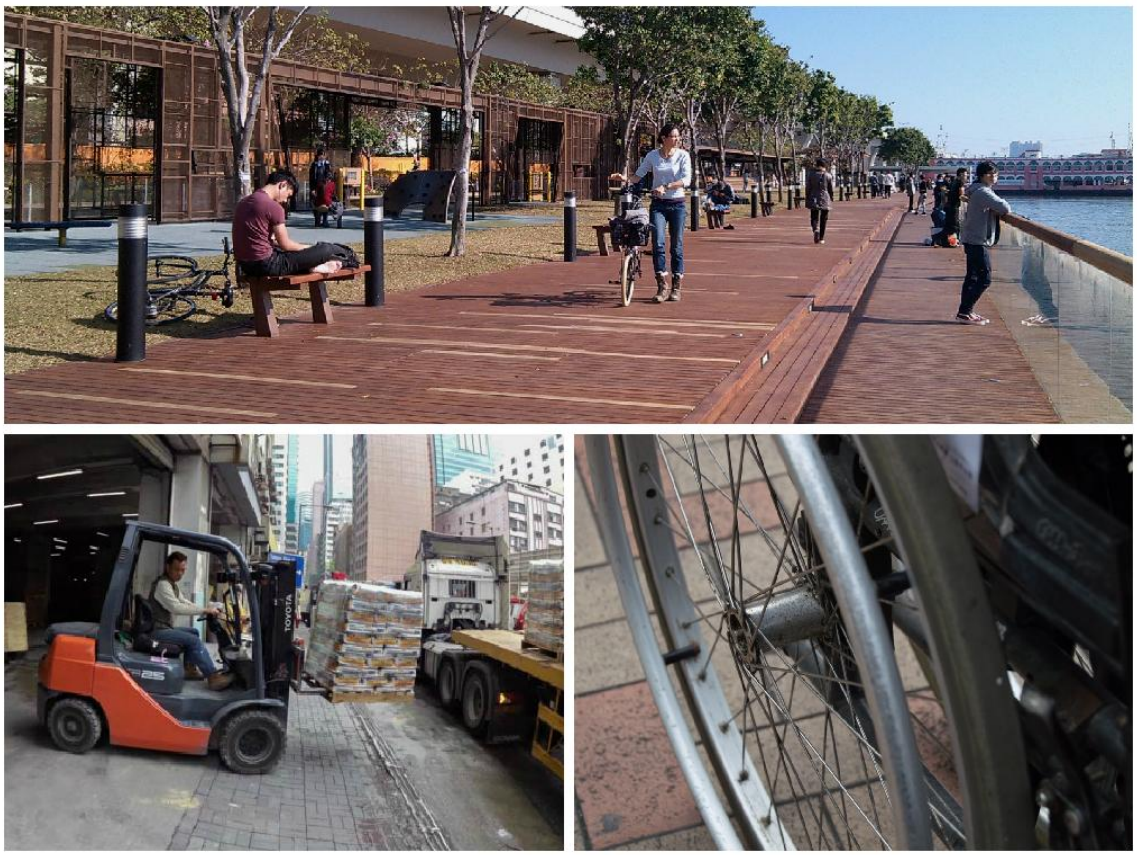
Promoting Universal Accessibility of the East Kowloon Harbor Front



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Promoting Universal Accessibility of the East Kowloon Harbor Front

An Interactive Qualifying Project Report submitted to the faculty of Worcester Polytechnic Institute in partial fulfillment of the requirements for the Degree of Bachelor of Science

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Abstract

The pedestrian scheme that emerged from the former industrial district of Kwun Tong, Hong Kong developed without the consideration of pedestrian universal accessibility. Our goal was to propose a universally accessible pedestrian model to reach the East Kowloon harbor front. Through surveys and exploration of pedestrian pathways, we found inconsistencies in the degree of accessibility, stemming from the lack of Hong Kong accessibility standards. Our recommendations include implementing a wheelchair ramp slope standard, uniformly wide sidewalks, and more prevalent signage.

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Authorship

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2.3 History of East Kowloon	Paige, Zachary	All
2.4 The Public Sector	Chuankai, Meagan, Zachary	All
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2.7 Summary	Paige	All
3.0 Methodology	Paige	All
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All group members contributed equally to the editing for spelling and grammatical errors for each section of this report. In addition, each team member contributed to this project in ways not reflected in this table of authorship.

Zachary Harmony was responsible for all the GPS data collection and analysis, as well as creating the final video.

Meagan Hiatt structured and designed all PowerPoint presentations used during ID 2050 and our term in Hong Kong.

Paige Waechter was responsible for creating the project timeline and project plan, as well as formatting the final report.

Chuankai Zhou approached and interacted with all survey takers, and was an invaluable resource when translating and communicating in Chinese.

Table of Contents

Table of Figures

Table of Tables

Executive Summary

Traditionally, the concept of disabilities and impairments was limited to the individual, however, in recent years this has begun to shift to a focus on society and creating an accommodating environment for people of all abilities. Universal accessibility has become a focus of urban planning and infrastructure of urban areas. However, Hong Kong is one major city that has yet to fully consider universal accessibility in redevelopment initiatives. The transformation of existing pedestrian schemes into a universally accessible model is vital to the success of Hong Kong and other major cities alike.

One such region that is currently undergoing transformation is the former industrial region of Kwun Tong. Industrial areas are often riddled with challenges for pedestrians to traverse the region efficiently. As a result, the pedestrian scheme that emerged from the once industrial district was developed without the consideration of universal accessibility. The challenge for the revitalization of this area becomes not only to develop into a central business district, but also to transform itself with universal accessibility in mind.

The overall goal of this project was to provide recommendations on how to improve the ease of navigation and accessibility for pedestrians so that they can reach the waterfront in Kwun Tong. To accomplish this goal, we determined the current conditions of the possible transit routes throughout the region and the connectivity of the residential neighborhoods to the waterfront. A survey was conducted to identify the local opinions about the signage and ease of reaching the waterfront. The tourist perspective was also analyzed using GPS enabled video recordings, followed by a survey questionnaire about their experiences reaching the waterfront. Lastly, the degree of universal accessibility and the challenges faced by a person navigating in a wheelchair were identified.

When analyzing possible pedestrian pathways taken to reach the waterfront, we identified nine routes, with varying attributes. The width of sidewalks varied significantly throughout the

region, and often along the same road, narrowing as one traveled closer to the waterfront. There were also various amounts of signage in the region. One route had sufficient signage, while other routes were entirely lacking signage for reaching a waterfront destination. Similarly, the crosswalks along one route were all clearly defined zebra crossings, compared to other routes that had several unmarked and informal crossings. We also found signage to be one inadequacy when analyzing the linkages to the residential neighborhoods. This was further confirmed by our survey of East Kowloon locals, with 51% stating there are not enough signs to get to the waterfront. In addition, 81% surveyed found it difficult to get to the waterfront. This is most likely due to the few direct paths to the waterfront from linkages and MTR Stations, observed from the GPS analysis of visitor video footage. When asked to navigate to the waterfront based solely on available signage, on average, the visitors took a detour of about 55% and 71% of the total estimated time to the waterfront from Kwun Tong and Ngau Tau Kok MTR Stations, respectively.

We also found that although the Kwun Tong Promenade is an available space for leisure along the waterfront, at this time there is no other attraction for tourism along the harbor. With the addition of attractions, such as waterfront beverage and dining locations, the district of Kwun Tong and the East Kowloon waterfront has the potential to be an attraction and entertainment center. However, in order to transform to a tourism and entertainment hub, the area must be universally accessible for all. When analyzing the accessibility of the district from the perspective of a person in a wheelchair, we faced several challenges and found instances where universal accessibility was limited or even impossible.

Based upon these accessibility results and our conclusions from the GPS video filming, we identified the following seven areas to be addressed: curb ramps, loading zones and blindside alleys, zebra crossings and eATS systems, signage, walkways and footpaths, wheelchair ramps and lift access. Each of these areas proposes challenges to the pedestrian environment and to some extent limits the universal accessibility of the Kwun Tong District. These areas of

improvement serve as the basis for the recommendations we provided to the Chinese University of Hong Kong. These recommendations include establishing ramp and curb slope requirements, placing clear and visible signage at each intersection, installing zebra crossings and eATS systems at all intersections, creating time constraints and audible warning systems for loading zones, widening and using large tiles, as opposed to individual bricks, for walkways and having wheelchair accessible ramps and lifts readily available for use during business hours. These recommendations will transform the pedestrian environment of Kwun Tong into a universally accessible region and will help serve as a model for the creation of universal accessibility standards in Hong Kong.

1.0 Introduction

The majority of large urban areas were settled along major waterways to provide sufficient avenues for trade (Ryckbost, 2005). The manufacturing districts of cities were originally located along the waterfront properties for ease of importing and exporting goods and provided little attraction to the waterfront for other purposes. However, as the methods of global trade and manufacturing have evolved, the development and structure of waterfront cities have also needed to change. In recent years, the waterfront regions in some cities have shifted from primarily trade ports to places for residence, recreation and commerce (Metropolitan Waterfront Alliance, 2015).

Hong Kong is one global economic center that is continuing to expand; however, it is severely limited by the amount of land available (Chan, 1997; Tong et. al, 1997). In order to maximize the land usage, the infrastructure and urban layout of Hong Kong has created a unique pedestrian transit system. Throughout many parts of Hong Kong, there is often no direct route solely on the ground level to reach a destination; rather pedestrians are often required to navigate using pedestrian footbridges and subterranean underpasses (referred to as subways in Hong Kong) (Solomon et. al, 2012). This system makes navigating through Hong Kong on foot difficult, and often specific areas are inaccessible to those with disabilities. Kwun Tong is one Hong Kong district located on the Kowloon peninsula that is no exception to the often non-intuitive pedestrian navigation present throughout Hong Kong.

During the height of textile manufacturing in Hong Kong, Kwun Tong was populated with people living in public housing provided to the employees working in the textile mills (Shelton et. al, 2011; Broggi, 2013). Due to this residential development, the region was not originally designed to have high pedestrian travel throughout the district. However, in June 2012, the Energizing Kowloon East Office was created by the Hong Kong Government to initiate

revival projects through the region of Kwun Tong, Kowloon Bay and Kai Tak to mirror reclamation and redevelopment initiatives in other waterfront cities, such as Tokyo, Japan and Barcelona, Spain (EKEO, 2014). The intent for the Kwun Tong region is to emerge as Hong Kong's second Central Business District (CBD), which would require high pedestrian mobility and universal accessibility throughout the district. Creating a second CBD will significantly alter the pedestrian scheme of the region in order to provide universal access. Unlike other countries, such as the United States, which often serves as a universal accessibility model, access standards published and enforced by the Hong Kong Government have yet to be realized (United States Access Board, 2015; Equal Opportunities Commission, 2015).

The completion of the revival and redevelopment initiatives along Victoria Harbor has changed the needs of pedestrians trying to navigate through the district. Although the Energizing Kowloon East Office (2014) has conducted vehicular and pedestrian traffic assessments, the scopes of their studies are limited only to the waterfront access from the Mass Transit Railway (MTR) Stations and the region east of Kwun Tong Road, the district's major thoroughfare. Additionally, the previous studies do not encompass the universal accessibility of the pedestrian routes through Kwun Tong. The exclusion of universal accessibility studies and non-uniform standards of accessibility limits those requiring a wheelchair or walking frame from also enjoying the harbor front.

The goal of this project was to develop recommendations on how to improve the area's walkability and promote universal access throughout the Kwun Tong district, including access to the East Kowloon harbor front. To accomplish this, we determined the opinions of locals and visitors about the current accessibility and usage of the waterfront areas in this district. Additionally, by systematically surveying the possible pedestrian routes to reach the East Kowloon harbor front, we identified the current condition of walkways, crossings and the accessibility of all routes leading to the waterfront. The suggestions we have provided through this research will help establish the universal accessibility required to transform the Kwun Tong

district into a second CBD and the East Kowloon harbor front into a world-class tourism and entertainment hub.

2.0 Background

Pedestrian mobility within a community can have a huge impact on the community and significantly alter the interaction between the local community, businesses and the government. In order to understand the urban planning challenges with respect to pedestrian access, in this chapter we explore universal access standards and other redevelopment and accessibility initiatives with a similar geography or historical background to the East Kowloon region of Hong Kong.

2.1 Universal Accessibility

One of the most important aspects of urban planning is creating a universally accessible environment (Hong Kong Government, 2004). Universal access is a necessity to ensure development is suitable for all, including the elderly and those with disabilities or impairments.

2.1.1 Pedestrian Access

As the trend towards urbanization continues, it becomes even more imperative for cities to stress the concept of pedestrian access (United Nations Population Fund, 2015; Hong Kong Government, 2014). Major cities around the world are becoming overcrowded, and providing a safe pedestrian environment is of the upmost importance. The Hong Kong Planning Department has focused on this issue by requiring several minimum standards for footpaths or walkways. These requirements depend upon several factors, including the land use type and the pedestrian volume. The Planning Department outlines the criteria required for the minimum standard of a walkway or footpath.

Pedestrian access has also been a key focus of the Transport Department of Hong Kong in recent years (Hong Kong Transport Department, 2009). Due to public need, the Transport Department has initiated several schemes to re-vamp the pedestrian environment in several major areas of Hong Kong since the year 2000. Within these districts, the focus has been to improve

pedestrian safety and mobility, while also promoting walking as a transport method and improving the overall pedestrian environment.

Another initiative to promote pedestrian access within Hong Kong has been the implementation of electronic Audible Traffic Signals (abbreviated eATS)(HKTD, 2009). Completed by the Hong Kong Government in 2004, the eATS system provides visually impaired persons with an indication that it is safe to cross a street. It consists of an audible unit, a tactile unit, or a tactile unit with a push button. These systems are important in helping to create a universally friendly pedestrian environment.

2.1.2 Physical and Visual Impairment Access

According to the World Health Organization, 15% of the global population is currently living with a disability (World Health Organization, 2012). A disability or impairment is traditionally interpreted as a medical problem, where the activity and ability of a person is limited by a medical condition. However, in recent years, a social model is replacing this medical concept of disability (Mont, 2007). The remedy for a disability or impairment is slowly shifting from the individual, rehabilitation and personal assistance, to society, by designing an environment that accommodates and supports people with functional limitations.

One specific area of focus to create a more accommodating environment is through urban design and planning (Mont, 2007; United Nations, 2003). Introducing urban design that makes infrastructure more accessible, specifically handicap accessible, helps eliminate the social and economic barriers for persons with disabilities. Currently, there is an insufficient level of accessibility within built environments and urban areas, which limits the ability of a disabled person to access certain roads, housing, transportation, healthcare, education and emergency response programs. However, if disability accessibility is considered in the design of urban areas, those with disabilities are less restricted and have more opportunities to participate more fully in society.

2.1.3 American Universal Access Standards

One nation with a well established standard for disabled access that is often used as the universal accessibility model is the United States (United States Access Board, 2015; United States Department of Justice, 2015). The Americans with Disabilities Act (ADA) of 1990 universalized the technical requirements for design and construction within the United States. Articles were appended to the ADA Standards for Accessible Design or ADA Accessible Guidelines (ADAAG) up through 2010, which further detailed handicap accessibility requirements, including accessible route, ground and floor surfaces, curb ramps, ramps and signage requirements.

One requirement under the ADAAG is there must be at least one accessible route, which coincides with a route for the general public to the maximum extent allowed (United States Access Board, 2015). Additionally, this route must extend from the public site and provide access to public transportation services, accessible parking, and public streets and sidewalks. The minimum width determined for all points along the route is 60 inches (1.5 m).

Section 4.5 of the ADAAG states that all ground and floor surfaces must be stable, firm and slip resistant (United States Access Board, 2015). Additionally, any change in vertical distance greater than 0.25 inch (6mm) requires a slope change. If the change in level is greater than 0.5 inch, it must comply with the curb ramp or ramp standards of slopes not exceeding 1:20 and 1:12, respectively. Hand railings on both sides of a ramp segment and a landing that is at least a length of 60 inches (1.5 m) is also required.

Additionally, there are signage specifications under the ADAAG to ensure signs are clear and readable (United States Access Board, 2015). Characters must be at least 3 inches (75 mm) in height if the sign is placed or hung overhead. Signs must also have a matte or non-glaring finish, and the background and text colors must be contrasting. Additionally, if a facility is required to be handicap accessible, it must be denoted by the international symbol for accessibility.

2.2 Universal Access Initiatives Near Waterfronts

Waterfronts are frequently being improved and redeveloped in order to draw in more visitors and to better handle business and visitor capacity. Waterfront development can be affected by a multitude of factors including pedestrian accessibility, politics and geography. In this section the redevelopments of several major waterfronts, with a focus on pedestrian accessibility, are reviewed. This review of waterfront revival projects brings up important factors to consider when forming urban accessibility recommendations specific to the East Kowloon waterfront.

2.2.1 Barcelona, Spain

Port Vell is located in Barcelona, Spain, and it has been recognized throughout the world as a paradigm of port and city integration (Barcelona, 2015). Before the 1992 Olympics came to Barcelona, the area around the port mainly contained empty warehouses and factories. Through carefully planned urban redevelopment projects, the 55 hectare area is now filled with business, commercial and cultural centers. Currently over 16 million visitors come to Port Vell each year.

Before the 1992 Olympics, a section of the road that was along the coast line was moved fully underground so there would be room for the Moll de la Fusta, a wide pedestrian promenade overtop the road (AVOC, 2015). The Moll de la Fusta is outlined in blue in Figure 2.1. This gave residents and visitors access to the waterfront.

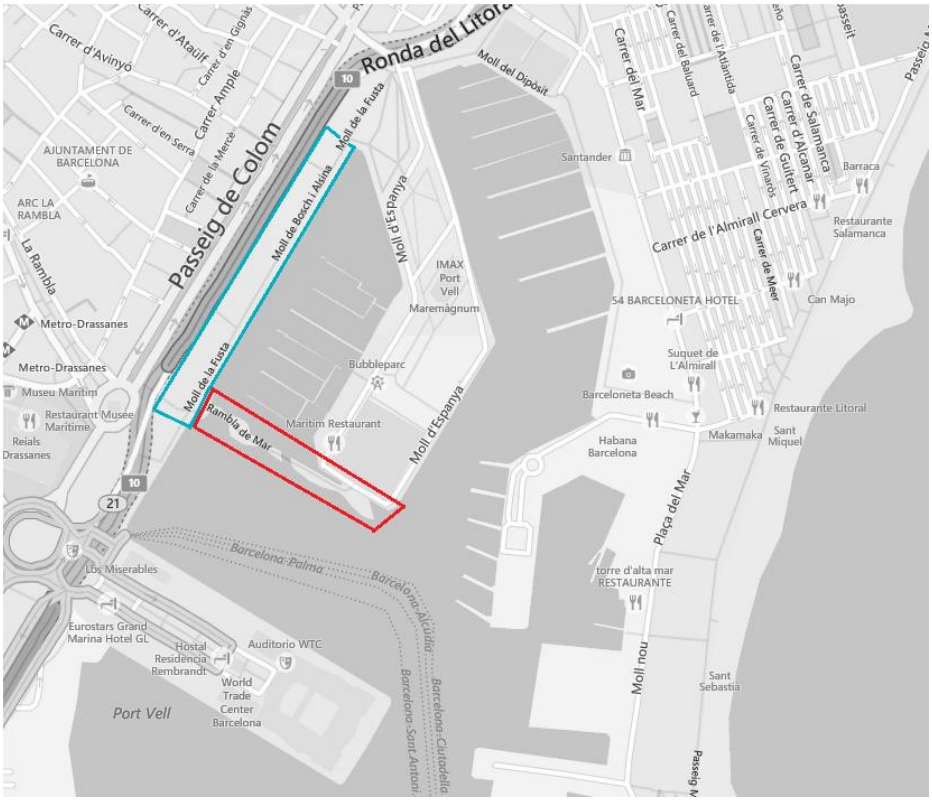

Figure 2.1: Map of Port Vell (adapted from Bing, 2015)

Another major change to the area was the addition of Rambla De Mar outlined in red in Figure 2.1. This walkway was installed to improve pedestrian access to the section of Port Vell where the mall and aquarium are located (UWF, 2011). While the Rambla De Mar does not have stairs, it is not completely handicapped accessible. The ramps on either sides of the walkway are rather steep, so those in a wheelchair would need assistance getting up the ramps. However the other walkways around Port Vell are wide and level, so those with wheelchairs, bikes or strollers can easily maneuver around the area.

Since 1992, development and expansion of the port has continued (Barcelona, 2015). Currently the port is twice the size it was in 1992. The Gerencia Urbanistica Port 2000 del Port de Barcelona, manages the port-city area, including Port Vell. Those working at Port 2000 have given many international talks and seminars as an example for waterfront development, including at the Energizing East Kowloon Office in Kwun Tong, Hong Kong.

2.2.2 Tokyo, Japan

One of the largest urban revival initiatives in Tokyo, Japan, is currently underway (Bureau of Port and Harbor, TMG, 2014a; 2014b; 2014c). Tokyo is one of the largest and most densely populated cities in the world, so effective use of land is important. However, pedestrian access is limited in areas due to the demand for residential and business structures. One section of Tokyo's urban development plan focuses on providing a transportation infrastructure that can support Tokyo's population and increasing accessibility throughout Tokyo. One of the areas that is being affected by this project is Tokyo's Waterfront City area.

Tokyo's waterfront area was originally being renovated when it was the planned site for the 2016 Olympic and Paralympics Games (Bureau of Port and Harbor, TMG, 2009; 2014a; 2014b; 2014c). However, from the start of the waterfront renovation project it incorporated the main focus from Tokyo's Urban Development plan: creating an environmentally-friendly, sustainable development that contained a great transportation infrastructure and universal accessibility, while maintaining the local culture. Over 440 hectares of land are included in this government-run project.

The purpose of these two projects was to increase the attractiveness and accessibility of the waterfront and surrounding areas by developing new business and residential centers and renovating the old ones (Bureau of Port and Harbor, TMG, 2009). However, some of the developed areas did not previously have access for those who are physically or visually impaired. The Tokyo government wanted to create this access and made it one of their project goals; however, it was not an easy task. Placing features like handicapped ramps or lifts in areas that are already built can be difficult. An existing structure that does not have universal access may not have the room or support for these features.

Another challenging part of accessibility in the waterfront area was the visitor capacity. Around 48.5 million people visit the waterfront each year (Bureau of Port and Harbor, TMG,

2014a; 2014b; 2014c). Visitors come from various regions to the waterfront for many different purposes. Creating a development that allows for easy accessibility for visitors and locals can be difficult, due to limited space within Tokyo. As the Tokyo project nears completion, the sections of the project area that have been completed and re-opened so far seem to be thriving.

While Tokyo's Urban Development plan and Tokyo's Waterfront City project cover a much greater area than the East Kowloon Harbor Front, we believe the information gathered from these projects can assist in forming suggestions for the development of the Kwun Tong area. For example, in Tokyo's Urban Development plan current housing structures are slowly being renovated on the inside, while lifts and ramps are being constructed for the elderly and handicapped (Tokyo Government, 2011)(see Figure 2.2).

Figure 2.2: Tokyo Urban Renovations (TMG, 2011)

Around 300 private housing units are currently being created in the Tokyo area, with adjoining daycare centers, to appeal to new families, while also having elevators and ramps for the elderly and handicapped (Bureau of Port and Harbor, TMG, 2014a; 2014b; 2014c). Tokyo's Urban Development plan has focused on accommodating people of all ages, so that the area would be more diverse. To support residents and businesses, railway stations and their

surrounding areas are becoming community centers to increase accessibility. However, creating barrier-free facilities and dealing with space restrictions is still being worked on.

Road extensions and modifications that will expand the public transportation network are also being implemented (Bureau of Port and Harbor, TMG, 2009; 2013; 2014a; 2014b; 2014c). This is to create better accessibility to and in the waterfront area, which will allow residents to commute to work or school with greater ease and decrease their commuting duration. Visitors, or potential consumers, will also have an easier time coming to the waterfront area, which can benefit many of the local businesses. Businesses will also have an easier time transporting their products with this increased network. Expanding the public transportation network should also help relieve traffic congestion, reducing carbon emissions.

Tokyo's Urban Development plan is still a work in progress, and the Tokyo Waterfront City site is now the planned location for the 2020 Olympic Games, so there are areas where sport centers and event specific venues are being built (TOCOPG, 2014). However, the overall goal of these projects remains the same: to create a development that is long-lasting, environmentally-friendly and universally accessible.

2.2.3 London, England

The Port of London lies along the Thames River in London, England, and was once the largest port in the world, but now ranks only 89th on the list of largest ports in the world (AAPA, 2012).

The Port of London is also referred to as the London Gateway (2015) because it has some of the best inland transportation access as well as pedestrian access in the whole country. Access is important for London's Gateway since over 16% of the population in England is located in London alone, not including the surrounding, well-populated districts, and the port provides access to both the waterfront as well as to other countries. Pedestrian access to the waterfront is important for the port since there are many leisure activities along the waterway, such as rowing,

sailing and other water sports. The waterfront where these sports are located is owned and maintained by the Port of London. The Port of London is also the preferred port in England to be a UK distribution hub, because of the access shippers have to Europe's largest logistics park, which lies right across the river from the port.

Because visitor capacity is growing, the Port of London Authority hired Volker Fitzatrick Construction Company to put in a new access road and widen the main roundabout to ease traffic congestion (Port Access Road, 2014). However, the Port of London Authority also wished to make the area and the new access road pedestrian friendly, so more sidewalks, as well as signal controlled crossings for those with physical and visual impairments, and a non-motorized user's bridge over the new road, were installed. Also, to improve the pedestrian environment, noise barriers were constructed and more lighting, drainage, fencing and signage were placed around the port to assist with ease of navigation and access for pedestrians.

2.3 History of East Kowloon Harbor Front

East Kowloon has a very unique and developed culture and heritage that should be preserved through any redevelopment. The industry of this area helped the region to grow and diversify with the influx of migrant workers. Although the industry left, many of the local factory and airport workers remained, and industry culture is still prevalent in East Kowloon.

2.3.1 Industrial Background

Prior to 1950, there was very little technological advancement, and Hong Kong's industry was stagnant (Chiu et. al, 1991). There was minimal industry diversification, and the practice of traditional skilled trades was prevalent. However, the Civil War in China throughout the 1940s resulted in the influx of industrial entrepreneurs and capitalists into Hong Kong in the late 1940s. This political war also isolated Hong Kong, as the territory's trade with Mainland China was severely reduced. This spurred the need for Hong Kong to change to a manufacturing center.

The existing industries in East Kowloon, specifically in Kwun Tong, significantly expanded, and larger facilities were built to accommodate the increase in manufacturing (Shelton et. al, 2011; Broggi, 2013). The success of Hong Kong's manufacturing sector was partly due to the changing global dynamic following World War II. The primary industry in Hong Kong was textiles, specifically the cotton spinning and weaving mills pioneered by capitalists from Shanghai. Great Britain and Japan were among the world's top textile exporters; however, they were no longer able to compete following the destruction and economic hardship of war. This allowed the textile industry to quickly expand in other places, and Hong Kong entered the global trade market, importing raw cotton and exporting manufactured textiles throughout Asia, Southern and Western Africa, the Middle East, Europe, and North America. Hong Kong quickly became an export-oriented manufacturing power and was classified as a Newly Industrializing Country or NIC.

The rapid expansion of industry required the manufacturing facilities in the Kwun Tong district to dramatically expand (Broggi, 2013). The Hong Kong Government provided factories, dormitories for employees, medical facilities and subsidies for meals and clothing. Regulations against female workers were revised so women could work extended hours as well. The textile mills employed more than 40,000 workers, and drew workers from Mainland China, as well as created jobs for Kowloon residents. As the industry continued to grow, so did immigration to the East Kowloon area. This continuous flow of immigrants allowed factories to keep wages low and secure a high profit, due to the scarcity and demand for cotton.

The growth of industry in the area also led to an increase in housing and residences, in addition to, the dormitories within the district (Shelton et.al, 2011). By 1959, twelve resettlement estates that could house up to 67,000 residents were built to accommodate the increasing number of factory workers. The influx of construction to the area created a unique living environment, incorporating industry, shopping, markets, schools and recreation areas into new, densely

populated buildings. With this style of construction, there was little consideration for pedestrian travel throughout the district, since all necessities were combined into a few buildings.

2.3.2 Airport History

The land that was once the Kai Tak airstrip was originally acquired by two businessmen who sought to develop it for the purpose of residential housing (Civil Aviation Department, 2013). However, this reclamation failed, and soon after the Royal Air Force began using the land as an airstrip. The Royal Air Force used the Kai Tak site until 1936, when it was then transformed into a commercial airport. At the height of its success, Kai Tak was the third busiest airport in the world for international passengers and first for cargo output. It closed in 1998 due to the need for a much larger airport. With the closure of Kai Tak and the transition to the new airport, Chek Lap Kok, the area of Kowloon East no longer became the reception area for thousands of international travelers (Cheng, 1998). Also without the industry that brought jobs to the Kowloon East region, it has lost some of its prior color and vibrancy. The shutdown of Kai Tak airport caused many local shop owners and businesses to miss the noise that had come with the airport industry. With the disappearance of tourism in the Kowloon East area, came the loss of income for local shops and businesses.

2.3.3 Culture and History

The culture and heritage, particularly of Kwun Tong, a neighborhood that borders the Kai Tak airport, is heavily determined by the industry that was once prevalent there. In the 1950s and 60s, the textile industry had consumed Hong Kong, and the area of East Kowloon had been transformed into an industrial center (Carroll, 2007). The textile industry boomed for about a decade before increasing real estate prices and labor costs made it inefficient and uneconomical for industry to stay in Hong Kong. In the 1980s, industry moved back to Mainland China to places like Guangzhou and other parts of the Pearl River Delta. In the late 1990s, the Kai Tak

airport (see Section 2.1.2) was closed (Civil Engineering and Development Department, 2013). The relocation of the airport contributed to the departure of industry in the area. After the exit of industry from Kowloon East, many industrial buildings that were left have become instrumental in the emergence of local arts in Hong Kong (Energizing Kowloon East, 2012). The area of Kwun Tong specifically, where many of the families of industrial workers lived, has emerged as a center for the arts and culture. The area has seen a rise in participation in the genres of photography, film, and theater.

2.4 The Hong Kong Government and Public Sector

The Hong Kong Government has taken a huge interest in the redevelopment of the former Kai Tak Airport and the surrounding region. The reason for this is because land is so scarce in Hong Kong and very little of the available land in the old airport area was being used efficiently. The government wishes to provide environmentally sustainable development plans while providing better access throughout the East Kowloon area. While many features are in the process of being constructed or are completed, such as the Kwun Tong Promenade and the Kai Tak Cruise Terminal, accessibility throughout the area is still being studied (EKEO, 2015).

2.4.1 Existing Waterfront Redevelopment Initiatives in East Kowloon

In Kwun Tong there has been continuous growth and development in the commercial and industrial sectors, as Kwun Tong's industrial area is transforming into the second Central Business District of Kowloon. However, there is also a large expansion in the residential areas of Kwun Tong as well, due to rapid population growth in recent years. Because of this expansion in population, there has been a growing demand for residential and community facilities, which has caused many plans and initiatives to develop the waterfront and local green spaces to form.

In order to engage the public and gather their opinions, the Hong Kong Government formed the Energizing Kowloon East Office (EKEO) (EKEO, 2015). The EKEO office was also

formed to coordinate the government's efforts and resources towards improvement in the East Kowloon area, as well as organize the various projects in the area and further develop the Conceptual Master Plan for East Kowloon. This plan was developed by the Hong Kong Government in hopes of reviving the former Kai Tak airport area as well as the Kwun Tong region.

The EKEO has several proposed plans for the East Kowloon area (Development Bureau, The HKSAR Government, 2012). The figure below (Figure 2.3) shows 3-D renderings of one of the proposed plans for the former Kai Tak airport. Some of the proposals have been accepted and have been completed or are currently being implemented.

Figure 2.3: 3D Rendering of Kowloon East (EKEO, 2014)

Sections that have been completed or nearly completed and are now open to pedestrians, include Kai Tak Cruise Terminal, Kai Tai Runway Park and a section of the Kwun Tong Promenade (Development Bureau, The HKSAR Government, 2012).

One of the primary problems in the Kwun Tong and Kai Tak area is the transportation infrastructure. Within Kwun Tong there are busy and narrow roads, so it can be difficult for busses and taxies to drive and stop along the roads. In the Kai Tak area, there is very little public transportation: only one minibus drives to the Kai Tak Runway Park and Cruise Terminal. To diminish road congestion and increase the accessibility of the area, an elevated, rail-based,

environmentally friendly linkage system (EFLS) has been proposed (Development Bureau, The HKSAR Government, 2012). The proposed EFLS would be independent of ground level traffic, so it would be able to avoid congestion, making the EFLS an efficient and reliable way to travel. The EFLS is currently proposed under the preliminary feasibility study for the sustainable development of the Central Business District (CBD).

The proposed EFLS would run from the Kowloon Bay MTR Station through the Kai Tak Development, to the Kwun Tong MTR Station creating access along the former Kai Tak runway and to Kwun Tong. A map of the planned railway is in Figure 2.4, however the proposed route does not adequately incorporate the residential neighborhoods northeast of the Kwun Tong industrial area.

Figure 2.4: Proposed EFLS Railway Route (EKEO, 2014)

Another major problem in East Kowloon is the walkability of the area. To tackle this problem The Pedestrian Environment Organization and the EKEO have launched an initiative, "Walkable" Kowloon East, where the goal is to increase the walkability and accessibility of East

Kowloon (Development Bureau, The HKSAR Government, 2012). They began this program when the EKEO was established in June 2012. This initiative has three main parts: Assessment of Pedestrian and Vehicle Traffic, Short to Medium-term Improvements and Long-term Improvement measures. The goal of the first stage was to analyze the accessibility and to get local opinions to help improve the planning for the area. The study's aim was to assist in creating a plan for developing and improving the pedestrian environment in Kwun Tong. While the study is due to be completed mid-2016, a few small improvements for pedestrians have already been made in the Kwun Tong area. These include adding pedestrian signals and adding or widening current zebra-crossings (Figure 2.5).

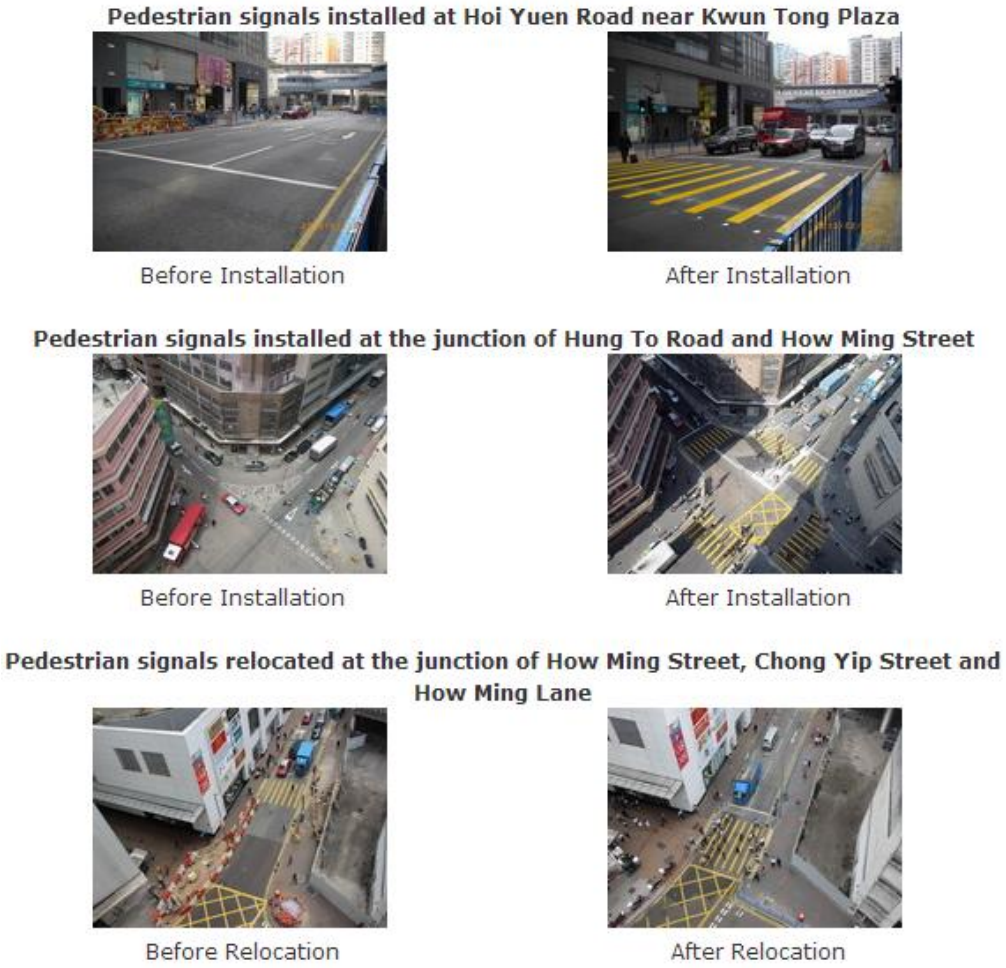

Figure 2.5: EKEO Short-term Solutions for a Better Pedestrian Environment (EKEO, 2014)

2.4.2 Accessibility Studies in Hong Kong

Universal accessibility has become an extremely important topic in Hong Kong over the past several years (Legislative Council Panel, 2012). The need for universal access is becoming more and more relevant each year as the population of elderly people in Hong Kong is continually growing (HKG, 2004). There are estimations that the elderly population of Hong Kong will reach close to 22% by the year 2026, and based upon other data, the median age of the population will have increased from 37 to 46 by the year 2031. Because of the trend in population aging, it becomes extremely important that universal accessibility is considered.

Universal accessibility in Hong Kong gained much needed exposure from the Disability and Discrimination Ordinance in 1996 (HKG, 2004). There is a push to provide barrier free access to buildings and public areas in Hong Kong, where currently the barrier free access requirements are under review due to several inaccuracies. The most thorough study that has been performed on universal accessibility in Hong Kong at this point is a study conducted by the Architectural Services Department performed in 2004. The study references the Hong Kong standards while also looking at good examples of universal access overseas. The study also performed two case studies within Hong Kong; the Tai Po Waterfront Park and Hong Kong Central Library. The case studies analyzed the accessibility of the sites and provided recommendations as to how to improve the accessibility of the sites in question.

The Energizing Kowloon East Office has recently performed a study on pedestrian accessibility (EKEO, 2014). Their feasibility study, "Pedestrian Environment Improvement Scheme for Transformation of Kwun Tong Business Area" is stage one of the Hong Kong government's plan to transform Kwun Tong into the next major Central Business District in Hong Kong. The first step in this long process is creating a walkable Kwun Tong business area. To achieve this objective, the EKEO first mapped and assessed many of the common routes from the popular MTR stations and bus stops to various commercial and industrial buildings in the area.

Upon further evaluation of the pedestrian environment, the EKEO has suggested several initial improvement strategies to enhance the pedestrian experience (EKEO, 2014). Among these suggestions are the concepts of internal and external connectivity, and the revitalization of back alleys. In conjunction with these strategies, they have also begun to install eATS systems at many of the major zebra crossings in the area, and are working to make it a more universally accessible region. The EKEO plans to strengthen the linkages between the commercial areas of Kowloon Bay and Kwun Tong, while also improving connections to the surrounding districts. They also plan to revitalize or face-lift several back alleys within the area, in order to encourage pedestrian traffic through these areas. The utilization of back alleys will assist in cutting down the amount of pedestrian traffic on major walkways within the region. Overall, these changes will allow for a more walkable and universally accessible pedestrian environment in the Kwun Tong business district.

2.4.3 Land Ownership

In Hong Kong most of the land is owned by the Hong Kong Government (Land Registry, HKG, 2014). If a Hong Kong resident or business uses land in Hong Kong, they must lease it from the government. This method of government leasing land is called a leasehold system, and Hong Kong has one of the most developed leasehold systems in the world. There are many benefits to this system: the Hong Kong Government has the flexibility to control the land use on a case-by-case basis, and it provides revenue for the government. The Hong Kong government also charges property tax: 5% of estimated rental value of flats for landlords and 15% of income earned on the rental premises for businesses. This contributes a considerable amount to the Hong Kong Government's revenue.

However, there are drawbacks to this system (Hong, 1999; Land Registry, HKG, 2014). Over time, the business and residential areas change, while the leases do not. Standard Hong Kong leases are typically for 50 or 99 years. When a lease is signed, the lessee agrees to use the

land for a particular use (e.g.. residential or commercial), which can only be changed if they apply for a lease modification. Since lease modifications are costly and require a lengthy process to obtain, they are not typically sought after. Lessees can only use the land for the original intended purpose stated in the lease, which can hinder them in the long-term if the surrounding land use changes. Another drawback is the government relies on the revenue from land leases, while they are also in charge of stabilizing the land prices. This means the government has to achieve a balance between making money from the land leases while, keeping their citizens happy and able to afford the use of the land.

The land leases in Hong Kong are not automatically renewed (Land Registry, HKG, 2014). This is so the government has the right to take the land if it is needed to rebuild the neighborhood or for other public reasons, once the lease is up. The lessee would then be compensated for the building only. For urban renewal projects, like in Kai Tak and Kwun Tong, the government must wait for all the leases to expire before it can begin to assemble land for a new project, which can take a long time.

This is important for our project because of the multi-level architecture of Hong Kong; many pedestrian overpasses are owned by the buildings they are connected to **(**EKEO, 2015**)**. If the pedestrian overpass is over a major road, the government will own that section, while the building owners will own the entrances. So he land lessee must approve any changes to the structure. Also, some streets or ground level pedestrian thoroughfares can be privately owned as well. This makes improving pedestrian accessibility more complicated and difficult.

2.4.4 Transportation

Public transportation in Hong Kong is very popular and the preferred way to travel for the majority of visitors and residents of Hong Kong (Travel China Guide, 2014; Transport Department, HKG, 2014). There are several common methods of public transportation: ferries, trams, buses, railways, trains and taxis. All methods of public transportation are government

regulated, but only a few are government owned. Generally the 'public' transportation is privately owned. To alter or create alternative routes for public transportation or to make improvements to a public transportation service, both the government and one or more private companies are involved. The Hong Kong government has to approve any change to the services, while the private companies will implement that change to the route or service. This is because, while these private companies follow the rules and regulations that the government establishes, they own the vehicles and employ the vehicle operators (Transport Department, HKG, 2014).

However the extent of power over public transport does not necessarily end at regulations, from the Hong Kong government (MTR, 2014). For Mass Transit Railways Company, which operates the largest railway (metro) system in Hong Kong, the Hong Kong Government is the sole shareholder. This is not the case for all of the public transportation companies in Hong Kong. Only for some of the private companies that provide public transportation, is the Hong Kong Government a major shareholder.

The most common forms of public transportation in Hong Kong are ferries and the metro rail systems, both of which are privately owned (Transport Department, HKG, 2014). All other methods of transportation listed above are also all privately owned except for a few buses.

Within the Kowloon Harbor area there are many bus, minibus and metro systems in Kwun Tong and around the former Kai Tak airport, as well as a few ferry lines (Transport Department, HKG, 2014). However the former runway has barely been incorporated into the transportation system. Kwun Tong is still filled with industrial traffic and some streets are very narrow. This makes it difficult for bus drivers to navigate these streets and to keep on schedule due to traffic delays.

2.5 The Hong Kong Private Sector

Kwun Tong is a big business center located between a large residential center and the waterfront. Any major redevelopment within the area will impact not only the businesses and tourism industry, but the locals in the neighboring residential area as well.

2.5.1 Business Sector

Since the 1950's the region of Kwun Tong has turned from a mainly industrial area to a business center, surrounded by residential areas (Koho, 2014; CBRE, 2014; Hong Kong Tourism Board, 2014). There are still some industrial buildings and companies in the area; however office buildings are becoming more predominate. There are also a couple shopping malls and many small restaurants in the Kwun Tong area.

The companies based within the office buildings, the retail centers and the small restaurants have a vested interest in what happens to the former Kai Tak airport land and waterfront, since any major changes to the area can greatly affect their business (EKEO, 2014). Waterfront attractions like the Kwun Tong Promenade will bring visitors and people from the residential areas, who could be potential consumers for the retail outlets and restaurants. Whereas any shopping mall or store facilities along the waterfront could mean competition for the existing businesses in the area. Also businesses in the Kwun Tong area are interested in increased accessibility in both the transportation sector as well as pedestrian access: ease of access would bring in more visitors or potential consumers for retail companies, while also making it easier for employees to get to their office and for products to be transported for the non-retail sector.

2.5.2 Tourism

The tourism industry plays a large role in the economy of Hong Kong, so much so, that in 2012, the tourism industry accounted for close to five percent of Hong Kong's GDP (Hong Kong Tourism Board, 2014). Within Hong Kong, however, there are many popular traveling options for

tourists. One of the most popular options is the MTR, accounting for 40% of public transport in Hong Kong, and it carries close to 4.4 million passenger trips per day (Hong Kong Transport Department, 2014). Although ferries are not as popular as the MTR, they are used quite often, and in 2010, 49 million people used the ferry system in Hong Kong.

The Hong Kong Tourism Board (HKTB) has also made a push for cultural tourism. The HKTB has started several initiatives to preserve culture, including the publishing of several walking guides, which feature itineraries that explore the culture and history of Hong Kong (2014). Kwun Tong is one region that can be incorporated into the walking guides due to its rich industrial history. Although an 11km promenade in Kwun Tong will be completed in the future, the challenge will be drawing tourism specifically to the East Kowloon harbor front.

2.6 Local Community of East Kowloon

The suggestions we provided on how to promote pedestrian mobility and universal accessibility of the East Kowloon harbor front will have a direct impact on the Kowloon City and Kwun Tong districts of Kowloon. Both districts border the Kowloon Bay and are in close proximity to the former Kai Tak Airport. The industrial history and development discussed in section 2.3 has created a unique demographic structure and business community that should not be disrupted by changes in the region (Chiu et. al, 1991). Please refer to Appendix B for demographic information and statistics of the districts of Kwun Tong, Kowloon City and Kai Tak.

2.7 Summary

Universal accessibility is an important aspect in urban design and planning in order to ensure that everyone, regardless of age or physical abilities, can use public facilities and green spaces. Universal access and pedestrian mobility initiatives have been completed in other major waterfront cities, and their outcomes and guidelines could be modeled and applied to the Hong

Kong infrastructure system. Although there have been previously completed and commissioned accessibility studies in Hong Kong and in Kwun Tong, the accessibility for those with physical or visual impairments have not been extensively considered. In the next chapter, we explain how we carried out our research to develop a recommendation model that significantly considers universal accessibility to the waterfront from areas of Kwun Tong, which may have previously been excluded from consideration.

3.0 Methodology

The purpose of this project was to determine the current accessibility and viable transit routes within the Kwun Tong district and surrounding residential neighborhoods to be able to reach the eastern harbor front of Kowloon Bay.

To accomplish this goal, our measurable objectives are:

- Determine the current condition of possible transit routes;
- Determine the connectivity of the Kwun Tong and Ngau Tau Kok residential neighborhoods to the waterfront;
- Determine the East Kowloon resident's opinions of the accessibility to the waterfront and how they believe it can be improved;
- Determine the ease of navigation for visitors and tourists and their opinions of the accessibility to the waterfront in East Kowloon;
- Determine the challenges to waterfront accessibility for those with restrictions, such as people with handicaps, or navigating with walkers, wheelchairs or strollers.

In this chapter we describe the research methods we used to achieve our objectives.

3.1 Determine the Current Condition of Possible Routes to the Harbor Front

A Geographic Information System (GIS) and Global Positioning System (GPS) were used to determine the exact geographical locations of the MTR stations and bus stops within the Kwun Tong District. From these points, the level of pedestrian traffic was observed on each street between Kwun Tong Road and Hoi Bun Road. At each intersection, the number of people crossing was counted for one minute, to accurately determine the level of foot traffic. Observations were made in the morning, lunch hour, afternoon and in the evening on two different weekdays, and then once on both Saturday and Sunday afternoon and evening. All

viable walkways from the MTR stations and bus stops were recorded and identified as possible routes to reach the waterfront.

After identifying the possible pedestrian routes to reach the waterfront, we walked each route and completed an evaluation matrix (see Appendix C for evaluation matrix protocol). The criteria each route was evaluated on included: the width and quality of sidewalks and walkways, prevalence and clarity of signage, ease and availability of intersections and connections, degree of universal accessibility and the level of pedestrian traffic. The evaluation of each route was carried out two times during weekdays and once on a weekend.

3.2 Determine the Connectivity of Residential Areas to the Waterfront

Once the possible transit routes to the harbor front originating from the public transportation departure points were evaluated, we increased the scope of our evaluations to include the residential areas of the district. Located northeast of Kwun Tong Road, the residential neighborhoods of Ngau Tau Kok and Kwun Tong were walked and observed. We made our observations in the morning, lunch hour, afternoon and in the evening on both weekdays and weekends. Similarly, viable pedestrian routes were recorded and mapped.

A GPS system was used to determine the geographical locations of the linkages providing access across Kwun Tong Road. Using the GPS locations of linkages, possible connections of these access points to routes through the neighborhoods were identified. The identified crosswalks, overpasses and subways were then evaluated (see Appendix D).

The connectivity of neighborhoods to the harbor front is an integral component in evaluating the universal accessibility to the East Kowloon waterfront that has not been included in previous studies. The currently commissioned pedestrian access study, "Pedestrian Environment Improvement Scheme for Transformation of Kwun Tong Business Area Feasibility Study", encompasses only the pedestrian routes east of Kwun Tong Road (EKEO, 2014). However, those who live in the residential areas beyond Kwun Tong Road have interest in

waterfront access as well as those visiting the district, which we determined from the opinions of East Kowloon locals.

3.3 Determine the Opinions of the East Kowloon Locals

In order to determine the needs of the East Kowloon locals, we conducted a survey of Kwun Tong residents and those who frequent the area. The survey included questions regarding length of residency within the region, primary form of transit in general and how they reached the waterfront, frequented routes and the local opinions of signage and ease of navigation (see Appendix E for the survey questionnaire). The questionnaire also contained a visual feature: an Image Preference Survey (IPS) to obtain a clearer representation of the popular transit routes in the area (Farr, 2008).

The survey questionnaires were distributed to those who were utilizing the mini parks in the Kwun Tong district, the Kai Tak runway park and the Kwun Tong Promenade. These sites were chosen due to their leisurely atmosphere increasing the likelihood that the locals there would devote time to filling out our survey questionnaire. We decided to focus our efforts in this area, since the locals along the promenade were already tasked with reaching the waterfront. Additionally, questionnaires were distributed at the Ngau Tau Kok Centre for the Elderly, due to their familiarity with the region and it's ease of access. Those surveyed included approximately 100 individuals: adults both alone and with their young children, primary school aged children and elderly adults.

3.4 Determine the Opinions of Visitors and Tourists

We conducted a study where we ourselves as well as fellow WPI students, who were not familiar with the region, walked the area and attempted to navigate their way to the waterfront. The students were asked to carry a GPS enabled camera to determine how intuitive navigation through the area was. The students were told to navigate based upon existing signage, without the

use of cell phones and asking for directions. The GPS enabled camera allowed us to follow their steps on a map, while also giving us a first person perspective. With this unique perspective, we gained more detailed information about their chosen route, such as any barriers that were encountered, any backtracking, or any lack of signage that might create confusion. Combining the video footage and the GPS technology allowed us to observe whether tourists tended to take a direct or non-direct route to the waterfront. After attempting to navigate to the harbor front, the students completed a survey questionnaire to identify their opinions on pedestrian travel through the area. Please refer to Appendix E for questionnaire.

3.5 Determine the Limitations of Accessibility

In order to determine how accessible the harbor front was to those requiring wheelchairs or walkers or those pushing strollers, we repeated the previous evaluations of possible routes to the waterfront with a wheelchair to determine whether an acceptable degree of universal access exists (see Appendix C for evaluation matrix protocol). We decided to travel these routes in a wheelchair because we wanted to gain a first-hand perspective of the challenges that would be faced by handicapped persons navigating to the waterfront. We also noted how many people were observed in wheelchairs or with strollers along these routes and the Kwun Tong Promenade.

We primarily focused our evaluation on accessibility for handicapped persons, to accommodate for the visually and physically impaired. Our evaluation criteria include the frequency and slope of ramps along routes to the waterway, which determines the accessibility of those traveling in wheelchairs. Braille and tactile surfaces were also noted to determine whether there were proper markings of routes with access to the waterfront for the visually impaired. Additionally, the presence of slippery and uneven surfaces was noted to determine whether the routes to the waterfront are safe and accessible for everyone.

3.6 Summary

The methods described above enabled us to achieve our goal of providing recommendations for creating universal accessibility to the East Kowloon harbor front. Videotaping the first attempts of visitors to navigate towards the waterfront provided invaluable data and insight on how intuitive or non-intuitive navigating through Hong Kong can be. By conducting a survey of the Kwun Tong region locals, we were able to map possible and most direct routes of access to the waterfront. Through our analysis of these mapped routes and existing signage, we were able to provide recommendations on how to improve the ease of navigation and accessibility to the East Kowloon harbor front.

4.0 Results and Analysis

The goal of our project was to provide recommendations to promote universal accessibility through the district of Kwun Tong to the East Kowloon harbor front. In this chapter, we discuss the results and analysis of our data collected through site visits in Kwun Tong. Our results are organized to show how we achieved five specific objectives: determining the condition of pedestrian pathways and their walkability, determining residential connectivity to the waterfront, identifying local resident opinions, as well as tourist opinions about the ease of reaching the waterfront and it's universal accessibility, and determining the limitations of accessibility that would be faced by those with impairments or disabilities.

4.1 Current Condition of Viable Transit Routes

We used GPS locationing and direct observations to identify the most direct and any additional viable pedestrian routes to reach the East Kowloon waterfront. We used GPS locationing to determine the exact geographical locations of the Ngau Tau Kok and Kwun Tong MTR stations and the shortest possible walking routes to the waterfront. Through direct observation and experience, we identified other possible pedestrian pathways to reach the waterfront but involved some amount of detour from the most direct route. These routes were then evaluated using an evaluation matrix and were rated on the following criteria: the width and quality of walkways, prevalence and clarity of signage, ease and availability of connectivity, degree of universal accessibility and the amount of pedestrian traffic.

4.1.1 Possible Routes to Reach the Harbor Front

Each street from Kwun Tong Road between Ngau Tau Kok MTR Station and Kwun Tong MTR Station was systematically surveyed to find the best routes to the eastern waterfront. Through direct observation, nine transit routes were identified as viable pedestrian paths to reach the harbor front. Of the nine, four routes originate from Ngau Tau Kok Station and the other five

from Kwun Tong MTR Station (refer to Figure 4.1). Please refer to Appendix F for a detailed description of each route.

Figure 4.1: Viable Pedestrian Routes though Kwun Tong (adapted from Google, 2015)

For our analysis, a route was considered viable if it appeared to be a feasible path to reach the waterfront. In order for a path to be identified as viable, we considered the following two variables: length of detour from the shortest possible route and amount of pedestrian traffic. Paths with significant detours (greater than 0.5 km) were immediately eliminated, as such a detour is impractical. Route 2 (denoted by the red path in Figure 4.1) originating from Ngau Tau Kok MTR Station appears to have a large detour, however, it is only 0.1 km longer than Route 1 (denoted by the royal blue path in Figure 4.1), the most direct. Additionally, only the southern section of the promenade is currently open. The remaining areas of the promenade are still under construction, with an expected completion in March 2015 (EKEO, 2015). The main entrance of the promenade will then be at the intersection of Lai Yip Street and Hoi Bun Road (shown by the blue drop pin

in Figure 4.2), which will make the red route more of a direct option. The completion of the promenade may also create more possible pedestrian pathways from Ngau Tau Kok north of Lai Yip Street, however our analysis was limited to exploring the routes reaching the promenade via the two current entrances (shown in Figure 4.2 by the green drop pins).

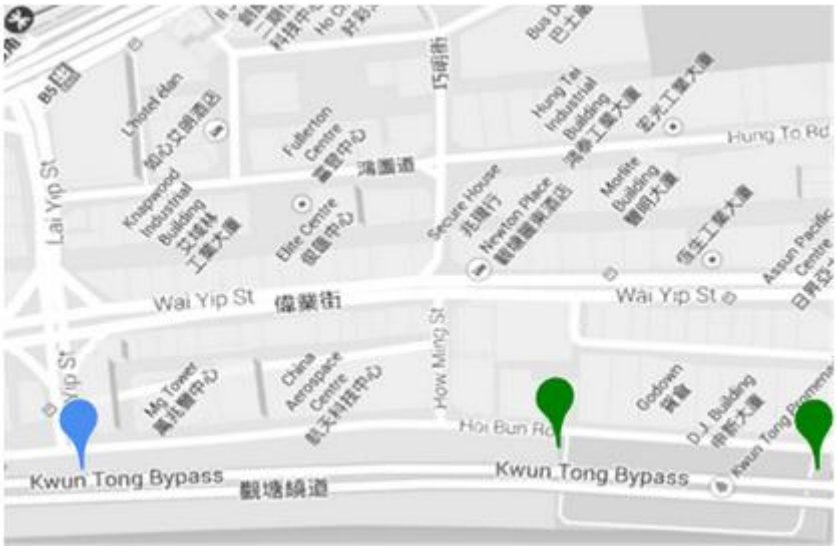

Figure 4.2: Existing (green) and Projected (blue) Entrances to the Kwun Tong Promenade (adapted from Google, 2015)

The second consideration of viability was the amount of pedestrian traffic along a route and routes with no recorded pedestrian traffic were eliminated as not being viable for pedestrians. Although the EKEO would like to incorporate back alleyways into the Kwun Tong pedestrian scheme, we felt that pathways that are not used are not a feasible option, since there is currently no draw or demand to use them. Additionally, several alleys are used for vehicular traffic and are not safe for pedestrian travel.

4.1.2 Analysis of Current Route Conditions

Each of the nine routes was walked at least three times, both during the week and on a Saturday and Sunday, and at varying times of day. For each walk, the route was rated bronze, silver, gold or platinum, with platinum being the ideal standard, for each of the following criteria: the width and quality of walkways, prevalence and clarity of signage, ease and availability of

connectivity, degree of universal accessibility and the amount of pedestrian traffic (see Table 4.1). The platinum criteria for each category were derived from international access standards (refer to Appendix C). Additionally, an overall rating was given to each route based on the average of ratings in each category. Please refer to Appendix F for a detailed analysis of each identified pedestrian route.

Table 4.1: Current Route Condition Ratings

Route Number	**Sidewalks and Walkways**	**Signage**	**Connectivity**	**Universal Accessibility**	**Pedestrian Traffic**	**Overall Rating**
1	Gold	Gold	Platinum	Bronze	Gold	Gold
2	Silver	Bronze	Silver	Silver	Silver	Silver
3	Silver	Bronze	Gold	Silver	Silver	Silver
4	Silver	Bronze	Silver	Bronze	Bronze	Bronze
5	Silver	Silver	Gold	Silver	Silver	Silver
6	Silver	Bronze	Gold	Silver	Silver	Silver
7	Silver	Bronze	Gold	Silver	Bronze	Silver
8	Silver	Bronze	Gold	Silver	Bronze	Silver
9	Silver	Bronze	Silver	Silver	Bronze	Silver

Route 1 achieved a rating of gold for sidewalks and walkways since the sidewalks along the entire route were at least 4 meters wide and clear from any obstacles or obstructions. The sidewalk along Lai Yip Street, the left image in Figure 4.3, is approximately 4 meters wide and is even and level. By comparison, the right image is of the sidewalk along Tsun Yip Street, which contributed to the low silver rating of Routes 5-8. The sidewalk is uneven, and in some places damaged, and the narrow width is not ideal. In addition, using the limited sidewalk space for storage further minimizes the walkable area and creates unsafe tripping hazards.

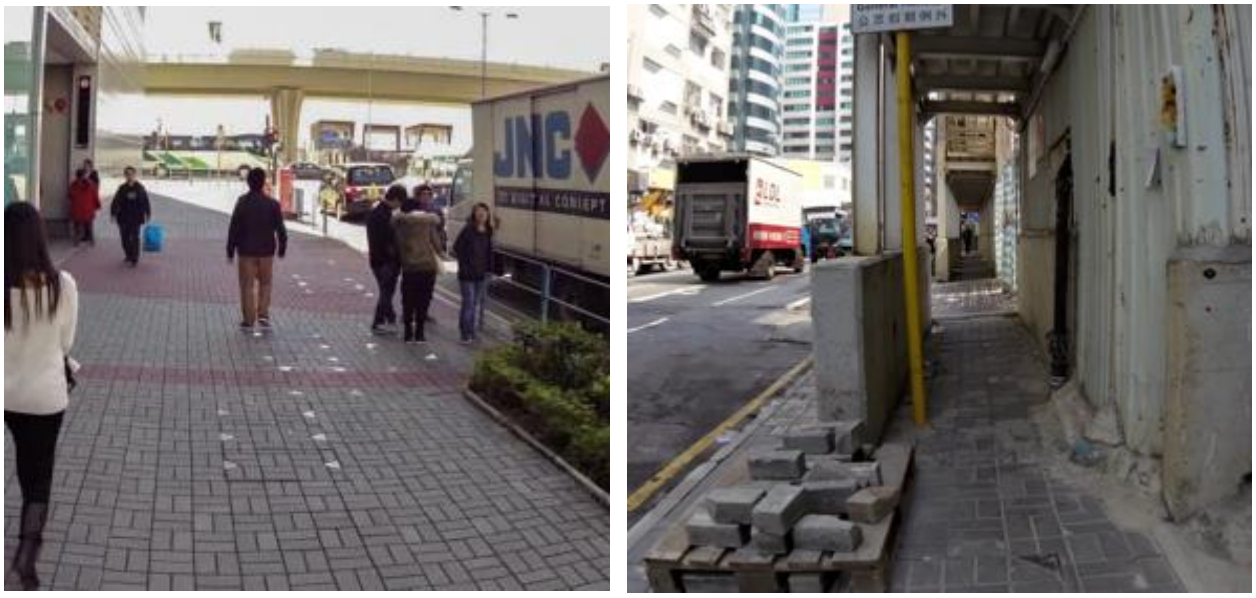

Figure 4.3: Sidewalk Condition Comparison of Lai Yip Street (left) and Tsun Yip Street (right)

Route 1 also achieved the highest rating of all the routes for signage. Route 1 was the only route originating from Ngau Tau Kok MTR Station that had prevalent signs for the Energizing Kowloon East Office. Route 9 was rated average for signage because there were signs for the Kwun Tong Promenade, however, the signs were small and unreadable from the opposite side of the street, and hung high overhead (Figure 4.4). The remaining routes completely lacked signage for the waterfront and only had signs to navigate to the MTR stations.

The highest rating achieved for connectivity was Route 1, since all crosswalks along the route were zebra crossings. The routes awarded a gold rating had all but one zebra crossing across Hoi Bun Road. The remaining routes that achieved a silver rating had few zebra crossings, rather crossings marked with directional arrows or were completely unmarked (Figure 4.5).

Figure 4.4: Signage for the Kwun Tong Promenade

Figure 4.5: Unmarked Crossings

Route 3 achieved the highest rating for universal accessibility, since it was the route that would be easiest to navigate using a wheelchair. Although the foot bridge over Kwun Tong Road has an incline of almost 19°, it was possible to push a person in a wheel chair up the ramp and into Millennium Tower (Figure 4.5). Millennium Tower provided a fireman's lift that was labeled as handicapped accessible, and the sidewalks along the rest of the route were wide and level enough to navigate in a wheel chair. Additionally, all but one crosswalk is a zebra crossing along this route, containing tactile surfaces and the audio pedestrian cross signal to accommodate the visually impaired. By comparison, the two routes rated bronze, Routes 1 and 4, were entirely inaccessible by wheelchair. Both contain subways that are only accessed via stairs (Figure 4.6).

Figure 4.6: Comparison in Accessibility of a Ramp and Inaccessible Subway

Lastly, each route was rated for the highest amount of pedestrian traffic recorded, since high foot traffic along narrow sidewalks can significantly decrease the walkability of a region. The highest rating achieved for pedestrian traffic was gold, and these routes had about 60

pedestrians per minute recorded at each given intersection at the busiest time of day, weekdays from 1-2pm.

4.2 Connectivity of Residential Neighborhoods

Within the Kwun Tong Business area, each linkage across Kwun Tong Road was directly observed to determine the ease of navigation for those people living in the residential areas of Kwun Tong. We used both GIS mapping to find the location of the linkages as well as the survey results from those living in the residential areas to determine how locals got to the waterfront. These routes were evaluated based on the following criteria: signage, handicapped access, tactile surfaces and blockages on the surrounding sidewalks.

4.2.1 Possible Linkages from Residential Areas

By walking around the whole Kwun Tong area, recording pedestrian traffic flow and though an analysis of our survey responses, our team was able to determine 11 main pedestrian traffic routes from the residential areas to the other side of Kwun Tong Road. The routes are mainly near the Kwun Tong and Ngau Tau Kok MTR Stations, since the linkages across Kwun Tong Road are mainly for the convenience of MTR passengers. Footbridges are denoted by the blue lines and subways are denoted by green lines in the following figures.

Routes 1 & 2 were north of the Ngau Tau Kok MTR Station (see Figure 4.7). Routes 3-5 were either at Ngau Tau Kok MTR Station or south of the station (see Figure 4.8). Routes 6-9 were around Kwun Tong MTR Station, while Routes 10 & 11 were south of that station (see Figure 4.9).

Figure 4.7: Routes 1 & 2 to Cross Kwun Tong Road

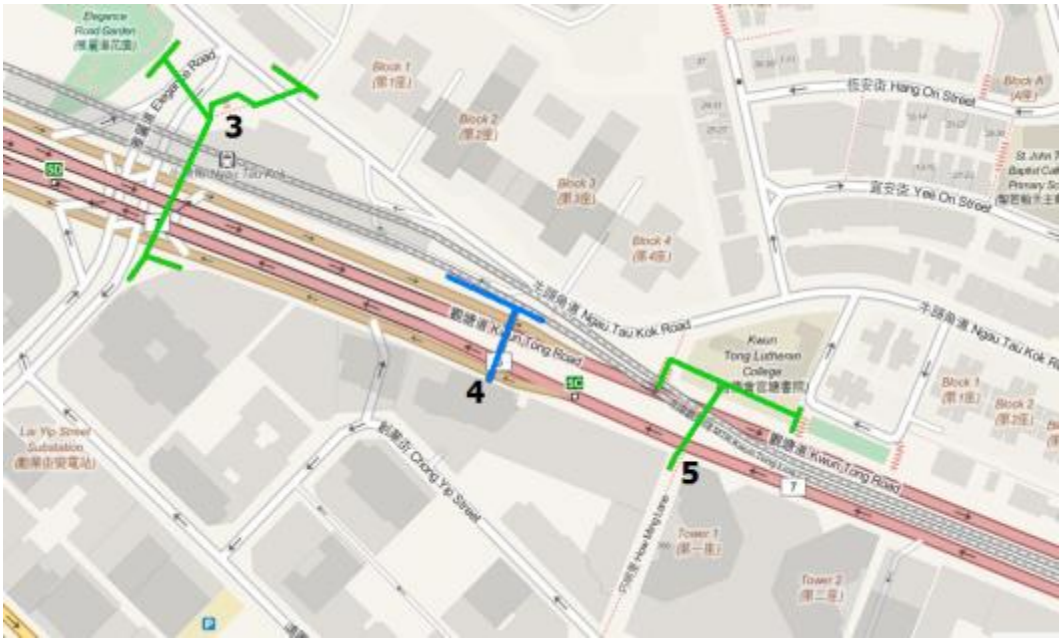

Figure 4.8: Routes 3, 4 & 5 to Cross Kwun Tong Road

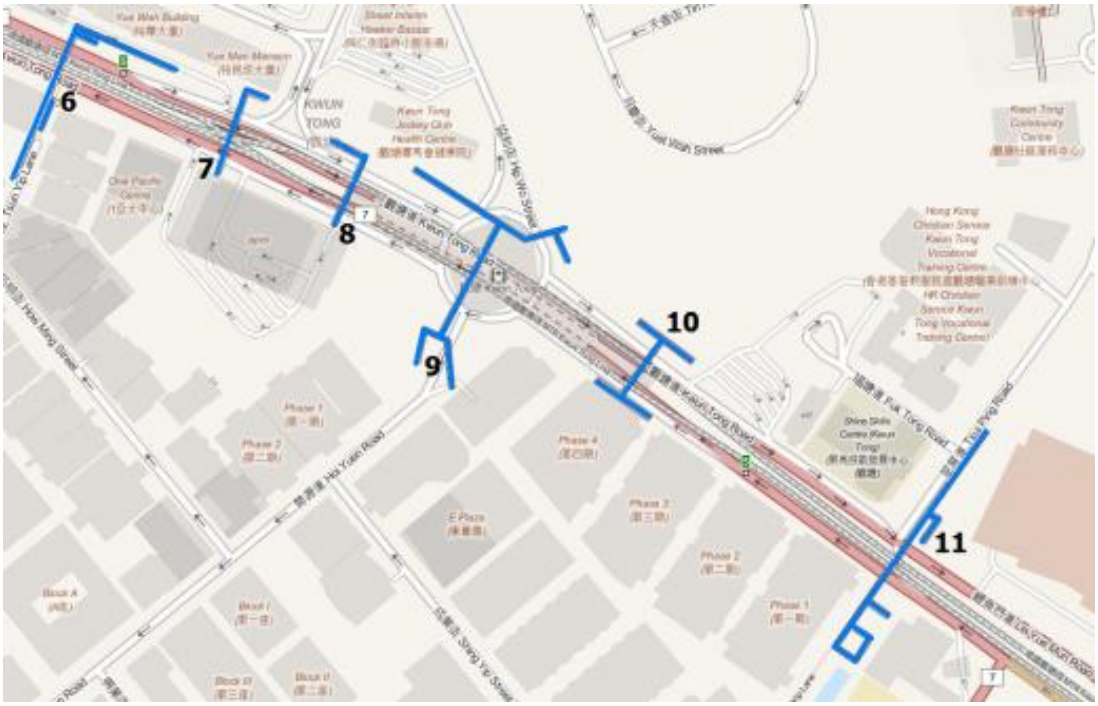

Figure 4.9: Routes 6 - 11 to Cross Kwun Tong Road

The best route that we found crossing Kwun Tong Road was Route 11 (see Figure 4.10). While there was no signage or tactile surfaces, it was handicapped accessible on both sides, and the sidewalks surrounding the entrances to the pedestrian overpass were wide and not obstructed. The ramps for handicapped access on this route have a slope of 12°. No other linkage over Kwun Tong Road meets this standard.

The worst route that we found was Route 1 (see Figure 4.11). There was no handicapped access, few tactile surfaces and no signage. The sidewalks around the entrances were narrow at some points, and there were many obstacles such as vehicular red lights and fire hydrants. Also, to enter the footbridge, pedestrians must walk along side a road with high vehicular traffic levels and few barriers between the pedestrians on the sidewalk and the vehicles on Kwun Tong Road.

Figure 4.10: Route 11, Ramp for Handicapped Access

Figure 4.11: Route 1, A Challenging Pedestrian Overpass

Out of the 11 routes, only 6 were handicapped accessible on the residential side of Kwun Tong Road, and of those 6, only 4 of them were easily handicapped accessible on both sides. The other two routes required employee assistance, which was not always available we found. Only 6 routes had tactile surfaces where the stairs or handicapped ramps began, but none of the routes had tactile surfaces along the walkways. For the route analysis of each route, see Appendix G.

4.2.2 Analysis of Linkages and Connectivity

For all of the routes mentioned in Section 4.2.1, our team traversed them first on foot and then using a wheelchair. When our team analyzed these routes, we looked at availability and quality of handicapped access, signage for the waterfront, frequency of tactile surfaces, and barriers on and around the subways or footbridges such as stop light posts, storefronts, stalls, bollards and street light posts. Also we took into consideration how far apart the bridges and subways across Kwun Tong Road were and the condition of the sidewalks along Kwun Tong Road, particularly on the residential side.

Overall there was a general lack of signage for the East Kowloon waterfront, and the signage that was there was not very visible. The handicapped accessible areas were also often difficult to transverse. To cross Kwun Tong Road, the foot bridges that are near the Kwun Tong MTR station tended to have more accessibility for those in wheelchairs or with strollers; however, the sidewalk on the residential side of Kwun Tong Road is narrow, and there are many obstacles along the sidewalk, such as store front displays and bus stops. In general, this makes it difficult to walk, and extremely hard for those with wheelchairs and strollers to get to the lifts or ramps.

Near the Ngau Tau Kok MTR station there are fewer obstacles on the residential side of Kwun Tong Road, however there are no lifts and only one of the footbridges has a steep ramp for handicapped access. When our team traveled across Kwun Tong Road in a wheelchair from Ngau

Tau Kok MTR Station, none of us were able to wheel ourselves up the steep ramp: another team member had to push the wheelchair and even that was difficult.

The subways and footbridges are mainly for those who are traveling on the MTR. As for those who live in the residential areas of Kwun Tong, they typically have to go to one of the MTR stations if they want to cross Kwun Tong Road, since there are only a few direct routes from the neighborhood areas.

4.3 Opinions of East Kowloon Locals

To determine the local opinions about the accessibility and navigation of the Kwun Tong area, our team frequently walked around the waterfront and in the Kwun Tong green spaces, to survey the residents in the area.

4.3.1 Survey Results

In total our team was able to survey 67 people along the Kwun Tong Promenade and in Tsun Yip Street Park. We unfortunately were not able to collect surveys from the Ngau Tau Kok Centre for the Elderly before the project ended. From the surveys collected, we found that 62.1% of the people surveyed were residents of Hong Kong but were not local to the Kai Tak, Kwun Tong and Kowloon Bay area. When asked if they or anyone in their family was over 65 years of age, 50% responded yes. However, only 12.3% responded yes when asked if they or someone in their family needed a stroller, wheelchair or walking frame.

Out of all those surveyed, 80.6% thought it was difficult to travel to the waterfront through Kwun Tong (see Figure 4.12), 50% thought there were not enough signs (see Figure 4.13) and 50% thought that the signs that were there were not clear enough (see Figure 4.14).

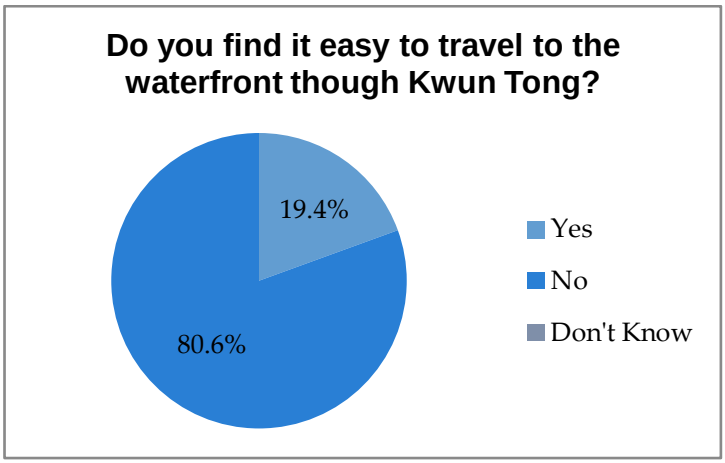

Figure 4.12: Ease of Reaching the Waterfront Responses

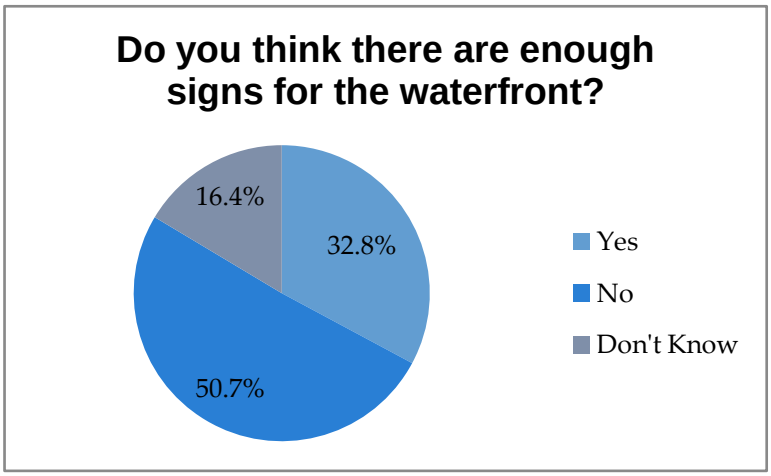

Figure 4.13: Responses to Whether There Are Enough Signs for the Waterfront

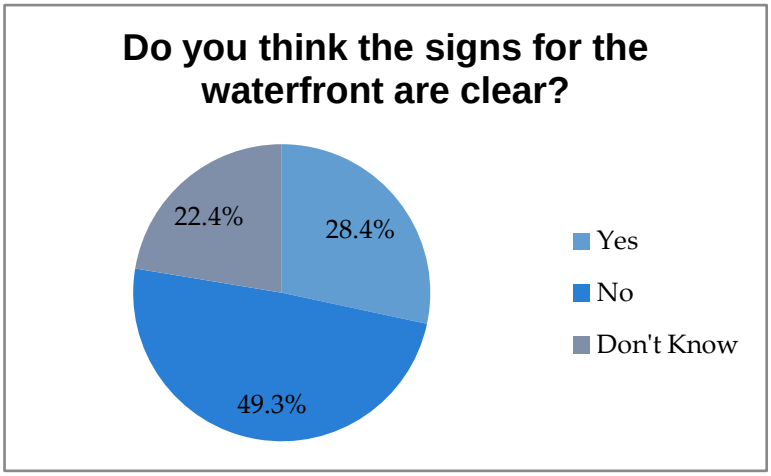

Figure 4.14: Responses to Whether the Signs for the Waterfront are Clear

We also found that 41% of those who thought it was difficult to travel to the waterfront though Kwun Tong were local to the area. However, only 15.2% of those who thought there was a lack of signage were from the Kwun Tong, Kowloon Bay or Kai Tak area.

In the survey people were asked, in general, what their most preferred methods of transportation were. There were seven choices given: MTR, bus/minibus, taxi, tram, ferry, walking and other. Our results showed that 22.9% selected MTR, 22.9% selected walking and 20% selected buses as their most preferred method of transport in general. See Figure 4.15 below for a comparison of all transportation rating percentages.

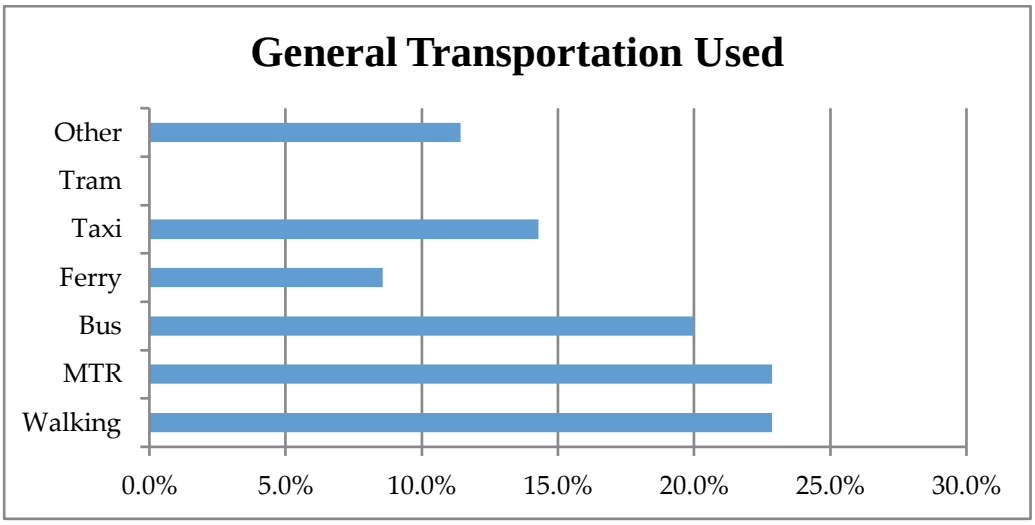

Figure 4.15: Ratings for Methods of Transportation in General

These numbers differed greatly when those surveyed were asked how they got to the waterfront. A majority (52.9%) of people reported that they walked to the waterfront, while 23.5% took the MTR. Some people had more than one method of transportation to get to the waterfront area. To see all of the percentages for transportation used when going to the waterfront, see Figure 4.16.

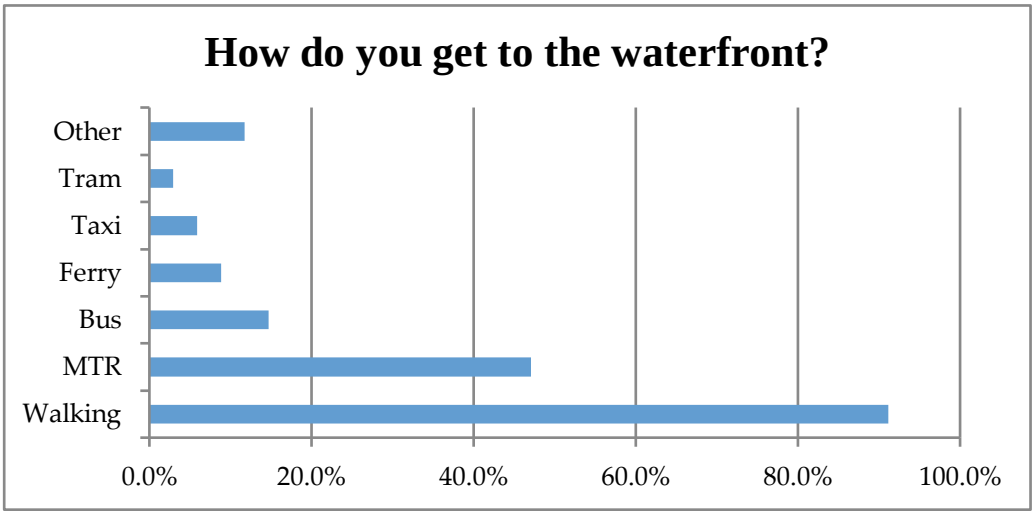

Figure 4.16: Ratings of Methods of Transportation Used to Travel to the Waterfront

The majority of people surveyed indicated where they had come from on the map that was part of the questionnaire. There were 21 people who came to Kwun Tong through the Ngau

Tau Kok MTR Station and 18 from the Kwun Tong MTR Station, while 25 people were from the residential areas to the east Kwun Tong Road.

4.3.2 Survey Analysis

Our team found the locals surveyed, i.e., those who came from the Kwun Tong MTR station, around the Kwun Tong MTR Station or from the residential areas between the Ngau Tau Kok and Kwon Tong MTR Stations, believed the current level of signage is not adequate, and they have trouble locating and traveling to and from the waterfront. By contrast, those respondents who came from the Ngau Tau Kok MTR Station tended to believe that locating the waterfront was not difficult, but that there was not a very direct route to the waterfront. Those from the Ngau Tau Kok MTR Station also tended to believe that the signage was not sufficient in the area.

4.3.3 Limitations

The limitations of our data are due to sample size and time available to collect information. With the amount of time our team was given for this project, only 67 questionnaires were able to be collected. To have more meaningful and valid data, a larger sample size would be needed as well as a more randomized sampling.

Also in our questionnaires, occasionally fields were left blank. Fortunately this did not occur often, and when this occurred, it was noted, so when our team analyzed the results, we knew there were not 67 responses to that question.

4.4 Opinions of Visitors and Tourists

Our team used a GPS enabled Garmin VIRB Elite camera to map the route that a first time visitor takes when reaching the waterfront from the MTR stations of Ngau Tau Kok and Kwun Tong. These visitors were then surveyed to determine their opinion of walkability and universal accessibility in East Kowloon.

4.4.1 GPS Navigation

After compiling the video footage recorded by six visitors traveling from the Kwun Tong MTR station to the Kwun Tong Promenade, we determined that it is not as difficult as we had assumed it would be to navigate to the waterfront. According to the data, on average, it took each visitor approximately 16 minutes and to reach the promenade. Upon further analysis, and comparison with Google maps, we determined that the average detour from the most direct route was approximately 3 minutes. At first glance this detour does not seem to be meaningful in terms of time spent. However, if you look at this information in terms of the total time it takes to reach the waterfront, this average detour accounts for approximately 25% of the entire trip to the waterfront. Figure 4.16 below overlays the route of KT visitors #s 1, 3, and 4 against one of the most direct routes according to Google Maps. This figure shows that although the visitors traveled the same route as suggested by Google, the duration of their trip was longer than the approximated time from Google Maps. This is most likely due to the fact that someone unfamiliar to an area would travel slower and spend time searching for signs. According to further analysis provided in Appendix H, these three visitors took the fastest route compared to the other visitor routes.

Figure 4.17: KT Visitor #1, #3, and #4 vs. Google Maps, originating from Kwun Tong MTR Station

To build off of this, in terms of distance traveled, according to Google Maps the most direct route from the Kwun Tong MTR station to the Kwun Tong Promenade via Tsun Yip Street or Hoi Bun Road, is approximately 1 km or 0.62 miles. Upon evaluation of the visitor video footage and related data, we determined that the average distance traveled by each of the six visitors was 1.54 km or 0.97 miles. Looking at it from this perspective, we feel that this more accurately represents the size of the detour taken by the visitors because it leaves out factors, such as walking speed or time spent waiting at a cross walk. Therefore, it seems that on average, there was a substantial detour taken by visitors while walking a route to the waterfront, amounting to about 1/2 km or about three tenths of a mile. Examining the average distance of the detours more closely, it was determined that the detour of 1/2km is close to 50% of the total trip from the MTR station to the waterfront, a significant distance to add to the trip. In Figure 4.18 below, the route with the longest detour, taken by both KT visitor #2 and #6, is overlaid against one of the most direct routes according to Google maps.

Figure 4.18: KT Visitor #2 and #6 vs. Google Maps, originating from Kwun Tong MTR Station

Additionally, in table 4.2, the data for each visitor's route along with the average time and distance detour of the six visitors from the station is displayed. The data includes the average detours from Ngau Tau Kok MTR Station as well. See Appendix H to view in-depth analysis of each visitor's' route from the MTR station to the waterfront of East Kowloon and any necessary data charts or tables.

Table 4.2: Average Time & Distance detours from Kwun Tong & Ngau Tau Kok MTR Station

Average Detour: Kwun Tong Station				
Time (min)	**Distance (miles)**	**Distance (km)**	**% Of Trip Time**	**% Of Trip Distance**
3	0.345	0.552	23.077	55.645
Average Detour: Ngau Tau Kok Station				
Time (min)	**Distance (miles)**	**Distance (km)**	**% Of Trip Time**	**% Of Trip Distance**
6	0.444	0.7104	54.545	71.613

A similar experiment was conducted from the Ngau Tau Kok MTR Station to the Kwun Tong Promenade. Data and video footage were collected from six individuals who were first-time visitors to the area. After analyzing the video footage, our team determined that on average, the visitors walked about 1.7 km or 1.1 miles to reach the waterfront. Comparing this data with the most direct route according to Google Maps, the trip to the waterfront is approximately 1km or 0.62 miles. Therefore, the distance of the detour walked by the six visitors averaged about 0.7 km or 0.48 miles more than the shortest route. Displayed below in Figure 4.19, the route with longest detour in terms of distance is compared to that of the suggested route that Google maps offered. The route in question was taken from the journeys of NTK Visitors #2, #3, and #6.

Figure 4.19: NTK Visitor #2, #3, & #6 vs. Google Maps, originating from Kwun Tong MTR Station

As far as time goes, according to Google Maps, the journey from Ngau Tau Kok station to the promenade should be approximately 11 minutes. After analyzing the video footage from the different visitors, our team determined that the average time spent by the visitors to reach the waterfront was approximately 17 minutes. Therefore, we determined the average time detour to be close to 6 minutes longer than the ideal time of the most direct route. This average detour of 6 minutes is substantial because it consists of about 55% of the total time that it should take for an individual to reach the waterfront. In Figure 4.20, the routes of NKT visitors #1 and #5 are overlaid against the suggested route according to Google maps. As you can see, these visitors took the suggested route to the waterfront and thus the most direct route.

Figure 4.20: NTK Visitor #1 and #5 vs. Google Maps, originating from Ngau Tau Kok MTR Station

One important observation to be noted is the fact that NTK Visitor #4 never reached the developed waterfront. Visitor #4 could not find the currently finished section of the waterfront and after a 2 mile trip, and close to 30 minutes of searching for the waterfront, the visitor returned back to Ngau Tau Kok MTR station. Although this route cannot be compared to the others, this information is probably more valuable in accessing the ease of navigation and universal accessibility in the region. If one person in every six visitors were to get lost when traveling to navigate to the Kwun Tong Promenade, this would become a major issue in attempting to make it a major tourist destination. Having roughly 17% of your visitors never reach the waterfront is not a good percentage for a region that is attempting to establish itself as the next major business district in Hong Kong, and a major region of tourism and entertainment.

Similar to the analysis of the routes from Kwun Tong MTR Station, in table 4.2, the data for each visitor's route from Ngau Tau Kok MTR Station, along with the average time and distance detour of the six visitors is displayed. See Appendix H to view in-depth analysis of each visitor's' route from the MTR station to the waterfront of East Kowloon and any necessary data charts or tables.

4.4.2 Visitor Opinion Results

After collecting the video footage of the twelve visitors to the region of Kowloon East, they were given a survey questionnaire to reflect on their experiences traveling from the given MTR station to the waterfront. All of those surveyed were considered visitors, as they are not from the region of Kowloon East, nor were any of them from Hong Kong. The visitors were asked a series of questions that may be referenced in Appendix E.2: East Kowloon Visitor Opinion Survey. Of those surveyed, only 20% of the visitors believed that there were enough signs to sufficiently reach the waterfront, leaving 80% of the people believing that there were not enough signs. Along with this, we asked the visitors if they encountered any obstruction or barriers while traveling to the waterfront. Of those surveyed, 92% said that they did in fact

encounter a barrier or obstruction while traveling to the waterfront. Of this 92%, approximately 82% of these visitors specified that they encountered two or more barriers during their journey. In addition, 37% of those visitors said that there were three or more barriers inhibiting their travels, see Figure 4.21.

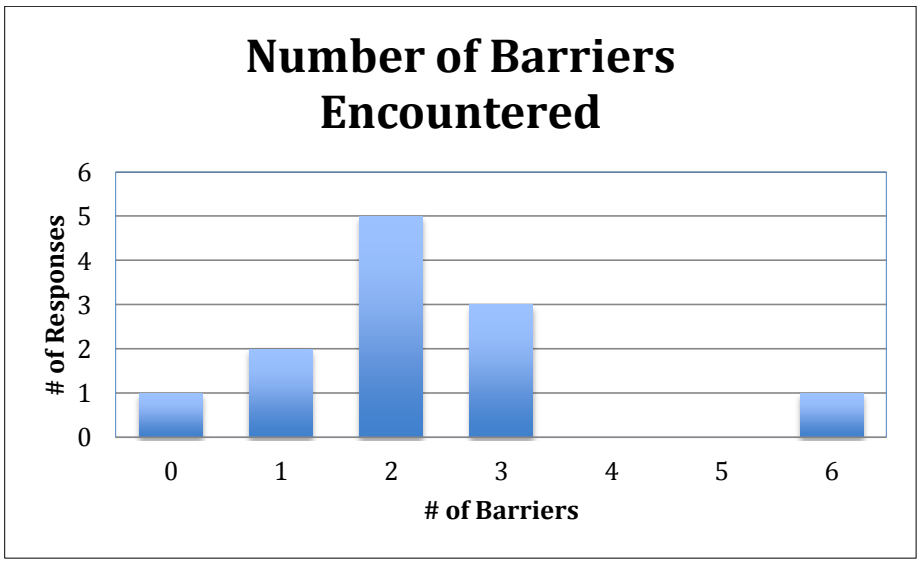

Figure 4.21: How many obstructions did you encounter while traveling to the waterfront?

Part of the visitor opinion survey also asked the individuals if they believed the route they walked was handicap accessible. Of the 12 surveyed, 58% believed that their route was in fact not handicapped accessible, while approximately 25% of the polled visitors didn't notice whether it was handicap accessible (Figure 4.22). Visitors were also asked about other features of universal accessibility, including if there were any braille or tactile surfaces or audible walk signals along the route they walked. Of the respondents, only 33% said that there were any of these present along the route that they walked, while 42% said that these features were not present (Figure 4.23).

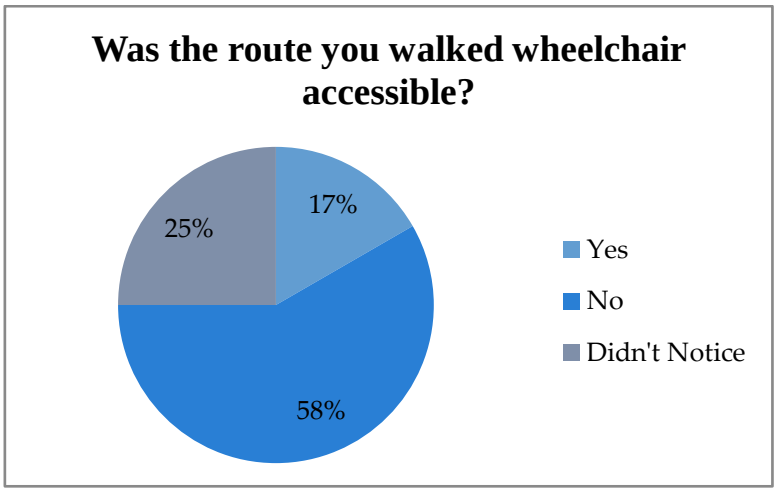

Figure 4.22: Was the route that you walked wheelchair accessible?

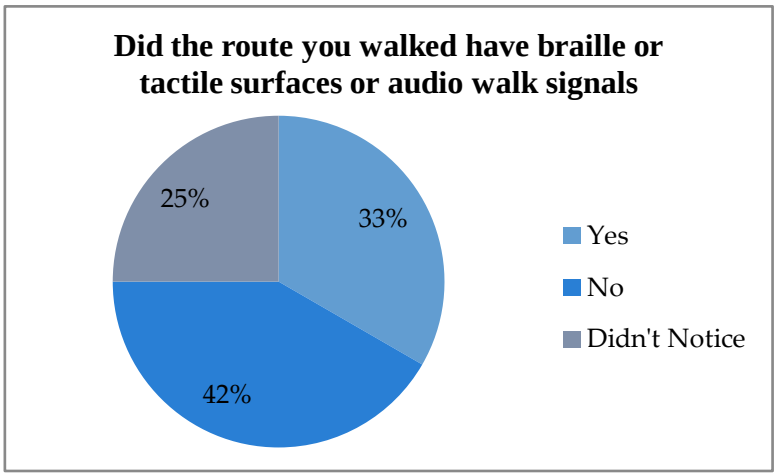

Figure 4.23: Did the route you walked have braille or tactile surfaces or audio walk signals?

Concluding the visitor questionnaire were two questions that related to a social aspect of our project. We first asked if the visitor would likely return to the waterfront, with an explanation of why or why not. The second question asked, "Do you think the waterfront is a desirable tourist attraction in its current state (Kwun Tong Promenade, Kai Tak Runway Park or Cruise Terminal)?" and then went on to ask for recommendations as to what might make this a desirable place to come, if the person answered no to the question. 58% of visitors claimed that they would return to the waterfront. Of the respondents who answered the question with a no, several cited

the lack of entertainment or activity on the waterfront as the reason that they would not return. Based on this information, an overwhelming 92% of the questioned visitors felt that in its current state, the waterfront is not a desirable tourist attraction (Figure 4.24). These visitors cited several suggestions for improvements and nearly half of them recommended to add some sort of dining and entertainment to the area in order to make it a more desirable destination.

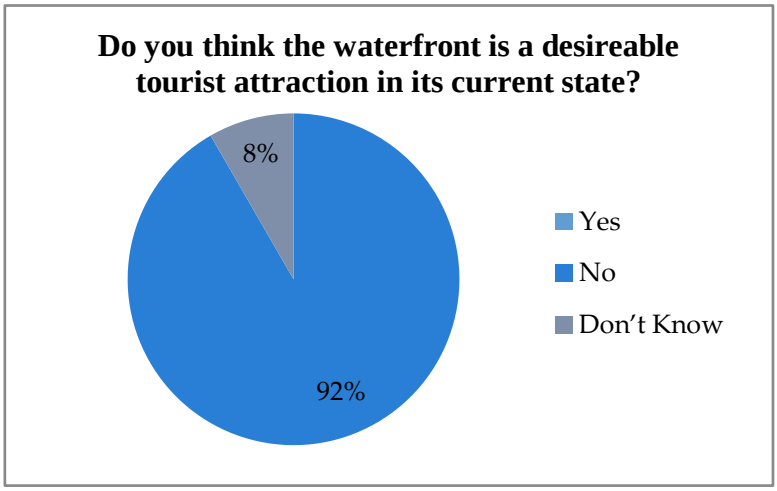

Figure 4.24: Do you think that the waterfront is a desirable tourist attraction in its current state?

4.4.3 Visitor Opinion Analysis

Our team determined from the visitors surveyed that most visitors to the area do not believe there are enough signs in the area to navigate effectively and efficiently to and from the waterfront. Our analysis also determined this area is not friendly to pedestrian traffic and often pedestrians must avoid obstacles or barriers in order to reach their destination. Another key point to take away from the analysis is that a majority of visitors answered that the route they took to and from the waterfront was not handicapped accessible. This information is important to note as we further explain the limitations of universal accessibility in the area of Kwun Tong.

Finally, one of the major conclusions from analyzing the visitor opinion survey is that an overwhelming majority of people do not believe the waterfront to be a legitimate tourist attraction in its current state, while only about half of the visitors would return to the waterfront. This issue

is extremely important for the social implications of our project because it provides us with the social justifications for why the EKEO and others must attempt to make Kwun Tong's waterfront a more universally accessible and interesting place to visit. In the long term, a push for a more universally accessible region will contribute to a safer pedestrian environment, and in turn will hopefully help the region and the waterfront become a world-renowned entertainment center.

4.5 Limitations of Accessibility

The nine identified routes as possible pathways to reach the waterfront were reevaluated from the perspective of a person in a wheelchair. By wheeling ourselves and pushing group members in the wheelchair, we experienced first hand the inadequacies of handicap accessibility along the routes to the waterfront and the general inaccessibility of the region.

Two of the nine identified routes were completely inaccessible by wheelchair, and on the remaining seven we faced significant challenges and difficulties when attempting to reach the waterfront promenade. Among the most easily traveled routes, someone in a wheelchair faces ramps with steep slopes of about 19°, abrupt drops and changes of level at intersections due to a lack of curb ramps, tight sidewalks with heavy pedestrian traffic, and an overall bumpy and uncomfortable ride due to sunken bricks and uneven sidewalks. Please refer to Appendix I for a detailed analysis of the universal accessibility of each route.

We found the use of wheelchairs throughout the region is minimal. During the longest continual observation period of six hours, only three people traveling in wheelchairs were seen. Of the three, two people were accompanied and being pushed through APM Mall or the Tsun Yip Street Playground. The other wheelchair was also observed within APM Mall, but was electrically powered. We never observed any persons with obvious visual impairments.

Although the accessibility of the region is limited, we also found staff and business employees were very willing to help those in wheelchairs. An employee in APM Mall approached us and guided us towards the handicapped accessible lift and then directed us towards

the second lift we needed to take to reach the ground level. Once on the ground level, a second employee rushed to remove the metal bollard blocking the exit of the elevator, and ensured the wheelchair could safely be wheeled out of the car park entrance. In the case of a construction area, one worker stopped other pedestrians from passing while the other helped guide the front wheels over the temporary pathway.

4.6 Summary

Through site observations and survey responses, we established there is inadequate signage and numerous limitations to the universal accessibility of the East Kowloon harbor front. Based on our research, we identified specific areas along each route that hinder the accessibility of those requiring wheelchairs or with visual impairments (please refer to Appendix J for a detailed analysis of each area in need of improvement). For these eight areas in need of improvement, we developed recommendations, which we present in Chapter 5, to address these areas in order to promote universal accessibility to the Kwun Tong waterfront.

5.0 Conclusions and Recommendations

Based on our research, we achieved our goal of providing recommendations to promote universal accessibility throughout the Kwun Tong district to the Chinese University of Hong Kong (CUHK) and Urban Planning and Design International. In this chapter we identify our key conclusions and the areas throughout Kwun Tong we believe need to be improved in order to promote universal accessibility. In addition, we include our recommendations and suggestions on how to adapt the current pedestrian environment to make it more universally accessible are included.

5.1 Accessibility Shortcomings

Based on our results and analysis presented in Chapter 4, we identified the following seven areas to be addressed that significantly hinder the universal accessibility of the Kwun Tong District. A more detailed description and analysis of each accessibility shortcoming can be found in Appendix J.

- Curb Ramps: The curb ramps at intersections are often inadequate. There is often a change in vertical height greater than 0.5 inches without a slope, making it difficult to wheel a wheelchair into the crosswalk.
- Loading Zones: The sidewalks are often mostly obstructed or completely blocked by commercial business use as storage or loading zone spaces
- Zebra Crossings and eATS systems: There are often only zebra crossings or audible walk signals at major intersections, side streets have informal crossings
- Signage: inadequate or lack of signage in key locations; small signs are difficult to see from a distance
- Walkways/Footpaths: Most sidewalks are extremely narrow and sometimes it becomes difficult for a wheelchair to fit on the walkway. There are often obstacles on walkways

that hinder pedestrian flow (e.g. signs, fire hydrants, bollards, trash cans, street light posts)

- Wheelchair Ramps: if present, there is no standard for slope; becomes difficult to push someone or wheel oneself up a ramp.
- Lift Access: some lifts are locked or require you to call for assistance to use; sometimes you must find a staff member in order to use the elevator.

5.2 Recommendations for Kwun Tong

Based on our conclusions and identified areas needing improvement mentioned in Section 5.1, we developed the following recommendations to promote universal accessibility throughout the region.

A) We recommend the establishment and enforcement of ramp and curb ramp slope standards.

We recommend the establishment and enforcement of ramp and curb ramp slope standards, which would increase the ease of access to those in need of handicapped access. These standards should clearly define a maximum slope standard for wheelchair ramps and curb ramps, as well as setting a standard for maximum height difference allowed between the curb ramp and the street. Currently, there are no clear ramp standards for Hong Kong, so often ramp slopes are too steep for those in wheelchairs to wheel themselves up the ramp. It can also be difficult for the person pushing a wheelchair, if the ramps are too steep. Curb ramps can also incline quickly, causing the wheelchair to accelerate into the road or to have trouble getting onto the sidewalk from the road. Also, the curb ramps do not always meet the road, leaving more than 6mm height difference between them. This makes it difficult for those in wheelchairs to get on or off the sidewalk.

B) We recommend that clear and visible signage is placed at every major intersection.

Currently there is little to no signage in the area for guidance in getting to the waterfront and the current signage is not easily visible. We recommend that signage that is more visible be placed at every major intersection along the most direct routes for getting to the waterfront. The words on the signs should be readable to an average person, on the opposite side of the street. Also the signs or the signpost should be visible from all corners of the intersection.

C) We recommend that signal zebra-crossings be installed at each intersection.

We recommend that zebra-crossings and eATS systems be installed at each intersection. This will help all pedestrians, including those with physical and visual impairments, travel through Kwun Tong. Currently Kwun Tong is a high traffic area, and it is difficult in several areas to cross the roads because there is no crosswalk, and the on-coming traffic is not prepared to stop for pedestrians. So zebra-crossings and eATS systems would create a safer pedestrian environment.

D) We recommend that new sidewalks contain tactile surfaces and be made of large tiles or concrete slabs.

We recommend that all new sidewalks contain tactile surfaces to promote accessibility in the area for those with visual impairments. We also recommend that new sidewalks be made of large tiles or concrete slabs, compared to the bricks that the majority of sidewalks in Kwun Tong are currently constructed out of. Individual bricks tend to sink, causing the paths to become unlevel. This is a potential tripping hazard for those walking and for those with wheelchairs or strollers; their wheels can get caught on the uneven bricks, causing them to become stuck. We also recommend that the walkways be at least 2.5m wide, or as close to that as possible, if spatial constraints permit it.

E) We recommend that sidewalk loading zones be clearly marked and time constricted.

We recommend that loading zones on sidewalks be clearly marked on the ground, as well as have audible signals to warn pedestrians if there is to be a vehicle moving onto the sidewalk. We also recommend that the loading zones be free of all vehicles and no loading/unloading occurring during lunch hours (12:30-2pm). During the lunch hours there is a notable increase of pedestrians on the sidewalks, since office workers in the area come out to eat lunch. Having loading/unloading occurring during this hour makes the sidewalks more congested.

F) We recommend that lift access be more easily available.

We recommend that lifts that currently require one to call for assistance, either be opened for general use or that a lift operator is stationed by the elevator during business hours. When traveling though Kwun Tong on a wheelchair we came upon several lifts where assistance in operating the lift was needed. Sometimes help was received right away; typically because a lift operator was already near the lift, whereas at other times, no one answered the call for lift assistance.

5.3 Recommendations for Future Research

We believe this project can significantly impact the pedestrian scheme throughout the Kwun Tong District and Hong Kong in general, with further research. Weather conditions impact the accessibility of an area, especially if there are surfaces that are slippery when wet or lacking necessary traction. This project was completed in the winter, during the dry season, with little variation in the weather. Although route conditions were identified during light rain, we do not feel our results from that day are indicative of the route accessibility during the rainy season.

In addition, the EKEO is projected to complete the remaining northern section of the promenade in March 2015 and continue development of the former Kai Tak Runway and

surrounding region over the next 10 years (EKEO, 2015). Due to this changing environment and continued central business district transformation, we recommend this study be repeated with the scope of analysis including the area north of Lai Yip Street and the entrance to the Kai Tak Runway.

Lastly, we recommend further exploring our seven identified challenge areas in greater detail. The process for implementing time restrictions and regulations on loading zones should be researched further. In addition, we recommend comparing the challenge areas in Kwun Tong to Central, and seeing to what degree they exist. Since Kwun Tong is emerging as the second Central Business District, it would be beneficial to compare the universal accessibility to that of the existing business and entertainment center.

5.4 Summary

These recommendations were developed to be presented to the Chinese University of Hong Kong School of Architecture, however we hope their impact reaches beyond that. It is our vision that the Energizing Kowloon East Office will consider implementing our recommendations to fully energize the pedestrian scheme of Kwun Tong and make the district a place everyone can enjoy. In addition, we hope our recommendations are adapted to the revitalization and creation of other central business districts throughout Hong Kong, with the establishment of standardized accessibility guidelines.

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Appendix A: Sponsor Descriptions

Chinese University of Hong Kong

The Chinese University of Hong Kong (CUHK, 2014) is a public research university in Hong Kong. CUHK's goal or mission is to "assist in the preservation, creation, application, and dissemination of knowledge by teaching (CUHK, Mission and Vision, Motto and Emblem, 2014)." CUHK was founded in 1963 and looks to combine tradition with modernity (CUHK, 2014).

Hendrik Tieben

Hendrik Tieben is an associate professor at the Chinese University of Hong Kong School of Architecture (CUHK School of Architecture, 2014). He is the director of the Master in Science in Urban Design program at the CUHK and is also an Associate Professor who teaches urban design, theory, and criticism. Tieben is an architect and urban designer who has worked on countless publications of the sort. In particular, several of his publications detail the connection between urban design and the social effects that it can have upon a neighborhood or population. His research covers most facets of urban design, including the concept of community involvement and participation in these projects. He is specifically interested in the heritage and identity of Hong Kong and Macau (2014). One such initiative that Tieben is currently the coordinating leader for is "Magic Carpet – Tu Shui Wai" (School of Architecture and School of School of Journalism and Communication CUHK, 2014), a program to spur community involvement and empowerment. The program is an outdoor screening of a collection of videos created by local residents about the different aspects of life in Tu Shui Wai (2014). The purpose of these videos, to bring community members together in order to interact and determine how the community might be able to change for the better. Magic carpet combines urban design with community involvement, and documentation of daily life and the ultimate goal of the program is

to transform the public space of a neighborhood, and in turn, help to make the community more vibrant.

Urban Design & Planning Consultants Ltd (UDPC)

UDPC or UDP International was established in 1997 (UDP International, 2014) and is a Consulting company for urban design and planning. UDP international works for both the public and private sector and has received 10 industry awards in various competitions or projects (2014). UDP international has been a major participant in the urban design and planning of Hong Kong. Specifically, UDP international has played a large role in the design of the Central Harbor front concept (2014).

Dr. Sujata Govada

Dr. Sujata Govada is an Adjunct associate professor at the Chinese University of Hong Kong and Consultant for UDPC (CUHK School of Architecture, 2014). Dr. Govada is the founder and managing director of UDPC (UDP International, 2014). She is an accomplished urban designer and planner and is a member of the harbor commission who is responsible for planning the future of Hong Kong's waterfront. Dr. Govada is also well versed in the subject of sustainability, and looks to incorporate those techniques into her urban design and planning projects.

Appendix B: District Demographics

Kwun Tong is the most densely populated district of Hong Kong with an average of 145,826 residents per square mile (Cox, 2012; HKG, 2012c). The employment rate in Kwun Tong is relatively high at 56.1% with 22.5% of the working population employed within the same district. Roughly a quarter of the employed population, 27.1%, has a professional occupation, including managers, administrators and other white-collar professions. Additionally, 37.8% of the employed Kwun Tong population works in the business services, retail, hospitality, and food services industries.

Kowloon City is slightly less densely populated than the district of Kwun Tong with an average of 104,052 people per square mile (Cox, 2012; HKG, 2012a). Similar to the employment rate of Kwun Tong, 58.8% of Kowloon City residents are employed. However, the number that works within the district is slightly less at 14.3%. Compared to other districts, Kowloon City has a high percentage, 44.2%, who are employed in a professional occupation. However, there is an equal number of workers, 44.4%, who hold jobs within the business services, retail, hospitality, and food service industries.

Since the major districts are so densely populated, the Hong Kong Government divides the districts into separate regions to track demographic trends throughout specific neighborhoods. Kwun Tong is divided into 35 regions, compared to Kowloon City's 22 (HKG, 2012b). Within Kowloon City is the Kai Tak region, which encompasses the area of the former Kai Tak Airport. This region houses 22,263 individuals within an area of just over a square mile; however, the majority of this land is undeveloped. The Kai Tak region has a slightly higher employed population than the entire district of Kowloon City, 62.5%. Also greater than the district statistic is the percentage of workers who work within the Kai Tak region, 16.0% of workers. However, few of those employed hold jobs in a professional occupation. Rather, a high number of workers, 45.8%, are employees in the business services, retail, hospitality, and food service industries.

Kwun Tong and Kowloon City have similar demographic distributions due to the fact they share a boundary and their common industrial heritage (HKG, 2012a; 2012b; 2012c). The ethnic background of the three regions is comparable, with Chinese ethnicity being the most prevalent (Figure B.1). The majority of residents of this region have lived within the district for the majority or entirety of their lives. Therefore, the most frequently used language is Cantonese (Figure B.2). Additionally, the age distribution of residents is similar, with the median age of 39.9 in Kai Tak, 42.5 in Kowloon City, and 42.8 in Kwun Tong (Figure B.3).

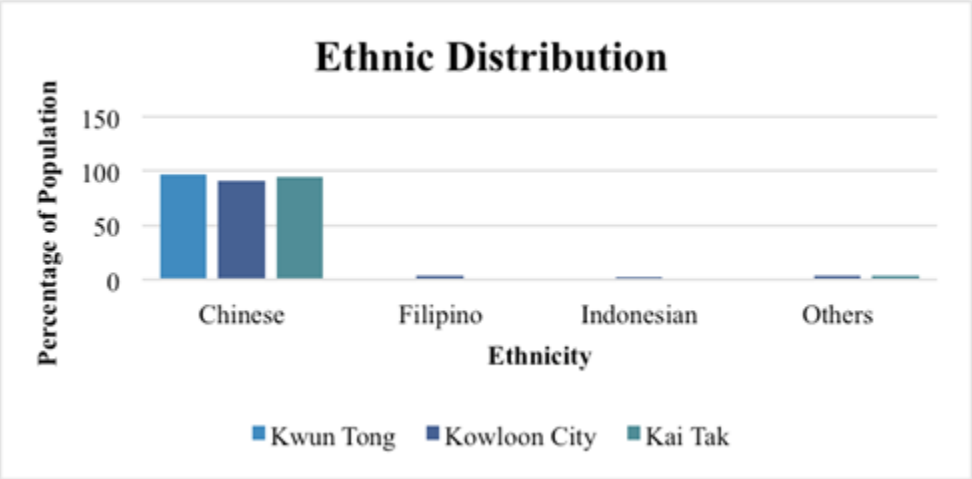

Figure B. 1: Ethnic Distribution of Kwun Tong, Kowloon City and Kai Tak (adapted from Hong Kong Government, 2012)

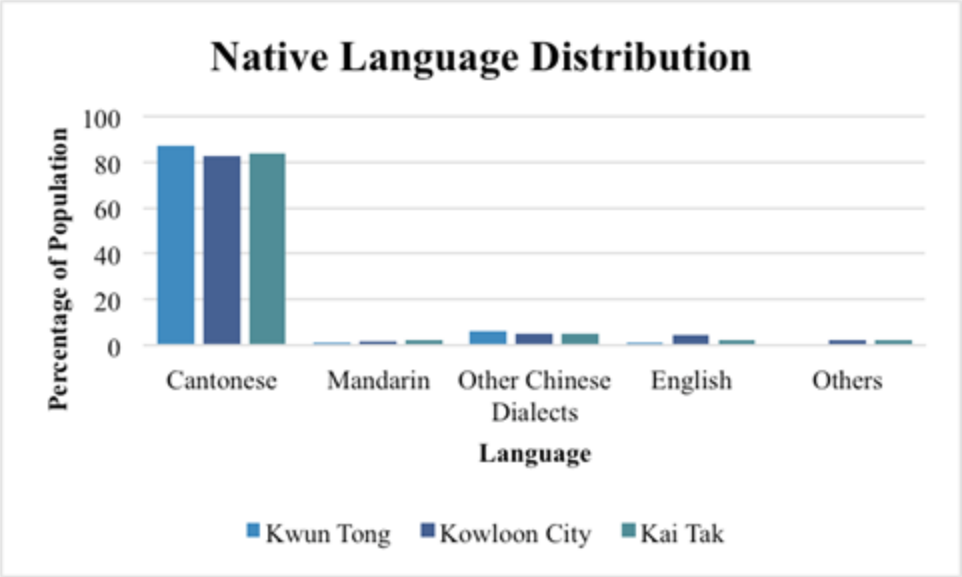

Figure B. 2: Native Language Distribution of Kwun tong, Kowloon City and Kai Tak (adapted from Hong Kong Government, 2012)

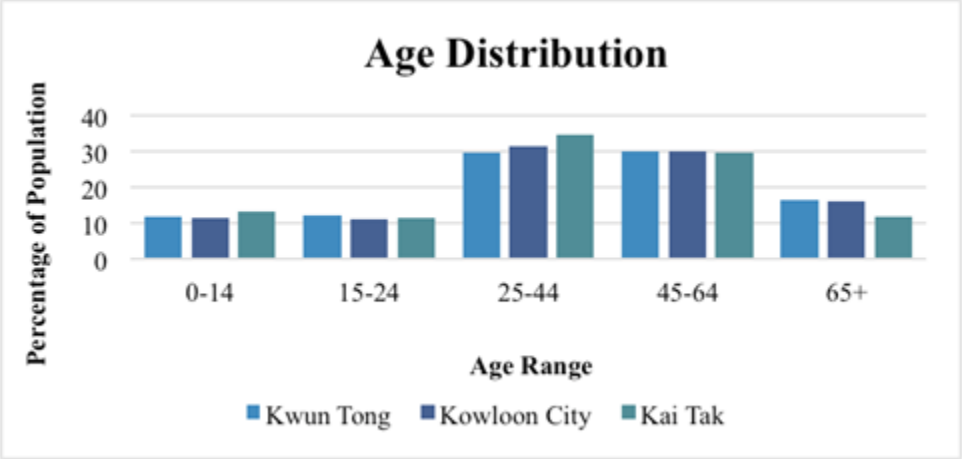

Figure B. 3: Age Distribution of Kwun Tong, Kowloon City and Kai Tak (adapted from Hong Kong government, 2012)

Appendix C: Route Evaluation Matrix Protocol

This protocol will be used to complete an evaluation matrix for the most frequently traveled routes to the harbor front. Each route will be assigned a rating for the following categories: Sidewalks and Walkways, Signage, Connectivity, Universal Access and Pedestrian Traffic. From the evaluation matrix, an overall rating for each route will be determined.

Table C. 1: Route Evaluation Criteria

Rating	Sidewalks and Walkways	Signage	Connectivity	Universal Accessibility	Pedestrian Traffic
Platinum	4+ meters of clear walking space, well maintained condition. No obstacles and barriers or uneven surfaces. All walkways are segregated from vehicular routes and are well lit.	All signs use appropriate font size and color contrast. At least one sign is visible while standing at another. All over/underpasses are clearly labeled.	All intersections have clearly defined and labeled crosswalks.	All ramps are an appropriate slope gradient (no more than a slope of 1:12) and contain adequate landings. Handrails present where appropriate. Braille or tactile surfaces are present and there are minimal slippery surfaces.	Fewer than 30 pedestrians per minute
Gold	3-4 meters of walking space, cood condition. Few items to walk around and few unever surfaces. Most walkways are segregated from vehicular routes and are well lit.	Good amount of signs, next sign not always visible from location of previous sign. Majority signs use appropriate font size and color contrast. Some over/underpasses are clearly labeled.	Most intersections have clearly defined and labeled crosswalks.	Most ramps are an appropriate slope gradient (no more than a slope of 1:12) and contain adequate landings. Handrails are mostly present where appropriate. Braille or tactile surfaces mostly present and there are few slippery surfaces.	Approximately 60 pedestrians per minute
Silver	2 meters of walking space, fair condition. Few obstacles to meander around and some uneven surfaces. Some walkways are segregated from vehicular routes and are well lit.	Decent amount of signs, next sign sometimes visible from previous sign. Some signs use appropriate font size and color contrast. Few over/underpasses are clearly labeled.	A decent amount intersections have clearly defined and labeled crosswalks.	Some ramps are an appropriate slope gradient (no more than a slope of 1:12) and contain adequate landings. Some handrails present where appropriate. Some braille or tactile surfaces present and a there are a decent amount of slippery surfaces.	Approximately 80 pedestrians per minute
Bronze	Less than 2 meters of walking space, fair to poor condition. Several obstacles to meander around and several uneven surfaces. Few walkways are segregated from vehicular routes and are well lit.	Few signs, next sign rarely visible from previous sign. Few to no signs use appropriate font size and color contrast. Over/underpasses are rarely labeled.	Few to no intersections have clearly defined and labeled crosswalks.	Few to no ramps are present or are an appropriate slope gradient (no more than a slope of 1:12) and contain adequate landings. Few handrails present where appropriate. Few to no braille or tactile surfaces present and there are several slippery surfaces.	Over 100 pedestrians per minute

Platinum Rating Criteria adapted from Hong Kong Pedestrian Environment and American Accessibility Standards.

Obstacles and barriers include but are not limited to: bollards, scaffolding, parking meters, light fittings and fixtures, trees, curbs and drainage gratings. Overall pedestrian traffic rating will be denoted by the maximum number of pedestrians for the multiple executions of this evaluation matrix at various times of day.

Appendix D: Linkage Evaluation Matrix Protocol

This protocol contains was used to complete the analysis for the linkages across Kwun Tong Road. Each linkage was evaluated on the following criteria: Signage, Handicapped Access, Tactile Surfaces and Barriers in or around the linkage.

For each linkage across Kwun Tong road, an evaluation matrix will be filled out. The boxes below will be circled to record the routes quality. If there are barriers in or around the linkage, the type of barrier will be noted.

Table D. 1: Linkage Evaluation Matrix

Signage	No Signage	Signage on one side of linkage, not clear or easily visible	Signage on one side of linkage, clear and easily visible	Signage on both sides of linkage, not clear or easily visible	Signage on both sides of linkage, clear and easily visible
Handicapped Access	No Handicapped Access	Ramp or Lift Access on one side of Kwun Tong Road, with outside assistance needed	Ramp or Lift Access on one side of Kwun Tong Road, without outside assistance needed	Ramp or Lift Access on both sides of Kwun Tong Road, with outside assistance needed	Ramp or Lift Access on both sides of Kwun Tong Road, without outside assistance needed
Tactile Surfaces	No Tactile Surfaces	Tactile Surfaces at start and end of stairs or ramps	Tactile Surfaces at start and end of stairs or ramps, & along the walkway	Tactile Surfaces at start and end of stairs or ramps, along the walkway & on the sidewalks around the linkages on one side of Kwun Tong road	Tactile Surfaces at start and end of stairs or ramps, along the walkway & on the sidewalks around the linkages on both sides of Kwun Tong road
Barriers	No barriers or obstacles around or in the linkages.	A couple (1-3) barriers or obstacles around or in the linkages.	A few (3-6) barriers or obstacles around or in the linkages.	Some (7-9) barriers or obstacles around or in the linkages.	Many (10+) barriers or obstacles around or in the linkages.
	Type of Barriers:				

Obstacles and barriers include but are not limited to: bollards, storefronts, stalls, parking meters, light posts and planters.

Appendix E: Waterfront Access Surveys

This appendix contains the two sets of survey questionnaires distributed, one for the local residents of East Kowloon and the other visitors to the Kwun Tong region following the filmed walks to the waterfront.

E.1: East Kowloon Local Resident Opinion Survey

Access to Eastern Waterfront - Local Resident Opinion Survey
啟德發展區-問卷調查

The purpose of our research project is to provide suggestions on how create better access to the waterfronts. This survey will be used to determine local perspectives waterfront access. Please answer honestly and legible.
Please note all responses will remain anonymous and be kept confidential.
該問卷是為了提供關於如何創建更便捷的方式抵達啟德機場港口 。該问卷将用于调查当地居民对于如何便捷的抵达港口的觀點。請如實回答
所有問卷調查將是匿名以及不公開的

Part A – Where are you from? (住址)

1) Kowloon City(九龍城)_____ Kai Tak(啟德)_____ Kwun Tong(观塘區) _____
Other(其他) _____ If you selected other, what district are you from?_____
2) Length of residency _____ years(居住 _____ 年)

Part B - General Information　(個人信息)

1) Gender(性別): Male(男)_____ Female(女)_____ Prefer not to Answer _____(不方便回答)

2) Marital Status(婚姻狀況): Married(已婚)_____ Single(未婚)_____

3) Number of Children, if any _____ (您有幾個孩子？_____)

4a) Are you Employed? (就業狀態?) Yes(就業) No(失業)

4b) If so please specify job title: _____ (職業: _____)

5) Do you or anyone in your family need a wheelchair, stroller or walking frame? (您或您的家裏人是否需要使用輪椅，嬰兒車或拐杖？) Yes(是) No(不是) Prefer not to Answer(不方便回答)

6) Are you or anyone in your family over 65? (您的家庭成員是否有超過 65 歲？)
Yes(是) No(不是) Prefer not to Answer(不方便回答)

7) Do you think there are enough signs for waterfront? (您覺得去港口有足夠的指示牌嗎？)
Yes(是) No(不是) Don't Know(不知道)

8) Do you think the signs for the waterfront are clear? (您覺得去港口的指示牌指示明確嗎？)
Yes(是) No(不是) Don't Know(不知道)

9a) Do you find it easy to travel to the waterfront and through the Kwun Tong area? (您覺得從觀塘區到海濱港口的路線容易走嗎？)
Yes(是) No(不是) Don't Know(不知道)

9b) If you find it difficult to travel to the waterfront and through the Kwun Tong area, why? （是否你覺得很難找到從觀塘區通向海濱港口的路線，為什麼？）

_____

_____

Part C - Which method of transportation do you prefer to use in general?
(您平時習慣用以下哪種交通工具？)

Please order 1-7, where 1 is most preferred method and 7 is least preferred method.
請從以下交通工具中標注 1-7 (1 代表最經常用的, 7 代表最不經常用的)

MTR（地鐵）_____ Tram(有軌電車)_____ Ferry(輪渡)_____ Taxi(的士)_____

Walking(步行)_____ Bus/Minibus(巴士/小巴)_____ Other(其他)_____

Part D – How do you get to the water front? (如何抵達港口)

Have you visited any part of the waterfront, Hoi Bun Park or Kai Tak Runway Park? If you have, please circle the place on the map. (您去過啟德港口, 海濱公園, 或啟德跑道公園嗎？請在地圖上圈出地點)

If you have been there before, please draw the route you would take to get to the places above. (如果您去過以上任何地點，請在下方地圖上畫出您是如何到達那裡的路線)

How do you get to the waterfront, Hoi Bun Park or Kai Tak Runway Park? (您一般如何去啟德港口，海濱公園，或啟德跑道公園？)

MTR（地鐵）_____ Tram(有軌電車)_____ Ferry(輪渡)_____

Bus/Minibus(巴士/小巴)_____ Taxi(的士)_____ Walking(步行)_____


觀塘市中心
KWUN TONG TOWN CENTRE
觀塘 KWUN TONG
MTR
牛頭角
NGAU TAU KOK
觀塘道 KWUN TONG ROAD
牛頭角 NGAU TAU KOK
MTR
駿業街遊樂場
TSUN YIP STREET
PLAYGROUND
駿業街 TSUN YIP STREET
開源道 HOI YUEN ROAD
鴻圖道 HUNG TO ROAD
敬業街 KING YIP STREET
翠屏河 TSUI PING RIVER
觀塘繞道 KWUN TONG BYPASS
麗港城
LAGUNA CITY
常怡道 SHEUNG YEE ROAD
啟福道 KAI FUK ROAD
偉業街 WAI YIP STREET
海濱道公園
HOI BUN ROAD PARK
勵業街 LAI YIP STREET
巧明街 HOW MING STREET
海濱道 HOI BUN ROAD
順業街 SHUN YIP STREET
觀塘海濱長廊
KWUN TONG PROMENADE
啟德發展區
KAI TAK DEVELOPMENT AREA
Kai Tai Runway Park
啟德跑道公園
0m 75m 150m 225m 300m米

E.2: East Kowloon Visitor Opinion Survey

East Kowloon Visitor Opinion Survey

The purpose of our research project is to provide suggestions on how to create better access to the harbour waterfront. This survey will be used to determine local perspectives on waterfront access. Please answer honestly and legible

Part A – General Information

1) Country of residency _____ Length of residency _____ years
2) Gender: Male_____ Female_____ Prefer not to answer _____
3) Marital status: Married_____ Single_____
4) Number of children, if any _____
5) Are you employed? Yes No
   If so, please specify job title: _____

Part B – Navigating To the Waterfront

1) In general, were the sidewalks level? Yes No Didn't notice
2) Were there any obstructions or barriers? Yes No Didn't notice
   If yes, about how many? _____
3) Were there were enough signs to get to the waterfront? Yes No Didn't notice
4) Were signs clear and easy to understand? Yes No Didn't notice
5) Did intersections have clearly defined cross walks? Yes No Didn't notice
6) Was the route you walked wheelchair accessible? Yes No Didn't notice
7) Did the route you walked have braille or tactile surfaces or audio walk signal? Yes No Didn't notice
8) Do you believe you took a direct route? Yes No Don't know

Part C – Waterfront Useage

1) Have you visited the waterfront in Kwun Tong before? Yes No

If yes, please list which areas

_____

2) Would you return to the waterfront in Kwun Tong? Yes No

Why or why not?

_____

_____

_____

3) Do you think the waterfront is a desireable tourist attraction in its current state (Kwun Tong Promenade, Kai Tak Runway Park or Cruise Terminal)?

Yes No

If no, what would make it more of an attraction?_____

Appendix F: Route Condition

This appendix includes the raw data collected when identifying and analyzing the possible pedestrian routes the reach the waterfront.

F.1: Possible Routes to Reach the Waterfront

The following nine routes were identified as possible pedestrian paths to reach the East Kowloon harbor front from the Ngau Tau Kok and Kwun Tong MTR Stations (Figures F.1 and F.2)

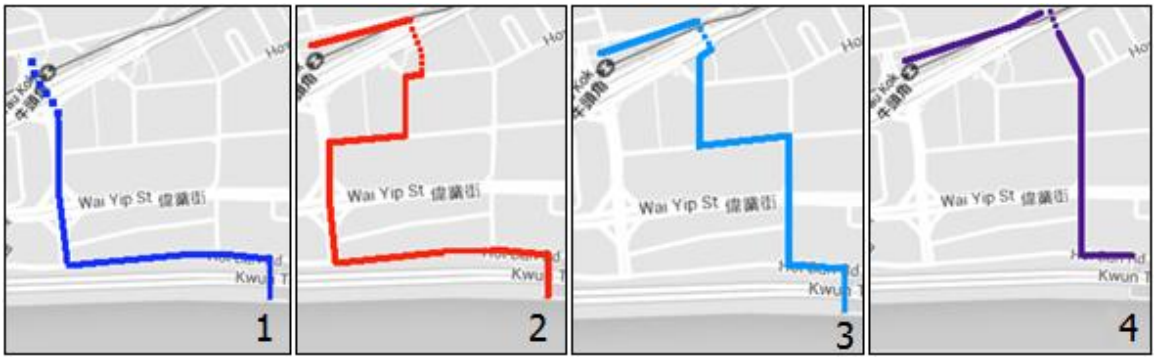

Figure F. 1Routes 1, 2, 3 and 4, originating from Ngau Tau Kok MTR Station

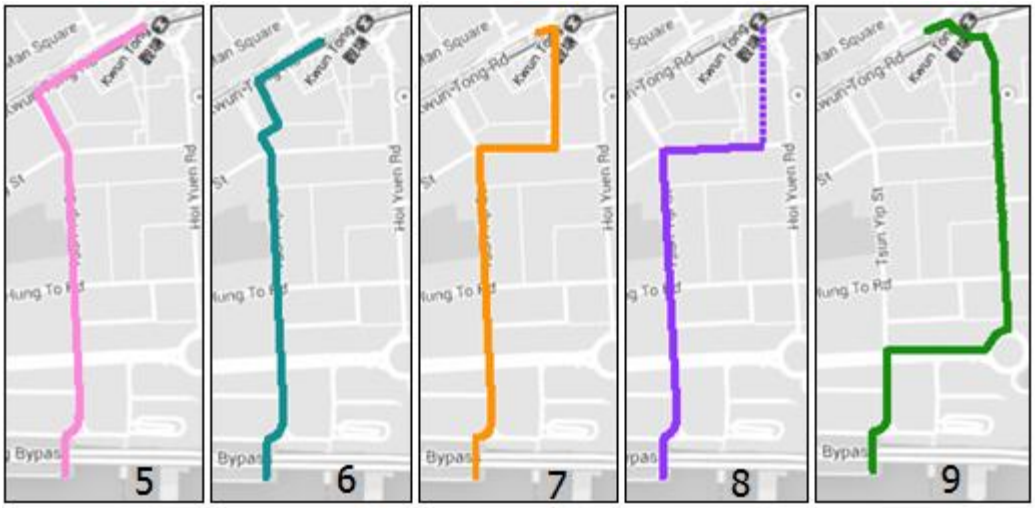

Figure F. 2: Routes 5, 6, 7, 8 and 9, originating from Kwun Tong MTR Station

Route 1 uses exit B6 of Ngau Tau Kok Station, which uses a subway underneath Kwun Tong Road (denoted by a doted line in Figure F.1). The subway emerges onto Lai Yip Street, which is followed to Hoi Bun Road. It is assumed pedestrians wishing to access the waterfront will cross Hoi Bun Road at the Lai Yip Street intersection and walk on the sidewalk closest to the Kwun Tong Promenade.

Routes 2 and 3 use exit A of Ngau Tau Kok MTR Station and follow the southwest sidewalk along Kwun Tong Road to the pedestrian footbridge connected to the Millennium City Phase II Tower (also denoted by the dotted line in Figure F.2). Route 2 continues through the Millennium Tower and exits onto Chong Yip Street. Chong Yip Street is followed to the right, until turning right onto Hung To Road. A left is taken at Lai Yip Street, and the route then coincides with the path of Route 1. Route 3 also utilizes the connection of the Millennium Tower, however it exits the building onto Kwun Tong Road and takes the left between Millennium Towers II and III. The pathway continues on Chong Yip Street and turns left on Hung To Road. A right is taken at the intersection of Hung To Road and How Ming Street, and How Ming Street is followed until it intersects with Hoi Bun Road. Hoi Bun Road is crossed at this point, as the Fly Over resting area and harbor front are visible.

Route 4 uses exit A of Ngau Tau Kok MTR Station and also follows the sidewalk southwest along Kwun Tong Road. A subway is then used to traverse under Kwun Tong Road (denoted by the dotted line on Figure F.1). The alleyway between Meyer Industrial Building and Millennium Phase I is followed, and the route continues down How Ming Street, coinciding with Route 3 to the waterfront.

Routes 5 and 6 both use the A2 exit of Kwun Tong MTR Station and turn left on Kwun Tong Road. Route 5 turns left onto Tsun Yip Lane, whereas Route 6 turns left down the alley following One Pacific Centre and then right down a second alley before converging onto Tsun Yip Lane. Across How Ming Street, Tsun Yip Lane becomes Tsun Yip Street, and both routes

continue down Tsun Yip Street and cross at the intersection of Hoi Bun Road, which leads directly to the entrance of the Kwun Tong Promenade.

Route 7 also uses the A2 exit of Kwun Tong MTR Station; however, the route exits to the right and follows the alleyway adjacent to the exit. A right is taken onto How Ming Street and then a left at the intersection of Tsun Yip Street and How Ming Street. Again, the route coincides with Routes 5 and 6 and follows Tsun Yip Street until reaching the promenade entrance.

Route 8 exits the Kwun Tong MTR Station through the APM Mall and continues through the Entrepot Centre to How Ming Street (denoted by the dotted line in Figure F.2). The route continues right down How Ming Street and then coincides with Route 7.

Route 9 exits the Kwun Tong MTR Station from exit A2 and takes a right onto Kwun Tong Road and follows the circle right onto Hoi Yuen Road. Hoi Yuen Road is then followed until the traffic circle, and a right is taken onto Wai Yip Street. Wai Yip Street is followed until taking a left onto Tsun Yip Street, where Route 9 coincides with the other four routes originating from the Kwun Tong Station.

F.2: Detailed Route Condition Results

Each of the nine routes was walked at least three times, both during the week and on a Saturday and Sunday, and at varying times of day. For each walk, the route was rated bronze, silver, gold or platinum, with platinum being the ideal standard, for each of the following criteria: the width and quality of walkways, prevalence and clarity of signage, ease and availability of connectivity, degree of universal accessibility and the amount of pedestrian traffic (see Table E.1). The platinum criteria for each category were derived from international access standards (refer to Appendix C). Additionally, an overall rating was given to each route based on the average of ratings in each category.

Table F. 1: Current Route Condition Ratings

Route Number	Sidewalks and Walkways	Signage	Connectivity	Universal Accessibility	Pedestrian Traffic	Overall Rating
1	Gold	Gold	Platinum	Bronze	Gold	Gold
2	Silver	Bronze	Silver	Silver	Silver	Silver
3	Silver	Bronze	Gold	Silver	Silver	Silver
4	Silver	Bronze	Silver	Bronze	Bronze	Bronze
5	Silver	Silver	Gold	Silver	Silver	Silver
6	Silver	Bronze	Gold	Silver	Silver	Silver
7	Silver	Bronze	Gold	Silver	Bronze	Silver
8	Silver	Bronze	Gold	Silver	Bronze	Silver
9	Silver	Bronze	Silver	Silver	Bronze	Silver

Route 1 received a rating of gold for sidewalks and walkways since the majority of the route has wide walkways. Lai Yip Street is at least 4 meters wide, with the exception of one area of construction, and is significantly wider east of Wai Yip Street. The walkway rating would be platinum, however, the sidewalk on the harbor front side of Hoi Bun Road gets very narrow, and was highlighted as a point of possible congestion that hinders universal accessibility. The signage rating was also gold, as there is prevalent signage for the Energizing Kowloon East Office, however, there is minimal signage at the origin of the route within the MTR Station. If the EKEO listing under exit B6 is initially missed, there is a high chance of it not being observed at later points along the route. In addition, there is no EKEO signage at the entrance of the subway, which may cause confusion and a pedestrian may bypass the subway. Connectivity scored platinum, as there are two major intersections to cross, both of which contain well-marked zebra crossings. Although there are the audio pedestrian signals at the zebra crossings, this route is otherwise not universally accessible, scoring bronze. The subway does contain handrails on both sides, however it is not accessible to those in a wheelchair, as it only has stairs. Lastly, the pedestrian traffic along this route varies between some pedestrian traffic (approximately 55 pedestrians per minute) and very light traffic (as few as 10 pedestrians per minute recorded).

Therefore, it was rated at the worst case and given a gold rating. The combination of the three gold ratings, one platinum rating and one bronze rating averaged to an overall rating of gold, the highest overall.

Although the sidewalks along Route 2 are about 3 meters wide, Route 2 was rated silver since there was construction along Hung To Road, significantly narrowing the pathways and congesting pedestrian traffic. The sidewalk on Hung To Road was uneven with steep slopes, and there were some parking garages and mechanics shops that had heavy traffic pulling in and out, and using the sidewalk as a loading zone or area for storage. The signage along Route 2 was rated bronze, as there were no signs for the waterfront, only a few for the Ngau Tau Kok MTR Station. Connectivity was rated silver, since there are no marked crosswalks across Chong Yip Street or Hung To Road, although there are marked zebra crossings along Lai Yip Street. Although there was the audio pedestrian cross signal at zebra crossings, universal accessibility was rated silver, as there was no other braille or tactile surfaces along the route. There was one ramp providing access to the pedestrian footbridge, however, the slope grade exceeded the ratio of 1:12. Depending on the day of the week and the time of day, the pedestrian traffic varies from about 10 to 85 pedestrians per minute, so pedestrian traffic was rated at the highest level, silver. Overall this route averaged a rating of silver, making it an acceptable, yet impractical route.

Route 3 was rated silver for sidewalks and walkways, as the sidewalks were only about 2 meters wide through the two Millennium Phase Towers, along Hung To Road and How Ming Street. Additionally, there were points along through route where the sidewalk had a steep slope down to the road and was further narrowed due to railings and fire hydrants at corners. Signage was rated bronze because there are no signs for the waterfront. However, there a few MTR signs and the ones along How Ming Street include the universal symbol for handicap accessibility. The connectivity of Route 3 was rated silver, since only one of the three crossings was a zebra crossing. When turning left onto Hung To Road, there is a crossing to a central island that then connects to the sidewalk, where both crossings are unmarked and only labeled with directional

arrows. Additionally, there is no marked zebra crossing over Hoi Bun Road to reach the waterfront. However, the intersection of Hung To Road and How Ming Street had the most vehicular traffic of the three roads and there was a zebra crossing in all four directions of the intersection. This route earned a silver rating for handicap accessibility since there were tactile surfaces present, even at crossings that were not marked zebra crossings. Also, the curb ramps, although not ideal for a wheelchair, were wheelchair accessible. Route 3 also utilizes the same pedestrian footbridge as Route 2, which is has a slope grade that less than ideal to be accessed in a wheelchair. Lastly, pedestrian traffic was rated silver since there can be some traffic along Hung To Road, with approximately 50 pedestrians per minute at its busiest, a weekday during the lunch hour. Overall this route averaged a rating of silver, making it an acceptable, yet impractical route.

Route 4 was rated silver for sidewalks and walkways due to the width of How Ming Road, discussed for Route 3. However, the walkway for the first half of the route up until the crossing at How Ming Street, the walkway has at least 4 meters of even, level unobstructed walking space. The signage was also rated the same as Route 3, bronze, as there are no signs for the waterfront. Although there are no waterfront signs, MTR signs are prevalent and are labeled with the universal symbol for handicap accessibility between the waterfront and the crossing at How Ming Street. The connectivity of Route 4 was rated gold since every intersection except for How Ming Street and Hoi Bun Road had well defined zebra crossings. Although the zebra crossings had tactile surfaces and audio pedestrian walk signals, this route was rated a bronze for universal accessibility. The subway used as a linkage underneath Kwun Tong Road consists of only stairs and is not wheelchair accessible. The pedestrian traffic along this route was also rated a bronze, as there were over 140 pedestrians per minute recorded at the crossing of How Ming Street during the lunch hour on a weekday. Additionally, the subway has a decent amount of pedestrian traffic and seems to be more crowded since there is no defined side for pedestrian travel. Compared to the subway used in Route 1, for approximately the same amount of

pedestrian traffic, around 50 pedestrians per minute, this subway appears to be significantly more congested. This may be due to the fact the subway in Route 1 has a dividing hand railing with designated flow of traffic on each side and this subway does not. Overall, this route was rated bronze/silver, making it a possible, however, impractical route.

Routes 5-8 all achieved a sidewalk and walkway ratings of silver since the sidewalks along Tsun Yip Street are only about 2-3 meters wide and are relatively uneven. In addition, there are some obstacles at the corners of intersections to maneuver around, as well as construction blocking parts of the sidewalk. However, the sidewalk along Kwun Tong Road at the start of Routes 5 and 6 is approximately 4 meters wide and is even and level. Once a left is taken onto Tsun Yip Lane, the sidewalks become increasingly narrow until reaching the promenade. Along Route 6, the two alleys used to connect to Tsun Yip Lane are at least 3 meters wide and are level. Additionally, the majority of pedestrians observed along Tsun Yip Lane walk in the road as there is no through traffic and the road is significantly wider and more level than the sidewalk. Routes 5 and 6 received bronze ratings for signage, as there were only MTR Station signs along the route and none for the waterfront. Connectivity of both routes was rated gold, since each crossing, except for the last across Hoi Bun Road, was a well-defined zebra crossing. Universal accessibility was rated silver, as a wheelchair could be wheeled along both routes. The MTR A2 exit is marked with the international symbol of accessibility and has braille surfaces. The rest of the route is flat and a wheelchair can be pushed along the sidewalks and through the intersections. Routes 5 and 6 both received a rating of silver for pedestrian traffic since about 80 pedestrians per minute were observed passing through the intersection of Tsun Yip Lane, How Ming Street and Tsun Yip Road. Overall, both Routes 5 and 6 received ratings of silver, although not ideal, they are possible routes to reach the waterfront.

Route 7 achieved a rating of silver for sidewalks and walkways due to the narrow and steep, side sloping sidewalk along How Ming Street. The alley used at the exit of A2, though, has a level, wide sidewalk that is at least 3 meters at its narrowest point. However, once the right is

taken on How Ming Street and the route continues down Tsun Yip Street, the sidewalk condition worsens and narrows. Signage was also rated bronze, as there was only signage for the Kwun Tong MTR Station and not the waterfront. The route was rated gold for connectivity since all crossings, except for the last across Hoi Bun Road was a clearly defined zebra crossing. Universal accessibility was rated silver, since the MTR exit was wheelchair accessible and the rest of the route was flat enough to push a wheelchair. Due to the heavy amount of pedestrian traffic along How Ming Road, the route was rated bronze. Route 7 achieved an overall rating of silver, making it a possible route.

Route 8 also achieved a rating of silver for sidewalks and walkways, for the same route condition along How Ming Street and Tsun Yip Street as Routes 5-7. Signage was also rated silver, since there were no signs along the route for the promenade, only for the Kwun Tong MTR Station. Route 8 achieved a rating of gold for connectivity, as the only unmarked crosswalk was the final crossing across Hoi Bun Road. Universal accessibility was rated silver because there were two handicapped accessible lifts to exit APM Mall and the Entrepot Centre. Although both lifts were accessible, they required staff assistance to operate. The remainder of the route was flat enough to push a wheelchair to the promenade. Similar to Route 7, Route 8 was rated bronze for pedestrian traffic due to the heavy amount of pedestrians passing along How Ming Street. The overall rating of Route 8 is silver, making it a possible route to reach the waterfront.

Lastly, Route 9 achieved a silver rating for sidewalks and walkways because the sidewalk narrows along Hoi Yuen Road. The sidewalk is initially about 3 meters wide, however it decreases in width closer to the traffic circle. There are several street vendors along the sidewalk, in addition to being used as storage spaces, which further limit the walking space. Further, along Wai Yip Street there is an increase in a usage of sidewalks for storage and loading zones, and there are signs and fire hydrants in the middle of the path. Signage for Route 9 was rated silver, as there is some signage present, although its not prevalent. The signs that are there are small in size and text, with minimal visibility, especially when on the opposite side of the street. Connectivity

was rated gold as all the crossings, with the exception of the crossing across Hoi Bun Road, were clearly marked zebra crossings. Universal accessibility achieved a rating of silver, as exit A2 is universally accessible and the rest of the route is acceptable, though not ideal, to be traveled in a wheelchair. Route 9 achieved a pedestrian traffic rating of bronze, as Hoi Yuen Street has a high amount of pedestrian traffic, upwards of 150 pedestrians passing per minute near the MTR Station during busy times. Overall, Route 9 achieves a rating of silver, and is the most appropriate route from the Kwun Tong MTR Station to the Kwun Tong Promenade.

Appendix G: Residential Connectivity

Route 1:

The first route (see Figure G.1) only had stairs, so it was not handicapped accessible. There were only tactile surfaces where the steps began and ended, none across the bridge nor on the ground around the bridge. The sidewalks around the entrances were narrow at some points and there were many obstacles such as vehicular red lights and fire hydrants. Also to enter the bridge, pedestrians must walk along aside a road with high vehicular traffic levels, with little barriers between the pedestrians on the sidewalk and the vehicles on Kwun Tong road. There is no signage on either side of the bridge for the waterfront.

Figure G. 1: Route 1, a pedestrian overpass

Route 2:

The second route was handicapped accessible via a ramp (see Figure G.2). However the ramp was rather steep, having an angle of 18.2°. Also there were bollards at the end of the ramp, that anyone with a stroller or wheelchair would have to maneuver around (see Figure G.3). There were only tactile surfaces where the steps and ramp began and ended, none along the floor of the

subway as it cross under Kwon Tong Road, and there were none leading up to the subway entrances, along Kwun Tong Road. There was no signage on either side of the subway for the waterfront. The sidewalks around the entrances to the subway were not that wide, but there were few obstacles such as trashcans and light posts that narrowed the sidewalk.

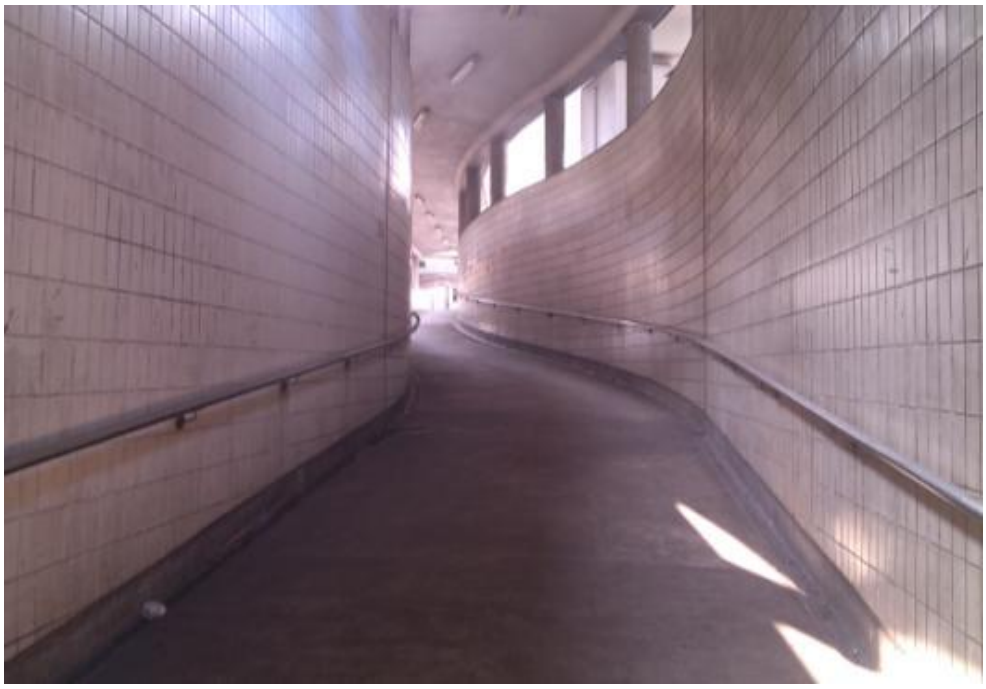

Figure G. 2: Route 2, ramp for handicapped access

Figure G. 3: Route 2, bollards at the end of the ramps

Route 3:

The third route was for the Ngau Tau Kok MTR station. The subway can only be access by stairs, so there was no access for those with wheelchairs or strollers (see Figure G.4). Like Route 2, there were only tactile surfaces where the steps began and ended. There was no signage on either side of the subway for the waterfront. The sidewalks around the entrances were wide and there were no obstacles around the entrances.

Figure G. 4: Route 3, steps leading to the subway

Route 4:

The fourth route was a pedestrian footbridge that went into Millennium Shopping Mall. It was handicapped accessible via a ramp (see Figure G.5). However the ramp was rather steep, having an angle of 18.9°, and there were warning signs on the ramp, warning it was slippery when wet. There were no tactile surfaces around the entrances or on the stairs, ramp or bridge. There was no signage around the entrances or on the bridge for the waterfront. To get to ground level with a wheelchair or stroller, one has to take the elevators down. Once on ground level, a mall employee must come to remove bollards before one can exit the building.

Figure G. 5: Route 4, ramp for handicapped access

Route 5:

The fifth route was a subway which, like Route 3, there were only tactile surfaces where the stairs began and ended. There was no ramp or lift, so there was no access for those with wheelchairs or strollers. There was no signage on either side of the subway for the waterfront. The sidewalks around the entrances on the residential side of Kwun Tong Road, were fairly wide (see Figure G.6). However around the entrance on the left (see Figure G.7) there are several bus stops. These bus stops cause frequent, sudden, increases in pedestrian traffic on the sidewalk, when passengers are let off. It can be very difficult to get around the passengers that just got off a bus and into the subway.

Figure G. 6: Route 5, north entrance on residential side of Kwun Tong Road

Figure G. 7: Route 5, south entrance on residential side of Kwun Tong Road

Route 6:

The sixth route was a pedestrian footbridge that was handicapped accessible via a ramp (see Figure G.8). However the ramp was rather steep, having an angle of 18.2°. There was no signage around the entrances or on the bridge for the waterfront. Like Route 1, there were only tactile surfaces where the steps and ramp began and ended. The sidewalk on the residential side was narrow and crowded due to the bus stops along it.

Figure G. 8: Route 6, ramp for handicapped access

Route 7:

The seventh route was a pedestrian footbridge that exited into the APM mall(see Figure F-9). There was a lift for those with strollers or wheelchairs on the residential side of Kwun Tong Road. However, to get to ground level on the waterfront side of Kwun Tong Road, a mall employee must assist in operation of the lifts and to remove bollards, if you have a wheelchair or stroller. There were only tactile surfaces where the steps began and ended, like Route 1. There was a sign for the Kwun Tong Promenade; however it was outside the steps only, so if you took the lift you would not see the sign (see Figure G.10).

Figure G. 9: Route 7, pedestrian overpass to APM mall

Figure G. 10: Route 7, signage outside the steps for the waterfront

Route 8-10:

The eighth, ninth and tenth routes are all pedestrian overpasses for the Kwun Tong MTR Station. Route 8 exited into APM mall, Route 9 exited onto Hoi Yuan Road and Route 10 exited along the waterfront side of Kwun Tong Road. Route 8 has a lift on the residential side of Kwun Tong Road for handicapped access (see Figure G.13). However, the handicapped access is only for the users MTR station and those going to APM mall. The only handicapped access down to the ground level on the waterfront side of Kwun Tong Road is though APM mall. Route 9 (see Figure G.14) and Route 10 (see Figure G.15) are not handicapped accessible on either side of Kwun Tong Road. There was signage for the Kwun Tong Promenade only outside the stairs of the Route 8 (see Figure G.11, G.12), on the residential side of Kwun Tong road. Otherwise there was no signage for the waterfront. For Routes 8 & 9, there were only tactile surfaces where the steps began and ended. There were no tactile surfaces on Route 10. On the residential side of Kwun Tong road, the south side exit for Route 10 has tactile surfaces on the sidewalk (see Figure G.16). Otherwise there are no tactile surfaces on the bridges or on the sidewalks surrounding the entrances on the residential side of Kwun Tong Road. Between these three bridges, there are also obstacles all along the sidewalks on the residential side of Kwun Tong Road, such as stalls, store fronts, trashcans and light posts. At some points the sidewalk became very narrow and uneven.

Figure G. 11: Route 8, a pedestrian footbridge that goes to Kwun Tong MTR Station

Figure G. 12: Route 8, signage outside the steps for the waterfront

Figure G. 13: Route 8, lift for handicapped access, hidden under the stairs

Figure G. 14: Route 9, a pedestrian footbridge that goes to Kwun Tong MTR Station

Figure G. 15: Route 10, a pedestrian footbridge that goes to the Kwun Tong MTR Station

Figure G. 16: Route 10, only tactile surfaces found on sidewalks along Kwun Tong Road

Route 11:

The eleventh route was a pedestrian overpass with a ramp for wheelchair and stroller access (see Figure G.17). The ramp wasn't as steep as the others, with an angle of 12°. There was no signage for the waterfront, and there were only tactile surfaces were the stairs and ramp began and ended. The sidewalks around the entrances to the footbridge were not obstructed and fairly wide.

Figure G. 17: Route 11, ramp for handicapped access

Appendix H: Visitor Opinion Analysis

This appendix contains the analysis of each route taken by the 12 visitors from the MTR stations of Ngau Tau Kok and Kwun Tong to the waterfront promenade. These visitors took part in a study where they were tasked with attempting to navigate to and from the waterfront from the designated MTR station. Each visitor was not allowed to ask for directions or use any sort of GPS navigation device. If preferred, the visitor was allowed to take pictures of any existing maps or signage in the area to assist them in their navigation.

H.1: Routes Originating from Kwun Tong MTR Station to the Waterfront

The routes of six visitors were recorded from Kwun Tong MTR station to the waterfront promenade in Kwun Tong. Visitors 1,3, and 4 all took very similar routes to the waterfront. These three visitors exited the MTR station at Exit A2 and headed southeast towards Hoi Yuen Road. From there, the visitors took a right on Hoi Yuen Road and traveled southwest for approximately 550 meters. The visitors then took another right at the roundabout and began traveling northwest on Wai Yip Street for approximately 250 meters. They then took a left at Tsun Yip Street and traveled southwest the remaining distance to the promenade. This route was one of three routes recommended by Google maps. These three visitors averaged a distance traveled of about 0.83 miles or 1.33 km. As you can see in Table G-2, the expected distance for the most direct route to the waterfront is approximately 0.62 miles or 1 km. From this, our team determined that the visitors that traveled this route took a detour of about 0.21 miles or 0.33 km. This distance accounts for about 34% of the total trip distance. In terms of time spent, these visitors averaged a travel time of approximately 13 minutes and 40 seconds. Again, according to the most direct route provided by Google maps, the journey should take around 13 minutes. In this sense, the detour was less than a minute, 40 seconds to be exact. A forty-second detour only accounts for about 5% of the total trip time. The visitors who took this route had the best results in reaching

the waterfront compared to the others who traveled from Kwun Tong MTR station to the waterfront. Figure H.1 displays the route that KT visitors 1, 3, and 4 used to travel to the waterfront and Table H.1 displays the detour information for all of the routes from Kwun Tong MTR Station.

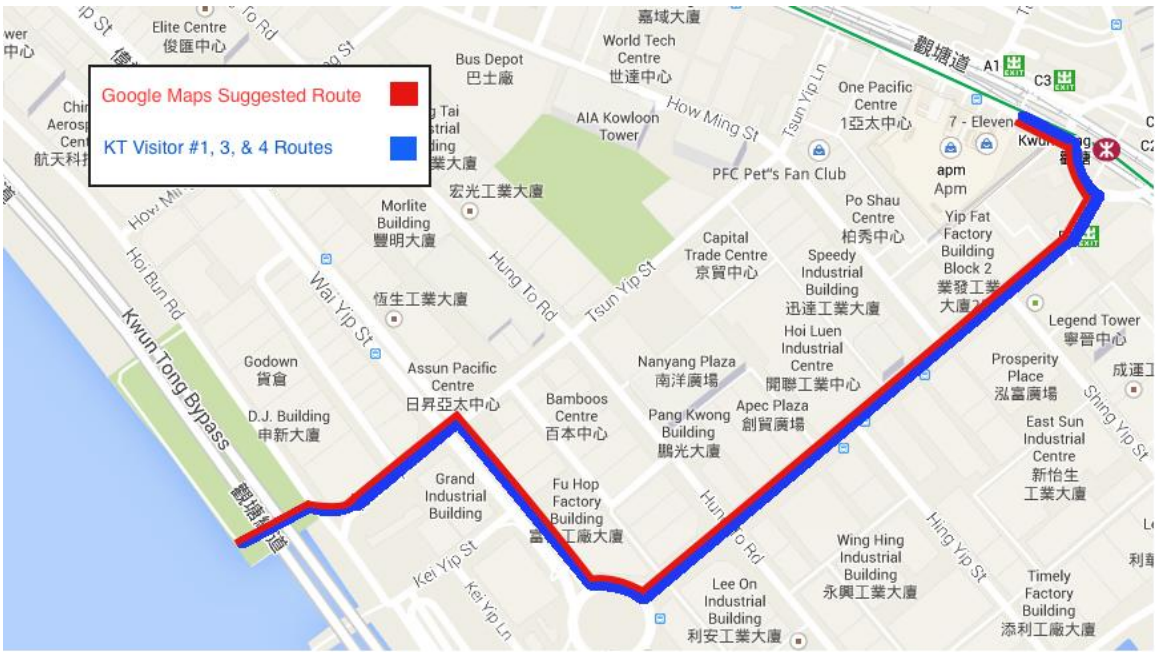

Figure H. 1: KT Visitor #1, #3, & #4 vs. Google Maps, originating from Kwun Tong MTR Station

Kwun Tong visitors #2 and #6 also took a similar route to the waterfront. Visitor #2 exited from Exit A2 of the MTR station and proceeded as the previous visitors did to Hoi Yuen Road. Visitor #6 took Exit B1which feeds directly onto Hoi Yuen Road. From there both visitors traveled southwest for approximately 550 meters. However, once they reached the roundabout, the visitors took a left on Wai Yip Street and began traveling southeast until the reached a pedestrian footpath that provides passage over Wai Yip Street. Once over the street, the visitors took a right and began walking along the waterfront near the ferry pier in the direction of northwest. After navigating around the ferry pier the visitors reached the Kwun Tong Promenade. These two visitors averaged a route distance of about 1.1 miles or 1.75km. According to the most direct route on Google maps that was mentioned earlier, the visitors took a detour of approximately 0.48 miles or 0.75 km. This accounts for roughly 77% of the total trip distance.

The two visitors that traveled this route averaged close to 18.5 minutes in travel time. In terms of the time detour, these visitors took a detour of close to 5 minutes and 30 seconds. This time detour accounts for about 42% of the total trip time. The visitors that took this route to the waterfront took the least efficient route of the routes recorded. Figure H.2 displays the route that KT visitors 2 and 6 used to travel to the waterfront overlaid against the Google Maps suggested route and Table G-1 displays the detour information.

Figure H. 2: KT Visitor #2 & #6 vs. Google Maps, originating from Kwun Tong MTR Station

KT visitor #5 traveled the third different route that was traveled from Kwun Tong MTR station. Similarly to many of several of the other visitors, Visitor #5 exited the MTR station at Exit A2. The visitor then traveled northwest along Kwun Tong road for roughly 150 meters. From there, the visitor turned left on Tsun Yip Lane and headed southwest, continuing onto Tsun Yip Street. At the end of Tsun Yip Street, the visitor took a right onto Hoi Bun Road and traveled northwest approximately 100 meters to the entrance of the Kwun Tong Promenade. Visitor #5 traveled a distance close to 1.1 miles or 1.75 km. The distance of the detour in this case was

similar to that of visitors #2 and #6, close to 0.48 miles or 0.75 km. Again, this accounts for roughly 77% of the total trip distance. In terms of time, visitor #5 took 18 minutes to reach the waterfront. The total of an 18-minute trip gives a detour of about 5 minutes. A 5-minute detour accounts for close to 38% of the total trip time. The data that resulted from visitor #5's route is very similar to the data collected from visitors #2 and #6. However, if we take a closer look at the video footage of visitor #5, we see that in fact, the route taken is quicker than that of the route taken by visitor #2 and #6. The reason that the data is similar is because visitor #5 became lost and returned to the start to examine the map at the MTR station. If it wasn't for this detour Visitor #5 actually took one of the most direct route as specified by Google maps. Visitor #5's route is overlaid in Figure H.3 vs. the Google Maps suggested route. Table H-1 displays the detour information.

Figure H. 3: KT Visitor #5 vs. Google Maps, originating from Kwun Tong MTR Station

Table H. 1:Data Table – Individual Detour Route Analysis: Kwun Tong MTR Station

Individual Route Detour Data: Kwun Tong MTR Station						
					Detour	
MTR Station	Visitor #	Distance (miles)	Distance (km)	Time (mins)	% Of Trip Time	% Of Trip Distance
KT	1,3,4	0.83	1.328	13.667	5%	34%
KT	2,6	1.1	1.76	18.5	42%	77%
KT	5	0.94	1.504	18	38%	52%

H.2: Routes Originating from Ngau Tau Kok MTR Station to the Waterfront

Similar to the previous section, the routes of six visitors from Ngau Tau Kok station were recorded as they attempted to reach the waterfront. NKT visitor #1 and #5

Traveled to the waterfront through the most direct route of all the visitors. Both visitors took exit B6 from the station and headed southwest towards on Lai Yip Street for approximately 350 meters. The visitors then took a left onto Hoi Bun Road and headed southeast for close to 450 meters until they reached the entrance to the Kwun Tong Promenade. This route was one of two recommended by Google maps. According to the aforementioned, this route was to take approximately 11 minutes and cover about 1 km in distance. These two visitors averaged a trip time of 12 minutes and 30 seconds and a distance of about 0.71 miles or 1.136 km. According to this information, the two visitors averaged a detour of roughly one tenth of a mile or 0.16 km. In terms of time, the detour by visitors #1 and #5 was close to 1 minute and 30 seconds. You can see in the table below that the distance of this detour only accounts for about 16% total trip, while in time, it only accounts for approximately 14% of the trip. Figure H.4 displays the route taken by these two visitors and compares it to the most direct route suggested by Google Maps and Table H.2 displays the route detour information.

Figure H. 4: NTK Visitor #1 & #5 vs. Google Maps, originating from Ngau Tau Kok MTR Station

Ngau Tau Kok Visitors #2, #3, and #6 also took very similar routes to the waterfront. These three visitors exited the MTR station at Exit B and proceeded to travel southeast along Kwun Tong Road for a few hundred meters until they reached a pedestrian footbridge. The visitors then took this bridge, heading southwest across Kwun Tong Road towards the waterfront. The footbridge connects to Millennium City Phase II Tower. From there, the visitors walked through the building and descended the escalators, arriving on street level at Chong Yip Street. From there, the visitor turned right and headed northwest along Chong Yip Street turning left and continuing southwest along the aforementioned street for approximately 100 meters. The three visitors then turned right on Hung To Road and traveled northwest about 150 meters until they reached Lai Yip Street. At this point, the visitors turned left onto Lai Yip Street and walked southwest for roughly 200 meters until the intersection of Hoi Bun Road. At Hoi Bun Road, the

visitors took a left and traveled about 450 meters southeast until they reached the entrance to the promenade. Visitors #2, #3, and #6 averaged a distance of nearly 1.3 miles or close to 2 km. The detour in this case was very nearly 100% of the suggested trip, in other words, the detour, in this situation, doubled the distance that the visitors had to travel. In terms of time traveled, these two visitors averaged about 20 minutes. The time detour in terms of percentage of the total suggested trip was approximately 82%. The time detour was roughly 9 minutes. Figure H.5 displays the route taken by these three visitors and compares it to the most direct route suggested by Google Maps and Table H.2 displays the route detour information.

Figure H. 5: NTK Visitor #2, #3, & #6 vs. Google Maps, originating from Ngau Tau Kok MTR Station

Visitor #4 from Ngau Tau Kok never actually reached the Kwun Tong Promenade. This visitor traveled from NTK MTR station but never reached the end point destination for the study. Although there is no quantitative data from this route, the fact that the visitor got lost is much

more valuable. As stated earlier in Section 4.4.1, since the visitor did not reach the waterfront, this data helps to corroborate the idea that the region of Kwun Tong not intuitive to navigate and that there is a limit to the degree of accessibility and universal accessibility in the region. Although the entire promenade is not open, this information is still quite valuable. This visitor actually spent close to 15 minutes trying to figure out a way to cross Kwun Tong Road. The visitor traveled northeast along the road until finally finding a subway underpass. Visitor #4 spent nearly thirty minutes attempting to find the waterfront before deciding to give up and return back to the MTR station. The visitor traveled close to 2 miles or 3.2 km and failed to reach the waterfront.

Table H. 2: Data Table – Individual Detour Route Analysis: Ngau Tau Kok MTR Station

Individual Route Detour Data: Ngau Tau Kok MTR Station						
					Detour	
MTR Station	Visitor #	Distance (miles)	Distance (km)	Time (min)	% Of Trip Time	% Of Trip Distance
NKT	1,5	0.71	1.136	12.5	14%	16%
NKT	2,3,6	1.3	2.08	20	82%	110%

H.3: Overall Route Detour Data Tables

Table H. 3: Data Table - Visitor Route Information: Kwun Tong MTR Station

MTR Station	Visitor	Time (mins)	Distance (miles)	Distance (km)	Expected Time Google (mins)	Expected Distance Google (miles)	Expected Distance Google (km)
KT	KT 1	16	0.8	1.28	13	0.62	0.992
KT	KT 2	22	1.1	1.76	13	0.62	0.992
KT	KT 3	13	0.75	1.2	13	0.62	0.992
KT	KT 4	12	0.94	1.504	13	0.62	0.992
KT	KT 5	18	1.1	1.76	13	0.62	0.992
KT	KT 6	15	1.1	1.76	13	0.62	0.992
Avg.		16	0.965	1.544	13	0.62	0.992

Table H. 4: Data Table - Visitor Detour Information: Kwun Tong & Ngau Tau Kok MTR Station

Average Detour: Kwun Tong Station				
Time (min)	**Distance (miles)**	**Distance (km)**	**% Of Trip Time**	**% Of Trip Distance**
3	0.345	0.552	23.077	55.645
Average Detour: Ngau Tau Kok Station				
Time (min)	**Distance (miles)**	**Distance (km)**	**% Of Trip Time**	**% Of Trip Distance**
6	0.444	0.7104	54.545	71.613

Table H. 5: Data Table - Visitor Route Information: Ngau Tau Kok MTR Station

MTR Station	Visitor	Time (mins)	Distance (miles)	Distance (km)	Expected Time Google (mins)	Expected Distance Google (miles)	Expected Distance Google (km)
NKT	NKT 1	13	0.67	1.072	11	0.62	0.992
NKT	NKT 2	21	1.2	1.92	11	0.62	0.992
NKT	NKT 3	20	1.2	1.92	11	0.62	0.992
NKT	NKT 4	NA	NA	NA	11	0.62	0.992
NKT	NKT 5	12	0.75	1.2	11	0.62	0.992
NKT	NKT 6	19	1.5	2.4	11	0.62	0.992
Avg.		17	1.064	1.7024	11	0.62	0.992

H.4: Visitor Opinion Survey Results, Data Tables and Charts

Table H. 6: Data Table - Visitor Survey Questionnaire Responses: Part B

		Part B								
Visitor #	MTR Station	1	2	2A	3	4	5	6	7	8
KT #1	KT	DN	Y	1	N	Y	N	N	DN	Y
KT #2	KT	Y	Y	2	N	Y	Y	N	DN	Y
KT #3	KT	N	Y	2	Y	Y	Y	Y	N	Y
KT #4	KT	DN	Y	1	Y	Y	Y	N	Y	Y
KT #5	KT	N	Y	2	N	N	DN	N	DN	Y
KT #6	KT	Y	Y	2	Y	Y	Y	Y	N	Y
NTK #1	NTK	DN	N	NA	N	DN	Y	DN	Y	Y
NTK #2	NTK	Y	Y	2	N	Y	Y	N	Y	Y
NTK #3	NTK	N	Y	3	N	N	Y	N	N	Y
NTK #4	NTK	Y	Y	3	N	Y	Y	DN	Y	N
NTK #5	NTK	N	Y	3	N	N	N	N	N	Y
NTK #6	NTK	Y	Y	6	N	Y	N	DN	N	N

Table H. 7: Data Table - Visitor Survey Questionnaire Responses: Part C

	Part C				
Visitor #	1	2	2A	3	3A
KT #1	Y	Y	Promenade is beautiful but too much construction	N	Dining options and advertise it more
KT #2	N	N	No interest in the area	N	More spots for sightseeing, only locals out for a walk
KT #3	N	Y	It's a central area in Hong Kong	N	If it was a bigger park
KT #4	N	Y	Seemed cool	DN	
KT #5	N	N	Nothing really to do there, nothing to bring me back	N	More stuff to do there, make it more of a focus point, the area doesn't make it seem like you are going towards a tourist attraction
KT #6	DN	N	Not much reason to	N	Nothing to do
NTK #1	N	N	There's nothing to draw you there except water	N	Dining and entertainment and better publicity
NTK #2	N	Y	The waterfront was nice	N	If there were restaurants and shops and other entertainment along the water
NTK #3	N	Y	The promenade was really nice	N	Less construction, more features such as dining and activities, improved accessibility from MTR stations
NTK #4	N	Y	I have to for my project	N	
NTK #5	Y	N	It was cool to see once, but there isn't anything to do	N	Entertainment and Bars
NTK #6	Y	Y	Its nice, I like water	N	If I could walk to it as soon as I get there instead of walking around it

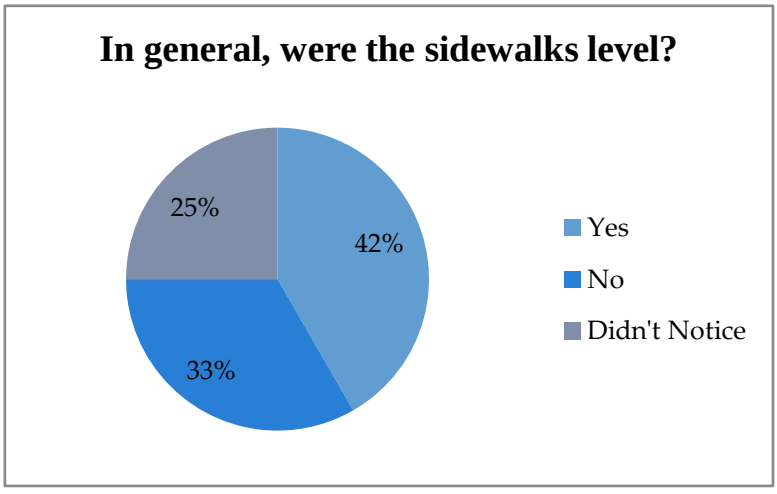

Figure H. 6: Question #1 Part B–In general, were the sidewalks level?

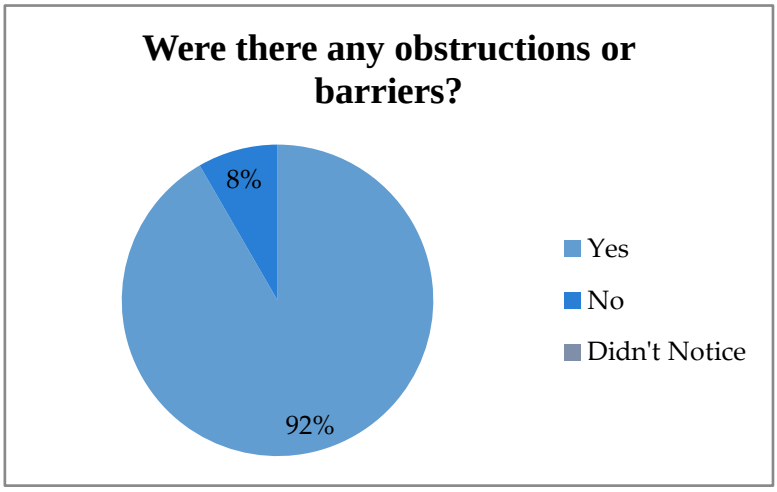

Figure H. 7: Question #2 Part B –Were there any obstructions or barriers?

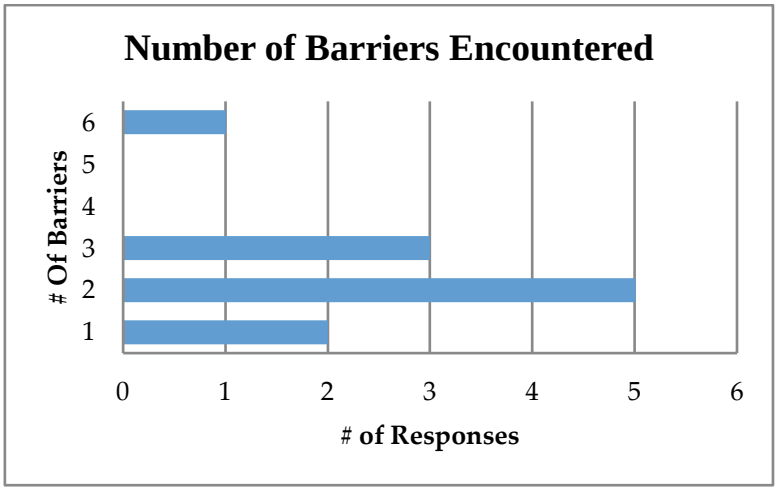

Figure H. 8: Question #2A Part B –If so, how many barriers or obstructions did you encounter?

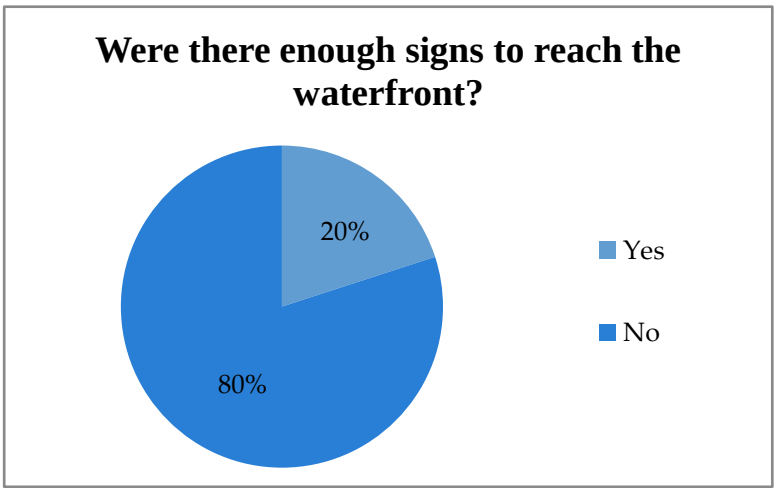

Figure H. 9: Question #3 Part B – Were there enough signs to get to the waterfront?

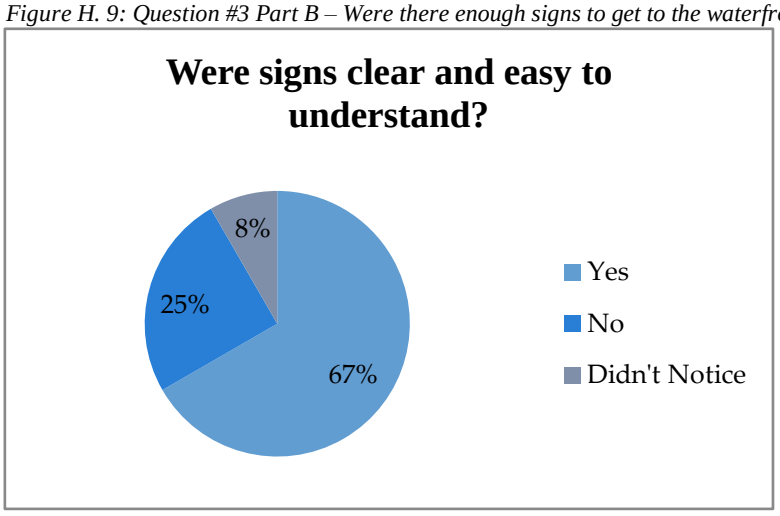

Figure H. 10: Question #4 Part B – Were signs clear and easy to understand?

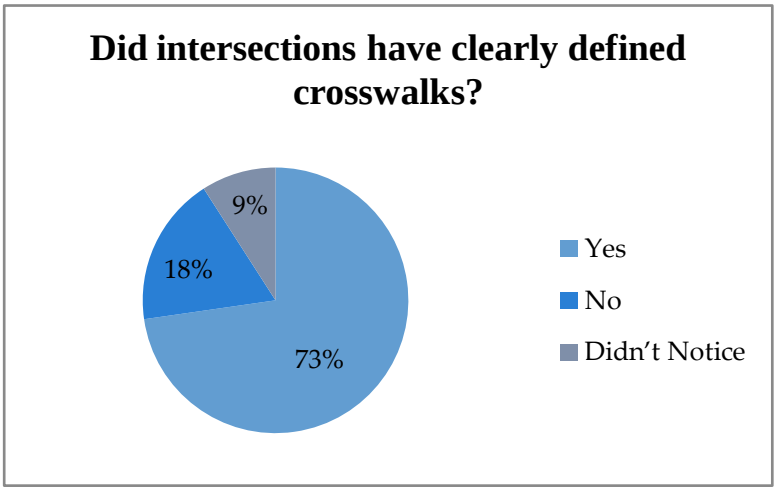

Figure H. 11: Question #5 Part B – Did intersections have clearly defined crosswalks?

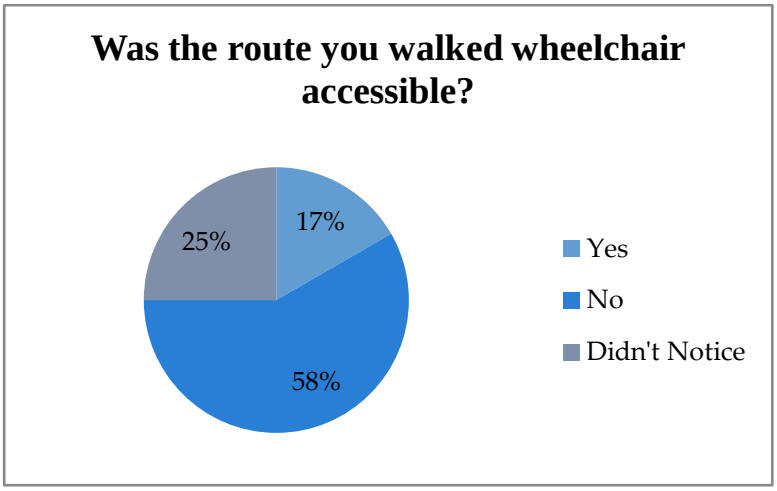

Figure H. 12: Question #6 Part B– Was the route you walked wheelchair accessible?

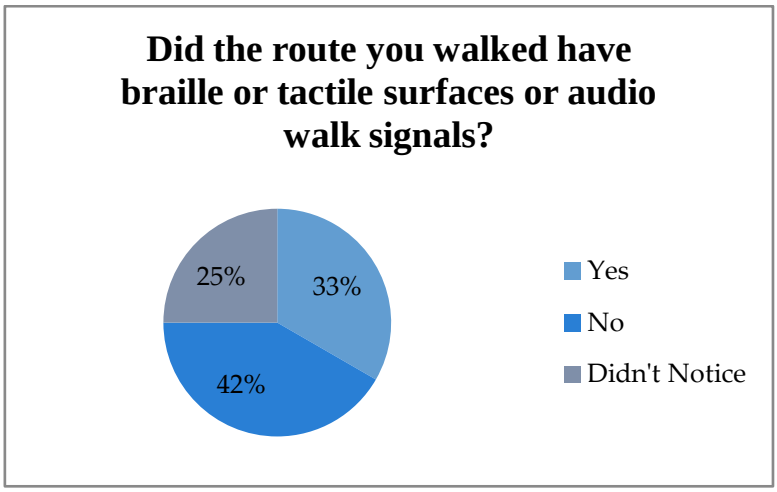

Figure H. 13: Question #7 Part B – Did the route you walked have braille or tactile surfaces or audio walk signals?

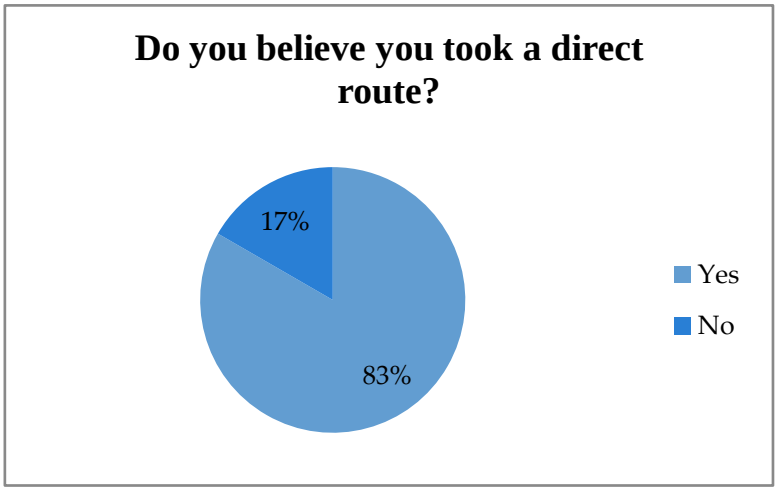

Figure H. 14: Question #8 Part B – Do you believe you took a direct route to the waterfront?

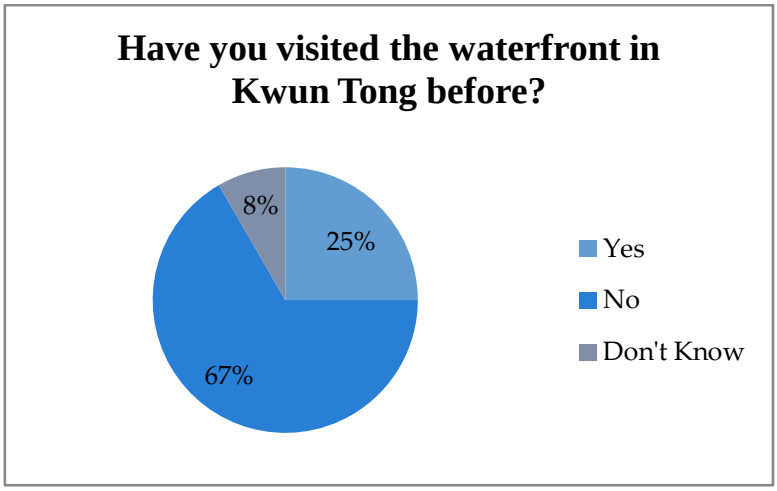

Figure H. 15: Question #1 Part C – Have you visited the waterfront in Kwun Tong before?

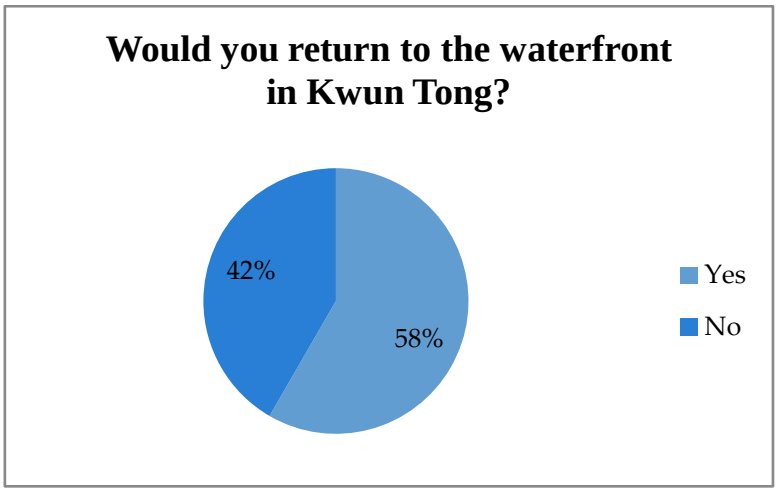

Figure H. 16: Question #2 Part C – Would you return to the waterfront in Kwun Tong?

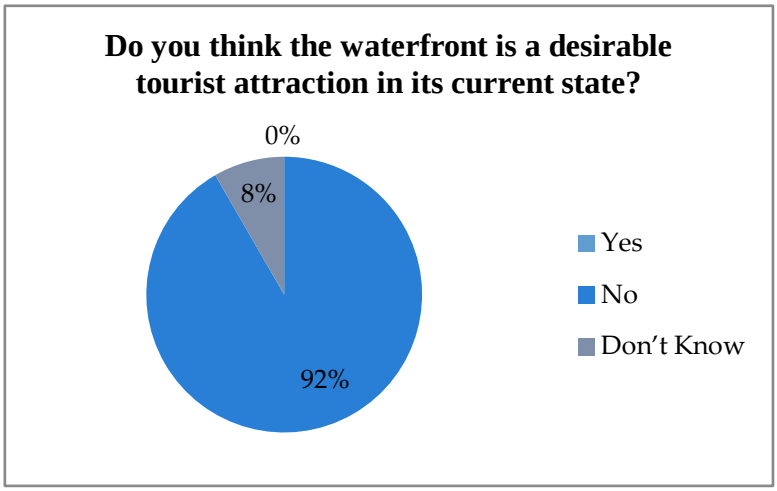

Figure H. 17: Question #3 Part C – Do you think the waterfront is a desirable tourist attraction in its current state?

Appendix I: Limitations of Accessibility

The nine identified routes as possible pathways to reach the waterfront were reevaluated from the perspective of a person in a wheelchair. From this first hand perspective, we determined whether routes we identified as universally accessible in our analysis from Section 4.1.2 were in fact wheelchair accessible.

First, Routes 1 and 4 originating from Ngau Tau Kok MTR Station were eliminated from our analysis, as both routes contain a subway that is completely inaccessible by wheelchair.

The remaining two routes from Ngau Tau Kok MTR Station could be navigated in a wheelchair, with assistance from someone pushing the wheelchair. The pedestrian overpass leading into the Millennium Phase II Tower had a slope of about 19° with two landings, making it possible to wheel a wheelchair up and down (Figure I.1, taken from first landing at ramp entrance). Additionally, there were textured strips to provide traction and slip resistance, however, they were in poor condition and degrading.

Figure I. 1: Pedestrian Footbridge Ramp

Once inside Millennium Tower, the Fireman's lift was labeled as handicapped accessible, with all controls within reach from a wheelchair. The lift exited onto Kwun Tong Road and followed the sidewalk left, crossing between the Millennium Towers II and III. The sidewalk along Kwun Tong Road was wide and level, and it is possible for the person in the wheelchair to push him or herself. However, at the crossing between the two towers, assistance is required since the sidewalk is very sloped and there is a significant change in vertical height at the curb without a curb ramp (Figure I.2).

Figure I. 2: Crossing Between Millennium Towers II and III

Once on How Ming Street, the remaining section of Route 2 is handicap accessible, although there are a few areas that were difficult to traverse in a wheelchair. Along How Ming Street, there were several parking garages and blindside alleys with heavy traffic and steeped sloped landings to the street. In addition, there were metal bollards and a fire hydrant in the middle of the sidewalk. At the intersection of Hung To Road and How Ming Street, there is a wide corner and sidewalk, however, there are several motorcycles and cars parked on the walkway, severely limiting the walking space. The last major obstruction along Route 2 was the

construction at the intersection of Hung To Road and Lai Yip Street, which also limited the walkway width.

The remainder of Route 3 could also be navigated in a wheelchair, however it presented more challenges than Route 2. When crossing at the intersection of How Ming Street and Hung To Road, there is no marked zebra crossing with an audio walk signal. Rather, the route requires crossing onto an island that can be used to cross the street from three directions, but only contains 2 curb ramps. In addition, once on How Ming Street, the sidewalk narrows and becomes very uneven due to several sunken bricks. There are also several loading zones and the limited walking space is used for commercial storage.

The 5 routes originating from Kwun Tong MTR Station can all be navigated in a wheelchair, however there are more challenges faced compared to Routes 2 and 3. All routes, except Route 8, use Kwun Tong MTR Exit A2, which is clearly labeled as universally accessible and has braille surfaces inside the MTR entrance. The lift exits onto Kwun Tong Road, which has a wide, level sidewalk. Routes 5 and 6 use Tsun Yip Lane, which is relatively level with a wide walking space even with several street vendors. The lane has minimal through vehicular traffic and the street is often used as pedestrian walk space. The alleys used in Route 6 to reach Tsun Yip Lane are level and wide. Currently, the use of the second alley is limited due to construction, however once clear, it could be a viable wheelchair accessible pathway.

The main challenges along Routes 5 and 6 were faced once Tsun Yip Lane crossed How Ming Street and became Tsun Tip Street. The zebra crossing at this intersection lacked curb ramps, causing difficulty when wheeling a wheelchair through the intersection. Additionally, this intersection is very crowded with about 100 people passing through the intersection per minute during the lunch hour. The sidewalk along Tsun Yip Street significantly narrows past the Tsun Yip Street Playground and becomes increasingly uneven and narrow due to construction.

Route 7 uses the alleyway to the right of exit A2, which is also easily accessed in a wheelchair. The alley is level and at least 3 meters wide at its narrowest point. The accessibility

of this route is challenged when it continues onto How Ming Street, which has very narrow sidewalks. Furthermore, the sidewalks have a steep slope and are uneven due to many sunken bricks. The unevenness combined with high pedestrian traffic along How Ming Street make navigating this route with a wheel chair difficult.

Route 8 exits through APM Mall and continues through the Entrepot Centre, and is wheelchair accessible with assistance from mall staff. This exit uses a lift, adjacent to the escalator, which can only be operated with assistance from APM staff (Figure I.3). When in a wheelchair, one is also required to take an elevator to the ground floor and exit through a car park entrance. This lift is labeled as wheelchair accessible, however there are metal bollards blocking the exit of the elevator. Again, only with assistance from an Entrepot Centre staff member were we able to continue on this route. Additionally, the car park exits onto How Ming Street, and challenges similar to that of Routes 5-7 were faced.

Figure I. 3: Lift Requiring Staff Assistance

Of the five routes from Kwun Tong Station, Route 9 is the easiest to traverse in a wheelchair. The main challenge along this route is the congestion of pedestrian traffic, since Hoi Yuen Road is heavily traveled. At varying times of observation (morning, lunch hour and evening, during both weekdays and on weekends) there were at least upwards of 80 pedestrians passing per minute, with denser pedestrian traffic closer to the MTR station. Although the sidewalks along Hoi Yuen Road are level and wide, this high level of pedestrian traffic made pushing a wheelchair difficult.

As Route 9 is followed closer to the waterfront, the amount of pedestrian traffic decreases but so does the width of sidewalks. In addition, there are some street vendors along the sidewalk, further narrowing the walking space. The sidewalk along Wai Yip Street widens, once past the construction at the corner of Hoi Yuen Road and Wai Yip Street. However, the sidewalk becomes increasingly uneven and there are several loading zones using the sidewalk as storage space. The route turns onto Tsun Yip Street beyond the construction, and the sidewalks are wide enough for a wheelchair to pass in a moderate level of pedestrian traffic. Finally, all routes from the Kwun Tong MTR Station cross Hoi Bun Road at an unmarked crossing lacking adequate curb ramps.

When considering the overall universal accessibility of the region to the waterfront, it is relatively inaccessible. Those in wheelchairs face several significant challenges along each route, with two main routes being completely inaccessible. In addition, travel in a wheelchair requires assistance being pushed up curbs at intersections, steep ramps, and along side sloping sidewalks.

Appendix J: Accessibility Shortcomings

Our team determined several accessibility shortcomings based on our results and analysis presented in Chapter 4. Through our analysis of our results and the conclusions from GPS video filming, we identified the following challenge areas to be addressed that significantly hinder the universal accessibility of the Kwun Tong District.

- Curb Ramps: The curb ramps at intersections are often inadequate. There is often a change in vertical height greater than 0.5 inches without a slope, making it difficult to wheel a wheelchair into the crosswalk. See Figure J.1 for an example of an inadequate curb ramp.

Figure J.1: Image of Lack of Cub Ramp

- Loading Zones: The sidewalks are often mostly obstructed or completely blocked by commercial business use as storage or loading zone spaces (Figure J.2)

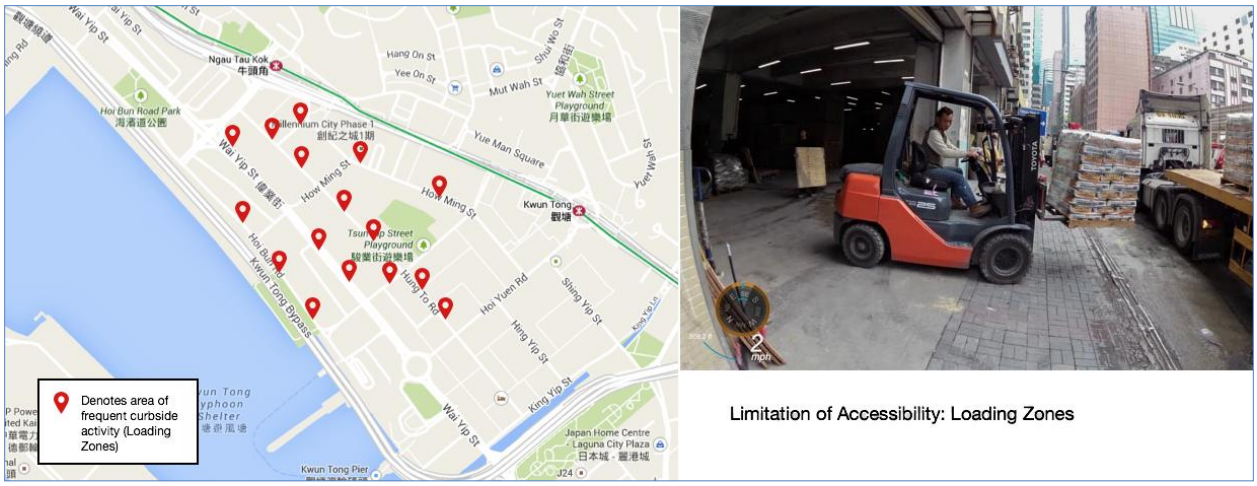

Figure J.2: Map Denoting Major Curbside Activity (Loading Zones)

- Zebra Crossings and eATS systems: There are often only zebra crossings or audible walk signals at major intersections, side streets have informal crossings. Figure J.3 maps all the crossings and the notes where all present zebra crossings in the area are located.

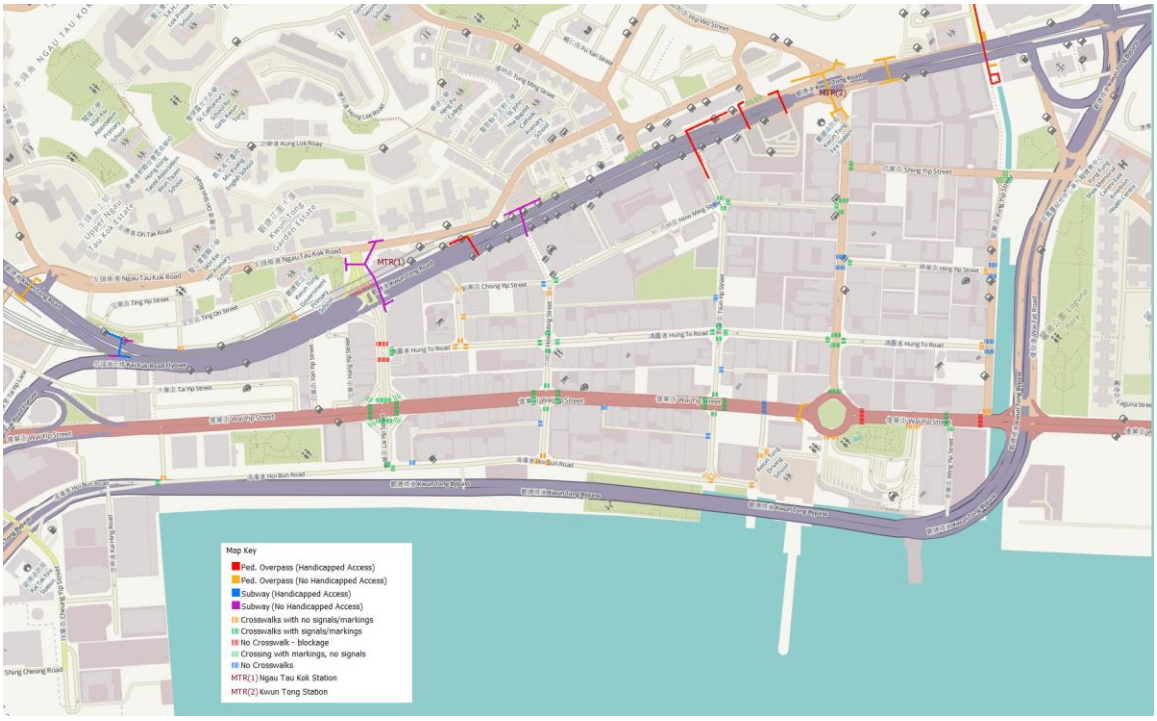

Figure J.3: Map Denoting All types of Crossings in the Region

- Signage: inadequate or lack of signage in key locations; small signs are difficult to see from a distance. Signs are only prevalent on the two main routes that the MTR designates as the correct exit for the promenade (J.4).

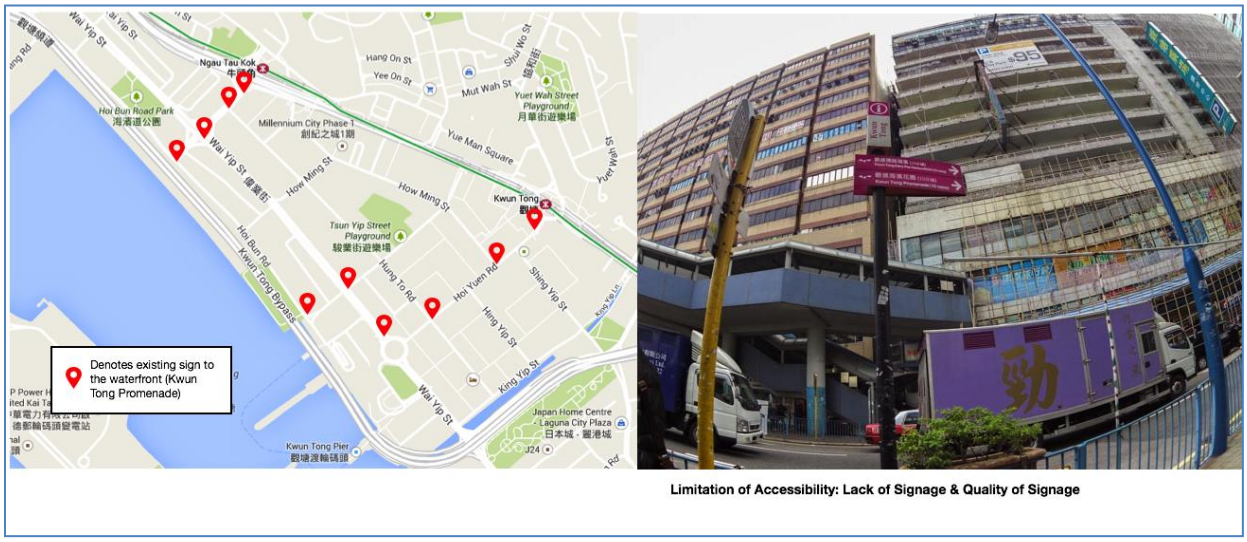

Figure J.4: Map Denoting All Signage to the Kwun Tong Promenade

- Walkways/Footpaths: Most sidewalks are extremely narrow and sometimes it becomes difficult for a wheelchair to fit on the walkway. There are often obstacles on walkways that hinder pedestrian flow (e.g. signs, fire hydrants, bollards, trash cans, street light posts)

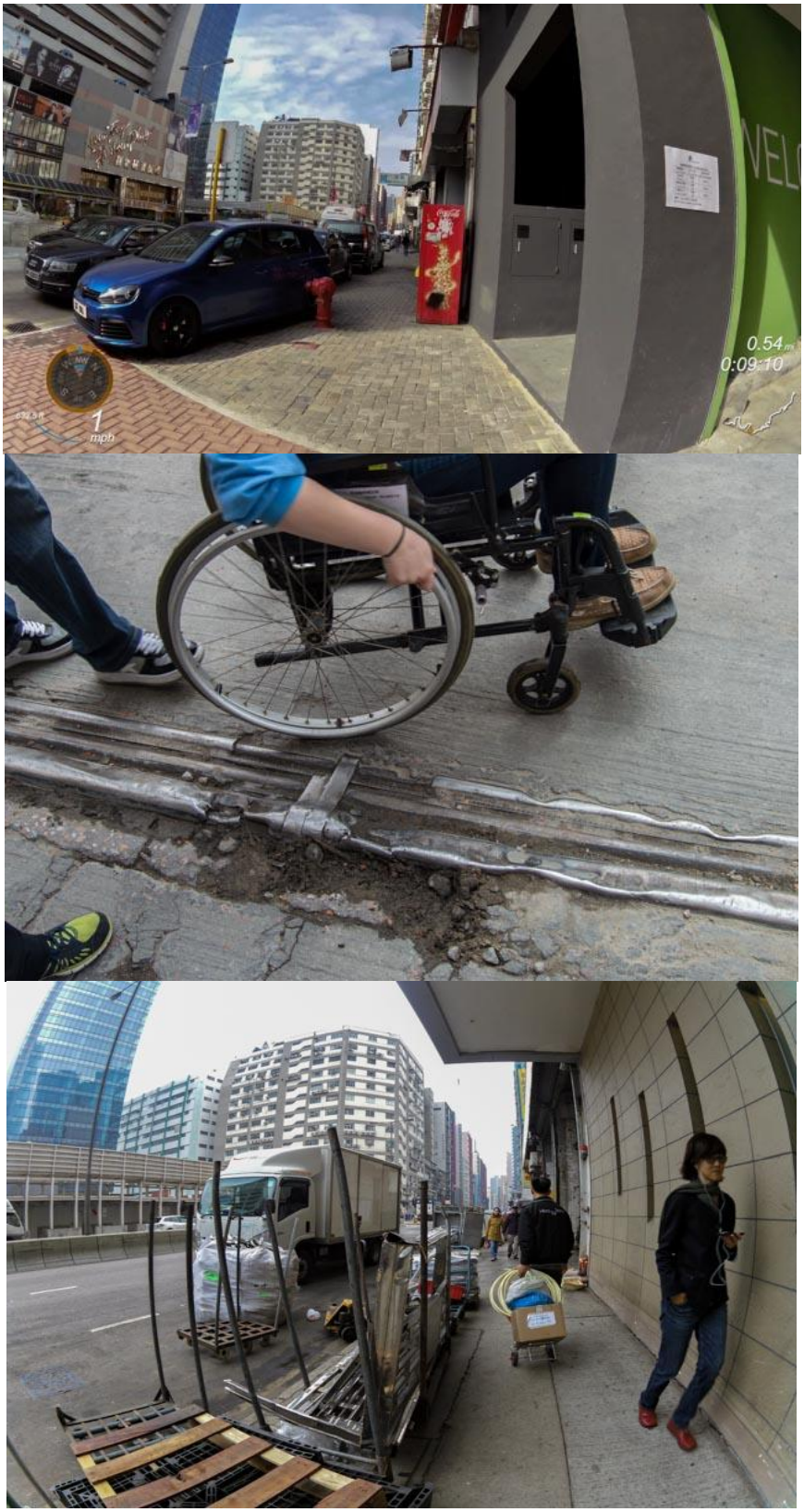

Figure J.5: Images of Obstacles often Found Along Walkways

- Wheelchair Ramps & Lift Access: If present, there is no standard for slope; becomes difficult to push someone or wheel oneself up a ramp. Some lifts are locked or require you to call for assistance to use; sometimes you must find a staff member in order to use the elevator.