







Urban Renewal Authority Development Scheme
Prepared under Section 25 (3) of the Urban Renewal Authority Ordinance

Nga Tsin Wai Road / Carpenter Road (KC-017)

Planning Report
May 2022

Book 2 of 2

市區重建局
URBAN RENEWAL AUTHORITY

Appendix 6

Traffic Impact Assessment (TIA) Report

ATKINS

Member of the SNC-Lavalin Group

Urban Renewal Authority Nga Tsin Wai Road / Carpenter Road Development Scheme (KC-017)

Traffic Impact Assessment Report

May 2022

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1. Introduction

1.1. Background

1.1.1. The Urban Renewal Authority (URA) has proposed a Development Scheme at Nga Tsin Wai Road/ Carpenter Road (KC-017) (the Scheme) under section 25 of the Urban Renewal Authority Ordinance (URAO).

1.1.2. This Traffic Impact Assessment (TIA) is to support the submission of a draft Development Scheme Plan (DSP) with its planning proposal to the Town Planning Board (TPB) for consideration.

1.1.3. Atkins China Limited (Atkins) was commissioned by URA to conduct a TIA study to assess the traffic impact and the proposal of traffic provisions for the Scheme.

1.2. Scope

1.2.1. The scope of this TIA is outlined as follows:

- conduct surveys to collect the existing traffic flows within the study area;
- recommend an appropriate and feasible provision and layout of internal transport facilities the proposed development schemes of the Scheme;
- estimate the vehicular and pedestrian traffic to be generated by the Scheme;
- forecast the future vehicular and pedestrian traffic demand in the vicinity at the appropriate design year;
- examine the traffic impact of the Scheme on the surrounding road and pedestrian walkway network; and
- recommend improvement measures to the problematic roads and junctions, if considered necessary and practicable to the Scheme wherever applicable.

1.3. Report Structure

1.3.1. Following this introductory chapter, there are 5 chapters:

- **Chapter 2** – presents the Scheme and internal transport facilities;
- **Chapter 3** – describes the road network and transport facilities in the vicinity;
- **Chapter 4** – describes the methodology for traffic forecasting;
- **Chapter 5** – presents the results of the TIA at the adopted design year, and recommends any improvement measures to alleviate the foreseeable traffic problem, if considered necessary; and
- **Chapter 6** – summarizes the findings of the study and presents the conclusion.

2. The Scheme

2.1. Site Location

2.1.1. The Scheme is located in the Nga Tsin Wai Road area, Lung Tong of the Kowloon City District. The Scheme comprises three sites, the main site, the northern site and the eastern site. The main site, comprising the connected Site A and Site C2, is broadly bounded by Carpenter Road, Lung Kong Road, Nga Tsin Wai Road and Hau Wong Road. The northern site (Site B) is located within Carpenter Road Park. The eastern site (Site C1) is broadly bounded by existing buildings to the north and the east, Prince Edward Road East and Tak Ku Ling Road Rest Garden to the south and Tak Ku Ling Road to the west. The location of the Scheme is shown indicated in **Figure 2.1**.

2.2. Development Parameters

2.2.1. The subject sites cover a total gross site area of about 37,061 m^2. The total net site area for plot ratio calculation is about 25,302 m^2 in the R(A) zone[1]. Under current notional design, the main site (Sites A and C2) is proposed to be developed into 7 high-rise residential buildings with retail and GIC facilities at the podia. Nga Tsin Wai Road and Nam Kok Road within the Scheme are proposed to be pedestrianized to enhance the walkability and provide space for at-grade landscaped diversified space. About 4 storeys basement car park are also proposed at the main site for loading/unloading bays and private car parking spaces. At the northern site (Site B), it is proposed to develop a new GIC complex for re-provisioning of the Kowloon City Municipal Service Building (KCMSB), Lee Kee Memorial Dispensary (LKMD) and Kowloon City Elderly Health Centre (KCEHC); and to accommodate new GIC facilities to meet community needs. At the eastern site (Site C1), diversion of the existing Nga Tsin Wai Road/ Kai Tak Road is proposed to provide an at-grade gateway square and retail facilities to serve as an enlarged gateway from Kai Tak Development Area (KTDA).

2.2.2. The Scheme is planned to be implemented in four phases and full completion will be by year 2037, subject to future implementation process. The proposed development parameters are tabulated in **Table 2.1**.

Table 2.1 Proposed Development Parameters

Component	Development Parameters				
	Site A	Site B	Site C		
			Site C1	Site C2	Site C Total
Completion year	2034	2030	2033	2037	-
Net Site Area	Approx. 13,353 m^2	Approx. 6,600 m^2	Approx. 3,367 m^2	Approx. 8,582 m^2	Approx. 11,949 m^2

[1] The net site area has excluded the three new road sections in the Scheme (the two new private streets proposed at the main site (Sites A and C2) and the new diverted road at the eastern site (Site C1), and the surrounding pavement of the Scheme. Should there be later departmental comments for a smaller net site area, the technical assessments conducted based on the development potential from this net site area (i.e. 25,302sq.m.) would be considered as the worst case scenario for the proposed development of the draft DSP.

Component		Development Parameters						
		Site A		Site B		Site C		
						Site C1	Site C2	Site C Total
Proposed Gross Floor Area (GFA) and Plot Ratio (PR)	Residential	Approx. 106,824 m² GFA	8.0 PR	-	-	-	Approx. 95,592 m² GFA	8.0 PR
	Retail	Approx. 13,353 m² GFA	1.0 PR	-	-	Approx. 2,000 m² GFA	Approx. 9,949 m² GFA	1.0 PR
	GIC (1)	1,000m²	-	Approx. 44,000 m² GFA	-	-	Approx. 2,000 m² GFA	-
No. of Building Block		4 and 1 retail block		1		1	3	
No. of Residential Flats	40 m² GFA < Flat Size ≤ 70 m² GFA	2,297 Fats		-		-	2,056 Fats	
Average Flat Size		Approx. 46.5 m²		-		-	Approx. 46.5 m²	
At-grade landscaped diversified space (2)		Approx. 5,000 m²		Approx. 1,320 m²		Approx. 2,130 m²	Approx. 2,000 m²	

Note: Subject to change at detailed design stage

Remarks: (1) The use of the GIC is not yet confirmed and subject to liaison with government departments upon approval of the Scheme.

(2) At-grade landscaped diversified space include gateway square, market square, landscaped pedestrian avenues and amenity spaces.

2.3. Parking and Servicing Facilities Provision

2.3.1. The required parking and servicing facilities provision are determined in according with the Hong Kong Planning Standards and Guidelines (HKPSG). The requirements and the proposed parking provisions are summarized in **Table 2.2**.

Table 2.2 Required Transport Facilities According to HKPSG

Type	Parameter	HKPSG Parking Provision Requirement		Required Provision (nos.)	Proposed Provision (nos.)
Site A					
Residential					
Private Car Parking Space	2,297 flats	Global Parking Standard (GPS): 1 car space for 4 - 7 flats Demand Adjustment Ratio (R1): 40 < Flat Size ≤ 70 = **1.2** Accessibility Adjustment Ratio (R2): Within a 500m-radius of rail station = **0.75** Development Intensity Adjustment Ratio (R3): 5.00 < Plot Ratio ≤ 8.00 = **0.90** Parking Requirement = GPS x R1 x R2 x R3	2,297 units, 40 < Flat Size ≤ 70	266 - 466	466
Visitor Car Parking	4 blocks	5 nos. per residential block with more than 75 units		20	20

Type	Parameter	HKPSG Parking Provision Requirement	Required Provision (nos.)	Proposed Provision (nos.)
Motorcycle Parking	2,297 flats	1 motorcycle parking space per 100-150 flats	16 - 23	23
Loading/ unloading Bay	2,297 flats/ 4 blocks	1 bay per 800 flats or minimum 1 bay for each housing block or as determined by Authority	4	4
Retail				
Private Car Parking Space	13,353 m²	1 car space per 150 – 300m² GFA	45 – 90	90
Motorcycle Parking	45 - 90	5 – 10% of private car parking space	3 - 9	5
Loading/ unloading Bay	13,353 m²	1 bay for GV for every good vehicle for every 800 - 1,200 m² GFA	12 - 17	17
Public Vehicle Park				
Private Car Parking Space	-	-	-	360
GIC Facility (~1,000 m² GFA) (1) (2)				
Private Car Parking Space	-	-	-	TBC (3)
Site A Total		**Private Car Parking**	331 - 576	**936**
		Motorcycle Parking	19 - 32	**28**
		Loading/ unloading Bay	16 - 21	**21**
Accessible Car Parking Space	*331- 576*	*4 spaces for 251-350 total car parking spaces in lot; 5 spaces for 351-450 total car parking spaces in lot; 6 spaces for above 450 total car parking spaces in lot*	*4 - 6*	***6***
Site B				
GIC Complex (~44,000 m² GFA) (1) (2)				
Private Car Parking Space	-	N/A	N/A	**72** (3)
Loading/ unloading Bay	-	N/A	N/A	**16** (3)
Accessible Car Parking Space	*72*	*2 spaces for 51-150 total car parking spaces in lot.*	*2*	**2** (3)
Site C1				
Retail				
Private Car Parking Space	2,000 m²	1 car space per 150 – 300m² GFA	7 - 14	14 (4)
Motorcycle Parking	7 - 14	5 – 10% of private car parking space	1 - 2	2
Loading/ unloading Bay	2,000 m²	1 bay for GV for every good vehicle for every 800 - 1,200 m² GFA	2 - 3	3
Site C2				
Residential				

Type	Parameter	HKPSG Parking Provision Requirement		Required Provision (nos.)	Proposed Provision (nos.)
Private Car Parking Space	2,056 flats	Global Parking Standard (GPS): 1 car space for 4 - 7 flats Demand Adjustment Ratio (R1): 40 < Flat Size ≤ 70 = **1.2** Accessibility Adjustment Ratio (R2): Within a 500m-radius of rail station = **0.75** Development Intensity Adjustment Ratio (R3): 5.00 < Plot Ratio ≤ 8.00 = **0.90** Parking Requirement = GPS x R1 x R2 x R3	2,056 units, 40 < Flat Size ≤ 70	238 - 417	417
Visitor Car Parking	3 blocks	5 nos. per residential block with more than 75 units		15	15
Motorcycle Parking	2,056 flats	1 motorcycle parking space per 100-150 flats		14 - 21	21
Loading/ unloading Bay	2,056 flats/ 3 blocks	1 bay per 800 flats or minimum 1 bay for each housing block or as determined by Authority		3	3
Retail					
Private Car Parking Space	9,949 m²	1 car space per 150 – 300m² GFA		34 – 67	67
Motorcycle Parking	34 - 67	5 – 10% of private car parking space		2 – 7	7
Loading/ unloading Bay	9,949 m²	1 bay for GV for every good vehicle for every 800 - 1,200 m² GFA		9 – 13	13
GIC Facility (~2,000 m² GFA) (1) (2)					
Private Car Parking Space	-	-		-	TBC (3)
Site C Total		**Private Car Parking**		294 – 513	**513**
		Motorcycle Parking		17 - 30	**30**
		Loading/ unloading Bay		14 - 19	**19**
Accessible Car Parking Space	*294 - 513*	*4 spaces for 251-350 total car parking spaces in lot;* *5 spaces for 351-450 total car parking spaces in lot;* *6 spaces for above 450 total car parking spaces in lot*		*4 - 6*	***6***
KC-017 Total		***Private Car Parking***		*625 – 1,089*	***1,521***
		Motorcycle Parking		*36 - 62*	***58***
		Loading/ unloading Bay		*30 - 40*	***56***

Remarks:

(1) The intended GIC uses will be subject to further liaison with relevant Government Departments. The proposed transport facilities provision is assumption only.

(2) G/IC Complex including re-provisioning of facilities in Kowloon City Municipal Services Building (except public portion of RCP & Public Toilet), Lee Kee Memorial Dispensary, Kowloon City Health Centre, as well as other new G/IC uses to meeting community needs. New G/IC uses will be subject to further liaison with relevant Government Departments

(3) No HKPSG recommendations for GIC facilities. The proposed provision is based on initial liaison with relevant government department. Actual provision may be adjusted to the GIC operator need at detailed design.

(4) The proposed parking spaces are located at Site C2 due to the site constraint (insufficient space of the site) at Site C1.

2.3.2. As can be seen in the above table, 1,521 nos. of private car parking space (including 360 nos. of public parking space and 14 nos. of assessable car parking space), 58 nos. of motorcycle parking space and 56 nos. of loading/unloading bay are proposed for the Scheme to facilitate the operation of the sites. The ancillary parking provision in each site are self-contained and self-sustained for its proposed development.

2.3.3. High-end parking provision is proposed for both Residential and Retail portions of the Scheme according to the latest HKPSG.

2.3.4. As the type of the new GIC to be provided at both Sites B and the main site are subject to finalisation by relevant government departments, the proposed parking provision for the GIC facilities have preliminarily consulted the relevant government departments to meet their operational needs of the reprovisioned GIC facilities in the new GIC complex, while other detailed provision will be liaised with the relevant government departments/GIC operators in the detailed design stage.

2.3.5. Public Vehicle Park (PVP) with 360 nos. of private car parking spaces is proposed at Site A to provide parking supply for the local area including visitors to the Kowloon City Market. The proposed PVP also will compensate the affected on-street parking spaces by the proposed development accesses and road closure scheme for Nga Tsin Long Road and Nam Kok Road.

2.4. Proposed Layout and Arrangement of Internal Transport Facilities

2.4.1. Ancillary car park for the Scheme is mostly provided at the basement levels. Car ramp system is proposed at Sites A, B and C2 to provide vertical connections between the ground and basement levels.

Site A

2.4.2. The ancillary car park for Site A and the proposed PVP are provided in the four basement levels. The loading/unloading area and the Refuse Collection Point are located on Basement Level 1 (B1/F) whilst the private car parking spaces are provided on Basement Levels 2 to 4 (B2/F to B4/F).

Site B

2.4.3. The ancillary car park for Site B is provided in the three basement levels. The loading/unloading area is located on B1/F and B2/F whilst the private car parking spaces are provided on the B3/F.

Site C

2.4.4. The ancillary car park for Site C2 is provided in the three basement levels. The loading/unloading area and the Refuse Collection Point are located on B1/F whilst the private car parking spaces are provided on B2/F and B3/F.

2.4.5. In order to facilitate and operation of Site C1, off-street loading/unloading bay for 1 no. of HGV and 2 no. of LGV is to be provided at the frontage abutting Tak Ku Ling Road.

2.5. Vehicular Access (Run-in/out) Arrangement

2.5.1. The proposed run-in/out of the main site of the Scheme would be located at Lung Kong Road (for Site A) and Hau Wong Road (for Site C2) respectively. The main site abuts Lung Kong Road, Nga Tsin Wai Road eastbound, Carpenter Road westbound and Hau Wong Road, Lung Kong Road and Hau Wong Road would be the roads with single traffic direction and less traffic compared to the others.

2.5.2. The proposed run-in/out of Site B of the Scheme would be located at Carpenter Road as which is the only boundary serving by a road.

2.5.3. Moreover, the off-street loading/unloading bays for Site C1 will be accessed via Tak Ku Ling Road.

2.5.4. The schematic layouts of ground and basement levels of the Scheme showing the proposed run-in/out, transport facilities arrangement and the typical swept path analysis results are shown in **Figures 2.2** to **2.10**.

2.5.5. As shown in **Figures 2.11** and **2.12**, the swept path analysis result shows that there are sufficient manoeuvring spaces at all the proposed run-in/out for the ingress and egress movements of a 11m long heavy goods vehicle.

2.6. Pedestrian Access Arrangement

2.6.1. The anticipated major pedestrian accesses of the main site would be via the two proposed landscaped pedestrian avenues at Nga Tsin Long Road and Nam Kok Road which are proposed to be closed for pedestrianization under the Scheme. Entrances to the residential blocks are also linked up to the landscaped pedestrian avenues. Thus, the major pedestrian route to the main site would be between Exit B3 of MTR Sung Wong Toi Station at Nam Kok Road, the bus stops at Prince Edward Road West and the sites via several crossing points at Nga Tsin Wai Road and the footpaths of the southern section of Nga Tsin Long Road and Hau Wong Road.

2.6.2. The major pedestrian access of Site B would be located at Carpenter Road as which is the only frontage to the public road. The major pedestrian access route to Site B will by-passing the main site along the pedestrianised Nam Kok Road and Nga Tsin Long Road. Moreover, a link bridge connecting the GIC facilities between Sites B and C2 at podium level is proposed to improve the connectivity between the GIC facilities at two sites, as well as providing alternative pedestrian link to enhance the connectivity of the sites, in addition to the existing pedestrian crossing at Carpenter Road.

2.6.3. As Site C1 is a small-scale retail development, pedestrian access is expected to be on all sides of the building frontage. The major assess route to the site would be via the footpath along Nga Tsin Wai Road and the planned subway system underneath Prince Edward Road East connecting the Kai Tak Development Area (KTDA).

2.6.4. Building setbacks of the main site with creation of market square is proposed at Carpenter Road and about 10m at portion of Nga Tsin Wai Road within the main site are proposed to provide a better walking environment around the Scheme (details refer to Appendix 1 – Preliminary Design in Planning Report).

2.6.5. Closure of the sections of Nga Tsin Long Road and Nam Kok Road within the main site is proposed to provide the pedestrian corridor for the major pedestrian routes connecting the main site and Site B.

2.7. Road Closure/Diversion Scheme

2.7.1. Sections of Nga Tsin Long Road and Nam Kok Road within Scheme are proposed to be pedestrianised for provision of two key landscaped pedestrian avenues of not less than 18m wide to enhance the north-south connectivity from the MTR Sung Wong Toi Station towards Carpenter Road Park (CRP). With the proposed road closure, the traffic pattern in the local area will be affected and thus the base traffic will be re-distributed according to the future road network.

2.7.2. The road closure scheme is to be implemented according to the phase completion of Sites A and C2.

2.7.3. In order to optimise the configuration and size of the gateway square for Site C1, the existing portion of Kai Tak Road in the Scheme is proposed to be closed. A new diverted road will be provided within the Scheme for traffic diversion from Kai Tak Road and Ngai Tsin Wai Road. The proposed diversion is to be implemented according to the phase completion of Site C1.

3. Traffic Context

3.1. Road Network

3.1.1. The local road network in the vicinity is essentially a grid formed by east-west and north-south running roads.

3.1.2. The Scheme area will be served by the trunk road of Prince Edward Road East, primary distributors of Prince Edward Road West, Boundary Street, Argyle Street and Ma Tau Chung Road, district distributors of Junction Road, Nga Tsin Wai Road and Lok Sin Road and the local distributors of Carpenter Road, Hau Wong Road, Lung Kong Road, Tak Ku Ling Road and Kai Tak Road. The major vehicular ingress and egress routes to and from the Scheme area are shown in **Figure 3.1**.

3.1.3. There are six major frontages of the Scheme area abutting Nga Tsin Wai Road, Carpenter Road, Hau Wong Road, Lung Kong Road and Tak Ku Ling Road.

3.1.4. The section of Hau Wong Road and Lung Kong Road abutting Sites A and C2 are the one-way northbound carriageway providing linkage from Prince Edward Road West to Carpenter Road and also connects Nga Tsin Wai Road.

3.1.5. The section of Tak Ku Ling Road abutting Site C1 is a one-way northbound carriageway providing linkage from Nga Tsin Wai Road to Carpenter Road with metered parking spaces along the eastern side of the kerb.

3.1.6. Nga Tsin Wai Road is a two-way carriageway providing linkage from Sa Po Road to the east to Junction Road to the west. The section of Carpenter Road abutting Sites A, B and C2 is a single 2-lane carriage with priority junction control at the intersection with Nga Tsin Long Road.

3.1.7. Carpenter Road is a two-way carriageway providing linkage from Lok Sin Road to the east to Kowloon Tong area to the west. The section of Nga Tsin Wai Road abutting the main site is a single 2-lane carriage with metered parking space along the northern side of the kerb.

3.1.8. These adjacent roads provide access to/from other areas in the territory. It is anticipated that the proposed development will be well served by the existing road network in the vicinity.

3.2. Public Transport Services

3.2.1. Currently, the Scheme area is served by several public transport services including MTR, franchised bus, Green Mini-bus (GMB) and Public Light Bus (PLB). The MTR Sung Wong Toi Station is located approximate 50m to 200m away from the Scheme area. Moreover, there are more than 100 numbers of franchised bus, GMB and PLB routes with servicing points in the vicinity of the Scheme area. Detail of the services are tabulated in **Table 3.1** and the existing adjacent public transport service points are shown in **Figure 2.13**.

Table 3.1 Existing Public Transport Services

Route No.	Origins & Destinations	Frequency (mins)
Franchised Bus		
KMB		
1	Chuk Yuen Estate ↔ Tsim Sha Tsui (Star Ferry)	Daily
1A	Shau Mau Ping (Central) ↔ Tsim Sha Tsui (Star Ferry)	Daily
2A	Mei Foo ↔ Lok Wah	Daily
2D	Tung Tau Estate ↔ Chak On Estate	Daily
3B	Tsz Wan Shan (Central) ↔ Hung Hom (Hung Luen Road)	Daily
5	Tsim Sha Tsui (Star Ferry) ↔ Fu Shan Estate	Daily
5C	Tsim Sha Tsui (Star Ferry) ↔ Tsz Wan Shan (Central)	Daily
5D	Telford Gardens ↔ Hung Hom	Daily, Circular
6D	Ngau Tau Kok ↔ Mei Foo	Daily
6P	Cheung Sha Wan (So Uk Estate) ↔ Lei Yue Mun Estate	AM peak & PM peak
9	Choi Fook ↔ Tsim Sha Tsui East (Mody Road)	Daily
10	Choi Wan ↔ Tai Kok Tsui	Daily, Circular
11	Diamond Hill Station ↔ Kowloon Station	Daily
11B	Kwun Tong (Tsui Ping Road) ↔ Kowloon City Ferry	Daily
11D	Lok Fu ↔ Kwun Tong Ferry	Daily
11K	Chuk Yuen Estate ↔ Hung Hom Station	Daily
11X	Hung Hom Station ↔ On Tai (North)	Daily
12A	Whampoa Garden ↔ Cheung Sha Wan (Sham Mong Road)	Daily
13D	Po Tat ↔ Island Harbourview	Daily
14	Lei Yue Mun Estate ↔ China Ferry Terminal	Daily
15	Ping Tin ↔ Hung Hom (Hung Luen Road)	Daily
16	Lam Tin (Kwong Tin Estate) ↔ Mong Kok (Park Avenue)	Daily
16X	Lam Tin (Kwong Tin Estate) ↔ Mong Kok (Park Avenue)	AM peak & PM peak
17	Kwun Tong (Yue Man Square) ↔ Ho Man Tin (Oi Man Estate)	Daily
20	Kai Tak (Muk On Street) ↔ Tai Lok Tsui (Island Habourview)	Daily
20A	Kai Tak ↔ West Kowloon Station	Daily, Circular
21	Choi Wan ↔ Hung Hom Station	Daily
22	Kai Tak Cruise Terminal ↔ Festival Walk	Daily
22M	Kai Tak Cruise Terminal ↔ To Kwa Wan (San Lau Street)	Daily, Circular
24	Kai Yip ↔ Mong Kok	Daily, Circular
26	Shun Tin ↔ Tsim Sha Tsui East	Daily
27	Shun Tin ↔ Mong Kok	Daily, Circular
28	Lok Wah ↔ Tsim Sha Tsui (Star Ferry)	Daily
42	Tsing Yi (Cheung Hong Estate) ↔ Shun Lee	Daily
61X	Tuen Mun Central ↔ Kowloon City Ferry	Daily
75X	Tai Po (Fu Shin) ↔ Kowloon City Ferry	Daily
85	Fo Tan (Shan Mei Street) ↔ Kowloon City Ferry	Daily
85A	Kwong Yuen ↔ Kowloon City Ferry	Daily
85B	Chun Shek ↔ Kowloon City Ferry	Daily

Route No.	Origins & Destinations	Frequency (mins)
85X	Ma On Shan Town Centre ↔ Hung Hom (Hung Luen Road)	Daily
92R	Sai Kung ↔ Tsim Sha Tsui (Star Ferry)	Weekend & Public holiday only
93K	Po Lam ↔ Mong Kok East Station	Daily
95	Tsui Lam ↔ Jordan (West Kowloon Station)	Daily
98C	Hang Hau (North) (Tseung Kwan O Hospital) ↔ Mei Foo	Daily
98S	Lohas Park Station ↔ Mei Foo	AM peak & PM peak
101	Kwun Tong (Yue Man Square) ↔ Kennedy Town	Daily
106	Wong Tai Sin ↔ Siu Sai Wan (Island Resort)	Daily
106A	Wong Tai Sin ↔ Tai Koo (Kornhill Plaza)	AM peak only
106P	Wong Tai Sin ↔ Siu Sai Wan (Island Resort)	AM peak & PM peak (except Public Holidays)
107	Kowloon Bay ↔ Wah Kwai	Daily
108	Kai Yip ↔ Braemar Hill	Daily
111	Ping Shek / Choi Hung Station ↔ Central (Macau Ferry)	Daily
111P	Choi Fook ↔ Central (Macau Ferry)	AM peak & PM peak (except Public Holidays)
113	Choi Hung ↔ Kennedy Town (Belcher Bay)	Daily
116	Tsz Wan Shan (Central) ↔ Quarry Bay (Yau Man Street)	Daily
203E	Choi Hung ↔ Kowloon Station	Daily
213D	Sau Mau Ping (Central) ↔ Mong Kok	Daily, Circular
293S	Hang Hau (Ngan O Road) ↔ Mong Kok East Station	Daily, Overnight
296C	Sheung Tak ↔ Cheung Sha Wan (Hoi Ying Estate)	Daily
296P	Sheung Tak ↔ Lai Chi Kok Station	AM peak & PM peak (except Public Holidays)
297	Hang Hau (North) (Tseung Kwan O Hospital) ↔ Hung Hom (Hung Luen Road)	Daily
796C	Oscar by the Sea ↔ So Uk Estate	Daily
796E	Tseung Kwan O Industrial Estate ↔ So Uk Estate	AM peak & PM peak (except Public Holidays)
796X	Tseung Kwan O Industrial Estate ↔ Tsim Sha Tsui (East)	Daily
A22	Lam Tin Station ↔ Airport	Daily
E23	Tsz Wan Shan (South) ↔ Airport	Daily
E23A	Airport ↔ Tsz Wan Shan (South)	Daily
N20	Tai Kok Tsui (Island Harbourview) ↔ Kai Tak (Muk On Street)	Daily, Overnight
N23	Tung Chung Station ↔ Tsz Wan Shan (North)	Daily, Overnight
N121	Central (Macau Ferry) ↔ Ngau Tau Kok	Daily, Overnight
N213	On Tai (West) ↔ Tsim Sha Tsui (Mody Road)	Daily, Overnight
N216	Yau Tong ↔ Hung Hom Station	Daily, Overnight
N293	Sheung Tak ↔ Mong Kok East Station	Daily, Overnight
N796	Tseung Kwan O Station ↔ Tsim Sha Tsui	Daily, Overnight, Circular
Green Minibus		
2	Whampoa Garden ↔ Festival Walk	Daily
2A	Whampoa Garden ↔ Festival Walk	Daily

Route No.	Origins & Destinations	Frequency (mins)
13	Kowloon Tong (Broadcast Drive) ↔ Hung Hom (Hung Luen Road)	Daily
25A	Kowloon Tong Station ↔ Tung Tau Estate	Daily
25B	Kowloon Tong Station ↔ The Latitude	Daily
25M	Kowloon Tong Station ↔ Tung Tau Estate	Daily
39M	Lok Fu Station ↔ Tung Tau Estate	Daily, Circular
46	Richland Gardens ↔ Island Harbourview	Daily
49	Shun Tin Estate ↔ Kowloon City Ferry Pier	AM peak & PM peak
61	Siu Sai Wan (Island Resort) ↔ Mong Kok Station	Daily, Overnight
66S	Fu Shan Estate ↔ Mong Kok (Sai Yeung Choi Street South)	Daily, Overnight
69	Laguna City ↔ Kowloon City (Lion Rock Road)	Daily
69A	Laguna City ↔ Prince Edward Station	Daily
70	Diamond Hill Station ↔ Island Harbourview	Daily
70A	Diamond Hill Station ↔ Olympic Station	Daily
88	Kai Ching Estate ↔ Wong Tai Sin	Daily, Circular
105	Tseung Kwan O (Hong Sing Garden) ↔ To Kwa Wan (Ko Shan Theatre)	Daily
105S	Tseung Kwan O (Hong Sing Garden) ↔ To Kwa Wan (Ko Shan Theatre)	Daily, Overnight
110	Tiu Keng Leng Station ↔ Kowloon City	Daily, Circular
805S	Ma On Shan (Kam Ying Court) ↔ Mong Kok Station	Daily, Overnight

3.2.2. As shown in the above, the Scheme area is well served by the existing public transport facilities provided in the vicinity.

3.3. Pedestrian Facilities

3.3.1. The existing pedestrian facilities are well-developed in the vicinity of the Scheme area. Pedestrians can access the subject sites via the surrounding footpaths and pedestrian crossings to/from nearby taxi, bus and PLB servicing points as well as MTR Sung Wong Toi Stations.

3.3.2. The anticipated pedestrian routings of the Scheme is shown in **Figure 3.2**.

3.4. Planned Highway Infrastructure

3.4.1. The Central Kowloon Route (CKR) is a dual 3-lane trunk road connecting the West Kowloon reclamation and the proposed Kai Tak Development to relieve traffic congestion on the existing east-west roads across Central Kowloon area and it is anticipated to be commissioned in 2025. In view of the connection point of the CKR, the local traffic pattern near the Scheme would have significant impact by the planned road.

4. Traffic Forecast

4.1. Methodology

4.1.1. According to the current programme, the completion of the Scheme is anticipated to be by phases at years 2030, 2033, 2034 and 2037 for Site B, C1, A and C2 respectively. For the purposes of this study, it has been assumed that full occupation of each site will be occurs in each completion year.

4.1.2. Therefore, years 2033, 2036, 2037 and 2040 (3 years after completion of each site) would be adopted as the design years for assessment purpose.

4.1.3. As discussed in the previous **Section 3.4**, the CKR is planned to be commissioned by year 2025 and the local traffic pattern would have significant impact by the new connection bypass the central Kowloon area. Since the local road network in design year would be similar to the existing arrangement, the background traffic forecasts for the design years were therefore derived according to the traffic survey results and projected by applying a growth rate. Adjustment have been made to the forecasted base traffic flow with reference to the 2015 Based District Traffic Models (BDTM) K1 published by Transport Department (TD) to reflect the change in traffic pattern on the road to be affected by the CKR.

4.1.4. The growth factor used was derived by referring to the past traffic growth trend on the Annual Traffic Census (ATC) Reports, latest 2019-based Territory Population and Employment Data Matrices (TPEDM) of Kowloon City and Wong Tai Sin Area on the website of Planning Department (PlanD) and the Hong Kong resident population growth stated in the Hong Kong Population Projection 2020-2069 report published by Census and Statistics Department.

4.1.5. Trip generations by other planned developments in the vicinity were estimated and assigned onto the surrounding road network to produce the reference traffic forecasts at design year.

4.1.6. Trip generations of the Scheme was estimated by using appropriate trip generation rates. Traffic generations were then assigned to the surrounding road network and superimposed onto the reference traffic forecasts to create the design year forecasts for assessment at design year.

4.2. Traffic Survey

4.2.1. Manual classified traffic count surveys were conducted to identify the existing traffic flows during the peak hour periods from 07:30 to 09:30 and from 16:00 to 19:00 on typical weekdays in November 2021.

4.2.2. Besides, a year 2021 weekend traffic flows in the area are derived making reference to the endorsed traffic study under URA KC-015 project by applied a nominal growth rate of +0.6% p.a. refer to **Para. 4.3.7**. As advised, the traffic counts survey under URA KC-015 project were conducted in year 2018 before the pandemic. It is anticipated that it was a robust observed traffic patten during weekend in the area.

4.2.3. The locations of the surveyed junctions in the vicinity are listed in **Table 4.1** and shown in **Figure 2.1**.

Table 4.1 Location of Key Junctions

Index (1)	Location	Junction Type
J1	Tung Tau Tsuen Road / Tung Tsing Road / Pui Man Street	Signal
J2	Junction Road / Carpenter Road	Signal
J3	Carpenter Road / Lion Rock Road	Signal
J4	Carpenter Road / Hau Wong Road	Priority
J5	Carpenter Road / Lung Kong Road	Priority
J6	Carpenter Road / Tak Ku Ling Road	Signal
J7	Tung Tsing Road / Lok Sin Road / Sa Po Road	Signal
J8	Nga Tsin Wai Road / Junction Road	Signal
J9	Nga Tsin Wai Road / Lion Rock Road	Signal
J10	Nga Tsin Wai Road / Hau Wong Road	Signal
J11	Nga Tsin Wai Road / Lung Kong Road	Signal
J12	Nga Tsin Wai Road / South Wall Road	Priority
J13	Prince Edward Road West / Boundary Street / Grampian Road	Signal
J14	Prince Edward Road West / Fuk Lo Tsun Road	Priority
J15	Prince Edward Road West / Lion Rock Road	Priority
J16	Kowloon City Roundabout	Roundabout
J17	Prince Edward Road West / South Wall Road	Priority

*Remarks: (1) Refer to **Figure 2.1**.*

4.2.4. The morning and evening peak hours were identified as 08:00 to 09:00 and 17:45 to 18:45 respectively. The year 2021 observed traffic flows are presented in **Figure 4.1** and **Figure 4.2**.

4.2.5. Pedestrian head count survey has been conducted at the key section of footpath along the anticipated access routes of the sites during the morning and evening peak periods (07:30 to 09:30 and 17:30 to 19:30) on a typical weekday in early December 2021 to collect the existing pedestrian demand in the local area.

4.2.6. The survey results indicate that the observed peak 15-minute pedestrian demand would be occurs during 08:50 to 09:05 and 18:00 to 18:15 in the morning and evening peak periods respectively and the observed pedestrian flows are presented in **Figure 4.3**.

4.2.7. In addition, making reference to the daily visitors' profile at Kowloon City Plaza, Carpenter Road Park and Kowloon City Market and Cooked Food Centre. A nominal weekend factor of 2.25 have been applied to observed PM peak pedestrian flows to derive the weekend peak pedestrian flows.

4.2.8. Pedestrian and traffic trip generation survey has also been conducted at two local residential developments at 46 Sa Po Road, Le Billionnaire and 83 Sa Po Road, Billionnaire Royale and Kowloon City Plaza for reference to develop the trip generation rate for the Scheme.

4.2.9. The observed survey results are summarized in **Table 4.2**.

Table 4.2 Trip Generation Survey Results

Development	No. of flat/ m² GFA/ space	Observed Peak Hour Traffic/ Peak 15-minute Pedestrian Demand (pcu/hr or ped/15-minute)				Traffic/ Pedestrian Trip Generation Rate (pcu/hr/space or ped/15-min/flat or 100m² GFA)			
		AM Peak		PM Peak		AM Peak		PM Peak	
		GEN (1)	ATT (1)	GEN (1)	ATT (1)	GEN (1)	ATT (1)	GEN (1)	ATT (1)
Traffic Trips									
Kowloon City Plaza PVP	400	16	71	56	129	0.1400	0.0600	0.0686	0.1343
Pedestrian Trips									
Le Billionnaire	212	43	3	11	25	0.2028	0.0142	0.0519	0.1179
Billionnaire Royale	226	45	11	30	38	0.1692	0.0414	0.1128	0.1429
Residential Total	*478*	*88*	*14*	*41*	*63*	*0.1841*	*0.0293*	*0.0858*	*0.1318*
Kowloon City Plaza	47,858	156	169	369	340	0.3260	0.3531	0.7710	0.7104

Remark: (1) "GEN" means "Generation" and "ATT" means Attraction.

4.3. Growth Rate Determination

4.3.1. Traffic forecasts for the design years were projected by applying an appropriate growth rate to the observed traffic flows based on the survey results. The growth rates were determined with reference to the ATC reports, the latest 2019-based TPEDM of Kowloon City and Wong Tai Sin Area on the website of PlanD and the Hong Kong residential population growth stated in the Hong Kong Population Projection 2020-2069 report.

Annual Traffic Census (ATC)

4.3.2. The historical traffic growth trend of the major roads in the vicinity of the subject site was reviewed making reference to the ATC reports. The Annual Average Daily Traffic (AADT) data from year 2013 to year 2019 were extracted and the estimated average annual growth rate is given in **Table 4.3**.

Table 4.3 Traffic Growth Rate Derived from ATC

Station No.	Road Name	AADT								Growth Rate (p.a.)
		2013	2014	2015	2016	2017	2018	2019	2020	
3016	Junction Rd	16,670	17,120	16,900	16,940	16,700	16,800	16,700	15,060	
3254	Tung Tau Tsuen Rd	5,470	6,590	*6,580*	*6,480*	*6,510*	5,540	6,580	*6,160*	
3284	Nga Tsin Wai Rd	8,040	8,030	*8,020*	*7,900*	*7,930*	8,850	8,420	*7,880*	
3458	Junction Rd	*19,730*	17,370	16,390	*16,130*	*16,200*	*16,270*	15,070	15,350	
3459	Tung Tau Tsuen Rd	*9,530*	9,470	9,260	*9,140*	*9,080*	*9,200*	9,990	9,460	
3489	Lok Sin Rd	*9,110*	9,300	8,970	*8,830*	*8,870*	*8,910*	8,860	7,840	**+0.60%**
3494	Tak Ku Ling Rd	*7,750*	8,040	7,480	*7,360*	*7,390*	*7,420*	7,130	8,140	
3692	Tung Tsing Rd	*6,580*	*6,460*	7,140	8,040	*8,070*	*8,110*	*8,170*	6,580	
3852	Nga Tsin Wai Rd	*12,250*	*12,030*	*12,010*	12,100	12,650	*12,700*	*12,800*	*11,980*	
4052	Lok Sin Rd	4,430	*4,300*	*4,440*	*4,380*	4,610	4,680	*4,280*	*4,130*	
4079	Nga Tsin Wai Rd	10,540	*10,340*	*10,330*	*10,170*	11,560	11,340	*11,420*	*10,690*	

Station No.	Road Name	AADT								Growth Rate (p.a.)
		2013	2014	2015	2016	2017	2018	2019	2020	
4613	Grampian Rd	3,400	3,800	3,350	3,760	3,720	3,870	*3,310*	*3,640*	
		82,880	**82,380**	**80,740**	**80,820**	**80,750**	**81,100**	**80,920**		

Notes: *The AADT figures with grey colour background are estimated values based on the ATC Reports. Those estimated figures are excluded in calculating the weighted average annual growth rate.*

4.3.3. As shown in **Table 4.3**, the weighted average annual growth rate determined from ATC data is about +0.60% per annum (p.a.) from year 2013 to year 2020.

Territory Population and Employment Data Matrices (TPEDM)

4.3.4. Reference was made to the latest 2019-based TPEDM from year 2019 to year 2031 in Kowloon City and Wong Tai Sin area published on the PlanD website to derive the annual growth rate for design years. The population and employment planning data from year 2019 to 2031 and the estimated annual growth rates are illustrated in **Table 4.4**.

Table 4.4 Annual Growth Rate Derived from TPEDM

District	Population			Employment			Overall		
	2019	2026	2031	2019	2026	2031	2019	2026	2031
Kowloon City	429,300	451,100	420,050	212,000	237,900	227,850	641,300	689,000	647,900
Wong Tai Sin	425,150	422,850	416,050	103,000	104,150	100,100	528,150	527,000	516,150
Growth Rate (p.a.)	**-0.88%**			**-0.84%**			**-0.87%**		

4.3.5. As shown in **Table 4.3**, the annual growth rate determined from TPEDM population, employment and the sum of two are about -0.88% p.a., -0.84% p.a. and -0.87% p.a. respectively from year 2019 to year 2031.

Hong Kong Population Projection

4.3.6. The projected Hong Kong resident population data of the Hong Kong Population Projection 2020-2069 report was also referenced to derivate the annual growth for the years after the available data provided by TPEDM. The projected Hong Kong population data from year 2031 to 2040 and the estimated annual growth rates for each design years are illustrated in **Table 4.5**.

Table 4.5 Annual Growth Rate Derived from Hong Kong Population Projection

Year	Hong Kong Resident Population (1)	Forecasting Years	Annual Growth Rate
2031	7,945,800	-	-
2033	7,998,400	2031 to 2033	+0.33%
2036	8,062,700	2033 to 2036	+0.27%
2037	8,075,100	2036 to 2037	+0.15%
2040	8,104,900	2037 to 2040	+0.12%

Remark: *(1) Population project data of Hong Kong Population Projection 2020-2069.*

Adopted Growth Rate

4.3.7. Based on the above, the highest growth rate derived from the three sets of data is +0.60% per annum (p.a). and to be adopted for assessment to produce the years, 2033, 2036, 2037 and 2040 background traffic flows in order to conduct a conservative assessment

4.3.8. Besides, the annual growth rates of 0% (negative growth is derived based on TPEDM), +0.33%, +0.27%, +0.15% and +0.12% derived from Hong Kong Population Projection 2020-2069 report are adopted for the pedestrian forecast from base year 2021 to 2031, year 2031 to 2033, year 2033 to 2036, year 2036 to 2037 and year 2037 to 2040 respectively for assessment to produce the design years background pedestrian flows.

4.4. Other Planned Development Trip Generation

4.4.1. According to the available information, it is noted that there are 10 nos. of planned developments which is approved in planning application, with approved building plan or currently under construction in the vicinity of the subject site and the location are shown in **Figure 2.1**. These planned developments are assumed to be completed before the design year 2033 in the study and have been considered in the reference traffic flows forecasting. The relevant development parameters are summarised in **Table 4.6**.

Table 4.6 Design Parameters for Planned Developments

Developments (1)	Development Component	Parameters
URA Projects		
Redevelopment of Kai Tak Road/ Sa Po Road (KC-015)	Residential	About 810 Flats
	Retail	About 8,028 m²
	PVP	About 300 Spaces
Public Housing Development Projects		
Mei Tung Estate Redevelopment	Residential	About 2,860 Flats
	Retail	About 4,300 m²
	Office	About 2,400 m²
	Kindergarten	9 Classrooms
	Social Welfare Services	About 4,653 m²
Private Development Projects		
45 – 47 Grampian Road	Religious Institution	About 8,649 m²
Kowloon Tsai Park Swimming Pool Redevelopment	Swimming Pool	About 16,356 m²
Kowloon City Plaza Redevelopment	Residential	About 850 Flats
	Retail	About 8,882 m²
	PVP	About 400 Spaces (same as existing)
4 – 24 Nam Kok Road	Residential	About 181 Flats
	Retail	About 1,814 m²
142 – 154 Carpenter Road	Residential	About 190 Flats
	Retail	About 1,270 m²
67 – 83 Fuk Lo Tsun Road	Residential	About 153 Flats

Developments (1)	Development Component	Parameters
	Retail	About 954 m²
3 – 13 Nga Tsin Long Road	Residential	About 130 Flats
	Retail	About 1,190 m²
26 & 36 Lion Rock Road	Residential	About 49 Flats
	Retail	About 154 m²
40 Lung Kong Road	GIC	About 4,208 m2
61 & 63 Lung Kong Road	Welfare Complex	About 16,078 m2
349 Prince Edward Road West	Welfare facility	About 1,285 m2
380 Prince Edward Road West	Hotel	64 rooms

*Remarks: (1) Refer to **Figure 2.1** for location of the planned development.*

4.4.2. Development trips generated by the above planned developments were estimated making reference to the Transport Planning and Design Manual (TPDM) published by TD, the trip rate adopted in the BDTM and the in-house survey data. Mean value of the trip rate provided in TPDM have been adopted in the study to in line with the forecasting methodology of BDTM. The adopted trip rates and traffic generation of the planned/ committed developments are summarized in **Table 4.7**.

Table 4.7 Traffic Generation by Planned Developments

Developments (1)	Parameters	Adopted Trip Rates (pcu/hr/flats or pcu/hr/100m² GFA or pcu/hr/space) (2)				Trip Generation (pcu/hr)			
		AM		PM		AM		PM	
		GEN (3)	ATT (3)	GEN (3)	ATT (3)	GEN (3)	ATT (3)	GEN (3)	ATT (3)
Redevelopment of Kai Tak Road/ Sa Po Road (KC-015)	810 Flats	0.0718	0.0425	0.0286	0.0370	59	35	24	30
	8,028 m² Retail	0.2296	0.2434	0.3100	0.3563	19	20	25	29
	300 Spaces	0.0975	0.1895	0.1684	0.2168	30	57	51	66
Mei Tung Estate Redevelopment	2,860 Flats	0.0432	0.0326	0.0237	0.0301	95	72	52	66
	4,300 m² Retail	0.2296	0.2434	0.3100	0.3563	10	10	13	15
	2,400 m² Office	0.1703	0.2452	0.1573	0.1175	4	6	4	3
	9 Classrooms	2.3056	2.3056	0.0286	0.0286	21	21	0	0
	4,653 m² GIC	-	-	-	-	10	10	10	10
45 – 47 Grampian Road	8,649 m² Religious Institution	-	-	-	-	10	10	10	10
Kowloon Tsai Park Swimming Pool Redevelopment (4)	16,356 m² Swimming Pool	-	-	-	-	30	30	30	30
Kowloon City Plaza Redevelopment	850 Flats	0.0718	0.0425	0.0286	0.0370	61	36	24	31
	8,882 m² Retail	0.2296	0.2434	0.3100	0.3563	20	22	28	32
	400 Spaces (same as existing)	-	-	-	-	traffic trip included in the observed flow			
4 – 24 Nam Kok Road	181 Flats	0.0718	0.0425	0.0286	0.0370	13	8	6	7
	1,814 m² Retail	0.2296	0.2434	0.3100	0.3563	5	5	6	7
142 – 154 Carpenter Road	190 Flats	0.0718	0.0425	0.0286	0.0370	14	9	6	8
	1,270 m² Retail	0.2296	0.2434	0.3100	0.3563	3	4	4	5
67 – 83 Fuk Lo Tsun Road	153 Flats	0.0718	0.0425	0.0286	0.0370	11	7	5	6
	954 m² Retail	0.2296	0.2434	0.3100	0.3563	3	3	3	4
3 – 13 Nga Tsin Long Road	130 Flats	0.0718	0.0425	0.0286	0.0370	10	6	4	5

Developments (1)	Parameters	Adopted Trip Rates (pcu/hr/flats or pcu/hr/100m² GFA or pcu/hr/space) (2)				Trip Generation (pcu/hr)			
		AM		PM		AM		PM	
		GEN (3)	ATT (3)	GEN (3)	ATT (3)	GEN (3)	ATT (3)	GEN (3)	ATT (3)
	1,190 m² Retail	0.2296	0.2434	0.3100	0.3563	3	3	4	5
26 & 36 Lion Rock Road	49 Flats	0.0718	0.0425	0.0286	0.0370	4	3	2	2
	154 m² Retail	0.2296	0.2434	0.3100	0.3563	1	1	1	1
40 Lung Kong Road	About 4,208 m²	-	-	-	-	10	10	10	10
61 & 63 Lung Kong Road	About 16,078 m²	-	-	-	-	10	10	10	10
349 Prince Edward Road West	About 1,285 m²	-	-	-	-	10	10	10	10
380 Prince Edward Road West	64 rooms	0.1329	0.1457	0.1290	0.1546	9	10	9	10
					Total	***475***	***418***	***351***	***412***

Remarks: *(1) Refer to **Figure 2.1** for location of the planned development.*
(2) Refer to TPDM Vol. 1, Ch. 3, Appendix, Table 1 and Table 2, BDTM Urban Final Report, Appendix Q or in-house survey results for public wet market and public car park;
(3) "GEN" means "Generation" and "ATT" means Attraction.
(4) Traffic trip is assumed based on the number of parking spaces to be provided on site.
Note: *Trip Generation is rounded to the nearest digit.*

4.4.3. As shown in **Table 4.7**, the planned developments will generate overall 2-way trips of 893 pcu/hr and 763 pcu/hr during the morning and evening peak hour respectively.

4.5. Reference Traffic Flows

4.5.1. The traffic demand to be generated/ attracted by the planned/ committed developments will be assigned on the surrounding road network and superimposed onto the years 2033, 2036, 2037 and 2040 background traffic flows to produce the reference traffic flows.

4.5.2. As discussed in **Section 2.7**, road closure scheme is proposed by the Scheme and thus the road network for the design years will be vary. The road arrangements of the four design years are summarised in **Table 4.8**.

Table 4.8 Programme of Road Closure Scheme

Design Year	Scenario	Completed Site	Road Closure	
			Nam Kok Road	Nga Tsin Long Road
2033	Reference	-	×	×
	Design	Site B	×	×
2036	Reference	Site B	×	×
	Design	Sites B & C1	×	×
2037	Reference	Sites B & C1	×	×
	Design	Sites A, B & C1	✓	×
2040	Reference	Sites A, B & C1	✓	×
	Design	Sites A, B, C1 & C2	✓	✓

4.5.3. The years 2033, 2036, 2037 and 2040 reference traffic flows are shown in **Figures 4.4**, **4.6**, **4.8** and **4.11**.

4.5.4. As the additional impact to the pedestrian walkway network to be induced by Sites B and C1 is expected to be neglectable. Assessment for the key pedestrian walkway will be conducted for the design years 2037 and 2040. The years 2037 and 2040 reference pedestrian traffic flows are shown in **Figures 4.10** and **4.13**.

4.6. Development Traffic Generation

4.6.1. Trip generation of the Scheme is estimated using the appropriate trip rates given in TPDM and in-house survey data. The estimation of traffic trips to be generated by the Scheme is summarized in **Table 4.9**.

Table 4.9 Traffic Generation by the Scheme

Component	Parameter	Adopted Trip Rates (pcu/hr/flat or pcu/hr/100 m² GFA) (1)				Trip Generation (pcu/hr)			
		AM		PM		AM		PM	
		GEN (2)	ATT (2)	GEN (2)	ATT (2)	GEN (2)	ATT (2)	GEN (2)	ATT (2)
Site A									
Residential	2,297 flats	0.0718	0.0425	0.0286	0.0370	165	98	66	85
Retail	13,353 m²	0.2296	0.2434	0.3100	0.3563	31	33	41	48
PVP	360 spaces	0.0400	0.1775	0.1400	0.3225	14	64	50	116
New GIC (3)	1,000 m²	0.1703	0.2452	0.1573	0.1175	2	2	2	1
Site B									
Re-provision of GIC at Site C2	-	-	-	-	-	Included in the observed traffic flows			
New GIC (3)	10,000 m²	0.1703	0.2452	0.1573	0.1175	17	25	16	12
Site C1									
Retail	2,000 m²	0.2296	0.2434	0.310	0.3563	5	5	6	7
Site C2									
Residential	2,056 flats	0.0718	0.0425	0.0286	0.0370	148	87	59	76
Retail	9,949 m²	0.2296	0.2434	0.3100	0.3563	23	24	31	35
New GIC (3)	2,000 m²	0.1703	0.2452	0.1573	0.1175	3	5	3	2
					Total	**408**	**343**	**274**	**382**

Remarks: *(1) Refer to TPDM Vol. 1, Ch. 3, Appendix, Table 1 and Table 2 or survey results;*
(2) "GEN" means "Generation" and "ATT" means Attraction;
(3) Trip rate for GIC referenced to Office rate in TPDM Vol. 1, Ch. 3, Appendix, Table 2

Note: *Trip Generation is rounded to the nearest digit.*

4.6.2. As presented in the above table, the Scheme will produce 2-way trips of 751 pcu/hr and 656 pcu/hr during the morning and evening peak hours respectively.

4.6.3. The forecast of pedestrian trip generation for the Scheme was derived with reference to the development schedule and the observed pedestrian trip generation rates in **Table 4.2**. The estimated pedestrian trips of the Scheme during the peak hour periods are tabulated in **Table 4.10**.

Table 4.10 Pedestrian Trip Generation by the Scheme

Development Use	No. of flat/ m² GFA/ space	AM Peak		PM Peak	
		GEN (1)	ATT (1)	GEN (1)	ATT (1)
		Pedestrian Trip Generation Rate (ped/15-min/flat or 100m² GFA)			
Residential	-	0.1841	0.0293	0.0858	0.1318
Retail	-	0.3260	0.3531	0.7710	0.7104
		Pedestrian Trip Generation (ped/15-min)			
Site A					
Residential	2,297 flats	423	67	197	303
Retail	13,353 m²	44	47	103	95
PVP (2)	360 spaces	7	32	25	58
New GIC (3)	1,000 m²	5	5	5	5
Sub-total		**479**	**151**	**330**	**461**
Site B					
Re-provision of GIC at Site C2	-	Included in the observed pedestrian flows			
New GIC (3)	10,000 m²	20	20	20	20
Site C1					
Retail	2,000 m²	4	0	1	2
Site C2					
Residential	2,056 flats	379	60	176	271
Retail	9,949 m²	32	35	77	71
New GIC (3)	2,000 m²	10	10	10	10
Sub-total		***421***	***105***	***263***	***352***
Total		**924**	**276**	**614**	**835**

Remarks: *(1) "GEN" means "Generation" and "ATT" means Attraction.*
(2) Pedestrian trips are estimated with reference to the vehicle trip of the public car park and the assumption of average 2 passengers per vehicle.
(3) Pedestrian trips are assumed value. The type of G/IC facilities is to be confirmed with government departments.
Note: *Trip Generation is rounded to the nearest digit.*

4.6.4. As can be seen in the above table, the peak demand of 2-way pedestrian trips would be 1,200 ped/15-minute and 1,449 ped/15-minute during the morning and evening peak respectively. The estimated pedestrian trip to be generated by the Scheme will be assigned onto the surrounding pedestrian walkway network based on the trip distribution to/from the major transport node with reference to the model split of the 2016 population by-census results of the adjacent residential buildings as shown in **Table 4.11**.

Table 4.11 Modal Split Adopted for the Subject Development

Building Group (1)	Type of Population	Population	Population Census Model Split (2)					
			MTR	BUS	PLB	Walk	Other	Total
KC0011	Working	1,366	22.2%	36.6%	13.0%	17.4%	11.0%	100%
	Student	343	4.5%	9.8%	-- (3)	38.9%	46.9%	100%
KC0003	Working	824	15.0%	37.1%	10.3%	26.1%	11.5%	100%
	Student	162	0%	30.4%	- (3)	37.5%	32.1%	100%
Overall		**2,695**	**16.3%**	**33.0%**	**9.8%**	**24.0%**	**16.9%**	**100%**

Remarks: (1) Building Group KC0011 include: Genius Court, Prince Ritz, High Place, Billionnaire Avant, Oxford Heights, The Opulence, Billionnaire Luxe, The Prince Place, Cambridge Heights, Goldview Court, Zebrano Luxe, Metro, Cameron Mansion, Nice Building, Carlson Court, Fook Chi Building, Urbana Lofts, Ka Fu House; Building Group KC0003 include: Chung Ying Building;
(2) Year 2016 population by-census results;
(3) PLB trips are classified as "Other" for the model split of student's trips.

4.6.5. The estimated development pedestrian trips for each transport mode are then distributed onto the pedestrian network and superimposed onto the 2037 and 2040 reference pedestrian flows to produce the 2037 and 2040 design pedestrian flows (with the Scheme). The 2037 and 2040 design pedestrian forecasts are shown in **Figures 4.9** and **4.12**.

4.7. Design Traffic Flows

4.7.1. The estimated development vehicular flows of the Scheme were assigned on the surrounding road network according to the vehicle access route of each site and superimposed onto the years 2033, 2036, 2037 and 2040 reference traffic flows to produce the design traffic flows.

4.7.2. The years 2033, 2036, 2037 and 2040 design traffic flows during the peak hours are shown in **Figures 4.5**, **4.7**, **4.9** and **4.12.**

5. Traffic Impact Assessment

5.1. Methodology

5.1.1. Junction capacity analysis was conducted for the base year 2021 and design years 2033, 2036, 2037 and 2040 (three years after completion of each site) for the junctions which are likely to be affected by the Scheme.

5.1.2. Capacity analysis was carried out in accordance with the procedures outlined in the Transport Planning and Design Manual (TPDM). The capacity analysis was based on the observed traffic flows at year 2021 and traffic forecasts at design years 2031 and 2037 for Reference Scenarios (without the Scheme) and Design Scenarios (with the Scheme).

5.1.3. In general, peak vehicular flows of the residents development would be generated during AM and PM peak periods, hence, the traffic impact assessment on weekend peak period of the Scheme in design years would be excluded in this Traffic Impact Assessment Report.

5.2. Junction Analysis

5.2.1. The results of the capacity analysis for existing year 2021 Observed Scenario, design years 2033, 2036, 2037 and 2040 Reference and Design Scenarios are summarized in **Tables 5.1**, **5.2** and **5.3** respectively. The calculation sheets are attached in **Appendix A**.

Table 5.1 Junction Performance for Year 2021 Observed Scenario

Index (1)	Location	Junction Type	RC%/ DFC (2)		
			AM	PM	Weekend
J1	Tung Tau Tsuen Road / Tung Tsing Road / Pui Man Street	Signal	83%	>100%	100%
J2	Junction Road / Carpenter Road	Signal	>100%	92%	53%
J3	Carpenter Road / Lion Rock Road	Signal	>100%	>100%	23%
J4	Carpenter Road / Hau Wong Road	Priority	0.47	0.46	0.59
J5	Carpenter Road / Lung Kong Road	Priority	0.48	0.47	0.63
J6	Carpenter Road / Tak Ku Ling Road	Signal	>100%	>100%	>100%
J7	Tung Tsing Road / Lok Sin Road / Sa Po Road	Signal	69%	98%	66%
J8	Nga Tsin Wai Road / Junction Road	Signal	73%	69%	61%
J9	Nga Tsin Wai Road / Lion Rock Road	Signal	>100%	>100%	67%
J10	Nga Tsin Wai Road / Hau Wong Road	Signal	>100%	90%	39%
J11	Nga Tsin Wai Road / Lung Kong Road	Signal	>100%	98%	66%

Index (1)	Location	Junction Type	RC%/ DFC (2)		
			AM	PM	Weekend
J12	Nga Tsin Wai Road / South Wall Road	Priority	0.59	0.52	0.73
J13	Prince Edward Road West / Boundary Street / Grampian Road	Signal	37%	29%	15%
J14	Prince Edward Road West / Fuk Lo Tsun Road	Priority	0.35	0.19	0.33
J15	Prince Edward Road West / Lion Rock Road	Priority	0.46	0.34	0.40
J16	Kowloon City Roundabout	Roundabout	0.80	0.72	0.72
J17	Prince Edward Road West / South Wall Road	Priority	0.68	0.52	0.63

Remarks: *(1) Refer to **Figure 2.1**.*
(2) "RC%" means reserved capacity and "DFC" means design flow capacity.

5.2.2. As can be seen in **Table 5.1**, all of the assessed key junctions are operating satisfactorily in the existing year 2021 (RC ≥ 15% or DFC ≤ 0.85).

Table 5.2 Junction Performance for Years 2033 and 2036

Index (1)	Location	RC%/ DFC (2)							
		2033 Reference		2033 Design		2036 Reference		2036 Design	
		AM	PM	AM	PM	AM	PM	AM	PM
J1	Tung Tau Tsuen Road / Tung Tsing Road / Pui Man Street	67%	>100%	66%	>100%	65%	100%	65%	100%
J2	Junction Road / Carpenter Road	>100%	>100%	>100%	>100%	>100%	>100%	>100%	>100%
J3	Carpenter Road / Lion Rock Road	>100%	>100%	>100%	>100%	>100%	96%	>100%	96%
J4	Carpenter Road / Hau Wong Road	0.48	0.46	0.53	0.49	0.54	0.50	0.54	0.50
J5	Carpenter Road / Lung Kong Road	0.58	0.68	0.58	0.68	0.58	0.69	0.58	0.69
J6	Carpenter Road / Tak Ku Ling Road	>100%	>100%	>100%	>100%	>100%	>100%	>100%	>100%
J7	Tung Tsing Road / Lok Sin Road / Sa Po Road	19%	40%	18%	40%	17%	38%	17%	38%
J8	Nga Tsin Wai Road / Junction Road	76%	75%	75%	74%	71%	70%	71%	70%
J9	Nga Tsin Wai Road / Lion Rock Road	>100%	>100%	>100%	>100%	>100%	>100%	>100%	>100%
J10	Nga Tsin Wai Road / Hau Wong Road	55%	45%	52%	44%	50%	42%	50%	42%
J11	Nga Tsin Wai Road / Lung Kong Road	71%	57%	69%	56%	66%	52%	66%	51%
J12	Nga Tsin Wai Road / South Wall Road	0.58	0.22	0.59	0.25	0.60	0.25	0.61	0.25
J13	Prince Edward Road West / Boundary Street / Grampian Road	23%	27%	23%	27%	20%	26%	20%	26%
J14	Prince Edward Road West / Fuk Lo Tsun Road	0.40	0.25	0.40	0.26	0.41	0.26	0.41	0.26
J15	Prince Edward Road West / Lion Rock Road	0.52	0.32	0.52	0.32	0.53	0.32	0.53	0.32
J16	Kowloon City Roundabout	0.83	0.74	0.83	0.74	0.85	0.76	0.85	0.76
J17	Prince Edward Road West / South Wall Road	**0.89**	0.51	**0.89**	0.52	**0.91**	0.53	**0.91**	0.53

*Remarks: (1) Refer to **Figure 2.1**.*
(2) "RC%" means reserved capacity and "DFC" means design flow capacity.

5.2.3. As shown in **Tables 5.2**, the junction of Prince Edward Road West/ South Wall Road (J17) would be operating below the marginal capacity limit (i.e. DFC ≥ 0.85) in design year 2033 even without the operational of Sites B and C1 of the Scheme.

Table 5.3 Junction Performance for Years 2037 and 2040

Index (1)	Location	RC%/ DFC (2)							
		2037 Reference		2037 Design		2040 Reference		2040 Design	
		AM	PM	AM	PM	AM	PM	AM	PM
J1	Tung Tau Tsuen Road / Tung Tsing Road / Pui Man Street	62%	98%	53%	96%	50%	92%	45%	92%
J2	Junction Road / Carpenter Road	>100%	>100%	69%	99%	66%	95%	41%	76%
J3	Carpenter Road / Lion Rock Road	>100%	96%	84%	68%	81%	65%	36%	26%
J4	Carpenter Road / Hau Wong Road	0.55	0.50	0.64	0.58	0.65	0.59	**1.02**	0.83
J5	Carpenter Road / Lung Kong Road	0.59	0.71	**1.06**	**1.14**	**1.08**	**1.15**	**1.11**	**1.16**
J6	Carpenter Road / Tak Ku Ling Road	>100%	>100%	>100%	97%	>100%	94%	87%	91%
J7	Tung Tsing Road / Lok Sin Road / Sa Po Road	16%	38%	**11%**	37%	**9%**	35%	**6%**	35%
J8	Nga Tsin Wai Road / Junction Road	71%	70%	63%	70%	61%	65%	47%	65%
J9	Nga Tsin Wai Road / Lion Rock Road	>100%	>100%	>100%	>100%	>100%	>100%	>100%	91%
J10	Nga Tsin Wai Road / Hau Wong Road	49%	40%	36%	30%	33%	29%	28%	26%
J11	Nga Tsin Wai Road / Lung Kong Road	66%	51%	55%	36%	52%	34%	43%	32%
J12	Nga Tsin Wai Road / South Wall Road	0.61	0.26	0.68	0.34	0.69	0.37	**0.93**	0.52
J13	Prince Edward Road West / Boundary Street / Grampian Road	19%	25%	**12%**	18%	**11%**	16%	**6%**	**13%**
J14	Prince Edward Road West / Fuk Lo Tsun Road	0.42	0.26	0.42	0.27	0.43	0.27	0.43	0.27
J15	Prince Edward Road West / Lion Rock Road	0.54	0.33	0.57	0.36	0.58	0.37	0.60	0.39
J16	Kowloon City Roundabout	**0.86**	0.76	**0.86**	0.76	**0.88**	0.78	**0.88**	0.78
J17	Prince Edward Road West / South Wall Road	**0.91**	0.53	**0.94**	0.58	**0.97**	0.60	**0.99**	0.63

*Remarks: (1) Refer to **Figure 2.1**.*
(2) "RC%" means reserved capacity and "DFC" means design flow capacity.

5.2.4. As shown in **Tables 5.3**, the junction of Carpenter Road/ Hau Wong Road (J4), and Carpenter Road/ Lung Kong Road (J5) would be overloaded in the design years 2040 and 2037 respectively with the operation of Sites A and C2.

5.2.5. Moreover, the junctions of Tung Tsing Road/ Lok Sin Road/ Sa Po Road (J7), Nga Tsin Wai Road/ South Wall Road (J12), Prince Edward Road West/ Boundary Street/ Grampian Road (J13), Kowloon City Roundabout (J16) and Prince Edward Road West/ South Wall Road (J17) would be operating below the marginal capacity in year 2040.

5.2.6. Junction improvement scheme is therefore proposed for Junctions J4, J5, J7, J12, J13, J16 and J17 to mitigate the traffic impact to be induced by the Scheme.

5.3. Junction Improvement Schemes

5.3.1. Junction improvement schemes are proposed for the 7 junctions to be affected by the development traffic of the Scheme.

Proposed Signalisation for Junctions of Carpenter Road/ Hau Wong Road (J4) and Carpenter Road/ Lung Kong Road (J5) – Figures 5.1 and 5.2

5.3.2. The existing priority junctions at the Junctions J4 and J5 are expected to be overloaded with the operation of the Sites A and C2. The affected junctions are proposed to be signalised in order to accommodate the additional traffic demand to be generated by the Scheme.

5.3.3. In view of the short distance between Junction J4 and the run-in/out of Kowloon City Plaza, free-flow traffic arrangement is proposed for the eastbound of Carpenter Road at Junction J4 to minimise impact to the egress movement from Kowloon City Plaza. Signal control is proposed for westbound of Carpenter Road and Hau Wong Road to allow sufficient time for the turning traffic from Hau Wong Road.

5.3.4. The on-street parking spaces along the northern side of Carpenter Road will be affected by the proposed junction improvement schemes and thus rearrangement is proposed and the private car parking that could not be re-provided on the street will be compensate by the proposed PVP at Site A.

5.3.5. The existing cautionary crossing near Junction J4 is proposed to be shifted towards east to the original Nga Tsin Wai Road to provide a more direct access for the proposed pedestrian corridor.

5.3.6. The proposed junction improvement schemes are as shown in **Figures 5.1** and **5.2**.

Proposed Improvement for Junction of Tung Tsing Road/ Lok Sin Road/ Sa Po Road (J7)

5.3.7. In order to allow more green time for the traffic signal at Junction J7 during the critical morning peak period, the existing traffic signal cycle time of 100 seconds is proposed to adjust to 115 seconds to in line with the arrangement during evening peak.

Proposed Ban Turn at Junction of Prince Edward Road West/ Boundary Street/ Grampian Road (J13) – Figure 5.4

5.3.8. The operational performance of Junction J13 is restricted by the traffic demand at right-turn of Prince Edward Road West and Junction Road. As road widening is not feasible for the junction due to the existing building boundary and the piers of the flyover and the heavy east-west traffic already running concurrently in the traffic signal phase, enhancement could only be proposed by banning some of the minor turning traffic movement to reduce traffic demand.

5.3.9. It is proposed to ban the left-turn movement at Junction Road to enhance the operational performance of Junction J13. The affected traffic could make the turn at Nga Tsin Wai Road and access Prince Edward Road West via Fuk Lo Tsun Road. The traffic pattern at the junctions of Nga Tsin Wai Road/ Junction Road (J8) and Prince Edward Road West/ Fuk Lo Tsun Road (J14) will be affected by the proposed traffic diversion. The proposed traffic diversion route as shown in **Figure 5.4**.

Proposed Junction Improvement at Nga Tsin Wai Road/ South Wall Road (J12), Kowloon City Roundabout (J18) and Prince Edward Road West/ South Wall Road (J17) – Figures 5.3, 5.5 and 5.6

5.3.10. In order to enhance the operation of the junctions would be operating with below marginal capacity, road widening is proposed at South Wall Road, Prince Edward Road East and Prince Edward Road West near Junctions J12, J18 and J17 respectively. The suggested junction improvement schemes are shown in Figures **5.5** and **5.6**.

5.3.11. The operational performance of the proposed junction improvement schemes are summarised in **Table 5.4**.

Table 5.4 Junction Performance in Design Years with Improvement Measure

Index (1)	Location	RC%/ DFC (2)							
		2037 Reference		2037 Design		2040 Reference		2040 Design	
		AM	PM	AM	PM	AM	PM	AM	PM
J4	Carpenter Road / Hau Wong Road	>100%	>100%	>100%	>100%	>100%	>100%	>100%	85%
J5	Carpenter Road / Lung Kong Road	99%	98%	64%	40%	60%	39%	28%	32%
J7	Tung Tsing Road / Lok Sin Road / Sa Po Road	26%	38%	21%	37%	18%	35%	15%	35%
J8	Nga Tsin Wai Road / Junction Road	71%	70%	63%	70%	61%	65%	44%	64%
J12	Nga Tsin Wai Road / South Wall Road	0.55	0.24	0.61	0.31	0.63	0.34	0.84	0.47

J13	Prince Edward Road West / Boundary Street / Grampian Road	39%	43%	29%	35%	28%	32%	22%	28%
J14	Prince Edward Road West / Fuk Lo Tsun Road	0.69	0.49	0.70	0.50	0.72	0.50	0.72	0.51
J16	Kowloon City Roundabout	0.70	0.63	0.70	0.63	0.72	0.64	0.72	0.64
J17	Prince Edward Road West / South Wall Road	0.84	0.49	**0.88**	0.54	**0.89**	0.55	**0.92**	0.58

*Remarks: (1) Refer to **Figure 2.1**.*
(2) "RC%" means reserved capacity and "DFC" means design flow capacity.

5.3.12. As can be seen in the assessment results, most of the concerned junctions would be operation within the marginal capacity whilst as the junction of Prince Edward Road West/ South Wall Road (J17) would be operated below the marginal capacity (i.e. RC ≤ 15%).

5.3.13. As the critical vehicle movement for Junction J17 is on the mainstream Prince Edward Road West and the road capacity could not be further enhanced due to site constraint. Potential improvement to the junction is limited.

5.3.14. As indicated by the assessment results in **Tables 5.2** and **5.3**, the junction improvement schemes are proposed to be implemented by phases according to the schedule in **Table 5.5** to mitigate the foreseeable adverse traffic conditions. Swept path analysis have also conducted at the modified junctions along Carpenter Road and Nga Tsin Wai Road and demonstrated there are adequate turning space for 12m long vehicles in general (see **Appendix C**).

Table 5.5 Junction Improvement Scheme Implementation Proposal

Index (1)	Location	Implementation Year
J4	Carpenter Road / Hau Wong Road	By 2040
J5	Carpenter Road / Lung Kong Road	By 2037
J7	Tung Tsing Road / Lok Sin Road / Sa Po Road	By 2037
J12	Nga Tsin Wai Road / South Wall Road	By 2040
J13	Prince Edward Road West / Boundary Street / Grampian Road	By 2040
J16	Kowloon City Roundabout	By 2037
J17	Prince Edward Road West / South Wall Road	By 2033

*Remarks: (1) Refer to **Figure 2.1**.*

5.4. Pedestrian Crossing Capacity Analysis

5.4.1. As mentioned in **Section 5.3**, junction of Carpenter Road / Hau Wong Road (J4) and Carpenter Road / Lung Kong Road (J5) are proposed to be converted to signalised junction.

5.4.2. Existing 3.0m wide cautionary crossing across Hau Wong Road would be converted to a 4.0m wide signalised pedestrian crossing at junction J4 and a 4.0m wide cautionary crossing across Carpenter Road would be like-to-like reprovisioned adjacent to the future closed Nga Tsin Long Road as shown in **Figure 5.1**

5.4.3. Besides, an existing 4.0m wide cautionary crossing across Carpenter Road near junction J5 would be removed. A new 5.0m wide signalised pedestrian crossing would be reprovisioned at junction J5 as shown in **Figure 5.2**. Besides, existing 3.5m wide cautionary crossing across Lung Kong Road would be converted to a 4.5m wide signalised pedestrian crossing at junction J5.

5.4.4. The expected pedestrian flows at the aforementioned affected cautionary crossings are shown in **Table 5.6** reference to the TPDM Vol. 2, Section 3.7.2, Table 3.7.2.1.

Table 5.6 Crossing Capacity at Existing Cautionary Crossings at Junctions J4 and J5

Index (1)	Crossing Location	Crossing Width (m)	Expected Pedestrian/hr both directions
J4	across Hau Wong Road	3.0	1,800 – 3,600 (mid-range 2,700)
	across Carpenter Road	4.0	2,400 – 4,800 (mid-range 3,600)
J5	across Carpenter Road	4.0	2,400 – 4,800 (mid-range 3,600)
	across Lung Kong Road	3.5	2,100 – 4,200 (mid-range 3,150)

*Remarks: (1) Refer to **Figure 2.1**.*

5.4.5. Besides, the light signal setting for the pedestrian crossing have been checked to ensure the light signal crossing facilities provided are adequate for pedestrian volumes wishing to cross. The analysis is applied by an empirical formula as stated in TPDM Vol. 4, Ch. 3.2 to check the light signal crossing facilities provided are adequate for pedestrian volumes wishing to cross.

$$PC = K \times GTP \times W$$

Where PC = Pedestrian crossing capacity in pedestrian per hour

GTP = Green time proportion

i.e. $$\frac{\text{Pedestrian green (GT) + flashing green time (FG)}}{\text{Cycle time (CT)}}$$

W = Lateral width of pedestrian crossing

K = A constant equivalent to saturation flow for pedestrians may be taken as 1,900 ped/metre/hours

5.4.6. The calculated capacity of pedestrian crossings at new junctions J4 and J5 are summarized in **Table 5.7**.

Table 5.7 Crossing Capacity at Proposed Signalised Junctions J4 and J5

Index (1)	Crossing Location	Calculated Capacity of Pedestrian Crossings (pph)										
		W (m)	K	AM					PM				
				GT (2)	FG (2)	CT (2)	GTP	PC	GT (2)	FG (2)	CT (2)	GTP	PC
J4	across Hau Wong Road	4.0	1,900	56	10	120	0.5	4,155	61	10	115	0.6	4,696
J5	across Carpenter Road	5.0		40	7	120	0.4	3,721	40	7	115	0.4	3,883
	across Lung Kong Road	4.5		76	10	120	0.7	6,139	64	10	115	0.6	5,536

Remarks: *(1) Refer to **Figure 2.1**.*
(2) Pedestrian Green Time (GT, Flashing Green (FG) time and Cycle Time (CT) are based on the proposed MOC in year 2040.

5.4.7. As shown in **Table 5.7**, it is noted that the calculated capacity of the proposed signalised pedestrian crossings across Hau Wong Road and Lung Kong Road at junctions J4 and J5 respectively could be met with the expected pedestrian demand at high-end at the existing cautionary crossings as stated in **Table 5.6**.

5.4.8. Besides, the calculated capacity of the proposed signalised pedestrian crossing across Carpenter Road at junction J4 and could be met the mid-range of the expected pedestrian demand at the existing cautionary crossing.

5.4.9. Hence, it is anticipated that the design of the proposed signalised crossings facilities at junctions J4 & J5 and the re-provisioned cautionary pedestrian crossing across Carpenter Road at junction J4 are adequate for pedestrian volumes wishing to cross in year 2040 after the completion of the Scheme.

5.5. Junction Queue Length Analysis

5.5.1. Junction queue length analysis have been carried out at assessed junction along Carpenter Road and Nga Tsin Wai Road (i.e. at junction J2 to junction J12).

5.5.2. The calculated average queue length at junction J2 to junction J12 for design years 2033, 2036, 2037 and 2040 are summarised in **Table 5.6**. The calculation sheets are attached in **Appendix B**.

Table 5.8 Summary of Calculated Average Queue Length in Years 2031 & 2036 Design Scenarios

Index (1)	Junction Name	Arm	Length of stacking area (m)	Existing 2021		Year 2033 Reference		Year 2033 Design		Year 2036 Reference		Year 2036 Design		Year 2037 Reference		Year 2037 Design		Year 2040 Reference		Year 2040 Design	
				Averaged Queue Length (m)		Averaged Queue Length (m)		Averaged Queue Length (m)		Averaged Queue Length (m)		Averaged Queue Length (m)		Averaged Queue Length (m)		Averaged Queue Length (m)		Averaged Queue Length (m)		Averaged Queue Length (m)	
				AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
J1	Tung Tau Tsuen Road / Tung Tsing Road / Pui Man Street	Tung Tau Tsuen Road WB	120	22	18	24	21	24	21	25	21	25	21	25	22	25	22	26	22	26	22
		Tung Tsing Road NB	225	10	9	15	11	15	11	15	11	15	11	16	12	17	12	17	12	18	12
		Pui Man Street SB	250	11	3	11	3	11	3	11	3	11	3	11	3	11	3	12	3	12	3
		Tung Tau Tsuen Road EB	395	10	8	15	12	15	12	15	12	15	12	15	12	15	12	15	13	16	13
J2	Junction Road / Carpenter Road	Carpenter Road WB	45	17	20	18	19	18	19	18	19	18	19	18	19	23	23	24	23	27	25
		Junction Road NB	170	15	19	14	15	14	15	14	15	14	15	14	15	17	17	17	18	19	19
		Junction Road SB	85	34	30	33	25	33	25	34	26	34	26	34	26	40	29	41	30	45	31
J3	Carpenter Road / Lion Rock Road	Carpenter Road WB	55	27	33	31	34	31	34	31	35	31	35	31	35	39	41	40	42	51	51
		Carpenter Road EB	45	7	9	5	5	5	5	6	5	6	5	6	5	6	5	6	6	6	6
J4	Carpenter Road / Hau Wong Road (2) (3)	Carpenter Road WB	135	-	-	-	-	-	-	-	-	-	-	-	-	24	27	-	-	36	37
		Hau Wong Road NB	170	-	-	-	-	-	-	-	-	-	-	-	-	18	16	-	-	26	22
J5	Carpenter Road / Lung Kong Road (2) (3)	Carpenter Road WB	45	-	-	-	-	-	-	-	-	-	-	-	-	20	30	-	-	19	30
		Lung Kong Road NB	170	-	-	-	-	-	-	-	-	-	-	-	-	34	34	-	-	37	35
		Carpenter Road EB	135	-	-	-	-	-	-	-	-	-	-	-	-	29	23	-	-	45	33
J6	Carpenter Road / Tak Ku Ling Road	Carpenter Road WB	100	9	10	10	10	10	10	10	10	10	10	10	10	11	10	11	10	11	10
		Tak Ku Ling Road NB	170	15	19	16	23	16	23	17	23	17	23	17	23	18	24	18	24	19	24
		Carpenter Road EB	45	24	26	23	33	24	33	24	34	24	34	24	34	29	35	29	35	33	36
J7	Tung Tsing Road / Lok Sin Road / Sa Po Road (3)	Lok Sin Road WB	60	20	19	41	33	41	33	42	33	42	33	-	-	47	33	-	-	50	34
		Lok Sin Road EB	100	26	27	30	35	30	35	31	36	31	36	-	-	38	36	-	-	42	37
		Tung Tsing Road SB	225	19	17	23	20	23	20	24	20	24	20	-	-	27	20	-	-	29	21
J8	Nga Tsin Wai Road / Junction Road (3)	Nga Tsin Wai Road WB	45	22	30	27	33	28	33	28	34	28	34	-	-	29	34	-	-	29	35
		Nga Tsin Wai Road EB	45	32	29	34	31	34	31	35	32	35	32	-	-	35	32	-	-	41	36
		Junction Road SB	170	29	22	37	29	37	29	37	30	37	30	-	-	38	30	-	-	51	37
		Junction Road NB	170	39	41	40	39	40	39	41	40	41	40	-	-	41	40	-	-	44	41
J9	Nga Tsin Wai Road / Lion Rock Road	Nga Tsin Wai Road WB	45	25	27	30	31	30	31	31	31	31	31	31	32	31	32	32	32	33	33
		Nga Tsin Wai Road EB	45	9	10	12	11	12	11	12	11	12	11	12	11	16	14	16	15	20	18
		Lion Rock Road SB	170	18	19	22	20	22	20	22	20	22	20	22	20	22	21	23	21	28	28
J10		Nga Tsin Wai Road WB	135	28	31	35	36	36	36	36	36	36	36	37	37	39	39	40	40	39	38

Index (1)	Junction Name	Arm	Length of stacking area (m)	Existing 2021		Year 2033 Reference		Year 2033 Design		Year 2036 Reference		Year 2036 Design		Year 2037 Reference		Year 2037 Design		Year 2040 Reference		Year 2040 Design	
				Averaged Queue Length (m)		Averaged Queue Length (m)		Averaged Queue Length (m)		Averaged Queue Length (m)		Averaged Queue Length (m)		Averaged Queue Length (m)		Averaged Queue Length (m)		Averaged Queue Length (m)		Averaged Queue Length (m)	
				AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
	Nga Tsin Wai Road / Hau Wong Road	Nga Tsin Wai Road EB	45	18	19	23	23	23	23	24	23	24	23	24	24	29	27	29	28	35	33
		Hau Wong Road NB	135	16	14	17	15	18	16	18	16	18	16	18	16	19	16	19	16	23	21
J11	Nga Tsin Wai Road / Lung Kong Road	Nga Tsin Wai Road WB	45	28	27	35	35	35	36	36	37	36	37	36	37	38	39	38	39	41	40
		Nga Tsin Wai Road EB	135	25	25	31	30	31	30	32	30	32	30	32	30	51	62	54	66	44	52
		Lung Kong Road NB	85	30	30	35	37	35	38	36	38	36	39	36	39	40	46	41	47	43	47
J13	Prince Edward Road West / Boundary Street / Grampian Road (3)	Prince Edward Road West WB	75	45	47	44	43	45	43	45	44	45	44	-	-	45	45	-	-	49	49
		Boundary Street EB	60	29	23	30	23	30	24	31	24	31	24	-	-	33	28	-	-	34	30
		Junction Road SB	170	42	39	50	43	50	43	51	44	51	44	-	-	46	39	-	-	50	42

*Remarks: (1) Refer to **Figure 2.1**.*

(2) Only proposed signalised junction at junctions J4 & J5 have been considered. .(Section 5.4 refers)

(3) Proposed junction improvement schemes have been taken into account for future years assessment.(Section 5.4 refers)

5.5.3. As shown in **Tables 5.5**, it is noted that the calculated average queue would not encroach to adjacent junctions in year 2021 and design years 2033, 2036, 2037 and 2040 while the proposed junction improvement schemes are implemented.

5.6. Traffic Queuing Analysis at Car Park Entrance

5.6.1. As mentioned in **Section 2.5**,the proposed run-in/out of the main site of the Scheme would be located at Lung Kong Road (for Site A) and Hau Wong Road (for Site C2) respectively.

5.6.2. In order to assess the impact of the Scheme to the public roads caused by vehicles waiting and queueing for entering carparks, the operational performance of the car parks entrance will be analysed by application of traffic queueing analysis. The theorem assumes that the "service rate" of the controlled gate is fixed and the "demand" is randomly distributed about a mean arrival rate

5.6.3. The analysis is applied the Poisson distribution for arrival pattern and multi-servers queuing (M/M/N) theory was applied to determine the queues induced due to the vehicles waiting at the controlled gate.

5.6.4. The probability that n vehicles are in the car parking system is given by:

For $e = \frac{\lambda}{\mu}$,

$$P(n) = \frac{1}{\sum_{n=0}^{N-1} \frac{e^n}{n!} + \frac{e^N}{N!\left(1 - \frac{e}{N}\right)}} \quad \text{for } n = 0$$

$$P(n) = \frac{e^n}{n!} P(0) \quad \text{for } 0 < n \le N$$

$$P(n) = \frac{e^n}{N^{n-N} N!} P(0) \quad \text{for } n > N$$

where: $P(n)$ = Probability of n vehicles in the system;
λ = Averaged Arrival rate;
μ = Averaged Servicing time;
n = Number of vehicles in the system; and,
N = Number of servers, i.e. no. of controlled gate.

Arrival Rate for Car Parking Systems at Site A and Site C

5.6.5. The adopted attraction rate during AM and peak hours is determined by the trip generation of the Site A and Site C2 as shown in **Table 4.8** in the **Chapter 4.** The adopted attraction rates at Site A and Site C2 are shown in **Table 6.2** for the car park arrival rates for assessment purpose.

Table 5.9: Attraction Rates of the Car Parking System at Site A and Site B

Location	Total Trips Attraction (pcu/hr)		Average Arrival Rates (pcu/min	
	AM	PM	AM	PM
Site A	197	250	3.3	4.2
Site C2	116	113	1.9	1.9

Service Rates for the Car Parking System

5.6.6. It is assumed that the servicing time per vehicle at the controlled gate is about 25 seconds. Therefore, the average servicing time (μ) is about 0.25 min/vehicle at the controlled gate.

5.6.7. With the application of the average arrival rate (λ) and the average servicing rate (μ) to the queuing theory, the probability of having vehicle waiting in front of the controlled are summarized in **Table 5.10**.

No. of Server (i.e. no. of controlled gate)

5.6.8. It is assumed that there are 2 nos. of controlled gates at Site A and 1 no. of controlled gate at Site C2, therefore No. of Server (N) is 2 and 1 respectively is adopted for the assessment

Table 5.10 Queuing Analysis of the Car Parking System at Site A and Site C2

	Probability of Having n Vehicle in the System, P(n)	
	P(n = x)	P(n ≤ x)
Site A – AM peak		
x = 0	0	41.8%
x = 1	1	34.3%
x = 2	2	14.1%
x = 3	3	5.8%
Site A – PM peak		
x = 0	31.5%	31.5%
x = 1	32.8%	64.3%
x = 2	17.1%	81.4%
x = 3	8.9%	90.3%
x = 4	4.6%	95.0%
X = 5	2.4%	97.4%
Site C2 – AM Peak		
x = 0	51.7%	51.7%
x = 1	25.0%	76.6%

	Probability of Having n Vehicle in the System, P(n)	
	P(n = x)	P(n ≤ x)
x = 2	12.1%	88.7%
x = 3	5.8%	94.5%
x = 4	2.8%	97.4%
Site C2 – PM Peak		
x = 0	52.9%	52.9%
x = 1	24.9%	77.8%
x = 2	11.7%	89.6%
x = 3	5.5%	95.1%

5.6.9. As suggested in **Table 5.10**, there would be 5 nos. and 4 nos. or less vehicles are waiting at the controlled gate(s) at Site A with 2 nos. of controlled gates and Site C2 with 1 no. of controlled gate respectively at 95% level of confidence following the M/M/N queueing theory. Therefore, sufficient space should be allowed for 5 nos. (i.e. about 30m long) and 4 nos. (i.e. about 24m long) of possible waiting vehicles at the internal access in front of the controlled gates at Site A and Site C2 respectively.

5.7. Pedestrian Walkway Assessment

5.7.1. Existing performance of the key footpath and pedestrian crossing facilities likely to be affected by the Scheme are assessed with the observed pedestrian traffic flows.

5.7.2. Current performance of the key pedestrian links is summarized in **Table 5.6** in terms of Level-of-Service (LOS). The key footpath sections are currently operating at LOS C during the morning and evening peak periods. For details of the LOS, please refer to **Section 5.4.3** and **Table 5.11** below.

Table 5.11 Existing Key Pedestrian Link Performance

Ref (1)	Street Name	Footpath Width (m)	Effective Width (m) (2)	Observed Pedestrian Demand (ped/15-min))			Flow Rate (ppm/m)			LOS		
				AM Peak	PM Peak	Week-end Peak	AM Peak	PM Peak	Week-end Peak	AM Peak	PM Peak	Week-end Peak
P1	Hau Wong Road (Eastern footpath)	3.1	2.1	105	85	191	3.3	2.7	6.1	A	A	A
P2	Nga Tsin Long Road(Western footpath)	3.2	2.2	50	85	191	1.5	2.6	5.8	A	A	A
P3	Nga Tsin Long Road (Eastern footpath)	3.2	1.7	120	200	450	4.7	7.8	17.7	A	A	B
P4	Nga Tsin Long Road (Western footpath)	4.5	3	20	30	68	0.4	0.7	1.5	A	A	A
P5	Nga Tsin Long Road (Eastern footpath)	4.6	3.1	20	30	68	0.4	0.6	1.5	A	A	A
P6	Nam Kok Road (Western footpath)	4.6	3.1	30	95	214	0.6	2	4.6	A	A	A

Ref (1)	Street Name	Footpath Width (m)	Effective Width (m) (2)	Observed Pedestrian Demand (ped/15-min))			Flow Rate (ppm/m)			LOS		
				AM Peak	PM Peak	Week-end Peak	AM Peak	PM Peak	Week-end Peak	AM Peak	PM Peak	Week-end Peak
P7	Nam Kok Road (Eastern footpath)	4.6	3.1	40	65	146	0.9	1.4	3.1	A	A	A
P8	Nam Kok Road (Western footpath)	3.6	2.1	20	100	225	0.6	3.2	7.1	A	A	A
P9	Nam Kok Road (Eastern footpath)	8	6.5	210	455	1024	2.2	4.7	10.5	A	A	A
P10	Lung Kong Road (Western footpath)	3	1.5	30	60	135	1.3	2.7	6.0	A	A	A
P11	Nga Tsin Wai Road (Northern footpath)	3.3	2.3	135	225	507	3.9	6.5	14.7	A	A	A
P12	Nga Tsin Wai Road (Southern footpath)	3	1.5	130	260	585	5.8	11.6	26.0	A	A	C
P13	Nga Tsin Wai Road (Northern footpath)	3.3	1.8	135	255	574	5	9.4	21.3	A	A	B
P14	Nga Tsin Wai Road (Southern footpath)	2.9	1.4	130	270	608	6.2	12.9	28.9	A	A	C
P15	Nga Tsin Wai Road (Northern footpath)	3	1.5	115	300	675	5.1	13.3	30.0	A	A	C
P16	Nga Tsin Wai Road (Southern footpath)	3	1.5	110	235	529	4.9	10.4	23.5	A	A	C

Remarks: *(1) Refer to **Figure 4.2**.*
(2) Effective Width = Footpath Width – Dead Width (0.5m for kerb/ wall/ fence, 0.7m for shop frontage and 1.0m for tree pits along the eastern footpath of Cheung Wah Street).

5.7.3. Performance of walkway is measured by LOS based on Highway Capacity Manual (HCM) 2000 (Exhibit 11-8). It illustrates the degree of congestion in pedestrian facilities. The definition of LOS is illustrated in **Table 5.12**. The TPDM states that the "LOS C is desirable for most design at streets with dominant 'living' pedestrian facilities".

Table 5.12 Pedestrian Walkway LOS

LOS	Flow Rate (ppm)	Description
A	≤ 16	Pedestrians move in desired paths without altering their movements in response to other pedestrians. Walking speeds are freely selected, and conflicts between pedestrians are unlikely.
B	16 – 23	There is sufficient area for pedestrians to select walking speeds freely, to bypass other pedestrians, and to avoid crossing conflicts. At this level, pedestrians begin to be aware of other pedestrians, and to respond to their presence when selecting a walking path.
C	23 – 33	Space is sufficient for normal walking speeds, and for bypassing other pedestrians in primarily unidirectional streams. Reverse-direction or crossing movements can cause minor conflicts, and speeds and flow rate are somewhat lower.
D	33 – 49	Freedom to select individual walkway speeds and to bypass other pedestrians is restricted. Crossing or reserve-flow movements face a high probability of conflict, requiring frequent changes in speed and position. The LOS provides reasonably fluid flow, but friction and interaction between pedestrians is likely.
E	49 – 75	Virtually all pedestrians restrict their normal walking speed, frequently adjusting their gait. At the lower range, forward movement is possible only by shuffling. Space is not sufficient for passing slower pedestrians. Cross- or reverse-flow movements are possible only with extreme difficulties. Design volumes approach the limit of walkway capacity, with stoppages and interruptions to flow.
F	> 75	All walking speeds are severely restricted, and forward progress is made only by shuffling. There is frequent, unavoidable contact with other pedestrians. Cross- and reverse-flow movements are virtually impossible. Flow is sporadic and unstable. Space is more characteristic of queued pedestrians than of moving pedestrian streams.

5.7.4. The performance of the key pedestrian links in the design years 2037 and 2040 reference (without the Scheme) and design (with the Scheme) scenarios are summarized in **Table 5.13** below in terms of LOS. The pedestrian walkway along the boundary of Sites A and C2 will be widened in year 2037 due to the proposed building set back and the sections of Nga Tsin Long Road and Nam Kok Road will be converted to pedestrian corridor in the design years by phases.

Table 5.13 Design Years Key Pedestrian Link Performance

Ref (1)	Street Name	Effective Width (m) (2)	Scenario	Pedestrian Demand (ped/15-min)		Flow Rate (ppm/m)		LOS	
				AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
P1	Hau Wong Road (Eastern Footpath)	2.1	2037 Reference	105	85	3.3	2.7	A	A
			2037 Design	105	85	3.3	2.7	A	A
			2040 Reference	105	85	3.3	2.7	A	A
		1.6 (3)	2040 Design	105	85	4.4	3.5	A	A

Ref [1]	Street Name	Effective Width (m) [2]	Scenario	Pedestrian Demand (ped/15-min)		Flow Rate (ppm/m)		LOS	
				AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
P2	Nga Tsin Long Road (Western footpath)	2.2	2037 Reference	75	110	2.3	3.3	A	A
			2037 Design	75	110	2.3	3.3	A	A
			2040 Reference	75	110	2.3	3.3	A	A
P3	Nga Tsin Long Road (Eastern footpath)	1.7	2037 Reference	120	205	4.7	8	A	A
			2037 Design	370	520	14.5	20.4	A	B
			2040 Reference	370	520	14.5	20.4	A	B
P2+P3	Nga Tsin Long Road Pedestrian Corridor	17.9 [4]	2040 Design	865	1,120	3.2	4.2	A	A
P4	Nga Tsin Long Road (Western footpath)	3	2037 Reference	20	30	0.4	0.7	A	A
			2037 Design	30	55	0.7	1.2	A	A
			2040 Reference	30	55	0.7	1.2	A	A
			2040 Design	40	95	0.9	2.1	A	A
P5	Nga Tsin Long Road (Eastern footpath)	3.1	2037 Reference	20	30	0.4	0.6	A	A
			2037 Design	45	50	1	1.1	A	A
			2040 Reference	45	50	1	1.1	A	A
			2040 Design	90	80	1.9	1.7	A	A
P6	Nam Kok Road (Western footpath)	3.1	2037 Reference	30	95	0.6	2	A	A
P7	Nam Kok Road (Eastern footpath)	2.1	2037 Reference	40	65	0.9	1.4	A	A
P6+P7	Nam Kok Road Pedestrian Corridor	15 [4]	2037 Design	195	320	0.9	1.4	A	A
			2040 Reference	195	320	0.9	1.4	A	A
			2040 Design	195	320	0.9	1.4	A	A

Ref [1]	Street Name	Effective Width (m) [2]	Scenario	Pedestrian Demand (ped/15-min)		Flow Rate (ppm/m)		LOS	
				AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
P8	Nam Kok Road (Western footpath)	2.1	2037 Reference	20	100	0.6	3.2	A	A
			2037 Design	55	145	1.7	4.6	A	A
			2040 Reference	55	145	1.7	4.6	A	A
			2040 Design	55	145	1.7	4.6	A	A
P9	Nam Kok Road (Eastern footpath)	6.5	2037 Reference	225	470	2.3	4.8	A	A
			2037 Design	465	770	4.8	7.9	A	A
			2040 Reference	465	775	4.8	7.9	A	A
			2040 Design	665	1,005	6.8	10.3	A	A
P10	Lung Kong Road (Western footpath)	1.5	2037 Reference	30	60	1.3	2.7	A	A
			2037 Design	155	220	6.9	9.8	A	A
			2040 Reference	155	220	6.9	9.8	A	A
			2040 Design	155	220	6.9	9.8	A	A
P11	Nga Tsin Wai Road (Northern footpath)	2.3	2037 Reference	135	230	3.9	6.7	A	A
			2037 Design	200	310	5.8	9	A	A
			2040 Reference	205	310	5.9	9	A	A
		3.5 [5]	2040 Design	260	375	5	7.1	A	A
P12	Nga Tsin Wai Road (Southern footpath)	1.5	2037 Reference	130	265	5.8	11.8	A	A
			2037 Design	130	265	5.8	11.8	A	A
			2040 Reference	135	265	6	11.8	A	A
			2040 Design	135	265	6	11.8	A	A

Ref [1]	Street Name	Effective Width (m) [2]	Scenario	Pedestrian Demand (ped/15-min)		Flow Rate (ppm/m)		LOS	
				AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
P13	Nga Tsin Wai Road (Northern footpath)	1.8	2037 Reference	145	270	5.4	10	A	A
		8.5 [5]	2037 Design	465	670	3.6	5.3	A	A
			2040 Reference	470	670	3.7	5.3	A	A
			2040 Design	780	1,030	6.1	8.1	A	A
P14	Nga Tsin Wai Road(Southern footpath)	1.4	2037 Reference	130	275	6.2	13.1	A	A
			2037 Design	130	275	6.2	13.1	A	A
			2040 Reference	135	275	6.4	13.1	A	A
			2040 Design	135	275	6.4	13.1	A	A
P15	Nga Tsin Wai Road (Northern footpath)	1.5	2037 Reference	120	310	5.3	13.8	A	A
			2037 Design	215	430	9.6	19.1	A	B
			2040 Reference	215	430	9.6	19.1	A	B
			2040 Design	325	560	14.4	24.9	A	C
P16	Nga Tsin Wai Road (Southern footpath)	1.5	2037 Reference	115	240	5.1	10.7	A	A
			2037 Design	190	335	8.4	14.9	A	A
			2040 Reference	190	335	8.4	14.9	A	A
			2040 Design	190	335	8.4	14.9	A	A

Remarks: *(1) Refer to **Figures 4.9** and **4.12**.*
(2) Effective Width = Footpath Width – Dead Width (0.5m for kerb/ wall/ fence, 0.7m for shop frontage and 1.0m for tree pits along the eastern footpath of Cheung Wah Street).
(3) Dead width increased due to change from existing wall to proposed shop frontage.
(4) Proposed pedestrian corridor.
(5) Footpath widened due to proposed building set back.

5.7.5. From **Table 5.13**, all of the key sections of footpath are still operating desirably during the morning and evening peak periods with the additional pedestrian trip to be generated by the Scheme.

6. Summary and Conclusion

6.1. Summary

6.1.1. A Traffic Impact Assessment (TIA) Study was carried out to investigate the traffic impact induced by the proposed Scheme. The main site is proposed to be developed into composite developments comprising residential buildings with retail and GIC facilities at the podia. Nga Tsin Wai Road and Nam Kok Road within the Scheme are proposed to be pedestrianized to enhance the walkability and provide space for at-grade landscaped diversified space. At Site B, it is proposed to develop a new GIC complex for re-provisioning of the affected G/IC uses along Hau Wong Road and to accommodate new GIC facilities to meet community needs. Site C1 is proposed for development of a gateway square and a low-rise retail block.

6.1.2. The proposed transport facilities for the Scheme will be within the range of the HKPSG parking requirements, with high-end provision for the proposed residential blocks and retail developments. The transport facilities would be provided at the ancillary basement car park at Sites A, B and C2 and loading/unloading bays for Site C1 will provided on ground floor. Besides, car ramps are proposed for the three basement car park to facilitate vehicle manoeuvring and entering to the sites.

6.1.3. The actual provision for GIC uses will be subject to liaison with the relevant government departments and services providers upon the Development Scheme Plan (DSP) approval.

6.1.4. Provision of public vehicle park is proposed at Site A to accommodate some of the parking demand in the local area. The provision of underground public carpark at Site A will be compensate some of the on-street parking spaces to be affected by the proposed development assesses and junction improvement schemes in the area.

6.1.5. Swept path analysis is conducted based on the notional layout. The notional layout for the development run-in/out and access road is technically feasible from traffic engineering point of view.

6.1.6. Building setback at Carpenter Road and Nga Tsin Wai Road is proposed within the Scheme to provide wider pedestrian walkways and thus enhance the pedestrian walking environment.

6.1.7. Road closure scheme is proposed for the section of Nga Tsin Long Road and Nam Kok Road within Scheme to provide pedestrian avenues for the major north-south pedestrian route. Diversion of the existing Kai Tak Road/Nga Tsin Wai Road is proposed to make way for new at-grade gateway square and retail facilities to serve as an enlarged gateway square from Kai Tak Development Area.

6.1.8. Pedestrians can access the subject site via the surrounding footpaths and pedestrian crossings to/ from nearby bus, GMB and PLB servicing points as well as to/ from MTR Sung Wong Toi Station.

6.1.9. The key junctions within the study area were assessed with respect to traffic generation of the Scheme in design years 2033, 2036, 2037 and 2040 (three years after completion of each site), taking into account the traffic generation by the major planned/ approved developments in the vicinity of the subject site. Completion years of different sites are based on preliminary phasing programme which is subject to changes at detailed design/implementation stage.

6.1.10. Based on the assessment results, it was found that some of identified junctions would be operating under the marginal capacity (i.e. RC ≤ 15%) or even over capacity (i.e. RC ≤ 0%) in design years.

6.1.11. Traffic enhancement measure is proposed for seven (7) junctions that would be operating below the marginal capacity or overloaded by the development trips of the Scheme.

6.2. Conclusion

6.2.1. It is concluded that with the proposed and suggested junction improvement measures and footpath widening scheme, the Scheme would not induce adverse traffic impact on the surrounding road and footpath network and would enhance the pedestrian walking environment of the proposed development and the neighbouring areas.

6.2.2. The proposed traffic provision to the Scheme, with reference to the notional layout, is considered technically feasible and acceptable.

Figures



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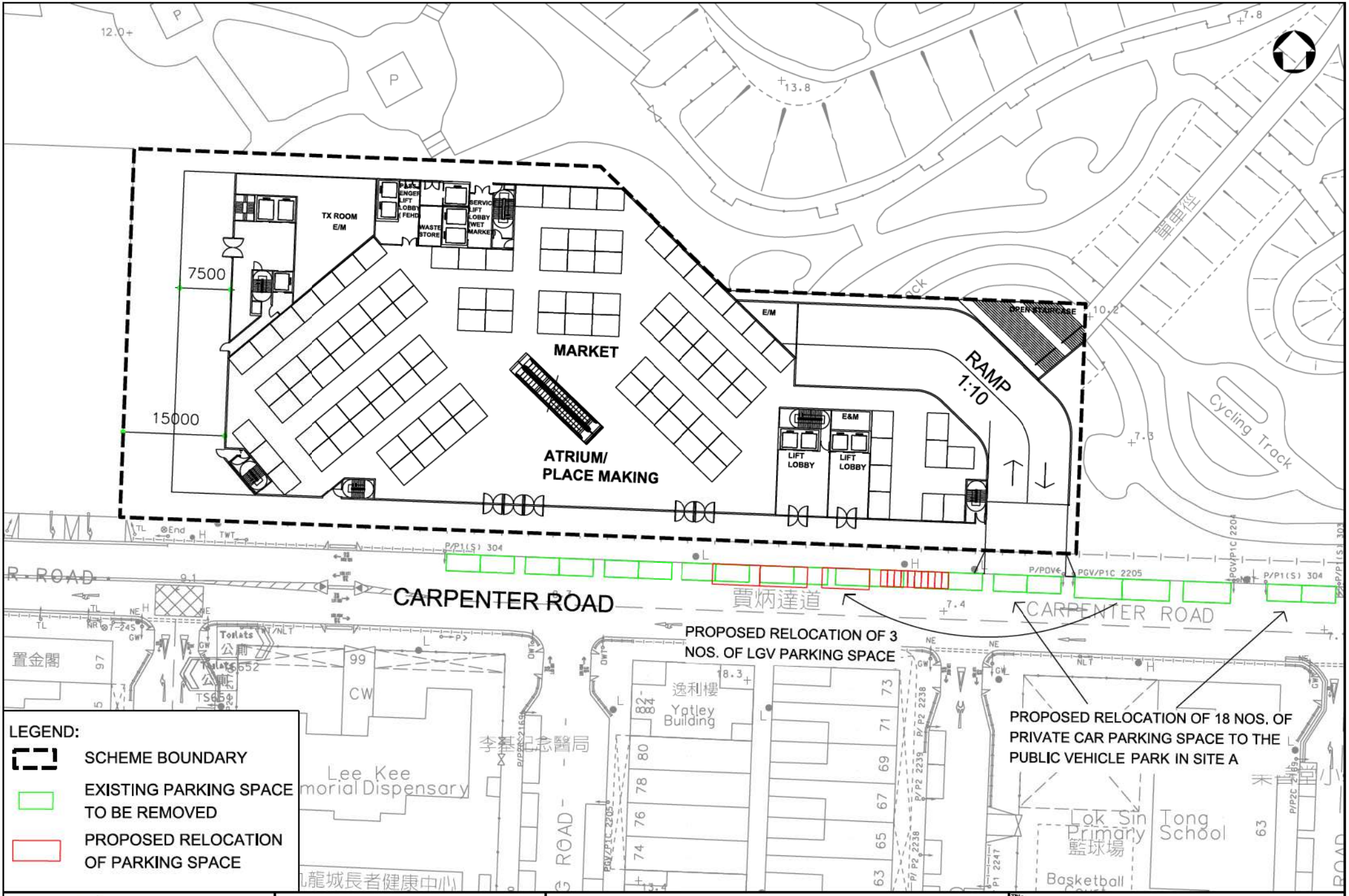
URA NGA TSIN WAI ROAD / CARPENTER ROAD DEVELOPMENT SCHEME (KC-017)

Title
LOCATION PLAN, KEY JUNCTION AND ADJACENT PLANNED DEVELOPMENTS

Scale at A3	Date	Figure No.
1:4000	MAY 2022	2.1



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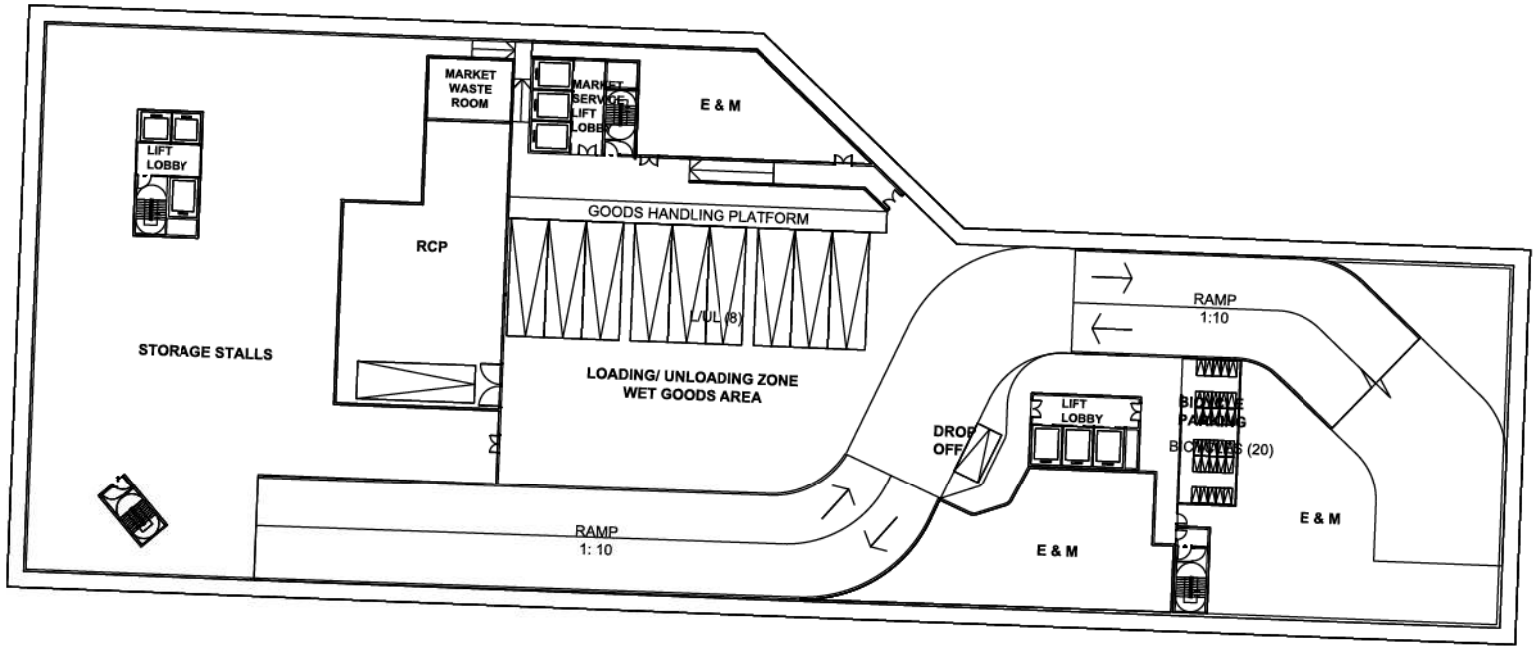
URA NGA TSIN WAI ROAD / CARPENTER ROAD DEVELOPMENT SCHEME (KC-017)

Title: LAYOUT OF DEVELOPMENT SCHEME - SITE B GROUND FLOOR

Scale at A3	Date	Figure No.
1:500	MAY 2022	2.2



LEGEND:

HGV LOADING / UNLOADING BAY(11m x 3.5m)

BICYCLE PARKING (1.5m x 0.75m)

TRAFFIC DIRECTION

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URA NGA TSIN WAI ROAD / CARPENTER ROAD DEVELOPMENT SCHEME (KC-017)

Title: LAYOUT OF DEVELOPMENT SCHEME - SITE B BASEMENT LEVEL 1

Scale at A3	Date	Figure No.
1:500	MAY 2022	2.3

PRINTED BY: CHEU1554 5/12/2022 2:59:48 PM
FILENAME: P:\CNHKA\Project\5205867_URA_Term_Con_2124\28.00 Working and Temporary\KC-017\drawing\TIA_Rev1_20220401\Figure 2.3.dgn
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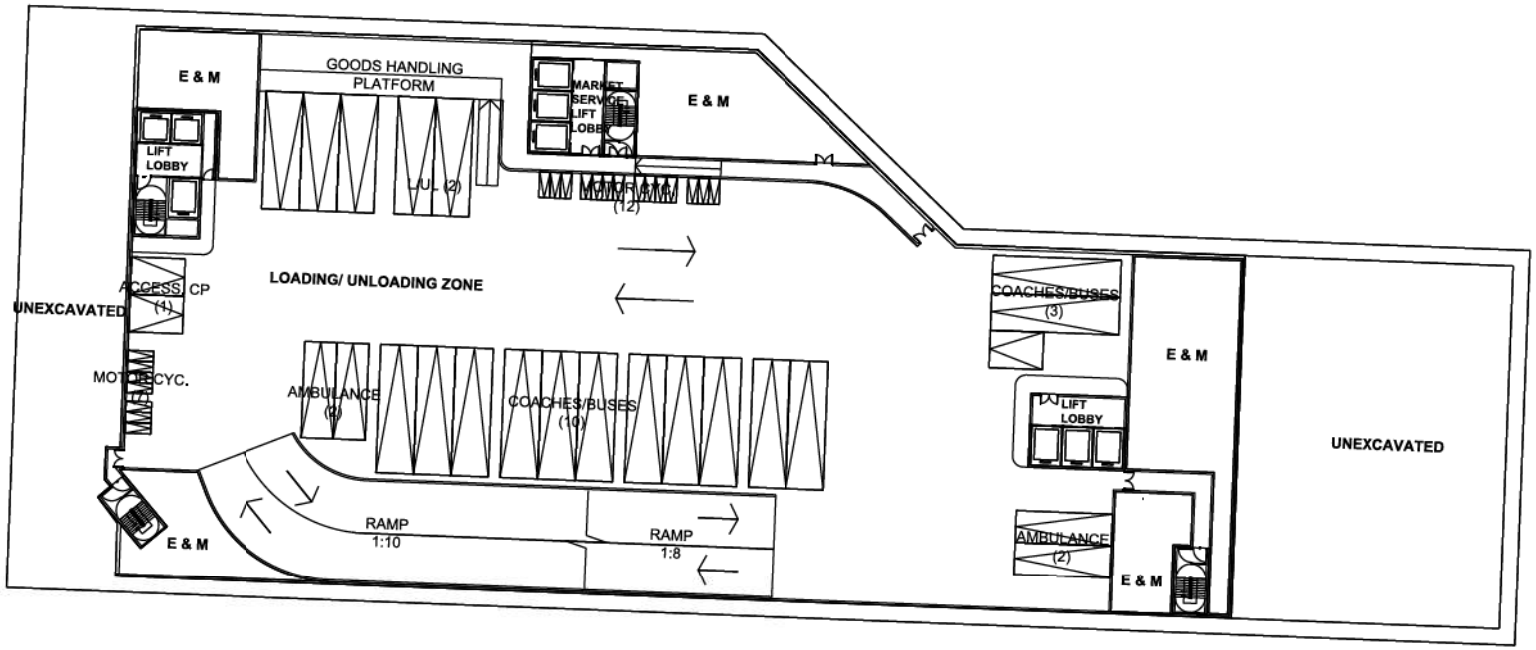

LEGEND:

- MOTORCYCLE PARKING (2.4m x 1m)
- AMBULANCE PARKING (9m x 3m)
- HGV LOADING / UNLOADING BAY (11m x 3.5m)
- COACHES / BUSES PARKING (12m x 3.5m)
- ACCESSIBLE PARKING (5m x 3.5m)
- TRAFFIC DIRECTION

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URA NGA TSIN WAI ROAD / CARPENTER ROAD DEVELOPMENT SCHEME (KC-017)

Title: LAYOUT OF DEVELOPEMTN SCHEME - SITE B BASEMENT LEVEL 2

Scale at A3	Date	Figure No.
1:500	MAY 2022	2.4

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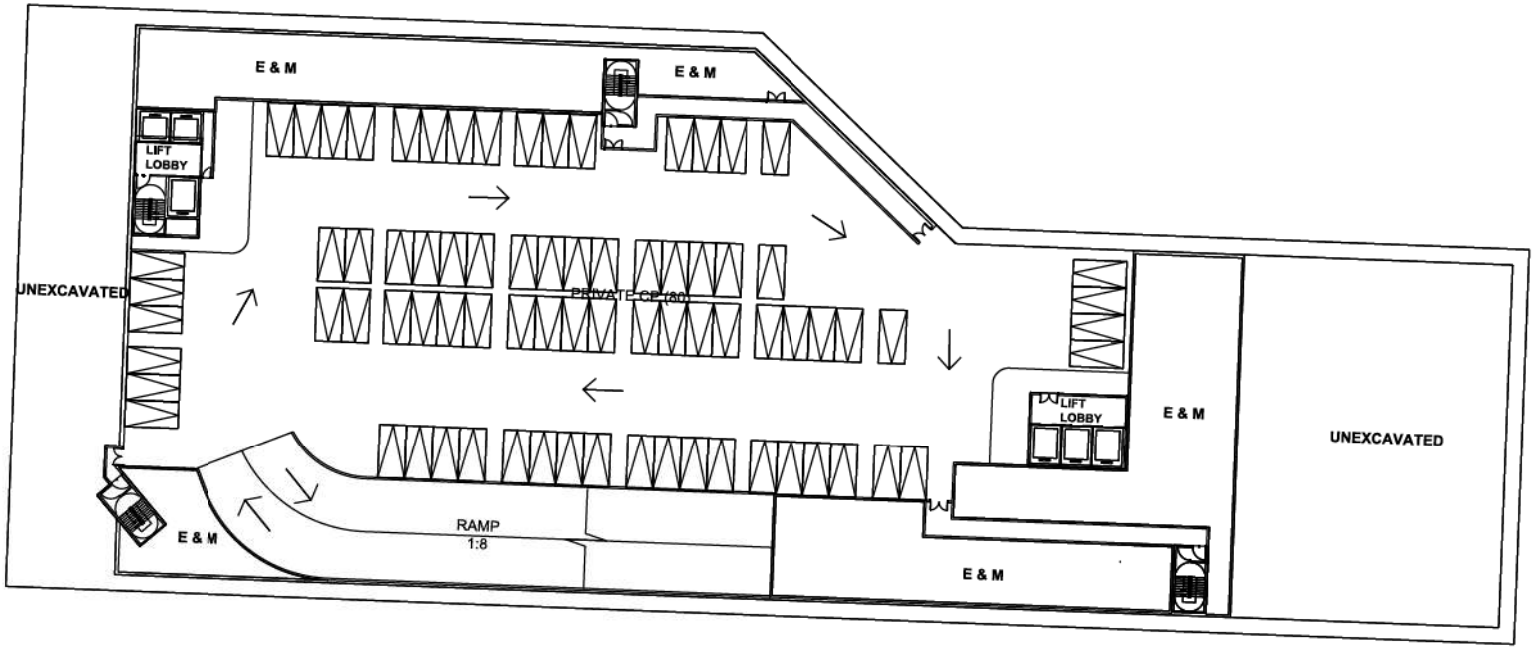

LEGEND:

PRIVATE CAR

PARKING (5m x 2.5m)

TRAFFIC DIRECTION

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URA NGA TSIN WAI ROAD / CARPENTER ROAD DEVELOPMENT SCHEME (KC-017)

Title: LAYOUT OF DEVELOPMENT SCHEME - SITE B BASEMENT LEVEL 3

Scale at A3	Date	Figure No.
1:500	MAY 2022	2.5



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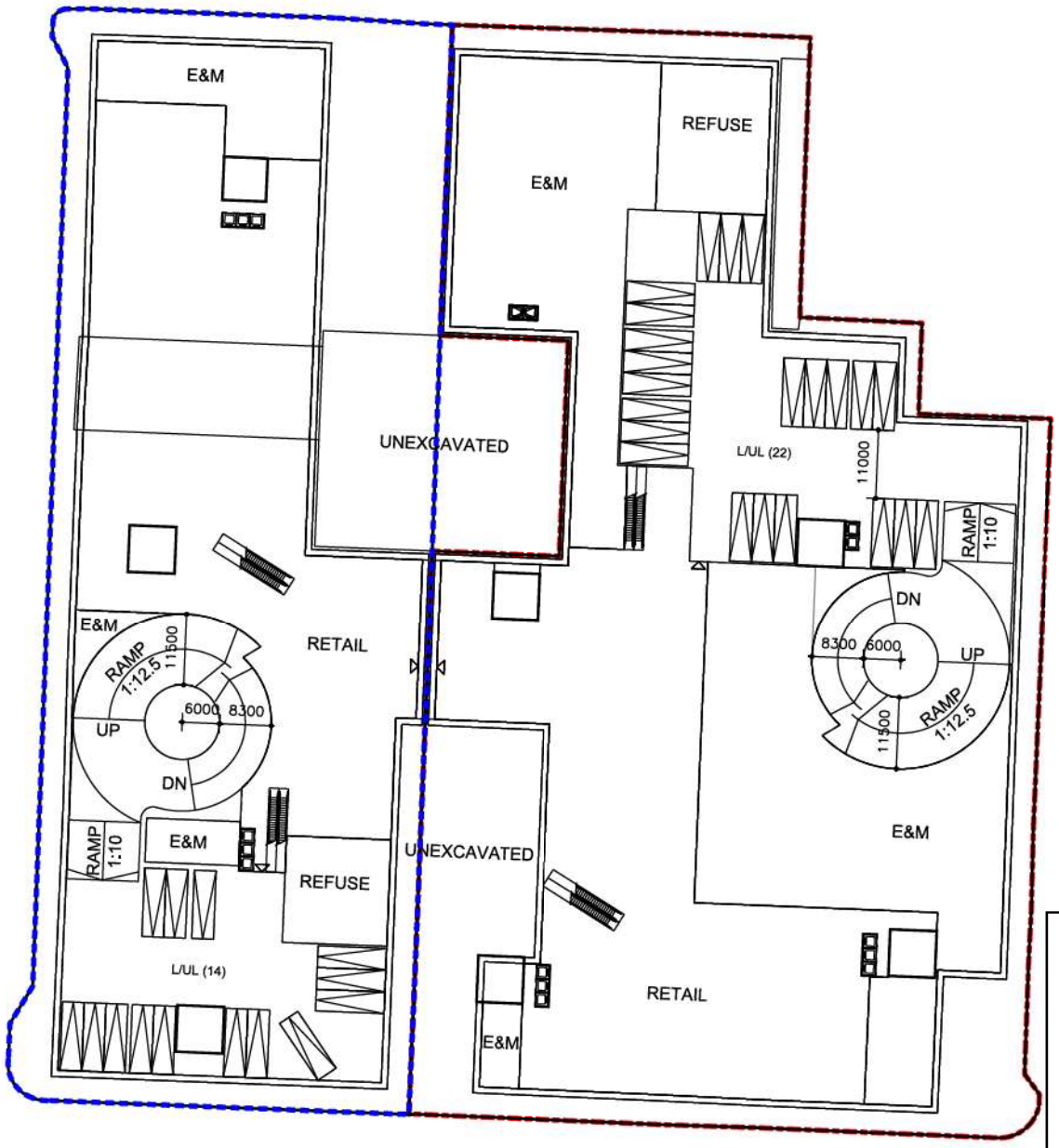
URA NGA TSIN WAI ROAD / CARPENTER ROAD DEVELOPMENT SCHEME (KC-017)

Title: LAYOUT OF DEVELOPMENT SCHEME - SITE A & C2 GROUND FLOOR

Scale at A3	Date	Figure No.
1:800	MAY 2022	2.6



LEGEND:

SITE C2 BOUNDARY

SITE A BOUNDARY

HGV LOADING / UNLOADING BAY(11m x 3.5m)

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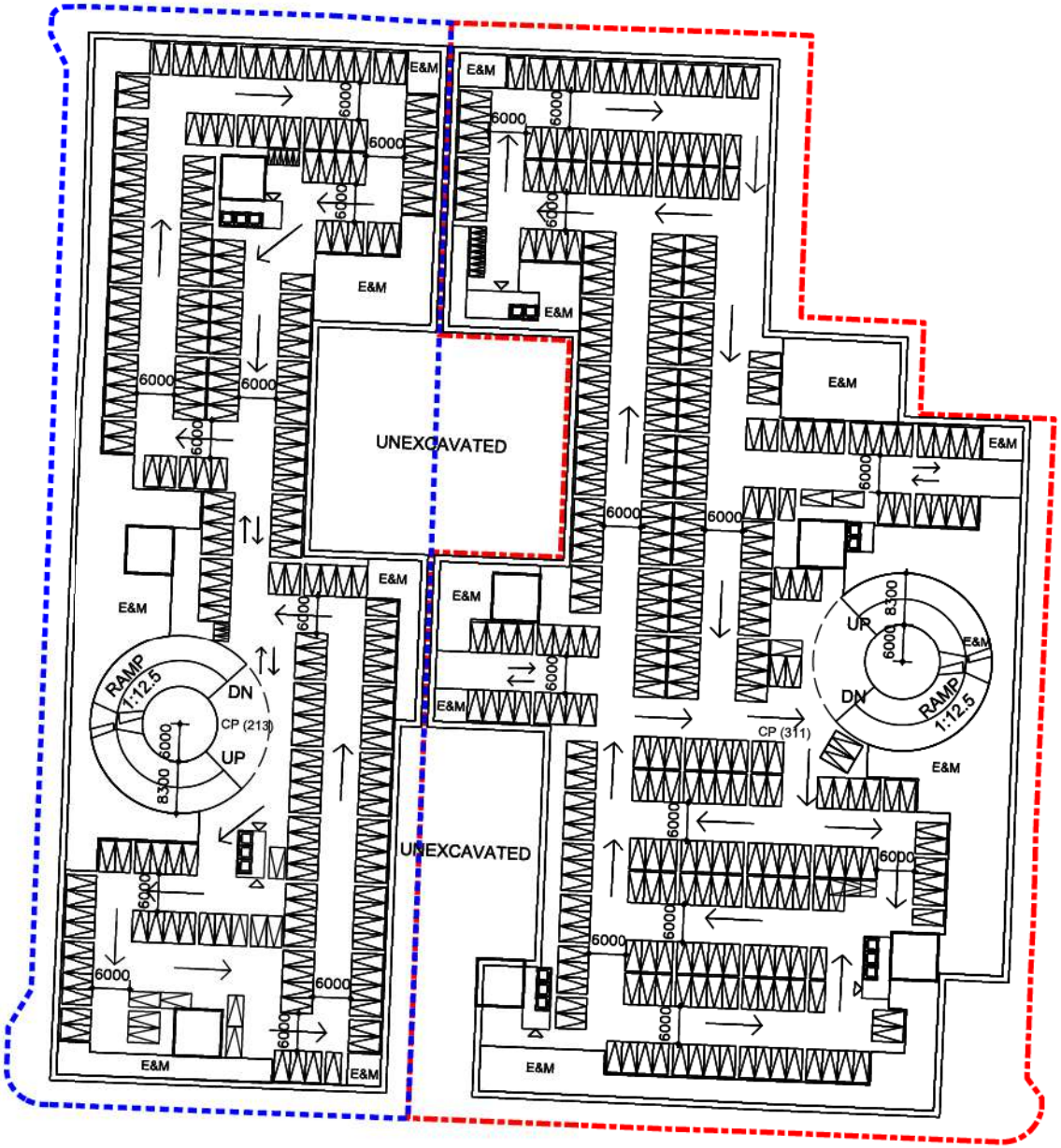
URA NGA TSIN WAI ROAD / CARPENTER ROAD DEVELOPMENT SCHEME (KC-017)

Title: LAYOUT OF DEVELOPMENT SCHEME - SITE A & C2 BASEMENT LEVEL 1

Scale at A3	Date	Figure No.
1:800	MAY 2022	2.7



LEGEND:

- SITE C2 BOUNDARY
- SITE A BOUNDARY
- PRIVATE CAR PARKING SPACE (5m x 2.5m)
- MOTORCYCLE PARKING SPACE (2.4m x 1m)
- TRAFFIC DIRECTION

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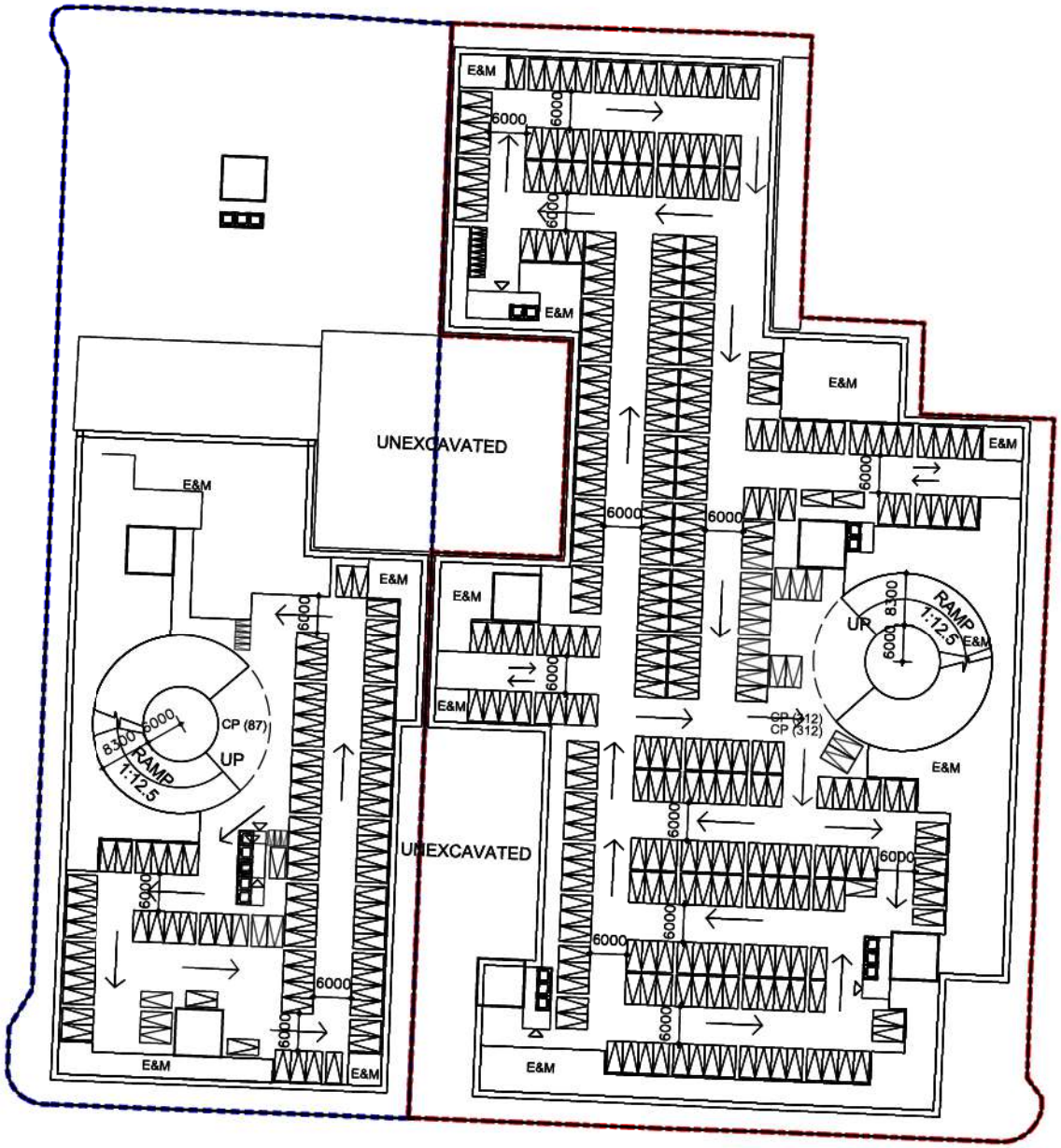
URA NGA TSIN WAI ROAD / CARPENTER ROAD DEVELOPMENT SCHEME (KC-017)

Title
LAYOUT OF DEVELOPMENT SCHEME - SITE A & C2 BASEMENT LEVELS 2 & 3

Scale at A3	Date	Figure No.
1:800	MAY 2022	2.8



LEGEND:

- SITE C2 BOUNDARY
- SITE A BOUNDARY
- PRIVATE CAR PARKING SPACE (5m x 2.5m)
- MOTORCYCLE PARKING SPACE (2.4m x 1m)
- TRAFFIC DIRECTION

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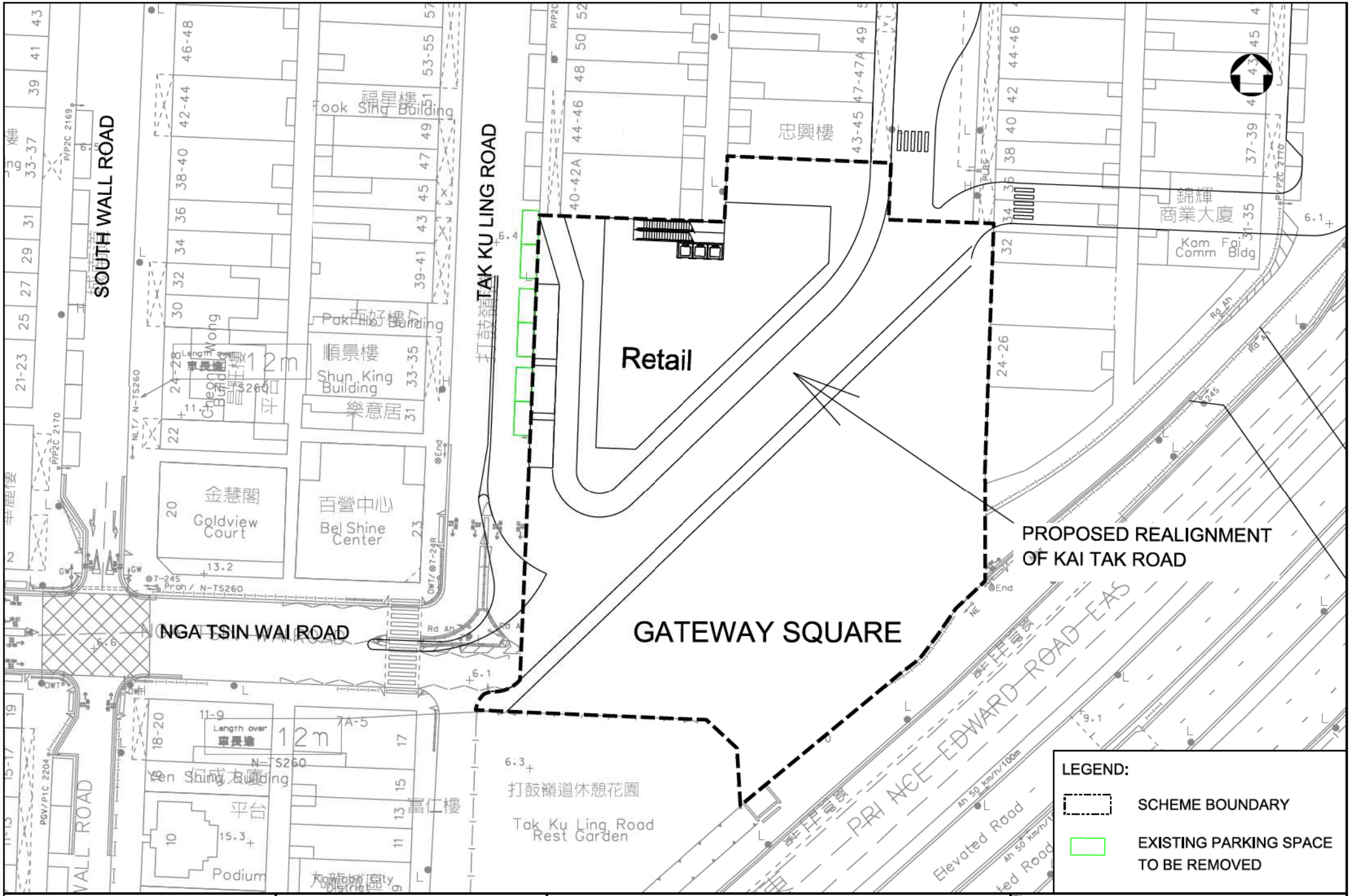
URA NGA TSIN WAI ROAD / CARPENTER ROAD DEVELOPMENT SCHEME (KC-017)

Title
LAYOUT OF DEVELOPMENT SCHEME - SITE A & C2 BASEMENT LEVEL 4

Scale at A3	Date	Figure No.
1:800	MAY 2022	2.9



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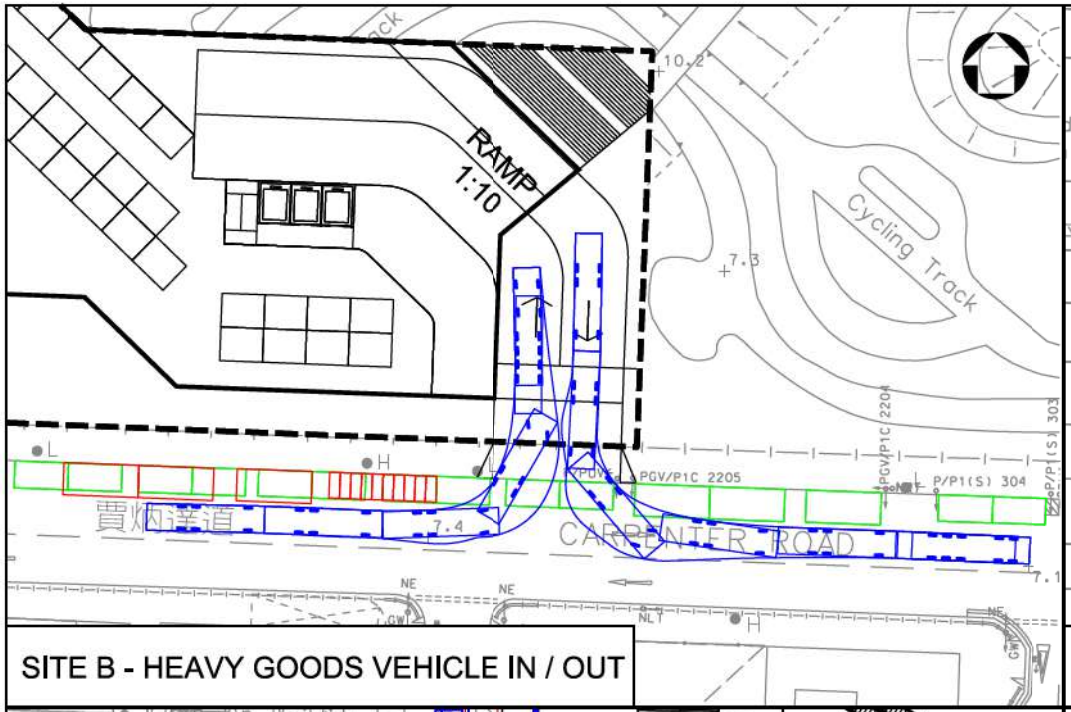
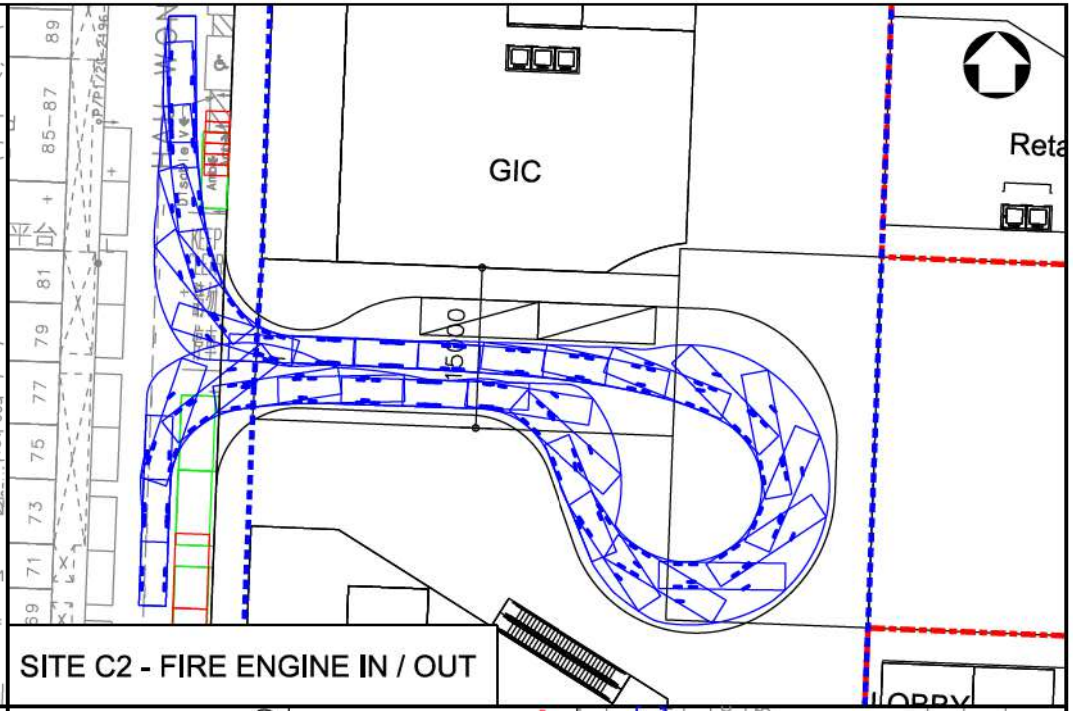
URA NGA TSIN WAI ROAD / CARPENTER ROAD DEVELOPMENT SCHEME (KC-017)

Title: LAYOUT OF DEVELOPMENT SCHEME - SITE C1 GROUND FLOOR

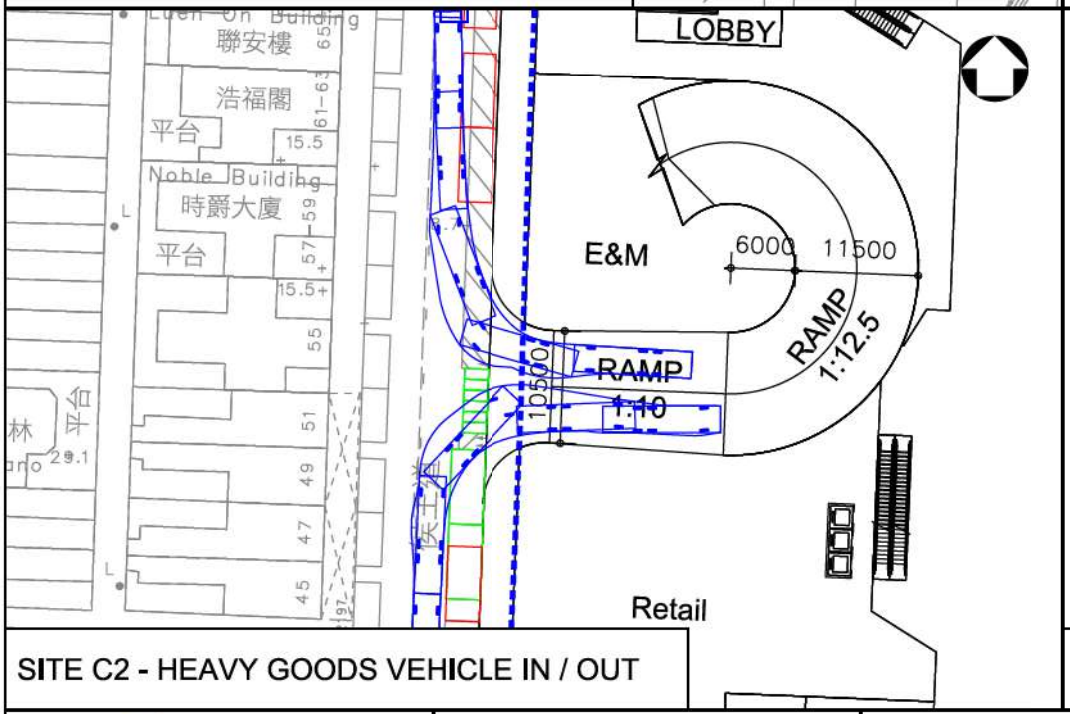
Scale at A3	Date	Figure No.
1:500	MAY 2022	2.10



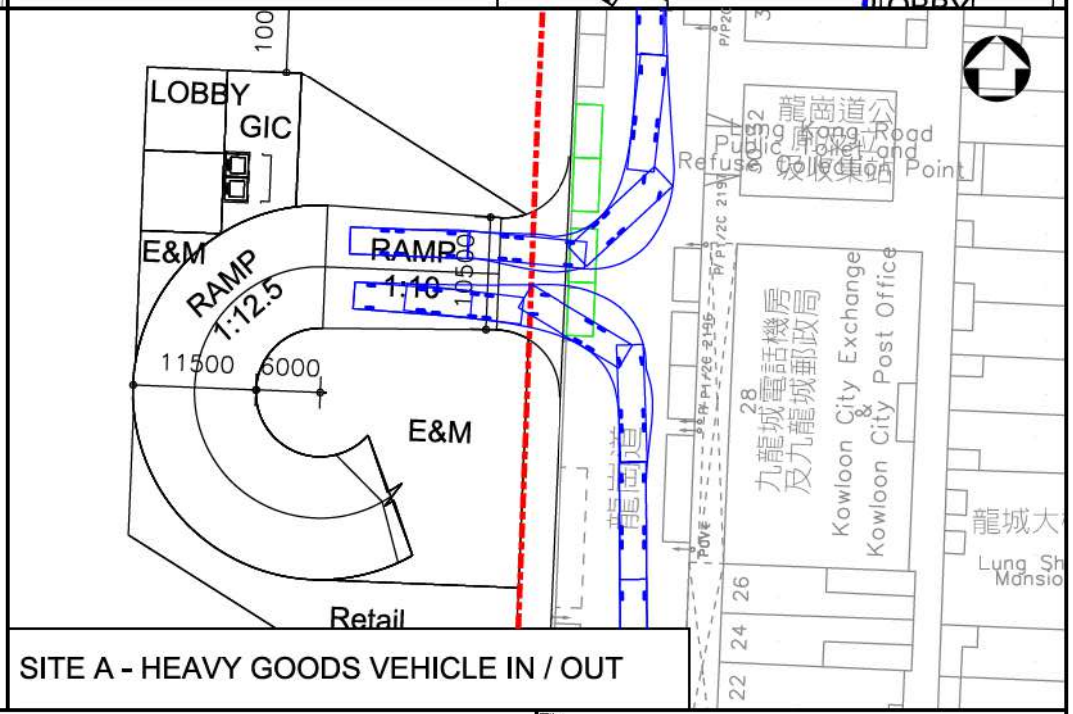
SITE B - HEAVY GOODS VEHICLE IN / OUT



SITE C2 - FIRE ENGINE IN / OUT



SITE C2 - HEAVY GOODS VEHICLE IN / OUT



SITE A - HEAVY GOODS VEHICLE IN / OUT

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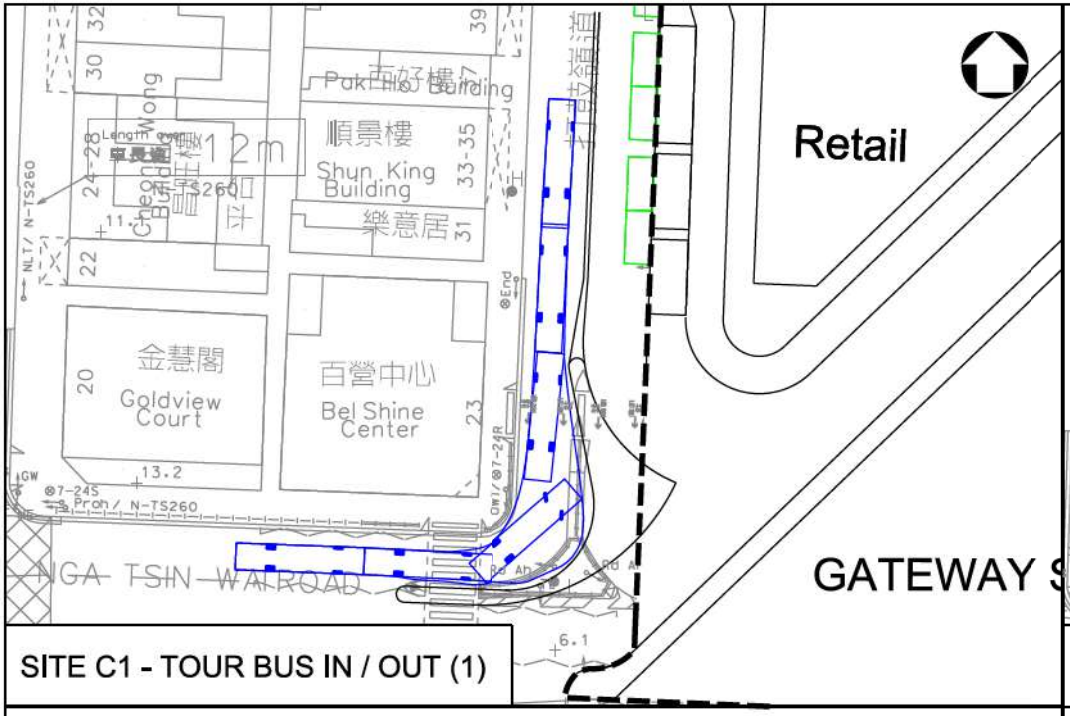
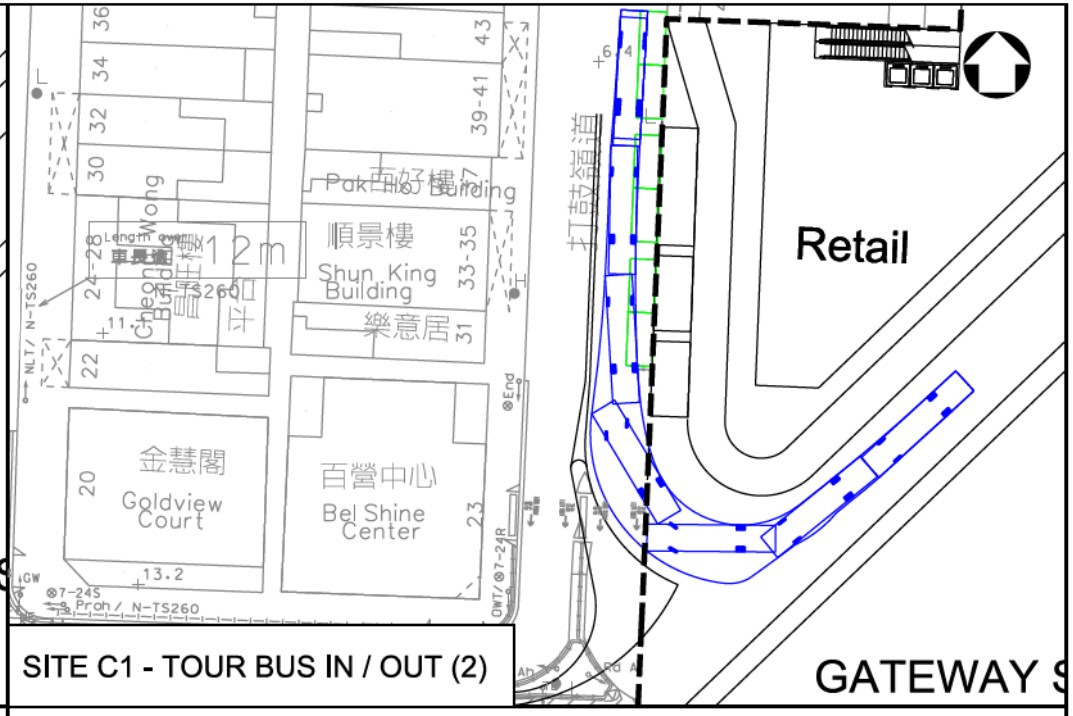
URA NGA TSIN WAI ROAD / CARPENTER ROAD
DEVELOPMENT SCHEME (KC-017)

Title
LAYOUT OF DEVELOPMENT SCHEME
- SWEPT PATH ANALYSIS (SITE A, B & C2)

Scale at A3	Date	Figure No.
1:500	MAY 2022	2.11



SITE C1 - TOUR BUS IN / OUT (1)



SITE C1 - TOUR BUS IN / OUT (2)

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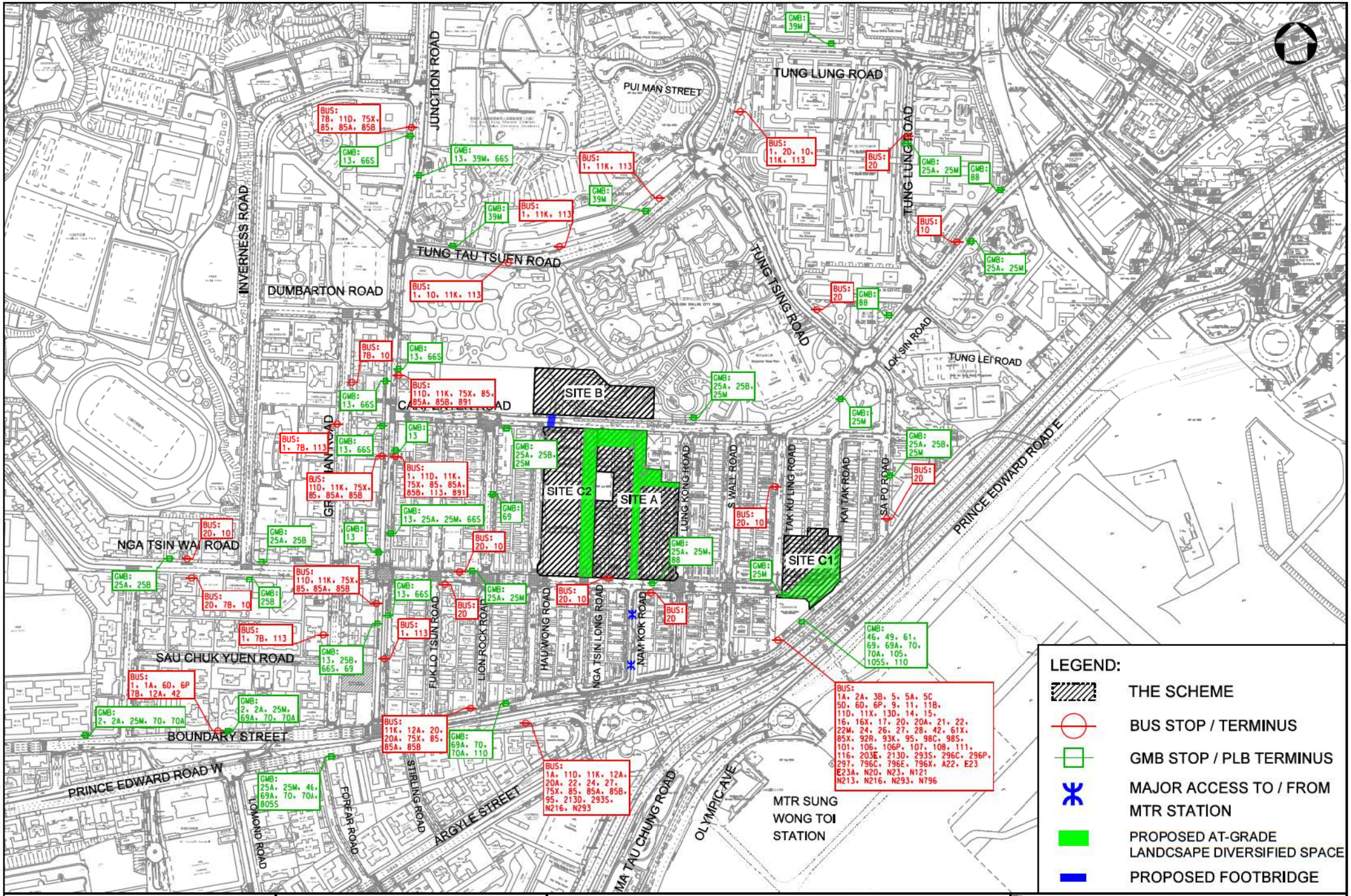
URA NGA TSIN WAI ROAD / CARPENTER ROAD DEVELOPMENT SCHEME (KC-017)

Title
LAYOUT OF DEVELOPMENT SCHEME - SWEPT PATH ANALYSIS (SITE C1)

Scale at A3	Date	Figure No.
1:500	MAY 2022	2.12



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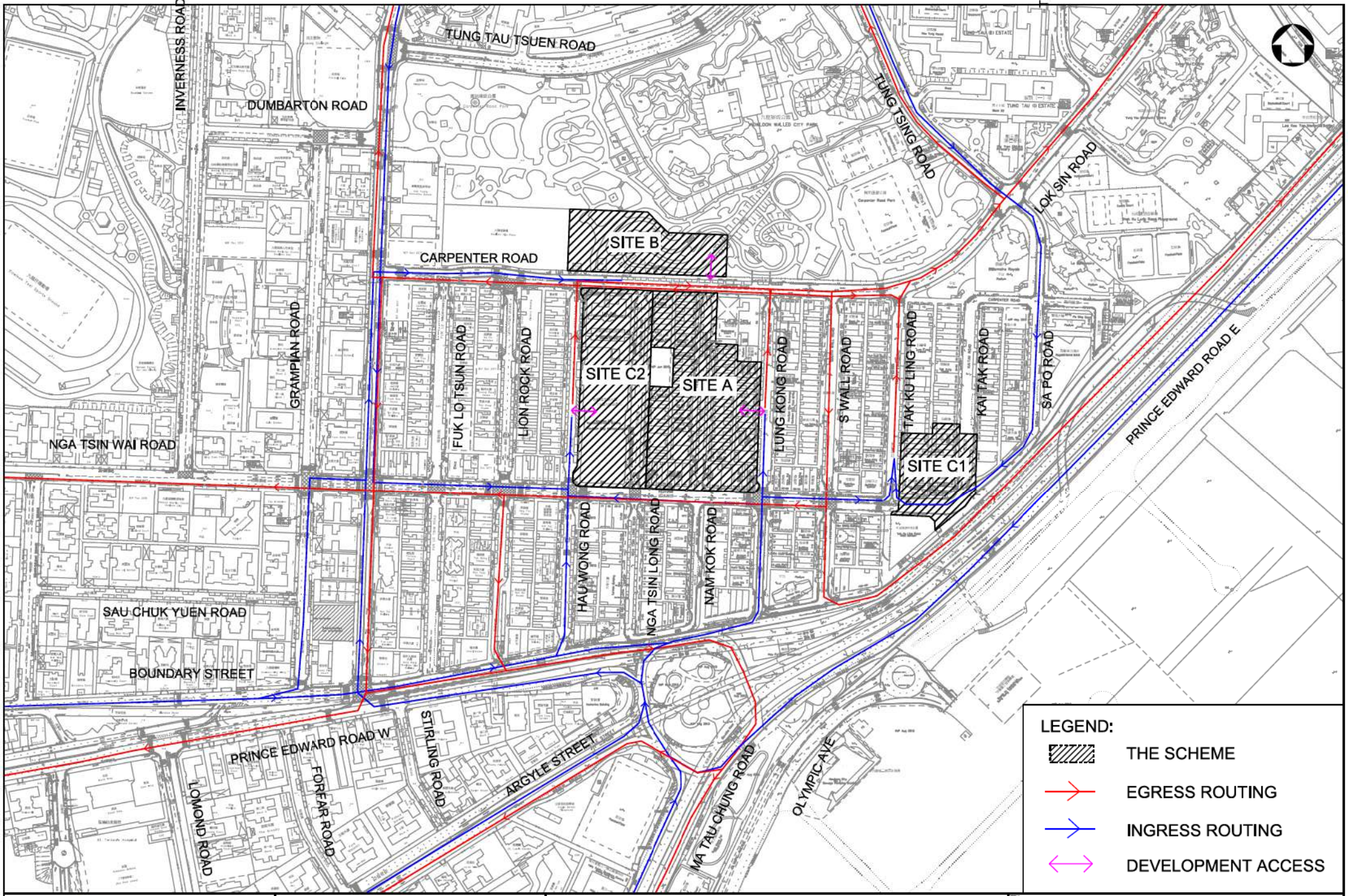
URA NGA TSIN WAI ROAD / CARPENTER ROAD DEVELOPMENT SCHEME (KC-017)

Title: EXISTING PUBLIC TRANSPORT SERVICING POINTS

Scale at A3	Date	Figure No.
1:4000	MAY 2022	2.13



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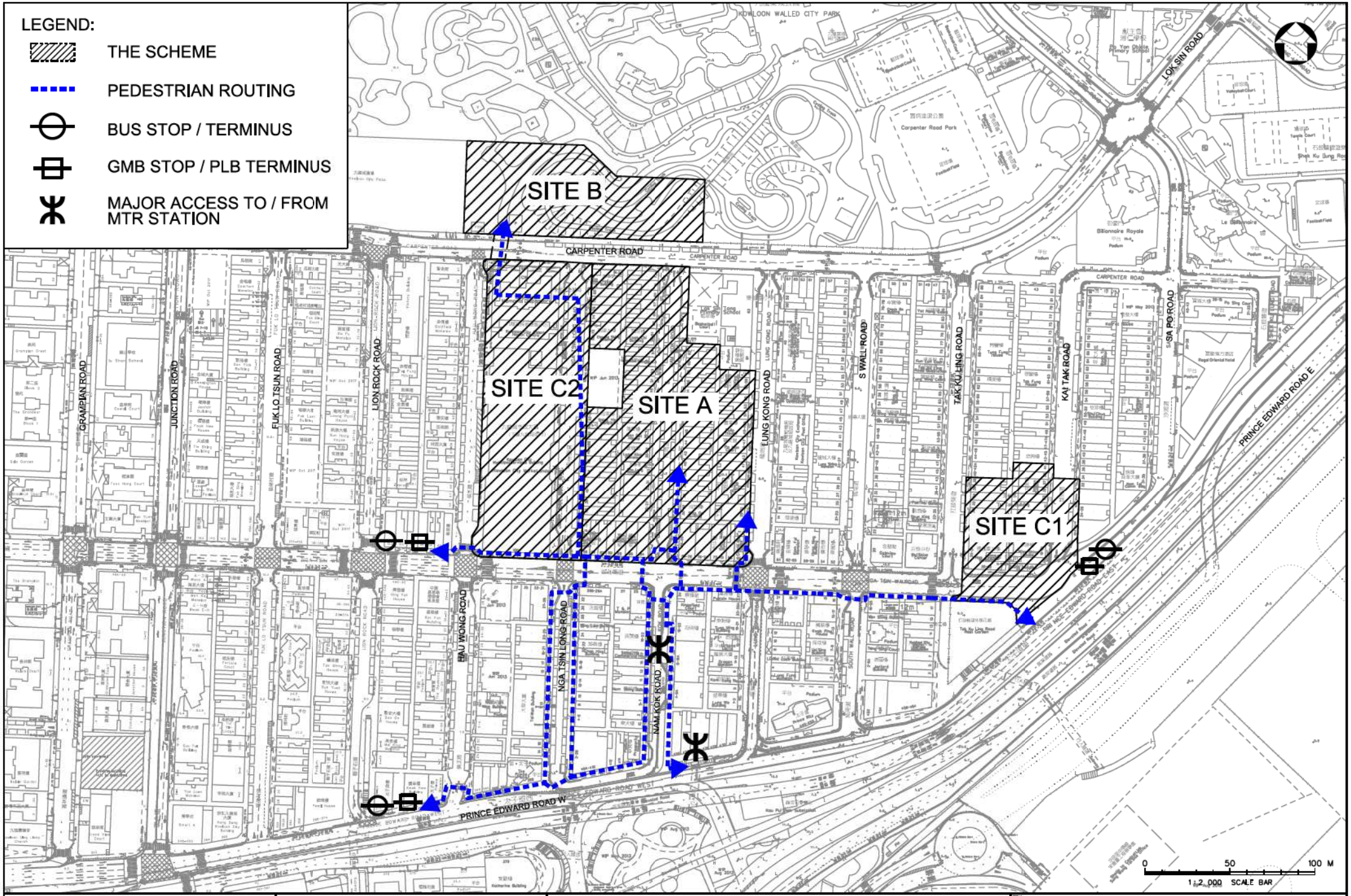
URA NGA TSIN WAI ROAD / CARPENTER ROAD
DEVELOPMENT SCHEME (KC-017)

Title
MAJOR ACCESS ROUTE

Scale at A3	Date	Figure No.
1:3000	MAY 2022	3.1



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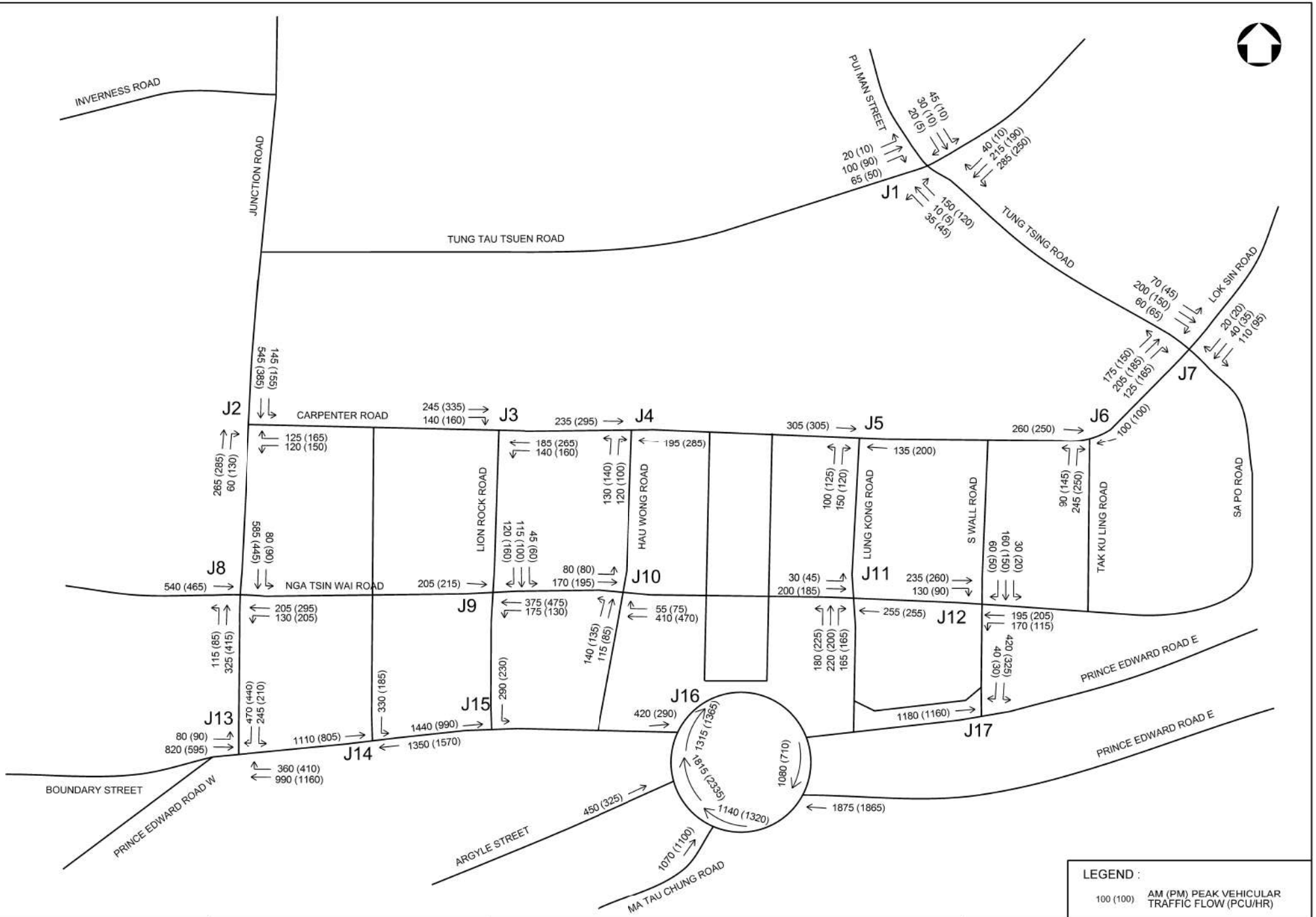
URA NGA TSIN WAI ROAD / CARPENTER ROAD DEVELOPMENT SCHEME (KC-017)

Title: ANTICIPATED PEDESTRIAN ROUTE

Scale at A3	Date	Figure No.
1:2000	MAY 2022	3.2



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URA NGA TSIN WAI ROAD / CARPENTER ROAD DEVELOPMENT SCHEME (KC-017)

Title: YEAR 2021 OBSERVED TRAFFIC FLOW

Scale at A3	Date	Figure No.
N.T.S	MAY 2022	4.1

PRINTED BY: CHEUY004 9/16/2022 2:56:46 PM
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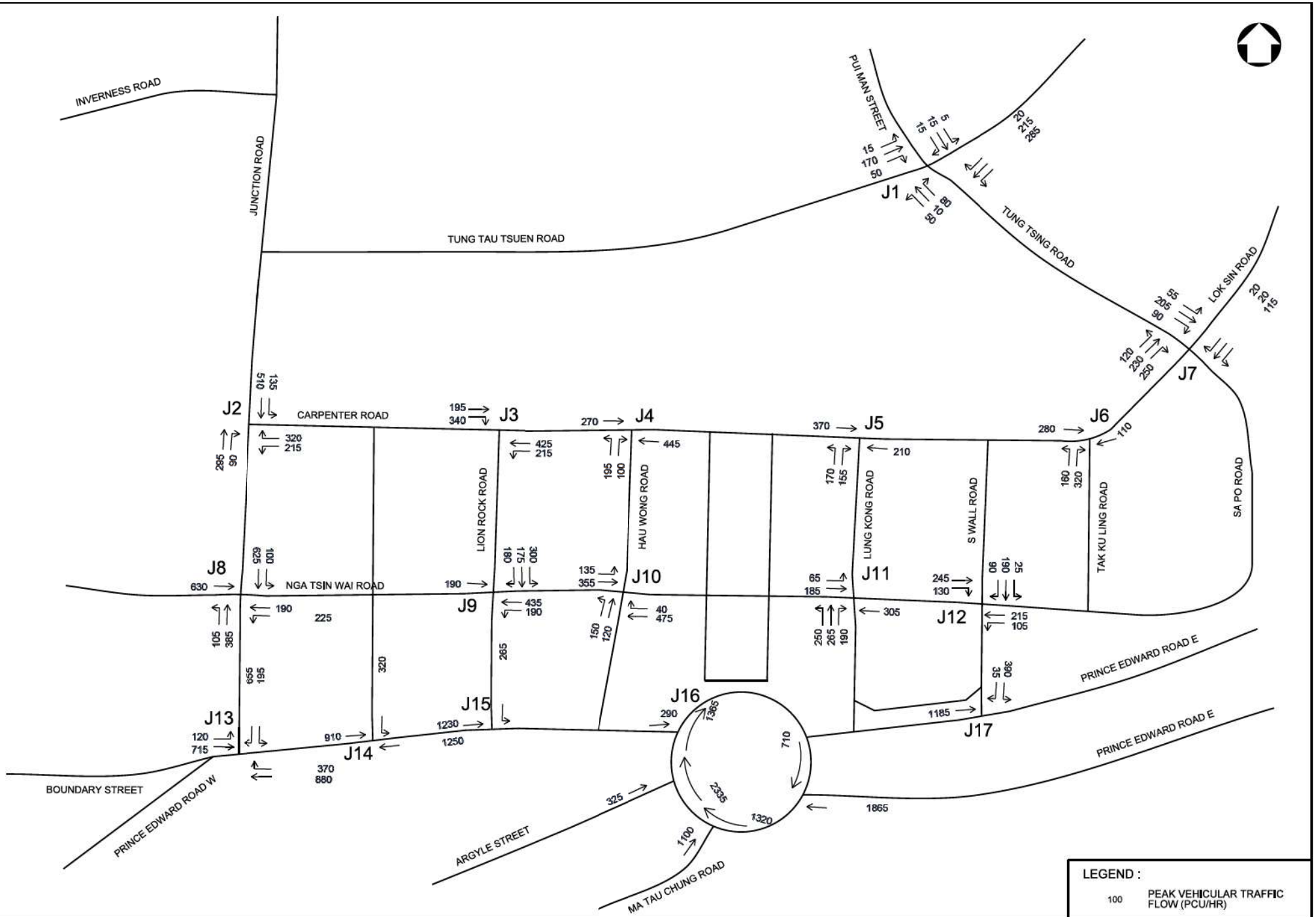

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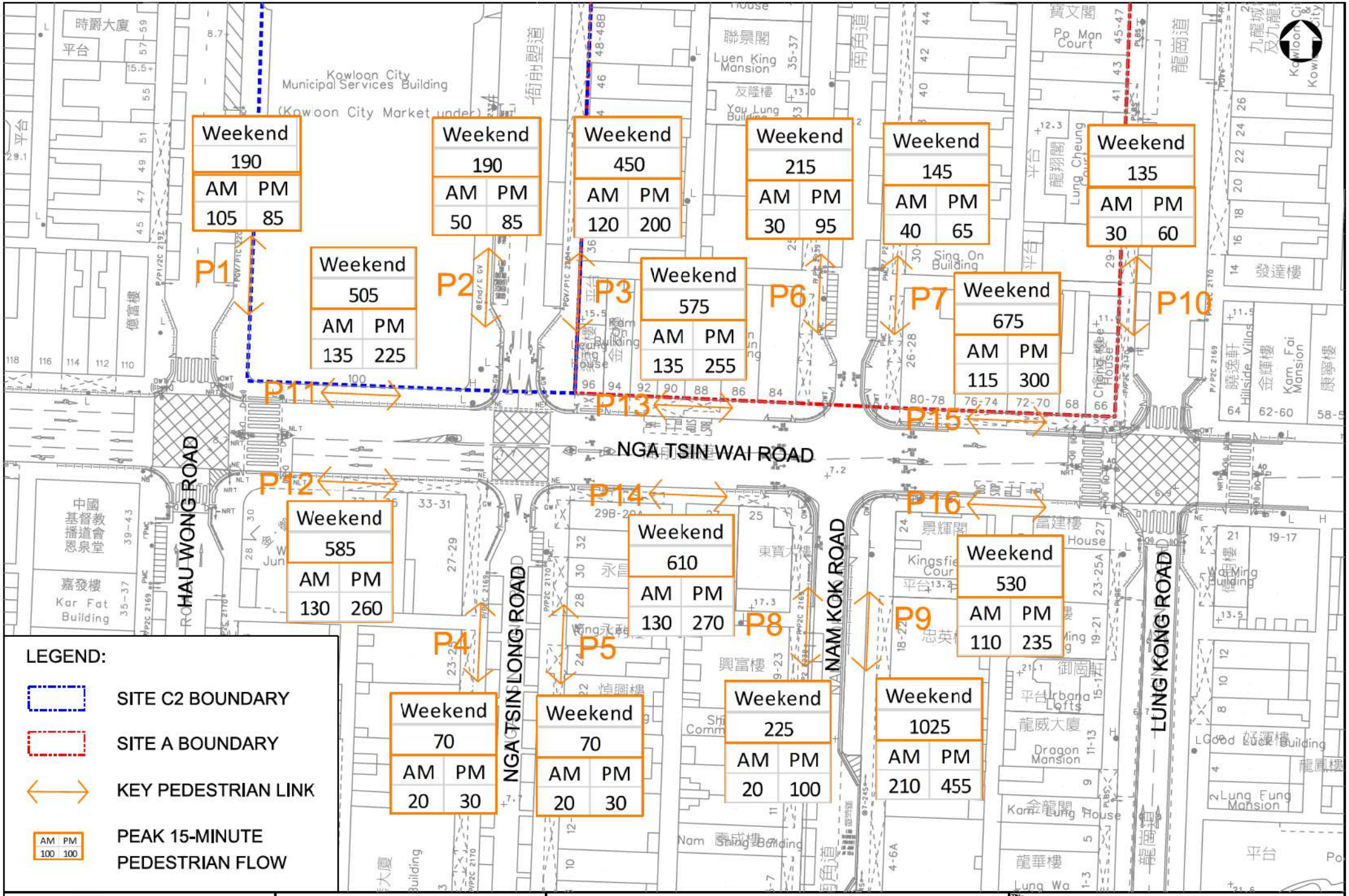
URA NGA TSIN WAI ROAD / CARPENTER ROAD DEVELOPMENT SCHEME (KC-017)

Title: YEAR 2021 OBSERVED TRAFFIC FLOW (WEEKEND)

Scale at A3: N.T.S | Date: MAY 2022 | Figure No.: 4.2



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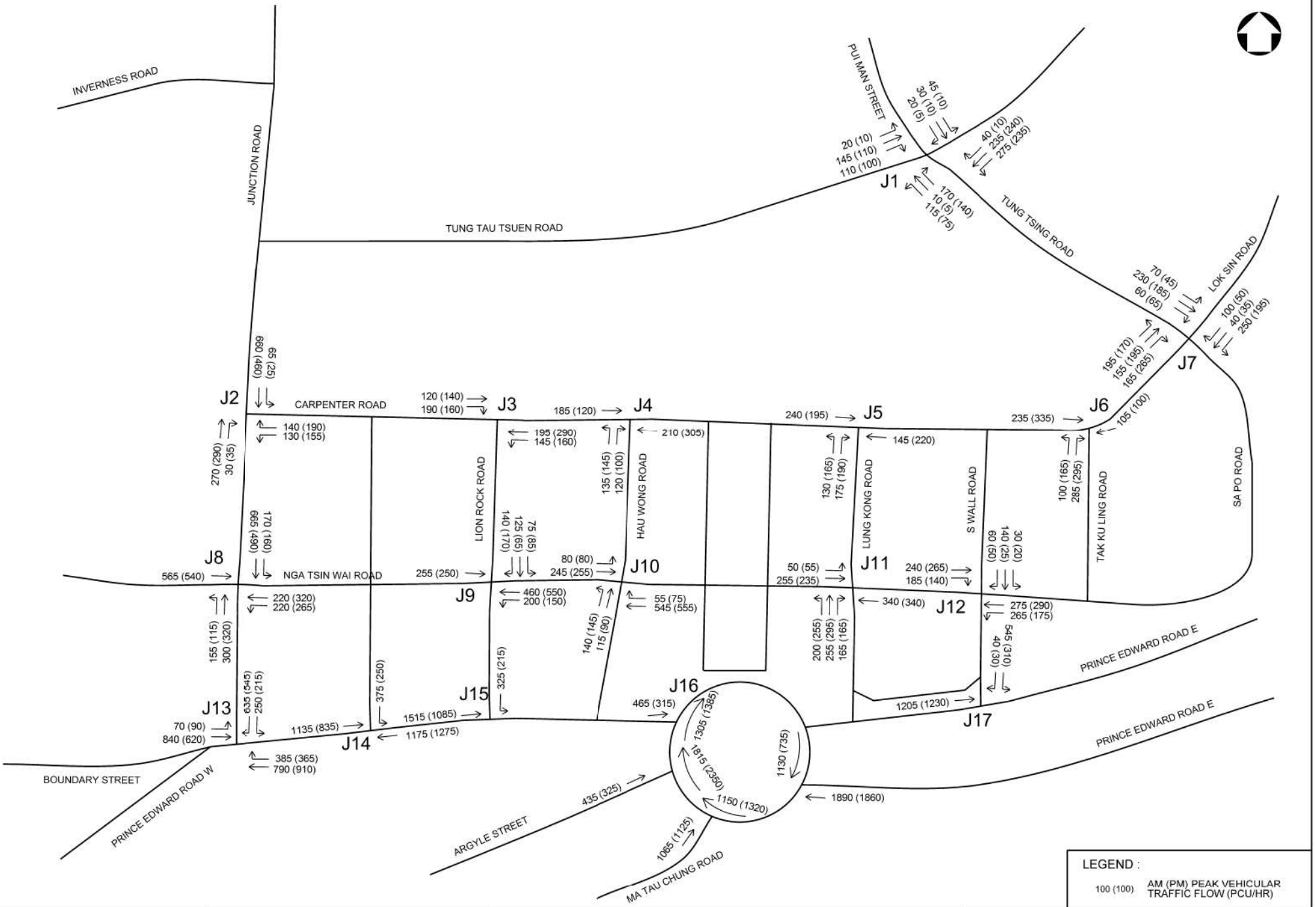
URA NGA TSIN WAI ROAD / CARPENTER ROAD DEVELOPMENT SCHEME (KC-017)

Title: YEAR 2021 OBSERVED PEDESTRIAN FLOW

Scale at A3	Date	Figure No.
1:600	MAY 2022	4.3



LEGEND :

100 (100) AM (PM) PEAK VEHICULAR TRAFFIC FLOW (PCU/HR)

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URA NGA TSIN WAI ROAD / CARPENTER ROAD DEVELOPMENT SCHEME (KC-017)

Title: YEAR 2033 REFERENCE TRAFFIC FLOW

Scale at A3	Date	Figure No.
N.T.S	MAY 2022	4.4

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FILENAME: P:\CNHKA\Project\5205867_URA_Tsim_Con_2124\28.00 Working and Temporary\KC-017\drawing\TIA_Rev1_202204\Figure 4.4.dgn
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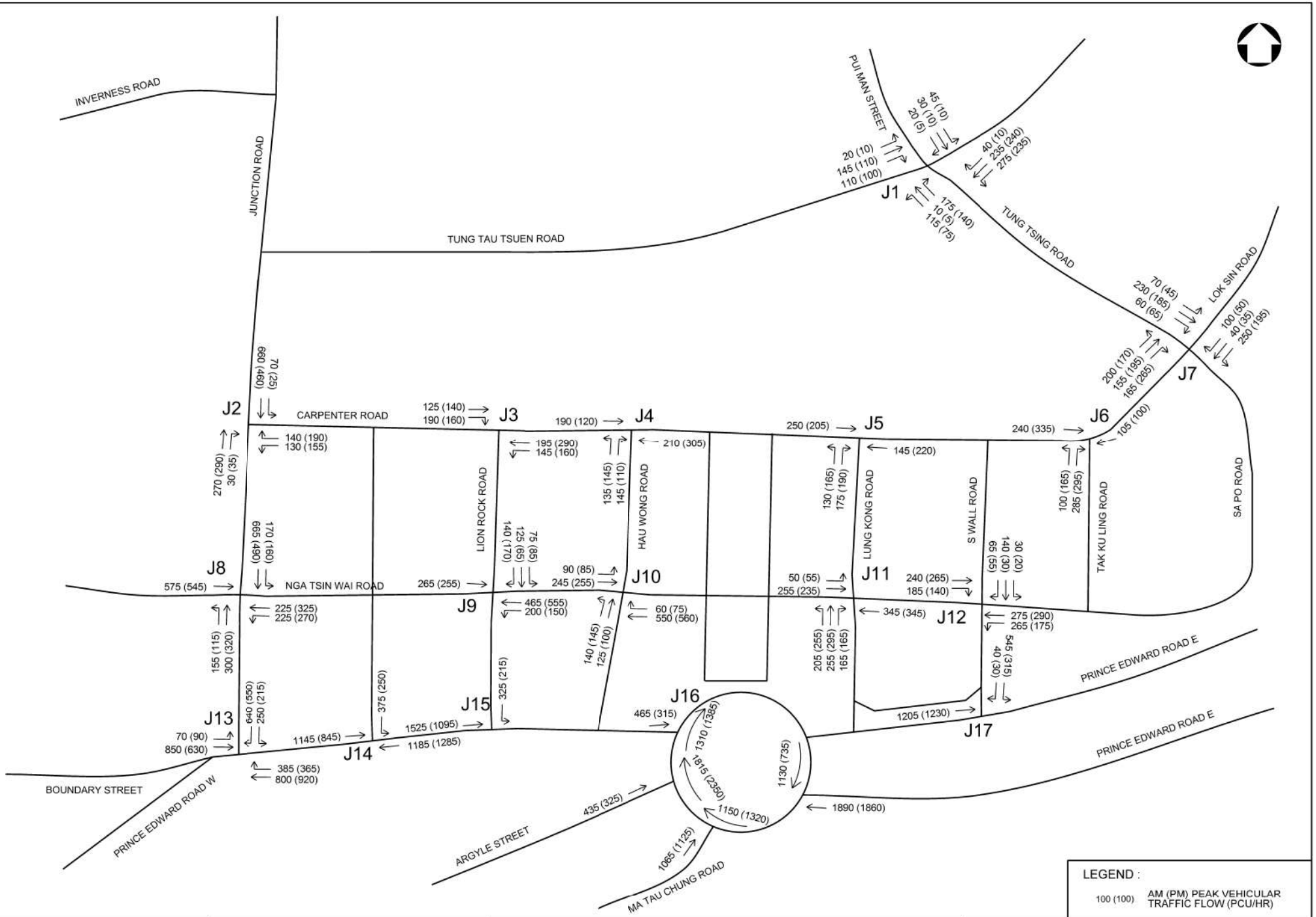

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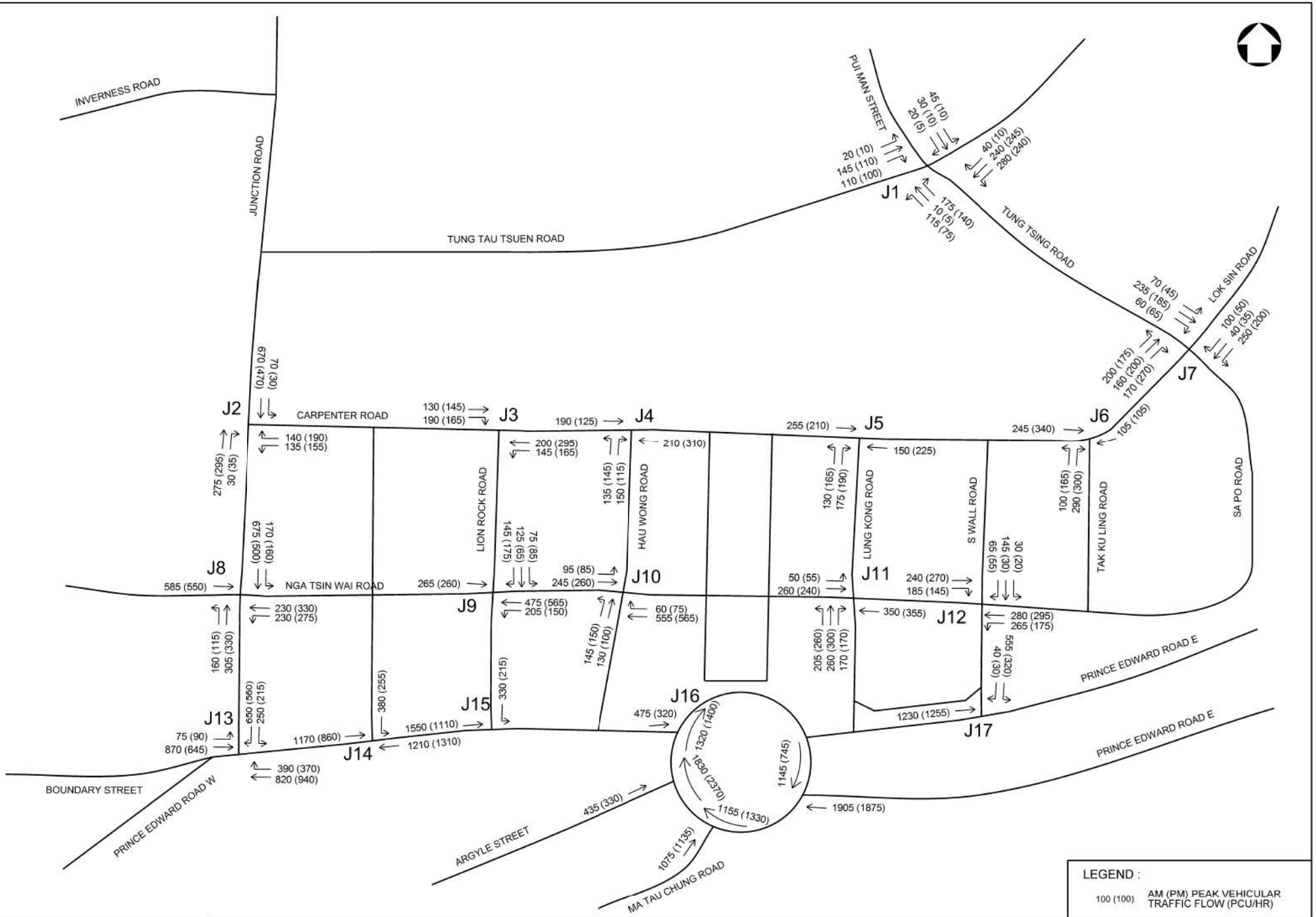
URA NGA TSIN WAI ROAD / CARPENTER ROAD DEVELOPMENT SCHEME (KC-017)

Title: YEAR 2033 DESIGN TRAFFIC FLOW

Scale at A3	Date	Figure No.
N.T.S	MAY 2022	4.5



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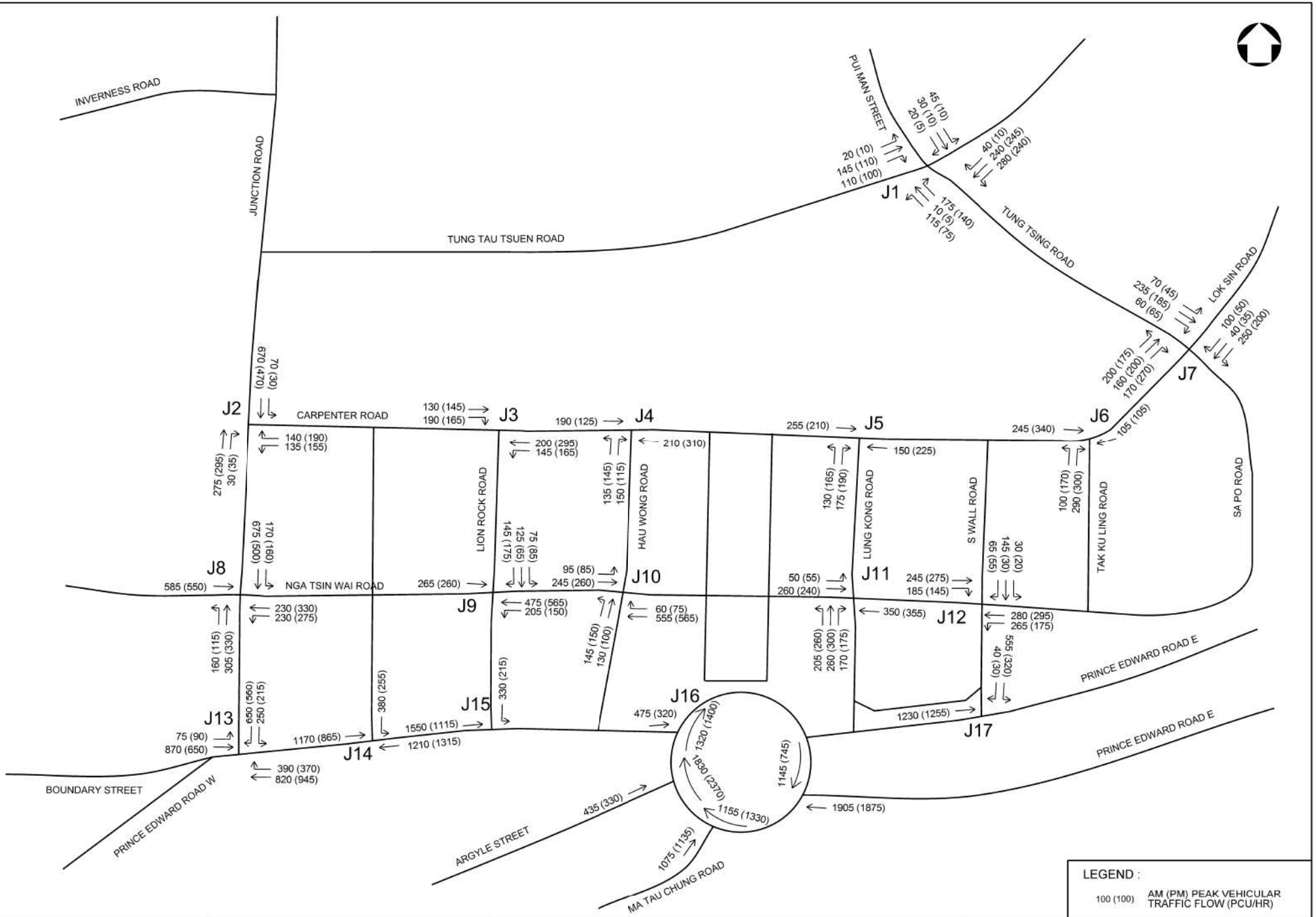
URA NGA TSIN WAI ROAD / CARPENTER ROAD DEVELOPMENT SCHEME (KC-017)

Title: YEAR 2036 REFERENCE TRAFFIC FLOW

Scale at A3	Date	Figure No.
N.T.S	MAY 2022	4.6



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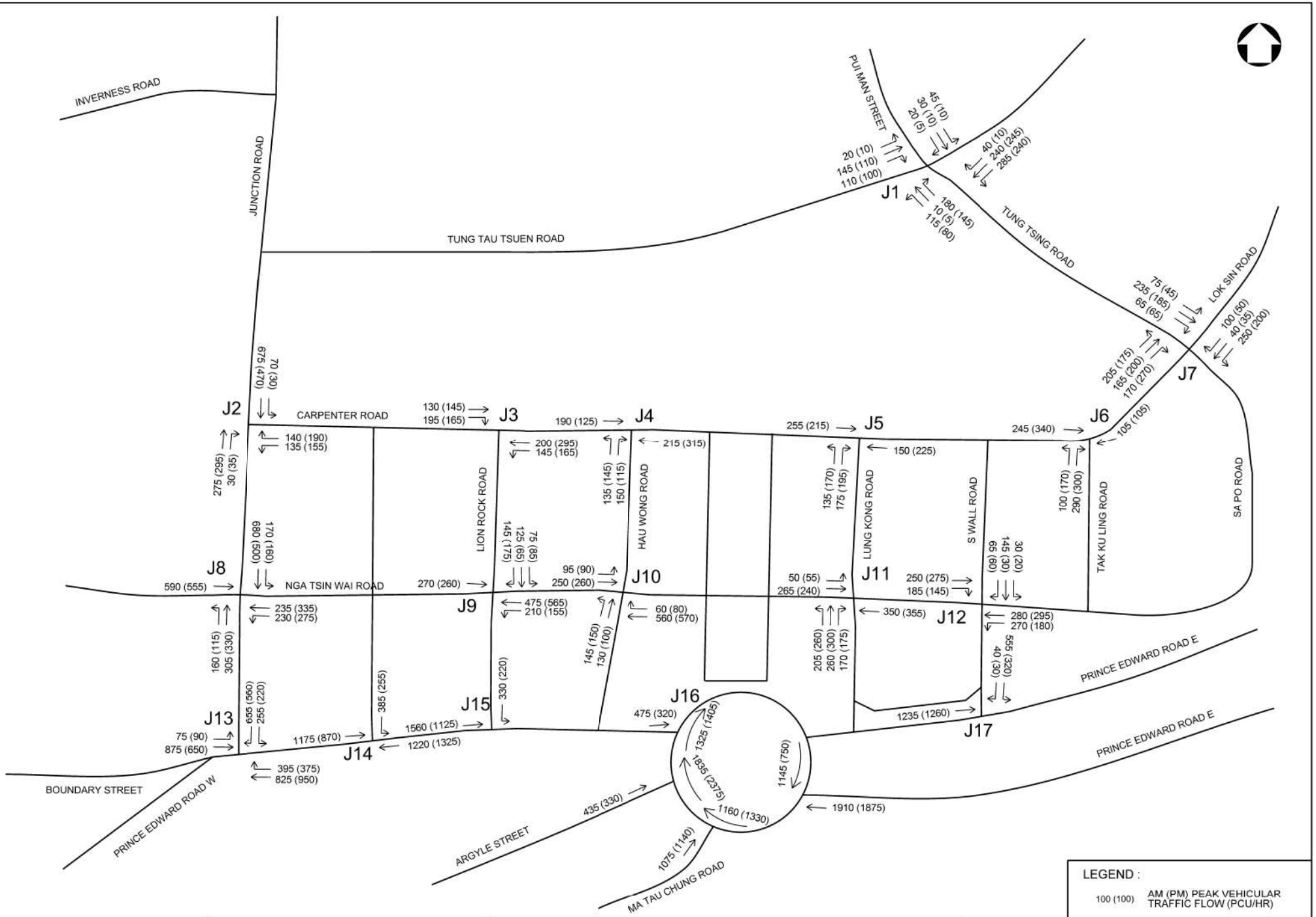
URA NGA TSIN WAI ROAD / CARPENTER ROAD DEVELOPMENT SCHEME (KC-017)

Title: YEAR 2036 DESIGN TRAFFIC FLOW

Scale at A3	Date	Figure No.
N.T.S	MAY 2022	4.7



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URA NGA TSIN WAI ROAD / CARPENTER ROAD DEVELOPMENT SCHEME (KC-017)

Title
YEAR 2037 REFERENCE TRAFFIC FLOW

Scale at A3	Date	Figure No.
N.T.S	MAY 2022	4.8

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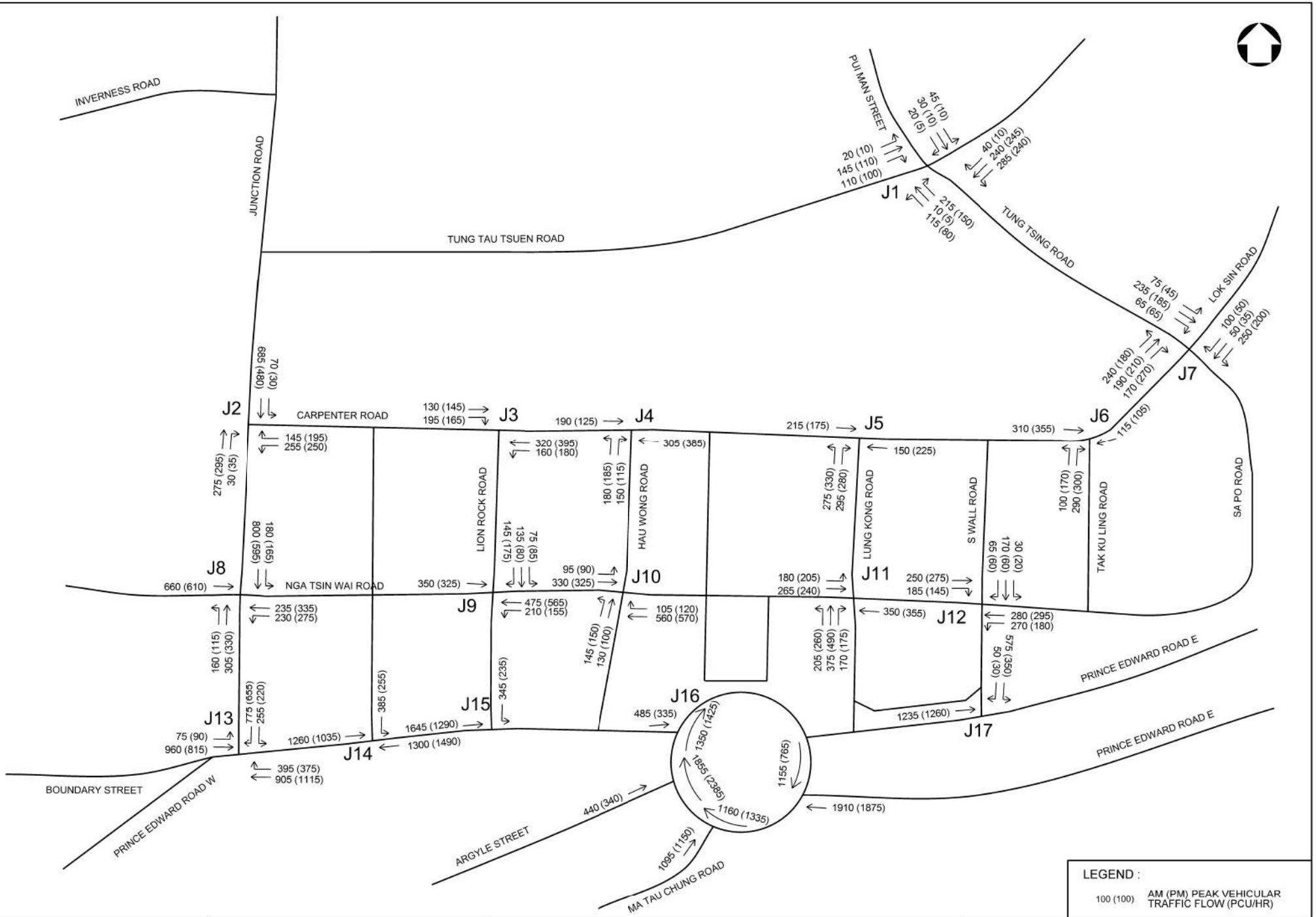

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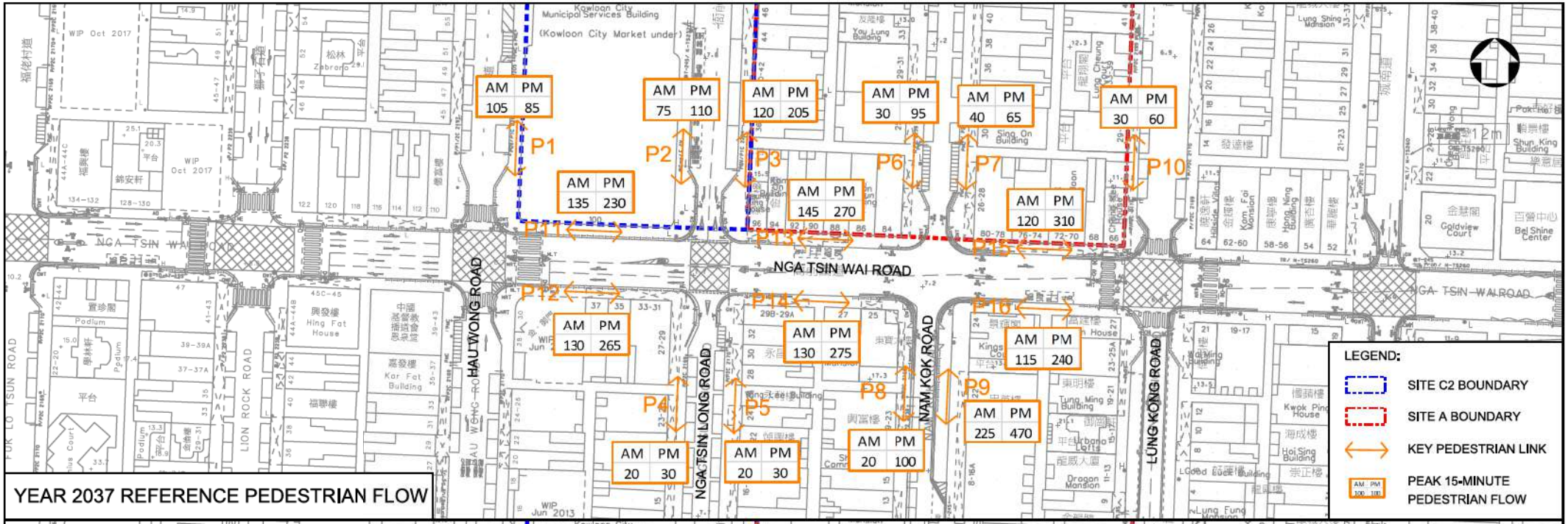
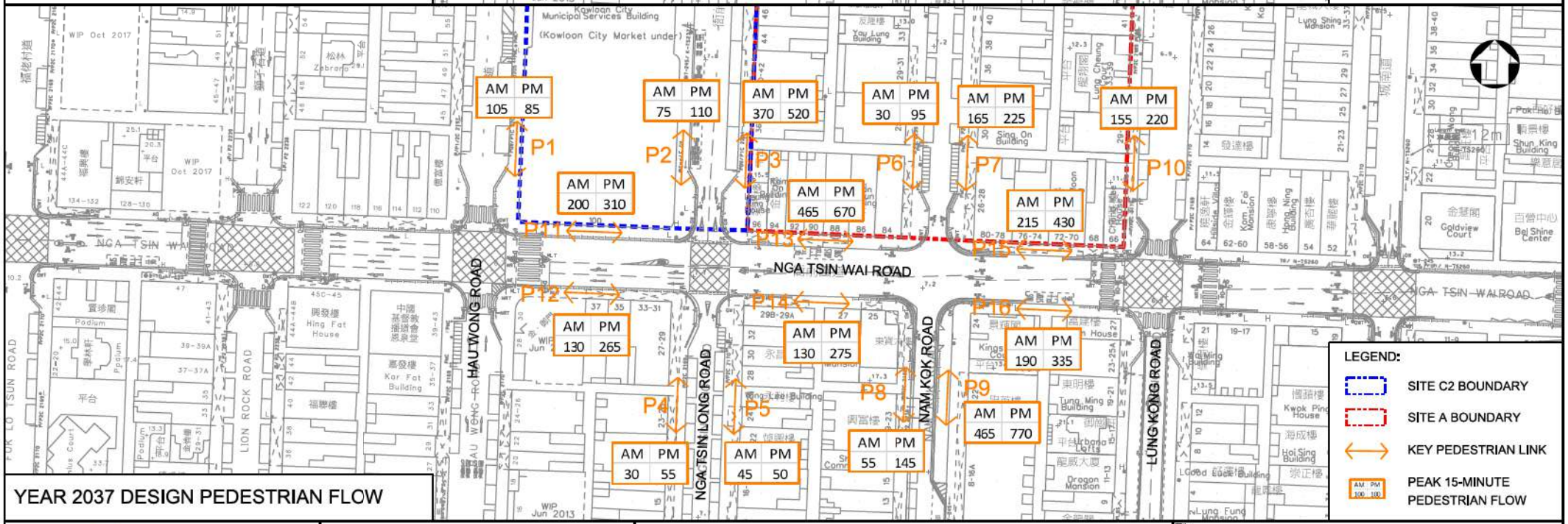
URA NGA TSIN WAI ROAD / CARPENTER ROAD DEVELOPMENT SCHEME (KC-017)

Title: YEAR 2037 DESIGN TRAFFIC FLOW

Scale at A3	Date	Figure No.
N.T.S	MAY 2022	4.9



YEAR 2037 REFERENCE PEDESTRIAN FLOW



YEAR 2037 DESIGN PEDESTRIAN FLOW

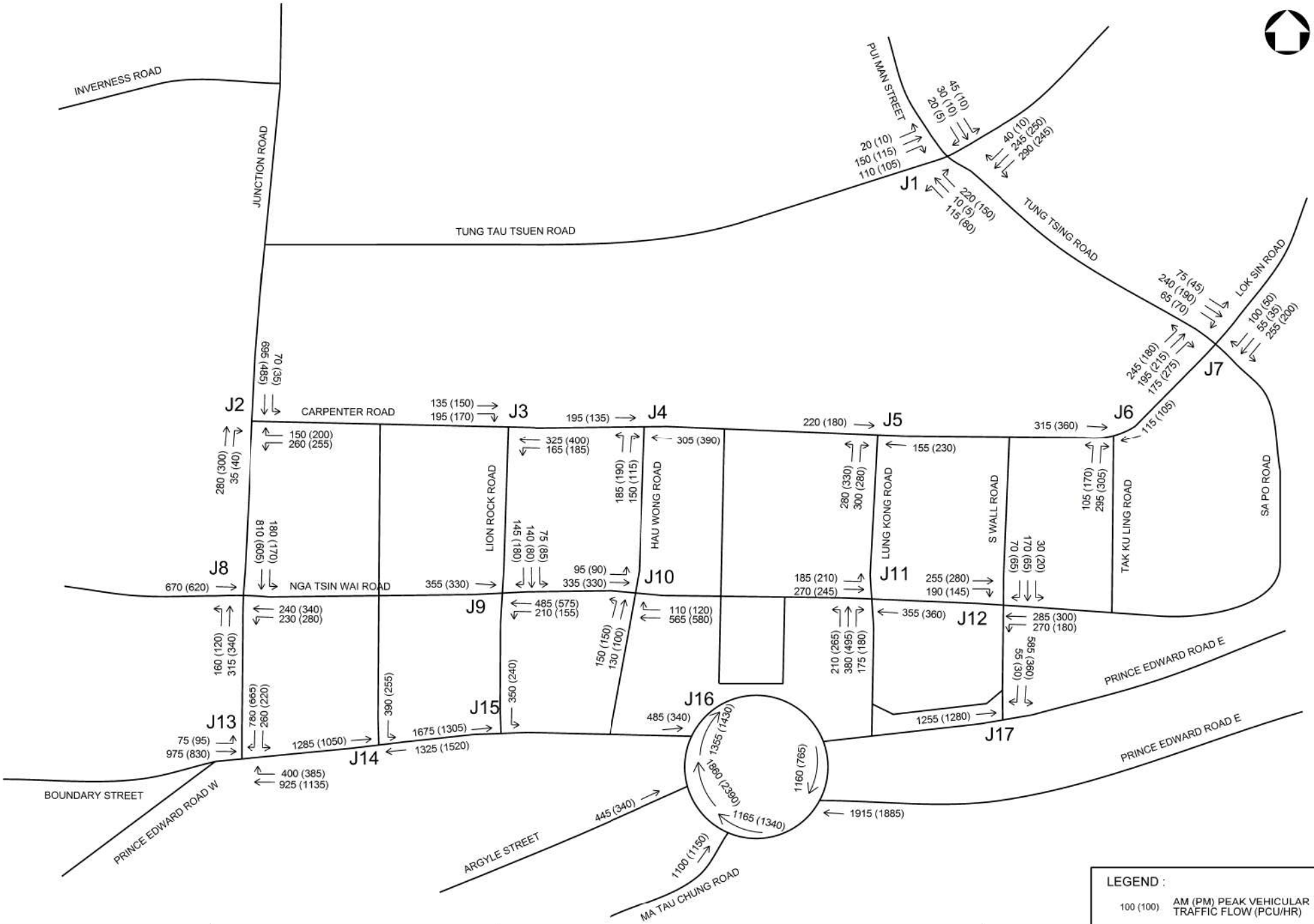
URBAN RENEWAL AUTHORITY 市區重建局

SNC·LAVALIN ATKINS Member of the SNC-Lavalin Group

URA NGA TSIN WAI ROAD / CARPENTER ROAD DEVELOPMENT SCHEME (KC-017)

Title: YEAR 2037 REFERENCE & DESIGN PEDESTRIAN FLOW

Scale at A3	Date	Figure No.
1:1000	MAY 2022	4.10



LEGEND :

100 (100) AM (PM) PEAK VEHICULAR TRAFFIC FLOW (PCU/HR)

URBAN RENEWAL AUTHORITY

SNC·LAVALIN

ATKINS Member of the SNC-Lavalin Group

URA NGA TSIN WAI ROAD / CARPENTER ROAD DEVELOPMENT SCHEME (KC-017)

Title: YEAR 2040 REFERENCE TRAFFIC FLOW

Scale at A3	Date	Figure No.
N.T.S	MAY 2022	4.11

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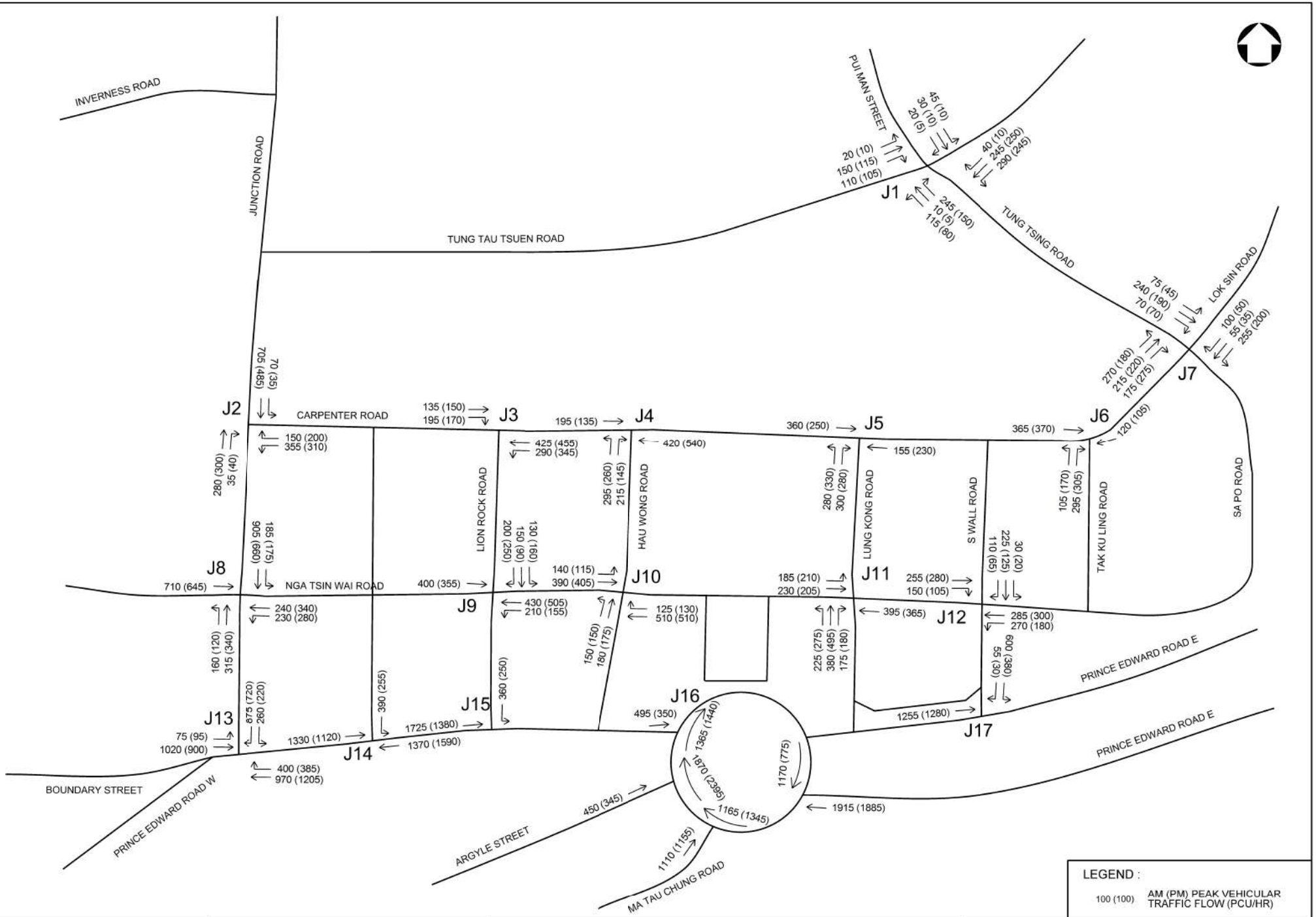

URBAN RENEWAL AUTHORITY

SNC·LAVALIN

ATKINS
Member of the SNC-Lavalin Group

URA NGA TSIN WAI ROAD / CARPENTER ROAD DEVELOPMENT SCHEME (KC-017)

Title: YEAR 2040 DESIGN TRAFFIC FLOW

Scale at A3	Date	Figure No.
N.T.S	MAY 2022	4.12

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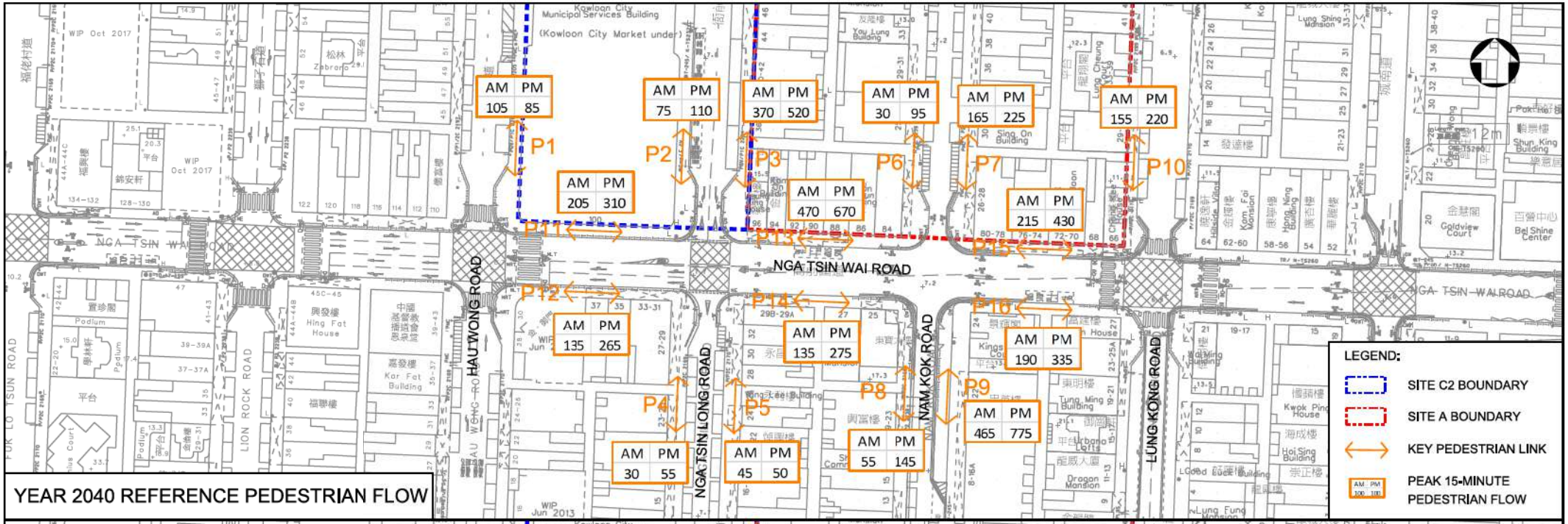
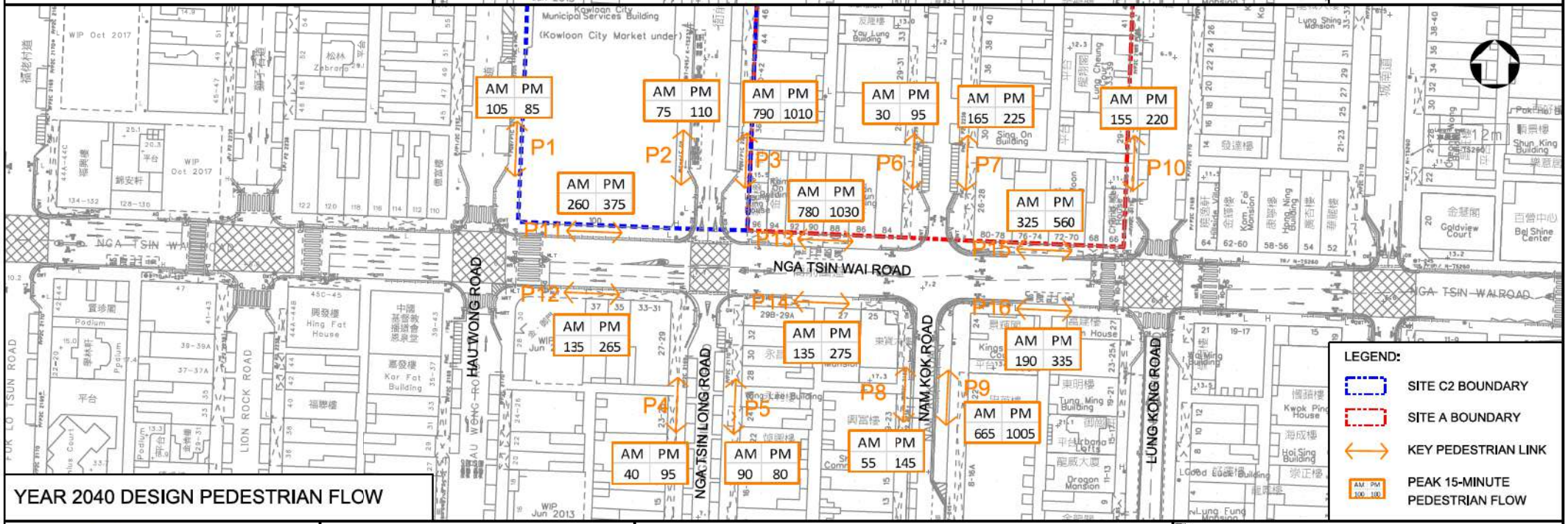


YEAR 2040 REFERENCE PEDESTRIAN FLOW



YEAR 2040 DESIGN PEDESTRIAN FLOW

URBAN RENEWAL AUTHORITY 市區重建局

SNC·LAVALIN ATKINS Member of the SNC-Lavalin Group

URA NGA TSIN WAI ROAD / CARPENTER ROAD DEVELOPMENT SCHEME (KC-017)

Title: YEAR 2040 REFERENCE & DESIGN PEDESTRIAN FLOW

Scale at A3	Date	Figure No.
1:1000	MAY 2022	4.13

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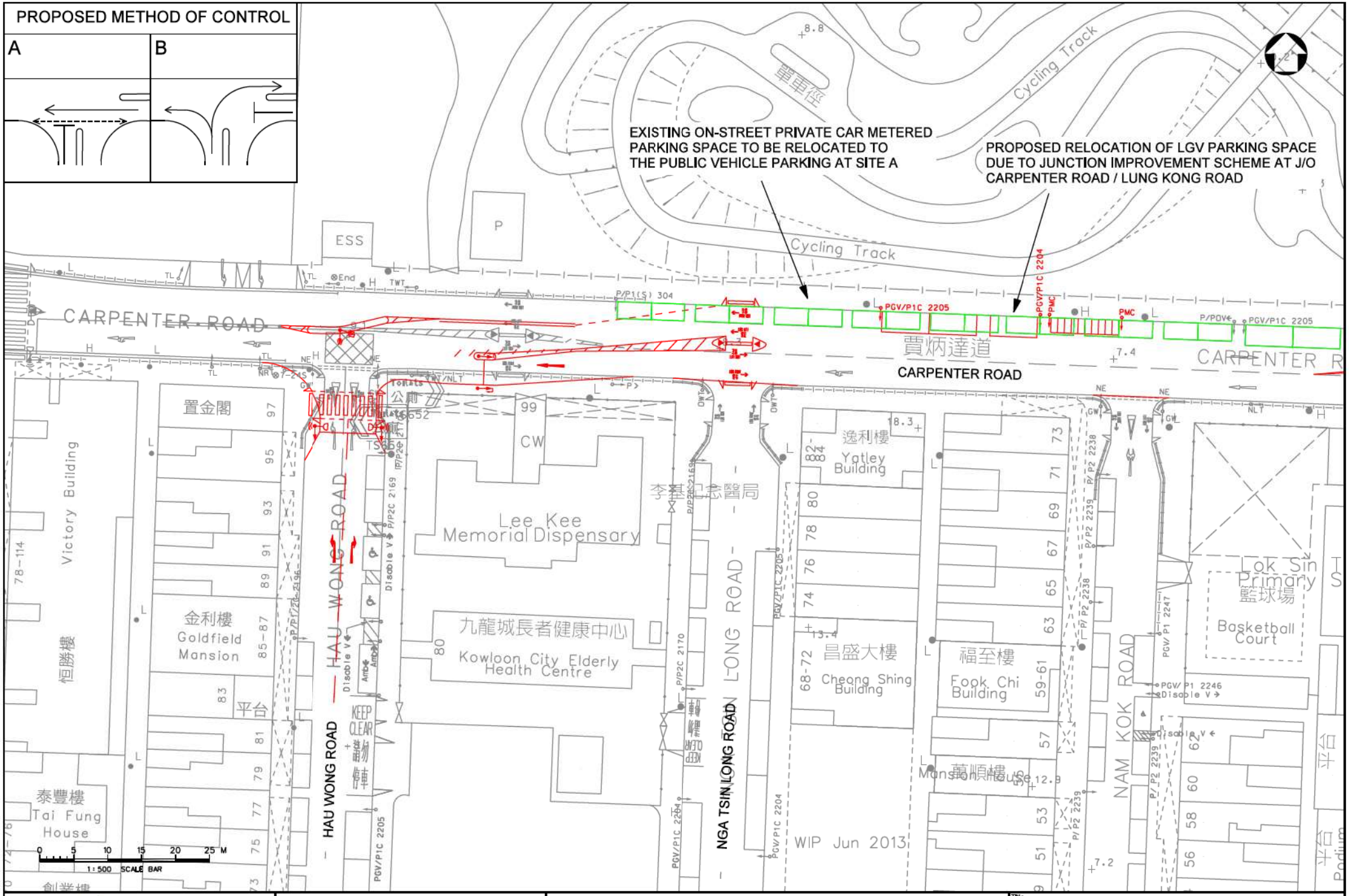


URBAN RENEWAL AUTHORITY 市區重建局

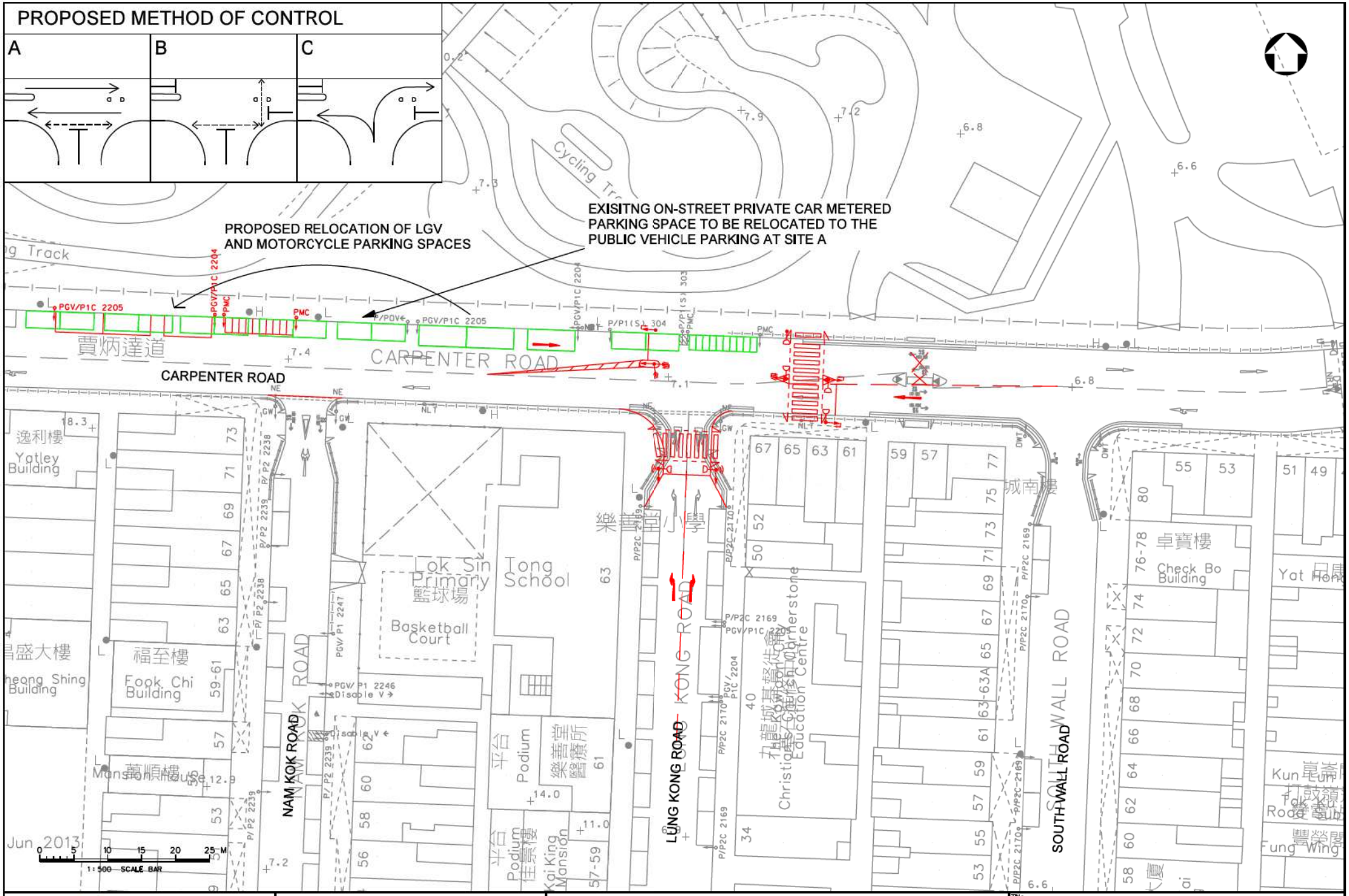
SNC·LAVALIN ATKINS Member of the SNC-Lavalin Group

URA NGA TSIN WAI ROAD / CARPENTER ROAD DEVELOPMENT SCHEME (KC-017)

Title

PROPOSED JUNCTION IMPROVEMENT SCHEME - J/O CARPENTER ROAD / HAU WONG ROAD (J4)

Scale at A3	Date	Figure No.
1 : 500	MAY 2022	5.1



URBAN RENEWAL AUTHORITY 市區重建局

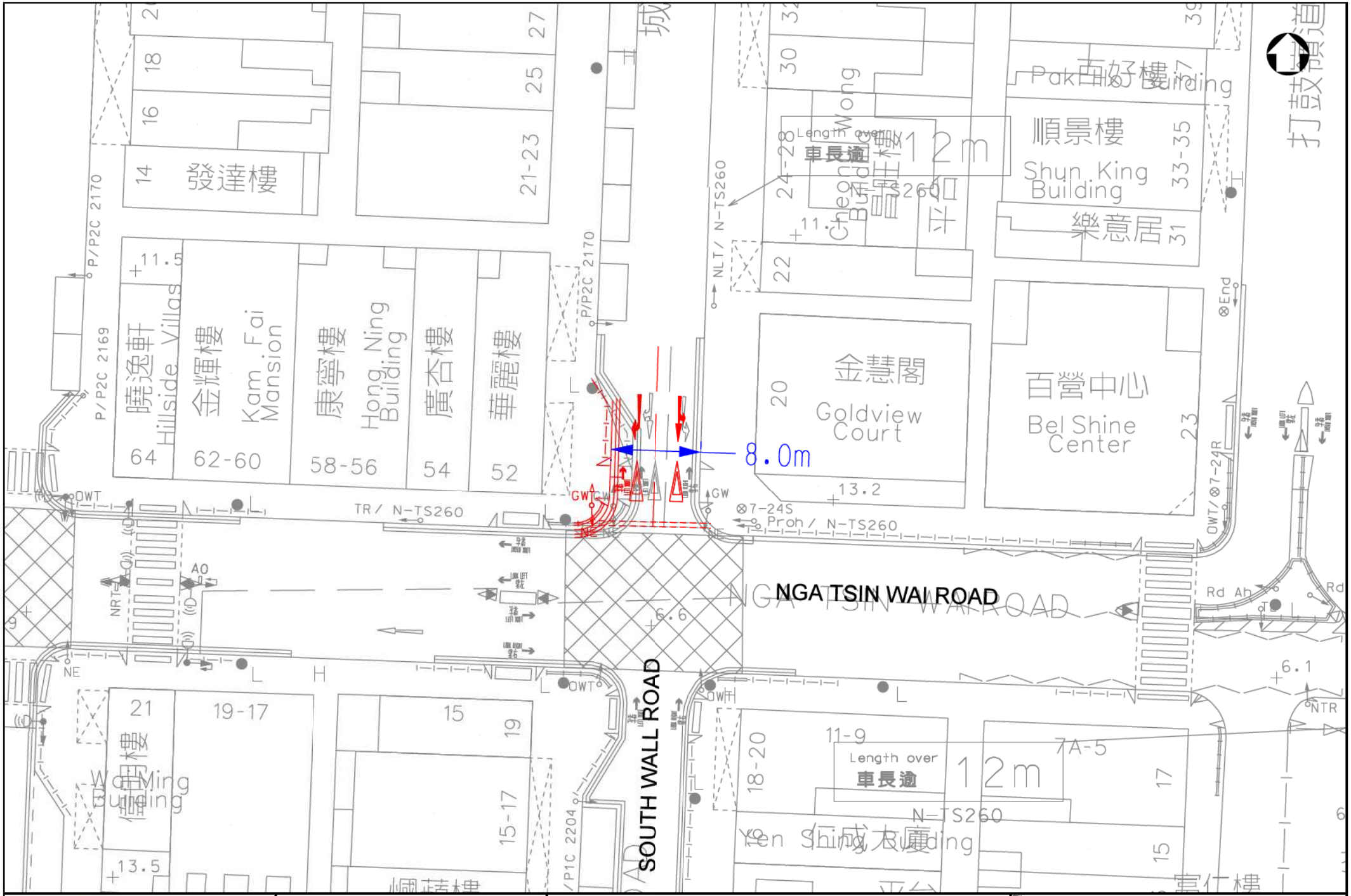
SNC·LAVALIN ATKINS Member of the SNC-Lavalin Group

URA NGA TSIN WAI ROAD / CARPENTER ROAD DEVELOPMENT SCHEME (KC-017)

Title

PROPOSED JUNCTION IMPROVEMENT SCHEME - J/O CARPENTER ROAD / LUNG KONG ROAD (J5)

Scale at A3	Date	Figure No.
1 : 500	MAY 2022	5.2



URBAN RENEWAL AUTHORITY 市區重建局

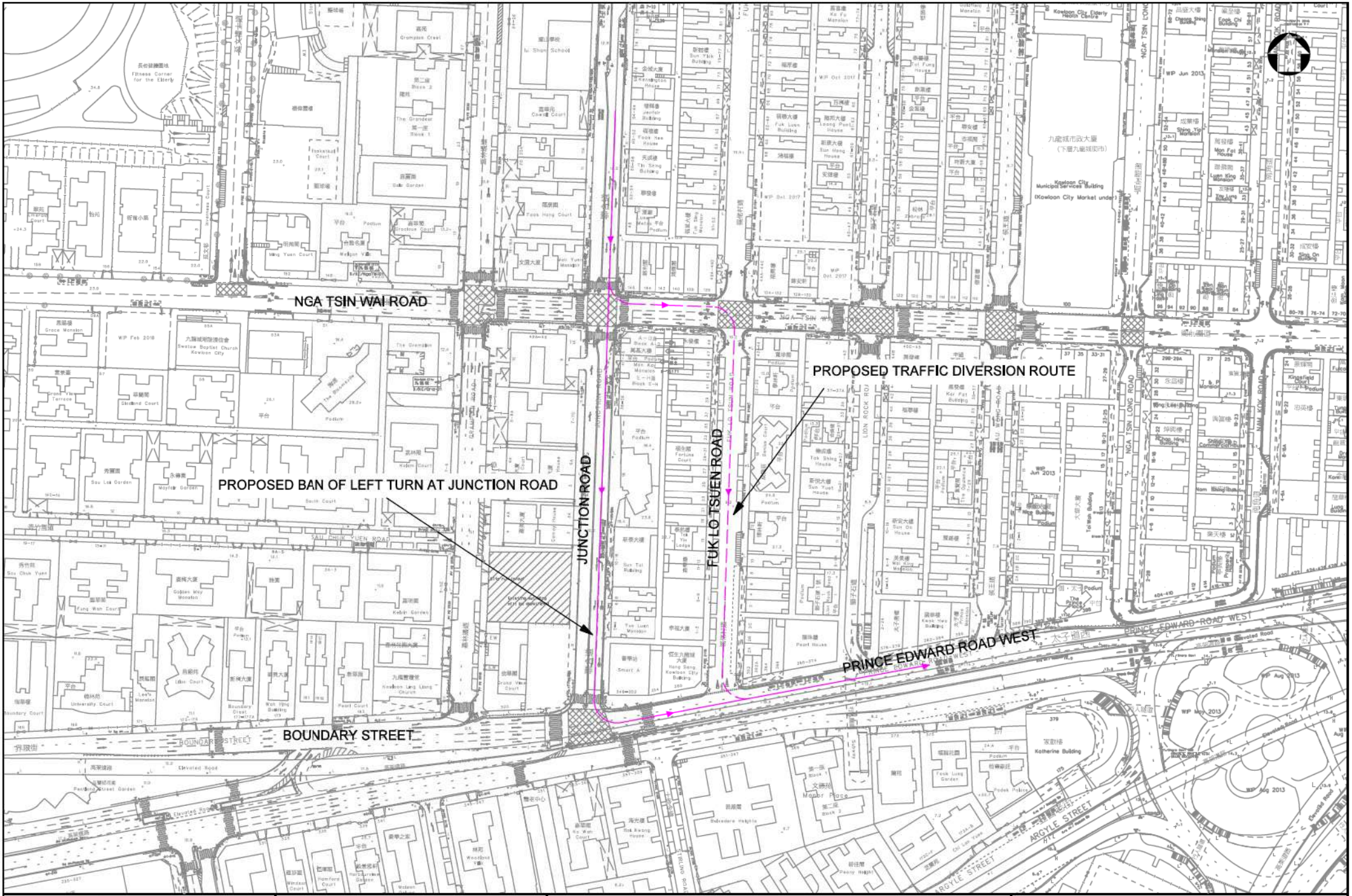
SNC·LAVALIN ATKINS Member of the SNC-Lavalin Group

URA NGA TSIN WAI ROAD / CARPENTER ROAD DEVELOPMENT SCHEME (KC-017)

Title

PROPOSED JUNCTION IMPROVEMENT SCHEME - J/O NGA TSIN WAI ROAD / SOUTH WALL ROAD (J12)

Scale at A3	1 : 300	Date	MAY 2022	Figure No.	5.3



市區重建局
URBAN RENEWAL AUTHORITY

SNC·LAVALIN

ATKINS
Member of the SNC-Lavalin Group

URA NGA TSIN WAI ROAD / CARPENTER ROAD DEVELOPMENT SCHEME (KC-017)

Title
PROPOSED JUNCTION IMPROVEMENT SCHEME AND TRAFFIC DIVERSION ROUTE - J/O PRINCE EDWARD ROAD WEST / BOUNDARY STREET / JUNCTION ROAD (J13)

Scale at A3	1 : 1500	Date	MAY 2022	Figure No.	5.4

PRINTED BY: CHEU1554 5/12/2022 2:42:57 PM
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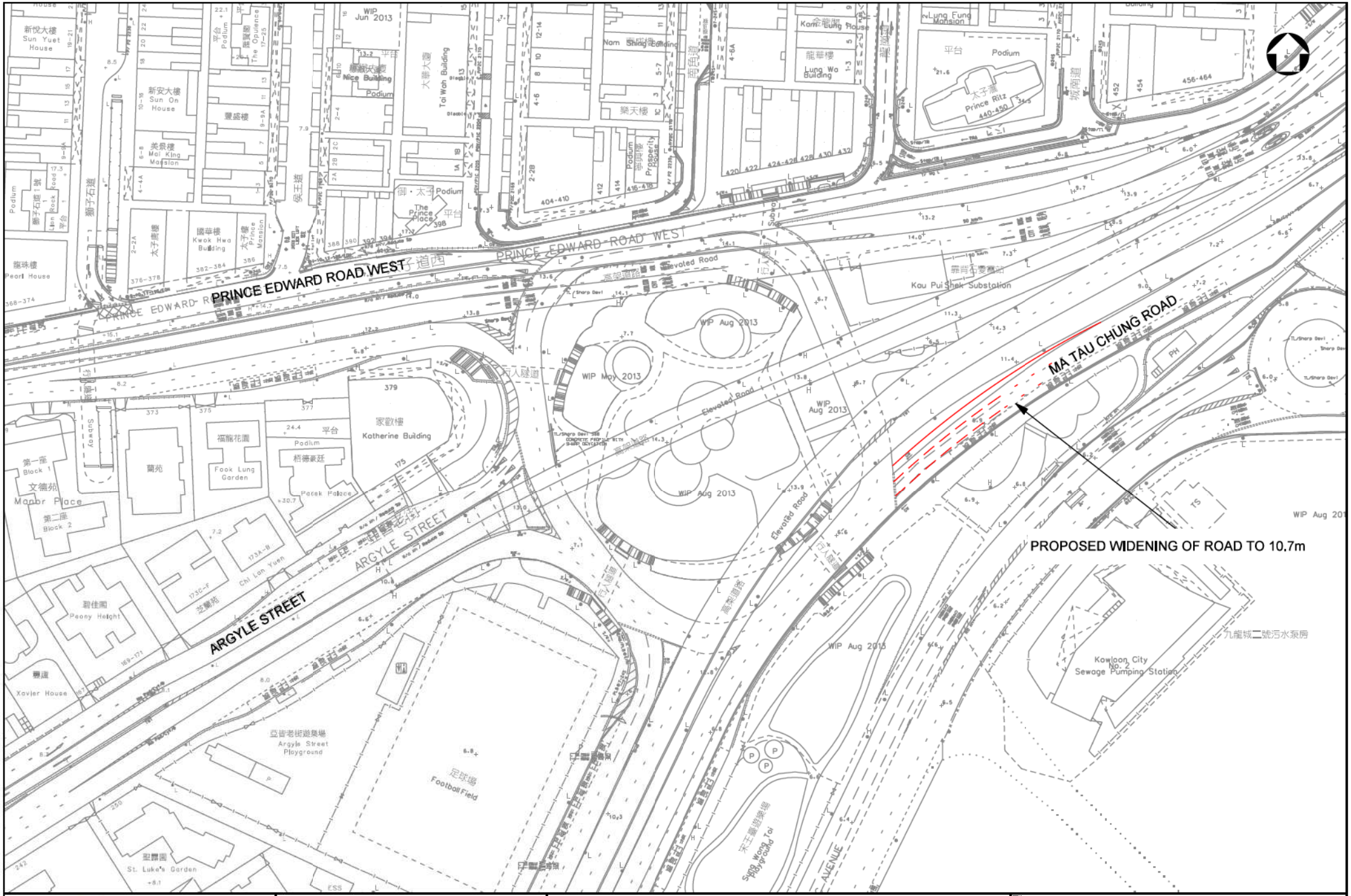
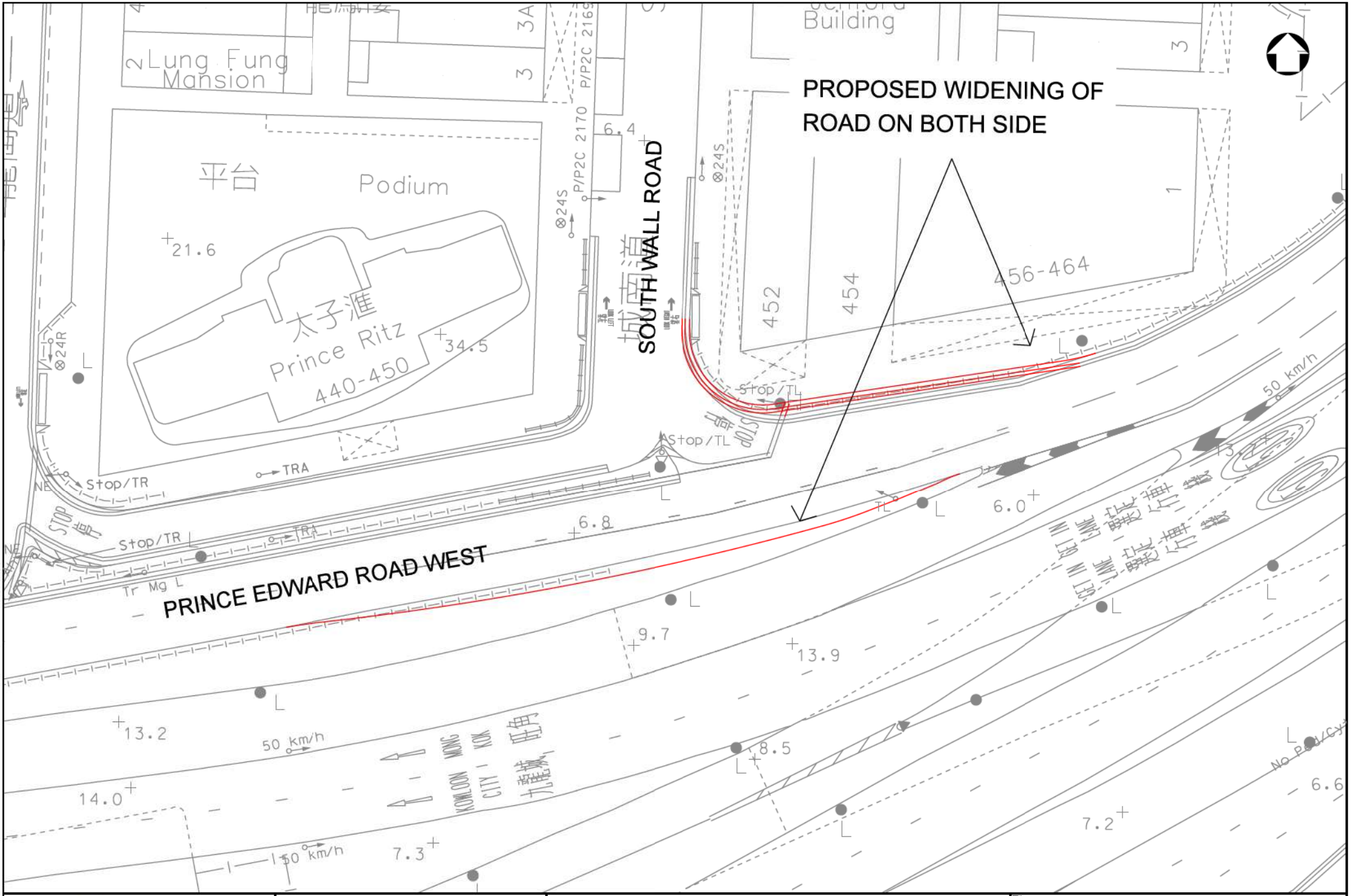


市區重建局 URBAN RENEWAL AUTHORITY	SNC·LAVALIN / ATKINS Member of the SNC-Lavalin Group	PROPOSED DEVELOPMENT SCHEME IN KOWLOON CITY (KC-017)	Title: SUGGESTED JUNCTION IMPROVEMENT SCHEME - J/O KOWLOON CITY ROUNDABOUT (J16)
			Scale at A3: 1 : 1000 · Date: MAY 2022 · Figure No. 5.5



URBAN RENEWAL AUTHORITY

SNC·LAVALIN

ATKINS
Member of the SNC-Lavalin Group

URA NGA TSIN WAI ROAD / CARPENTER ROAD
DEVELOPMENT SCHEME (KC-017)

Title

PROPOSED JUNCTION IMPROVEMENT SCHEME - J/O
PRINCE EDWARD ROAD WEST / SOUTH WALL ROAD (J17)

Scale at A3	1 : 300	Date	MAY 2022	Figure No.	5.6

Appendix A – Junction Calculation Sheets

TRAFFIC SIGNAL CALCULATION SHEET

ATKINS

JOB NO. : 5205867

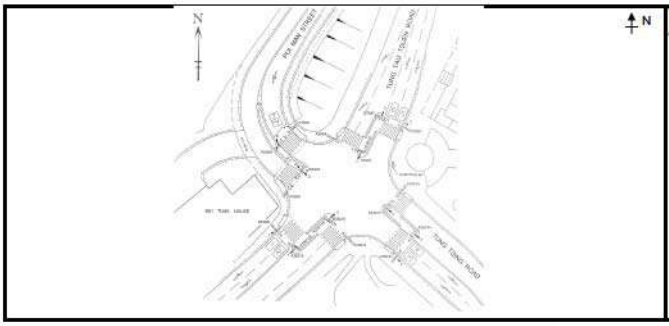
Junction : J1 - Tung Tau Tsuen Road / Tung Tsing Road / Pui Man Street

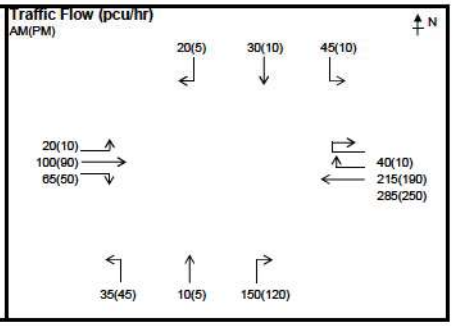
Design Year: 2021

Scheme : Existing

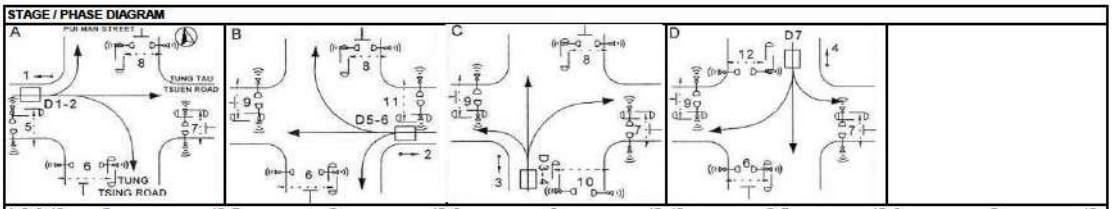
Designed by: RC

Checked by: EC





STAGE / PHASE DIAGRAM



1+2+3+12p	G=	IG=7	G=	IG=6	G=	IG=10	G=7	IG=9	G=	IG=
1+2+3+12p	G=	IG=7	G=	IG=6	G=	IG=10	G=7	IG=9	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Tung Tau Tsuen Road EB														
1A	A	3.30	Y	N	10		90	22%	1880	**0.048**	73	14%	1905	0.038
1B	A	3.30	N	N	20		95	68%	1985	0.048	77	65%	1990	**0.039**
Tung Tau Tsuen Road WB														
2A	B	3.00	Y	N	15		285	100%	1740	**0.164**	250	100%	1740	**0.144**
2B	B	3.00	N	N	15		255	16%	2025	0.126	200	5%	2045	0.098
Tung Tsing Road NB														
3A	C	3.50	Y	N	15		35	100%	1785	0.020	45	100%	1785	0.025
3B	C	3.50	N	N	15		160	94%	1925	**0.083**	125	96%	1920	**0.065**
Pui Man Street SB														
4A	D	5.50	Y	N	15/15		95	47% / 21%	2025	0.047	25	40% / 20%	2040	0.012
5p	A		6GM +	6FG =	12	sec								
6p	A,B,D		6GM +	6FG =	12	sec								
7p	A,C,D		6GM +	6FG =	12	sec								
8p	A,B,C		6GM +	6FG =	12	sec								
9p	B,C,D		7GM +	7FG =	14	sec								
10p	C		5GM +	5FG =	10	sec								
11p	B		7GM +	7FG =	14	sec								
12p	D		7GM +	7FG =	14	sec								

Notes:

AM Peak	1+2+3+12p	PM Peak	1+2+3+12p
Sum of Critical *y* **Y**	0.295	Sum of Critical *y* **Y**	0.247
Lost Time *L* (sec)	36	Lost Time *L* (sec)	36
Cycle Time *c* (sec)	90	Cycle Time *c* (sec)	90
Practical *Y* ***Ypr***	0.540	Practical *Y* ***Ypr***	0.540
Reserve Capacity ***RC***	83%	Reserve Capacity ***RC***	118%

Date : 5/12/2022 Junction : J1 - Tung Tau Tsuen Road / Tung Tsing Road / Pui Man Street

ATKINS CHINA LIMITED

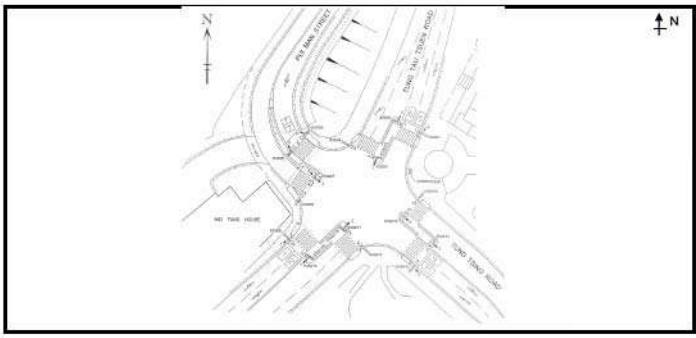
TRAFFIC SIGNAL CALCULATION SHEET

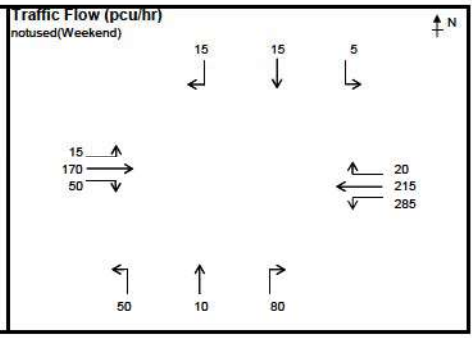
ATKINS

JOB NO. : 5205867

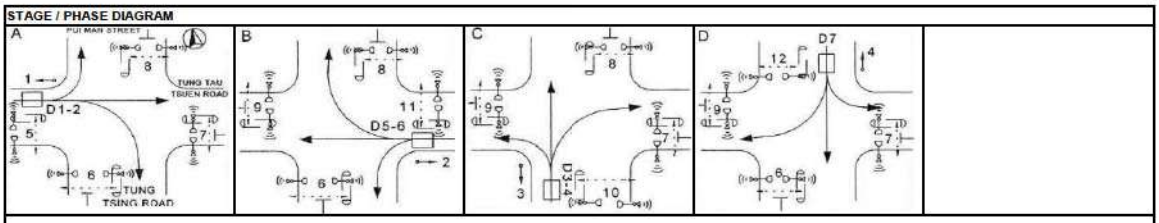
Junction : J1 - Tung Tau Tsuen Road / Tung Tsing Road / Pui Man Street Design Year: 2021

Scheme : Existing - Weekend Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+2+3+12p G= IG=7 G= IG=6 G= IG=10 G=7 IG=9 G= IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*					Weekend Peak: Design Flow *q* (pcu/hr)	Proportion turning (%) *f*	Saturation flow *S* (pcu/hr)	Flow factor *y*
Tung Tau Tsuen Road EB														
1A	A	3.30	Y	N	10						114	13%	1905	0.060
1B	A	3.30	N	N	20						121	41%	2020	**0.060**
Tung Tau Tsuen Road WB														
2A	B	3.00	Y	N	15						285	100%	1740	**0.164**
2B	B	3.00	N	N	15						235	9%	2040	0.115
Tung Tsing Road NB														
3A	C	3.50	Y	N	15						50	100%	1785	0.028
3B	C	3.50	N	N	15						90	89%	1935	**0.047**
Pui Man Street SB														
4A	D	5.50	Y	N	15/15						35	14% / 43%	2050	0.017
5p	A		6GM +	6FG =	12	sec								
6p	A,B,D		6GM +	6FG =	12	sec								
7p	A,C,D		6GM +	6FG =	12	sec								
8p	A,B,C		6GM +	6FG =	12	sec								
9p	B,C,D		7GM +	7FG =	14	sec								
10p	C		5GM +	5FG =	10	sec								
11p	B		7GM +	7FG =	14	sec								
12p	D		7GM +	7FG =	14	sec								

Notes:

Weekend Peak	1+2+3+12p
Sum of Critical *y* *Y*	0.270
Lost Time *L* (sec)	36
Cycle Time *c* (sec)	90
Practical *Y* *Ypr*	0.540
Reserve Capacity *RC*	100%

Date : 5/19/2022 Junction : J1 - Tung Tau Tsuen Road / Tung Tsing Road / Pui Man Street

ATKINS CHINA LIMITED

TRAFFIC SIGNAL CALCULATION SHEET

ATKINS

JOB NO. : 5205867

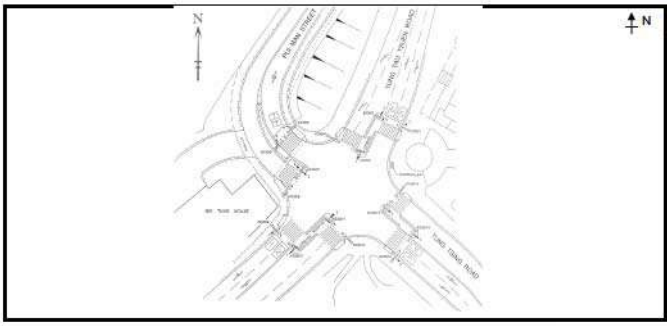
Junction : J1 - Tung Tau Tsuen Road / Tung Tsing Road / Pui Man Street

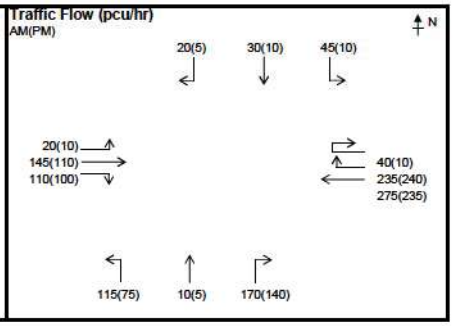
Design Year: 2033

Scheme : Reference

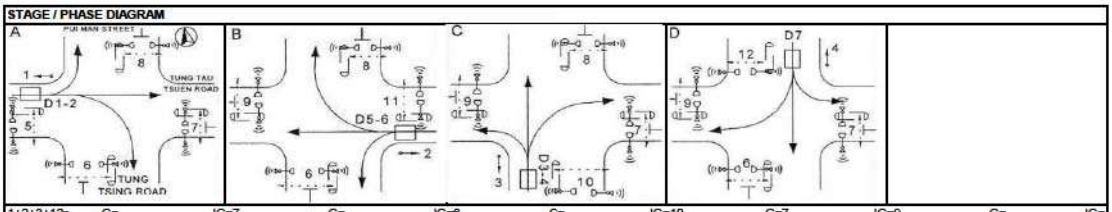
Designed by: RC

Checked by: EC





STAGE / PHASE DIAGRAM



1+2+3+12p	G=	IG=7	G=	IG=6	G=	IG=10	G=7	IG=9	G=	IG=
1+2+3+12p	G=	IG=7	G=	IG=6	G=	IG=10	G=7	IG=9	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Tung Tau Tsuen Road EB														
1A	A	3.30	Y	N	10		135	15%	1905	0.071	109	9%	1920	0.057
1B	A	3.30	N	N	20		140	79%	1970	0.071	111	90%	1955	0.057
Tung Tau Tsuen Road WB														
2A	B	3.00	Y	N	15		275	100%	1740	0.158	235	100%	1740	0.135
2B	B	3.00	N	N	15		275	15%	2025	0.136	250	4%	2045	0.122
Tung Tsing Road NB														
3A	C	3.50	Y	N	15		115	100%	1785	0.064	75	100%	1785	0.042
3B	C	3.50	N	N	15		180	94%	1925	0.094	145	97%	1920	0.076
Pui Man Street SB														
4A	D	5.50	Y	N	15/15		95	47% / 21%	2025	0.047	25	40% / 20%	2040	0.012
5p	A		6GM +	6FG =	12	sec								
6p	A,B,D		6GM +	6FG =	12	sec								
7p	A,C,D		6GM +	6FG =	12	sec								
8p	A,B,C		6GM +	6FG =	12	sec								
9p	B,C,D		7GM +	7FG =	14	sec								
10p	C		5GM +	5FG =	10	sec								
11p	B		7GM +	7FG =	14	sec								
12p	D		7GM +	7FG =	14	sec								

Notes:

AM Peak	1+2+3+12p	PM Peak	1+2+3+12p
Sum of Critical *y* *Y*	0.323	Sum of Critical *y* *Y*	0.267
Lost Time *L* (sec)	36	Lost Time *L* (sec)	36
Cycle Time *c* (sec)	90	Cycle Time *c* (sec)	90
Practical *Y* *Ypr*	0.540	Practical *Y* *Ypr*	0.540
Reserve Capacity *RC*	67%	Reserve Capacity *RC*	102%

Date : 5/12/2022 Junction : J1 - Tung Tau Tsuen Road / Tung Tsing Road / Pui Man Street

ATKINS CHINA LIMITED

TRAFFIC SIGNAL CALCULATION SHEET

ATKINS

JOB NO. : 5205867

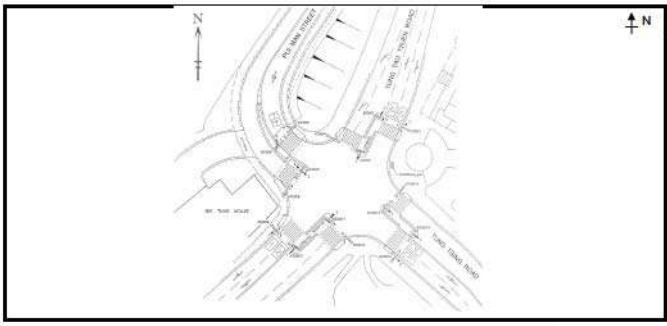
Junction : J1 - Tung Tau Tsuen Road / Tung Tsing Road / Pui Man Street

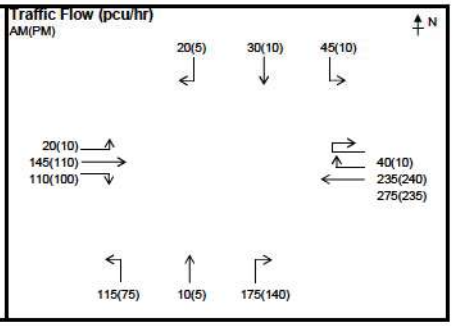
Design Year: 2033

Scheme : Design

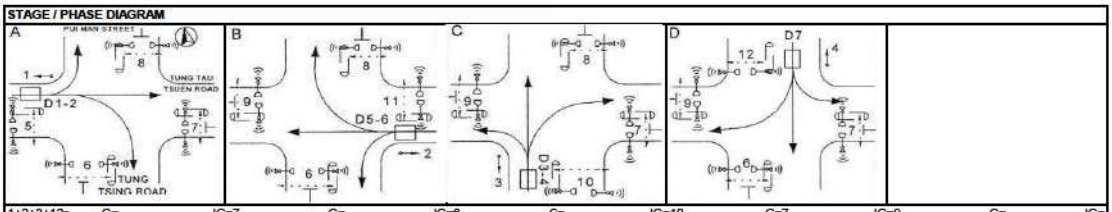
Designed by: RC

Checked by: EC





STAGE / PHASE DIAGRAM



1+2+3+12p	G=	IG=7	G=	IG=6	G=	IG=10	G=7	IG=9	G=	IG=
1+2+3+12p	G=	IG=7	G=	IG=6	G=	IG=10	G=7	IG=9	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Tung Tau Tsuen Road EB														
1A	A	3.30	Y	N	10		135	15%	1905	0.071	109	9%	1920	0.057
1B	A	3.30	N	N	20		140	79%	1970	0.071	111	90%	1955	0.057
Tung Tau Tsuen Road WB														
2A	B	3.00	Y	N	15		275	100%	1740	0.158	235	100%	1740	0.135
2B	B	3.00	N	N	15		275	15%	2025	0.136	250	4%	2045	0.122
Tung Tsing Road NB														
3A	C	3.50	Y	N	15		115	100%	1785	0.064	75	100%	1785	0.042
3B	C	3.50	N	N	15		185	95%	1925	0.096	145	97%	1920	0.076
Pui Man Street SB														
4A	D	5.50	Y	N	15/15		95	47% / 21%	2025	0.047	25	40% / 20%	2040	0.012
5p	A		6GM +	6FG =	12	sec								
6p	A,B,D		6GM +	6FG =	12	sec								
7p	A,C,D		6GM +	6FG =	12	sec								
8p	A,B,C		6GM +	6FG =	12	sec								
9p	B,C,D		7GM +	7FG =	14	sec								
10p	C		5GM +	5FG =	10	sec								
11p	B		7GM +	7FG =	14	sec								
12p	D		7GM +	7FG =	14	sec								

Notes:

AM Peak	1+2+3+12p	PM Peak	1+2+3+12p
Sum of Critical *y* **Y**	0.325	Sum of Critical *y* **Y**	0.267
Lost Time *L* (sec)	36	Lost Time *L* (sec)	36
Cycle Time *c* (sec)	90	Cycle Time *c* (sec)	90
Practical *Y* ***Ypr***	0.540	Practical *Y* ***Ypr***	0.540
Reserve Capacity ***RC***	66%	Reserve Capacity ***RC***	102%

Date : 5/12/2022 Junction : J1 - Tung Tau Tsuen Road / Tung Tsing Road / Pui Man Street

ATKINS CHINA LIMITED

TRAFFIC SIGNAL CALCULATION SHEET

ATKINS

JOB NO. : 5205867

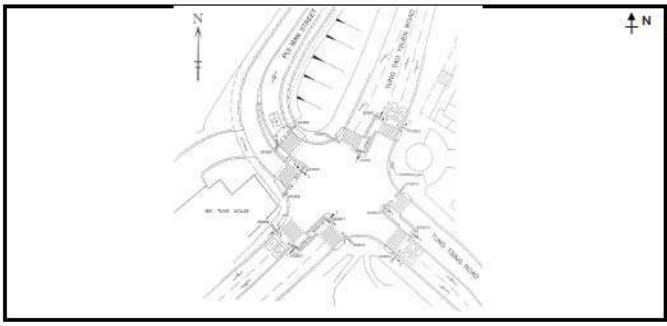
Junction : J1 - Tung Tau Tsuen Road / Tung Tsing Road / Pui Man Street

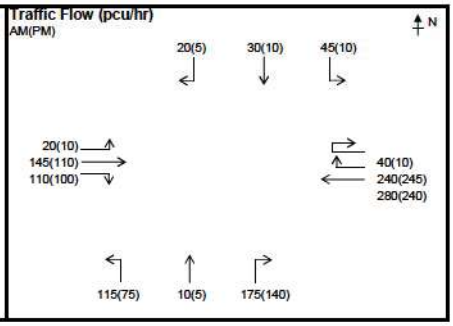
Design Year: 2036

Scheme : Reference

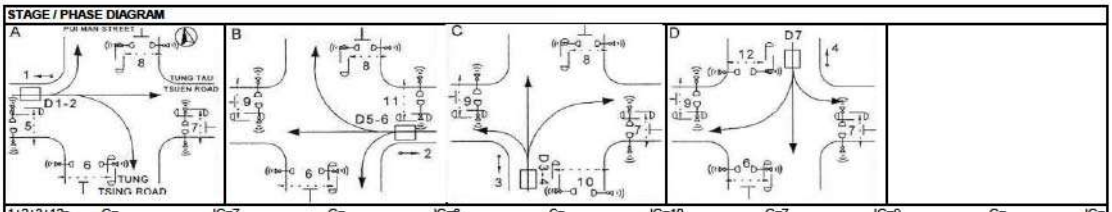
Designed by: RC

Checked by: EC





STAGE / PHASE DIAGRAM



1+2+3+12p	G=	IG=7	G=	IG=6	G=	IG=10	G=7	IG=9	G=	IG=
1+2+3+12p	G=	IG=7	G=	IG=6	G=	IG=10	G=7	IG=9	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Tung Tau Tsuen Road EB														
1A	A	3.30	Y	N	10		135	15%	1905	0.071	109	9%	1920	0.057
1B	A	3.30	N	N	20		140	79%	1970	0.071	111	90%	1955	0.057
Tung Tau Tsuen Road WB														
2A	B	3.00	Y	N	15		280	100%	1740	0.161	240	100%	1740	0.138
2B	B	3.00	N	N	15		280	14%	2025	0.138	255	4%	2045	0.125
Tung Tsing Road NB														
3A	C	3.50	Y	N	15		115	100%	1785	0.064	75	100%	1785	0.042
3B	C	3.50	N	N	15		185	95%	1925	0.096	145	97%	1920	0.076
Pui Man Street SB														
4A	D	5.50	Y	N	15/15		95	47% / 21%	2025	0.047	25	40% / 20%	2040	0.012
5p	A		6GM +	6FG =	12	sec								
6p	A,B,D		6GM +	6FG =	12	sec								
7p	A,C,D		6GM +	6FG =	12	sec								
8p	A,B,C		6GM +	6FG =	12	sec								
9p	B,C,D		7GM +	7FG =	14	sec								
10p	C		5GM +	5FG =	10	sec								
11p	B		7GM +	7FG =	14	sec								
12p	D		7GM +	7FG =	14	sec								

Notes:

AM Peak	1+2+3+12p	PM Peak	1+2+3+12p
Sum of Critical *y* **Y**	0.328	Sum of Critical *y* **Y**	0.270
Lost Time *L* (sec)	36	Lost Time *L* (sec)	36
Cycle Time *c* (sec)	90	Cycle Time *c* (sec)	90
Practical *Y* ***Ypr***	0.540	Practical *Y* ***Ypr***	0.540
Reserve Capacity ***RC***	65%	Reserve Capacity ***RC***	100%

Date : 5/12/2022 Junction : J1 - Tung Tau Tsuen Road / Tung Tsing Road / Pui Man Street

ATKINS CHINA LIMITED

TRAFFIC SIGNAL CALCULATION SHEET

ATKINS

JOB NO. : 5205867

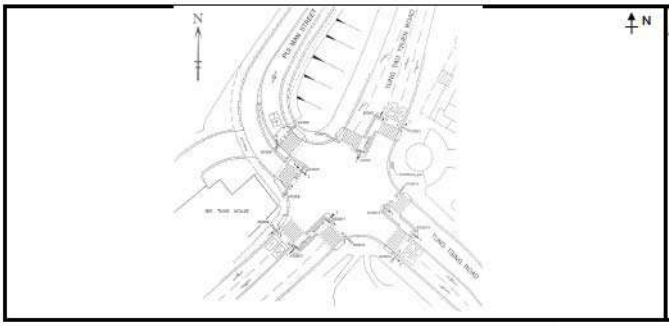
Junction : J1 - Tung Tau Tsuen Road / Tung Tsing Road / Pui Man Street

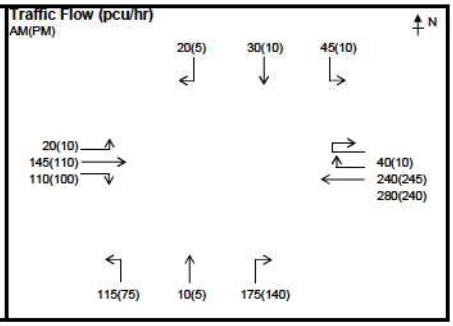
Design Year: 2036

Scheme : Design

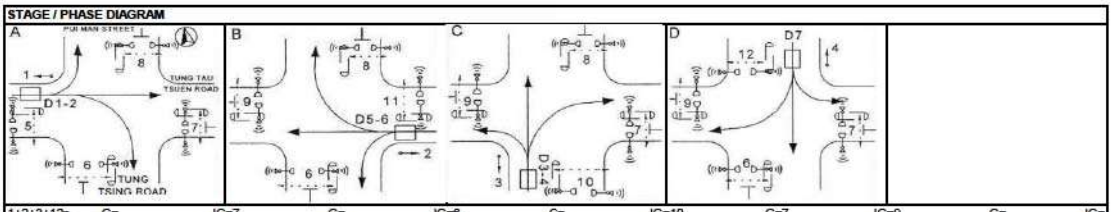
Designed by: RC

Checked by: EC





STAGE / PHASE DIAGRAM



1+2+3+12p	G=	IG=7	G=	IG=6	G=	IG=10	G=7	IG=9	G=	IG=
1+2+3+12p	G=	IG=7	G=	IG=6	G=	IG=10	G=7	IG=9	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Tung Tau Tsuen Road EB														
1A	A	3.30	Y	N	10		135	15%	1905	0.071	109	9%	1920	0.057
1B	A	3.30	N	N	20		140	79%	1970	0.071	111	90%	1955	0.057
Tung Tau Tsuen Road WB														
2A	B	3.00	Y	N	15		280	100%	1740	0.161	240	100%	1740	0.138
2B	B	3.00	N	N	15		280	14%	2025	0.138	255	4%	2045	0.125
Tung Tsing Road NB														
3A	C	3.50	Y	N	15		115	100%	1785	0.064	75	100%	1785	0.042
3B	C	3.50	N	N	15		185	95%	1925	0.096	145	97%	1920	0.076
Pui Man Street SB														
4A	D	5.50	Y	N	15/15		95	47% / 21%	2025	0.047	25	40% / 20%	2040	0.012
5p	A		6GM +	6FG =	12	sec								
6p	A,B,D		6GM +	6FG =	12	sec								
7p	A,C,D		6GM +	6FG =	12	sec								
8p	A,B,C		6GM +	6FG =	12	sec								
9p	B,C,D		7GM +	7FG =	14	sec								
10p	C		5GM +	5FG =	10	sec								
11p	B		7GM +	7FG =	14	sec								
12p	D		7GM +	7FG =	14	sec								

Notes:

AM Peak	1+2+3+12p	PM Peak	1+2+3+12p
Sum of Critical *y* **Y**	0.328	Sum of Critical *y* **Y**	0.270
Lost Time *L* (sec)	36	Lost Time *L* (sec)	36
Cycle Time *c* (sec)	90	Cycle Time *c* (sec)	90
Practical *Y* ***Ypr***	0.540	Practical *Y* ***Ypr***	0.540
Reserve Capacity ***RC***	65%	Reserve Capacity ***RC***	100%

Date : 5/12/2022 Junction : J1 - Tung Tau Tsuen Road / Tung Tsing Road / Pui Man Street

ATKINS CHINA LIMITED

TRAFFIC SIGNAL CALCULATION SHEET

ATKINS

JOB NO. : 5205867

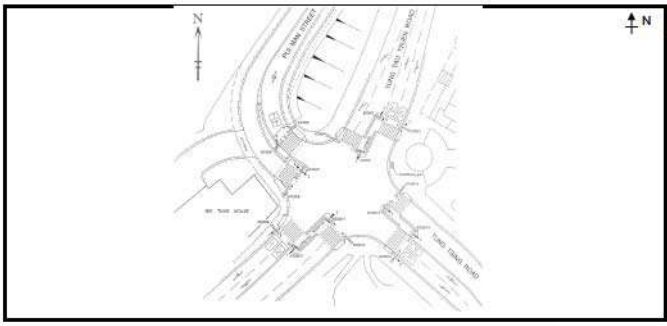
Junction : J1 - Tung Tau Tsuen Road / Tung Tsing Road / Pui Man Street

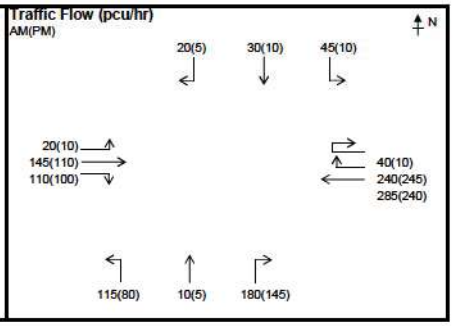
Design Year: 2037

Scheme : Reference

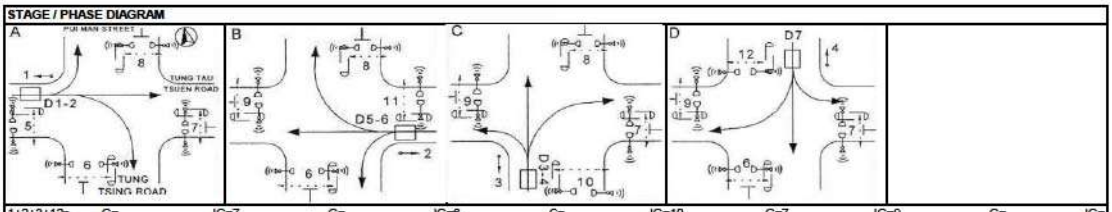
Designed by: RC

Checked by: EC





STAGE / PHASE DIAGRAM



1+2+3+12p	G=	IG=7	G=	IG=6	G=	IG=10	G=7	IG=9	G=	IG=
1+2+3+12p	G=	IG=7	G=	IG=6	G=	IG=10	G=7	IG=9	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Tung Tau Tsuen Road EB														
1A	A	3.30	Y	N	10		135	15%	1905	0.071	109	9%	1920	0.057
1B	A	3.30	N	N	20		140	79%	1970	0.071	111	90%	1955	0.057
Tung Tau Tsuen Road WB														
2A	B	3.00	Y	N	15		285	100%	1740	0.164	240	100%	1740	0.138
2B	B	3.00	N	N	15		280	14%	2025	0.138	255	4%	2045	0.125
Tung Tsing Road NB														
3A	C	3.50	Y	N	15		115	100%	1785	0.064	80	100%	1785	0.045
3B	C	3.50	N	N	15		190	95%	1925	0.099	150	97%	1920	0.078
Pui Man Street SB														
4A	D	5.50	Y	N	15/15		95	47% / 21%	2025	0.047	25	40% / 20%	2040	0.012
5p	A		6GM +	6FG =	12	sec								
6p	A,B,D		6GM +	6FG =	12	sec								
7p	A,C,D		6GM +	6FG =	12	sec								
8p	A,B,C		6GM +	6FG =	12	sec								
9p	B,C,D		7GM +	7FG =	14	sec								
10p	C		5GM +	5FG =	10	sec								
11p	B		7GM +	7FG =	14	sec								
12p	D		7GM +	7FG =	14	sec								

Notes:

AM Peak	1+2+3+12p	PM Peak	1+2+3+12p
Sum of Critical *y* **Y**	0.334	Sum of Critical *y* **Y**	0.273
Lost Time *L* (sec)	36	Lost Time *L* (sec)	36
Cycle Time *c* (sec)	90	Cycle Time *c* (sec)	90
Practical *Y* ***Ypr***	0.540	Practical *Y* ***Ypr***	0.540
Reserve Capacity ***RC***	62%	Reserve Capacity ***RC***	98%

Date : 5/12/2022 Junction : J1 - Tung Tau Tsuen Road / Tung Tsing Road / Pui Man Street

ATKINS CHINA LIMITED

TRAFFIC SIGNAL CALCULATION SHEET

ATKINS

JOB NO. : 5205867

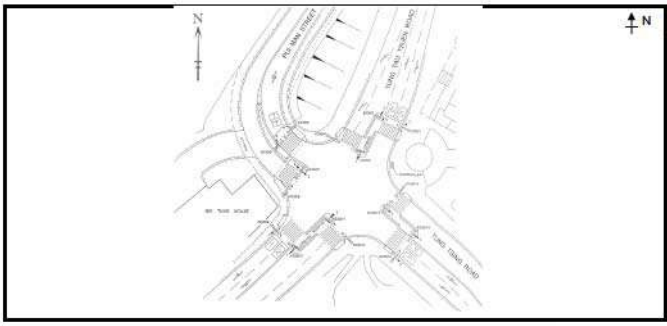
Junction : J1 - Tung Tau Tsuen Road / Tung Tsing Road / Pui Man Street

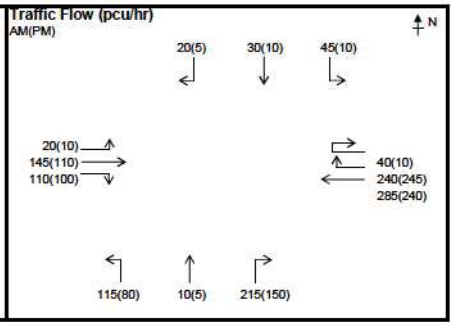
Design Year: 2037

Scheme : Design

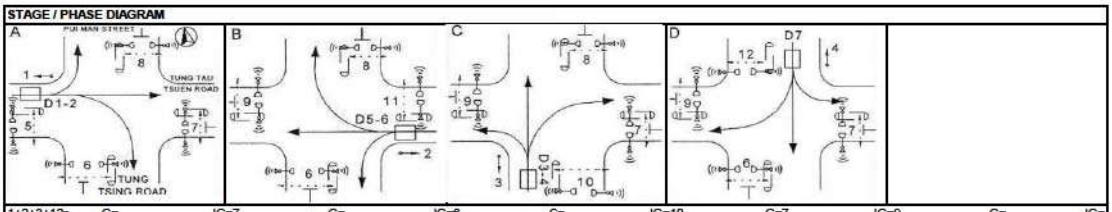
Designed by: RC

Checked by: EC





STAGE / PHASE DIAGRAM



1+2+3+12p	G=	IG=7	G=	IG=6	G=	IG=10	G=7	IG=9	G=	IG=
1+2+3+12p	G=	IG=7	G=	IG=6	G=	IG=10	G=7	IG=9	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Tung Tau Tsuen Road EB														
1A	A	3.30	Y	N	10		135	15%	1905	0.071	109	9%	1920	0.057
1B	A	3.30	N	N	20		140	79%	1970	**0.071**	111	90%	1955	**0.057**
Tung Tau Tsuen Road WB														
2A	B	3.00	Y	N	15		285	100%	1740	**0.164**	240	100%	1740	**0.138**
2B	B	3.00	N	N	15		280	14%	2025	0.138	255	4%	2045	0.125
Tung Tsing Road NB														
3A	C	3.50	Y	N	15		115	100%	1785	0.064	80	100%	1785	0.045
3B	C	3.50	N	N	15		225	96%	1920	**0.117**	155	97%	1920	**0.081**
Pui Man Street SB														
4A	D	5.50	Y	N	15/15		95	47% / 21%	2025	0.047	25	40% / 20%	2040	0.012
5p	A		6GM +	6FG =	12	sec								
6p	A,B,D		6GM +	6FG =	12	sec								
7p	A,C,D		6GM +	6FG =	12	sec								
8p	A,B,C		6GM +	6FG =	12	sec								
9p	B,C,D		7GM +	7FG =	14	sec								
10p	C		5GM +	5FG =	10	sec								
11p	B		7GM +	7FG =	14	sec								
12p	D		7GM +	7FG =	14	sec								

Notes:

AM Peak	1+2+3+12p	PM Peak	1+2+3+12p
Sum of Critical *y* **Y**	0.352	Sum of Critical *y* **Y**	0.275
Lost Time *L* (sec)	36	Lost Time *L* (sec)	36
Cycle Time *c* (sec)	90	Cycle Time *c* (sec)	90
Practical *Y* ***Ypr***	0.540	Practical *Y* ***Ypr***	0.540
Reserve Capacity ***RC***	53%	Reserve Capacity ***RC***	96%

Date : 5/12/2022 Junction : J1 - Tung Tau Tsuen Road / Tung Tsing Road / Pui Man Street

ATKINS CHINA LIMITED

TRAFFIC SIGNAL CALCULATION SHEET

ATKINS

JOB NO. : 5205867

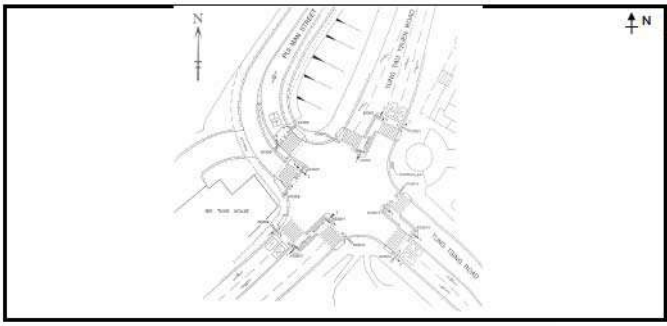
Junction : J1 - Tung Tau Tsuen Road / Tung Tsing Road / Pui Man Street

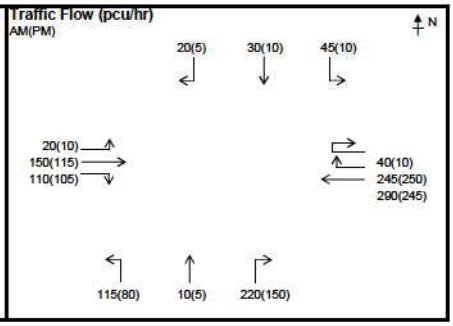
Design Year: 2040

Scheme : Reference

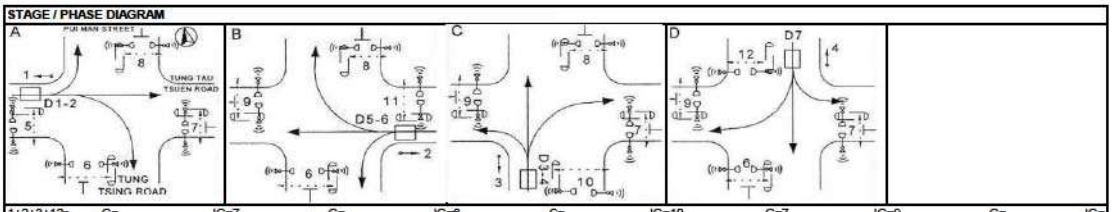
Designed by: RC

Checked by: EC





STAGE / PHASE DIAGRAM



1+2+3+12p	G=	IG=7	G=	IG=6	G=	IG=10	G=7	IG=9	G=	IG=
1+2+3+12p	G=	IG=7	G=	IG=6	G=	IG=10	G=7	IG=9	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Tung Tau Tsuen Road EB														
1A	A	3.30	Y	N	10		138	14%	1905	**0.072**	114	9%	1920	0.059
1B	A	3.30	N	N	20		142	77%	1970	0.072	116	91%	1950	**0.059**
Tung Tau Tsuen Road WB														
2A	B	3.00	Y	N	15		290	100%	1740	**0.167**	245	100%	1740	**0.141**
2B	B	3.00	N	N	15		285	14%	2025	0.141	260	4%	2045	0.127
Tung Tsing Road NB														
3A	C	3.50	Y	N	15		115	100%	1785	0.064	80	100%	1785	0.045
3B	C	3.50	N	N	15		230	96%	1920	**0.120**	155	97%	1920	**0.081**
Pui Man Street SB														
4A	D	5.50	Y	N	15/15		95	47% / 21%	2025	0.047	25	40% / 20%	2040	0.012
5p	A		6GM +	6FG =	12	sec								
6p	A,B,D		6GM +	6FG =	12	sec								
7p	A,C,D		6GM +	6FG =	12	sec								
8p	A,B,C		6GM +	6FG =	12	sec								
9p	B,C,D		7GM +	7FG =	14	sec								
10p	C		5GM +	5FG =	10	sec								
11p	B		7GM +	7FG =	14	sec								
12p	D		7GM +	7FG =	14	sec								

Notes:

AM Peak	1+2+3+12p	PM Peak	1+2+3+12p
Sum of Critical *y* **Y**	0.359	Sum of Critical *y* **Y**	0.281
Lost Time *L* (sec)	36	Lost Time *L* (sec)	36
Cycle Time *c* (sec)	90	Cycle Time *c* (sec)	90
Practical *Y* ***Ypr***	0.540	Practical *Y* ***Ypr***	0.540
Reserve Capacity ***RC***	50%	Reserve Capacity ***RC***	92%

Date : 5/12/2022 Junction : J1 - Tung Tau Tsuen Road / Tung Tsing Road / Pui Man Street

ATKINS CHINA LIMITED

TRAFFIC SIGNAL CALCULATION SHEET

ATKINS

JOB NO. : 5205867

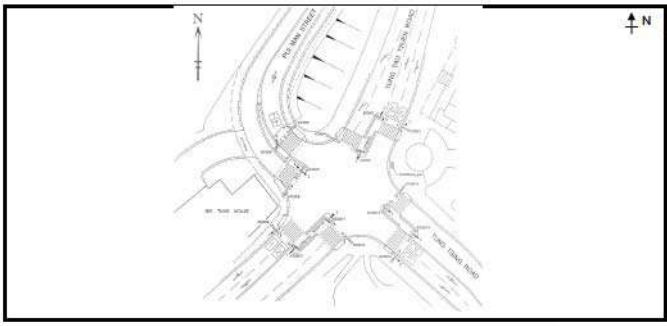
Junction : J1 - Tung Tau Tsuen Road / Tung Tsing Road / Pui Man Street

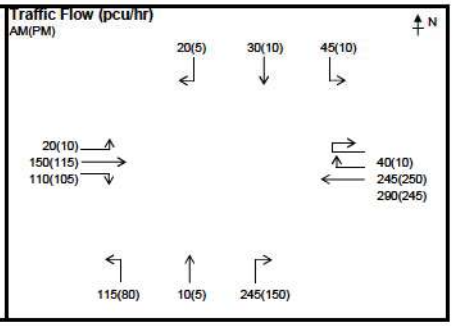
Design Year: 2040

Scheme : Design

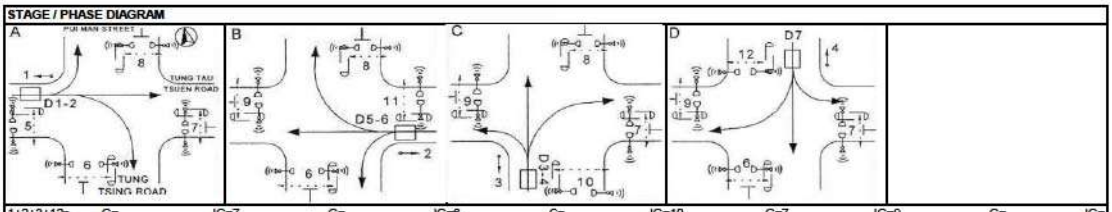
Designed by: RC

Checked by: EC





STAGE / PHASE DIAGRAM



1+2+3+12p	G=	IG=7	G=	IG=6	G=	IG=10	G=7	IG=9	G=	IG=
1+2+3+12p	G=	IG=7	G=	IG=6	G=	IG=10	G=7	IG=9	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Tung Tau Tsuen Road EB														
1A	A	3.30	Y	N	10		138	14%	1905	0.072	114	9%	1920	0.059
1B	A	3.30	N	N	20		142	77%	1970	0.072	116	91%	1950	0.059
Tung Tau Tsuen Road WB														
2A	B	3.00	Y	N	15		290	100%	1740	0.167	245	100%	1740	0.141
2B	B	3.00	N	N	15		285	14%	2025	0.141	260	4%	2045	0.127
Tung Tsing Road NB														
3A	C	3.50	Y	N	15		115	100%	1785	0.064	80	100%	1785	0.045
3B	C	3.50	N	N	15		255	96%	1920	0.133	155	97%	1920	0.081
Pui Man Street SB														
4A	D	5.50	Y	N	15/15		95	47% / 21%	2025	0.047	25	40% / 20%	2040	0.012
5p	A		6GM +	6FG =	12	sec								
6p	A,B,D		6GM +	6FG =	12	sec								
7p	A,C,D		6GM +	6FG =	12	sec								
8p	A,B,C		6GM +	6FG =	12	sec								
9p	B,C,D		7GM +	7FG =	14	sec								
10p	C		5GM +	5FG =	10	sec								
11p	B		7GM +	7FG =	14	sec								
12p	D		7GM +	7FG =	14	sec								

Notes:

AM Peak	1+2+3+12p	PM Peak	1+2+3+12p
Sum of Critical *y* **Y**	0.372	Sum of Critical *y* **Y**	0.281
Lost Time *L* (sec)	36	Lost Time *L* (sec)	36
Cycle Time *c* (sec)	90	Cycle Time *c* (sec)	90
Practical *Y* ***Ypr***	0.540	Practical *Y* ***Ypr***	0.540
Reserve Capacity ***RC***	45%	Reserve Capacity ***RC***	92%

Date : 5/12/2022 Junction : J1 - Tung Tau Tsuen Road / Tung Tsing Road / Pui Man Street

ATKINS CHINA LIMITED

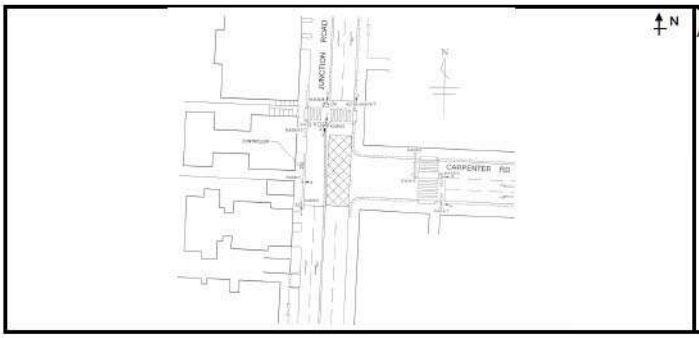
TRAFFIC SIGNAL CALCULATION SHEET

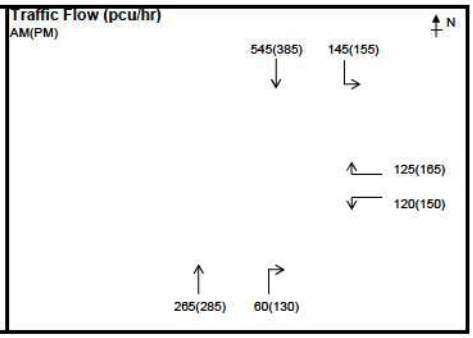
ATKINS

JOB NO. : 5205867

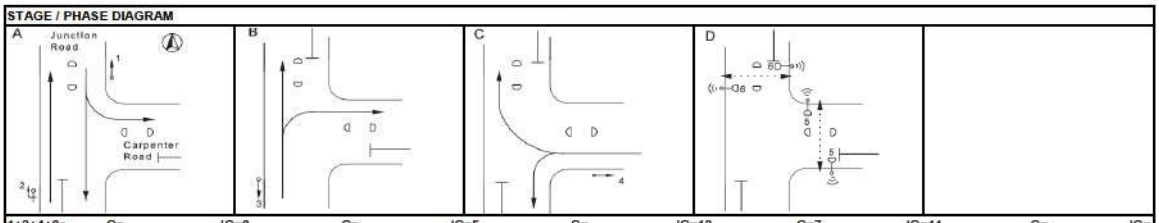
Junction : J2 - Junction Road / Carpenter Road Design Year: 2021

Scheme : Existing Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+3+4+6p	G=	IG=6	G=	IG=5	G=	IG=13	G=7	IG=11	G=	IG=	
1+3+4+6p	G=	IG=6	G=	IG=5	G=	IG=13	G=7	IG=11	G=	IG=	

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Junction Road NB														
2A	A,B	3.00	Y	N		1	265		1875	0.141	285		1875	0.152
3A	B	3.00	N	N	15	1	60	100%	1830	0.033	130	100%	1830	0.071
Junction Road SB														
1A	A	3.30	Y	N	7.5		318	46%	1780	0.179	245	63%	1725	0.142
1B	A	3.30	N	N			372		2085	0.178	295		2085	0.141
Carpenter Road WB														
4A	C	3.20	Y	N	7.5	2	120	100%	1545	0.078	150	100%	1545	0.097
4B	C	3.20	N	N	20	2	125	100%	1850	0.068	165	100%	1850	0.089
5p	D		7GM +	7FG =	14	sec								
6p	D		7GM +	8FG =	15	sec								

Notes:

AM Peak	1+3+4+6p	PM Peak	1+3+4+6p
Sum of Critical *y* *Y*	0.289	Sum of Critical *y* *Y*	0.310
Lost Time *L* (sec)	39	Lost Time *L* (sec)	39
Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
Practical *Y* *Ypr*	0.608	Practical *Y* *Ypr*	0.595
Reserve Capacity *RC*	110%	Reserve Capacity *RC*	92%

Date : 5/12/2022 Junction : J2 - Junction Road / Carpenter Road

ATKINS CHINA LIMITED

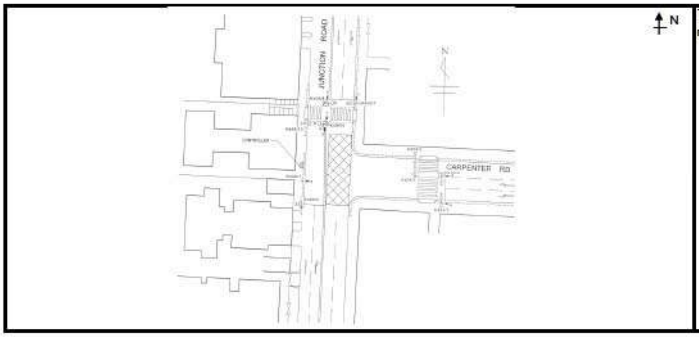
TRAFFIC SIGNAL CALCULATION SHEET

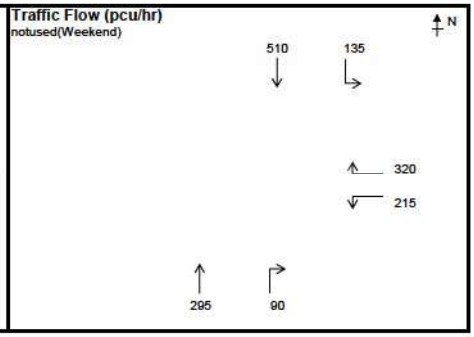
ATKINS

JOB NO. : 5205867

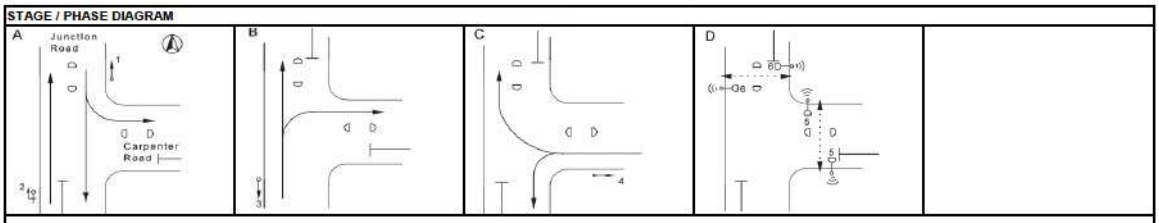
Junction : J2 - Junction Road / Carpenter Road Design Year: 2021

Scheme : Existing -Weekend Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+3+4+6p G= IG=6 G= IG=5 G= IG=13 G=7 IG=11 G= IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*					Weekend Peak: Design Flow *q* (pcu/hr)	Proportion turning (%) *f*	Saturation flow *S* (pcu/hr)	Flow factor *y*
Junction Road NB														
2A	A,B	3.00	Y	N		1					295		1875	0.157
3A	B	3.00	N	N	15	1					90	100%	1030	**0.049**
Junction Road SB														
1A	A	3.30	Y	N	7.5						297	45%	1785	0.166
1B	A	3.30	N	N							348		2085	**0.167**
Carpenter Road WB														
4A	C	3.20	Y	N	7.5	2					215	100%	1545	0.139
4B	C	3.20	N	N	20	2					320	100%	1850	**0.173**
5p	D		7GM +	7FG =	14	sec								
6p	D		7GM +	8FG =	15	sec								

Notes:

Weekend Peak	1+3+4+6p
Sum of Critical *y* **Y**	0.389
Lost Time *L* (sec)	39
Cycle Time *c* (sec)	115
Practical *Y* **Ypr**	0.595
Reserve Capacity *RC*	53%

Date : 5/19/2022 Junction : J2 - Junction Road / Carpenter Road

ATKINS CHINA LIMITED

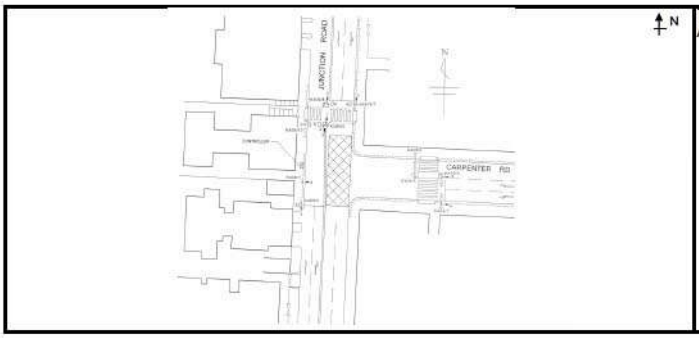
TRAFFIC SIGNAL CALCULATION SHEET

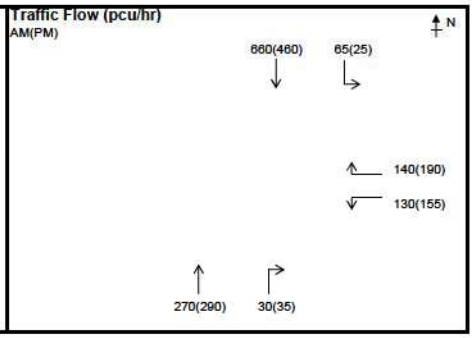
ATKINS

JOB NO. : 5205867

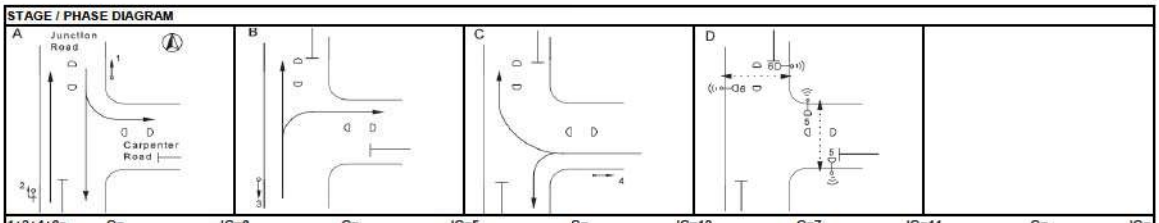
Junction : J2 - Junction Road / Carpenter Road Design Year: 2033

Scheme : Reference Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+3+4+6p	G=	IG=6	G=	IG=5	G=	IG=13	G=7	IG=11	G=	IG=
2+4+6p	G=	IG=	G=	IG=5	G=	IG=13	G=7	IG=11	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Junction Road NB														
2A	A,B	3.00	Y	N		1	270		1875	0.144	290		1875	0.155
3A	B	3.00	N	N	15	1	30	100%	1830	0.016	35	100%	1830	0.019
Junction Road SB														
1A	A	3.30	Y	N	7.5		343	19%	1875	0.183	231	11%	1905	0.121
1B	A	3.30	N	N			382		2085	0.183	254		2085	0.122
Carpenter Road WB														
4A	C	3.20	Y	N	7.5	2	130	100%	1545	0.084	155	100%	1545	0.100
4B	C	3.20	N	N	20	2	140	100%	1850	0.076	190	100%	1850	0.103
5p	D		7GM +	7FG =	14	sec								
6p	D		7GM +	8FG =	15	sec								

Notes:

AM Peak	1+3+4+6p	PM Peak	2+4+6p
Sum of Critical *y* *Y*	0.267	Sum of Critical *y* *Y*	0.257
Lost Time *L* (sec)	40	Lost Time *L* (sec)	34
Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
Practical *Y* *Ypr*	0.600	Practical *Y* *Ypr*	0.634
Reserve Capacity *RC*	124%	Reserve Capacity *RC*	146%

Date : 5/12/2022 Junction : J2 - Junction Road / Carpenter Road

ATKINS CHINA LIMITED

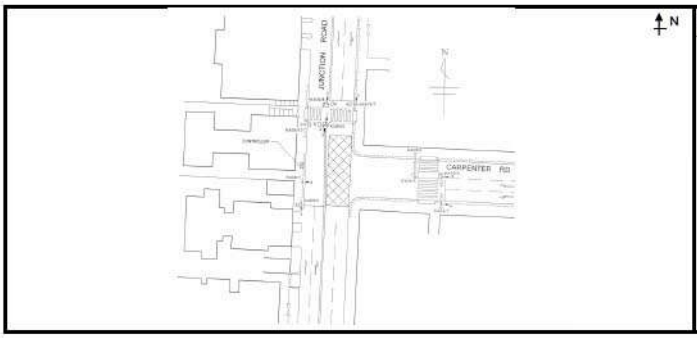
TRAFFIC SIGNAL CALCULATION SHEET

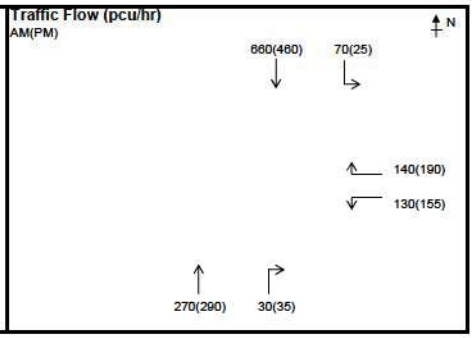
ATKINS

JOB NO. : 5205867

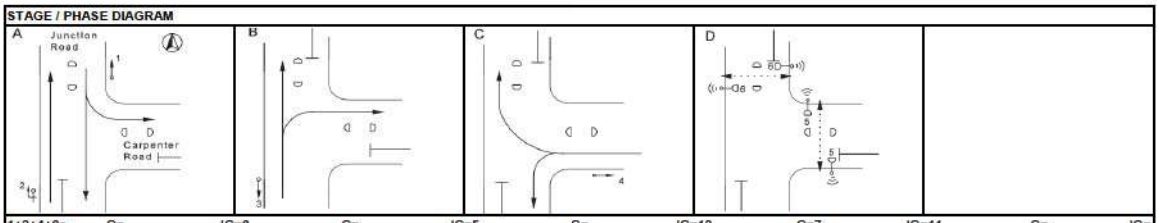
Junction : J2 - Junction Road / Carpenter Road Design Year: 2033

Scheme : Design Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+3+4+6p	G=	IG=6	G=	IG=5	G=	IG=13	G=7	IG=11	G=	IG=		
2+4+6p	G=	IG=	G=	IG=5	G=	IG=13	G=7	IG=11	G=	IG=		

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Junction Road NB														
2A	A,B	3.00	Y	N		1	270		1875	0.144	290		1875	0.155
3A	B	3.00	N	N	15	1	30	100%	1830	0.016	35	100%	1830	0.019
Junction Road SB														
1A	A	3.30	Y	N	7.5		345	20%	1870	0.184	231	11%	1905	0.121
1B	A	3.30	N	N			385		2085	0.185	254		2085	0.122
Carpenter Road WB														
4A	C	3.20	Y	N	7.5	2	130	100%	1545	0.084	155	100%	1545	0.100
4B	C	3.20	N	N	20	2	140	100%	1850	0.076	190	100%	1850	0.103
5p	D		7GM +	7FG =	14	sec								
6p	D		7GM +	8FG =	15	sec								

Notes:	AM Peak	1+3+4+6p	PM Peak	2+4+6p
	Sum of Critical *y* *Y*	0.269	Sum of Critical *y* *Y*	0.257
	Lost Time *L* (sec)	40	Lost Time *L* (sec)	34
	Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
	Practical *Y* *Ypr*	0.600	Practical *Y* *Ypr*	0.634
	Reserve Capacity *RC*	123%	Reserve Capacity *RC*	146%

Date : 5/12/2022 Junction : J2 - Junction Road / Carpenter Road

ATKINS CHINA LIMITED

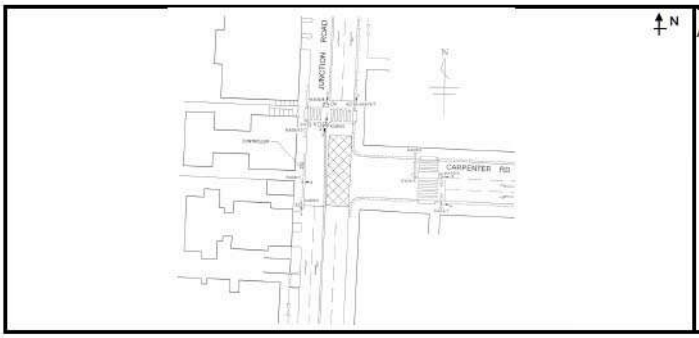
TRAFFIC SIGNAL CALCULATION SHEET

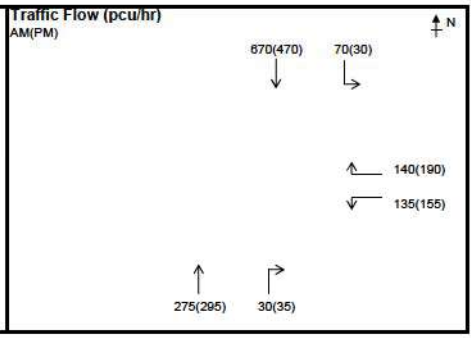
ATKINS

JOB NO. : 5205867

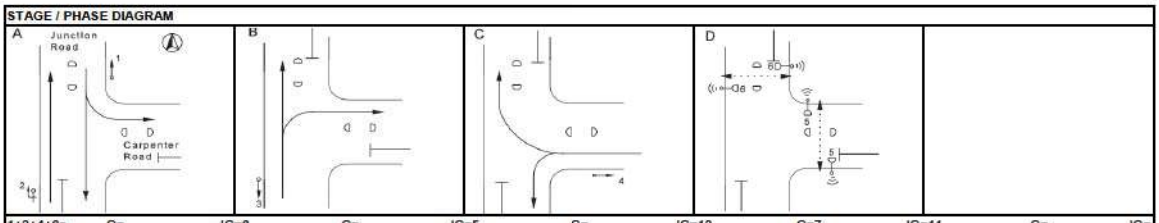
Junction : J2 - Junction Road / Carpenter Road Design Year: 2036

Scheme : Reference Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+3+4+6p	G=	IG=6	G=	IG=5	G=	IG=13	G=7	IG=11	G=	IG=		
2+4+6p	G=	IG=	G=	IG=5	G=	IG=13	G=7	IG=11	G=	IG=		

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Junction Road NB														
2A	A,B	3.00	Y	N		1	275		1875	0.147	295		1875	**0.157**
3A	B	3.00	N	N	15	1	30	100%	1830	0.016	35	100%	1830	0.019
Junction Road SB														
1A	A	3.30	Y	N	7.5		350	20%	1870	**0.187**	238	13%	1895	0.126
1B	A	3.30	N	N			390		2085	0.187	262		2085	0.126
Carpenter Road WB														
4A	C	3.20	Y	N	7.5	2	135	100%	1545	**0.087**	155	100%	1545	0.100
4B	C	3.20	N	N	20	2	140	100%	1850	0.076	190	100%	1850	**0.103**
5p	D		7GM +	7FG =	14	sec								
6p	D		7GM +	8FG =	15	sec								

Notes:	AM Peak	1+3+4+6p	PM Peak	2+4+6p
	Sum of Critical *y* *Y*	**0.275**	Sum of Critical *y* *Y*	**0.260**
	Lost Time *L* (sec)	40	Lost Time *L* (sec)	34
	Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
	Practical *Y* *Ypr*	0.600	Practical *Y* *Ypr*	0.634
	Reserve Capacity *RC*	**119%**	Reserve Capacity *RC*	**144%**

Date : 5/12/2022 Junction : J2 - Junction Road / Carpenter Road

ATKINS CHINA LIMITED

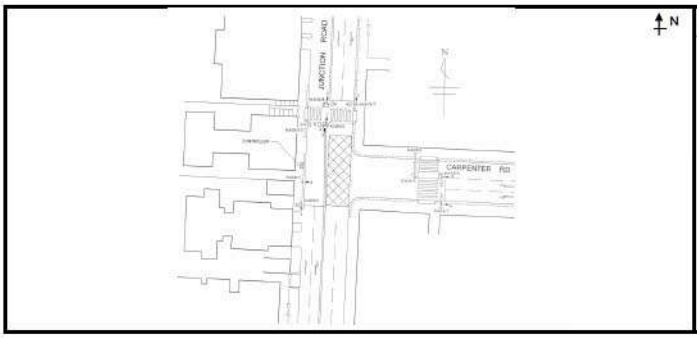
TRAFFIC SIGNAL CALCULATION SHEET

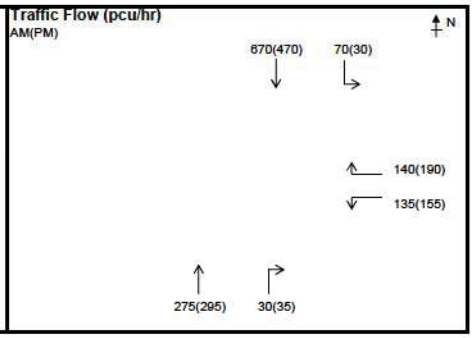
ATKINS

JOB NO. : 5205867

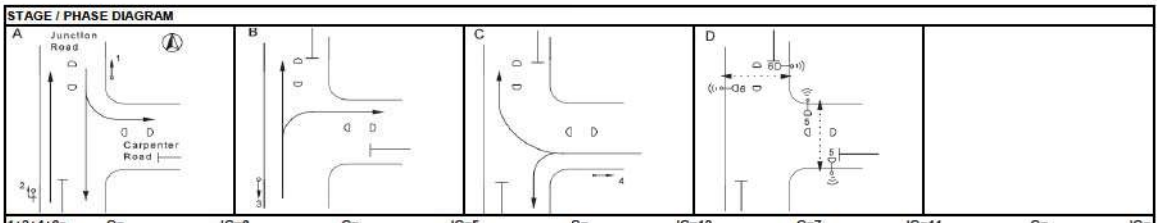
Junction : J2 - Junction Road / Carpenter Road Design Year: 2036

Scheme : Design Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+3+4+6p	G=	IG=6	G=	IG=5	G=	IG=13	G=7	IG=11	G=	IG=	
2+4+6p	G=	IG=	G=	IG=5	G=	IG=13	G=7	IG=11	G=	IG=	

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Junction Road NB														
2A	A,B	3.00	Y	N		1	275		1875	0.147	295		1875	**0.157**
3A	B	3.00	N	N	15	1	30	100%	1830	0.016	35	100%	1830	0.019
Junction Road SB														
1A	A	3.30	Y	N	7.5		350	20%	1870	**0.187**	238	13%	1895	0.126
1B	A	3.30	N	N			390		2085	0.187	262		2085	0.126
Carpenter Road WB														
4A	C	3.20	Y	N	7.5	2	135	100%	1545	**0.087**	155	100%	1545	0.100
4B	C	3.20	N	N	20	2	140	100%	1850	0.076	190	100%	1850	**0.103**
5p	D		7GM +	7FG =	14	sec								
6p	D		7GM +	8FG =	15	sec								

Notes:

AM Peak	1+3+4+6p	PM Peak	2+4+6p
Sum of Critical *y* *Y*	**0.275**	Sum of Critical *y* *Y*	**0.260**
Lost Time *L* (sec)	40	Lost Time *L* (sec)	34
Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
Practical *Y* *Ypr*	0.600	Practical *Y* *Ypr*	0.634
Reserve Capacity *RC*	**119%**	Reserve Capacity *RC*	**144%**

Date : 5/12/2022 Junction : J2 - Junction Road / Carpenter Road

ATKINS CHINA LIMITED

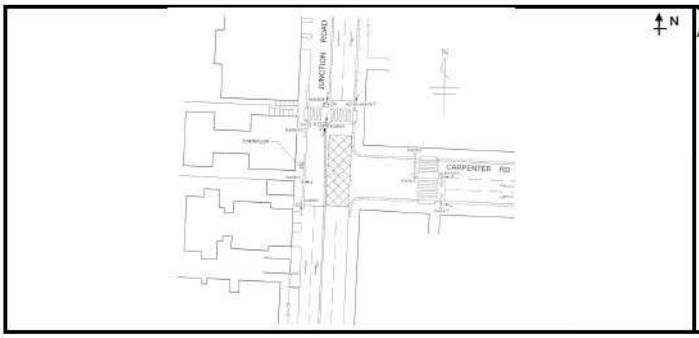
TRAFFIC SIGNAL CALCULATION SHEET

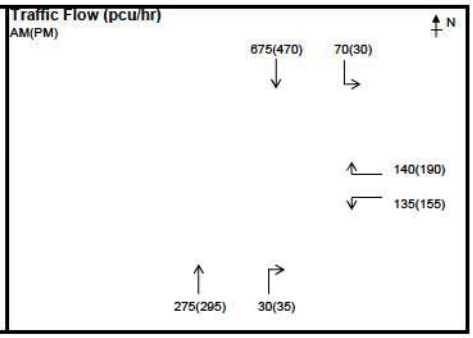
ATKINS

JOB NO. : 5205867

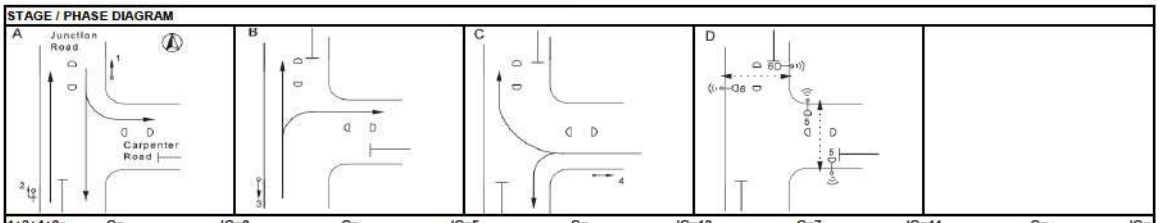
Junction : J2 - Junction Road / Carpenter Road Design Year: 2037

Scheme : Reference Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+3+4+6p	G=	IG=6	G=	IG=5	G=	IG=13	G=7	IG=11	G=	IG=		
2+4+6p	G=	IG=	G=	IG=5	G=	IG=13	G=7	IG=11	G=	IG=		

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Junction Road NB														
2A	A,B	3.00	Y	N		1	275		1875	0.147	295		1875	**0.157**
3A	B	3.00	N	N	15	1	30	100%	1830	0.016	35	100%	1830	0.019
Junction Road SB														
1A	A	3.30	Y	N	7.5		352	20%	1870	0.188	238	13%	1895	0.126
1B	A	3.30	N	N			393		2085	**0.188**	262		2085	0.126
Carpenter Road WB														
4A	C	3.20	Y	N	7.5	2	135	100%	1545	**0.087**	155	100%	1545	0.100
4B	C	3.20	N	N	20	2	140	100%	1850	0.076	190	100%	1850	**0.103**
5p	D		7GM +	7FG =	14	sec								
6p	D		7GM +	8FG =	15	sec								

Notes:	AM Peak	1+3+4+6p	PM Peak	2+4+6p
	Sum of Critical *y* **Y**	**0.276**	Sum of Critical *y* **Y**	**0.260**
	Lost Time *L* (sec)	40	Lost Time *L* (sec)	34
	Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
	Practical Y *Ypr*	0.600	Practical Y *Ypr*	0.634
	Reserve Capacity *RC*	**117%**	Reserve Capacity *RC*	**144%**

Date : 5/12/2022 Junction : J2 - Junction Road / Carpenter Road

ATKINS CHINA LIMITED

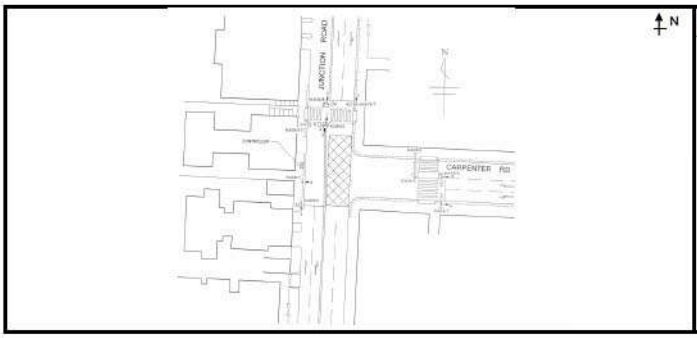
TRAFFIC SIGNAL CALCULATION SHEET

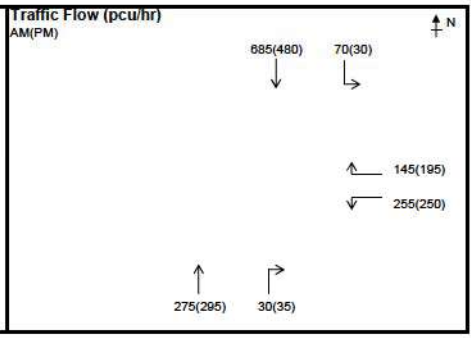
ATKINS

JOB NO. : 5205867

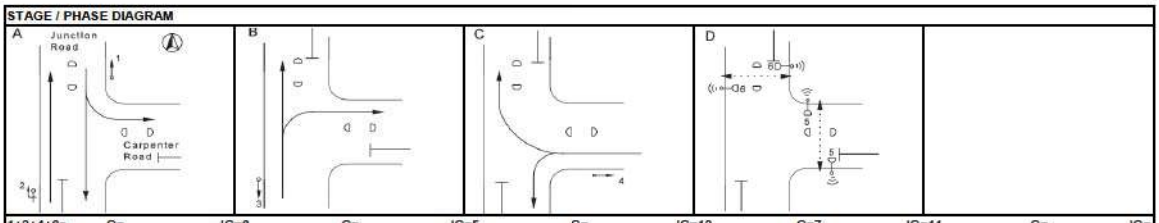
Junction : J2 - Junction Road / Carpenter Road Design Year: 2037

Scheme : Design Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+3+4+6p	G=	IG=6	G=	IG=5	G=	IG=13	G=7	IG=11	G=	IG=		
2+4+6p	G=	IG=	G=	IG=5	G=	IG=13	G=7	IG=11	G=	IG=		

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Junction Road NB														
2A	A,B	3.00	Y	N		1	275		1875	0.147	295		1875	**0.157**
3A	B	3.00	N	N	15	1	30	100%	1830	0.016	35	100%	1830	0.019
Junction Road SB														
1A	A	3.30	Y	N	7.5		357	20%	1870	**0.191**	243	12%	1900	0.128
1B	A	3.30	N	N			398		2085	0.191	267		2085	0.128
Carpenter Road WB														
4A	C	3.20	Y	N	7.5	2	255	100%	1545	**0.165**	250	100%	1545	**0.162**
4B	C	3.20	N	N	20	2	145	100%	1850	0.078	195	100%	1850	0.105
5p	D		7GM +	7FG =	14	sec								
6p	D		7GM +	8FG =	15	sec								

Notes:

AM Peak	1+3+4+6p	PM Peak	2+4+6p
Sum of Critical *y* *Y*	0.356	Sum of Critical *y* *Y*	0.319
Lost Time *L* (sec)	40	Lost Time *L* (sec)	34
Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
Practical *Y* *Ypr*	0.600	Practical *Y* *Ypr*	0.634
Reserve Capacity *RC*	69%	Reserve Capacity *RC*	99%

Date : 5/12/2022 Junction : J2 - Junction Road / Carpenter Road

ATKINS CHINA LIMITED

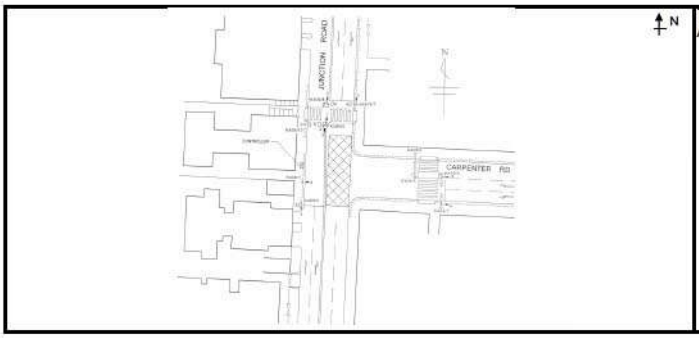
TRAFFIC SIGNAL CALCULATION SHEET

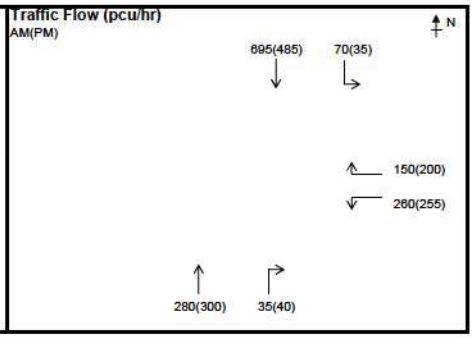
ATKINS

JOB NO. : 5205867

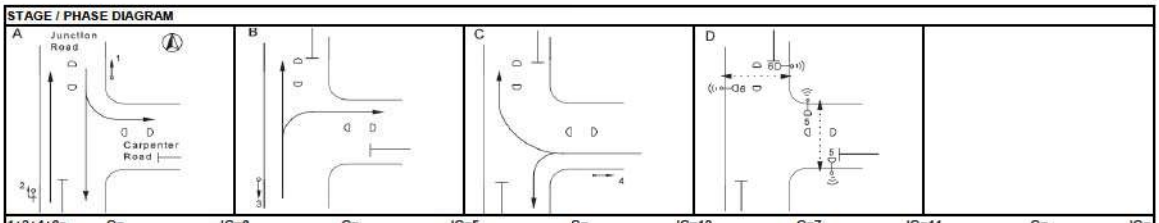
Junction : J2 - Junction Road / Carpenter Road Design Year: 2040

Scheme : Reference Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+3+4+6p	G=	IG=6	G=	IG=5	G=	IG=13	G=7	IG=11	G=	IG=		
2+4+6p	G=	IG=	G=	IG=5	G=	IG=13	G=7	IG=11	G=	IG=		

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Junction Road NB														
2A	A,B	3.00	Y	N		1	280		1875	0.149	300		1875	**0.160**
3A	B	3.00	N	N	15	1	35	100%	1830	0.019	40	100%	1830	0.022
Junction Road SB														
1A	A	3.30	Y	N	7.5		362	19%	1875	0.193	247	14%	1890	0.131
1B	A	3.30	N	N			403		2085	**0.193**	273		2085	0.131
Carpenter Road WB														
4A	C	3.20	Y	N	7.5	2	260	100%	1545	**0.168**	255	100%	1545	**0.165**
4B	C	3.20	N	N	20	2	150	100%	1850	0.081	200	100%	1850	0.108
5p	D		7GM +	7FG =	14	sec								
6p	D		7GM +	8FG =	15	sec								

Notes:

AM Peak	1+3+4+6p	PM Peak	2+4+6p
Sum of Critical *y* **Y**	0.362	Sum of Critical *y* **Y**	0.325
Lost Time *L* (sec)	40	Lost Time *L* (sec)	34
Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
Practical Y ***Ypr***	0.600	Practical Y ***Ypr***	0.634
Reserve Capacity ***RC***	66%	Reserve Capacity ***RC***	95%

Date : 5/12/2022 Junction : J2 - Junction Road / Carpenter Road

ATKINS CHINA LIMITED

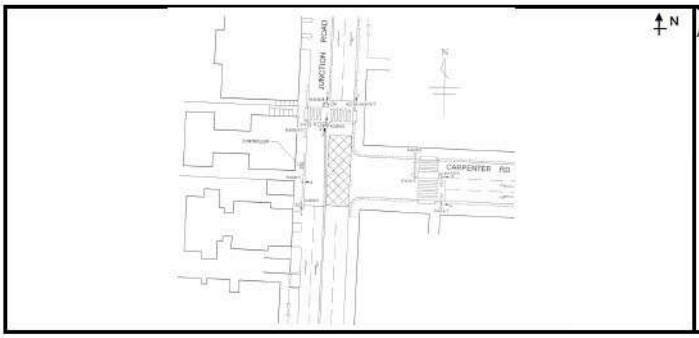
TRAFFIC SIGNAL CALCULATION SHEET

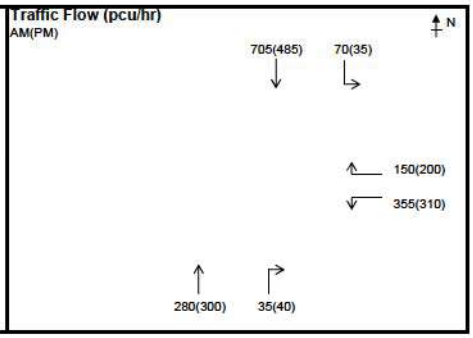
ATKINS

JOB NO. : 5205867

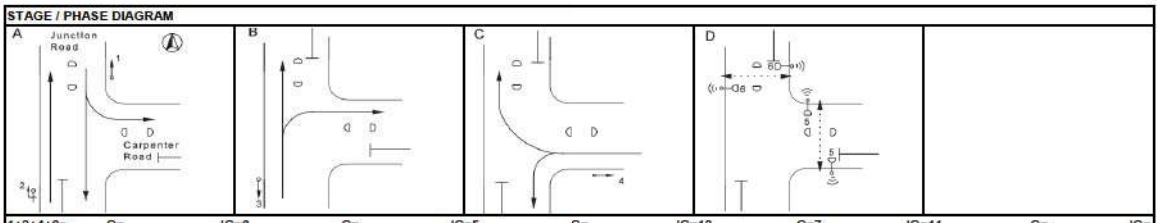
Junction : J2 - Junction Road / Carpenter Road Design Year: 2040

Scheme : Design Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+3+4+6p	G=	IG=6	G=	IG=5	G=	IG=13	G=7	IG=11	G=	IG=		
2+4+6p	G=	IG=	G=	IG=5	G=	IG=13	G=7	IG=11	G=	IG=		

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Junction Road NB														
2A	A,B	3.00	Y	N		1	280		1875	0.149	300		1875	**0.160**
3A	B	3.00	N	N	15	1	35	100%	1830	0.019	40	100%	1830	0.022
Junction Road SB														
1A	A	3.30	Y	N	7.5		367	19%	1875	**0.196**	247	14%	1890	0.131
1B	A	3.30	N	N			408		2085	0.196	273		2085	0.131
Carpenter Road WB														
4A	C	3.20	Y	N	7.5	2	355	100%	1545	**0.230**	310	100%	1545	**0.201**
4B	C	3.20	N	N	20	2	150	100%	1850	0.081	200	100%	1850	0.108
5p	D		7GM +	7FG =	14	sec								
6p	D		7GM +	8FG =	15	sec								

Notes:	AM Peak	1+3+4+6p	PM Peak	2+4+6p
	Sum of Critical *y* *Y*	0.426	Sum of Critical *y* *Y*	0.361
	Lost Time *L* (sec)	40	Lost Time *L* (sec)	34
	Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
	Practical *Y* *Ypr*	0.600	Practical *Y* *Ypr*	0.634
	Reserve Capacity *RC*	41%	Reserve Capacity *RC*	76%

Date : 5/12/2022 Junction : J2 - Junction Road / Carpenter Road

ATKINS CHINA LIMITED

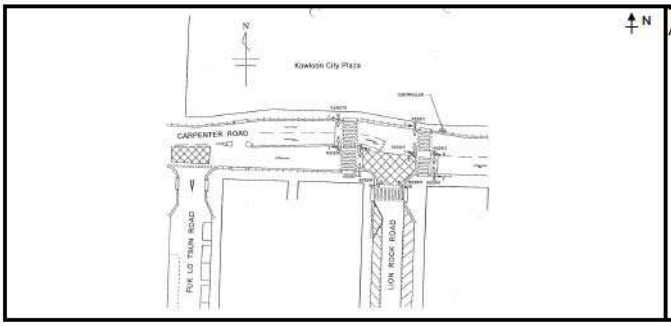
TRAFFIC SIGNAL CALCULATION SHEET

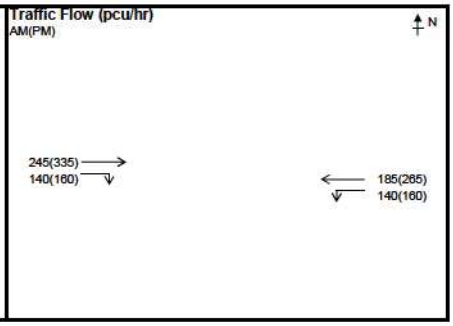
ATKINS

JOB NO. : 5205867

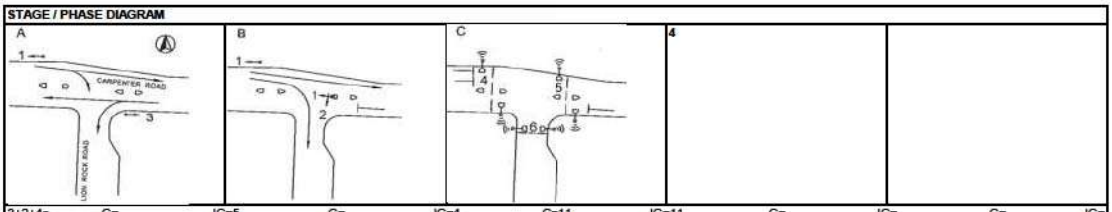
Junction : J3 - Carpenter Road / Lion Rock Road Design Year: 2021

Scheme : Existing Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



3+2+4p	G=	IG=5	G=	IG=4	G=11	IG=11	G=	IG=	G=	IG=
3+2+4p	G=	IG=5	G=	IG=4	G=11	IG=11	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Carpenter Road EB														
1A	A,B	3.70	Y	N			245		1985	0.123	335		1985	0.169
2A	B	3.00	N	Y	10		140	100%	1585	**0.088**	160	100%	1585	**0.101**
Carpenter Road WB														
3A	A	5.10	Y	N	5		325	43%	1880	**0.173**	425	38%	1910	**0.223**
4p	C		11GM +	8FG =	19	sec								
5p	C		8GM +	7FG =	15	sec								
6p	C		5GM +	11FG =	16	sec								

Notes:

AM Peak	3+2+4p	PM Peak	3+2+4p
Sum of Critical *y* **Y**	**0.261**	Sum of Critical *y* **Y**	**0.323**
Lost Time *L* (sec)	29	Lost Time *L* (sec)	29
Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
Practical *Y* ***Ypr***	0.683	Practical *Y* ***Ypr***	0.673
Reserve Capacity ***RC***	**161%**	Reserve Capacity ***RC***	**108%**

Date : 5/12/2022 Junction : J3 - Carpenter Road / Lion Rock Road

ATKINS CHINA LIMITED

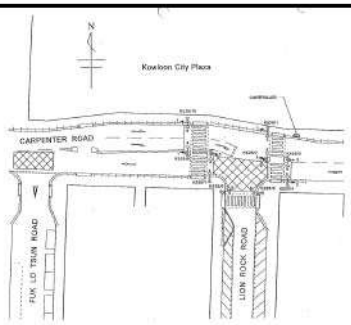
TRAFFIC SIGNAL CALCULATION SHEET

ATKINS

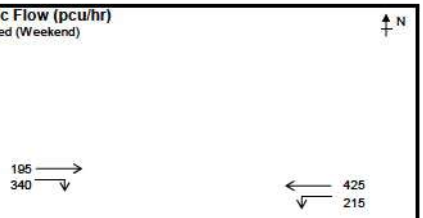
JOB NO. : 5205867

Junction : J3 - Carpenter Road / Lion Rock Road Design Year: 2021

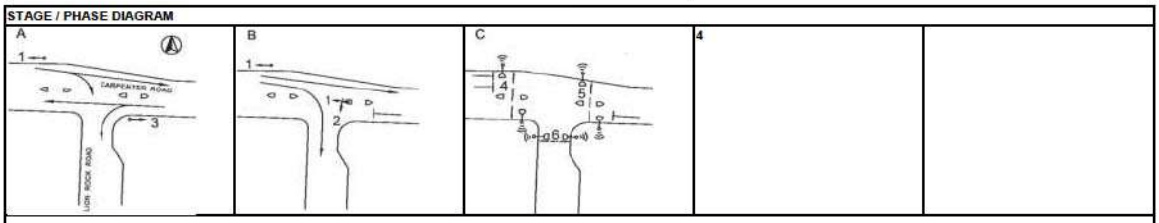
Scheme : Existing - Weekend Designed by: RC Checked by: EC



Traffic Flow (pcu/hr)
Not used (Weekend)



STAGE / PHASE DIAGRAM



3+2+4p	G=	IG=5	G=	IG=4	G=11	IG=11	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*					Weekend Peak: Design Flow *q* (pcu/hr)	Proportion turning (%) *f*	Saturation flow *S* (pcu/hr)	Flow factor *y*
Carpenter Road EB														
1A	A,B	3.70	Y	N							195		1985	0.098
2A	B	3.00	N	Y	10						340	100%	1585	0.215
Carpenter Road WB														
3A	A	5.10	Y	N	5						640	34%	1930	0.332
4p	C		11GM +	8FG =	19	sec								
5p	C		8GM +	7FG =	15	sec								
6p	C		5GM +	11FG =	16	sec								

Notes:

Weekend Peak	3+2+4p
Sum of Critical *y* **Y**	0.546
Lost Time *L* (sec)	29
Cycle Time *c* (sec)	115
Practical *Y* **Ypr**	0.673
Reserve Capacity *RC*	23%

Date : 5/19/2022 Junction : J3 - Carpenter Road / Lion Rock Road

ATKINS CHINA LIMITED

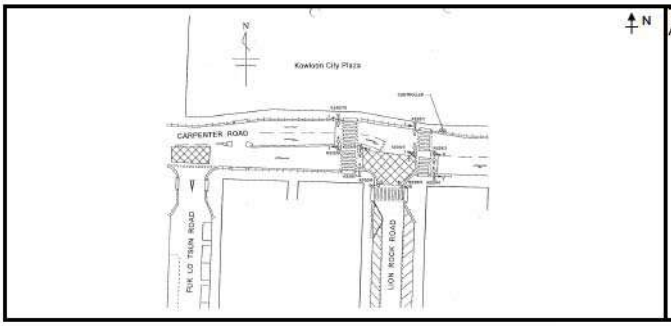
TRAFFIC SIGNAL CALCULATION SHEET

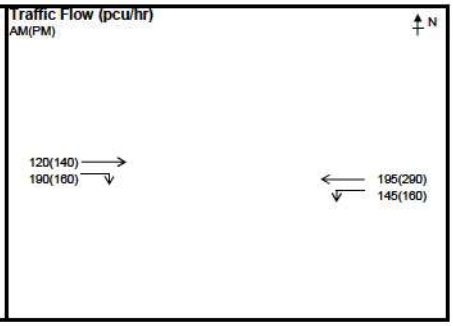
ATKINS

JOB NO. : 5205867

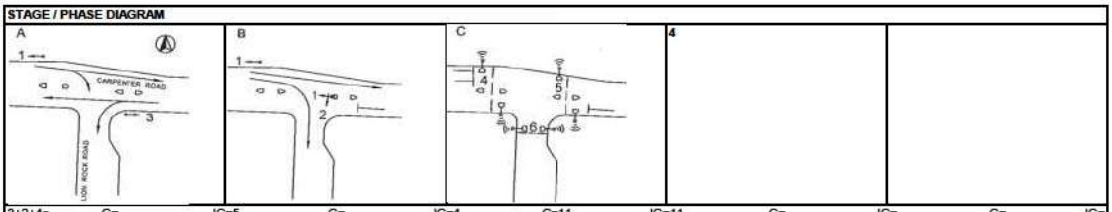
Junction : J3 - Carpenter Road / Lion Rock Road Design Year: 2033

Scheme : Reference Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



3+2+4p	G=	IG=5	G=	IG=4	G=11	IG=11	G=	IG=	G=	IG=
3+2+4p	G=	IG=5	G=	IG=4	G=11	IG=11	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Carpenter Road EB														
1A	A,B	3.70	Y	N			120		1985	0.060	140		1985	0.071
2A	B	3.00	N	Y	10		190	100%	1585	**0.120**	160	100%	1585	**0.101**
Carpenter Road WB														
3A	A	5.10	Y	N	5		340	43%	1885	**0.180**	450	36%	1920	**0.234**
4p	C		11GM +	8FG =	19	sec								
5p	C		8GM +	7FG =	15	sec								
6p	C		5GM +	11FG =	16	sec								

Notes:

AM Peak	3+2+4p	PM Peak	3+2+4p
Sum of Critical *y* **Y**	**0.300**	Sum of Critical *y* **Y**	**0.335**
Lost Time *L* (sec)	29	Lost Time *L* (sec)	29
Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
Practical *Y* ***Ypr***	0.683	Practical *Y* ***Ypr***	0.673
Reserve Capacity ***RC***	**127%**	Reserve Capacity ***RC***	**101%**

Date : 5/12/2022 Junction : J3 - Carpenter Road / Lion Rock Road

ATKINS CHINA LIMITED

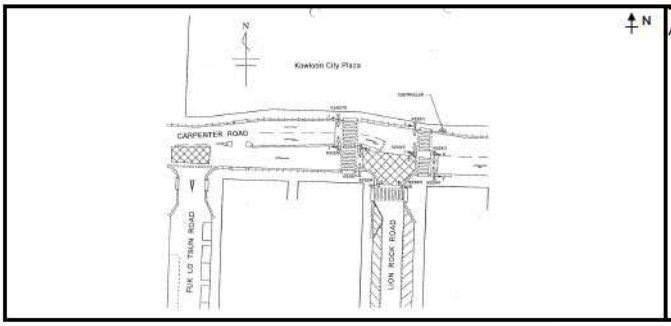
TRAFFIC SIGNAL CALCULATION SHEET

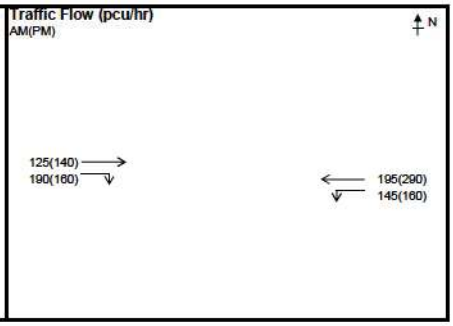
ATKINS

JOB NO. : 5205867

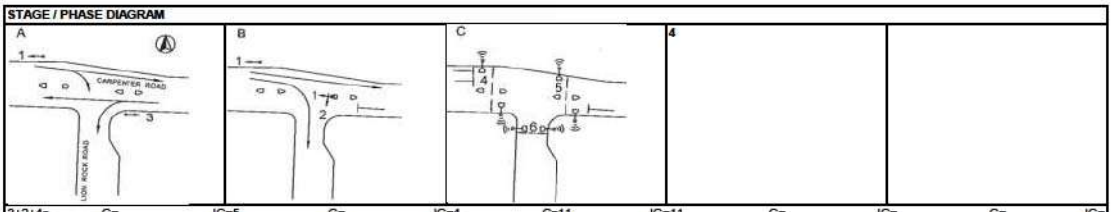
Junction : J3 - Carpenter Road / Lion Rock Road Design Year: 2033

Scheme : Design Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



3+2+4p	G=	IG=5	G=	IG=4	G=11	IG=11	G=	IG=	G=	IG=
3+2+4p	G=	IG=5	G=	IG=4	G=11	IG=11	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Carpenter Road EB														
1A	A,B	3.70	Y	N			125		1985	0.063	140		1985	0.071
2A	B	3.00	N	Y	10		190	100%	1585	**0.120**	160	100%	1585	**0.101**
Carpenter Road WB														
3A	A	5.10	Y	N	5		340	43%	1885	**0.180**	450	36%	1920	**0.234**
4p	C		11GM +	8FG =	19	sec								
5p	C		8GM +	7FG =	15	sec								
6p	C		5GM +	11FG =	16	sec								

Notes:	AM Peak	3+2+4p	PM Peak	3+2+4p
	Sum of Critical *y* **Y**	**0.300**	Sum of Critical *y* **Y**	**0.335**
	Lost Time *L* (sec)	29	Lost Time *L* (sec)	29
	Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
	Practical *Y* ***Ypr***	0.683	Practical *Y* ***Ypr***	0.673
	Reserve Capacity ***RC***	**127%**	Reserve Capacity ***RC***	**101%**

Date : 5/12/2022 Junction : J3 - Carpenter Road / Lion Rock Road

ATKINS CHINA LIMITED

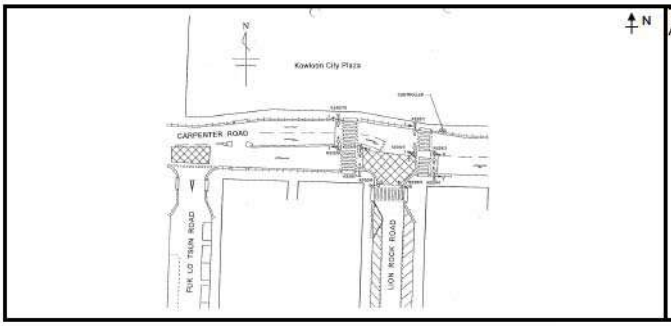
TRAFFIC SIGNAL CALCULATION SHEET

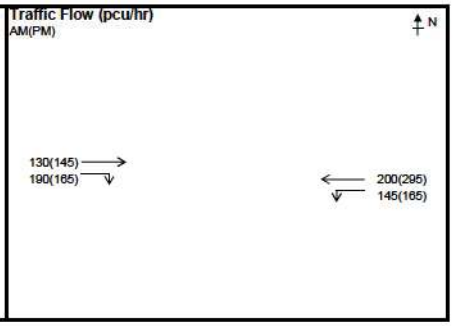
ATKINS

JOB NO. : 5205867

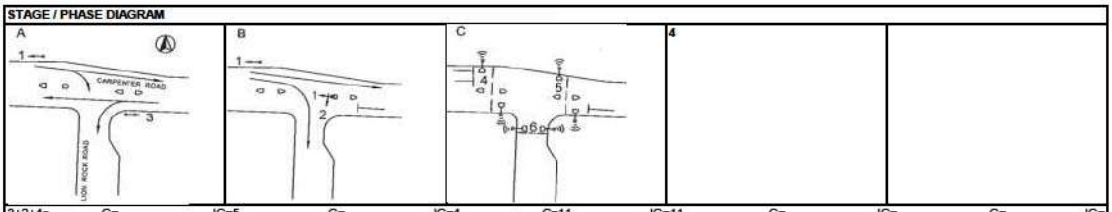
Junction : J3 - Carpenter Road / Lion Rock Road Design Year: 2036

Scheme : Reference Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



3+2+4p	G=	IG=5	G=	IG=4	G=11	IG=11	G=	IG=	G=	IG=
3+2+4p	G=	IG=5	G=	IG=4	G=11	IG=11	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Carpenter Road EB														
1A	A,B	3.70	Y	N			130		1985	0.065	145		1985	0.073
2A	B	3.00	N	Y	10		190	100%	1585	**0.120**	165	100%	1585	**0.104**
Carpenter Road WB														
3A	A	5.10	Y	N	5		345	42%	1885	**0.183**	460	36%	1920	**0.240**
4p	C		11GM +	8FG =	19	sec								
5p	C		8GM +	7FG =	15	sec								
6p	C		5GM +	11FG =	16	sec								

Notes:

AM Peak	3+2+4p	PM Peak	3+2+4p
Sum of Critical *y* **Y**	**0.303**	Sum of Critical *y* **Y**	**0.344**
Lost Time *L* (sec)	29	Lost Time *L* (sec)	29
Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
Practical *Y* ***Ypr***	0.683	Practical *Y* ***Ypr***	0.673
Reserve Capacity ***RC***	**125%**	Reserve Capacity ***RC***	**96%**

Date : 5/12/2022 Junction : J3 - Carpenter Road / Lion Rock Road

ATKINS CHINA LIMITED

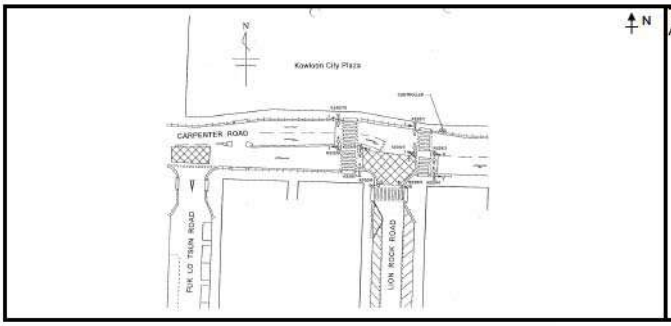
TRAFFIC SIGNAL CALCULATION SHEET

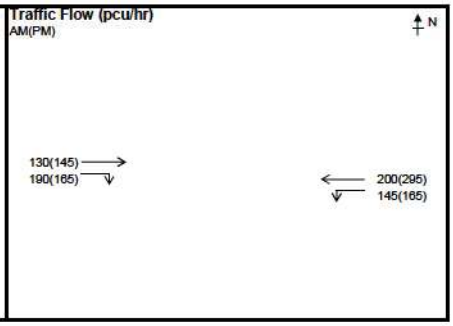
ATKINS

JOB NO. : 5205867

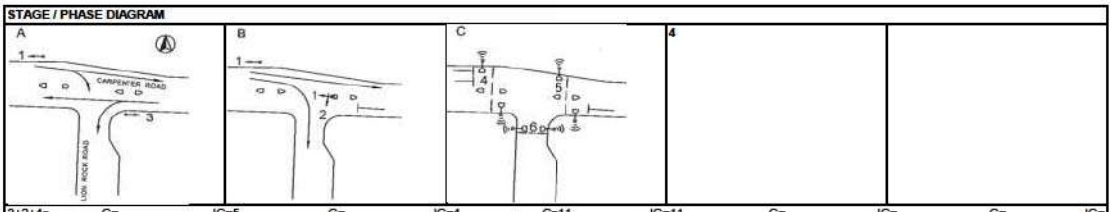
Junction : J3 - Carpenter Road / Lion Rock Road Design Year: 2036

Scheme : Design Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



3+2+4p	G=	IG=5	G=	IG=4	G=11	IG=11	G=	IG=	G=	IG=
3+2+4p	G=	IG=5	G=	IG=4	G=11	IG=11	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Carpenter Road EB														
1A	A,B	3.70	Y	N			130		1985	0.065	145		1985	0.073
2A	B	3.00	N	Y	10		190	100%	1585	**0.120**	165	100%	1585	**0.104**
Carpenter Road WB														
3A	A	5.10	Y	N	5		345	42%	1885	**0.183**	460	36%	1920	**0.240**
4p	C		11GM +	8FG =	19	sec								
5p	C		8GM +	7FG =	15	sec								
6p	C		5GM +	11FG =	16	sec								

Notes:

AM Peak	3+2+4p	PM Peak	3+2+4p
Sum of Critical *y* **Y**	**0.303**	Sum of Critical *y* **Y**	**0.344**
Lost Time *L* (sec)	29	Lost Time *L* (sec)	29
Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
Practical *Y* ***Ypr***	0.683	Practical *Y* ***Ypr***	0.673
Reserve Capacity ***RC***	**125%**	Reserve Capacity ***RC***	**96%**

Date : 5/12/2022 Junction : J3 - Carpenter Road / Lion Rock Road

ATKINS CHINA LIMITED

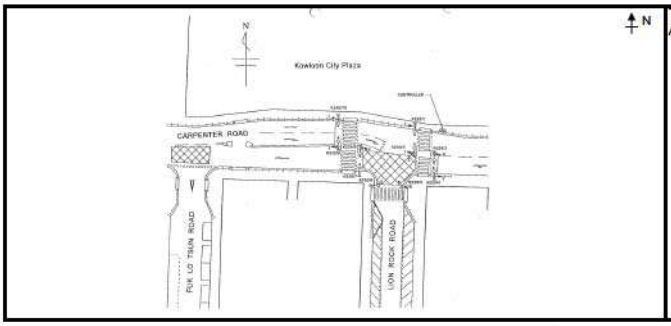
TRAFFIC SIGNAL CALCULATION SHEET

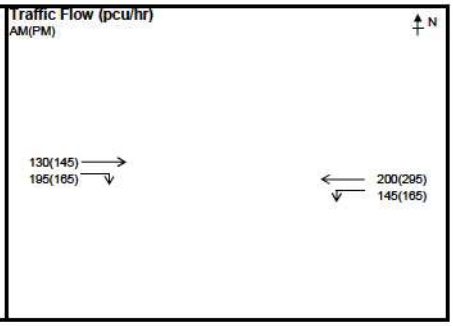
ATKINS

JOB NO. : 5205867

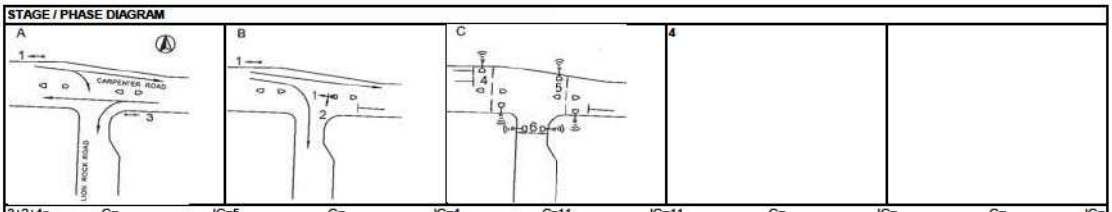
Junction : J3 - Carpenter Road / Lion Rock Road Design Year: 2037

Scheme : Reference Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



3+2+4p	G=	IG=5	G=	IG=4	G=11	IG=11	G=	IG=	G=	IG=
3+2+4p	G=	IG=5	G=	IG=4	G=11	IG=11	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Carpenter Road EB														
1A	A,B	3.70	Y	N			130		1985	0.065	145		1985	0.073
2A	B	3.00	N	Y	10		195	100%	1585	**0.123**	165	100%	1585	**0.104**
Carpenter Road WB														
3A	A	5.10	Y	N	5		345	42%	1885	**0.183**	460	36%	1920	**0.240**
4p	C		11GM +	8FG =	19	sec								
5p	C		8GM +	7FG =	15	sec								
6p	C		5GM +	11FG =	16	sec								

Notes:

AM Peak	3+2+4p	PM Peak	3+2+4p
Sum of Critical *y* **Y**	**0.306**	Sum of Critical *y* **Y**	**0.344**
Lost Time *L* (sec)	29	Lost Time *L* (sec)	29
Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
Practical *Y* ***Ypr***	0.683	Practical *Y* ***Ypr***	0.673
Reserve Capacity ***RC***	**123%**	Reserve Capacity ***RC***	**96%**

Date : 5/12/2022 Junction : J3 - Carpenter Road / Lion Rock Road

ATKINS CHINA LIMITED

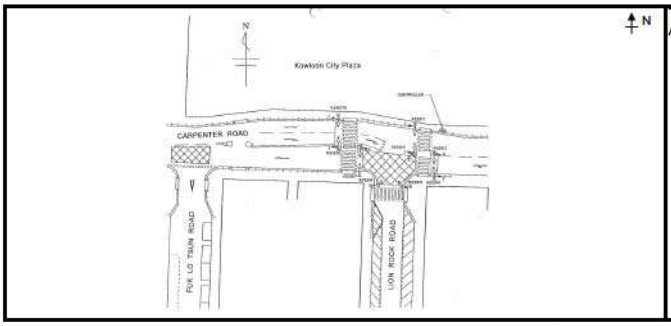
TRAFFIC SIGNAL CALCULATION SHEET

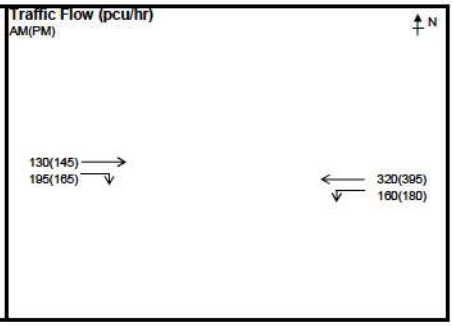
ATKINS

JOB NO. : 5205867

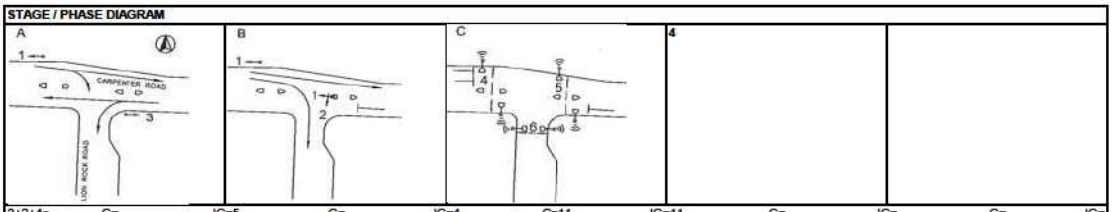
Junction : J3 - Carpenter Road / Lion Rock Road Design Year: 2037

Scheme : Design Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



3+2+4p	G=	IG=5	G=	IG=4	G=11	IG=11	G=	IG=	G=	IG=
3+2+4p	G=	IG=5	G=	IG=4	G=11	IG=11	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Carpenter Road EB														
1A	A,B	3.70	Y	N			130		1985	0.065	145		1985	0.073
2A	B	3.00	N	Y	10		195	100%	1585	**0.123**	165	100%	1585	**0.104**
Carpenter Road WB														
3A	A	5.10	Y	N	5		480	33%	1930	**0.249**	575	31%	1945	**0.296**
4p	C		11GM +	8FG =	19	sec								
5p	C		8GM +	7FG =	15	sec								
6p	C		5GM +	11FG =	16	sec								

Notes:	AM Peak	3+2+4p	PM Peak	3+2+4p
	Sum of Critical *y* **Y**	**0.372**	Sum of Critical *y* **Y**	**0.400**
	Lost Time *L* (sec)	29	Lost Time *L* (sec)	29
	Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
	Practical *Y* **Ypr**	0.683	Practical *Y* **Ypr**	0.673
	Reserve Capacity *RC*	**84%**	Reserve Capacity *RC*	**68%**

Date : 5/12/2022 Junction : J3 - Carpenter Road / Lion Rock Road

ATKINS CHINA LIMITED

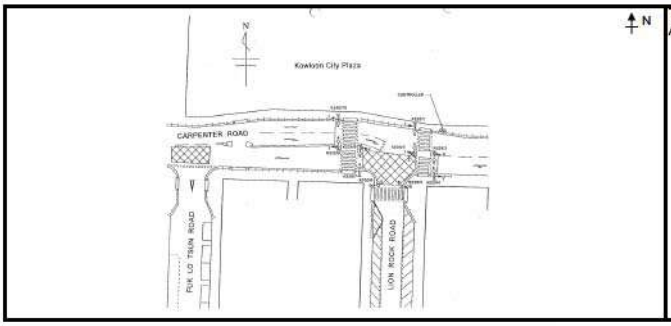
TRAFFIC SIGNAL CALCULATION SHEET

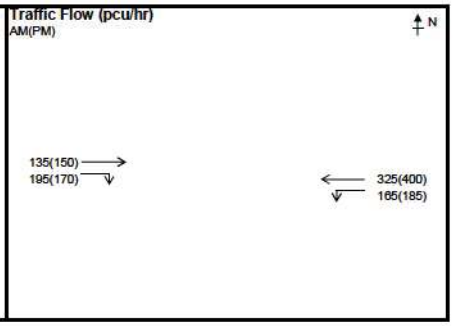
ATKINS

JOB NO. : 5205867

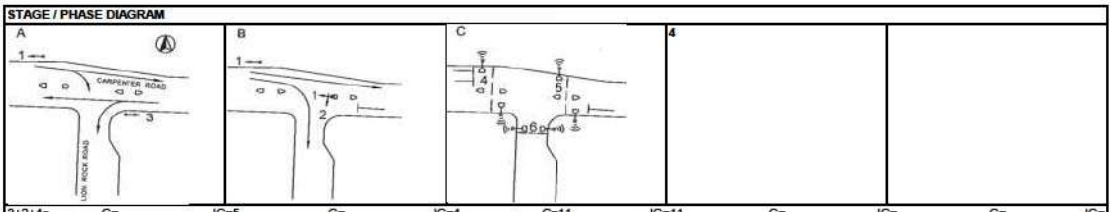
Junction : J3 - Carpenter Road / Lion Rock Road Design Year: 2040

Scheme : Reference Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



3+2+4p	G=	IG=5	G=	IG=4	G=11	IG=11	G=	IG=	G=	IG=
3+2+4p	G=	IG=5	G=	IG=4	G=11	IG=11	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Carpenter Road EB														
1A	A,B	3.70	Y	N			135		1985	0.068	150		1985	0.076
2A	B	3.00	N	Y	10		195	100%	1585	**0.123**	170	100%	1585	**0.107**
Carpenter Road WB														
3A	A	5.10	Y	N	5		490	34%	1930	**0.254**	585	32%	1940	**0.302**
4p	C		11GM +	8FG =	19	sec								
5p	C		8GM +	7FG =	15	sec								
6p	C		5GM +	11FG =	16	sec								

Notes:	AM Peak	3+2+4p	PM Peak	3+2+4p
	Sum of Critical *y* **Y**	**0.377**	Sum of Critical *y* **Y**	**0.409**
	Lost Time *L* (sec)	29	Lost Time *L* (sec)	29
	Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
	Practical *Y* **Ypr**	0.683	Practical *Y* **Ypr**	0.673
	Reserve Capacity *RC*	**81%**	Reserve Capacity *RC*	**65%**

Date : 5/12/2022 Junction : J3 - Carpenter Road / Lion Rock Road

ATKINS CHINA LIMITED

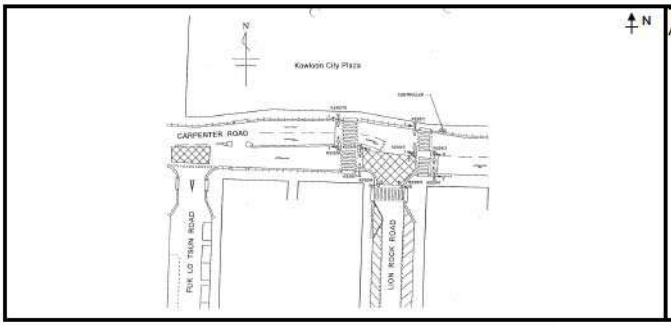
TRAFFIC SIGNAL CALCULATION SHEET

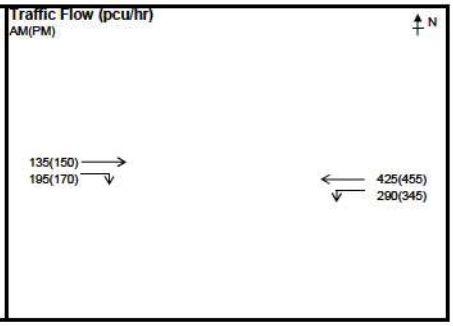
ATKINS

JOB NO. : 5205867

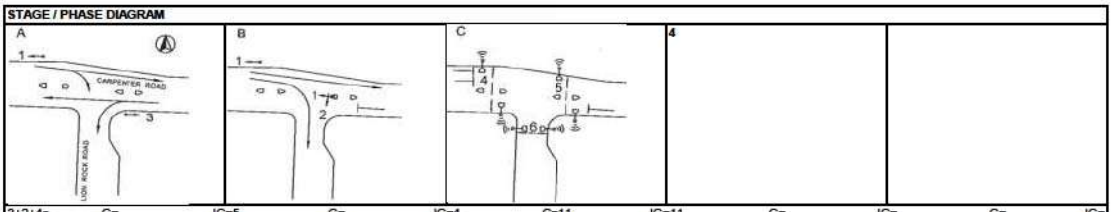
Junction : J3 - Carpenter Road / Lion Rock Road Design Year: 2040

Scheme : Design Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



3+2+4p	G=	IG=5	G=	IG=4	G=11	IG=11	G=	IG=	G=	IG=
3+2+4p	G=	IG=5	G=	IG=4	G=11	IG=11	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Carpenter Road EB														
1A	A,B	3.70	Y	N			135		1985	0.068	150		1985	0.076
2A	B	3.00	N	Y	10		195	100%	1585	**0.123**	170	100%	1585	**0.107**
Carpenter Road WB														
3A	A	5.10	Y	N	5		715	41%	1895	**0.377**	800	43%	1880	**0.426**
4p	C		11GM +	8FG =	19	sec								
5p	C		8GM +	7FG =	15	sec								
6p	C		5GM +	11FG =	16	sec								

Notes:	AM Peak	3+2+4p	PM Peak	3+2+4p
	Sum of Critical *y* **Y**	0.500	Sum of Critical *y* **Y**	0.533
	Lost Time *L* (sec)	29	Lost Time *L* (sec)	29
	Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
	Practical *Y* ***Ypr***	0.683	Practical *Y* ***Ypr***	0.673
	Reserve Capacity ***RC***	36%	Reserve Capacity ***RC***	26%

Date : 5/12/2022 Junction : J3 - Carpenter Road / Lion Rock Road

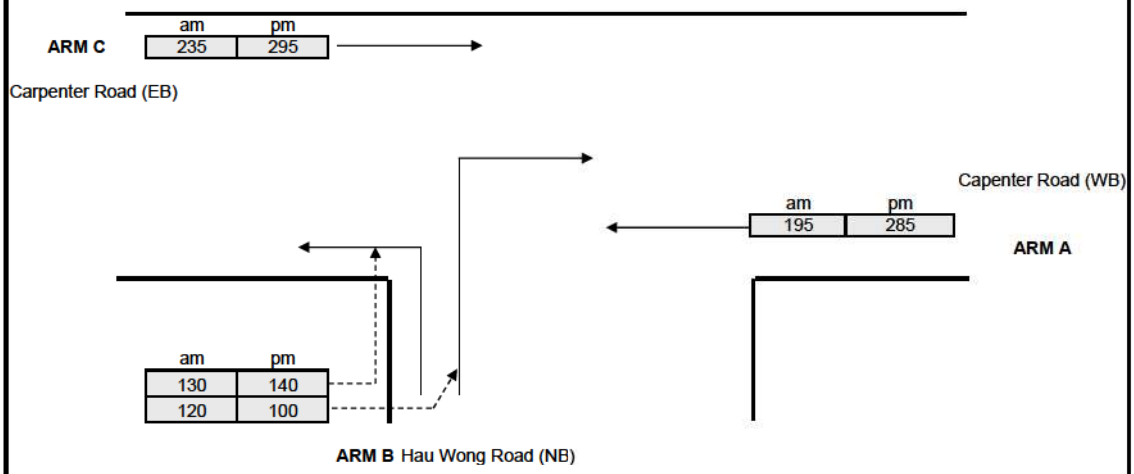
ATKINS CHINA LIMITED

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(Single Lane Minor Arm B)

Job Title:	URA KC-017			
Junction:	J4 - Carpenter Road / Hau Wong Road		Designed by:	RC
Scheme:	Existing		Checked by:	EC
Design Year:	2021	Job No.: 5205867	Date :	5/12/2022
ARM A:	Capenter Road (WB)			
ARM B:	Hau Wong Road (NB)			
ARM C:	Carpenter Road (EB)			



GEOMETRY					
Major road width	W	11.00	Lane widths	w(b-a)	3.30
Central Reserve width	Wcr	0.00		w(b-c)	3.30
Residual width	Wr(c-a)				
Visibilities	Vr(b-a)	35	Calculated	D	0.83
	Vl(b-a)	30		E	0.89
	Vr(b-c)	35		F	0.59
	Vr(c-b)			Y	0.62

ANALYSIS		AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	235	295
	q(c-b)	0	0
	q(a-b)	0	0
	q(a-c)	195	285
	q(b-a)	120	100
	q(b-c)	130	140
	f	0.52	0.58
CAPACITIES	Q(b-a)	455	432
	Q(b-c)	626	608
	Q(c-b)	411	399
	Q(b-ac)	531	519
	Q(c-a)	1800	1800
DFC's	b-a	0.26	0.23
	b-c	0.21	0.23
	c-b	0.000	0.000
	b-ac	0.471	0.462
	c-a	0.130556	0.164
Critical DFC		**0.47**	**0.46**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a) Capacity of combined streams

T.P.D.M.V.2.4
Appendix 1

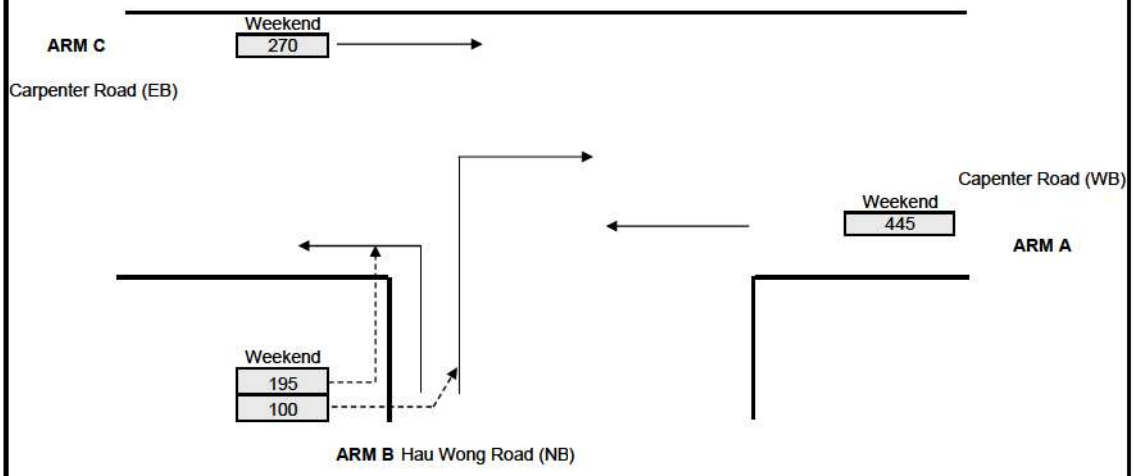
- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(Single Lane Minor Arm B)

Job Title:	URA KC-017			
Junction:	J4 - Carpenter Road / Hau Wong Road		Designed by:	RC
Scheme:	Existing - Weekend		Checked by:	EC
Design Year:	2021	Job No.: 5205867	Date :	5/19/2022
ARM A:	Capenter Road (WB)			
ARM B:	Hau Wong Road (NB)			
ARM C:	Carpenter Road (EB)			



GEOMETRY					
Major road width	W	11.00	Lane widths	w(b-a)	3.30
Central Reserve width	Wcr	0.00		w(b-c)	3.30
Residual width	Wr(c-a)				
Visibilities	Vr(b-a)	35	Calculated	D	0.83
	Vl(b-a)	30		E	0.89
	Vr(b-c)	35		F	0.59
	Vr(c-b)			Y	0.62

ANALYSIS		Weekend PEAK
TRAFFIC FLOWS	q(c-a)	270
	q(c-b)	0
	q(a-b)	0
	q(a-c)	445
	q(b-a)	100
	q(b-c)	195
	f	0.66
CAPACITIES	Q(b-a)	405
	Q(b-c)	576
	Q(c-b)	378
	Q(b-ac)	503
	Q(c-a)	1800
DFC's	b-a	0.25
	b-c	0.34
	c-b	0.000
	b-ac	0.586
	c-a	0.150
Critical DFC		**0.59**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a) Capacity of combined streams

T.P.D.M.V.2.4
Appendix 1

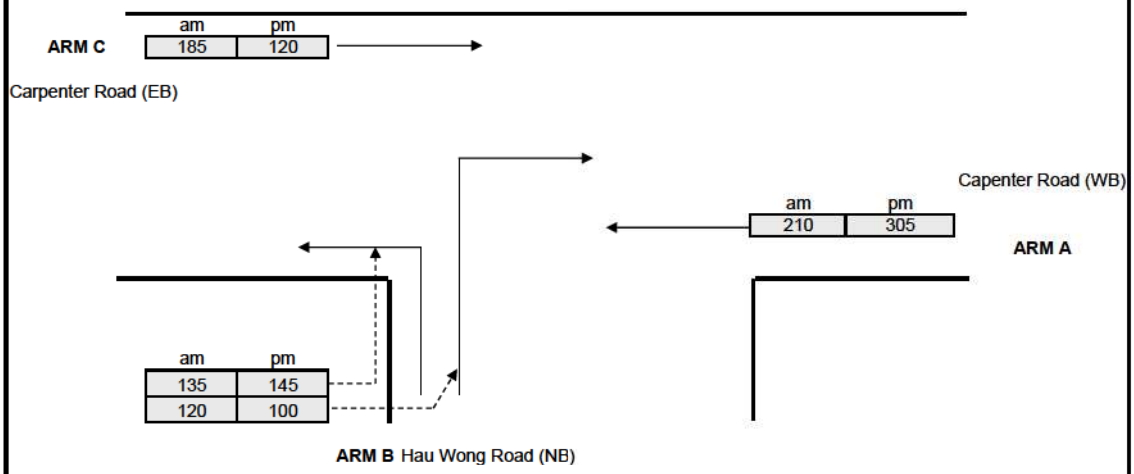
- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(Single Lane Minor Arm B)

Job Title:	URA KC-017			
Junction:	J4 - Carpenter Road / Hau Wong Road		Designed by:	RC
Scheme:	Reference		Checked by:	EC
Design Year:	2033	Job No.: 5205867	Date :	5/12/2022
ARM A:	Capenter Road (WB)			
ARM B:	Hau Wong Road (NB)			
ARM C:	Carpenter Road (EB)			



GEOMETRY					
Major road width	W	11.00	Lane widths	w(b-a)	3.30
Central Reserve width	Wcr	0.00		w(b-c)	3.30
Residual width	Wr(c-a)				
Visibilities	Vr(b-a)	35	Calculated	D	0.83
	Vl(b-a)	30		E	0.89
	Vr(b-c)	35		F	0.59
	Vr(c-b)			Y	0.62

ANALYSIS		AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	185	120
	q(c-b)	0	0
	q(a-b)	0	0
	q(a-c)	210	305
	q(b-a)	120	100
	q(b-c)	135	145
	f	0.53	0.59
CAPACITIES	Q(b-a)	459	448
	Q(b-c)	623	604
	Q(c-b)	409	396
	Q(b-ac)	533	529
	Q(c-a)	1800	1800
DFC's	b-a	0.26	0.22
	b-c	0.22	0.24
	c-b	0.000	0.000
	b-ac	0.478	0.463
	c-a	0.102778	0.067
Critical DFC		**0.48**	**0.46**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a) Capacity of combined streams

T.P.D.M.V.2.4
Appendix 1

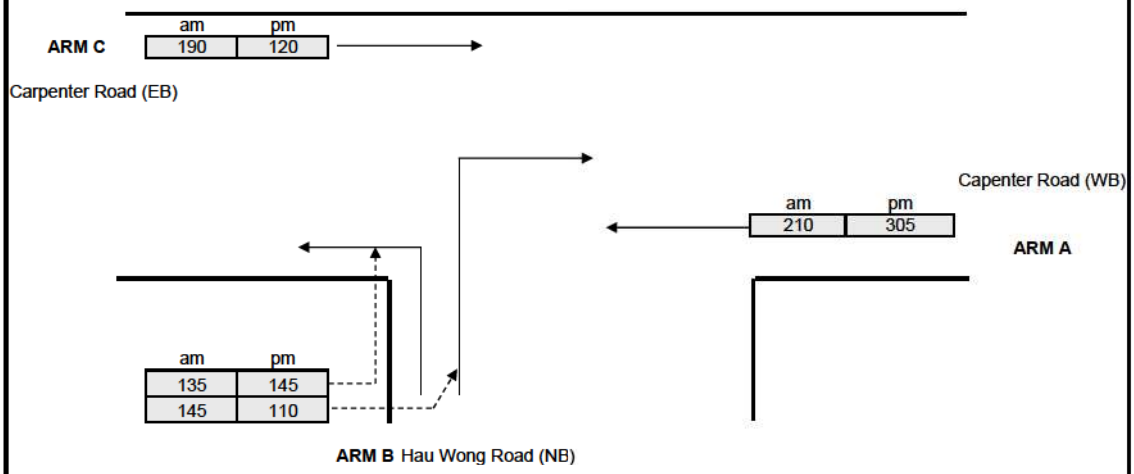
- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(Single Lane Minor Arm B)

Job Title:	URA KC-017			
Junction:	J4 - Carpenter Road / Hau Wong Road		Designed by:	RC
Scheme:	Design		Checked by:	EC
Design Year:	2033	Job No.: 5205867	Date :	5/12/2022
ARM A:	Capenter Road (WB)			
ARM B:	Hau Wong Road (NB)			
ARM C:	Carpenter Road (EB)			



GEOMETRY					
Major road width	W	11.00	Lane widths	w(b-a)	3.30
Central Reserve width	Wcr	0.00		w(b-c)	3.30
Residual width	Wr(c-a)				
Visibilities	Vr(b-a)	35	Calculated	D	0.83
	Vl(b-a)	30		E	0.89
	Vr(b-c)	35		F	0.59
	Vr(c-b)			Y	0.62

ANALYSIS		AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	190	120
	q(c-b)	0	0
	q(a-b)	0	0
	q(a-c)	210	305
	q(b-a)	145	110
	q(b-c)	135	145
	f	0.48	0.57
CAPACITIES	Q(b-a)	458	448
	Q(b-c)	623	604
	Q(c-b)	409	396
	Q(b-ac)	525	525
	Q(c-a)	1800	1800
DFC's	b-a	0.32	0.25
	b-c	0.22	0.24
	c-b	0.000	0.000
	b-ac	0.533	0.485
	c-a	0.105556	0.067
Critical DFC		**0.53**	**0.49**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a) Capacity of combined streams

T.P.D.M.V.2.4
Appendix 1

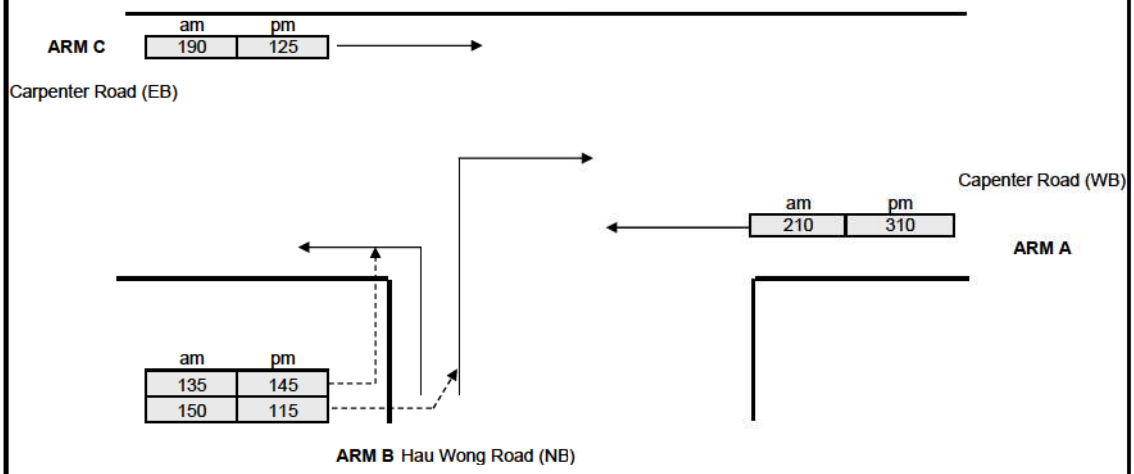
- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(Single Lane Minor Arm B)

Job Title:	URA KC-017			
Junction:	J4 - Carpenter Road / Hau Wong Road		Designed by:	RC
Scheme:	Reference		Checked by:	EC
Design Year:	2036	Job No.: 5205867	Date :	5/12/2022
ARM A:	Capenter Road (WB)			
ARM B:	Hau Wong Road (NB)			
ARM C:	Carpenter Road (EB)			



GEOMETRY					
Major road width	W	11.00	Lane widths	w(b-a)	3.30
Central Reserve width	Wcr	0.00		w(b-c)	3.30
Residual width	Wr(c-a)				
Visibilities	Vr(b-a)	35	Calculated	D	0.83
	Vl(b-a)	30		E	0.89
	Vr(b-c)	35		F	0.59
	Vr(c-b)			Y	0.62

ANALYSIS		AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	190	125
	q(c-b)	0	0
	q(a-b)	0	0
	q(a-c)	210	310
	q(b-a)	150	115
	q(b-c)	135	145
	f	0.47	0.56
CAPACITIES	Q(b-a)	458	447
	Q(b-c)	623	603
	Q(c-b)	409	396
	Q(b-ac)	524	522
	Q(c-a)	1800	1800
DFC's	b-a	0.33	0.26
	b-c	0.22	0.24
	c-b	0.000	0.000
	b-ac	0.544	0.498
	c-a	0.105556	0.069
Critical DFC		**0.54**	**0.50**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a) Capacity of combined streams

T.P.D.M.V.2.4
Appendix 1

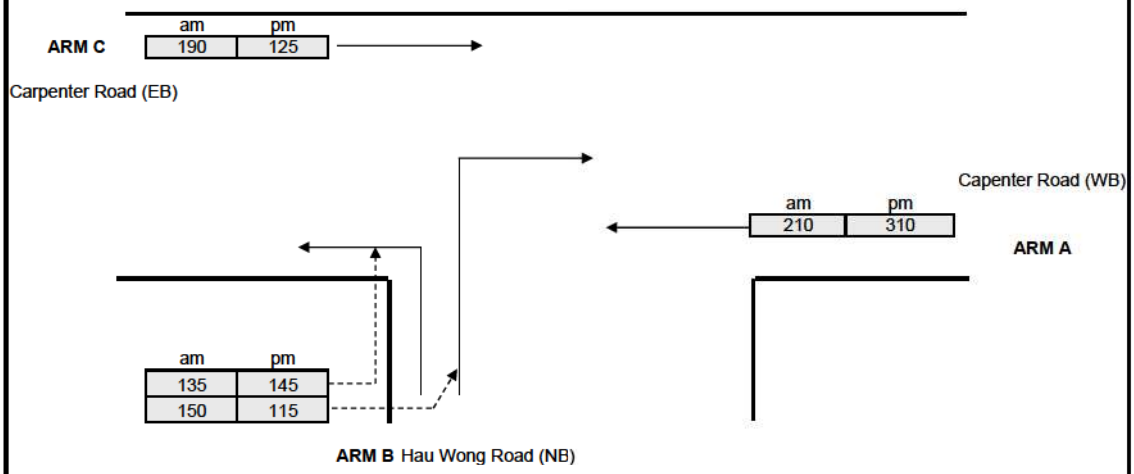
- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(Single Lane Minor Arm B)

Job Title:	URA KC-017			
Junction:	J4 - Carpenter Road / Hau Wong Road		Designed by:	RC
Scheme:	Design		Checked by:	EC
Design Year:	2036	Job No.: 5205867	Date :	5/12/2022
ARM A:	Capenter Road (WB)			
ARM B:	Hau Wong Road (NB)			
ARM C:	Carpenter Road (EB)			



GEOMETRY					
Major road width	W	11.00	Lane widths	w(b-a)	3.30
Central Reserve width	Wcr	0.00		w(b-c)	3.30
Residual width	Wr(c-a)				
Visibilities	Vr(b-a)	35	Calculated	D	0.83
	Vl(b-a)	30		E	0.89
	Vr(b-c)	35		F	0.59
	Vr(c-b)			Y	0.62

ANALYSIS		AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	190	125
	q(c-b)	0	0
	q(a-b)	0	0
	q(a-c)	210	310
	q(b-a)	150	115
	q(b-c)	135	145
	f	0.47	0.56
CAPACITIES	Q(b-a)	458	447
	Q(b-c)	623	603
	Q(c-b)	409	396
	Q(b-ac)	524	522
	Q(c-a)	1800	1800
DFC's	b-a	0.33	0.26
	b-c	0.22	0.24
	c-b	0.000	0.000
	b-ac	0.544	0.498
	c-a	0.105556	0.069
Critical DFC		**0.54**	**0.50**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a) Capacity of combined streams

T.P.D.M.V.2.4
Appendix 1

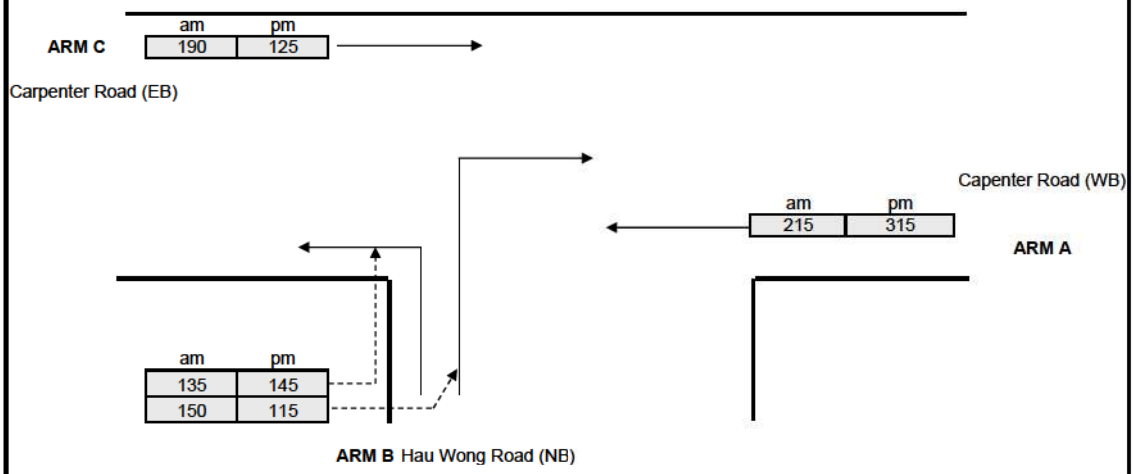
- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(Single Lane Minor Arm B)

Job Title:	URA KC-017			
Junction:	J4 - Carpenter Road / Hau Wong Road		Designed by:	RC
Scheme:	Reference		Checked by:	EC
Design Year:	2037	Job No.: 5205867	Date :	5/12/2022
ARM A:	Capenter Road (WB)			
ARM B:	Hau Wong Road (NB)			
ARM C:	Carpenter Road (EB)			



GEOMETRY					
Major road width	W	11.00	Lane widths	w(b-a)	3.30
Central Reserve width	Wcr	0.00		w(b-c)	3.30
Residual width	Wr(c-a)				
Visibilities	Vr(b-a)	35	Calculated	D	0.83
	Vl(b-a)	30		E	0.89
	Vr(b-c)	35		F	0.59
	Vr(c-b)			Y	0.62

ANALYSIS		AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	190	125
	q(c-b)	0	0
	q(a-b)	0	0
	q(a-c)	215	315
	q(b-a)	150	115
	q(b-c)	135	145
	f	0.47	0.56
CAPACITIES	Q(b-a)	457	446
	Q(b-c)	622	602
	Q(c-b)	408	395
	Q(b-ac)	523	521
	Q(c-a)	1800	1800
DFC's	b-a	0.33	0.26
	b-c	0.22	0.24
	c-b	0.000	0.000
	b-ac	0.545	0.499
	c-a	0.105556	0.069
Critical DFC		**0.55**	**0.50**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a) Capacity of combined streams

T.P.D.M.V.2.4
Appendix 1

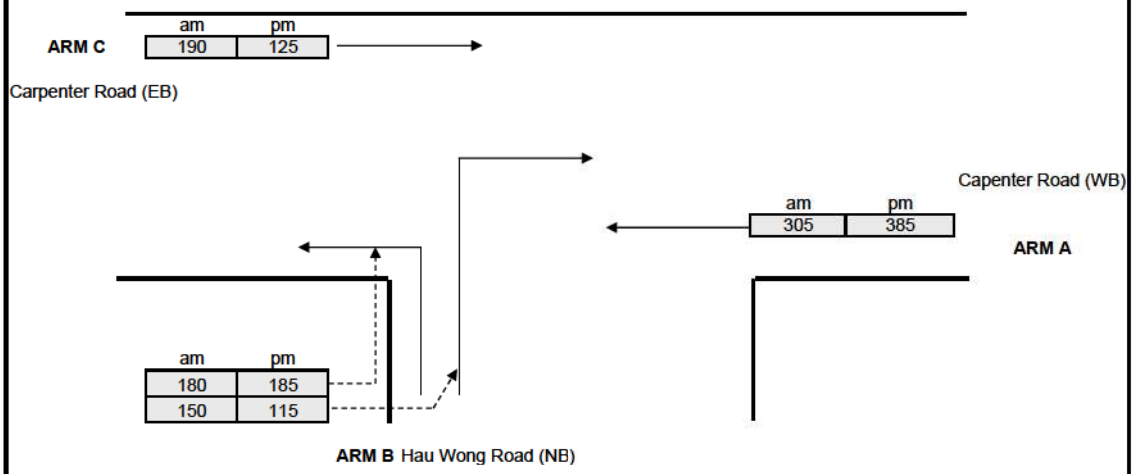
- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(Single Lane Minor Arm B)

Job Title:	URA KC-017			
Junction:	J4 - Carpenter Road / Hau Wong Road		Designed by:	RC
Scheme:	Design		Checked by:	EC
Design Year:	2037	Job No.: 5205867	Date :	5/12/2022
ARM A:	Capenter Road (WB)			
ARM B:	Hau Wong Road (NB)			
ARM C:	Carpenter Road (EB)			



GEOMETRY					
Major road width	W	11.00	Lane widths	w(b-a)	3.30
Central Reserve width	Wcr	0.00		w(b-c)	3.30
Residual width	Wr(c-a)				
Visibilities	Vr(b-a)	35	Calculated	D	0.83
	Vl(b-a)	30		E	0.89
	Vr(b-c)	35		F	0.59
	Vr(c-b)			Y	0.62

ANALYSIS		AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	190	125
	q(c-b)	0	0
	q(a-b)	0	0
	q(a-c)	305	385
	q(b-a)	150	115
	q(b-c)	180	185
	f	0.55	0.62
CAPACITIES	Q(b-a)	440	433
	Q(b-c)	604	588
	Q(c-b)	396	386
	Q(b-ac)	517	517
	Q(c-a)	1800	1800
DFC's	b-a	0.34	0.27
	b-c	0.30	0.31
	c-b	0.000	0.000
	b-ac	0.639	0.580
	c-a	0.105556	0.069
Critical DFC		**0.64**	**0.58**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a) Capacity of combined streams

T.P.D.M.V.2.4
Appendix 1

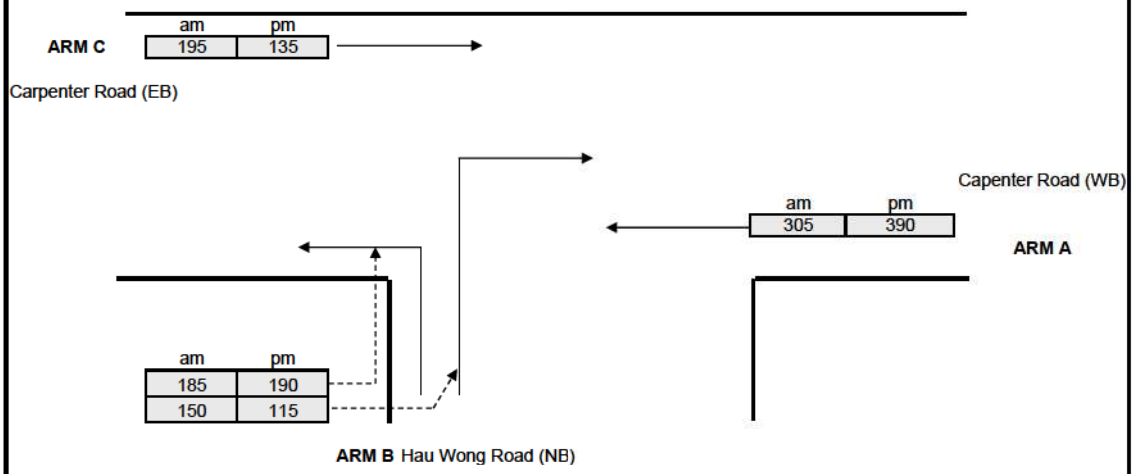
- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(Single Lane Minor Arm B)

Job Title:	URA KC-017			
Junction:	J4 - Carpenter Road / Hau Wong Road		Designed by:	RC
Scheme:	Reference		Checked by:	EC
Design Year:	2040	Job No.: 5205867	Date :	5/12/2022
ARM A:	Capenter Road (WB)			
ARM B:	Hau Wong Road (NB)			
ARM C:	Carpenter Road (EB)			



GEOMETRY					
Major road width	W	11.00	Lane widths	w(b-a)	3.30
Central Reserve width	Wcr	0.00		w(b-c)	3.30
Residual width	Wr(c-a)				
Visibilities	Vr(b-a)	35	Calculated	D	0.83
	Vl(b-a)	30		E	0.89
	Vr(b-c)	35		F	0.59
	Vr(c-b)			Y	0.62

ANALYSIS		AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	195	135
	q(c-b)	0	0
	q(a-b)	0	0
	q(a-c)	305	390
	q(b-a)	150	115
	q(b-c)	185	190
	f	0.55	0.62
CAPACITIES	Q(b-a)	440	431
	Q(b-c)	604	587
	Q(c-b)	396	385
	Q(b-ac)	517	516
	Q(c-a)	1800	1800
DFC's	b-a	0.34	0.27
	b-c	0.31	0.32
	c-b	0.000	0.000
	b-ac	0.648	0.591
	c-a	0.108333	0.075
Critical DFC		**0.65**	**0.59**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a) Capacity of combined streams

T.P.D.M.V.2.4
Appendix 1

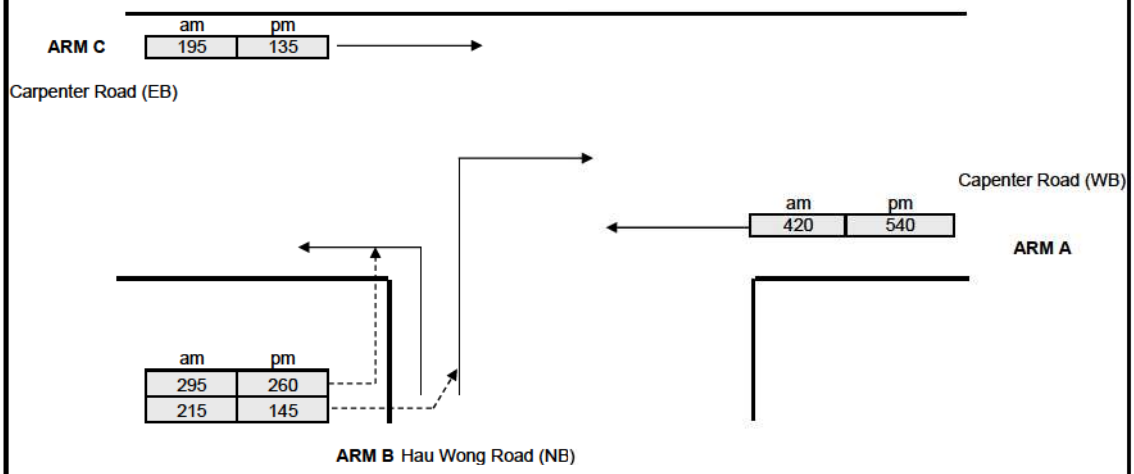
- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(Single Lane Minor Arm B)

Job Title:	URA KC-017			
Junction:	J4 - Carpenter Road / Hau Wong Road		Designed by:	RC
Scheme:	Design		Checked by:	EC
Design Year:	2040	Job No.: 5205867	Date :	5/12/2022
ARM A:	Capenter Road (WB)			
ARM B:	Hau Wong Road (NB)			
ARM C:	Carpenter Road (EB)			



GEOMETRY					
Major road width	W	11.00	Lane widths	w(b-a)	3.30
Central Reserve width	Wcr			w(b-c)	3.30
Residual width	Wr(c-a)				
Visibilities	Vr(b-a)	35	Calculated	D	0.83
	Vl(b-a)	30		E	0.89
	Vr(b-c)	35		F	0.59
	Vr(c-b)			Y	0.62

ANALYSIS		AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	195	135
	q(c-b)	0	0
	q(a-b)	0	0
	q(a-c)	420	540
	q(b-a)	215	145
	q(b-c)	295	260
	f	0.58	0.64
CAPACITIES	Q(b-a)	418	403
	Q(b-c)	581	556
	Q(c-b)	381	365
	Q(b-ac)	499	490
	Q(c-a)	1800	1800
DFC's	b-a	0.51	0.36
	b-c	0.51	0.47
	c-b	0.000	0.000
	b-ac	1.022	0.827
	c-a	0.108333	0.075
Critical DFC		**1.02**	**0.83**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a) Capacity of combined streams

T.P.D.M.V.2.4
Appendix 1

- In accordance with TPDM V2.4

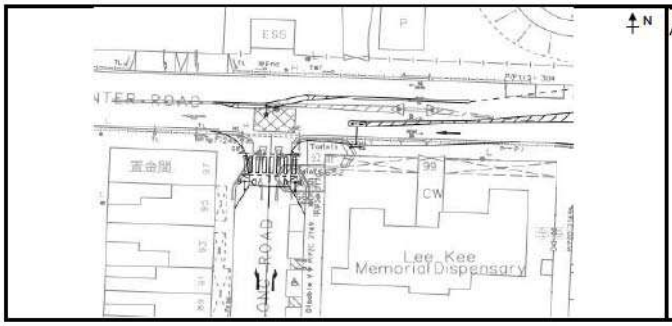
TRAFFIC SIGNAL CALCULATION SHEET

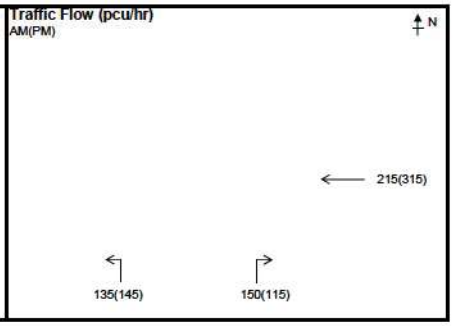
ATKINS

JOB NO. : 5205867

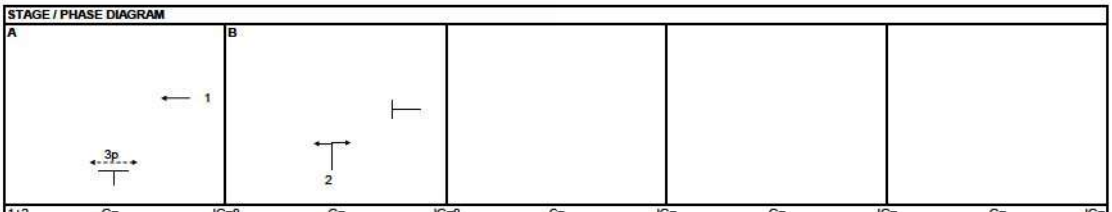
Junction : J4 - Carpenter Road / Hau Wong Road Design Year: 2037

Scheme : Reference (with improvement) Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+2	G=	IG=8	G=	IG=8	G=	IG=	G=	IG=	G=	IG=	G=	IG=
1+2	G=	IG=8	G=	IG=8	G=	IG=	G=	IG=	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Carpenter Road WB														
1A	A	3.50	Y	N			215		1965	0.109	315		1965	0.160
Hau Wong Road NB														
2A	B	3.50	Y	N	10		135	100%	1710	0.079	145	100%	1710	0.085
2B	B	3.50	N	N	10		150	100%	1830	0.082	115	100%	1830	0.063
3p	A		6GM +	10FG =	16	sec								

Notes:

AM Peak	1+2	PM Peak	1+2
Sum of Critical *y* *Y*	0.191	Sum of Critical *y* *Y*	0.245
Lost Time *L* (sec)	14	Lost Time *L* (sec)	14
Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
Practical *Y* *Ypr*	0.795	Practical *Y* *Ypr*	0.790
Reserve Capacity *RC*	315%	Reserve Capacity *RC*	222%

Date : 5/12/2022 Junction : J4 - Carpenter Road / Hau Wong Road

ATKINS CHINA LIMITED

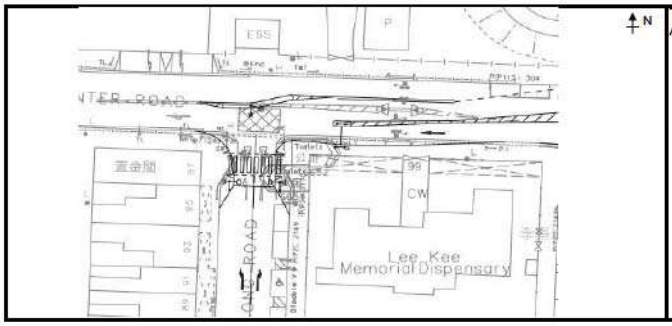
TRAFFIC SIGNAL CALCULATION SHEET

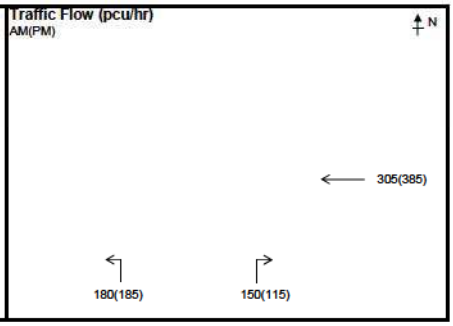
ATKINS

JOB NO. : 5205867

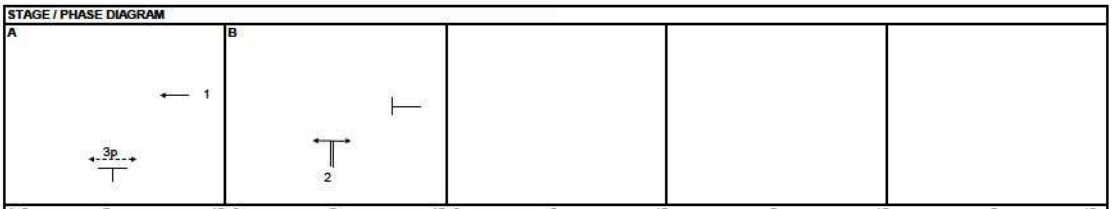
Junction : J4 - Carpenter Road / Hau Wong Road Design Year: 2037

Scheme : Design (with improvement) Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+2	G=	IG=8	G=	IG=8	G=	IG=	G=	IG=	G=	IG=	G=	IG=
1+2	G=	IG=8	G=	IG=8	G=	IG=	G=	IG=	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Carpenter Road WB														
1A	A	3.50	Y	N			305		1965	0.155	385		1965	0.196
Hau Wong Road NB														
2A	B	3.50	Y	N	10		180	100%	1710	0.105	185	100%	1710	0.108
2B	B	3.50	N	N	10		150	100%	1830	0.082	115	100%	1830	0.063
3p	A		6GM +	10FG =	16	sec								

Notes:

AM Peak	1+2	PM Peak	1+2
Sum of Critical *y* *Y*	0.260	Sum of Critical *y* *Y*	0.304
Lost Time *L* (sec)	14	Lost Time *L* (sec)	14
Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
Practical *Y* *Ypr*	0.795	Practical *Y* *Ypr*	0.790
Reserve Capacity *RC*	205%	Reserve Capacity *RC*	160%

Date : 5/12/2022 Junction : J4 - Carpenter Road / Hau Wong Road

ATKINS CHINA LIMITED

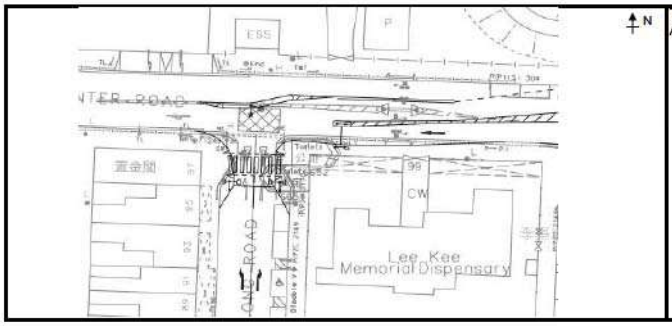
TRAFFIC SIGNAL CALCULATION SHEET

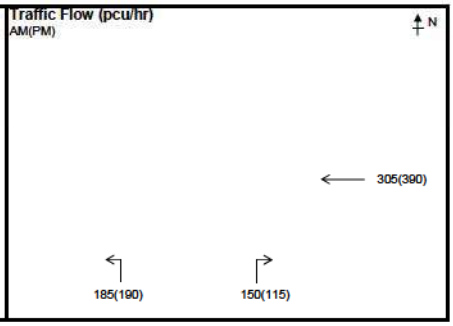
ATKINS

JOB NO. : 5205867

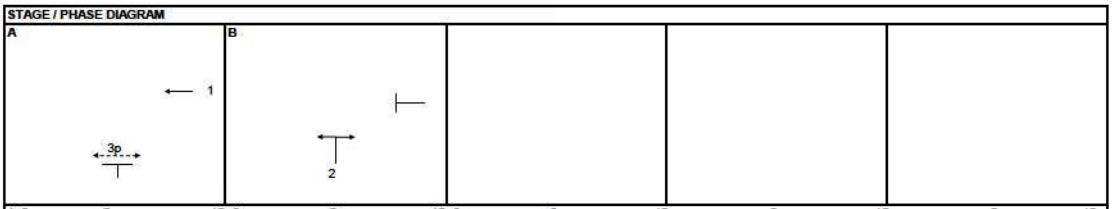
Junction : J4 - Carpenter Road / Hau Wong Road Design Year: 2040

Scheme : Reference (with improvement) Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+2	G=	IG=8	G=	IG=8	G=	IG=	G=	IG=	G=	IG=	G=	IG=
1+2	G=	IG=8	G=	IG=8	G=	IG=	G=	IG=	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Carpenter Road WB														
1A	A	3.50	Y	N			305		1965	0.155	390		1965	0.198
Hau Wong Road NB														
2A	B	3.50	Y	N	10		185	100%	1710	0.108	190	100%	1710	0.111
2B	B	3.50	N	N	10		150	100%	1830	0.082	115	100%	1830	0.063
3p	A		6GM +	10FG =	16	sec								

Notes:	AM Peak	1+2	PM Peak	1+2
	Sum of Critical *y* **Y**	0.263	Sum of Critical *y* **Y**	0.310
	Lost Time *L* (sec)	14	Lost Time *L* (sec)	14
	Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
	Practical *Y* **Ypr**	0.795	Practical *Y* **Ypr**	0.790
	Reserve Capacity *RC*	202%	Reserve Capacity *RC*	155%

Date : 5/12/2022 Junction : J4 - Carpenter Road / Hau Wong Road

ATKINS CHINA LIMITED

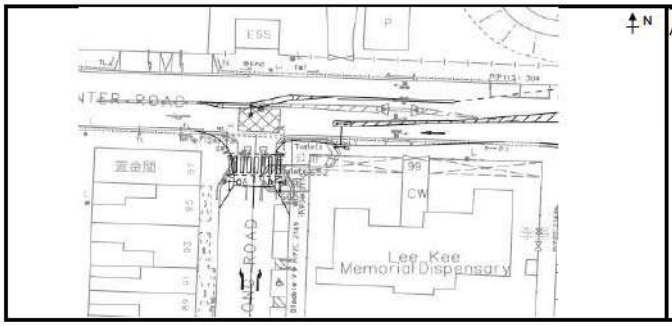
TRAFFIC SIGNAL CALCULATION SHEET

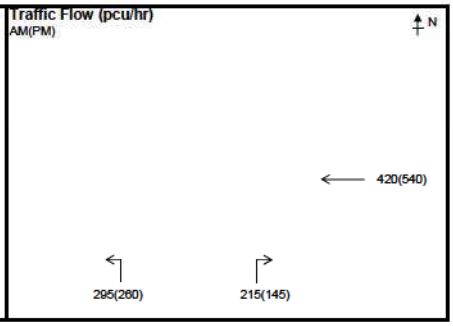
ATKINS

JOB NO. : 5205867

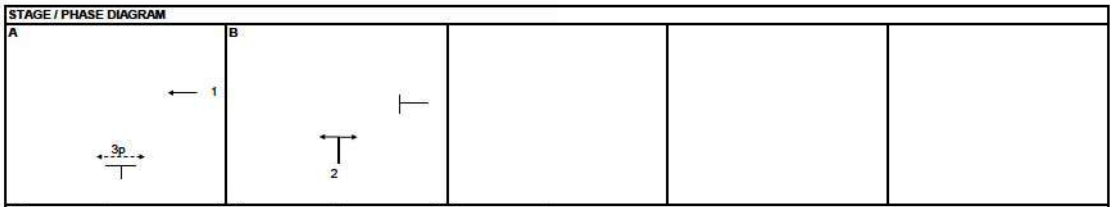
Junction : J4 - Carpenter Road / Hau Wong Road Design Year: 2040

Scheme : Design (with improvement) Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+2	G=	IG=8	G=	IG=8	G=	IG=	G=	IG=	G=	IG=	G=	IG=
1+2	G=	IG=8	G=	IG=8	G=	IG=	G=	IG=	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Carpenter Road WB														
1A	A	3.50	Y	N			420		1965	0.214	540		1965	0.275
Hau Wong Road NB														
2A	B	3.50	Y	N	10		295	100%	1710	0.173	260	100%	1710	0.152
2B	B	3.50	N	N	10		215	100%	1830	0.117	145	100%	1830	0.079
3p	A		6GM +	10FG =	16	sec								

Notes:

AM Peak	1+2	PM Peak	1+2
Sum of Critical *y* *Y*	0.386	Sum of Critical *y* *Y*	0.427
Lost Time *L* (sec)	14	Lost Time *L* (sec)	14
Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
Practical *Y* *Ypr*	0.795	Practical *Y* *Ypr*	0.790
Reserve Capacity *RC*	106%	Reserve Capacity *RC*	85%

Date : 5/12/2022 Junction : J4 - Carpenter Road / Hau Wong Road

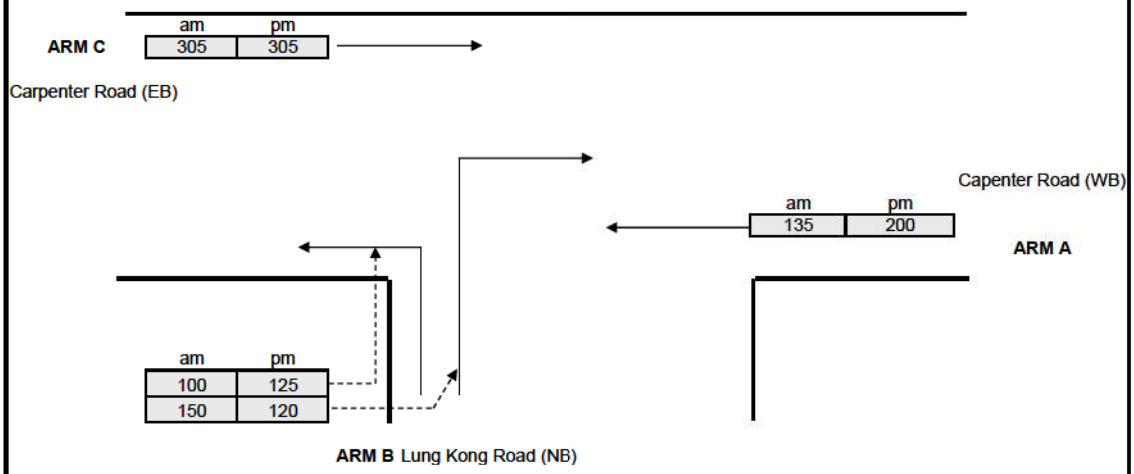
ATKINS CHINA LIMITED

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(Single Lane Minor Arm B)

Job Title:	URA KC-017			
Junction:	J5 - Carpenter Road / Lung Kong Road		Designed by:	RC
Scheme:	Existing		Checked by:	EC
Design Year:	2021	Job No.: 5205867	Date :	5/12/2022
ARM A:	Capenter Road (WB)			
ARM B:	Lung Kong Road (NB)			
ARM C:	Carpenter Road (EB)			



GEOMETRY					
Major road width	W	9.00	Lane widths	w(b-a)	3.60
Central Reserve width	Wcr			w(b-c)	3.60
Residual width	Wr(c-a)				
Visibilities	Vr(b-a)	20	Calculated	D	0.84
	Vl(b-a)	25		E	0.91
	Vr(b-c)	20		F	0.59
	Vr(c-b)			Y	0.69

ANALYSIS		AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	305	305
	q(c-b)	0	0
	q(a-b)	0	0
	q(a-c)	135	200
	q(b-a)	150	120
	q(b-c)	100	125
	f	0.40	0.51
CAPACITIES	Q(b-a)	457	443
	Q(b-c)	644	629
	Q(c-b)	417	407
	Q(b-ac)	517	522
	Q(c-a)	1800	1800
DFC's	b-a	0.33	0.27
	b-c	0.16	0.20
	c-b	0.000	0.000
	b-ac	0.484	0.470
	c-a	0.169444	0.169
Critical DFC		**0.48**	**0.47**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a) Capacity of combined streams

T.P.D.M.V.2.4
Appendix 1

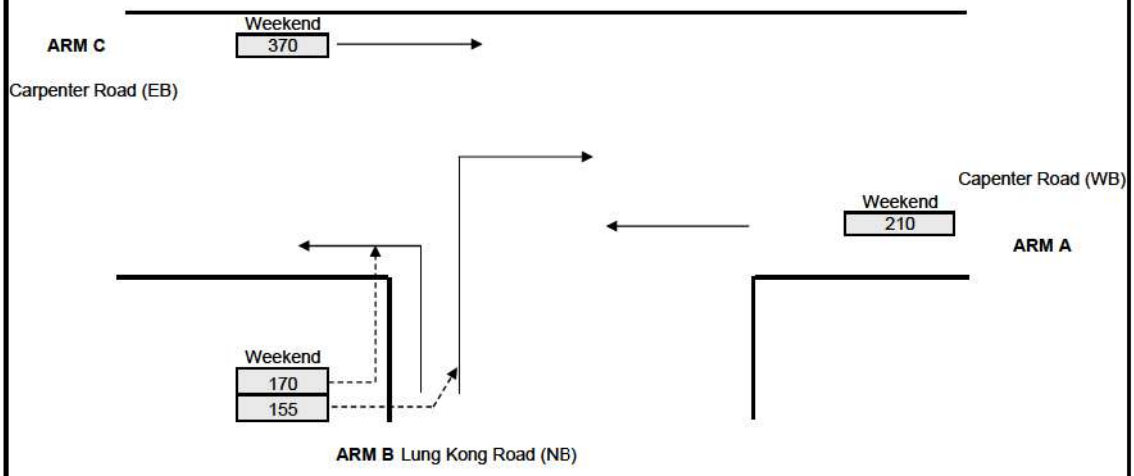
- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(Single Lane Minor Arm B)

Job Title:	URA KC-017			
Junction:	J5 - Carpenter Road / Lung Kong Road		Designed by:	RC
Scheme:	Existing -Weekend		Checked by:	EC
Design Year:	2021	Job No.: 5205867	Date :	5/19/2022
ARM A:	Capenter Road (WB)			
ARM B:	Lung Kong Road (NB)			
ARM C:	Carpenter Road (EB)			



GEOMETRY					
Major road width	W	9.00	Lane widths	w(b-a)	3.60
Central Reserve width	Wcr			w(b-c)	3.60
Residual width	Wr(c-a)				
Visibilities	Vr(b-a)	20	Calculated	D	0.84
	Vl(b-a)	25		E	0.91
	Vr(b-c)	20		F	0.59
	Vr(c-b)			Y	0.69

ANALYSIS		Weekend PEAK
TRAFFIC FLOWS	q(c-a)	370
	q(c-b)	0
	q(a-b)	0
	q(a-c)	210
	q(b-a)	155
	q(b-c)	170
	f	0.52
CAPACITIES	Q(b-a)	432
	Q(b-c)	627
	Q(c-b)	406
	Q(b-ac)	516
	Q(c-a)	1800
DFC's	b-a	0.36
	b-c	0.27
	c-b	0.000
	b-ac	0.630
	c-a	0.206
Critical DFC		**0.63**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a) Capacity of combined streams

T.P.D.M.V.2.4
Appendix 1

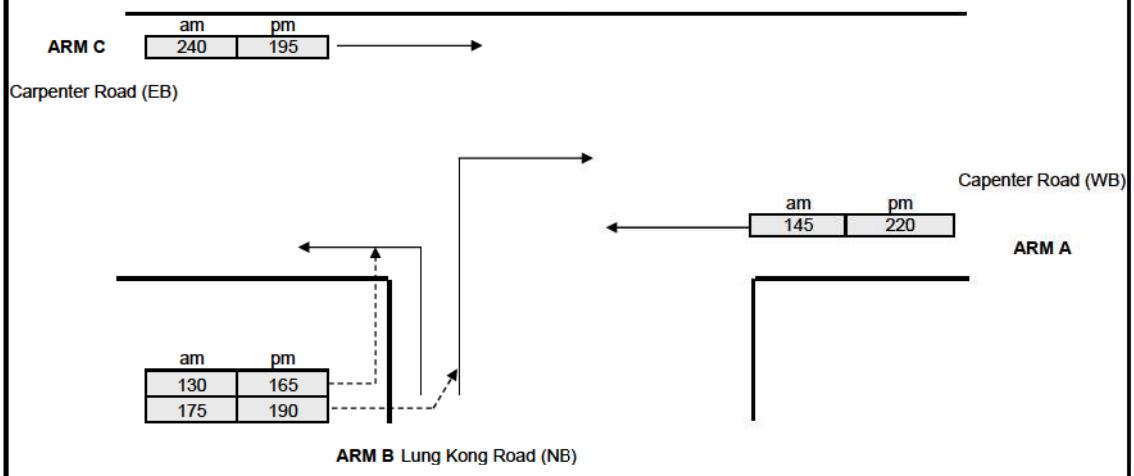
- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(Single Lane Minor Arm B)

Job Title:	URA KC-017			
Junction:	J5 - Carpenter Road / Lung Kong Road		Designed by:	RC
Scheme:	Reference		Checked by:	EC
Design Year:	2033	Job No.: 5205867	Date :	5/12/2022
ARM A:	Capenter Road (WB)			
ARM B:	Lung Kong Road (NB)			
ARM C:	Carpenter Road (EB)			



GEOMETRY					
Major road width	W	9.00	Lane widths	w(b-a)	3.60
Central Reserve width	Wcr			w(b-c)	3.60
Residual width	Wr(c-a)				
Visibilities	Vr(b-a)	20	Calculated	D	0.84
	Vl(b-a)	25		E	0.91
	Vr(b-c)	20		F	0.59
	Vr(c-b)			Y	0.69

ANALYSIS		AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	240	195
	q(c-b)	0	0
	q(a-b)	0	0
	q(a-c)	145	220
	q(b-a)	175	190
	q(b-c)	130	165
	f	0.43	0.46
CAPACITIES	Q(b-a)	463	453
	Q(b-c)	642	625
	Q(c-b)	415	404
	Q(b-ac)	525	520
	Q(c-a)	1800	1800
DFC's	b-a	0.38	0.42
	b-c	0.20	0.26
	c-b	0.000	0.000
	b-ac	0.580	0.683
	c-a	0.133333	0.108
Critical DFC		**0.58**	**0.68**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a) Capacity of combined streams

T.P.D.M.V.2.4
Appendix 1

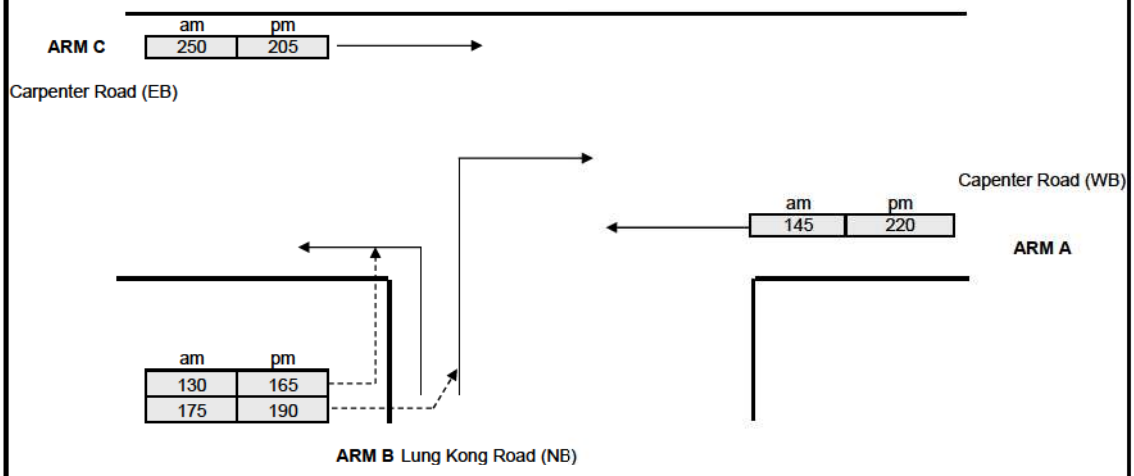
- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(Single Lane Minor Arm B)

Job Title:	URA KC-017		
Junction:	J5 - Carpenter Road / Lung Kong Road	Designed by:	RC
Scheme:	Design	Checked by:	EC
Design Year:	2033	Job No.: 5205867	Date : 5/12/2022
ARM A:	Capenter Road (WB)		
ARM B:	Lung Kong Road (NB)		
ARM C:	Carpenter Road (EB)		



GEOMETRY					
Major road width	W	9.00	Lane widths	w(b-a)	3.60
Central Reserve width	Wcr			w(b-c)	3.60
Residual width	Wr(c-a)				
Visibilities	Vr(b-a)	20	Calculated	D	0.84
	Vl(b-a)	25		E	0.91
	Vr(b-c)	20		F	0.59
	Vr(c-b)			Y	0.69

ANALYSIS		AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	250	205
	q(c-b)	0	0
	q(a-b)	0	0
	q(a-c)	145	220
	q(b-a)	175	190
	q(b-c)	130	165
	f	0.43	0.46
CAPACITIES	Q(b-a)	462	452
	Q(b-c)	642	625
	Q(c-b)	415	404
	Q(b-ac)	524	519
	Q(c-a)	1800	1800
DFC's	b-a	0.38	0.42
	b-c	0.20	0.26
	c-b	0.000	0.000
	b-ac	0.582	0.685
	c-a	0.138889	0.114
Critical DFC		**0.58**	**0.68**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a) Capacity of combined streams

T.P.D.M.V.2.4
Appendix 1

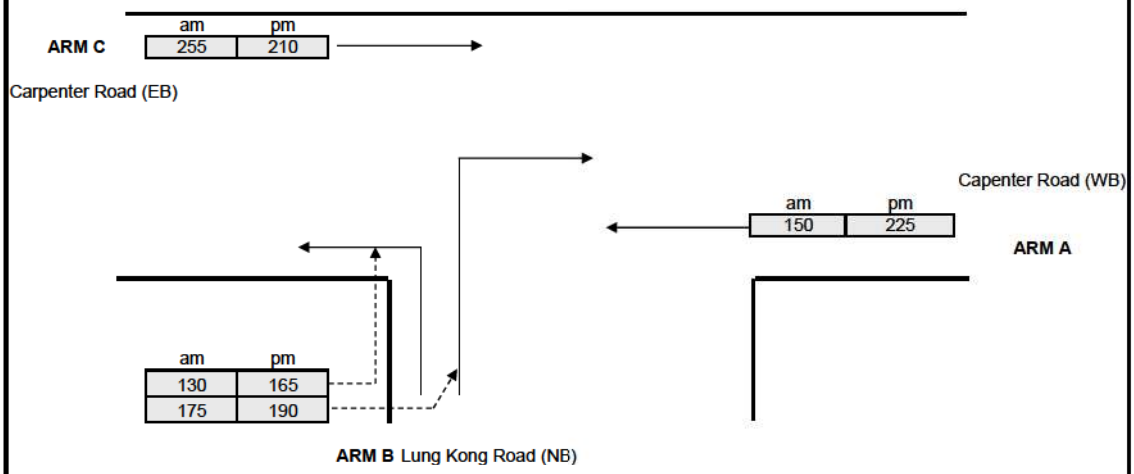
- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(Single Lane Minor Arm B)

Job Title:	URA KC-017			
Junction:	J5 - Carpenter Road / Lung Kong Road		Designed by:	RC
Scheme:	Reference		Checked by:	EC
Design Year:	2036	Job No.: 5205867	Date :	5/12/2022
ARM A:	Capenter Road (WB)			
ARM B:	Lung Kong Road (NB)			
ARM C:	Carpenter Road (EB)			



GEOMETRY					
Major road width	W	9.00	Lane widths	w(b-a)	3.60
Central Reserve width	Wcr			w(b-c)	3.60
Residual width	Wr(c-a)				
Visibilities	Vr(b-a)	20	Calculated	D	0.84
	Vl(b-a)	25		E	0.91
	Vr(b-c)	20		F	0.59
	Vr(c-b)			Y	0.69

ANALYSIS		AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	255	210
	q(c-b)	0	0
	q(a-b)	0	0
	q(a-c)	150	225
	q(b-a)	175	190
	q(b-c)	130	165
	f	0.43	0.46
CAPACITIES	Q(b-a)	460	450
	Q(b-c)	641	624
	Q(c-b)	414	403
	Q(b-ac)	523	517
	Q(c-a)	1800	1800
DFC's	b-a	0.38	0.42
	b-c	0.20	0.26
	c-b	0.000	0.000
	b-ac	0.583	0.687
	c-a	0.141667	0.117
Critical DFC		**0.58**	**0.69**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a) Capacity of combined streams

T.P.D.M.V.2.4
Appendix 1

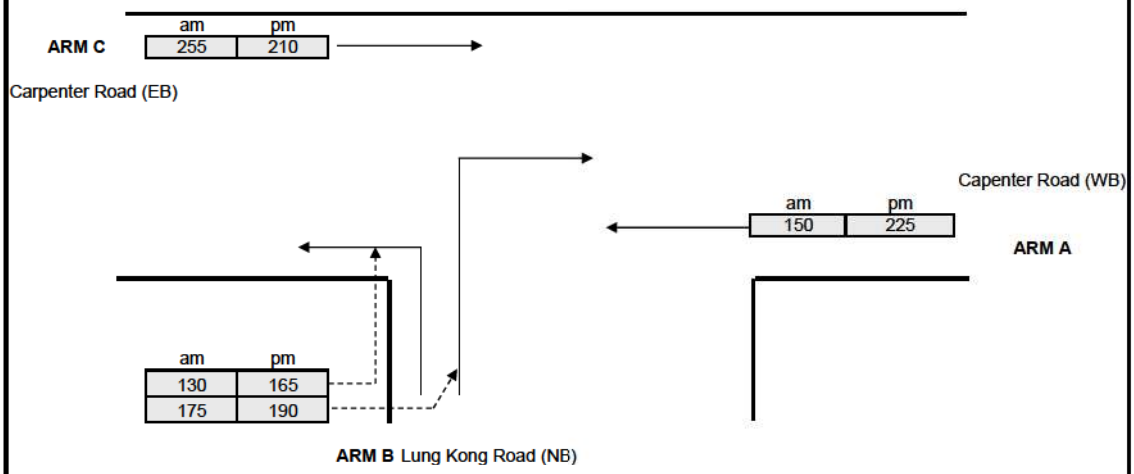
- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(Single Lane Minor Arm B)

Job Title:	URA KC-017			
Junction:	J5 - Carpenter Road / Lung Kong Road		Designed by:	RC
Scheme:	Design		Checked by:	EC
Design Year:	2036	Job No.: 5205867	Date :	5/12/2022
ARM A:	Capenter Road (WB)			
ARM B:	Lung Kong Road (NB)			
ARM C:	Carpenter Road (EB)			



GEOMETRY					
Major road width	W	9.00	Lane widths	w(b-a)	3.60
Central Reserve width	Wcr			w(b-c)	3.60
Residual width	Wr(c-a)				
Visibilities	Vr(b-a)	20	Calculated	D	0.84
	Vl(b-a)	25		E	0.91
	Vr(b-c)	20		F	0.59
	Vr(c-b)			Y	0.69

ANALYSIS		AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	255	210
	q(c-b)	0	0
	q(a-b)	0	0
	q(a-c)	150	225
	q(b-a)	175	190
	q(b-c)	130	165
	f	0.43	0.46
CAPACITIES	Q(b-a)	460	450
	Q(b-c)	641	624
	Q(c-b)	414	403
	Q(b-ac)	523	517
	Q(c-a)	1800	1800
DFC's	b-a	0.38	0.42
	b-c	0.20	0.26
	c-b	0.000	0.000
	b-ac	0.583	0.687
	c-a	0.141667	0.117
Critical DFC		**0.58**	**0.69**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a) Capacity of combined streams

T.P.D.M.V.2.4
Appendix 1

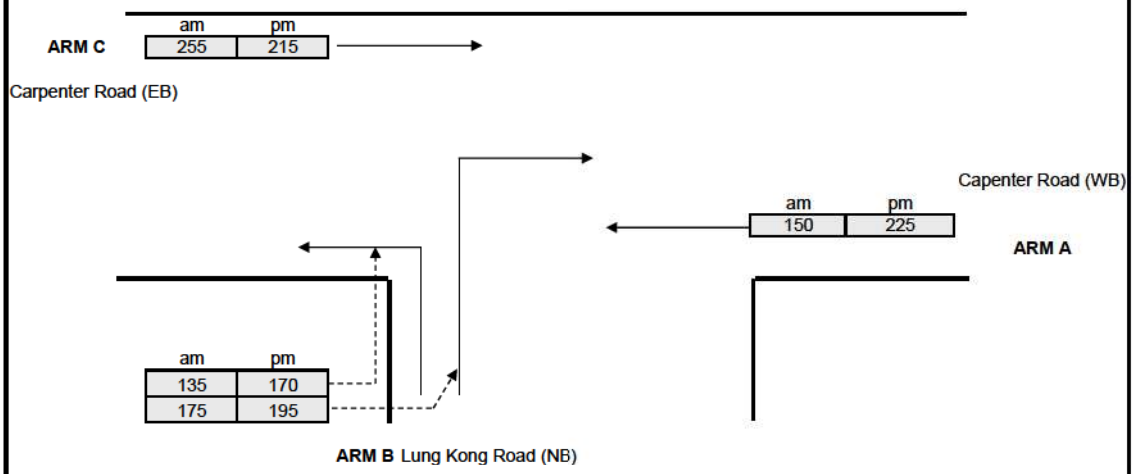
- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(Single Lane Minor Arm B)

Job Title:	URA KC-017		
Junction:	J5 - Carpenter Road / Lung Kong Road	Designed by:	RC
Scheme:	Reference	Checked by:	EC
Design Year:	2037	Job No.: 5205867	Date : 5/12/2022
ARM A:	Capenter Road (WB)		
ARM B:	Lung Kong Road (NB)		
ARM C:	Carpenter Road (EB)		



GEOMETRY					
Major road width	W	9.00	Lane widths	w(b-a)	3.60
Central Reserve width	Wcr			w(b-c)	3.60
Residual width	Wr(c-a)				
Visibilities	Vr(b-a)	20	Calculated	D	0.84
	Vl(b-a)	25		E	0.91
	Vr(b-c)	20		F	0.59
	Vr(c-b)			Y	0.69

ANALYSIS		AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	255	215
	q(c-b)	0	0
	q(a-b)	0	0
	q(a-c)	150	225
	q(b-a)	175	195
	q(b-c)	135	170
	f	0.44	0.47
CAPACITIES	Q(b-a)	460	450
	Q(b-c)	641	624
	Q(c-b)	414	403
	Q(b-ac)	524	517
	Q(c-a)	1800	1800
DFC's	b-a	0.38	0.43
	b-c	0.21	0.27
	c-b	0.000	0.000
	b-ac	0.591	0.706
	c-a	0.141667	0.119
Critical DFC		**0.59**	**0.71**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a) Capacity of combined streams

T.P.D.M.V.2.4
Appendix 1

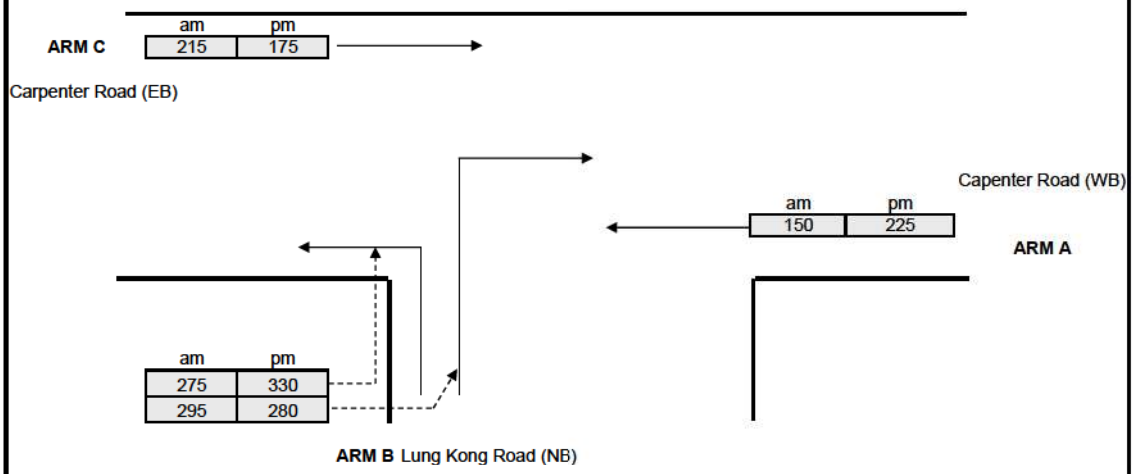
- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(Single Lane Minor Arm B)

Job Title:	URA KC-017			
Junction:	J5 - Carpenter Road / Lung Kong Road		Designed by:	RC
Scheme:	Design		Checked by:	EC
Design Year:	2037	Job No.: 5205867	Date :	5/12/2022
ARM A:	Capenter Road (WB)			
ARM B:	Lung Kong Road (NB)			
ARM C:	Carpenter Road (EB)			



GEOMETRY					
Major road width	W	9.00	Lane widths	w(b-a)	3.60
Central Reserve width	Wcr			w(b-c)	3.60
Residual width	Wr(c-a)				
Visibilities	Vr(b-a)	20	Calculated	D	0.84
	Vl(b-a)	25		E	0.91
	Vr(b-c)	20		F	0.59
	Vr(c-b)			Y	0.69

ANALYSIS		AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	215	175
	q(c-b)	0	0
	q(a-b)	0	0
	q(a-c)	150	225
	q(b-a)	295	280
	q(b-c)	275	330
	f	0.48	0.54
CAPACITIES	Q(b-a)	465	455
	Q(b-c)	641	624
	Q(c-b)	414	403
	Q(b-ac)	536	533
	Q(c-a)	1800	1800
DFC's	b-a	0.63	0.62
	b-c	0.43	0.53
	c-b	0.000	0.000
	b-ac	1.063	1.145
	c-a	0.119444	0.097
Critical DFC		**1.06**	**1.14**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a) Capacity of combined streams

T.P.D.M.V.2.4
Appendix 1

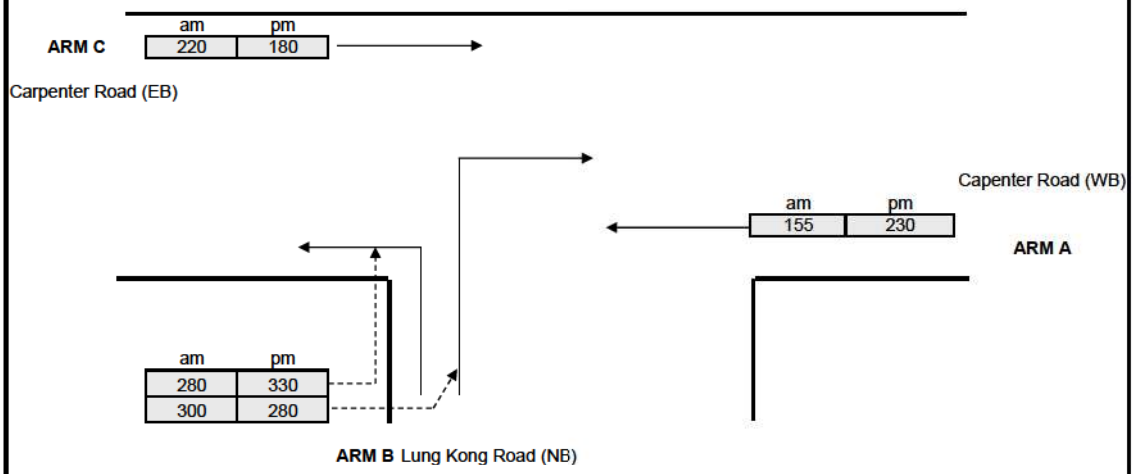
- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(Single Lane Minor Arm B)

Job Title:	URA KC-017				
Junction:	J5 - Carpenter Road / Lung Kong Road			Designed by:	RC
Scheme:	Reference			Checked by:	EC
Design Year:	2040	Job No.:	5205867	Date :	5/12/2022
ARM A:	Capenter Road (WB)				
ARM B:	Lung Kong Road (NB)				
ARM C:	Carpenter Road (EB)				



GEOMETRY					
Major road width	W	9.00	Lane widths	w(b-a)	3.60
Central Reserve width	Wcr			w(b-c)	3.60
Residual width	Wr(c-a)				
Visibilities	Vr(b-a)	20	Calculated	D	0.84
	Vl(b-a)	25		E	0.91
	Vr(b-c)	20		F	0.59
	Vr(c-b)			Y	0.69

ANALYSIS		AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	220	180
	q(c-b)	0	0
	q(a-b)	0	0
	q(a-c)	155	230
	q(b-a)	300	280
	q(b-c)	280	330
	f	0.48	0.54
CAPACITIES	Q(b-a)	464	453
	Q(b-c)	640	622
	Q(c-b)	414	403
	Q(b-ac)	535	531
	Q(c-a)	1800	1800
DFC's	b-a	0.65	0.62
	b-c	0.44	0.53
	c-b	0.000	0.000
	b-ac	1.085	1.148
	c-a	0.122222	0.100
Critical DFC		**1.08**	**1.15**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a) Capacity of combined streams

T.P.D.M.V.2.4
Appendix 1

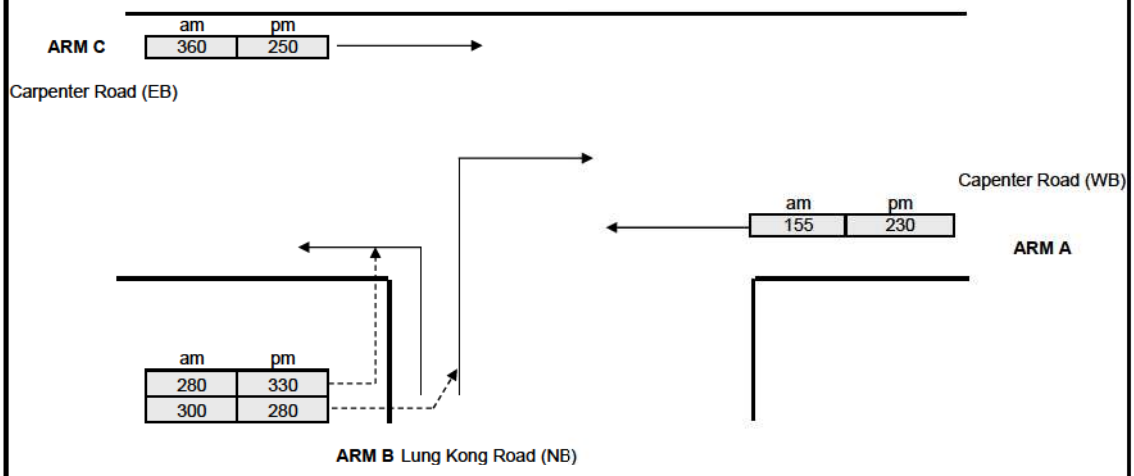
- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(Single Lane Minor Arm B)

Job Title:	URA KC-017			
Junction:	J5 - Carpenter Road / Lung Kong Road		Designed by:	RC
Scheme:	Design		Checked by:	EC
Design Year:	2040	Job No.: 5205867	Date :	5/12/2022
ARM A:	Capenter Road (WB)			
ARM B:	Lung Kong Road (NB)			
ARM C:	Carpenter Road (EB)			



GEOMETRY					
Major road width	W	9.00	Lane widths	w(b-a)	3.60
Central Reserve width	Wcr			w(b-c)	3.60
Residual width	Wr(c-a)				
Visibilities	Vr(b-a)	20	Calculated	D	0.84
	Vl(b-a)	25		E	0.91
	Vr(b-c)	20		F	0.59
	Vr(c-b)			Y	0.69

ANALYSIS		AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	360	250
	q(c-b)	0	0
	q(a-b)	0	0
	q(a-c)	155	230
	q(b-a)	300	280
	q(b-c)	280	330
	f	0.48	0.54
CAPACITIES	Q(b-a)	445	444
	Q(b-c)	640	622
	Q(c-b)	414	403
	Q(b-ac)	522	525
	Q(c-a)	1800	1800
DFC's	b-a	0.67	0.63
	b-c	0.44	0.53
	c-b	0.000	0.000
	b-ac	1.112	1.161
	c-a	0.2	0.139
Critical DFC		**1.11**	**1.16**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a) Capacity of combined streams

T.P.D.M.V.2.4
Appendix 1

- In accordance with TPDM V2.4

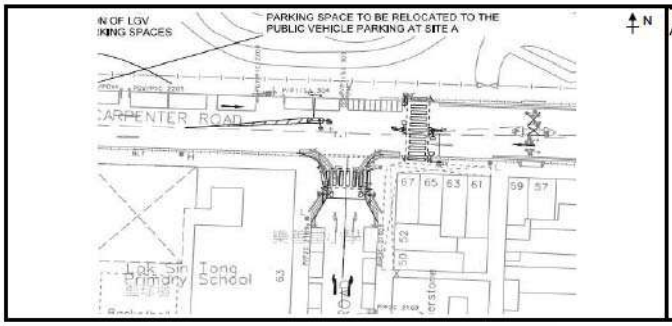
TRAFFIC SIGNAL CALCULATION SHEET

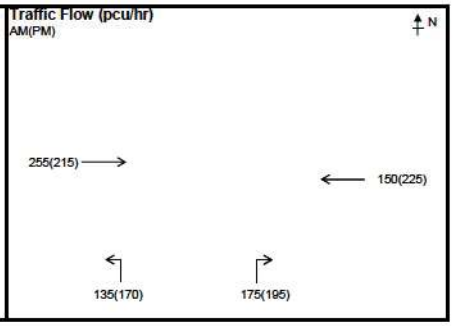
ATKINS

JOB NO. : 5205867

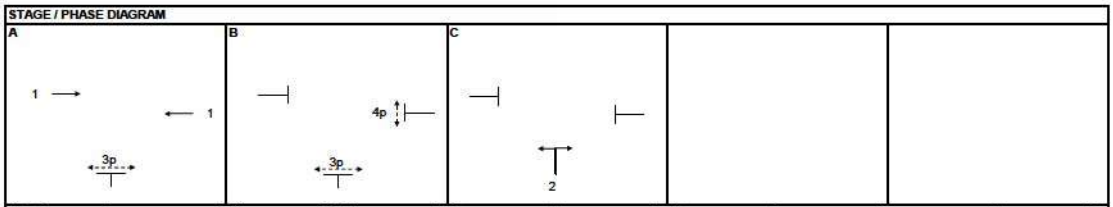
Junction : J5 - Carpenter Road / Lung Kong Road Design Year: 2037

Scheme : Reference (with improvement) Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+4p+2	G=	IG=8	G=40	IG=9	G=	IG=6	G=	IG=	G=	IG=
1+4p+2	G=	IG=8	G=40	IG=9	G=	IG=6	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Carpenter Road EB														
1A	A	3.50	Y	N			255		1965	0.130	215		1965	0.109
Carpenter Road WB														
1B	A	4.60	Y	N			150		2075	0.072	225		2075	0.108
Lung Kong Road NB														
2A	C	3.50	Y	N	10		135	100%	1710	0.079	170	100%	1710	0.099
2B	C	3.50	N	N	13		175	100%	1880	0.093	195	100%	1880	0.104
3P	A,B		6GM +	10FG =	16	sec								
4P	B		9GM +	7FG =	16	sec								

Notes:

AM Peak	1+4p+2	PM Peak	1+4p+2
Sum of Critical *y* *Y*	0.223	Sum of Critical *y* *Y*	0.213
Lost Time *L* (sec)	61	Lost Time *L* (sec)	61
Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
Practical *Y* *Ypr*	0.443	Practical *Y* *Ypr*	0.423
Reserve Capacity *RC*	99%	Reserve Capacity *RC*	98%

Date : 5/12/2022 Junction : J5 - Carpenter Road / Lung Kong Road

ATKINS CHINA LIMITED

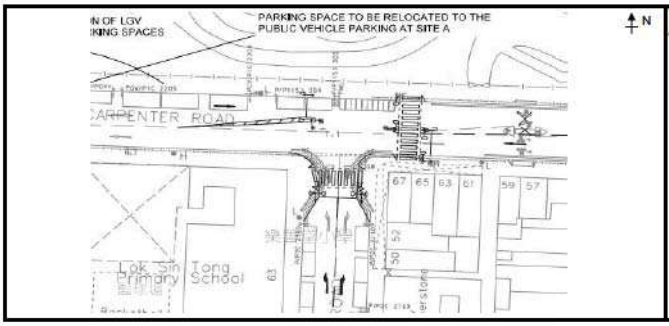
TRAFFIC SIGNAL CALCULATION SHEET

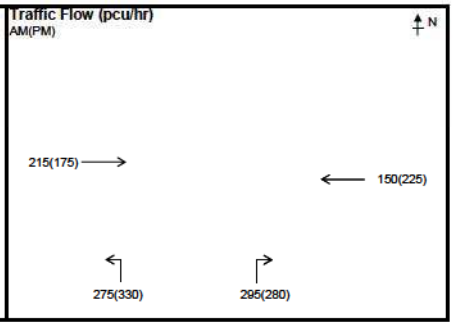
ATKINS

JOB NO. : 5205867

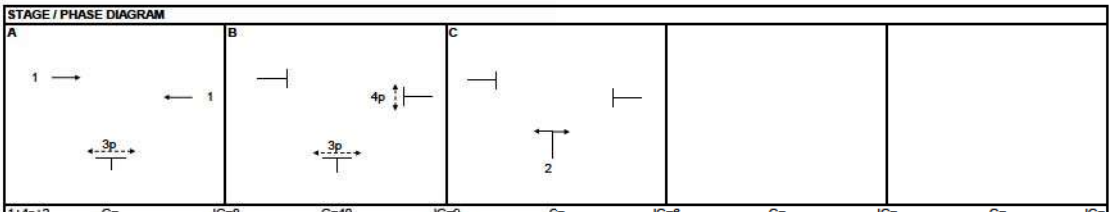
Junction : J5 - Carpenter Road / Lung Kong Road Design Year: 2037

Scheme : Design (with improvement) Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+4p+2	G=	IG=8	G=40	IG=9	G=	IG=6	G=	IG=	G=	IG=		
1+4p+2	G=	IG=8	G=40	IG=9	G=	IG=6	G=	IG=	G=	IG=		

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Carpenter Road EB														
1A	A	3.50	Y	N			215		1965	0.109	175		1965	0.089
Carpenter Road WB														
1B	A	4.60	Y	N			150		2075	0.072	225		2075	0.108
Lung Kong Road NB														
2A	C	3.50	Y	N	10		275	100%	1710	0.161	330	100%	1710	0.193
2B	C	3.50	N	N	13		295	100%	1880	0.157	280	100%	1880	0.149
3P	A,B		6GM +	10FG =	16	sec								
4P	B		9GM +	7FG =	16	sec								

Notes:

AM Peak	1+4p+2	PM Peak	1+4p+2
Sum of Critical *y* *Y*	0.270	Sum of Critical *y* *Y*	0.301
Lost Time *L* (sec)	61	Lost Time *L* (sec)	61
Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
Practical *Y* *Ypr*	0.443	Practical *Y* *Ypr*	0.423
Reserve Capacity *RC*	64%	Reserve Capacity *RC*	40%

Date : 5/12/2022 Junction : J5 - Carpenter Road / Lung Kong Road

ATKINS CHINA LIMITED

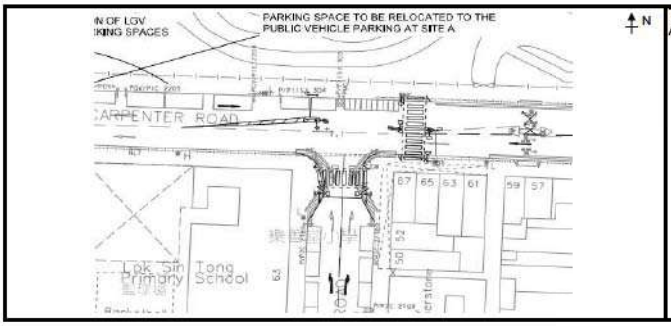
TRAFFIC SIGNAL CALCULATION SHEET

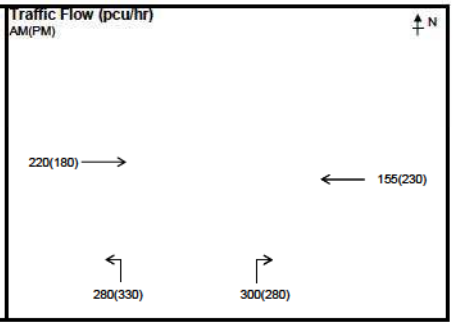
ATKINS

JOB NO. : 5205867

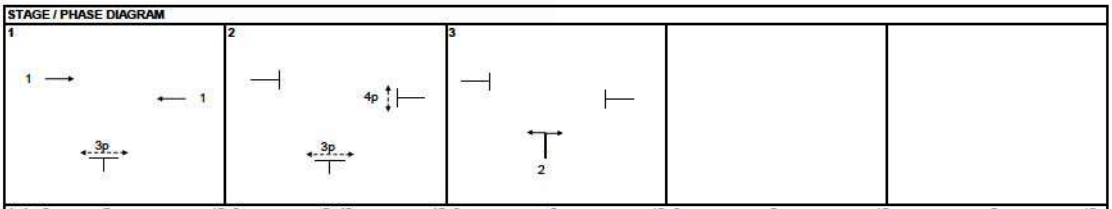
Junction : J5 - Carpenter Road / Lung Kong Road Design Year: 2040

Scheme : Reference (with improvement) Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+4p+2	G=	IG=8	G=40	IG=9	G=	IG=6	G=	IG=	G=	IG=		
1+4p+2	G=	IG=8	G=40	IG=9	G=	IG=6	G=	IG=	G=	IG=		

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Carpenter Road EB														
1A	A	3.50	Y	N			220		1965	**0.112**	180		1965	0.092
Carpenter Road WB														
1B	A	4.60	Y	N			155		2075	0.075	230		2075	**0.111**
Lung Kong Road NB														
2A	C	3.50	Y	N	10		280	100%	1710	0.164	330	100%	1710	0.193
2B	C	3.50	N	N	13		300	100%	1880	0.160	280	100%	1880	0.149
3P	A,B		6GM +	10FG =	16	sec								
4P	B		9GM +	7FG =	16	sec								

Notes:

AM Peak	1+4p+2	PM Peak	1+4p+2
Sum of Critical *y* **Y**	0.276	Sum of Critical *y* **Y**	0.304
Lost Time *L* (sec)	61	Lost Time *L* (sec)	61
Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
Practical *Y* ***Ypr***	0.443	Practical *Y* ***Ypr***	0.423
Reserve Capacity ***RC***	60%	Reserve Capacity ***RC***	39%

Date : 5/12/2022 Junction : J5 - Carpenter Road / Lung Kong Road

ATKINS CHINA LIMITED

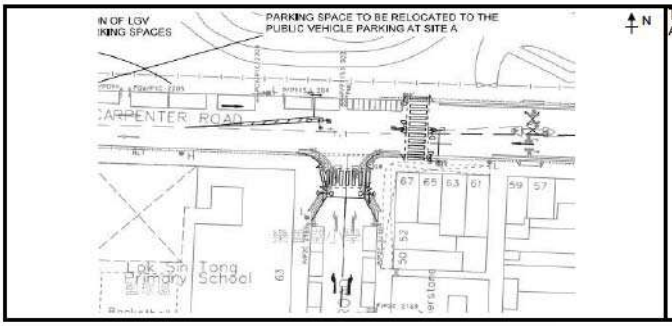
TRAFFIC SIGNAL CALCULATION SHEET

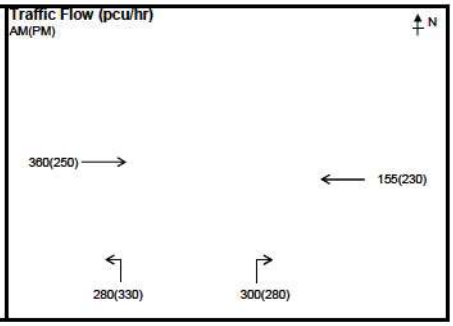
ATKINS

JOB NO. : 5205867

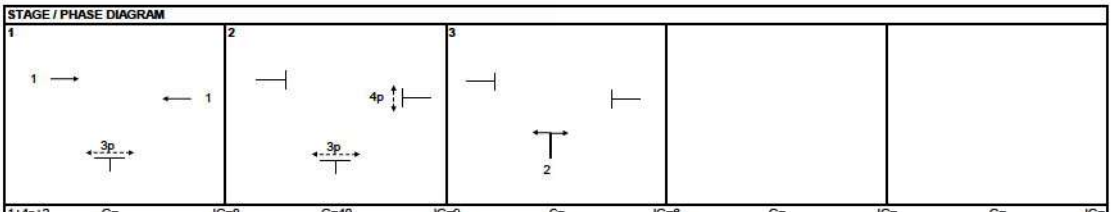
Junction : J5 - Carpenter Road / Lung Kong Road Design Year: 2040

Scheme : Design (with improvement) Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+4p+2	G=	IG=8	G=40	IG=9	G=	IG=6	G=	IG=	G=	IG=
1+4p+2	G=	IG=8	G=40	IG=9	G=	IG=6	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Carpenter Road EB														
1A	A	3.50	Y	N			360		1965	0.183	250		1965	0.127
Carpenter Road WB														
1B	A	4.60	Y	N			155		2075	0.075	230		2075	0.111
Lung Kong Road NB														
2A	C	3.50	Y	N	10		280	100%	1710	0.164	330	100%	1710	0.193
2B	C	3.50	N	N	13		300	100%	1880	0.160	280	100%	1880	0.149
3P	A,B		6GM +	10FG =	16	sec								
4P	B		9GM +	7FG =	16	sec								

Notes:

AM Peak	1+4p+2	PM Peak	1+4p+2
Sum of Critical *y* *Y*	0.347	Sum of Critical *y* *Y*	0.320
Lost Time *L* (sec)	61	Lost Time *L* (sec)	61
Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
Practical *Y* *Ypr*	0.443	Practical *Y* *Ypr*	0.423
Reserve Capacity *RC*	28%	Reserve Capacity *RC*	32%

Date : 5/12/2022 Junction : J5 - Carpenter Road / Lung Kong Road

ATKINS CHINA LIMITED

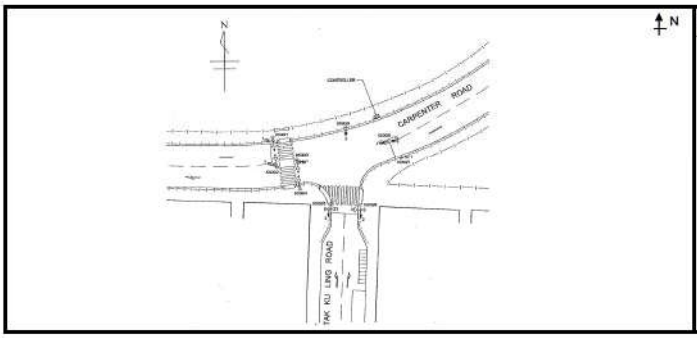
TRAFFIC SIGNAL CALCULATION SHEET

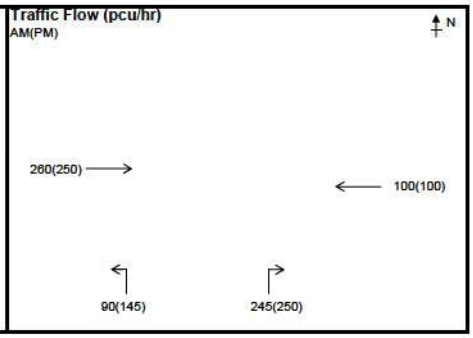
ATKINS

JOB NO. : 5205867

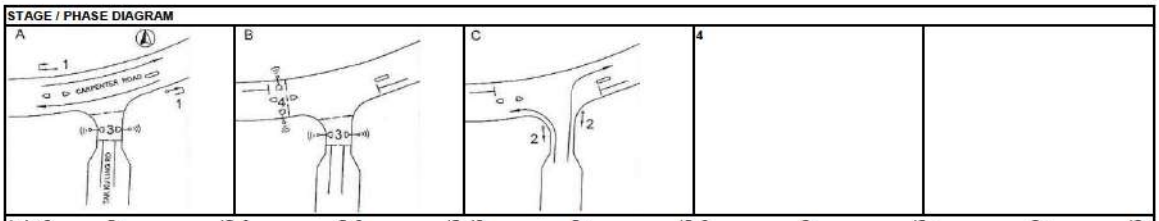
Junction : J6 - Carpenter Road / Tak Ku Ling Road Design Year: 2021

Scheme : Existing Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+4p+2	G=	IG=8	G=9	IG=12	G=	IG=6	G=	IG=	G=	IG=
1+4p+2	G=	IG=8	G=9	IG=12	G=	IG=6	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Carpenter Road EB														
1A	A	5.50	Y	N			260		2165	0.120	250		2165	0.115
Carpenter Road WB														
1B	A	5.00	Y	N			100		2115	0.047	100		2115	0.047
Tak Ku Ling Road NB														
2A	C	3.60	Y	N	10		90	100%	1715	0.052	145	100%	1715	0.085
2B	C	3.60	N	N	15		245	100%	1925	0.127	250	100%	1925	0.130
3p	A,B		9GM +	9FG =	18	sec								
4p	B		9GM +	9FG =	18	sec								

Notes:

AM Peak	1+4p+2	PM Peak	1+4p+2
Sum of Critical *y* *Y*	0.247	Sum of Critical *y* *Y*	0.245
Lost Time *L* (sec)	33	Lost Time *L* (sec)	33
Cycle Time *c* (sec)	100	Cycle Time *c* (sec)	110
Practical *Y* *Ypr*	0.603	Practical *Y* *Ypr*	0.630
Reserve Capacity *RC*	144%	Reserve Capacity *RC*	157%

Date : 5/12/2022 Junction : J6 - Carpenter Road / Tak Ku Ling Road

ATKINS CHINA LIMITED

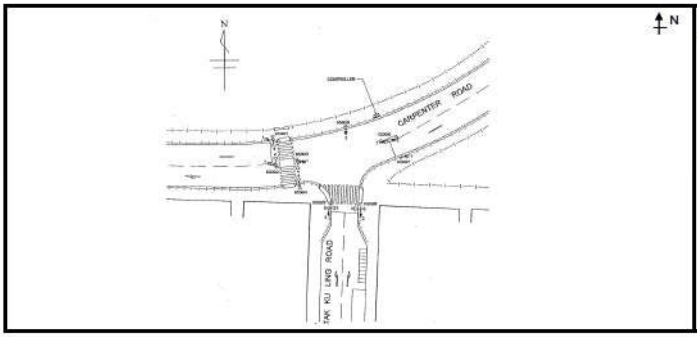
TRAFFIC SIGNAL CALCULATION SHEET

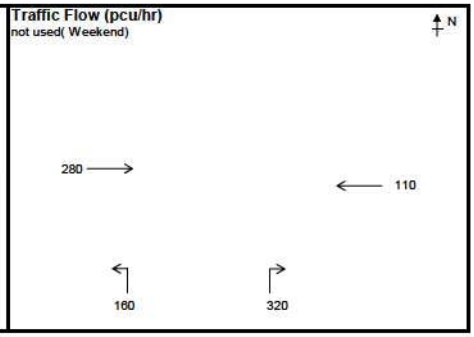
ATKINS

JOB NO. : 5205867

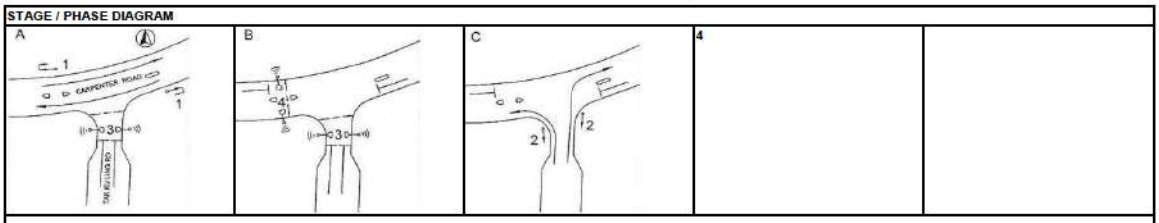
Junction : J6 - Carpenter Road / Tak Ku Ling Road Design Year: 2021

Scheme : Existing - Weekend Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+4p+2	G=	IG=8	G=9	IG=12	G=	IG=6	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	Weekend Peak: Design Flow *q* (pcu/hr)	Proportion turning (%) *f*	Saturation flow *S* (pcu/hr)	Flow factor *y*
Carpenter Road EB										
1A	A	5.50	Y	N			280		2165	**0.129**
Carpenter Road WB										
1B	A	5.00	Y	N			110		2115	0.052
Tak Ku Ling Road NB										
2A	C	3.60	Y	N	10		160	100%	1715	0.093
2B	C	3.60	N	N	15		320	100%	1925	**0.166**
3p	A,B		9GM +	9FG =	18	sec				
4p	B		9GM +	9FG =	18	sec				

Notes:

Weekend Peak	1+4p+2
Sum of Critical *y* **Y**	0.296
Lost Time *L* (sec)	33
Cycle Time *c* (sec)	110
Practical *Y* **Ypr**	0.630
Reserve Capacity *RC*	**113%**

Date : 5/19/2022 Junction : J6 - Carpenter Road / Tak Ku Ling Road

ATKINS CHINA LIMITED

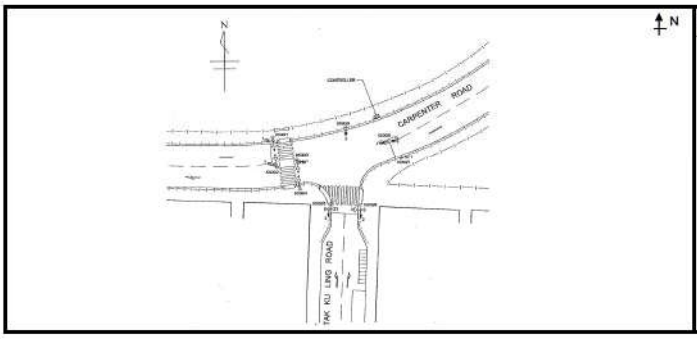
TRAFFIC SIGNAL CALCULATION SHEET

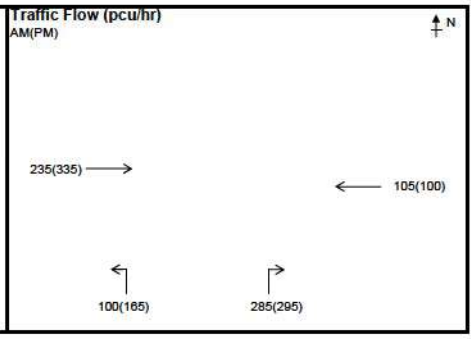
ATKINS

JOB NO. : 5205867

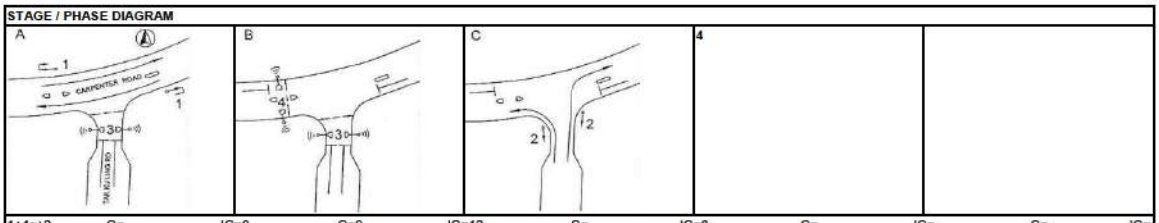
Junction : J6 - Carpenter Road / Tak Ku Ling Road Design Year: 2033

Scheme : Reference Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+4p+2	G=	IG=8	G=9	IG=12	G=	IG=6	G=	IG=	G=	IG=
1+4p+2	G=	IG=8	G=9	IG=12	G=	IG=6	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Carpenter Road EB														
1A	A	5.50	Y	N			235		2165	0.109	335		2165	0.155
Carpenter Road WB														
1B	A	5.00	Y	N			105		2115	0.050	100		2115	0.047
Tak Ku Ling Road NB														
2A	C	3.60	Y	N	10		100	100%	1715	0.058	165	100%	1715	0.096
2B	C	3.60	N	N	15		285	100%	1925	0.148	295	100%	1925	0.153
3p	A,B		9GM +	9FG =	18	sec								
4p	B		9GM +	9FG =	18	sec								

Notes:

AM Peak	1+4p+2	PM Peak	1+4p+2
Sum of Critical *y* *Y*	0.257	Sum of Critical *y* *Y*	0.308
Lost Time *L* (sec)	33	Lost Time *L* (sec)	33
Cycle Time *c* (sec)	100	Cycle Time *c* (sec)	110
Practical *Y* *Ypr*	0.603	Practical *Y* *Ypr*	0.630
Reserve Capacity *RC*	135%	Reserve Capacity *RC*	105%

Date : 5/12/2022 Junction : J6 - Carpenter Road / Tak Ku Ling Road

ATKINS CHINA LIMITED

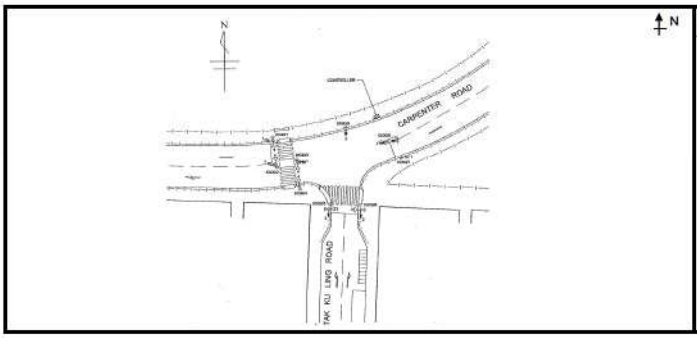
TRAFFIC SIGNAL CALCULATION SHEET

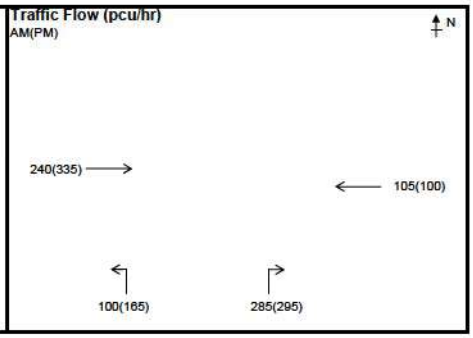
ATKINS

JOB NO. : 5205867

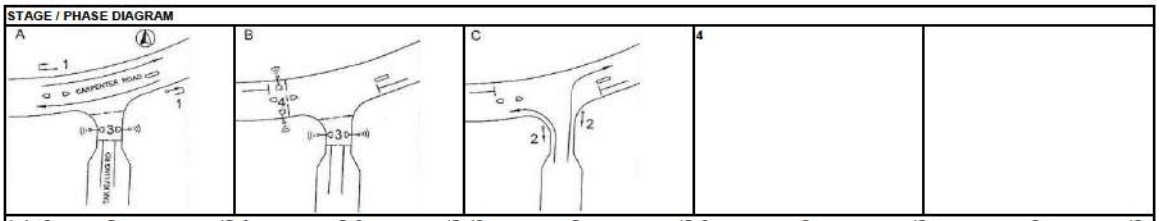
Junction : J6 - Carpenter Road / Tak Ku Ling Road Design Year: 2033

Scheme : Design Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+4p+2	G=	IG=8	G=9	IG=12	G=	IG=6	G=	IG=	G=	IG=
1+4p+2	G=	IG=8	G=9	IG=12	G=	IG=6	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Carpenter Road EB														
1A	A	5.50	Y	N			240		2165	**0.111**	335		2165	**0.155**
Carpenter Road WB														
1B	A	5.00	Y	N			105		2115	0.050	100		2115	0.047
Tak Ku Ling Road NB														
2A	C	3.60	Y	N	10		100	100%	1715	0.058	165	100%	1715	0.096
2B	C	3.60	N	N	15		285	100%	1925	**0.148**	295	100%	1925	**0.153**
3p	A,B		9GM +	9FG =	18	sec								
4p	B		9GM +	9FG =	18	sec								

Notes:	AM Peak	1+4p+2	PM Peak	1+4p+2
	Sum of Critical *y* *Y*	0.259	Sum of Critical *y* *Y*	0.308
	Lost Time *L* (sec)	33	Lost Time *L* (sec)	33
	Cycle Time *c* (sec)	100	Cycle Time *c* (sec)	110
	Practical *Y* *Ypr*	0.603	Practical *Y* *Ypr*	0.630
	Reserve Capacity *RC*	133%	Reserve Capacity *RC*	105%

Date : 5/12/2022 Junction : J6 - Carpenter Road / Tak Ku Ling Road

ATKINS CHINA LIMITED

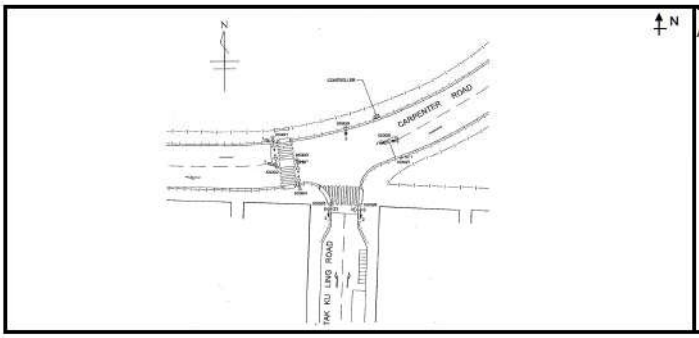
TRAFFIC SIGNAL CALCULATION SHEET

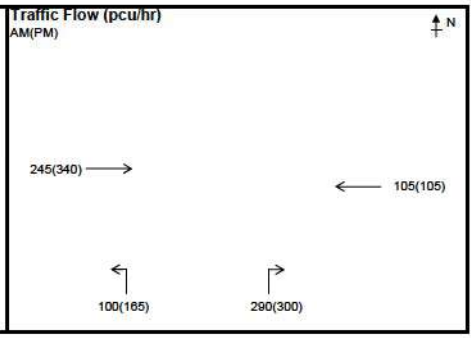
ATKINS

JOB NO. : 5205867

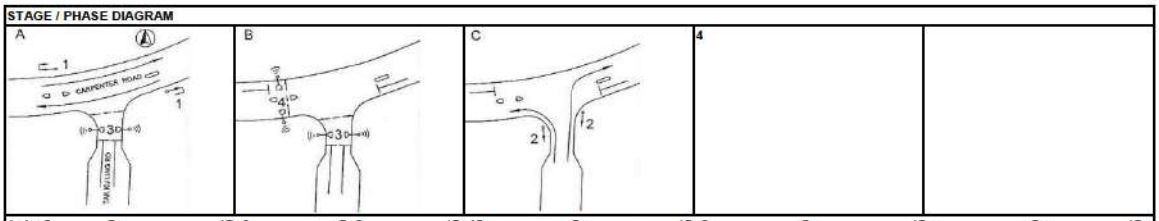
Junction : J6 - Carpenter Road / Tak Ku Ling Road Design Year: 2036

Scheme : Reference Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+4p+2	G=	IG=8	G=9	IG=12	G=	IG=6	G=	IG=	G=	IG=
1+4p+2	G=	IG=8	G=9	IG=12	G=	IG=6	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Carpenter Road EB														
1A	A	5.50	Y	N			245		2165	**0.113**	340		2165	**0.157**
Carpenter Road WB														
1B	A	5.00	Y	N			105		2115	0.050	105		2115	0.050
Tak Ku Ling Road NB														
2A	C	3.60	Y	N	10		100	100%	1715	0.058	165	100%	1715	0.096
2B	C	3.60	N	N	15		290	100%	1925	**0.151**	300	100%	1925	**0.156**
3p	A,B		9GM +	9FG =	18	sec								
4p	B		9GM +	9FG =	18	sec								

Notes:	AM Peak	1+4p+2	PM Peak	1+4p+2
	Sum of Critical *y* *Y*	**0.264**	Sum of Critical *y* *Y*	**0.313**
	Lost Time *L* (sec)	33	Lost Time *L* (sec)	33
	Cycle Time *c* (sec)	100	Cycle Time *c* (sec)	110
	Practical *Y* *Ypr*	0.603	Practical *Y* *Ypr*	0.630
	Reserve Capacity *RC*	**129%**	Reserve Capacity *RC*	**101%**

Date : 5/12/2022 Junction : J6 - Carpenter Road / Tak Ku Ling Road

ATKINS CHINA LIMITED

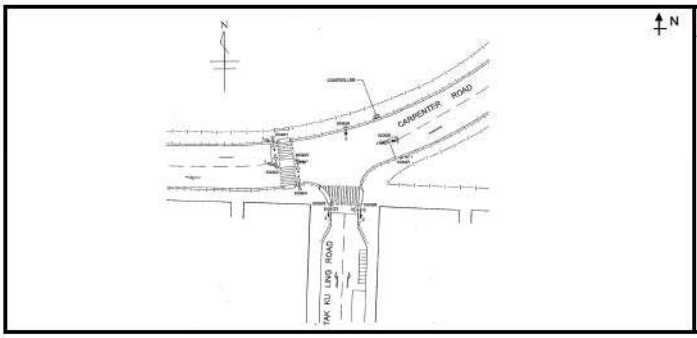
TRAFFIC SIGNAL CALCULATION SHEET

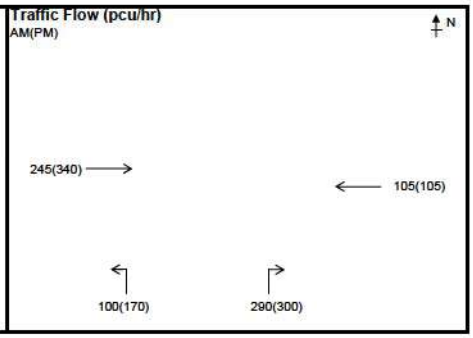
ATKINS

JOB NO. : 5205867

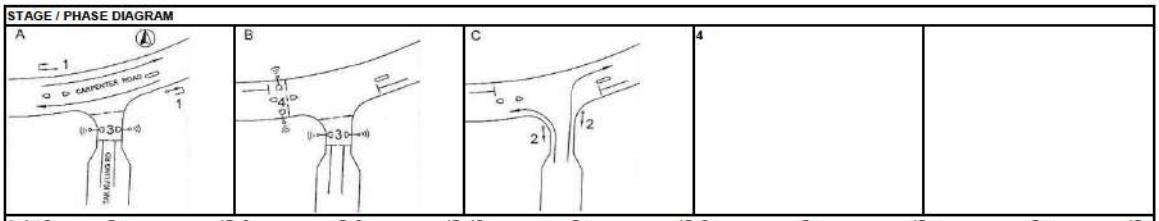
Junction : J6 - Carpenter Road / Tak Ku Ling Road Design Year: 2036

Scheme : Design Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+4p+2	G=	IG=8	G=9	IG=12	G=	IG=6	G=	IG=	G=	IG=
1+4p+2	G=	IG=8	G=9	IG=12	G=	IG=6	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Carpenter Road EB														
1A	A	5.50	Y	N			245		2165	**0.113**	340		2165	**0.157**
Carpenter Road WB														
1B	A	5.00	Y	N			105		2115	0.050	105		2115	0.050
Tak Ku Ling Road NB														
2A	C	3.60	Y	N	10		100	100%	1715	0.058	170	100%	1715	0.099
2B	C	3.60	N	N	15		290	100%	1925	**0.151**	300	100%	1925	**0.156**
3p	A,B		9GM +	9FG =	18	sec								
4p	B		9GM +	9FG =	18	sec								

Notes:	AM Peak	1+4p+2	PM Peak	1+4p+2
	Sum of Critical *y* *Y*	**0.264**	Sum of Critical *y* *Y*	**0.313**
	Lost Time *L* (sec)	33	Lost Time *L* (sec)	33
	Cycle Time *c* (sec)	100	Cycle Time *c* (sec)	110
	Practical *Y* *Ypr*	0.603	Practical *Y* *Ypr*	0.630
	Reserve Capacity *RC*	**129%**	Reserve Capacity *RC*	**101%**

Date : 5/12/2022 Junction : J6 - Carpenter Road / Tak Ku Ling Road

ATKINS CHINA LIMITED

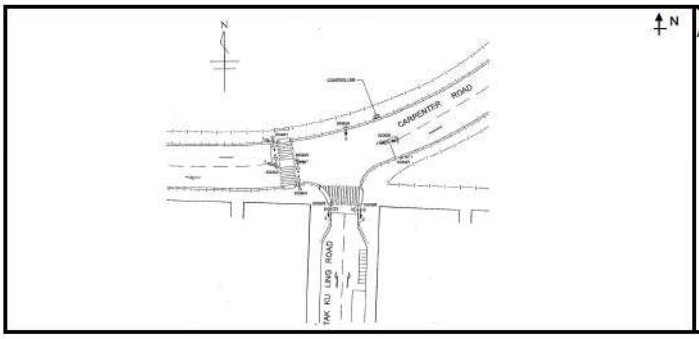
TRAFFIC SIGNAL CALCULATION SHEET

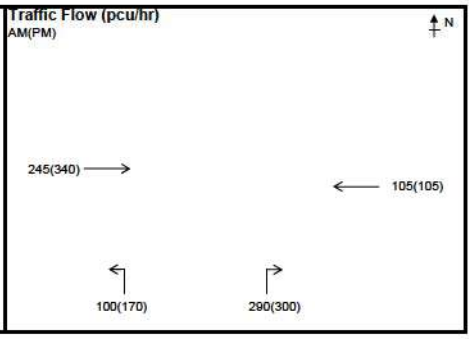
ATKINS

JOB NO. : 5205867

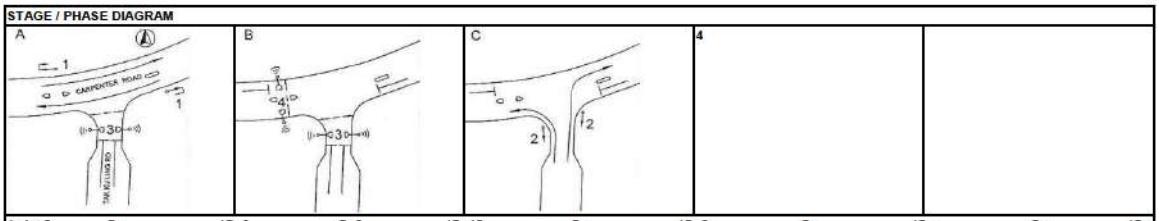
Junction : J6 - Carpenter Road / Tak Ku Ling Road Design Year: 2037

Scheme : Reference Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+4p+2	G=	IG=8	G=9	IG=12	G=	IG=6	G=	IG=	G=	IG=
1+4p+2	G=	IG=8	G=9	IG=12	G=	IG=6	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Carpenter Road EB														
1A	A	5.50	Y	N			245		2165	**0.113**	340		2165	**0.157**
Carpenter Road WB														
1B	A	5.00	Y	N			105		2115	0.050	105		2115	0.050
Tak Ku Ling Road NB														
2A	C	3.60	Y	N	10		100	100%	1715	0.058	170	100%	1715	0.099
2B	C	3.60	N	N	15		290	100%	1925	**0.151**	300	100%	1925	**0.156**
3p	A,B		9GM +	9FG =	18	sec								
4p	B		9GM +	9FG =	18	sec								

Notes:	AM Peak	1+4p+2	PM Peak	1+4p+2
	Sum of Critical *y* *Y*	**0.264**	Sum of Critical *y* *Y*	**0.313**
	Lost Time *L* (sec)	33	Lost Time *L* (sec)	33
	Cycle Time *c* (sec)	100	Cycle Time *c* (sec)	110
	Practical *Y* *Ypr*	0.603	Practical *Y* *Ypr*	0.630
	Reserve Capacity *RC*	**129%**	Reserve Capacity *RC*	**101%**

Date : 5/12/2022 Junction : J6 - Carpenter Road / Tak Ku Ling Road

ATKINS CHINA LIMITED

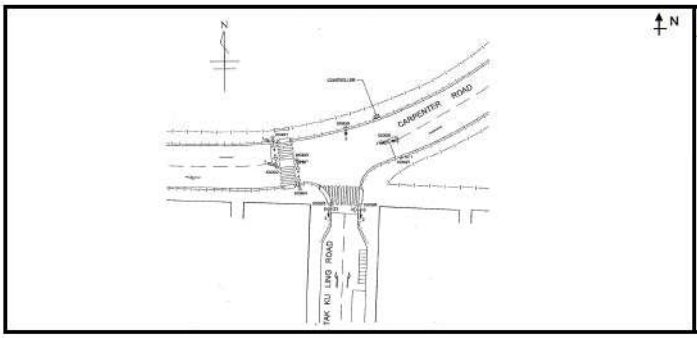
TRAFFIC SIGNAL CALCULATION SHEET

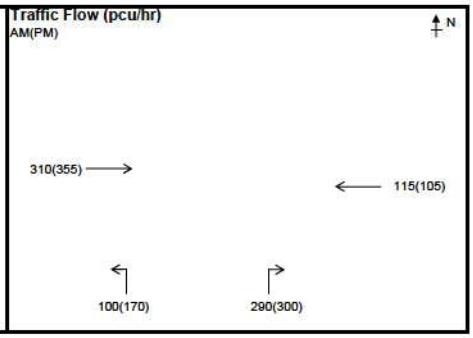
ATKINS

JOB NO. : 5205867

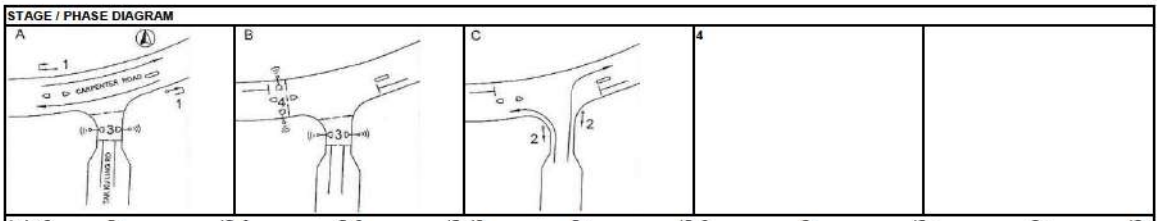
Junction : J6 - Carpenter Road / Tak Ku Ling Road Design Year: 2037

Scheme : Design Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+4p+2	G=	IG=8	G=9	IG=12	G=	IG=6	G=	IG=	G=	IG=
1+4p+2	G=	IG=8	G=9	IG=12	G=	IG=6	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Carpenter Road EB														
1A	A	5.50	Y	N			310		2165	0.143	355		2165	0.164
Carpenter Road WB														
1B	A	5.00	Y	N			115		2115	0.054	105		2115	0.050
Tak Ku Ling Road NB														
2A	C	3.60	Y	N	10		100	100%	1715	0.058	170	100%	1715	0.099
2B	C	3.60	N	N	15		290	100%	1925	0.151	300	100%	1925	0.156
3p	A,B		9GM +	9FG =	18	sec								
4p	B		9GM +	9FG =	18	sec								

Notes:

AM Peak	1+4p+2	PM Peak	1+4p+2
Sum of Critical *y* *Y*	0.294	Sum of Critical *y* *Y*	0.320
Lost Time *L* (sec)	33	Lost Time *L* (sec)	33
Cycle Time *c* (sec)	100	Cycle Time *c* (sec)	110
Practical *Y* *Ypr*	0.603	Practical *Y* *Ypr*	0.630
Reserve Capacity *RC*	105%	Reserve Capacity *RC*	97%

Date : 5/12/2022 Junction : J6 - Carpenter Road / Tak Ku Ling Road

ATKINS CHINA LIMITED

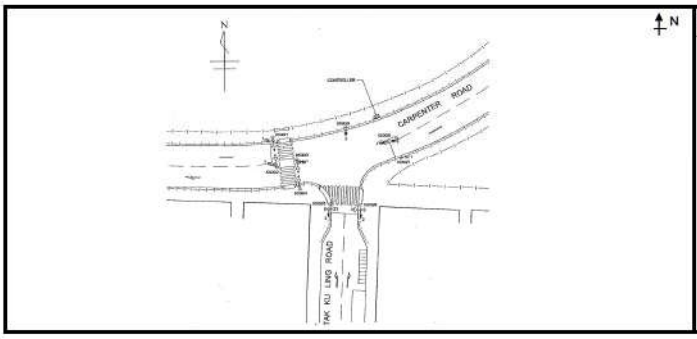
TRAFFIC SIGNAL CALCULATION SHEET

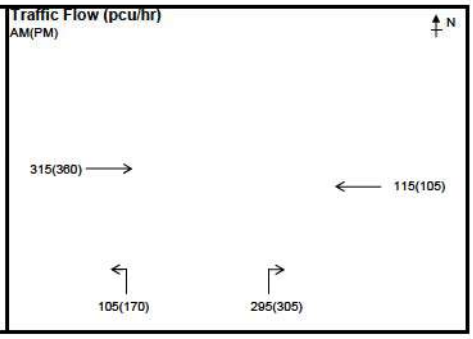
ATKINS

JOB NO. : 5205867

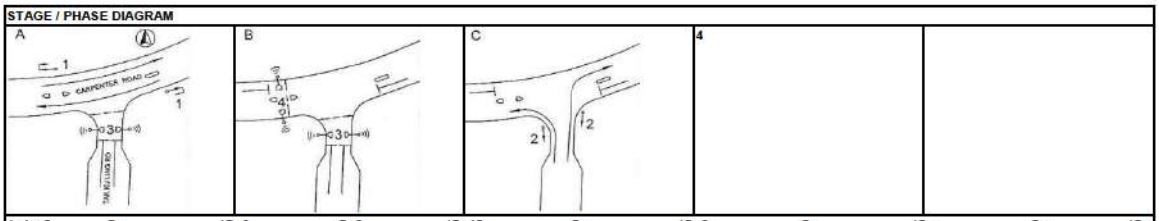
Junction : J6 - Carpenter Road / Tak Ku Ling Road Design Year: 2040

Scheme : Reference Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+4p+2	G=	IG=8	G=9	IG=12	G=	IG=6	G=	IG=	G=	IG=
1+4p+2	G=	IG=8	G=9	IG=12	G=	IG=6	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Carpenter Road EB														
1A	A	5.50	Y	N			315		2165	0.145	360		2165	0.166
Carpenter Road WB														
1B	A	5.00	Y	N			115		2115	0.054	105		2115	0.050
Tak Ku Ling Road NB														
2A	C	3.60	Y	N	10		105	100%	1715	0.061	170	100%	1715	0.099
2B	C	3.60	N	N	15		295	100%	1925	0.153	305	100%	1925	0.158
3p	A,B		9GM +	9FG =	18	sec								
4p	B		9GM +	9FG =	18	sec								

Notes:	AM Peak	1+4p+2	PM Peak	1+4p+2
	Sum of Critical *y* *Y*	0.299	Sum of Critical *y* *Y*	0.325
	Lost Time *L* (sec)	33	Lost Time *L* (sec)	33
	Cycle Time *c* (sec)	100	Cycle Time *c* (sec)	110
	Practical *Y* *Ypr*	0.603	Practical *Y* *Ypr*	0.630
	Reserve Capacity *RC*	102%	Reserve Capacity *RC*	94%

Date : 5/12/2022 Junction : J6 - Carpenter Road / Tak Ku Ling Road

ATKINS CHINA LIMITED

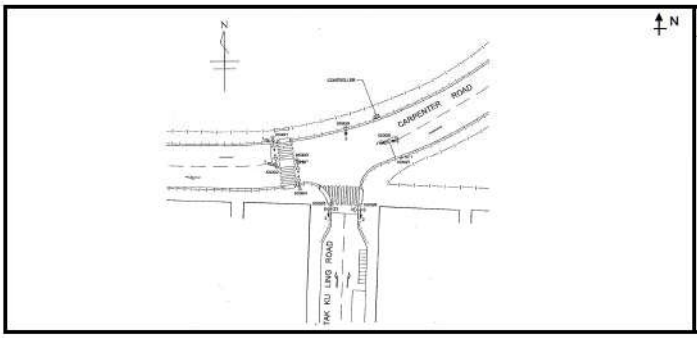
TRAFFIC SIGNAL CALCULATION SHEET

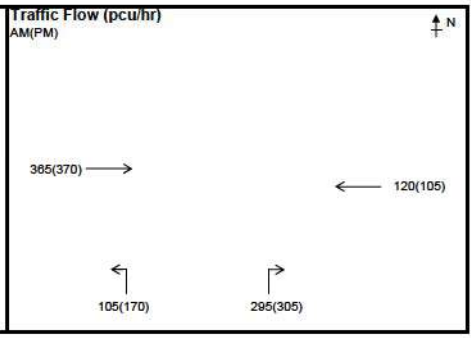
ATKINS

JOB NO. : 5205867

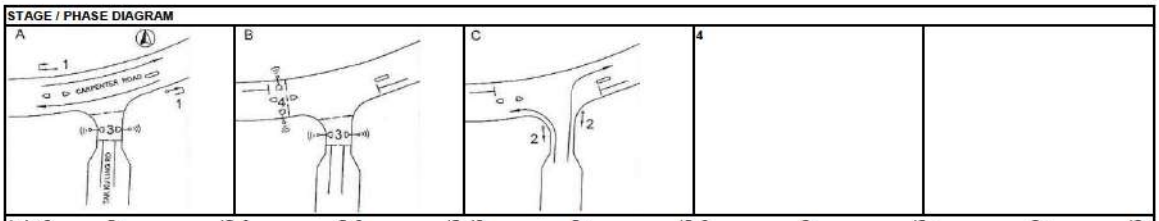
Junction : J6 - Carpenter Road / Tak Ku Ling Road Design Year: 2040

Scheme : Design Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+4p+2	G=	IG=8	G=9	IG=12	G=	IG=6	G=	IG=	G=	IG=
1+4p+2	G=	IG=8	G=9	IG=12	G=	IG=6	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Carpenter Road EB														
1A	A	5.50	Y	N			365		2165	**0.169**	370		2165	**0.171**
Carpenter Road WB														
1B	A	5.00	Y	N			120		2115	0.057	105		2115	0.050
Tak Ku Ling Road NB														
2A	C	3.60	Y	N	10		105	100%	1715	0.061	170	100%	1715	0.099
2B	C	3.60	N	N	15		295	100%	1925	**0.153**	305	100%	1925	**0.158**
3p	A,B		9GM +	9FG =	18	sec								
4p	B		9GM +	9FG =	18	sec								

Notes:	AM Peak	1+4p+2	PM Peak	1+4p+2
	Sum of Critical *y* *Y*	0.322	Sum of Critical *y* *Y*	0.329
	Lost Time *L* (sec)	33	Lost Time *L* (sec)	33
	Cycle Time *c* (sec)	100	Cycle Time *c* (sec)	110
	Practical *Y* *Ypr*	0.603	Practical *Y* *Ypr*	0.630
	Reserve Capacity *RC*	87%	Reserve Capacity *RC*	91%

Date : 5/12/2022 Junction : J6 - Carpenter Road / Tak Ku Ling Road

ATKINS CHINA LIMITED

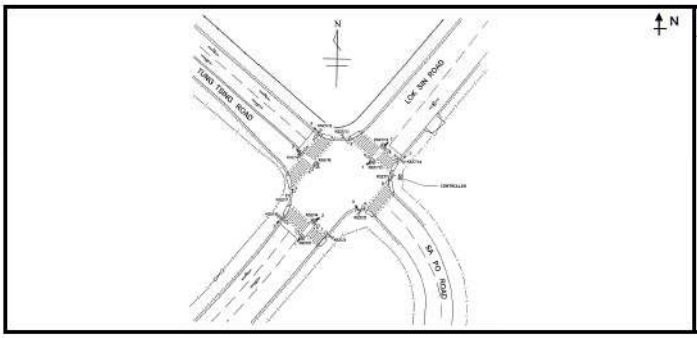
TRAFFIC SIGNAL CALCULATION SHEET

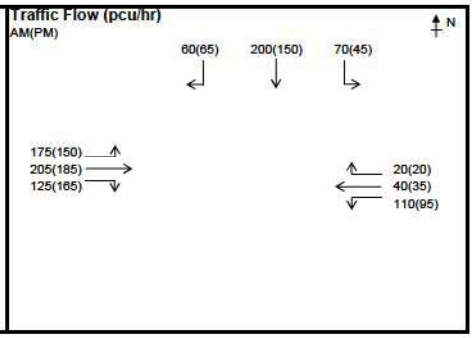
ATKINS

JOB NO. : 5205867

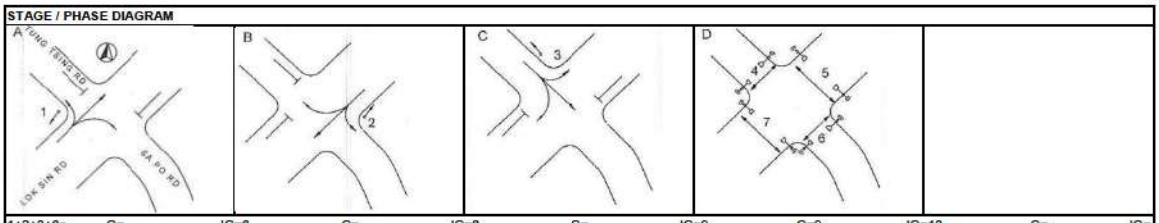
Junction : J7 - Tung Tsing Road / Lok Sin Road / Sa Po Road Design Year: 2021

Scheme : Existing Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+2+3+6p	G=	IG=6	G=	IG=6	G=	IG=9	G=9	IG=13	G=	IG=
1+2+3+6p	G=	IG=6	G=	IG=6	G=	IG=9	G=9	IG=13	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Lok Sin Road EB														
1A	A	3.00	Y	N	10		239	73%	1725	**0.139**	241	62%	1750	0.138
1B	A	3.00	N	N	10		266	47%	1920	0.139	259	64%	1875	**0.138**
Lok Sin Road WB														
2A	B	4.50	Y	N	10/10		170	65% / 12%	1855	**0.092**	150	63% / 13%	1850	**0.081**
Tung Tsing Road SB														
3A	C	2.85	Y	N	10		158	44%	1780	**0.089**	127	35%	1805	**0.070**
3B	C	2.85	N	N	10		172	35%	1940	0.089	133	49%	1900	0.070
4p	D		9GM +	9FG =	18	sec								
5p	D		9GM +	9FG =	18	sec								
6p	D		9GM +	10FG =	19	sec								
7p	D		9GM +	9FG =	18	sec								

Notes:

	AM Peak	1+2+3+6p	PM Peak	1+2+3+6p
Sum of Critical *y* *Y*		0.319		0.290
Lost Time *L* (sec)		40		40
Cycle Time *c* (sec)		100		110
Practical *Y* *Ypr*		0.540		0.573
Reserve Capacity *RC*		69%		98%

Date : 5/12/2022 Junction : J7 - Tung Tsing Road / Lok Sin Road / Sa Po Road

ATKINS CHINA LIMITED

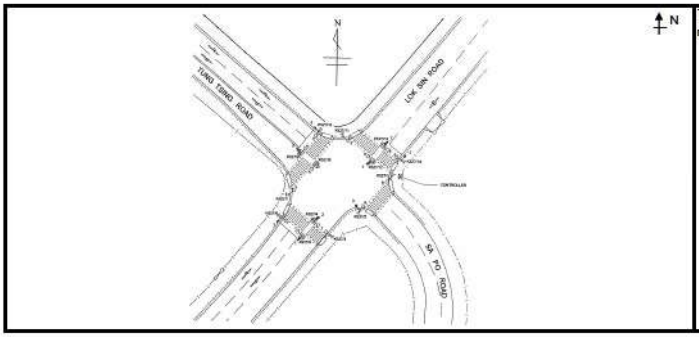
TRAFFIC SIGNAL CALCULATION SHEET

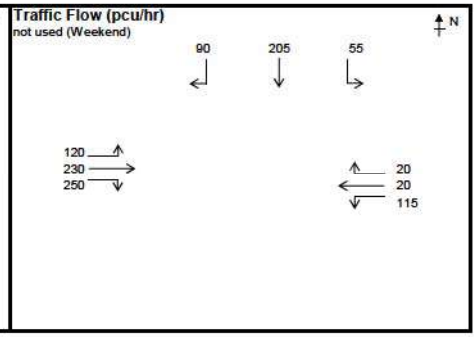
ATKINS

JOB NO. : 5205867

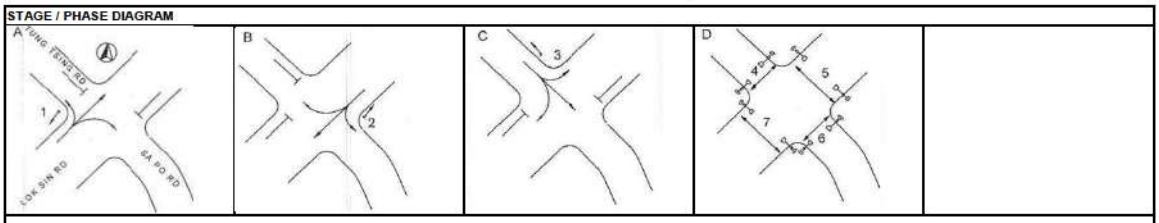
Junction : J7 - Tung Tsing Road / Lok Sin Road / Sa Po Road Design Year: 2021

Scheme : Existing - Weekend Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+2+3+6p	G=	IG=6	G=	IG=8	G=	IG=9	G=9	IG=13	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	Weekend Peak: Design Flow *q* (pcu/hr)	Proportion turning (%) *f*	Saturation flow *S* (pcu/hr)	Flow factor *y*
Lok Sin Road EB										
1A	A	3.00	Y	N	10		298	40%	1805	**0.165**
1B	A	3.00	N	N	10		302	83%	1830	0.165
Lok Sin Road WB										
2A	B	4.50	Y	N	10/10		155	74% / 13%	1825	**0.085**
Tung Tsing Road SB										
3A	C	2.85	Y	N	10		171	32%	1815	0.094
3B	C	2.85	N	N	10		179	50%	1895	**0.094**
4p	D		9GM +	9FG =	18	sec				
5p	D		9GM +	9FG =	18	sec				
6p	D		9GM +	10FG =	19	sec				
7p	D		9GM +	9FG =	18	sec				

Notes:

Weekend Peak	1+2+3+6p
Sum of Critical *y* **Y**	0.344
Lost Time *L* (sec)	40
Cycle Time *c* (sec)	110
Practical *Y* ***Ypr***	0.573
Reserve Capacity ***RC***	66%

Date : 5/19/2022 Junction : J7 - Tung Tsing Road / Lok Sin Road / Sa Po Road

ATKINS CHINA LIMITED

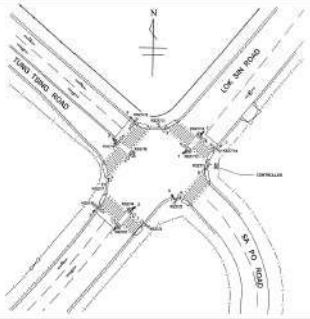
TRAFFIC SIGNAL CALCULATION SHEET

ATKINS

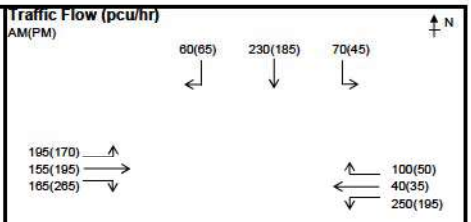
JOB NO. : 5205867

Junction : J7 - Tung Tsing Road / Lok Sin Road / Sa Po Road Design Year: 2033

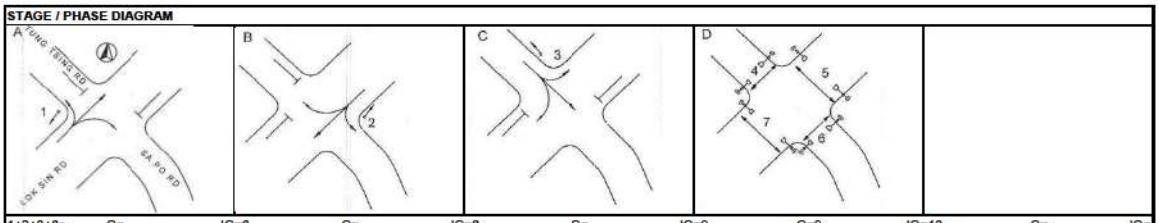
Scheme : Reference Designed by: RC Checked by: EC



Traffic Flow (pcu/hr)
AM(PM)



STAGE / PHASE DIAGRAM



1+2+3+6p	G=	IG=6	G=	IG=8	G=	IG=9	G=9	IG=13	G=	IG=
1+2+3+6p	G=	IG=6	G=	IG=8	G=	IG=9	G=9	IG=13	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Lok Sin Road EB														
1A	A	3.00	Y	N	10		245	80%	1710	0.143	310	55%	1770	**0.175**
1B	A	3.00	N	N	10		270	61%	1880	**0.144**	320	83%	1830	0.175
Lok Sin Road WB														
2A	B	4.50	Y	N	10/10		390	64% / 26%	1820	**0.214**	280	70% / 18%	1825	**0.153**
Tung Tsing Road SB														
3A	C	2.85	Y	N	10		173	40%	1790	**0.097**	143	31%	1815	0.079
3B	C	2.85	N	N	10		187	32%	1945	0.096	152	43%	1915	**0.079**
4p	D		9GM +	9FG =	18	sec								
5p	D		9GM +	9FG =	18	sec								
6p	D		9GM +	10FG =	19	sec								
7p	D		9GM +	9FG =	18	sec								

Notes:

AM Peak	1+2+3+6p	PM Peak	1+2+3+6p
Sum of Critical *y* **Y**	**0.455**	Sum of Critical *y* **Y**	**0.408**
Lost Time ***L*** (sec)	40	Lost Time ***L*** (sec)	40
Cycle Time ***c*** (sec)	100	Cycle Time ***c*** (sec)	110
Practical Y ***Ypr***	0.540	Practical Y ***Ypr***	0.573
Reserve Capacity ***RC***	**19%**	Reserve Capacity ***RC***	**40%**

Date : 5/12/2022 Junction : J7 - Tung Tsing Road / Lok Sin Road / Sa Po Road

ATKINS CHINA LIMITED

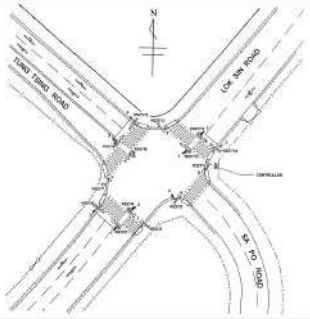
TRAFFIC SIGNAL CALCULATION SHEET

ATKINS

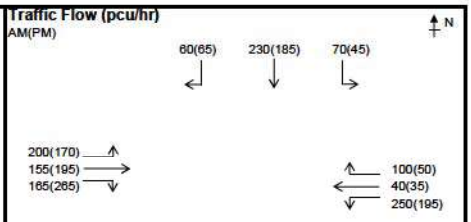
JOB NO. : 5205867

Junction : J7 - Tung Tsing Road / Lok Sin Road / Sa Po Road Design Year: 2033

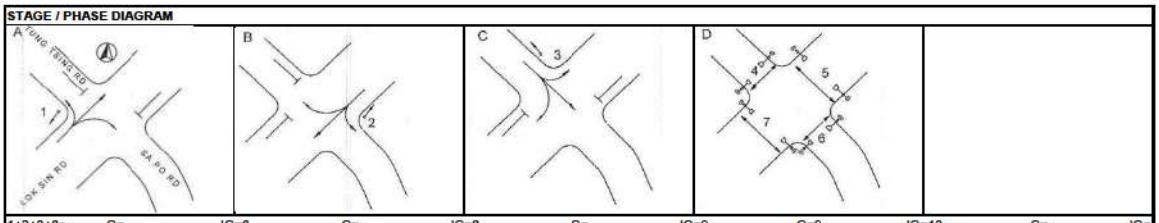
Scheme : Design Designed by: RC Checked by: EC



Traffic Flow (pcu/hr)
AM(PM)



STAGE / PHASE DIAGRAM



1+2+3+6p	G=	IG=6	G=	IG=8	G=	IG=9	G=9	IG=13	G=	IG=	
1+2+3+6p	G=	IG=6	G=	IG=8	G=	IG=9	G=9	IG=13	G=	IG=	

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Lok Sin Road EB														
1A	A	3.00	Y	N	10		247	81%	1710	0.144	310	55%	1770	**0.175**
1B	A	3.00	N	N	10		273	60%	1885	**0.145**	320	83%	1830	0.175
Lok Sin Road WB														
2A	B	4.50	Y	N	10/10		390	64% / 26%	1820	**0.214**	280	70% / 18%	1825	**0.153**
Tung Tsing Road SB														
3A	C	2.85	Y	N	10		173	40%	1790	**0.097**	143	31%	1815	0.079
3B	C	2.85	N	N	10		187	32%	1945	0.096	152	43%	1915	**0.079**
4p	D		9GM +	9FG =	18	sec								
5p	D		9GM +	9FG =	18	sec								
6p	D		9GM +	10FG =	19	sec								
7p	D		9GM +	9FG =	18	sec								

Notes:

AM Peak	1+2+3+6p	PM Peak	1+2+3+6p
Sum of Critical *y* **Y**	**0.456**	Sum of Critical *y* **Y**	**0.408**
Lost Time ***L*** (sec)	40	Lost Time ***L*** (sec)	40
Cycle Time ***c*** (sec)	100	Cycle Time ***c*** (sec)	110
Practical Y ***Ypr***	0.540	Practical Y ***Ypr***	0.573
Reserve Capacity ***RC***	**18%**	Reserve Capacity ***RC***	**40%**

Date : 5/12/2022 Junction : J7 - Tung Tsing Road / Lok Sin Road / Sa Po Road

ATKINS CHINA LIMITED

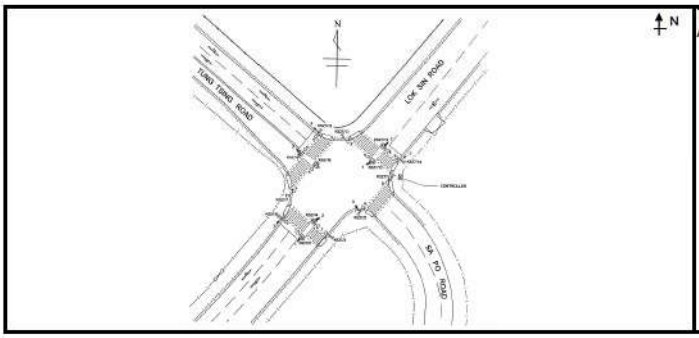
TRAFFIC SIGNAL CALCULATION SHEET

ATKINS

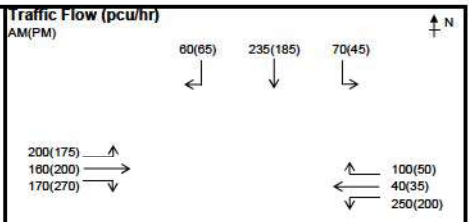
JOB NO. : 5205867

Junction : J7 - Tung Tsing Road / Lok Sin Road / Sa Po Road Design Year: 2036

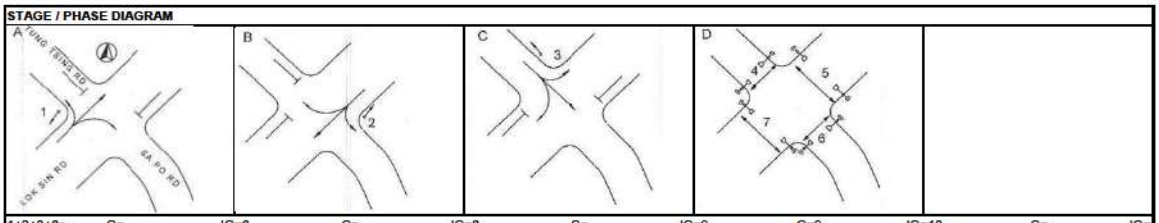
Scheme : Reference Designed by: RC Checked by: EC



Traffic Flow (pcu/hr)
AM(PM)



STAGE / PHASE DIAGRAM



1+2+3+6p	G=	IG=6	G=	IG=8	G=	IG=9	G=9	IG=13	G=	IG=
1+2+3+6p	G=	IG=6	G=	IG=8	G=	IG=9	G=9	IG=13	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Lok Sin Road EB														
1A	A	3.00	Y	N	10		252	79%	1710	0.147	317	55%	1770	0.179
1B	A	3.00	N	N	10		278	61%	1880	**0.148**	328	82%	1830	**0.179**
Lok Sin Road WB														
2A	B	4.50	Y	N	10/10		390	64% / 26%	1820	**0.214**	285	70% / 18%	1825	**0.156**
Tung Tsing Road SB														
3A	C	2.85	Y	N	10		175	40%	1790	**0.098**	143	31%	1815	0.079
3B	C	2.85	N	N	10		190	32%	1950	0.097	152	43%	1915	**0.079**
4p	D		9GM +	9FG =	18	sec								
5p	D		9GM +	9FG =	18	sec								
6p	D		9GM +	10FG =	19	sec								
7p	D		9GM +	9FG =	18	sec								

Notes:

AM Peak	1+2+3+6p	PM Peak	1+2+3+6p
Sum of Critical *y* **Y**	**0.460**	Sum of Critical *y* **Y**	**0.415**
Lost Time ***L*** (sec)	40	Lost Time ***L*** (sec)	40
Cycle Time ***c*** (sec)	100	Cycle Time ***c*** (sec)	110
Practical Y ***Ypr***	0.540	Practical Y ***Ypr***	0.573
Reserve Capacity ***RC***	**17%**	Reserve Capacity ***RC***	**38%**

Date : 5/12/2022 Junction : J7 - Tung Tsing Road / Lok Sin Road / Sa Po Road

ATKINS CHINA LIMITED

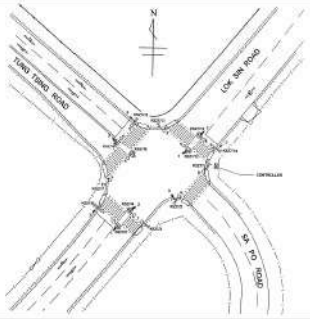
TRAFFIC SIGNAL CALCULATION SHEET

ATKINS

JOB NO. : 5205867

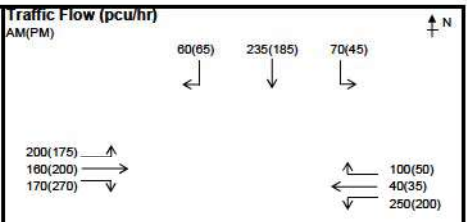
Junction : J7 - Tung Tsing Road / Lok Sin Road / Sa Po Road Design Year: 2036

Scheme : Design Designed by: RC Checked by: EC

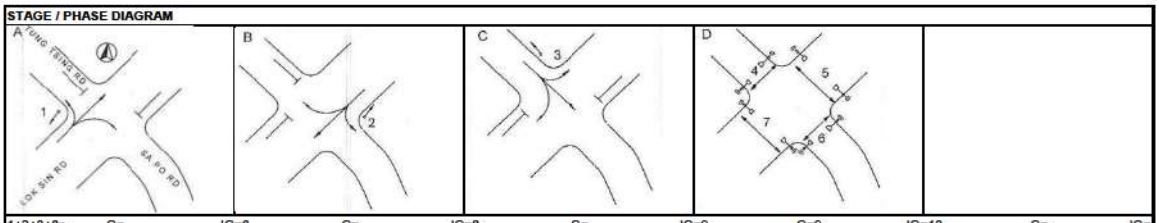


Traffic Flow (pcu/hr)

AM(PM)



STAGE / PHASE DIAGRAM



1+2+3+6p	G=	IG=6	G=	IG=8	G=	IG=9	G=9	IG=13	G=	IG=	
1+2+3+6p	G=	IG=6	G=	IG=8	G=	IG=9	G=9	IG=13	G=	IG=	

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Lok Sin Road EB														
1A	A	3.00	Y	N	10		252	79%	1710	0.147	317	55%	1770	0.179
1B	A	3.00	N	N	10		278	61%	1880	**0.148**	328	82%	1830	**0.179**
Lok Sin Road WB														
2A	B	4.50	Y	N	10/10		390	64% / 26%	1820	**0.214**	285	70% / 18%	1825	**0.156**
Tung Tsing Road SB														
3A	C	2.85	Y	N	10		175	40%	1790	**0.098**	143	31%	1815	0.079
3B	C	2.85	N	N	10		190	32%	1950	0.097	152	43%	1915	**0.079**
4p	D		9GM +	9FG =	18	sec								
5p	D		9GM +	9FG =	18	sec								
6p	D		9GM +	10FG =	19	sec								
7p	D		9GM +	9FG =	18	sec								

Notes:

AM Peak	1+2+3+6p	PM Peak	1+2+3+6p
Sum of Critical *y* **Y**	**0.460**	Sum of Critical *y* **Y**	**0.415**
Lost Time ***L*** (sec)	40	Lost Time ***L*** (sec)	40
Cycle Time ***c*** (sec)	100	Cycle Time ***c*** (sec)	110
Practical Y ***Ypr***	0.540	Practical Y ***Ypr***	0.573
Reserve Capacity ***RC***	**17%**	Reserve Capacity ***RC***	**38%**

Date : 5/12/2022 Junction : J7 - Tung Tsing Road / Lok Sin Road / Sa Po Road

ATKINS CHINA LIMITED

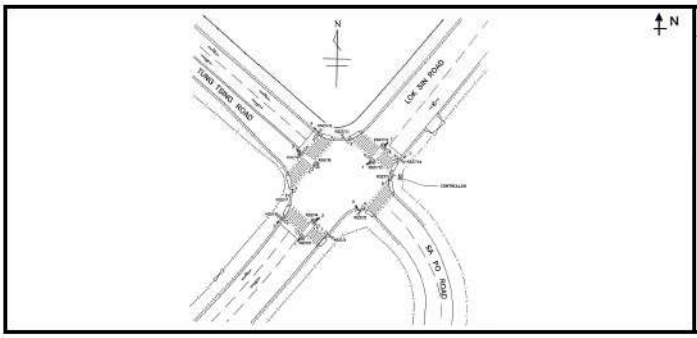
TRAFFIC SIGNAL CALCULATION SHEET

ATKINS

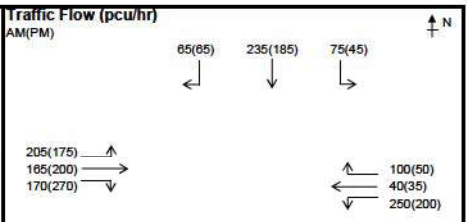
JOB NO. : 5205867

Junction : J7 - Tung Tsing Road / Lok Sin Road / Sa Po Road Design Year: 2037

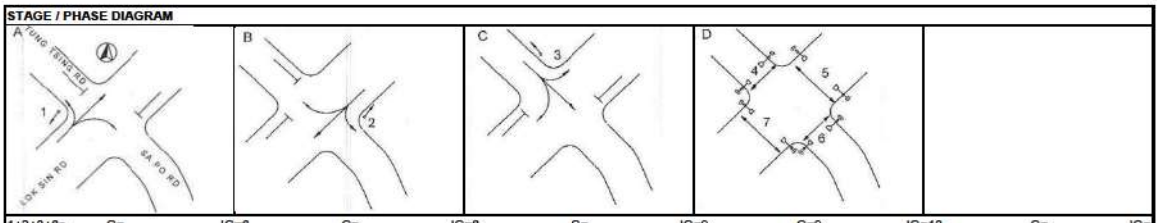
Scheme : Reference Designed by: RC Checked by: EC



Traffic Flow (pcu/hr)
AM(PM)



STAGE / PHASE DIAGRAM



1+2+3+6p	G=	IG=6	G=	IG=8	G=	IG=9	G=9	IG=13	G=	IG=	
1+2+3+6p	G=	IG=6	G=	IG=8	G=	IG=9	G=9	IG=13	G=	IG=	

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Lok Sin Road EB														
1A	A	3.00	Y	N	10		257	80%	1710	**0.150**	317	55%	1770	0.179
1B	A	3.00	N	N	10		283	60%	1885	0.150	328	82%	1830	**0.179**
Lok Sin Road WB														
2A	B	4.50	Y	N	10/10		390	64% / 26%	1820	**0.214**	285	70% / 18%	1825	**0.156**
Tung Tsing Road SB														
3A	C	2.85	Y	N	10		180	42%	1790	**0.101**	143	31%	1815	0.079
3B	C	2.85	N	N	10		195	33%	1945	0.100	152	43%	1915	**0.079**
4p	D		9GM +	9FG =	18	sec								
5p	D		9GM +	9FG =	18	sec								
6p	D		9GM +	10FG =	19	sec								
7p	D		9GM +	9FG =	18	sec								

Notes:

AM Peak	1+2+3+6p	PM Peak	1+2+3+6p
Sum of Critical *y* **Y**	**0.465**	Sum of Critical *y* **Y**	**0.415**
Lost Time ***L*** (sec)	40	Lost Time ***L*** (sec)	40
Cycle Time ***c*** (sec)	100	Cycle Time ***c*** (sec)	110
Practical Y ***Ypr***	0.540	Practical Y ***Ypr***	0.573
Reserve Capacity ***RC***	**16%**	Reserve Capacity ***RC***	**38%**

Date : 5/12/2022 Junction : J7 - Tung Tsing Road / Lok Sin Road / Sa Po Road

ATKINS CHINA LIMITED

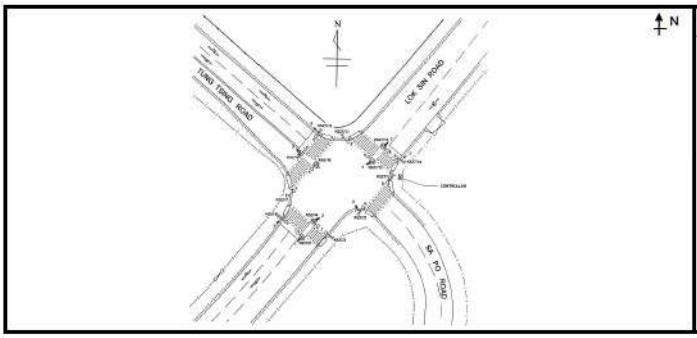
TRAFFIC SIGNAL CALCULATION SHEET

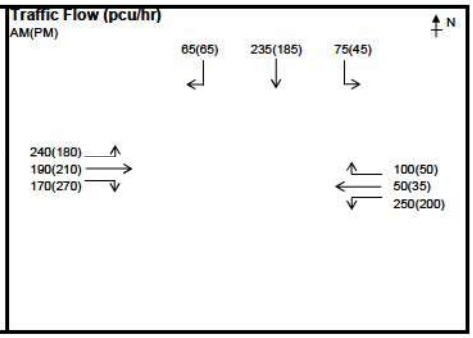
ATKINS

JOB NO. : 5205867

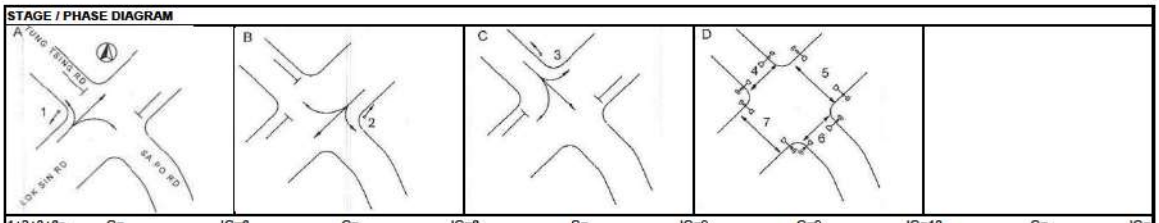
Junction : J7 - Tung Tsing Road / Lok Sin Road / Sa Po Road Design Year: 2037

Scheme : Design Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+2+3+6p	G=	IG=6	G=	IG=6	G=	IG=9	G=9	IG=13	G=	IG=	
1+2+3+6p	G=	IG=6	G=	IG=6	G=	IG=9	G=9	IG=13	G=	IG=	

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Lok Sin Road EB														
1A	A	3.00	Y	N	10		283	85%	1700	0.166	324	56%	1770	0.183
1B	A	3.00	N	N	10		317	54%	1900	**0.167**	336	80%	1835	**0.183**
Lok Sin Road WB														
2A	B	4.50	Y	N	10/10		400	63% / 25%	1825	**0.219**	285	70% / 18%	1825	**0.156**
Tung Tsing Road SB														
3A	C	2.85	Y	N	10		180	42%	1790	**0.101**	143	31%	1815	0.079
3B	C	2.85	N	N	10		195	33%	1945	0.100	152	43%	1915	**0.079**
4p	D		9GM +	9FG =	18	sec								
5p	D		9GM +	9FG =	18	sec								
6p	D		9GM +	10FG =	19	sec								
7p	D		9GM +	9FG =	18	sec								

Notes:

AM Peak	1+2+3+6p	PM Peak	1+2+3+6p
Sum of Critical *y* **Y**	**0.487**	Sum of Critical *y* **Y**	**0.419**
Lost Time ***L*** (sec)	40	Lost Time ***L*** (sec)	40
Cycle Time ***c*** (sec)	100	Cycle Time ***c*** (sec)	110
Practical Y ***Ypr***	0.540	Practical Y ***Ypr***	0.573
Reserve Capacity ***RC***	**11%**	Reserve Capacity ***RC***	**37%**

Date : 5/12/2022 Junction : J7 - Tung Tsing Road / Lok Sin Road / Sa Po Road

ATKINS CHINA LIMITED

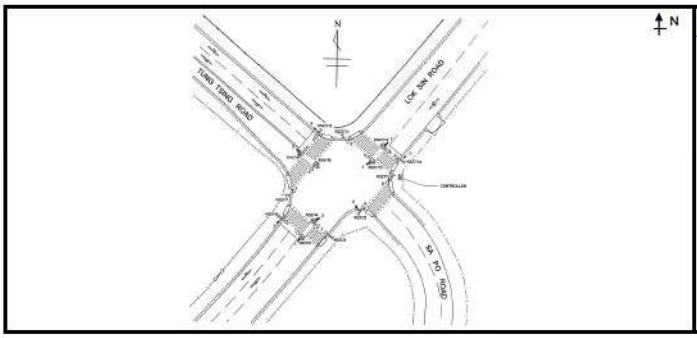
TRAFFIC SIGNAL CALCULATION SHEET

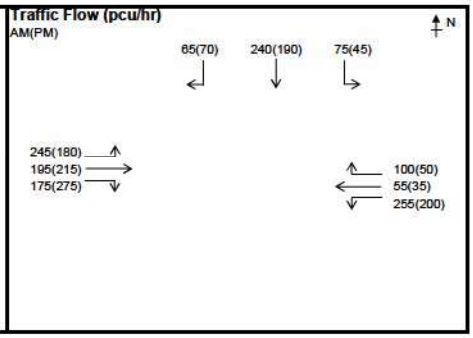
ATKINS

JOB NO. : 5205867

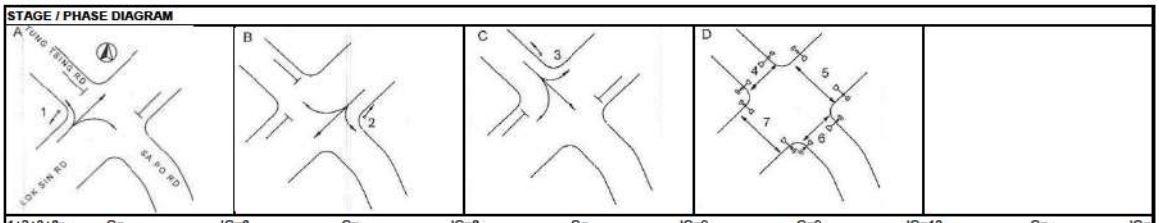
Junction : J7 - Tung Tsing Road / Lok Sin Road / Sa Po Road Design Year: 2040

Scheme : Reference Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+2+3+6p	G=	IG=6	G=	IG=6	G=	IG=9	G=9	IG=13	G=	IG=
1+2+3+6p	G=	IG=6	G=	IG=6	G=	IG=9	G=9	IG=13	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Lok Sin Road EB														
1A	A	3.00	Y	N	10		290	84%	1700	0.171	329	55%	1770	**0.186**
1B	A	3.00	N	N	10		325	54%	1900	**0.171**	341	81%	1835	0.186
Lok Sin Road WB														
2A	B	4.50	Y	N	10/10		410	62% / 24%	1830	**0.224**	285	70% / 18%	1825	**0.156**
Tung Tsing Road SB														
3A	C	2.85	Y	N	10		182	41%	1790	0.102	149	30%	1820	**0.082**
3B	C	2.85	N	N	10		198	33%	1945	**0.102**	156	45%	1910	0.082
4p	D		9GM +	9FG =	18	sec								
5p	D		9GM +	9FG =	18	sec								
6p	D		9GM +	10FG =	19	sec								
7p	D		9GM +	9FG =	18	sec								

Notes:

AM Peak	1+2+3+6p	PM Peak	1+2+3+6p
Sum of Critical *y* **Y**	**0.497**	Sum of Critical *y* **Y**	**0.424**
Lost Time ***L*** (sec)	40	Lost Time ***L*** (sec)	40
Cycle Time ***c*** (sec)	100	Cycle Time ***c*** (sec)	110
Practical Y ***Ypr***	0.540	Practical Y ***Ypr***	0.573
Reserve Capacity ***RC***	**9%**	Reserve Capacity ***RC***	**35%**

Date : 5/12/2022 Junction : J7 - Tung Tsing Road / Lok Sin Road / Sa Po Road

ATKINS CHINA LIMITED

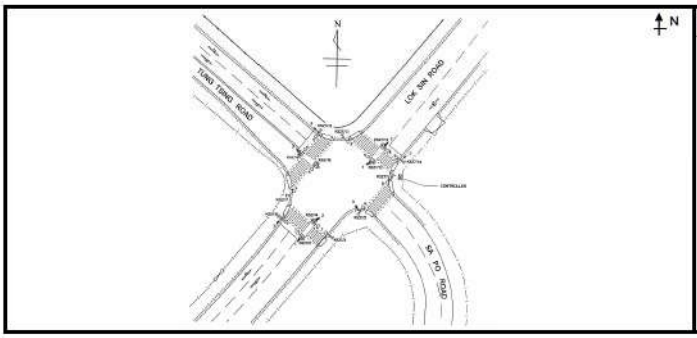
TRAFFIC SIGNAL CALCULATION SHEET

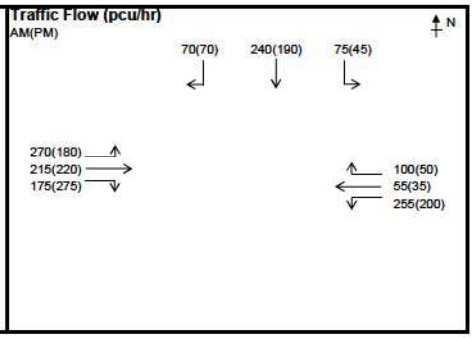
ATKINS

JOB NO. : 5205867

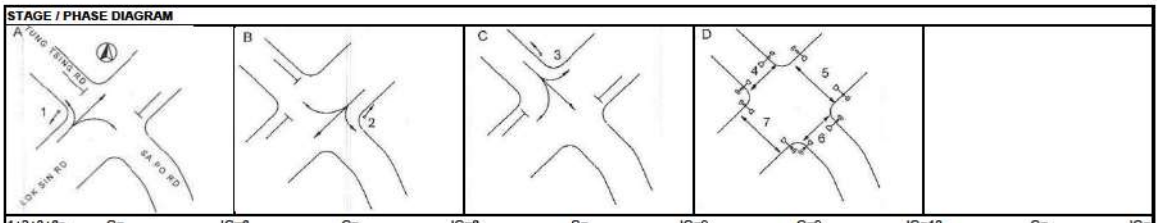
Junction : J7 - Tung Tsing Road / Lok Sin Road / Sa Po Road Design Year: 2040

Scheme : Design Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+2+3+6p	G=	IG=6	G=	IG=6	G=	IG=9	G=9	IG=13	G=	IG=	
1+2+3+6p	G=	IG=6	G=	IG=6	G=	IG=9	G=9	IG=13	G=	IG=	

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Lok Sin Road EB														
1A	A	3.00	Y	N	10		310	87%	1695	0.183	332	54%	1770	**0.188**
1B	A	3.00	N	N	10		350	50%	1910	**0.183**	343	80%	1835	0.187
Lok Sin Road WB														
2A	B	4.50	Y	N	10/10		410	62% / 24%	1830	**0.224**	285	70% / 18%	1825	**0.156**
Tung Tsing Road SB														
3A	C	2.85	Y	N	10		185	41%	1790	**0.103**	149	30%	1820	**0.082**
3B	C	2.85	N	N	10		200	35%	1940	0.103	156	45%	1910	0.082
4p	D		9GM +	9FG =	18	sec								
5p	D		9GM +	9FG =	18	sec								
6p	D		9GM +	10FG =	19	sec								
7p	D		9GM +	9FG =	18	sec								

Notes:

AM Peak	1+2+3+6p	PM Peak	1+2+3+6p
Sum of Critical *y* **Y**	**0.511**	Sum of Critical *y* **Y**	**0.426**
Lost Time ***L*** (sec)	40	Lost Time ***L*** (sec)	40
Cycle Time ***c*** (sec)	100	Cycle Time ***c*** (sec)	110
Practical Y ***Ypr***	0.540	Practical Y ***Ypr***	0.573
Reserve Capacity ***RC***	**6%**	Reserve Capacity ***RC***	**35%**

Date : 5/12/2022 Junction : J7 - Tung Tsing Road / Lok Sin Road / Sa Po Road

ATKINS CHINA LIMITED

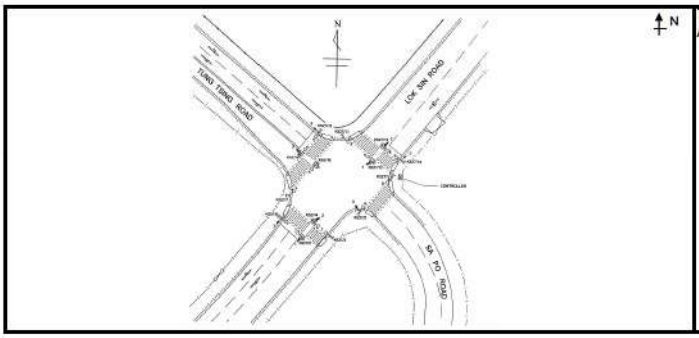
TRAFFIC SIGNAL CALCULATION SHEET

ATKINS

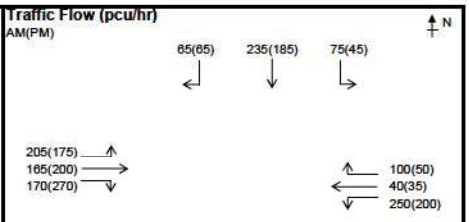
JOB NO. : 5205867

Junction : J7 - Tung Tsing Road / Lok Sin Road / Sa Po Road Design Year: 2037

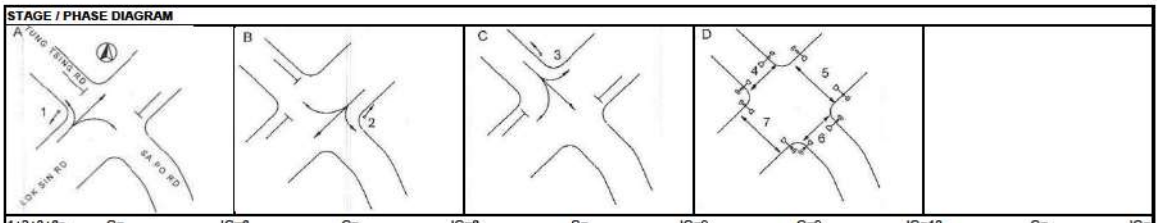
Scheme : Reference Designed by: RC Checked by: EC



Traffic Flow (pcu/hr)
AM(PM)



STAGE / PHASE DIAGRAM



1+2+3+6p	G=	IG=6	G=	IG=8	G=	IG=9	G=9	IG=13	G=	IG=
1+2+3+6p	G=	IG=6	G=	IG=8	G=	IG=9	G=9	IG=13	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Lok Sin Road EB														
1A	A	3.00	Y	N	10		257	80%	1710	**0.150**	317	55%	1770	0.179
1B	A	3.00	N	N	10		283	60%	1885	0.150	328	82%	1830	**0.179**
Lok Sin Road WB														
2A	B	4.50	Y	N	10/10		390	64% / 26%	1820	**0.214**	285	70% / 18%	1825	**0.156**
Tung Tsing Road SB														
3A	C	2.85	Y	N	10		180	42%	1790	**0.101**	143	31%	1815	0.079
3B	C	2.85	N	N	10		195	33%	1945	0.100	152	43%	1915	**0.079**
4p	D		9GM +	9FG =	18	sec								
5p	D		9GM +	9FG =	18	sec								
6p	D		9GM +	10FG =	19	sec								
7p	D		9GM +	9FG =	18	sec								

Notes:

AM Peak	1+2+3+6p	PM Peak	1+2+3+6p
Sum of Critical *y* **Y**	**0.465**	Sum of Critical *y* **Y**	**0.415**
Lost Time ***L*** (sec)	40	Lost Time ***L*** (sec)	40
Cycle Time ***c*** (sec)	115	Cycle Time ***c*** (sec)	110
Practical Y ***Ypr***	0.587	Practical Y ***Ypr***	0.573
Reserve Capacity ***RC***	**26%**	Reserve Capacity ***RC***	**38%**

Date : 5/12/2022 Junction : J7 - Tung Tsing Road / Lok Sin Road / Sa Po Road

ATKINS CHINA LIMITED

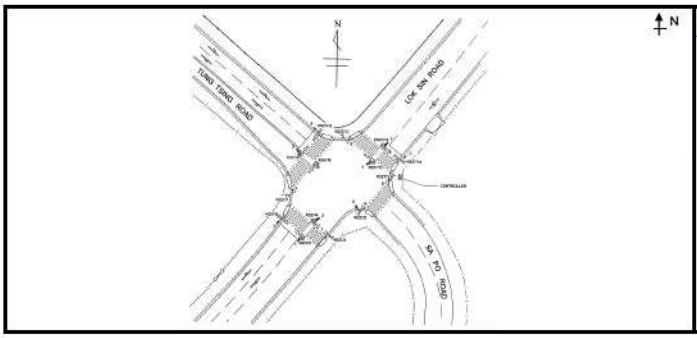
TRAFFIC SIGNAL CALCULATION SHEET

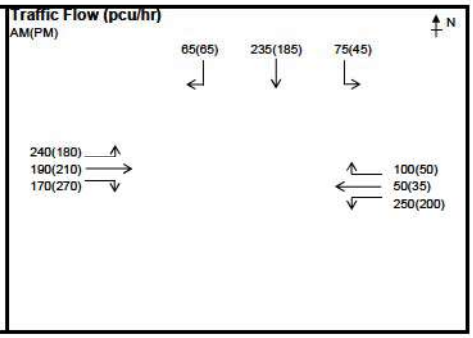
ATKINS

JOB NO. : 5205867

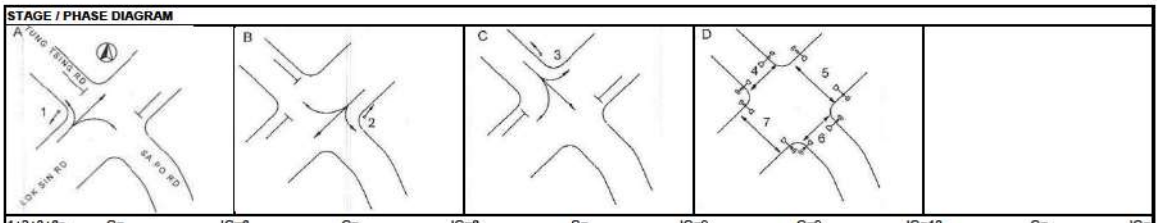
Junction : J7 - Tung Tsing Road / Lok Sin Road / Sa Po Road Design Year: 2037

Scheme : Design Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+2+3+6p	G=	IG=6	G=	IG=8	G=	IG=9	G=9	IG=13	G=	IG=	
1+2+3+6p	G=	IG=6	G=	IG=8	G=	IG=9	G=9	IG=13	G=	IG=	

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Lok Sin Road EB														
1A	A	3.00	Y	N	10		283	85%	1700	0.166	324	56%	1770	0.183
1B	A	3.00	N	N	10		317	54%	1900	**0.167**	336	80%	1835	**0.183**
Lok Sin Road WB														
2A	B	4.50	Y	N	10/10		400	63% / 25%	1825	**0.219**	285	70% / 18%	1825	**0.156**
Tung Tsing Road SB														
3A	C	2.85	Y	N	10		180	42%	1790	**0.101**	143	31%	1815	0.079
3B	C	2.85	N	N	10		195	33%	1945	0.100	152	43%	1915	**0.079**
4p	D		9GM +	9FG =	18	sec								
5p	D		9GM +	9FG =	18	sec								
6p	D		9GM +	10FG =	19	sec								
7p	D		9GM +	9FG =	18	sec								

Notes:

AM Peak	1+2+3+6p	PM Peak	1+2+3+6p
Sum of Critical *y* **Y**	**0.487**	Sum of Critical *y* **Y**	**0.419**
Lost Time ***L*** (sec)	40	Lost Time ***L*** (sec)	40
Cycle Time ***c*** (sec)	115	Cycle Time ***c*** (sec)	110
Practical Y ***Ypr***	0.587	Practical Y ***Ypr***	0.573
Reserve Capacity ***RC***	**21%**	Reserve Capacity ***RC***	**37%**

Date : 5/12/2022 Junction : J7 - Tung Tsing Road / Lok Sin Road / Sa Po Road

ATKINS CHINA LIMITED

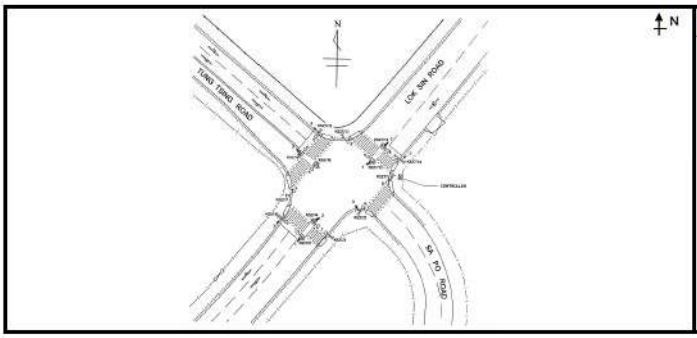
TRAFFIC SIGNAL CALCULATION SHEET

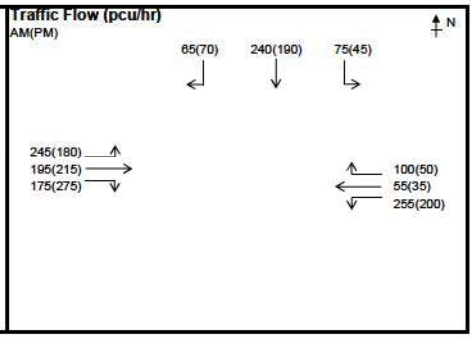
ATKINS

JOB NO. : 5205867

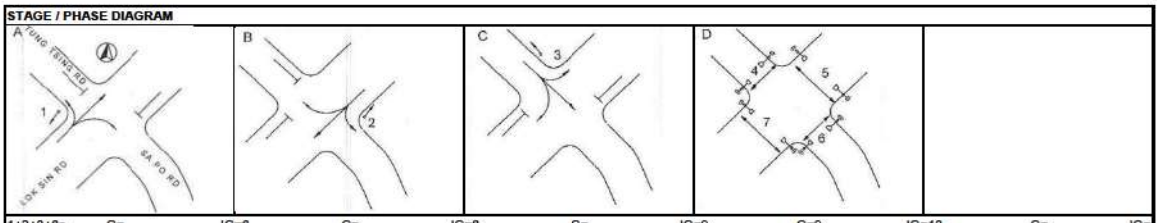
Junction : J7 - Tung Tsing Road / Lok Sin Road / Sa Po Road Design Year: 2040

Scheme : Reference Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+2+3+6p	G=	IG=6	G=	IG=8	G=	IG=9	G=9	IG=13	G=	IG=	
1+2+3+6p	G=	IG=6	G=	IG=8	G=	IG=9	G=9	IG=13	G=	IG=	

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Lok Sin Road EB														
1A	A	3.00	Y	N	10		290	84%	1700	0.171	329	55%	1770	**0.186**
1B	A	3.00	N	N	10		325	54%	1900	**0.171**	341	81%	1835	0.186
Lok Sin Road WB														
2A	B	4.50	Y	N	10/10		410	62% / 24%	1830	**0.224**	285	70% / 18%	1825	**0.156**
Tung Tsing Road SB														
3A	C	2.85	Y	N	10		182	41%	1790	0.102	149	30%	1820	**0.082**
3B	C	2.85	N	N	10		198	33%	1945	**0.102**	156	45%	1910	0.082
4p	D		9GM +	9FG =	18	sec								
5p	D		9GM +	9FG =	18	sec								
6p	D		9GM +	10FG =	19	sec								
7p	D		9GM +	9FG =	18	sec								

Notes:

AM Peak	1+2+3+6p	PM Peak	1+2+3+6p
Sum of Critical *y* **Y**	**0.497**	Sum of Critical *y* **Y**	**0.424**
Lost Time ***L*** (sec)	40	Lost Time ***L*** (sec)	40
Cycle Time ***c*** (sec)	115	Cycle Time ***c*** (sec)	110
Practical Y ***Ypr***	0.587	Practical Y ***Ypr***	0.573
Reserve Capacity ***RC***	**18%**	Reserve Capacity ***RC***	**35%**

Date : 5/12/2022 Junction : J7 - Tung Tsing Road / Lok Sin Road / Sa Po Road

ATKINS CHINA LIMITED

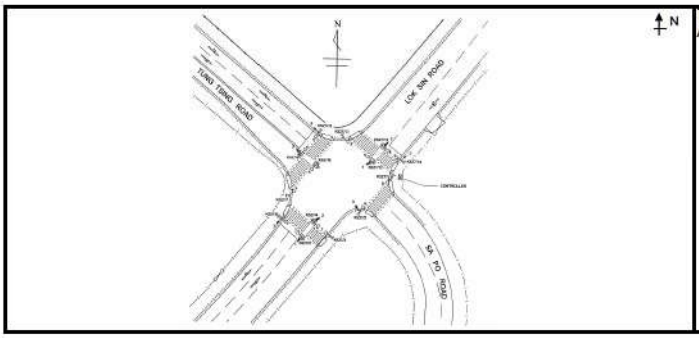
TRAFFIC SIGNAL CALCULATION SHEET

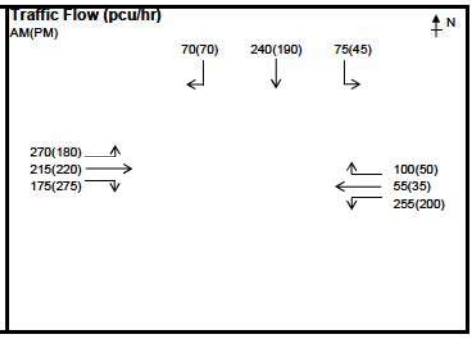
ATKINS

JOB NO. : 5205867

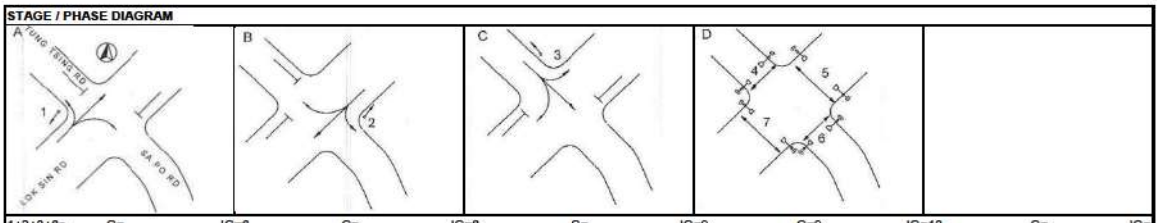
Junction : J7 - Tung Tsing Road / Lok Sin Road / Sa Po Road Design Year: 2040

Scheme : Design Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+2+3+6p	G=	IG=6	G=	IG=6	G=	IG=9	G=9	IG=13	G=	IG=	
1+2+3+6p	G=	IG=6	G=	IG=6	G=	IG=9	G=9	IG=13	G=	IG=	

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Lok Sin Road EB														
1A	A	3.00	Y	N	10		310	87%	1695	0.183	332	54%	1770	**0.188**
1B	A	3.00	N	N	10		350	50%	1910	**0.183**	343	80%	1835	0.187
Lok Sin Road WB														
2A	B	4.50	Y	N	10/10		410	62% / 24%	1830	**0.224**	285	70% / 18%	1825	**0.156**
Tung Tsing Road SB														
3A	C	2.85	Y	N	10		185	41%	1790	**0.103**	149	30%	1820	**0.082**
3B	C	2.85	N	N	10		200	35%	1940	0.103	156	45%	1910	0.082
4p	D		9GM +	9FG =	18	sec								
5p	D		9GM +	9FG =	18	sec								
6p	D		9GM +	10FG =	19	sec								
7p	D		9GM +	9FG =	18	sec								

Notes:

AM Peak	1+2+3+6p	PM Peak	1+2+3+6p
Sum of Critical *y* **Y**	**0.511**	Sum of Critical *y* **Y**	**0.426**
Lost Time ***L*** (sec)	40	Lost Time ***L*** (sec)	40
Cycle Time ***c*** (sec)	115	Cycle Time ***c*** (sec)	110
Practical Y ***Ypr***	0.587	Practical Y ***Ypr***	0.573
Reserve Capacity ***RC***	**15%**	Reserve Capacity ***RC***	**35%**

Date : 5/12/2022 Junction : J7 - Tung Tsing Road / Lok Sin Road / Sa Po Road

ATKINS CHINA LIMITED

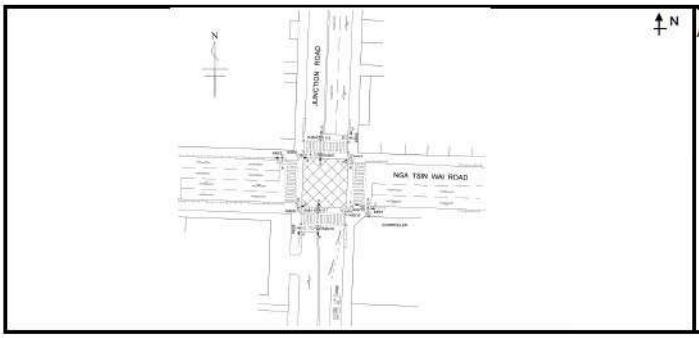
TRAFFIC SIGNAL CALCULATION SHEET

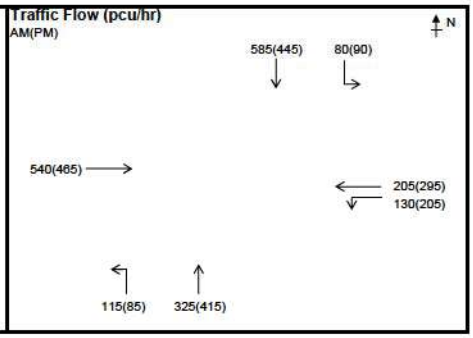
ATKINS

JOB NO. : 5205867

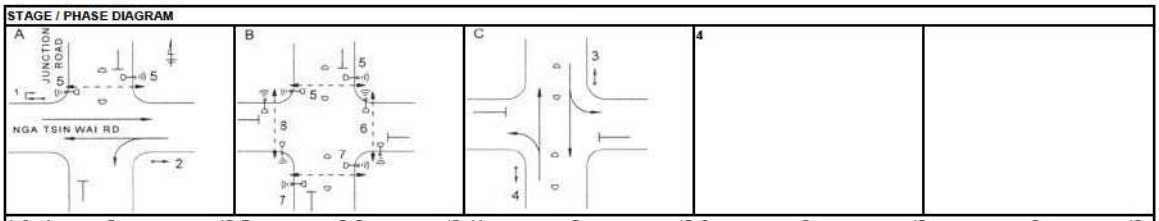
Junction : J8 - Nga Tsin Wai Road / Junction Road Design Year: 2021

Scheme : Existing Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+6p+4	G=	IG=7	G=5	IG=14	G=	IG=6	G=	IG=	G=	IG=
2+6p+4	G=	IG=7	G=5	IG=14	G=	IG=6	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Nga Tsin Wai Road EB														
1A	A	3.00	Y	N			260		1915	0.136	224		1915	0.117
1B	A	3.00	N	N			280		2055	0.136	241		2055	0.117
Nga Tsin Wai Road WB														
2A	A	3.30	Y	N	12.5		154	84%	1765	0.087	229	90%	1755	0.130
2B	A	3.30	N	N			181		2085	0.087	271		2085	0.130
Junction Road SB														
3A	C	3.40	Y	N	7.5		313	26%	1860	0.168	249	36%	1825	0.136
3B	C	3.40	N	N			352		2095	0.168	286		2095	0.137
Junction Road NB														
4A	C	4.00	Y	N	7.5		440	26%	1915	0.230	500	17%	1950	0.256
5p	A,B		5GM +	11FG =	16	sec								
6p	B		5GM +	11FG =	16	sec								
7p	B		5GM +	11FG =	16	sec								
8p	B		5GM +	11FG =	16	sec								

Notes:

AM Peak	1+6p+4	PM Peak	2+6p+4
Sum of Critical *y* *Y*	0.366	Sum of Critical *y* *Y*	0.387
Lost Time *L* (sec)	30	Lost Time *L* (sec)	30
Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
Practical *Y* *Ypr*	0.675	Practical *Y* *Ypr*	0.665
Reserve Capacity *RC*	84%	Reserve Capacity *RC*	72%

Date : 5/12/2022 Junction : J8 - Nga Tsin Wai Road / Junction Road

ATKINS CHINA LIMITED

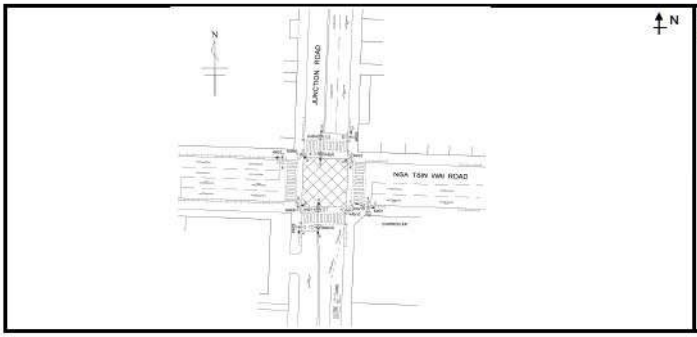
TRAFFIC SIGNAL CALCULATION SHEET

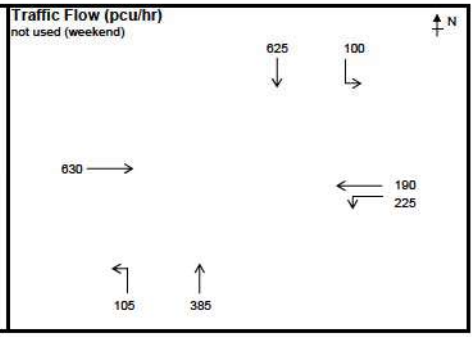
ATKINS

JOB NO. : 5205867

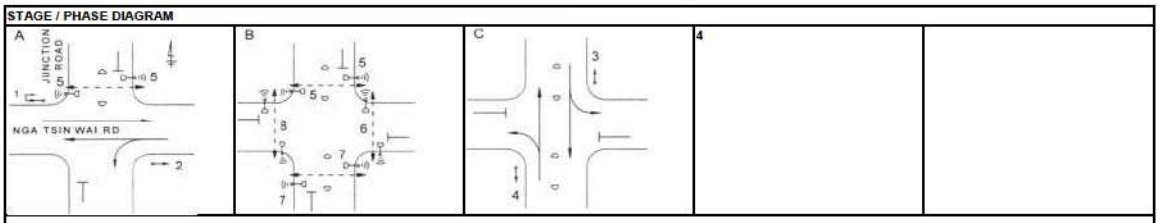
Junction : J8 - Nga Tsin Wai Road / Junction Road Design Year: 2021

Scheme : Existing - Weekend Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+6p+4 G= IG=7 G=5 IG=14 G= IG=6 G= IG= G= IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	Weekend Peak: Design Flow *q* (pcu/hr)	Proportion turning (%) *f*	Saturation flow *S* (pcu/hr)	Flow factor *y*
Nga Tsin Wai Road EB										
1A	A	3.00	Y	N			304		1915	**0.159**
1B	A	3.00	N	N			326		2055	0.159
Nga Tsin Wai Road WB										
2A	A	3.30	Y	N	12.5		225	100%	1735	0.130
2B	A	3.30	N	N			190		2085	0.091
Junction Road SB										
3A	C	3.40	Y	N	7.5		340	29%	1845	0.184
3B	C	3.40	N	N			385		2095	0.184
Junction Road NB										
4A	C	4.00	Y	N	7.5		490	21%	1930	**0.254**
5p	A,B		5GM +	11FG =	16	sec				
6p	B		5GM +	11FG =	16	sec				
7p	B		5GM +	11FG =	16	sec				
8p	B		5GM +	11FG =	16	sec				

Notes:

Weekend Peak	1+6p+4
Sum of Critical *y* **Y**	0.413
Lost Time *L* (sec)	30
Cycle Time *c* (sec)	115
Practical *Y* ***Ypr***	0.665
Reserve Capacity ***RC***	**61%**

Date : 5/19/2022 Junction : J8 - Nga Tsin Wai Road / Junction Road

ATKINS CHINA LIMITED

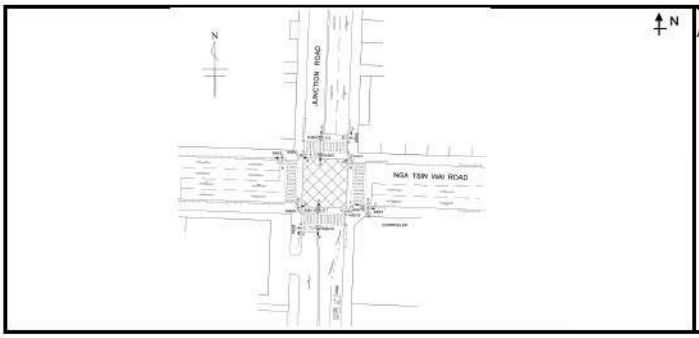
TRAFFIC SIGNAL CALCULATION SHEET

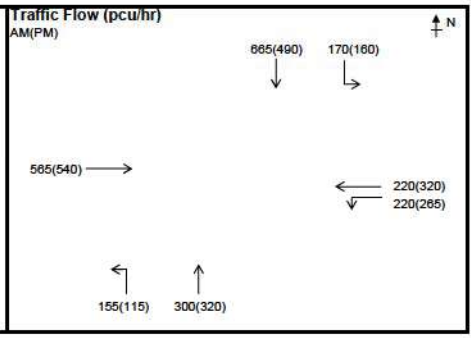
ATKINS

JOB NO. : 5205867

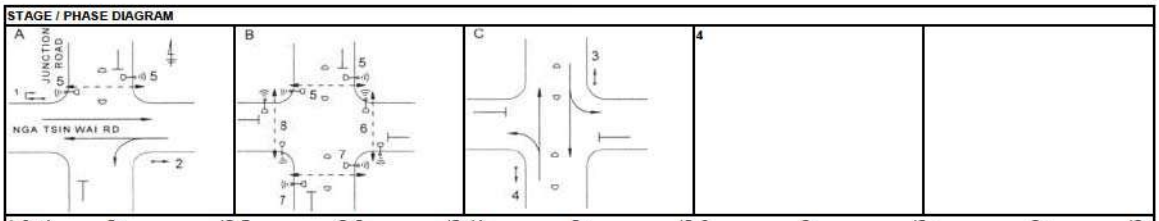
Junction : J8 - Nga Tsin Wai Road / Junction Road Design Year: 2033

Scheme : Reference Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+6p+4	G=	IG=7	G=5	IG=14	G=	IG=6	G=	IG=	G=	IG=
2+6p+4	G=	IG=7	G=5	IG=14	G=	IG=6	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Nga Tsin Wai Road EB														
1A	A	3.00	Y	N			273		1915	**0.143**	260		1915	0.136
1B	A	3.00	N	N			292		2055	0.142	280		2055	0.136
Nga Tsin Wai Road WB														
2A	A	3.30	Y	N	12.5		220	100%	1735	0.127	266	100%	1735	**0.153**
2B	A	3.30	N	N			220		2085	0.106	319		2085	0.153
Junction Road SB														
3A	C	3.40	Y	N	7.5		385	44%	1795	0.214	297	54%	1765	0.168
3B	C	3.40	N	N			450		2095	0.215	353		2095	0.168
Junction Road NB														
4A	C	4.00	Y	N	7.5		455	34%	1885	**0.241**	435	26%	1915	**0.227**
5p	A,B		5GM +	11FG =	16	sec								
6p	B		5GM +	11FG =	16	sec								
7p	B		5GM +	11FG =	16	sec								
8p	B		5GM +	11FG =	16	sec								

Notes:

AM Peak	1+6p+4	PM Peak	2+6p+4
Sum of Critical *y* *Y*	**0.384**	Sum of Critical *y* *Y*	**0.380**
Lost Time *L* (sec)	30	Lost Time *L* (sec)	30
Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
Practical *Y* *Ypr*	0.675	Practical *Y* *Ypr*	0.665
Reserve Capacity *RC*	76%	Reserve Capacity *RC*	75%

Date : 5/12/2022 Junction : J8 - Nga Tsin Wai Road / Junction Road

ATKINS CHINA LIMITED

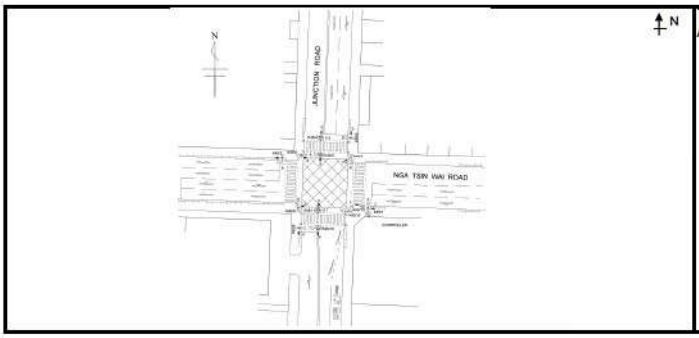
TRAFFIC SIGNAL CALCULATION SHEET

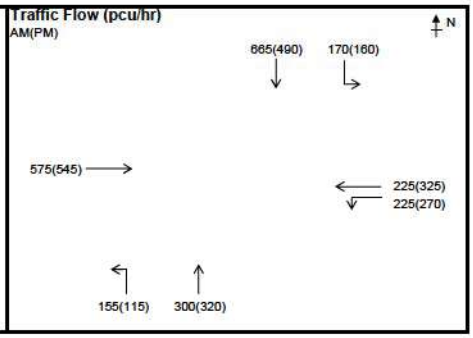
ATKINS

JOB NO. : 5205867

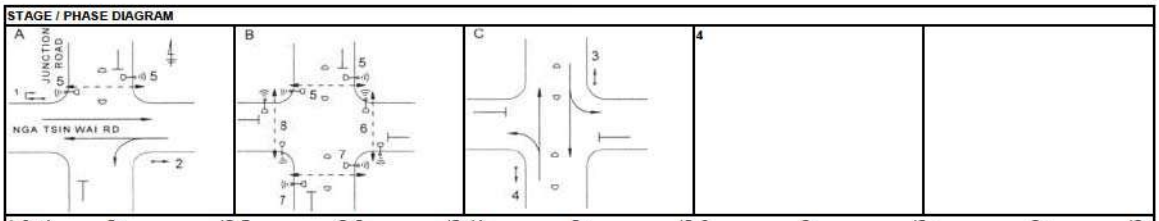
Junction : J8 - Nga Tsin Wai Road / Junction Road Design Year: 2033

Scheme : Design Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+6p+4	G=	IG=7	G=5	IG=14	G=	IG=6	G=	IG=	G=	IG=
2+6p+4	G=	IG=7	G=5	IG=14	G=	IG=6	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Nga Tsin Wai Road EB														
1A	A	3.00	Y	N			277		1915	0.145	263		1915	0.137
1B	A	3.00	N	N			298		2055	**0.145**	282		2055	0.137
Nga Tsin Wai Road WB														
2A	A	3.30	Y	N	12.5		225	100%	1735	0.130	270	100%	1735	0.156
2B	A	3.30	N	N			225		2085	0.108	325		2085	**0.156**
Junction Road SB														
3A	C	3.40	Y	N	7.5		385	44%	1795	0.214	297	54%	1765	0.168
3B	C	3.40	N	N			450		2095	0.215	353		2095	0.168
Junction Road NB														
4A	C	4.00	Y	N	7.5		455	34%	1885	**0.241**	435	26%	1915	**0.227**
5p	A,B		5GM +	11FG =	16	sec								
6p	B		5GM +	11FG =	16	sec								
7p	B		5GM +	11FG =	16	sec								
8p	B		5GM +	11FG =	16	sec								

Notes:

AM Peak	1+6p+4	PM Peak	2+6p+4
Sum of Critical *y* *Y*	0.386	Sum of Critical *y* *Y*	0.383
Lost Time *L* (sec)	30	Lost Time *L* (sec)	30
Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
Practical *Y* *Ypr*	0.675	Practical *Y* *Ypr*	0.665
Reserve Capacity *RC*	75%	Reserve Capacity *RC*	74%

Date : 5/12/2022 Junction : J8 - Nga Tsin Wai Road / Junction Road

ATKINS CHINA LIMITED

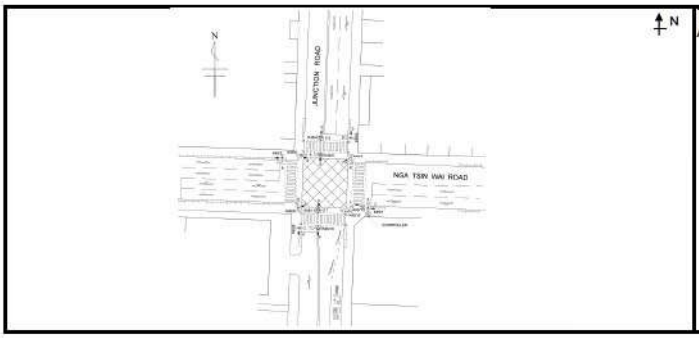
TRAFFIC SIGNAL CALCULATION SHEET

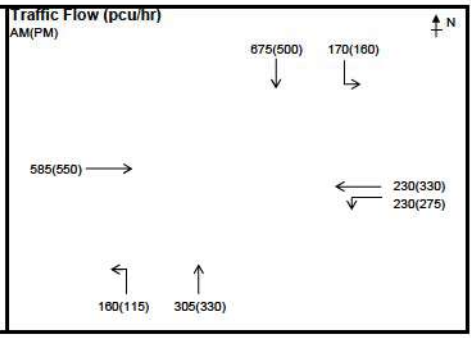
ATKINS

JOB NO. : 5205867

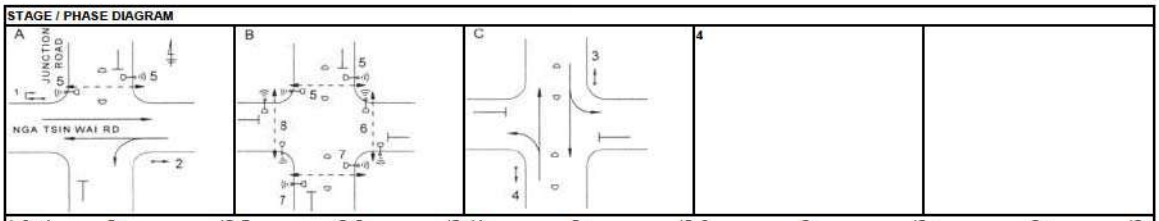
Junction : J8 - Nga Tsin Wai Road / Junction Road Design Year: 2036

Scheme : Reference Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+6p+4	G=	IG=7	G=5	IG=14	G=	IG=6	G=	IG=	G=	IG=
2+6p+4	G=	IG=7	G=5	IG=14	G=	IG=6	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Nga Tsin Wai Road EB														
1A	A	3.00	Y	N			282		1915	0.147	265		1915	0.138
1B	A	3.00	N	N			303		2055	**0.147**	285		2055	0.139
Nga Tsin Wai Road WB														
2A	A	3.30	Y	N	12.5		230	100%	1735	0.133	275	100%	1735	**0.159**
2B	A	3.30	N	N			230		2085	0.110	330		2085	0.158
Junction Road SB														
3A	C	3.40	Y	N	7.5		390	44%	1800	0.217	302	53%	1770	0.171
3B	C	3.40	N	N			455		2095	0.217	358		2095	0.171
Junction Road NB														
4A	C	4.00	Y	N	7.5		465	34%	1885	**0.247**	445	26%	1915	**0.232**
5p	A,B		5GM +	11FG =	16	sec								
6p	B		5GM +	11FG =	16	sec								
7p	B		5GM +	11FG =	16	sec								
8p	B		5GM +	11FG =	16	sec								

Notes:

AM Peak	1+6p+4	PM Peak	2+6p+4
Sum of Critical *y* *Y*	**0.394**	Sum of Critical *y* *Y*	**0.391**
Lost Time *L* (sec)	30	Lost Time *L* (sec)	30
Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
Practical *Y* *Ypr*	0.675	Practical *Y* *Ypr*	0.665
Reserve Capacity *RC*	**71%**	Reserve Capacity *RC*	**70%**

Date : 5/12/2022 Junction : J8 - Nga Tsin Wai Road / Junction Road

ATKINS CHINA LIMITED

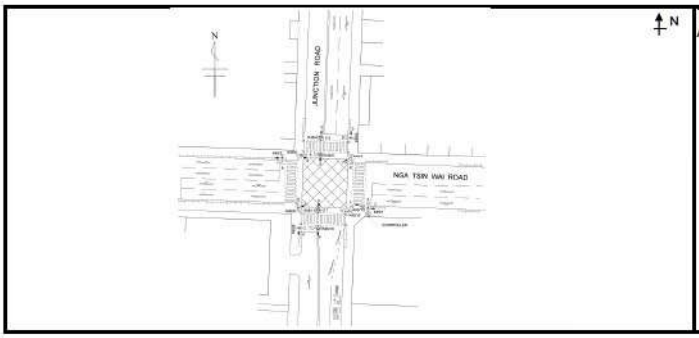
TRAFFIC SIGNAL CALCULATION SHEET

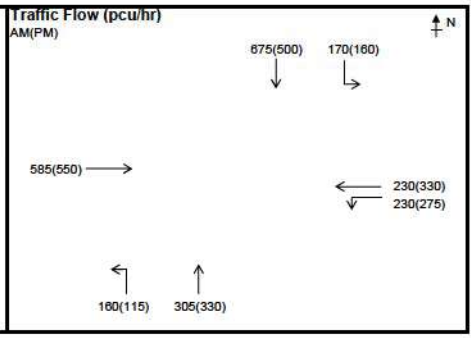
ATKINS

JOB NO. : 5205867

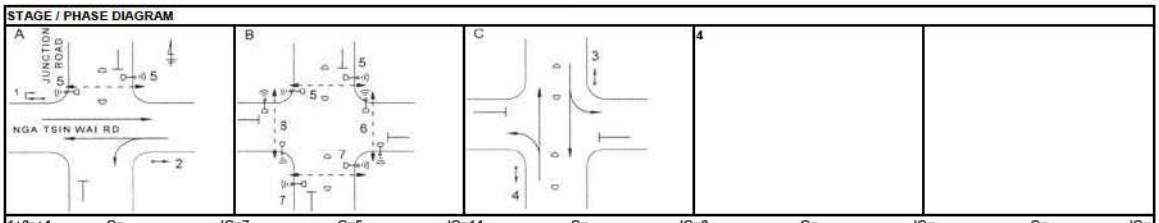
Junction : J8 - Nga Tsin Wai Road / Junction Road Design Year: 2036

Scheme : Design Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+6p+4	G=	IG=7	G=5	IG=14	G=	IG=6	G=	IG=	G=	IG=
2+6p+4	G=	IG=7	G=5	IG=14	G=	IG=6	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Nga Tsin Wai Road EB														
1A	A	3.00	Y	N			282		1915	0.147	265		1915	0.138
1B	A	3.00	N	N			303		2055	**0.147**	285		2055	0.139
Nga Tsin Wai Road WB														
2A	A	3.30	Y	N	12.5		230	100%	1735	0.133	275	100%	1735	**0.159**
2B	A	3.30	N	N			230		2085	0.110	330		2085	0.158
Junction Road SB														
3A	C	3.40	Y	N	7.5		390	44%	1800	0.217	302	53%	1770	0.171
3B	C	3.40	N	N			455		2095	0.217	358		2095	0.171
Junction Road NB														
4A	C	4.00	Y	N	7.5		465	34%	1885	**0.247**	445	26%	1915	**0.232**
5p	A,B		5GM +	11FG =	16	sec								
6p	B		5GM +	11FG =	16	sec								
7p	B		5GM +	11FG =	16	sec								
8p	B		5GM +	11FG =	16	sec								

Notes:

AM Peak	1+6p+4	PM Peak	2+6p+4
Sum of Critical *y* *Y*	0.394	Sum of Critical *y* *Y*	0.391
Lost Time *L* (sec)	30	Lost Time *L* (sec)	30
Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
Practical *Y* *Ypr*	0.675	Practical *Y* *Ypr*	0.665
Reserve Capacity *RC*	71%	Reserve Capacity *RC*	70%

Date : 5/12/2022 Junction : J8 - Nga Tsin Wai Road / Junction Road

ATKINS CHINA LIMITED

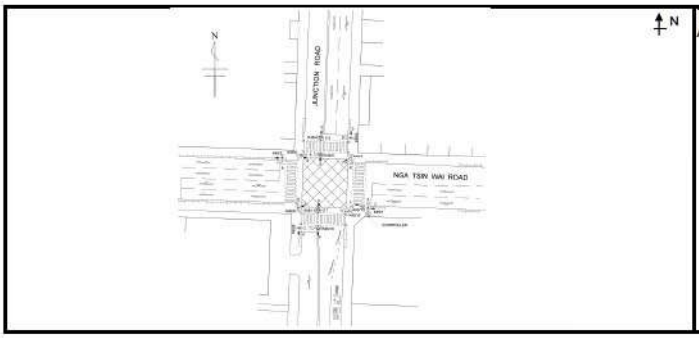
TRAFFIC SIGNAL CALCULATION SHEET

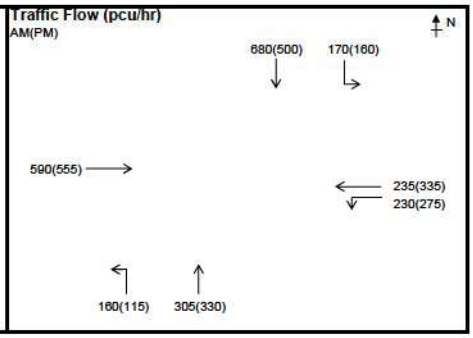
ATKINS

JOB NO. : 5205867

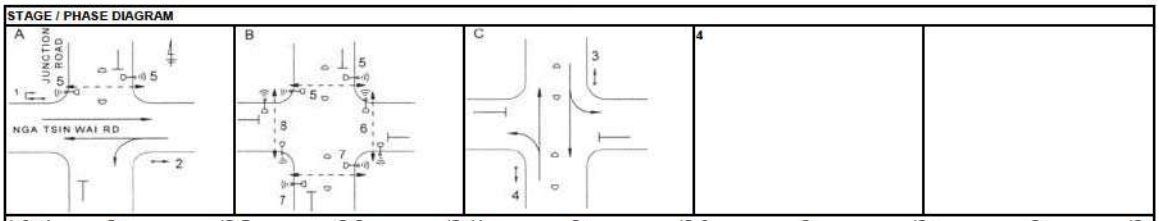
Junction : J8 - Nga Tsin Wai Road / Junction Road Design Year: 2037

Scheme : Reference Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+6p+4	G=	IG=7	G=5	IG=14	G=	IG=6	G=	IG=	G=	IG=
2+6p+4	G=	IG=7	G=5	IG=14	G=	IG=6	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Nga Tsin Wai Road EB														
1A	A	3.00	Y	N			285		1915	**0.149**	268		1915	0.140
1B	A	3.00	N	N			305		2055	0.148	287		2055	0.140
Nga Tsin Wai Road WB														
2A	A	3.30	Y	N	12.5		230	100%	1735	0.133	277	99%	1740	0.159
2B	A	3.30	N	N			235		2085	0.113	333		2085	**0.160**
Junction Road SB														
3A	C	3.40	Y	N	7.5		393	43%	1800	0.218	302	53%	1770	0.171
3B	C	3.40	N	N			457		2095	0.218	358		2095	0.171
Junction Road NB														
4A	C	4.00	Y	N	7.5		465	34%	1885	**0.247**	445	26%	1915	**0.232**
5p	A,B		5GM +	11FG =	16	sec								
6p	B		5GM +	11FG =	16	sec								
7p	B		5GM +	11FG =	16	sec								
8p	B		5GM +	11FG =	16	sec								

Notes:

AM Peak	1+6p+4	PM Peak	2+6p+4
Sum of Critical *y* *Y*	0.396	Sum of Critical *y* *Y*	0.392
Lost Time *L* (sec)	30	Lost Time *L* (sec)	30
Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
Practical *Y* *Ypr*	0.675	Practical *Y* *Ypr*	0.665
Reserve Capacity *RC*	71%	Reserve Capacity *RC*	70%

Date : 5/12/2022 Junction : J8 - Nga Tsin Wai Road / Junction Road

ATKINS CHINA LIMITED

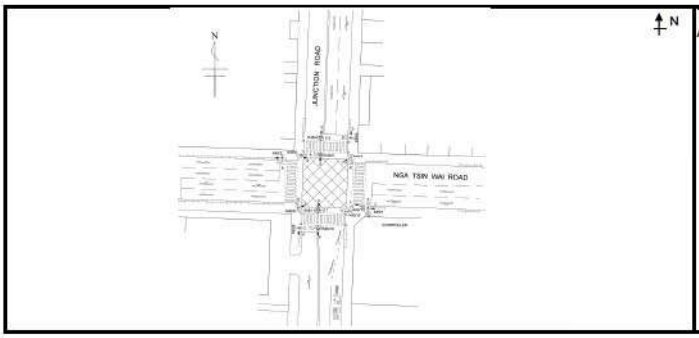
TRAFFIC SIGNAL CALCULATION SHEET

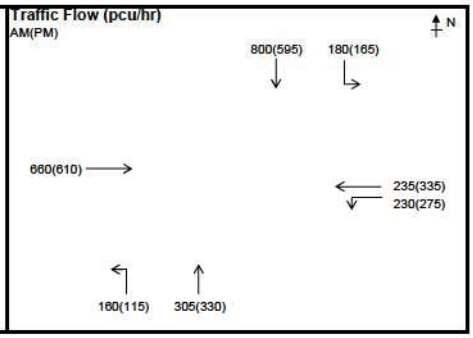
ATKINS

JOB NO. : 5205867

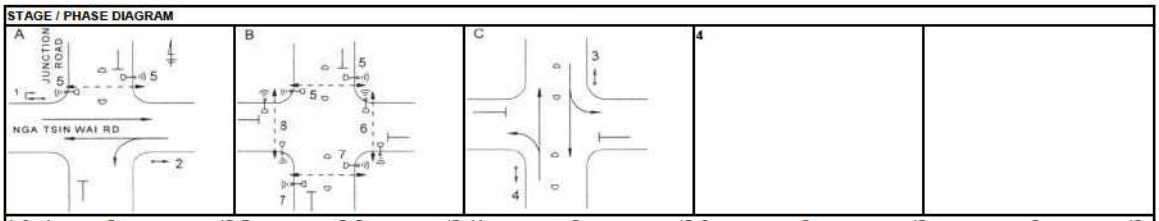
Junction : J8 - Nga Tsin Wai Road / Junction Road Design Year: 2037

Scheme : Design Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+6p+4	G=	IG=7	G=5	IG=14	G=	IG=6	G=	IG=	G=	IG=
2+6p+4	G=	IG=7	G=5	IG=14	G=	IG=6	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Nga Tsin Wai Road EB														
1A	A	3.00	Y	N			318		1915	0.166	294		1915	0.154
1B	A	3.00	N	N			342		2055	**0.166**	316		2055	0.154
Nga Tsin Wai Road WB														
2A	A	3.30	Y	N	12.5		230	100%	1735	0.133	277	99%	1740	0.159
2B	A	3.30	N	N			235		2085	0.113	333		2085	**0.160**
Junction Road SB														
3A	C	3.40	Y	N	7.5		454	40%	1810	0.251	350	47%	1785	0.196
3B	C	3.40	N	N			526		2095	0.251	410		2095	0.196
Junction Road NB														
4A	C	4.00	Y	N	7.5		465	34%	1885	**0.247**	445	26%	1915	**0.232**
5p	A,B		5GM +	11FG =	16	sec								
6p	B		5GM +	11FG =	16	sec								
7p	B		5GM +	11FG =	16	sec								
8p	B		5GM +	11FG =	16	sec								

Notes:

AM Peak	1+6p+4	PM Peak	2+6p+4
Sum of Critical *y* *Y*	**0.413**	Sum of Critical *y* *Y*	**0.392**
Lost Time *L* (sec)	30	Lost Time *L* (sec)	30
Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
Practical *Y* *Ypr*	0.675	Practical *Y* *Ypr*	0.665
Reserve Capacity *RC*	63%	Reserve Capacity *RC*	70%

Date : 5/12/2022 Junction : J8 - Nga Tsin Wai Road / Junction Road

ATKINS CHINA LIMITED

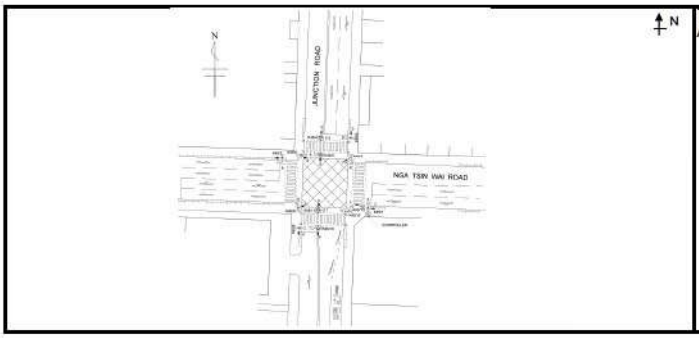
TRAFFIC SIGNAL CALCULATION SHEET

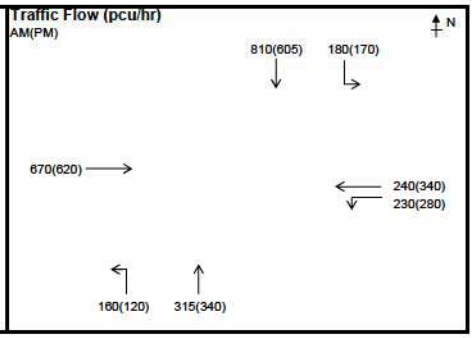
ATKINS

JOB NO. : 5205867

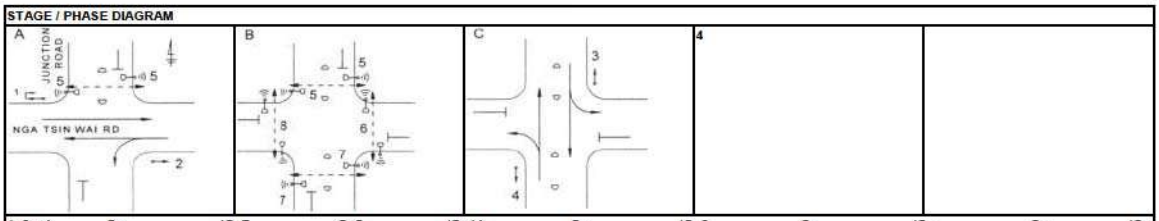
Junction : J8 - Nga Tsin Wai Road / Junction Road Design Year: 2040

Scheme : Reference Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+6p+4	G=	IG=7	G=5	IG=14	G=	IG=6	G=	IG=	G=	IG=
2+6p+4	G=	IG=7	G=5	IG=14	G=	IG=6	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Nga Tsin Wai Road EB														
1A	A	3.00	Y	N			323		1915	0.169	299		1915	0.156
1B	A	3.00	N	N			347		2055	0.169	321		2055	0.156
Nga Tsin Wai Road WB														
2A	A	3.30	Y	N	12.5		230	100%	1735	0.133	282	99%	1740	0.162
2B	A	3.30	N	N			240		2085	0.115	338		2085	0.162
Junction Road SB														
3A	C	3.40	Y	N	7.5		459	39%	1815	0.253	357	48%	1785	0.200
3B	C	3.40	N	N			531		2095	0.253	418		2095	0.200
Junction Road NB														
4A	C	4.00	Y	N	7.5		475	34%	1890	0.251	460	26%	1915	0.240
5p	A,B		5GM +	11FG =	16	sec								
6p	B		5GM +	11FG =	16	sec								
7p	B		5GM +	11FG =	16	sec								
8p	B		5GM +	11FG =	16	sec								

Notes:

AM Peak	1+6p+4	PM Peak	2+6p+4
Sum of Critical *y* *Y*	0.420	Sum of Critical *y* *Y*	0.402
Lost Time *L* (sec)	30	Lost Time *L* (sec)	30
Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
Practical *Y* *Ypr*	0.675	Practical *Y* *Ypr*	0.665
Reserve Capacity *RC*	61%	Reserve Capacity *RC*	65%

Date : 5/12/2022 Junction : J8 - Nga Tsin Wai Road / Junction Road

ATKINS CHINA LIMITED

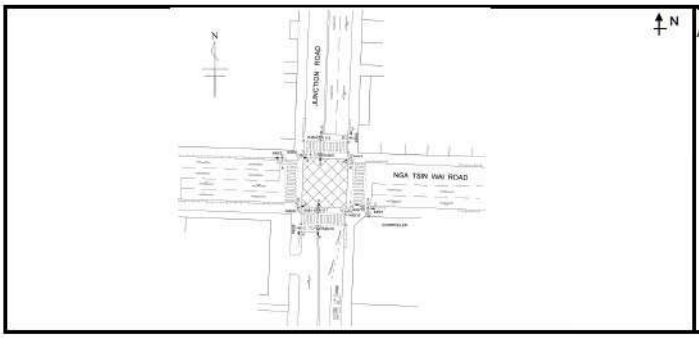
TRAFFIC SIGNAL CALCULATION SHEET

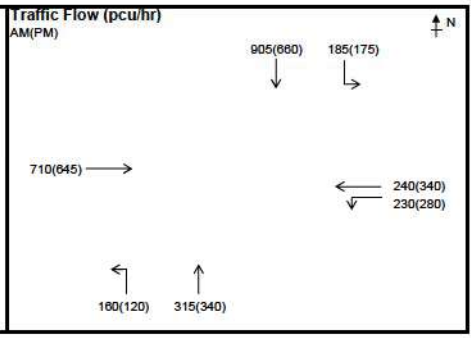
ATKINS

JOB NO. : 5205867

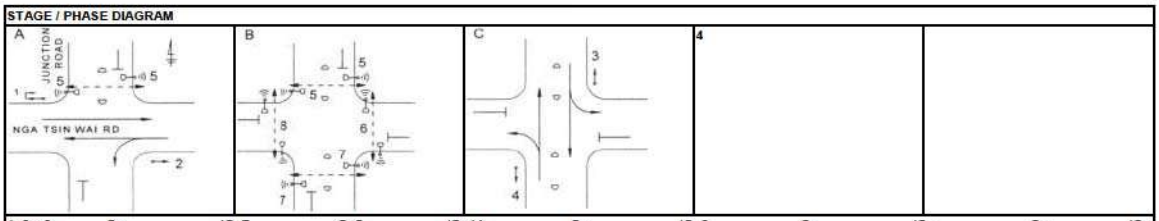
Junction : J8 - Nga Tsin Wai Road / Junction Road Design Year: 2040

Scheme : Design Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+6p+3	G=	IG=7	G=5	IG=14	G=	IG=6	G=	IG=	G=	IG=
1+6p+4	G=	IG=7	G=5	IG=14	G=	IG=6	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Nga Tsin Wai Road EB														
1A	A	3.00	Y	N			342		1915	0.179	311		1915	0.162
1B	A	3.00	N	N			368		2055	**0.179**	334		2055	**0.163**
Nga Tsin Wai Road WB														
2A	A	3.30	Y	N	12.5		230	100%	1735	0.133	282	99%	1740	0.162
2B	A	3.30	N	N			240		2085	0.115	338		2085	0.162
Junction Road SB														
3A	C	3.40	Y	N	7.5		507	36%	1820	**0.279**	385	45%	1790	0.215
3B	C	3.40	N	N			583		2095	0.278	450		2095	0.215
Junction Road NB														
4A	C	4.00	Y	N	7.5		475	34%	1890	0.251	460	26%	1915	**0.240**
5p	A,B		5GM +	11FG =	16	sec								
6p	B		5GM +	11FG =	16	sec								
7p	B		5GM +	11FG =	16	sec								
8p	B		5GM +	11FG =	16	sec								

Notes:

AM Peak	1+6p+3	PM Peak	1+6p+4
Sum of Critical *y* *Y*	**0.458**	Sum of Critical *y* *Y*	**0.403**
Lost Time *L* (sec)	30	Lost Time *L* (sec)	30
Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
Practical *Y* *Ypr*	0.675	Practical *Y* *Ypr*	0.665
Reserve Capacity *RC*	**47%**	Reserve Capacity *RC*	**65%**

Date : 5/12/2022 Junction : J8 - Nga Tsin Wai Road / Junction Road

ATKINS CHINA LIMITED

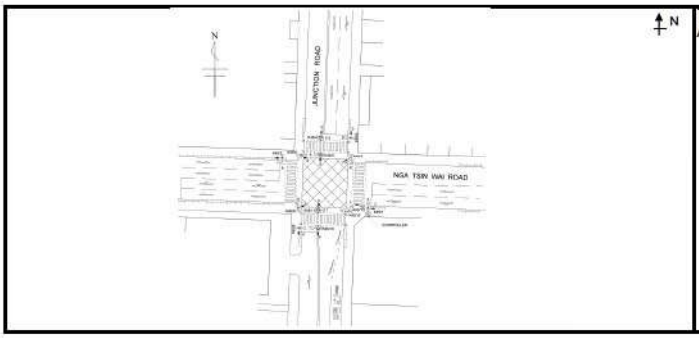
TRAFFIC SIGNAL CALCULATION SHEET

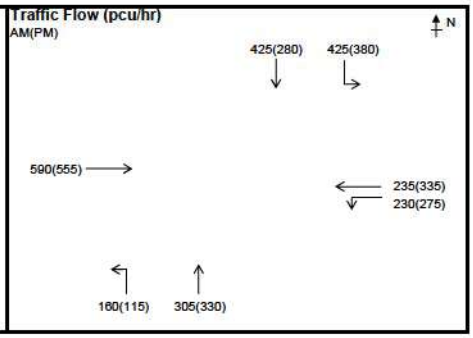
ATKINS

JOB NO. : 5205867

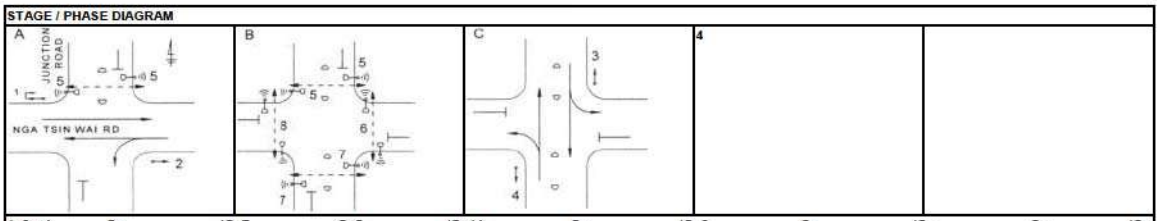
Junction : J8 - Nga Tsin Wai Road / Junction Road Design Year: 2037

Scheme : Reference (with improvement at J15) Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+6p+4	G=	IG=7	G=5	IG=14	G=	IG=6	G=	IG=	G=	IG=
2+6p+4	G=	IG=7	G=5	IG=14	G=	IG=6	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
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1A	A	3.00	Y	N			285		1915	**0.149**	268		1915	0.140
1B	A	3.00	N	N			305		2055	0.148	287		2055	0.140
Nga Tsin Wai Road WB														
2A	A	3.30	Y	N	12.5		230	100%	1735	0.133	277	99%	1740	0.159
2B	A	3.30	N	N			235		2085	0.113	333		2085	**0.160**
Junction Road SB														
3A	C	3.40	Y	N	7.5		425	100%	1630	0.261	380	100%	1630	0.233
3B	C	3.40	N	N			425		2095	0.203	280		2095	0.134
Junction Road NB														
4A	C	4.00	Y	N	7.5		465	34%	1885	**0.247**	445	26%	1915	**0.232**
5p	A,B		5GM +	11FG =	16	sec								
6p	B		5GM +	11FG =	16	sec								
7p	B		5GM +	11FG =	16	sec								
8p	B		5GM +	11FG =	16	sec								

Notes:

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Sum of Critical *y* *Y*	0.396	Sum of Critical *y* *Y*	0.392
Lost Time *L* (sec)	30	Lost Time *L* (sec)	30
Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
Practical *Y* *Ypr*	0.675	Practical *Y* *Ypr*	0.665
Reserve Capacity *RC*	71%	Reserve Capacity *RC*	70%

Date : 5/12/2022 Junction : J8 - Nga Tsin Wai Road / Junction Road

ATKINS CHINA LIMITED

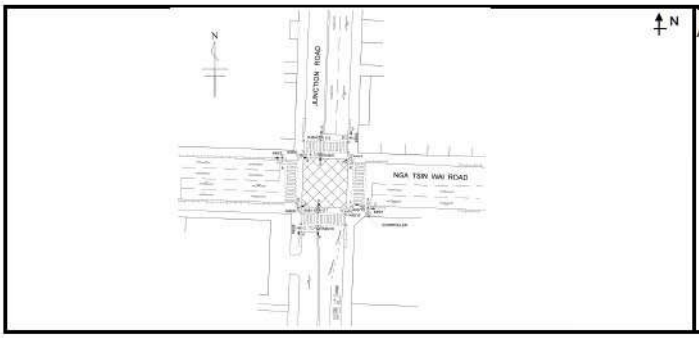
TRAFFIC SIGNAL CALCULATION SHEET

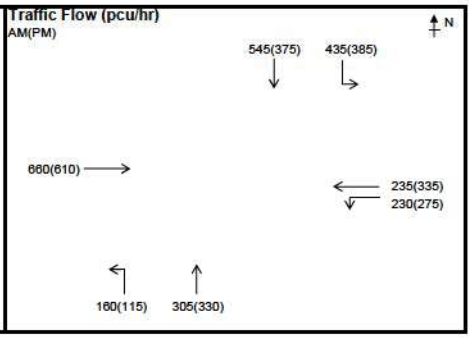
ATKINS

JOB NO. : 5205867

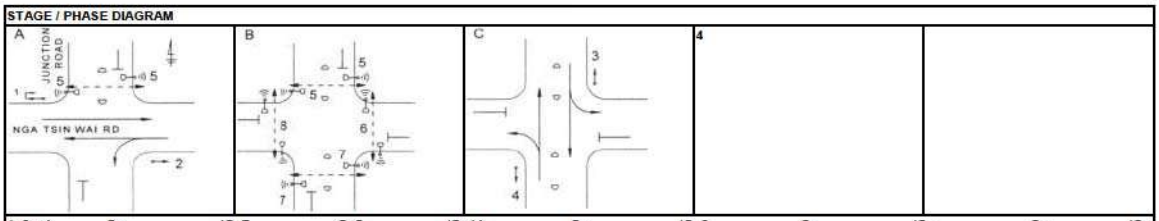
Junction : J8 - Nga Tsin Wai Road / Junction Road Design Year: 2037

Scheme : Design (with improvement at J15) Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+6p+4	G=	IG=7	G=5	IG=14	G=	IG=6	G=	IG=	G=	IG=
2+6p+4	G=	IG=7	G=5	IG=14	G=	IG=6	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
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Junction Road SB														
3A	C	3.40	Y	N	7.5		435	100%	1630	0.267	385	100%	1630	0.236
3B	C	3.40	N	N			545		2095	0.260	375		2095	0.179
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Notes:

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Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
Practical *Y* *Ypr*	0.675	Practical *Y* *Ypr*	0.665
Reserve Capacity *RC*	63%	Reserve Capacity *RC*	70%

Date : 5/12/2022 Junction : J8 - Nga Tsin Wai Road / Junction Road

ATKINS CHINA LIMITED

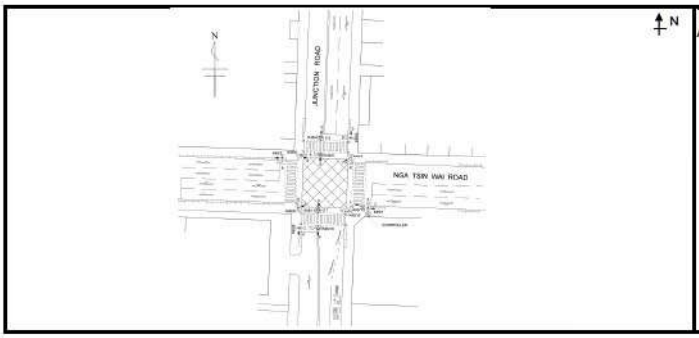
TRAFFIC SIGNAL CALCULATION SHEET

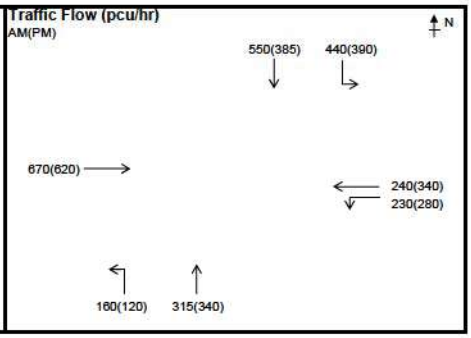
ATKINS

JOB NO. : 5205867

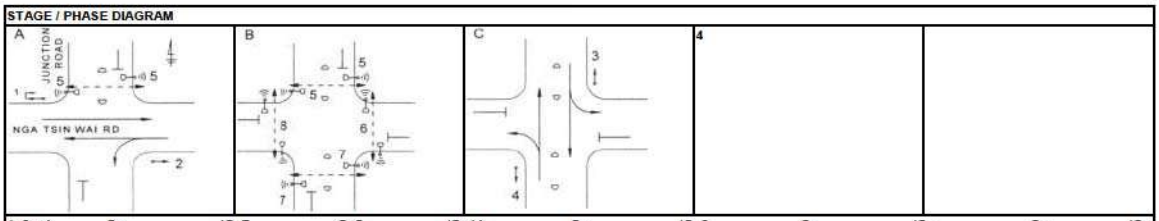
Junction : J8 - Nga Tsin Wai Road / Junction Road Design Year: 2040

Scheme : Reference (with improvement at J15) Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+6p+4	G=	IG=7	G=5	IG=14	G=	IG=6	G=	IG=	G=	IG=
2+6p+4	G=	IG=7	G=5	IG=14	G=	IG=6	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Nga Tsin Wai Road EB														
1A	A	3.00	Y	N			323		1915	0.169	299		1915	0.156
1B	A	3.00	N	N			347		2055	0.169	321		2055	0.156
Nga Tsin Wai Road WB														
2A	A	3.30	Y	N	12.5		230	100%	1735	0.133	282	99%	1740	0.162
2B	A	3.30	N	N			240		2085	0.115	338		2085	0.162
Junction Road SB														
3A	C	3.40	Y	N	7.5		440	100%	1630	0.270	390	100%	1630	0.239
3B	C	3.40	N	N			550		2095	0.263	385		2095	0.184
Junction Road NB														
4A	C	4.00	Y	N	7.5		475	34%	1890	0.251	460	26%	1915	0.240
5p	A,B		5GM +	11FG =	16	sec								
6p	B		5GM +	11FG =	16	sec								
7p	B		5GM +	11FG =	16	sec								
8p	B		5GM +	11FG =	16	sec								

Notes:

AM Peak	1+6p+4	PM Peak	2+6p+4
Sum of Critical *y* *Y*	0.420	Sum of Critical *y* *Y*	0.402
Lost Time *L* (sec)	30	Lost Time *L* (sec)	30
Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
Practical *Y* *Ypr*	0.675	Practical *Y* *Ypr*	0.665
Reserve Capacity *RC*	61%	Reserve Capacity *RC*	65%

Date : 5/12/2022 Junction : J8 - Nga Tsin Wai Road / Junction Road

ATKINS CHINA LIMITED

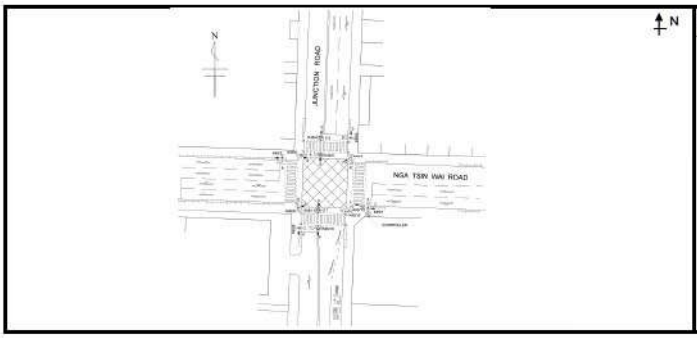
TRAFFIC SIGNAL CALCULATION SHEET

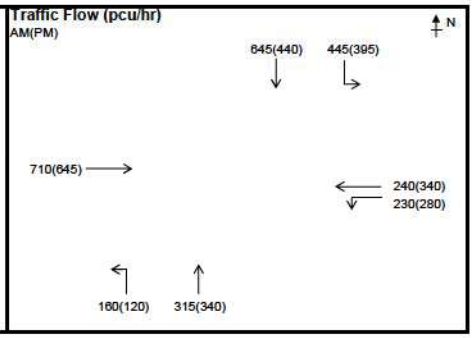
ATKINS

JOB NO. : 5205867

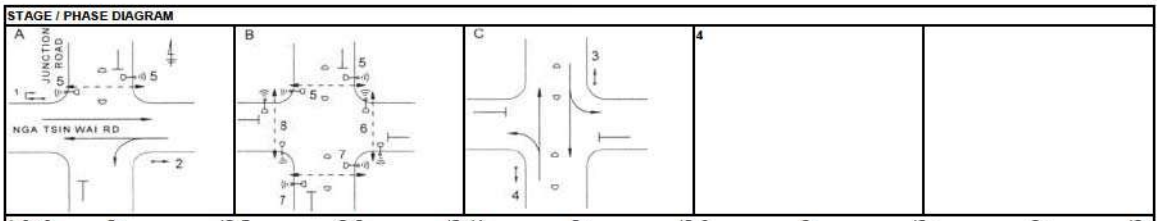
Junction : J8 - Nga Tsin Wai Road / Junction Road Design Year: 2040

Scheme : Design (with improvement at J15) Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+6p+3	G=	IG=7	G=5	IG=14	G=	IG=6	G=	IG=	G=	IG=
1+6p+3	G=	IG=7	G=5	IG=14	G=	IG=6	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Nga Tsin Wai Road EB														
1A	A	3.00	Y	N			342		1915	0.179	311		1915	0.162
1B	A	3.00	N	N			368		2055	**0.179**	334		2055	**0.163**
Nga Tsin Wai Road WB														
2A	A	3.30	Y	N	12.5		230	100%	1735	0.133	282	99%	1740	0.162
2B	A	3.30	N	N			240		2085	0.115	338		2085	0.162
Junction Road SB														
3A	C	3.40	Y	N	7.5		480	93%	1650	0.291	395	100%	1630	**0.242**
3B	C	3.40	N	N			610		2095	**0.291**	440		2095	0.210
Junction Road NB														
4A	C	4.00	Y	N	7.5		475	34%	1890	0.251	460	26%	1915	0.240
5p	A,B		5GM +	11FG =	16	sec								
6p	B		5GM +	11FG =	16	sec								
7p	B		5GM +	11FG =	16	sec								
8p	B		5GM +	11FG =	16	sec								

Notes:

AM Peak	1+6p+3	PM Peak	1+6p+3
Sum of Critical *y* **Y**	**0.470**	Sum of Critical *y* **Y**	**0.405**
Lost Time *L* (sec)	30	Lost Time *L* (sec)	30
Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
Practical Y *Ypr*	0.675	Practical Y *Ypr*	0.665
Reserve Capacity *RC*	**44%**	Reserve Capacity *RC*	**64%**

Date : 5/12/2022 Junction : J8 - Nga Tsin Wai Road / Junction Road

ATKINS CHINA LIMITED

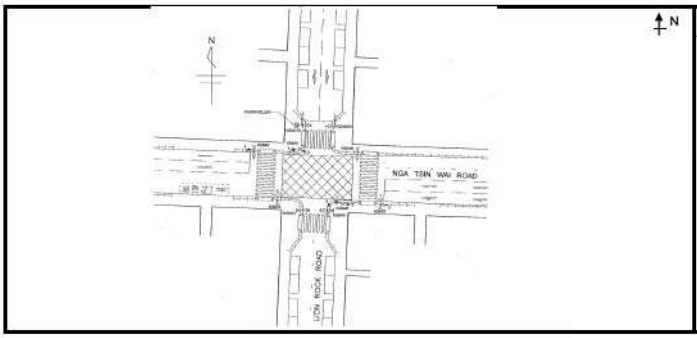
TRAFFIC SIGNAL CALCULATION SHEET

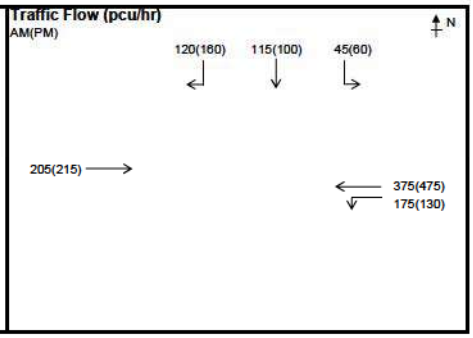
ATKINS

JOB NO. : 5205867

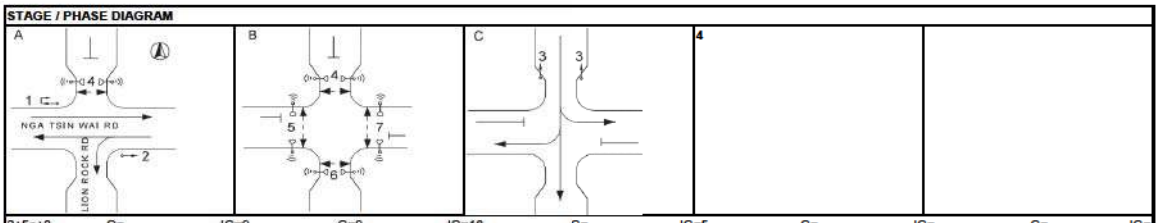
Junction : J9 - Nga Tsin Wai Road / Lion Rock Road Design Year: 2021

Scheme : Existing Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



2+5p+3	G=	IG=9	G=9	IG=16	G=	IG=5	G=	IG=	G=	IG=
2+5p+3	G=	IG=9	G=9	IG=16	G=	IG=5	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Nga Tsin Wai Road EB														
1A	A	3.00	Y	N			99		1915	0.052	104		1915	0.054
1B	A	3.00	N	N			106		2055	0.052	111		2055	0.054
Nga Tsin Wai Road WB														
2A	A	3.00	Y	N	7		246	71%	1660	**0.148**	277	47%	1740	0.159
2B	A	3.00	N	N			304		2055	0.148	328		2055	**0.160**
Lion Rock Road SB														
3A	C	3.50	Y	N	5		137	33%	1790	**0.077**	157	38%	1765	**0.089**
3B	C	3.50	N	N	10		143	84%	1870	0.076	163	98%	1835	0.089
4p	A,B		5GM +	8FG =	13	sec								
5p	B		9GM +	14FG =	23	sec								
6p	B		5GM +	7FG =	12	sec								
7p	B		9GM +	14FG =	23	sec								

Notes:

AM Peak	2+5p+3	PM Peak	2+5p+3
Sum of Critical *y* **Y**	**0.225**	Sum of Critical *y* **Y**	**0.249**
Lost Time ***L*** (sec)	37	Lost Time ***L*** (sec)	37
Cycle Time ***c*** (sec)	120	Cycle Time ***c*** (sec)	115
Practical Y ***Ypr***	0.623	Practical Y ***Ypr***	0.610
Reserve Capacity ***RC***	**177%**	Reserve Capacity ***RC***	**146%**

Date : 5/13/2022 Junction : J9 - Nga Tsin Wai Road / Lion Rock Road

ATKINS CHINA LIMITED

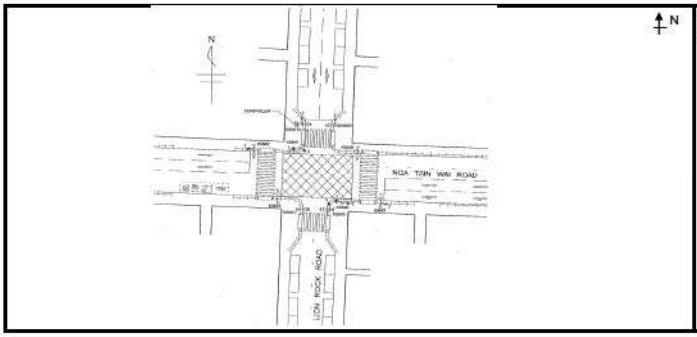
TRAFFIC SIGNAL CALCULATION SHEET

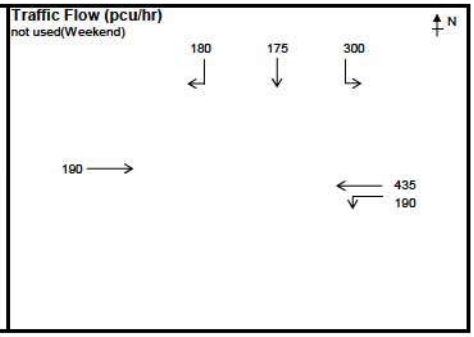
ATKINS

JOB NO. : 5205867

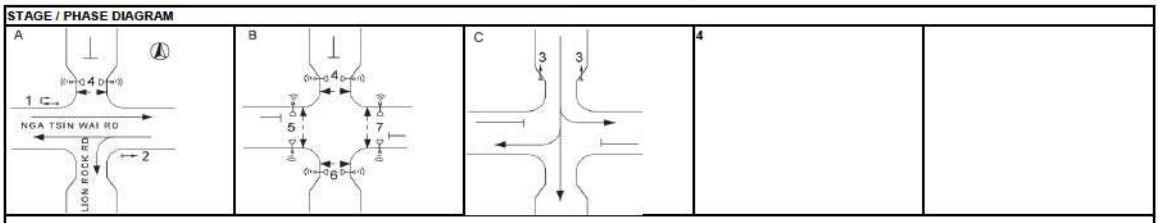
Junction : J9 - Nga Tsin Wai Road / Lion Rock Road Design Year: 2021

Scheme : Existing - Weekend Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



2+5p+3	G=	IG=9	G=9	IG=16	G=	IG=5	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*					Weekend Peak: Design Flow *q* (pcu/hr)	Proportion turning (%) *f*	Saturation flow *S* (pcu/hr)	Flow factor *y*
Nga Tsin Wai Road EB														
1A	A	3.00	Y	N							92		1915	0.048
1B	A	3.00	N	N							98		2055	0.048
Nga Tsin Wai Road WB														
2A	A	3.00	Y	N	7						280	68%	1670	0.168
2B	A	3.00	N	N							345		2055	0.168
Lion Rock Road SB														
3A	C	3.50	Y	N	5						300	100%	1510	0.199
3B	C	3.50	N	N	10						355	51%	1955	0.182
4p	A,B		5GM +	8FG =	13	sec								
5p	B		9GM +	14FG =	23	sec								
6p	B		5GM +	7FG =	12	sec								
7p	B		9GM +	14FG =	23	sec								

Notes:

PM Peak	2+5p+3
Sum of Critical *y* *Y*	0.367
Lost Time *L* (sec)	37
Cycle Time *c* (sec)	115
Practical *Y* *Ypr*	0.610
Reserve Capacity *RC*	67%

Date : 5/19/2022 Junction : J9 - Nga Tsin Wai Road / Lion Rock Road

ATKINS CHINA LIMITED

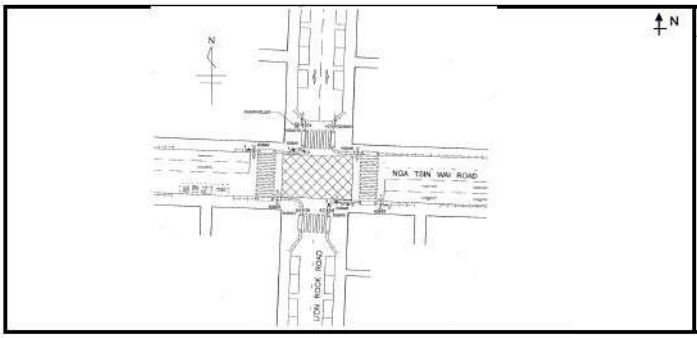
TRAFFIC SIGNAL CALCULATION SHEET

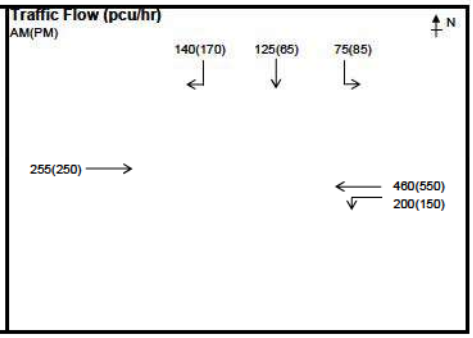
ATKINS

JOB NO. : 5205867

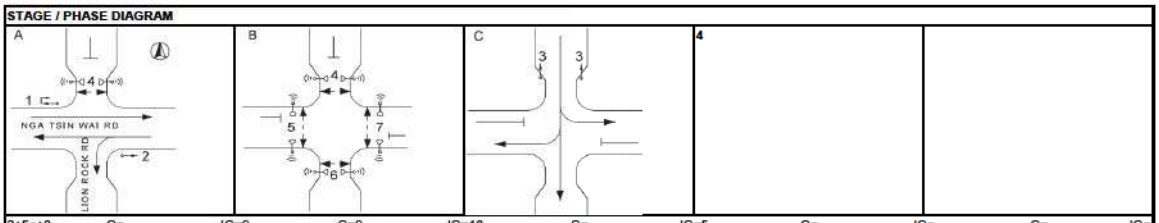
Junction : J9 - Nga Tsin Wai Road / Lion Rock Road Design Year: 2033

Scheme : Reference Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



2+5p+3	G=	IG=9	G=9	IG=16	G=	IG=5	G=	IG=	G=	IG=	
2+5p+3	G=	IG=9	G=9	IG=16	G=	IG=5	G=	IG=	G=	IG=	

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Nga Tsin Wai Road EB														
1A	A	3.00	Y	N			123		1915	0.064	121		1915	0.063
1B	A	3.00	N	N			132		2055	0.064	129		2055	0.063
Nga Tsin Wai Road WB														
2A	A	3.00	Y	N	7		296	68%	1675	0.177	321	47%	1740	**0.184**
2B	A	3.00	N	N			364		2055	**0.177**	379		2055	0.184
Lion Rock Road SB														
3A	C	3.50	Y	N	5		163	46%	1725	**0.094**	150	57%	1680	0.089
3B	C	3.50	N	N	10		177	79%	1880	0.094	170	100%	1830	**0.093**
4p	A,B		5GM +	8FG =	13	sec								
5p	B		9GM +	14FG =	23	sec								
6p	B		5GM +	7FG =	12	sec								
7p	B		9GM +	14FG =	23	sec								

Notes:

AM Peak	2+5p+3	PM Peak	2+5p+3
Sum of Critical *y* **Y**	**0.272**	Sum of Critical *y* **Y**	**0.277**
Lost Time ***L*** (sec)	37	Lost Time ***L*** (sec)	37
Cycle Time ***c*** (sec)	120	Cycle Time ***c*** (sec)	115
Practical Y ***Ypr***	0.623	Practical Y ***Ypr***	0.610
Reserve Capacity ***RC***	**129%**	Reserve Capacity ***RC***	**120%**

Date : 5/13/2022 Junction : J9 - Nga Tsin Wai Road / Lion Rock Road

ATKINS CHINA LIMITED

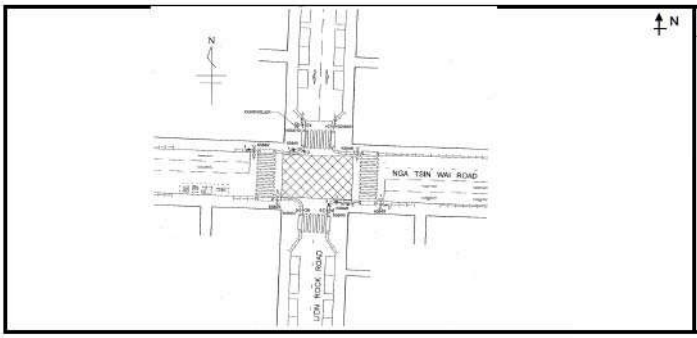
TRAFFIC SIGNAL CALCULATION SHEET

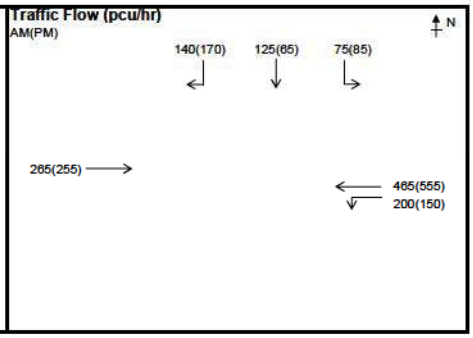
ATKINS

JOB NO. : 5205867

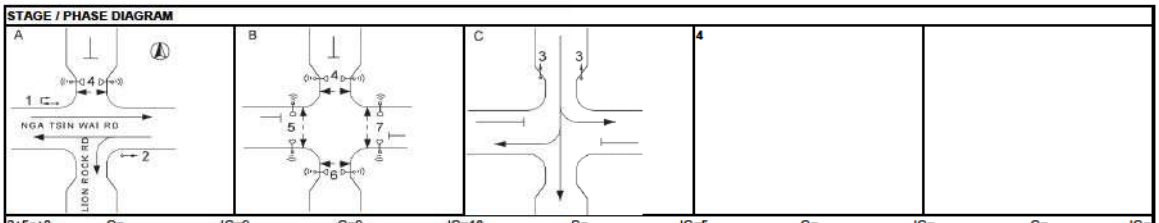
Junction : J9 - Nga Tsin Wai Road / Lion Rock Road Design Year: 2033

Scheme : Design Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



2+5p+3	G=	IG=9	G=9	IG=16	G=	IG=5	G=	IG=	G=	IG=	
2+5p+3	G=	IG=9	G=9	IG=16	G=	IG=5	G=	IG=	G=	IG=	

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Nga Tsin Wai Road EB														
1A	A	3.00	Y	N			128		1915	0.067	123		1915	0.064
1B	A	3.00	N	N			137		2055	0.067	132		2055	0.064
Nga Tsin Wai Road WB														
2A	A	3.00	Y	N	7		299	67%	1675	**0.179**	323	46%	1740	0.186
2B	A	3.00	N	N			366		2055	0.178	382		2055	**0.186**
Lion Rock Road SB														
3A	C	3.50	Y	N	5		163	46%	1725	**0.094**	150	57%	1680	0.089
3B	C	3.50	N	N	10		177	79%	1880	0.094	170	100%	1830	**0.093**
4p	A,B		5GM +	8FG =	13	sec								
5p	B		9GM +	14FG =	23	sec								
6p	B		5GM +	7FG =	12	sec								
7p	B		9GM +	14FG =	23	sec								

Notes:

AM Peak	2+5p+3	PM Peak	2+5p+3
Sum of Critical *y* **Y**	**0.273**	Sum of Critical *y* **Y**	**0.279**
Lost Time ***L*** (sec)	37	Lost Time ***L*** (sec)	37
Cycle Time ***c*** (sec)	120	Cycle Time ***c*** (sec)	115
Practical Y ***Ypr***	0.623	Practical Y ***Ypr***	0.610
Reserve Capacity ***RC***	**128%**	Reserve Capacity ***RC***	**119%**

Date : 5/13/2022 Junction : J9 - Nga Tsin Wai Road / Lion Rock Road

ATKINS CHINA LIMITED

TRAFFIC SIGNAL CALCULATION SHEET

ATKINS

JOB NO. : 5205867

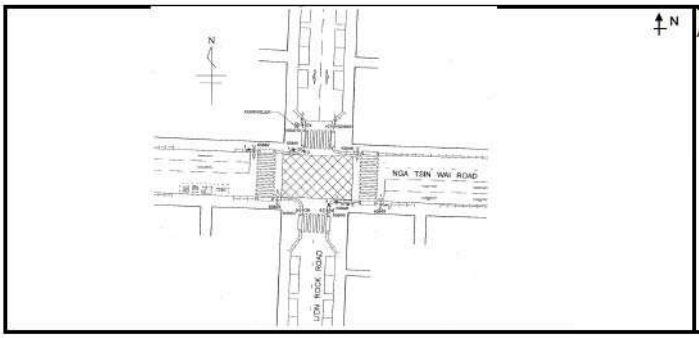
Junction : J9 - Nga Tsin Wai Road / Lion Rock Road

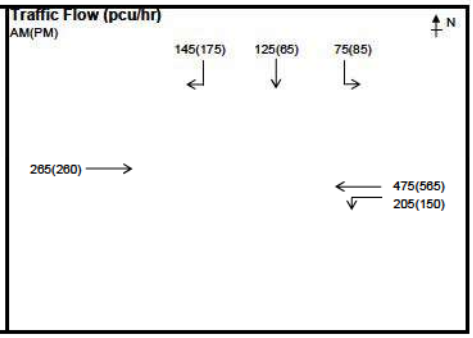
Design Year: 2036

Scheme : Reference

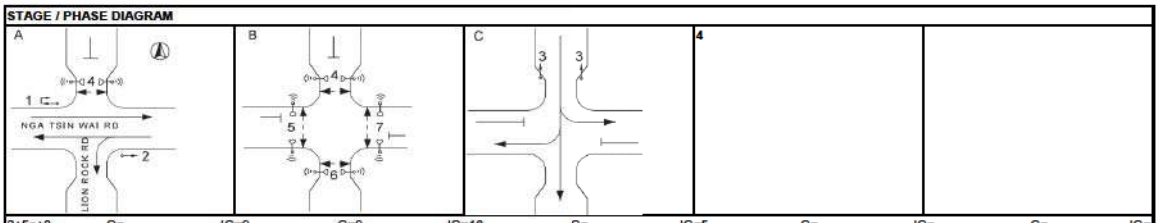
Designed by: RC

Checked by: EC





STAGE / PHASE DIAGRAM



2+5p+3	G=	IG=9	G=9	IG=16	G=	IG=5	G=	IG=	G=	IG=	
2+5p+3	G=	IG=9	G=9	IG=16	G=	IG=5	G=	IG=	G=	IG=	

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Nga Tsin Wai Road EB														
1A	A	3.00	Y	N			128		1915	0.067	125		1915	0.065
1B	A	3.00	N	N			137		2055	0.067	135		2055	0.066
Nga Tsin Wai Road WB														
2A	A	3.00	Y	N	7		305	67%	1675	0.182	328	46%	1745	0.188
2B	A	3.00	N	N			375		2055	**0.182**	387		2055	**0.188**
Lion Rock Road SB														
3A	C	3.50	Y	N	5		165	45%	1730	0.095	150	57%	1680	0.089
3B	C	3.50	N	N	10		180	81%	1880	**0.096**	175	100%	1830	**0.096**
4p	A,B		5GM +	8FG =	13	sec								
5p	B		9GM +	14FG =	23	sec								
6p	B		5GM +	7FG =	12	sec								
7p	B		9GM +	14FG =	23	sec								

Notes:

AM Peak	2+5p+3	PM Peak	2+5p+3
Sum of Critical *y* **Y**	**0.278**	Sum of Critical *y* **Y**	**0.284**
Lost Time ***L*** (sec)	37	Lost Time ***L*** (sec)	37
Cycle Time ***c*** (sec)	120	Cycle Time ***c*** (sec)	115
Practical Y ***Ypr***	0.623	Practical Y ***Ypr***	0.610
Reserve Capacity ***RC***	**124%**	Reserve Capacity ***RC***	**115%**

Date : 5/13/2022 Junction : J9 - Nga Tsin Wai Road / Lion Rock Road

ATKINS CHINA LIMITED

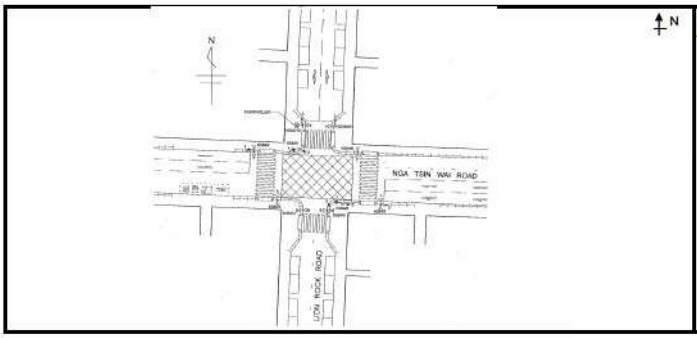
TRAFFIC SIGNAL CALCULATION SHEET

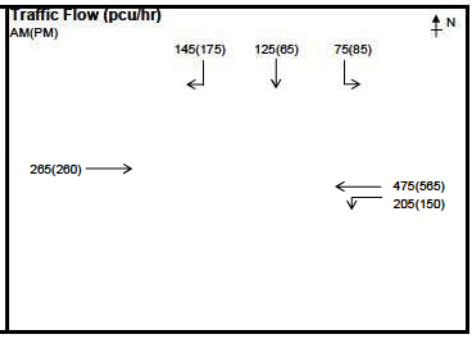
ATKINS

JOB NO. : 5205867

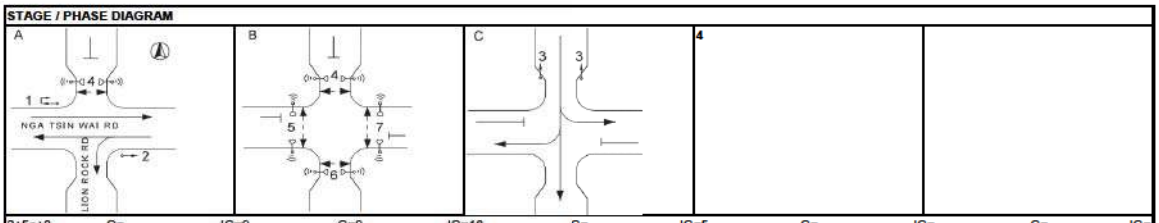
Junction : J9 - Nga Tsin Wai Road / Lion Rock Road Design Year: 2036

Scheme : Design Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



2+5p+3	G=	IG=9	G=9	IG=16	G=	IG=5	G=	IG=	G=	IG=	
2+5p+3	G=	IG=9	G=9	IG=16	G=	IG=5	G=	IG=	G=	IG=	

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Nga Tsin Wai Road EB														
1A	A	3.00	Y	N			128		1915	0.067	125		1915	0.065
1B	A	3.00	N	N			137		2055	0.067	135		2055	0.066
Nga Tsin Wai Road WB														
2A	A	3.00	Y	N	7		305	67%	1675	0.182	328	46%	1745	0.188
2B	A	3.00	N	N			375		2055	**0.182**	387		2055	**0.188**
Lion Rock Road SB														
3A	C	3.50	Y	N	5		165	45%	1730	0.095	150	57%	1680	0.089
3B	C	3.50	N	N	10		180	81%	1880	**0.096**	175	100%	1830	**0.096**
4p	A,B		5GM +	8FG =	13	sec								
5p	B		9GM +	14FG =	23	sec								
6p	B		5GM +	7FG =	12	sec								
7p	B		9GM +	14FG =	23	sec								

Notes:

AM Peak	2+5p+3	PM Peak	2+5p+3
Sum of Critical *y* **Y**	**0.278**	Sum of Critical *y* **Y**	**0.284**
Lost Time ***L*** (sec)	37	Lost Time ***L*** (sec)	37
Cycle Time ***c*** (sec)	120	Cycle Time ***c*** (sec)	115
Practical Y ***Ypr***	0.623	Practical Y ***Ypr***	0.610
Reserve Capacity ***RC***	**124%**	Reserve Capacity ***RC***	**115%**

Date : 5/13/2022 Junction : J9 - Nga Tsin Wai Road / Lion Rock Road

ATKINS CHINA LIMITED

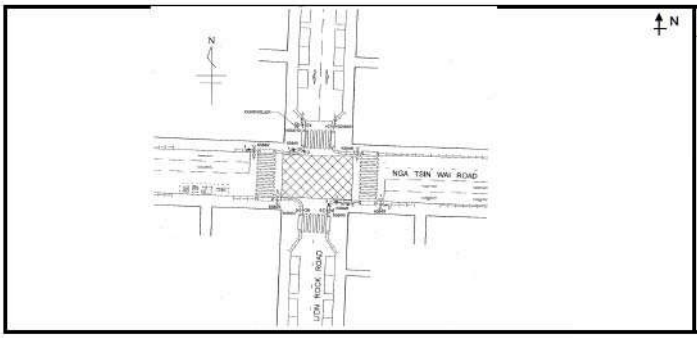
TRAFFIC SIGNAL CALCULATION SHEET

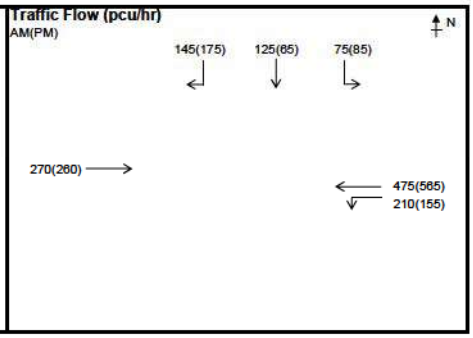
ATKINS

JOB NO. : 5205867

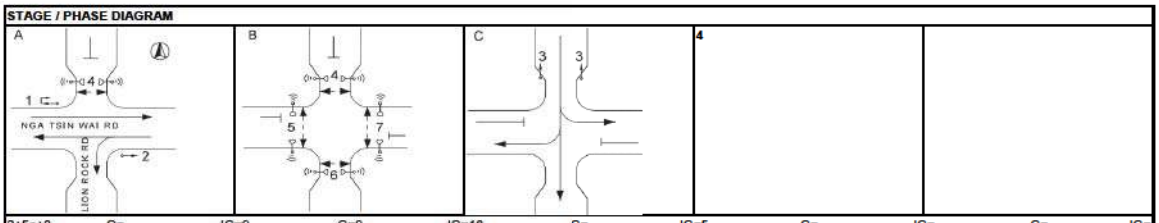
Junction : J9 - Nga Tsin Wai Road / Lion Rock Road Design Year: 2037

Scheme : Reference Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



2+5p+3	G=	IG=9	G=9	IG=16	G=	IG=5	G=	IG=	G=	IG=
2+5p+3	G=	IG=9	G=9	IG=16	G=	IG=5	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Nga Tsin Wai Road EB														
1A	A	3.00	Y	N			130		1915	0.068	125		1915	0.065
1B	A	3.00	N	N			140		2055	0.068	135		2055	0.066
Nga Tsin Wai Road WB														
2A	A	3.00	Y	N	7		307	68%	1670	0.184	330	47%	1740	0.190
2B	A	3.00	N	N			378		2055	**0.184**	390		2055	**0.190**
Lion Rock Road SB														
3A	C	3.50	Y	N	5		165	45%	1730	0.095	150	57%	1680	0.089
3B	C	3.50	N	N	10		180	81%	1880	**0.096**	175	100%	1830	**0.096**
4p	A,B		5GM +	8FG =	13	sec								
5p	B		9GM +	14FG =	23	sec								
6p	B		5GM +	7FG =	12	sec								
7p	B		9GM +	14FG =	23	sec								

Notes:

AM Peak	2+5p+3	PM Peak	2+5p+3
Sum of Critical *y* **Y**	**0.280**	Sum of Critical *y* **Y**	**0.285**
Lost Time ***L*** (sec)	37	Lost Time ***L*** (sec)	37
Cycle Time ***c*** (sec)	120	Cycle Time ***c*** (sec)	115
Practical Y ***Ypr***	0.623	Practical Y ***Ypr***	0.610
Reserve Capacity ***RC***	**123%**	Reserve Capacity ***RC***	**114%**

Date : 5/13/2022 Junction : J9 - Nga Tsin Wai Road / Lion Rock Road

ATKINS CHINA LIMITED

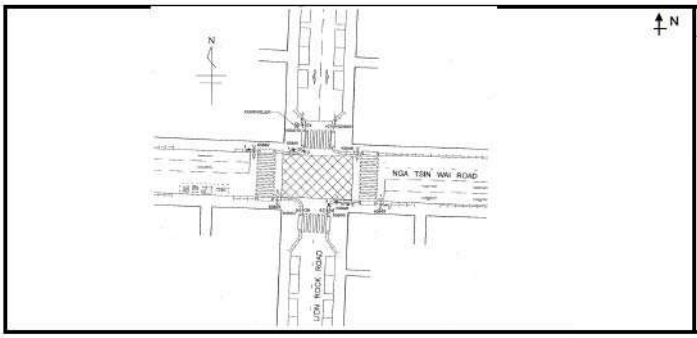
TRAFFIC SIGNAL CALCULATION SHEET

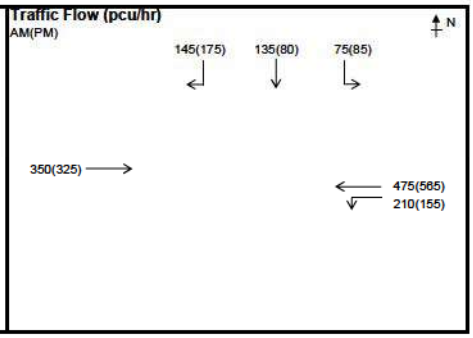
ATKINS

JOB NO. : 5205867

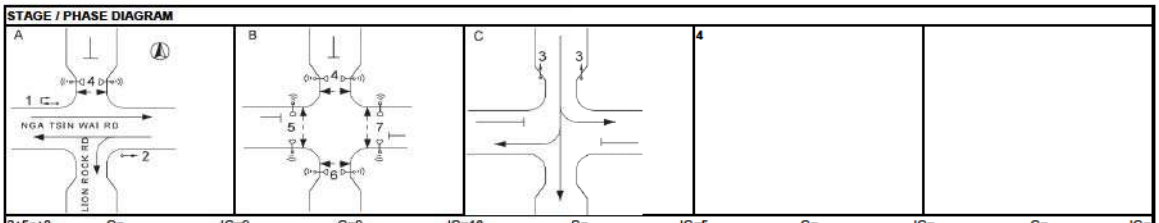
Junction : J9 - Nga Tsin Wai Road / Lion Rock Road Design Year: 2037

Scheme : Design Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



2+5p+3	G=	IG=9	G=9	IG=16	G=	IG=5	G=	IG=	G=	IG=
2+5p+3	G=	IG=9	G=9	IG=16	G=	IG=5	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Nga Tsin Wai Road EB														
1A	A	3.00	Y	N			169		1915	0.088	157		1915	0.082
1B	A	3.00	N	N			181		2055	0.088	168		2055	0.082
Nga Tsin Wai Road WB														
2A	A	3.00	Y	N	7		307	68%	1670	0.184	330	47%	1740	0.190
2B	A	3.00	N	N			378		2055	**0.184**	390		2055	**0.190**
Lion Rock Road SB														
3A	C	3.50	Y	N	5		170	44%	1735	0.098	164	52%	1700	**0.096**
3B	C	3.50	N	N	10		185	78%	1885	**0.098**	176	99%	1830	0.096
4p	A,B		5GM +	8FG =	13	sec								
5p	B		9GM +	14FG =	23	sec								
6p	B		5GM +	7FG =	12	sec								
7p	B		9GM +	14FG =	23	sec								

Notes:

AM Peak	2+5p+3	PM Peak	2+5p+3
Sum of Critical *y* **Y**	**0.282**	Sum of Critical *y* **Y**	**0.286**
Lost Time ***L*** (sec)	37	Lost Time ***L*** (sec)	37
Cycle Time ***c*** (sec)	120	Cycle Time ***c*** (sec)	115
Practical Y ***Ypr***	0.623	Practical Y ***Ypr***	0.610
Reserve Capacity ***RC***	**121%**	Reserve Capacity ***RC***	**113%**

Date : 5/13/2022 Junction : J9 - Nga Tsin Wai Road / Lion Rock Road

ATKINS CHINA LIMITED

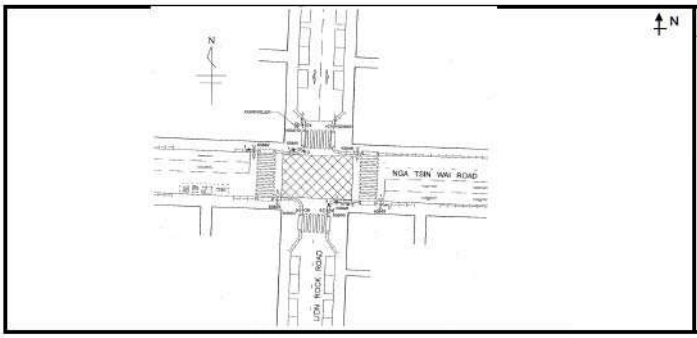
TRAFFIC SIGNAL CALCULATION SHEET

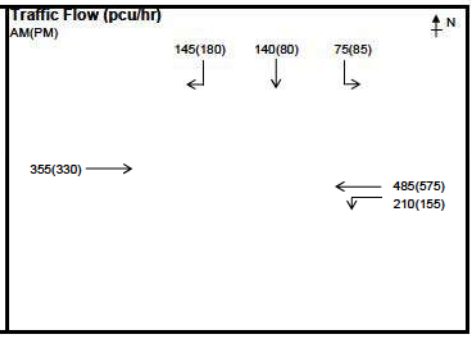
ATKINS

JOB NO. : 5205867

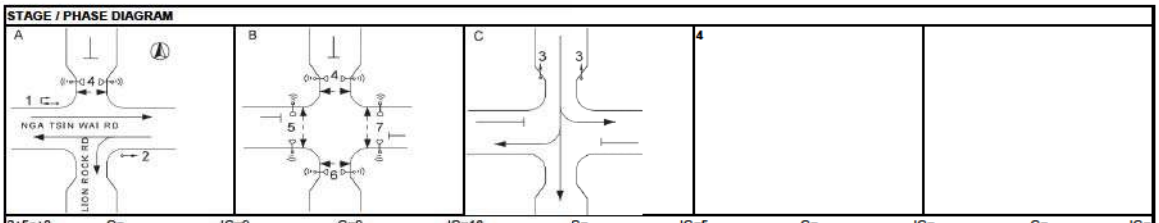
Junction : J9 - Nga Tsin Wai Road / Lion Rock Road Design Year: 2040

Scheme : Reference Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



2+5p+3	G=	IG=9	G=9	IG=16	G=	IG=5	G=	IG=	G=	IG=	
2+5p+3	G=	IG=9	G=9	IG=16	G=	IG=5	G=	IG=	G=	IG=	

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Nga Tsin Wai Road EB														
1A	A	3.00	Y	N			171		1915	0.089	159		1915	0.083
1B	A	3.00	N	N			184		2055	0.090	171		2055	0.083
Nga Tsin Wai Road WB														
2A	A	3.00	Y	N	7		312	67%	1675	0.186	335	46%	1740	**0.193**
2B	A	3.00	N	N			383		2055	**0.186**	395		2055	0.192
Lion Rock Road SB														
3A	C	3.50	Y	N	5		173	43%	1740	**0.099**	165	52%	1700	0.097
3B	C	3.50	N	N	10		187	78%	1885	0.099	180	100%	1830	**0.098**
4p	A,B		5GM +	8FG =	13	sec								
5p	B		9GM +	14FG =	23	sec								
6p	B		5GM +	7FG =	12	sec								
7p	B		9GM +	14FG =	23	sec								

Notes:

AM Peak	2+5p+3	PM Peak	2+5p+3
Sum of Critical *y* **Y**	**0.286**	Sum of Critical *y* **Y**	**0.291**
Lost Time ***L*** (sec)	37	Lost Time ***L*** (sec)	37
Cycle Time ***c*** (sec)	120	Cycle Time ***c*** (sec)	115
Practical Y ***Ypr***	0.623	Practical Y ***Ypr***	0.610
Reserve Capacity ***RC***	**118%**	Reserve Capacity ***RC***	**110%**

Date : 5/13/2022 Junction : J9 - Nga Tsin Wai Road / Lion Rock Road

ATKINS CHINA LIMITED

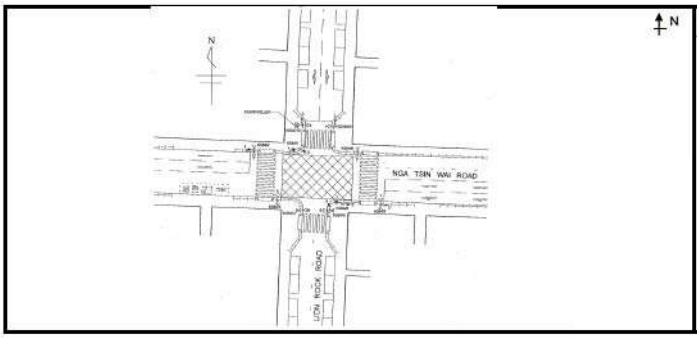
TRAFFIC SIGNAL CALCULATION SHEET

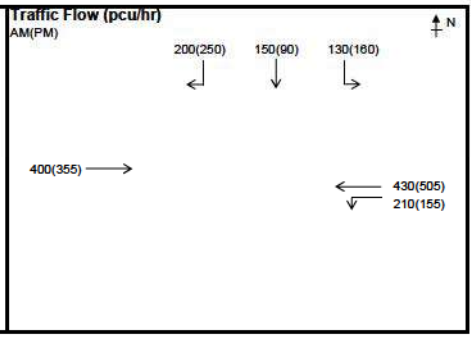
ATKINS

JOB NO. : 5205867

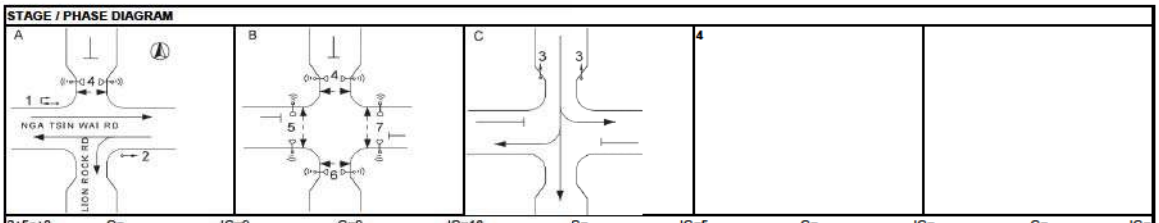
Junction : J9 - Nga Tsin Wai Road / Lion Rock Road Design Year: 2040

Scheme : Design Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



2+5p+3	G=	IG=9	G=9	IG=16	G=	IG=5	G=	IG=	G=	IG=	
2+5p+3	G=	IG=9	G=9	IG=16	G=	IG=5	G=	IG=	G=	IG=	

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Nga Tsin Wai Road EB														
1A	A	3.00	Y	N			193		1915	0.101	171		1915	0.089
1B	A	3.00	N	N			207		2055	0.101	184		2055	0.090
Nga Tsin Wai Road WB														
2A	A	3.00	Y	N	7		285	74%	1655	0.172	301	51%	1725	0.174
2B	A	3.00	N	N			355		2055	**0.173**	359		2055	**0.175**
Lion Rock Road SB														
3A	C	3.50	Y	N	5		226	58%	1675	**0.135**	235	68%	1630	**0.144**
3B	C	3.50	N	N	10		254	79%	1885	0.135	265	94%	1845	0.144
4p	A,B		5GM +	8FG =	13	sec								
5p	B		9GM +	14FG =	23	sec								
6p	B		5GM +	7FG =	12	sec								
7p	B		9GM +	14FG =	23	sec								

Notes:

AM Peak	2+5p+3	PM Peak	2+5p+3
Sum of Critical *y* **Y**	**0.308**	Sum of Critical *y* **Y**	**0.319**
Lost Time ***L*** (sec)	37	Lost Time ***L*** (sec)	37
Cycle Time ***c*** (sec)	120	Cycle Time ***c*** (sec)	115
Practical Y ***Ypr***	0.623	Practical Y ***Ypr***	0.610
Reserve Capacity ***RC***	**102%**	Reserve Capacity ***RC***	**91%**

Date : 5/13/2022 Junction : J9 - Nga Tsin Wai Road / Lion Rock Road

ATKINS CHINA LIMITED

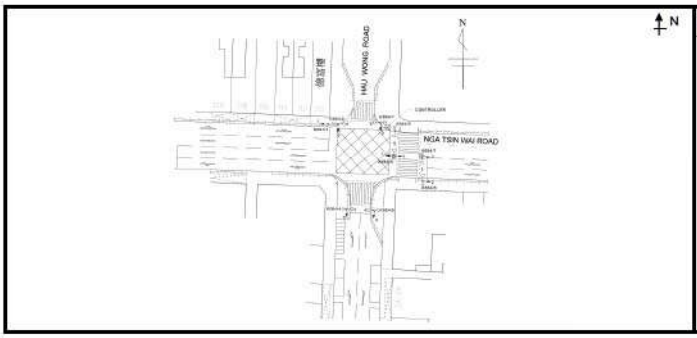
TRAFFIC SIGNAL CALCULATION SHEET

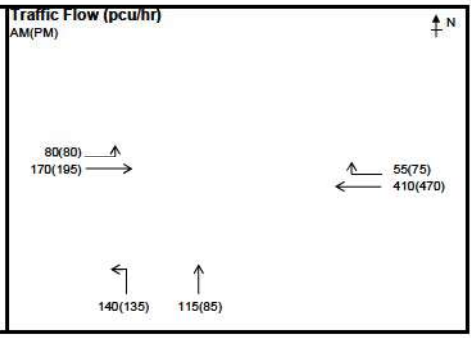
ATKINS

JOB NO. : 5205867

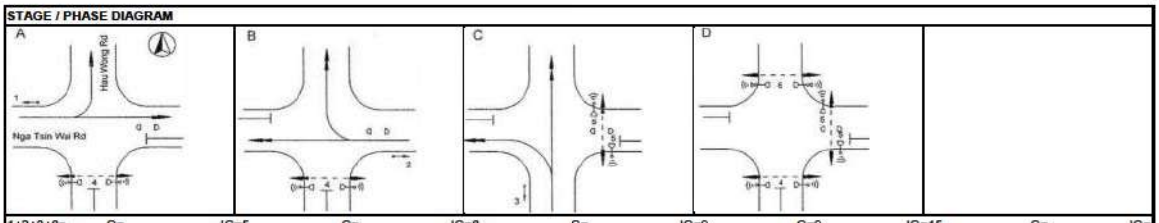
Junction : J10 - Nga Tsin Wai Road / Hau Wong Road Design Year: 2021

Scheme : Existing Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+2+3+6p	G=	IG=5	G=	IG=8	G=	IG=9	G=9	IG=15	G=	IG=	
1+2+3+6p	G=	IG=5	G=	IG=8	G=	IG=9	G=9	IG=15	G=	IG=	

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Nga Tsin Wai Road EB														
1A	A	3.00	Y	N	10		100	80%	1370	**0.073**	111	72%	1385	**0.080**
1B	A	3.00	N	N			150		2055	0.073	164		2055	0.080
Nga Tsin Wai Road WB														
2A	B	3.00	Y	N			202		1530	0.132	238		1530	**0.156**
2B	B	3.00	N	N	10		263	21%	1990	**0.132**	307	24%	1980	0.155
Hau Wong Road NB														
3A	C	3.00	Y	N	5		140	100%	1180	**0.119**	135	100%	1180	**0.114**
3B	C	3.00	N	N			115		2055	0.056	85		2055	0.041
4p	A,B,D		8GM +	9FG =	17	sec								
5p	C,D		6GM +	7FG =	13	sec								
6p	D		9GM +	12FG =	21	sec								

Notes:
Site factor have been applied to cater the kerbside activities

AM Peak	1+2+3+6p	PM Peak	1+2+3+6p
Sum of Critical *y* **Y**	**0.324**	Sum of Critical *y* **Y**	**0.350**
Lost Time ***L*** (sec)	41	Lost Time ***L*** (sec)	41
Cycle Time ***c*** (sec)	120	Cycle Time ***c*** (sec)	115
Practical Y ***Ypr***	0.593	Practical Y ***Ypr***	0.579
Reserve Capacity ***RC***	**83%**	Reserve Capacity ***RC***	**65%**

Date : 5/13/2022 Junction : J10 - Nga Tsin Wai Road / Hau Wong Road

ATKINS CHINA LIMITED

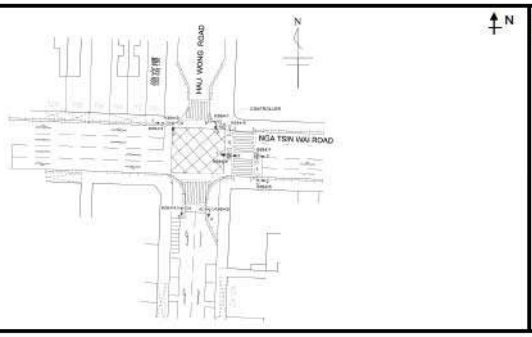
TRAFFIC SIGNAL CALCULATION SHEET

ATKINS

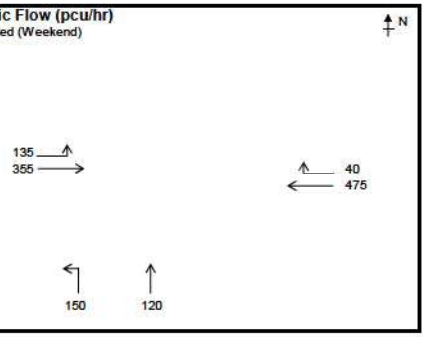
JOB NO. : 5205867

Junction : J10 - Nga Tsin Wai Road / Hau Wong Road Design Year: 2021

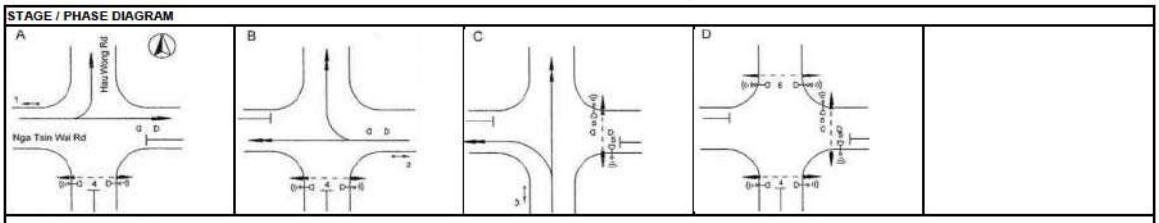
Scheme : Existing - Weekend Designed by: RC Checked by: EC



Traffic Flow (pcu/hr)
Not used (Weekend)



STAGE / PHASE DIAGRAM



1+2+3+6p G= IG=5 G= IG=6 G= IG=9 G=9 IG=15 G= IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	Weekend Peak: Design Flow *q* (pcu/hr)	Proportion turning (%) *f*	Saturation flow *S* (pcu/hr)	Flow factor *y*
Nga Tsin Wai Road EB										
1A	A	3.00	Y	N	10		198	68%	1390	**0.142**
1B	A	3.00	N	N			292		2055	0.142
Nga Tsin Wai Road WB										
2A	B	3.00	Y	N			223		1530	**0.146**
2B	B	3.00	N	N	10		292	14%	2015	0.145
Hau Wong Road NB										
3A	C	3.00	Y	N	5		150	100%	1180	**0.127**
3B	C	3.00	N	N			120		2055	0.058
4p	A,B,D		8GM +	9FG =	17	sec				
5p	C,D		6GM +	7FG =	13	sec				
6p	D		9GM +	12FG =	21	sec				

Notes:
Site factor have been applied to cater the kerbside activities

Weekend Peak	1+2+3+6p
Sum of Critical *y* **Y**	0.415
Lost Time *L* (sec)	41
Cycle Time *c* (sec)	115
Practical *Y* ***Ypr***	0.579
Reserve Capacity ***RC***	39%

Date : 5/19/2022 Junction : J10 - Nga Tsin Wai Road / Hau Wong Road

ATKINS CHINA LIMITED

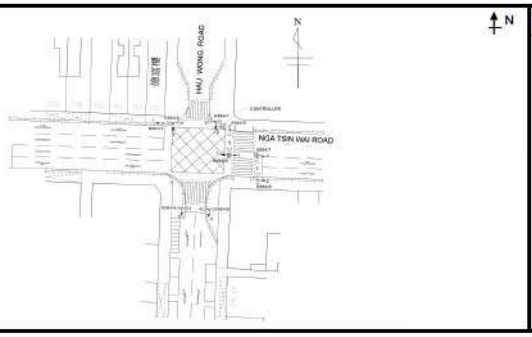
TRAFFIC SIGNAL CALCULATION SHEET

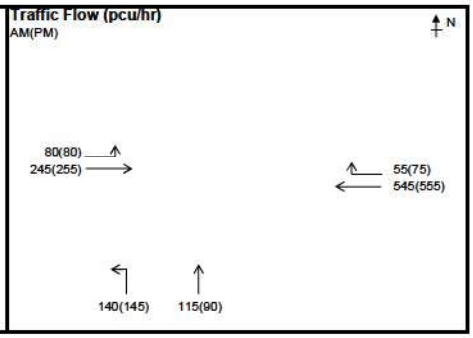
ATKINS

JOB NO. : 5205867

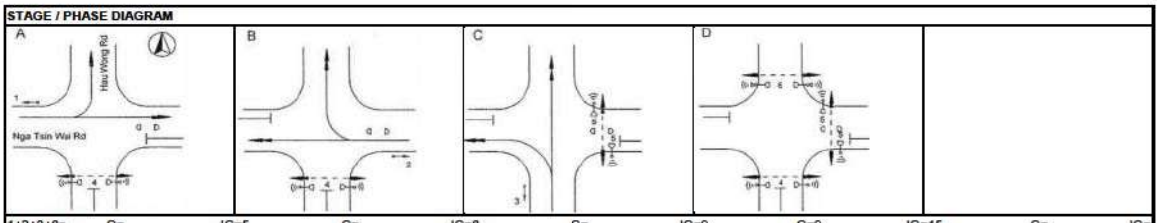
Junction : J10 - Nga Tsin Wai Road / Hau Wong Road Design Year: 2033

Scheme : Reference Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+2+3+6p	G=	IG=5	G=	IG=8	G=	IG=9	G=9	IG=15	G=	IG=
1+2+3+6p	G=	IG=5	G=	IG=8	G=	IG=9	G=9	IG=15	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Nga Tsin Wai Road EB														
1A	A	3.00	Y	N	10		132	61%	1405	**0.094**	136	59%	1410	0.096
1B	A	3.00	N	N			193		2055	0.094	199		2055	**0.097**
Nga Tsin Wai Road WB														
2A	B	3.00	Y	N			260		1530	**0.170**	274		1530	**0.179**
2B	B	3.00	N	N	10		340	16%	2005	0.170	356	21%	1990	0.179
Hau Wong Road NB														
3A	C	3.00	Y	N	5		140	100%	1180	**0.119**	145	100%	1180	**0.123**
3B	C	3.00	N	N			115		2055	0.056	90		2055	0.044
4p	A,B,D		8GM +	9FG =	17	sec								
5p	C,D		6GM +	7FG =	13	sec								
6p	D		9GM +	12FG =	21	sec								

Notes:
Site factor have been applied to cater the kerbside activities

AM Peak	1+2+3+6p	PM Peak	1+2+3+6p
Sum of Critical *y* **Y**	**0.383**	Sum of Critical *y* **Y**	**0.399**
Lost Time ***L*** (sec)	41	Lost Time ***L*** (sec)	41
Cycle Time ***c*** (sec)	120	Cycle Time ***c*** (sec)	115
Practical Y ***Ypr***	0.593	Practical Y ***Ypr***	0.579
Reserve Capacity ***RC***	**55%**	Reserve Capacity ***RC***	**45%**

Date : 5/13/2022 Junction : J10 - Nga Tsin Wai Road / Hau Wong Road

ATKINS CHINA LIMITED

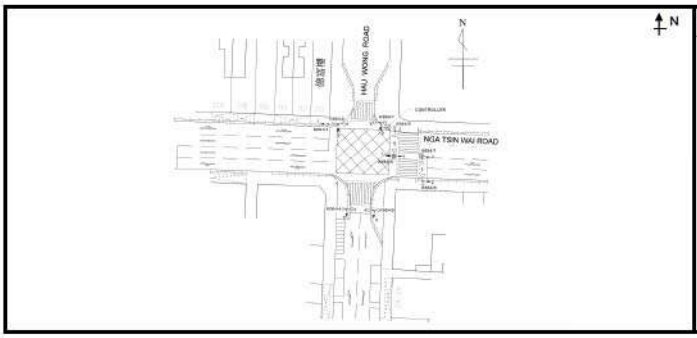
TRAFFIC SIGNAL CALCULATION SHEET

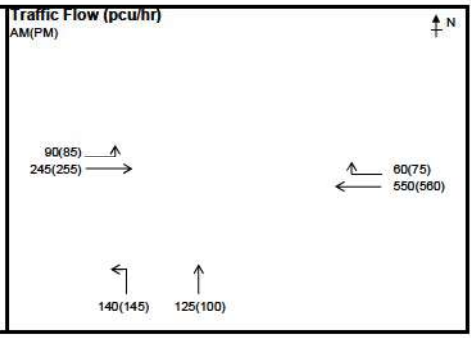
ATKINS

JOB NO. : 5205867

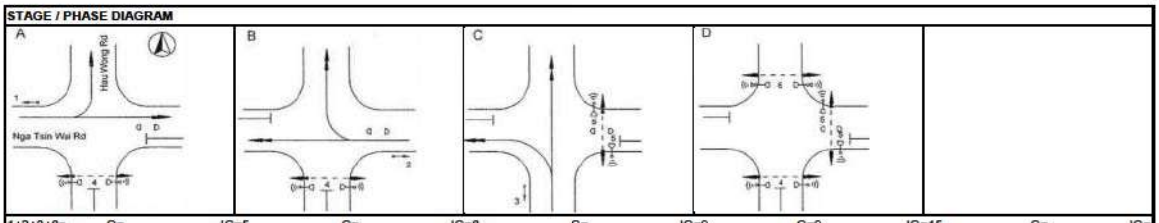
Junction : J10 - Nga Tsin Wai Road / Hau Wong Road Design Year: 2033

Scheme : Design Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+2+3+6p	G=	IG=5	G=	IG=8	G=	IG=9	G=9	IG=15	G=	IG=	
1+2+3+6p	G=	IG=5	G=	IG=8	G=	IG=9	G=9	IG=15	G=	IG=	

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Nga Tsin Wai Road EB														
1A	A	3.00	Y	N	10		135	67%	1395	0.097	138	62%	1400	**0.099**
1B	A	3.00	N	N			200		2055	**0.097**	202		2055	0.098
Nga Tsin Wai Road WB														
2A	B	3.00	Y	N			264		1530	0.173	276		1530	**0.180**
2B	B	3.00	N	N	10		346	17%	2005	**0.173**	359	21%	1995	0.180
Hau Wong Road NB														
3A	C	3.00	Y	N	5		140	100%	1180	**0.119**	145	100%	1180	**0.123**
3B	C	3.00	N	N			125		2055	0.061	100		2055	0.049
4p	A,B,D		8GM +	9FG =	17	sec								
5p	C,D		6GM +	7FG =	13	sec								
6p	D		9GM +	12FG =	21	sec								

Notes:
Site factor have been applied to cater the kerbside activities

AM Peak	1+2+3+6p	PM Peak	1+2+3+6p
Sum of Critical *y* **Y**	**0.389**	Sum of Critical *y* **Y**	**0.402**
Lost Time ***L*** (sec)	41	Lost Time ***L*** (sec)	41
Cycle Time ***c*** (sec)	120	Cycle Time ***c*** (sec)	115
Practical Y ***Ypr***	0.593	Practical Y ***Ypr***	0.579
Reserve Capacity ***RC***	**52%**	Reserve Capacity ***RC***	**44%**

Date : 5/13/2022 Junction : J10 - Nga Tsin Wai Road / Hau Wong Road

ATKINS CHINA LIMITED

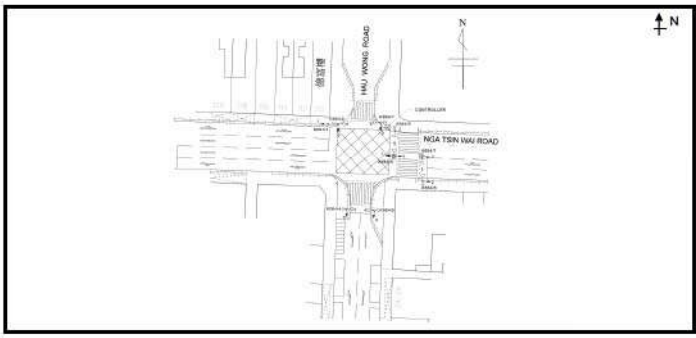
TRAFFIC SIGNAL CALCULATION SHEET

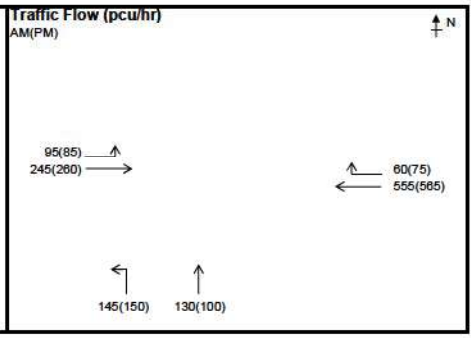
ATKINS

JOB NO. : 5205867

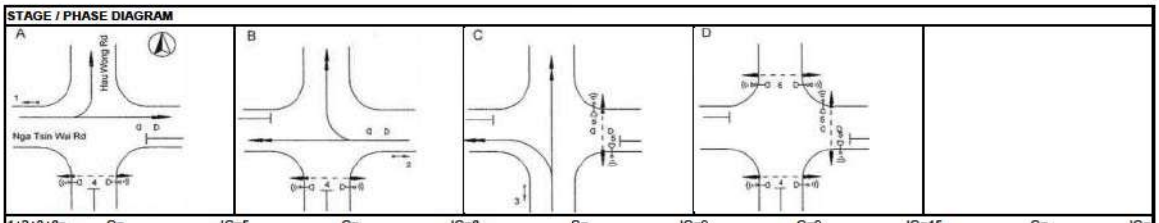
Junction : J10 - Nga Tsin Wai Road / Hau Wong Road Design Year: 2036

Scheme : Reference Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+2+3+6p	G=	IG=5	G=	IG=8	G=	IG=9	G=9	IG=15	G=	IG=	
1+2+3+6p	G=	IG=5	G=	IG=8	G=	IG=9	G=9	IG=15	G=	IG=	

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Nga Tsin Wai Road EB														
1A	A	3.00	Y	N	10		137	69%	1390	0.099	140	61%	1405	0.100
1B	A	3.00	N	N			203		2055	**0.099**	205		2055	**0.100**
Nga Tsin Wai Road WB														
2A	B	3.00	Y	N			267		1530	**0.175**	278		1530	**0.182**
2B	B	3.00	N	N	10		348	17%	2005	0.174	362	21%	1995	0.181
Hau Wong Road NB														
3A	C	3.00	Y	N	5		145	100%	1180	**0.123**	150	100%	1180	**0.127**
3B	C	3.00	N	N			130		2055	0.063	100		2055	0.049
4p	A,B,D		8GM +	9FG =	17	sec								
5p	C,D		6GM +	7FG =	13	sec								
6p	D		9GM +	12FG =	21	sec								

Notes:
Site factor have been applied to cater the kerbside activities

AM Peak	1+2+3+6p	PM Peak	1+2+3+6p
Sum of Critical *y* **Y**	**0.396**	Sum of Critical *y* **Y**	**0.409**
Lost Time ***L*** (sec)	41	Lost Time ***L*** (sec)	41
Cycle Time ***c*** (sec)	120	Cycle Time ***c*** (sec)	115
Practical Y ***Ypr***	0.593	Practical Y ***Ypr***	0.579
Reserve Capacity ***RC***	**50%**	Reserve Capacity ***RC***	**42%**

Date : 5/13/2022 Junction : J10 - Nga Tsin Wai Road / Hau Wong Road

ATKINS CHINA LIMITED

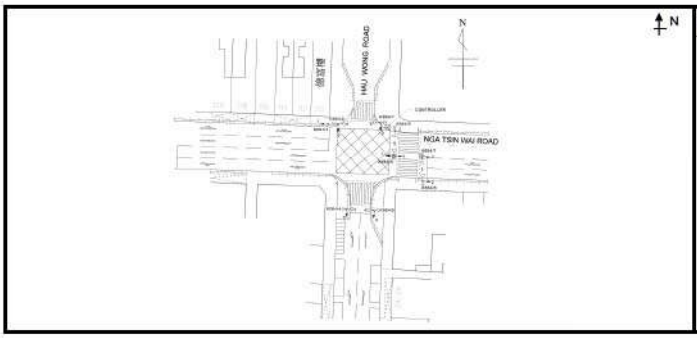
TRAFFIC SIGNAL CALCULATION SHEET

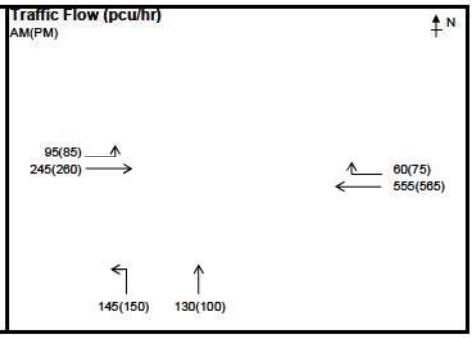
ATKINS

JOB NO. : 5205867

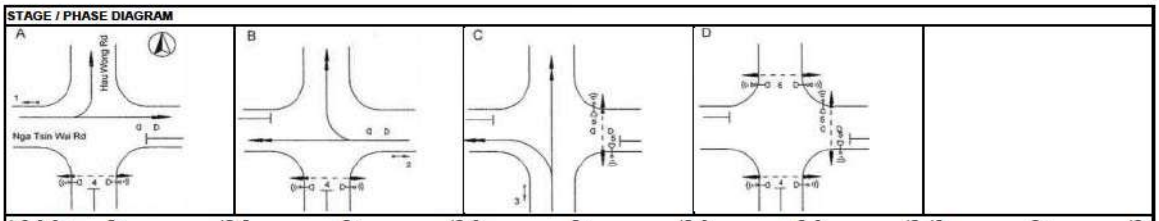
Junction : J10 - Nga Tsin Wai Road / Hau Wong Road Design Year: 2036

Scheme : Design Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+2+3+6p	G=	IG=5	G=	IG=8	G=	IG=9	G=9	IG=15	G=	IG=	
1+2+3+6p	G=	IG=5	G=	IG=8	G=	IG=9	G=9	IG=15	G=	IG=	

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Nga Tsin Wai Road EB														
1A	A	3.00	Y	N	10		137	69%	1390	0.099	140	61%	1405	0.100
1B	A	3.00	N	N			203		2055	**0.099**	205		2055	**0.100**
Nga Tsin Wai Road WB														
2A	B	3.00	Y	N			267		1530	**0.175**	278		1530	**0.182**
2B	B	3.00	N	N	10		348	17%	2005	0.174	362	21%	1995	0.181
Hau Wong Road NB														
3A	C	3.00	Y	N	5		145	100%	1180	**0.123**	150	100%	1180	**0.127**
3B	C	3.00	N	N			130		2055	0.063	100		2055	0.049
4p	A,B,D		8GM +	9FG =	17	sec								
5p	C,D		6GM +	7FG =	13	sec								
6p	D		9GM +	12FG =	21	sec								

Notes:
Site factor have been applied to cater the kerbside activities

AM Peak	1+2+3+6p	PM Peak	1+2+3+6p
Sum of Critical *y* **Y**	**0.396**	Sum of Critical *y* **Y**	**0.409**
Lost Time ***L*** (sec)	41	Lost Time ***L*** (sec)	41
Cycle Time ***c*** (sec)	120	Cycle Time ***c*** (sec)	115
Practical Y ***Ypr***	0.593	Practical Y ***Ypr***	0.579
Reserve Capacity ***RC***	**50%**	Reserve Capacity ***RC***	**42%**

Date : 5/13/2022 Junction : J10 - Nga Tsin Wai Road / Hau Wong Road

ATKINS CHINA LIMITED

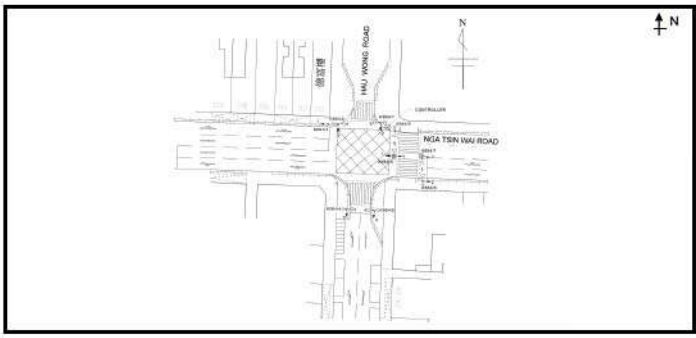
TRAFFIC SIGNAL CALCULATION SHEET

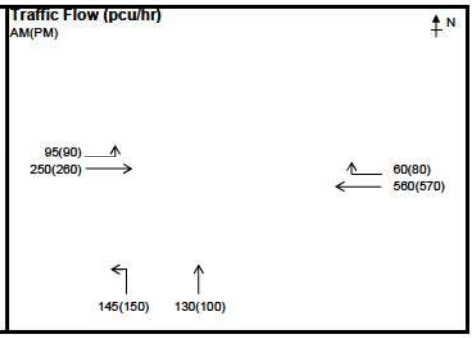
ATKINS

JOB NO. : 5205867

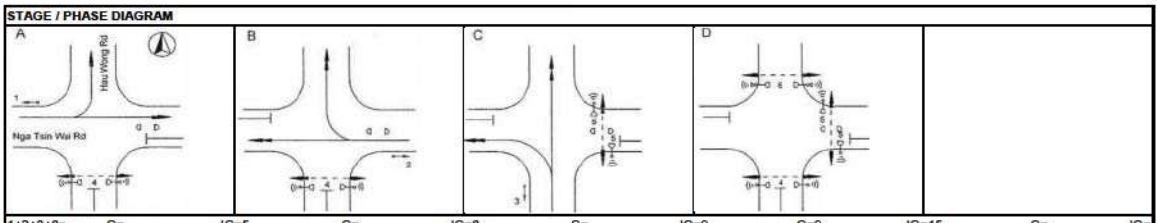
Junction : J10 - Nga Tsin Wai Road / Hau Wong Road Design Year: 2037

Scheme : Reference Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+2+3+6p	G=	IG=5	G=	IG=8	G=	IG=9	G=9	IG=15	G=	IG=
1+2+3+6p	G=	IG=5	G=	IG=8	G=	IG=9	G=9	IG=15	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Nga Tsin Wai Road EB														
1A	A	3.00	Y	N	10		139	68%	1390	0.100	142	63%	1400	**0.101**
1B	A	3.00	N	N			206		2055	**0.100**	208		2055	0.101
Nga Tsin Wai Road WB														
2A	B	3.00	Y	N			269		1530	**0.176**	283		1530	**0.185**
2B	B	3.00	N	N	10		351	17%	2005	0.175	367	22%	1990	0.184
Hau Wong Road NB														
3A	C	3.00	Y	N	5		145	100%	1180	**0.123**	150	100%	1180	**0.127**
3B	C	3.00	N	N			130		2055	0.063	100		2055	0.049
4p	A,B,D		8GM +	9FG =	17	sec								
5p	C,D		6GM +	7FG =	13	sec								
6p	D		9GM +	12FG =	21	sec								

Notes:
Site factor have been applied to cater the kerbside activities

AM Peak	1+2+3+6p	PM Peak	1+2+3+6p
Sum of Critical *y* **Y**	**0.399**	Sum of Critical *y* **Y**	**0.414**
Lost Time ***L*** (sec)	41	Lost Time ***L*** (sec)	41
Cycle Time ***c*** (sec)	120	Cycle Time ***c*** (sec)	115
Practical Y ***Ypr***	0.593	Practical Y ***Ypr***	0.579
Reserve Capacity ***RC***	**49%**	Reserve Capacity ***RC***	**40%**

Date : 5/13/2022 Junction : J10 - Nga Tsin Wai Road / Hau Wong Road

ATKINS CHINA LIMITED

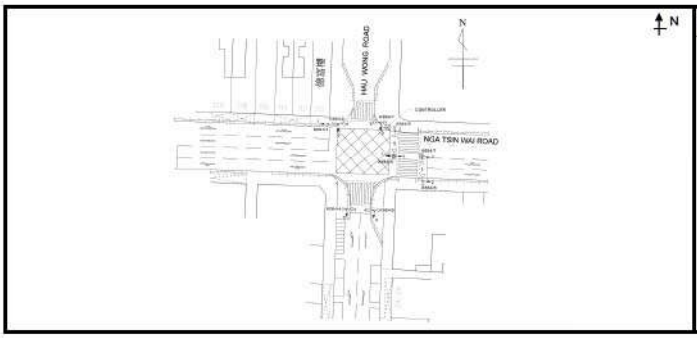
TRAFFIC SIGNAL CALCULATION SHEET

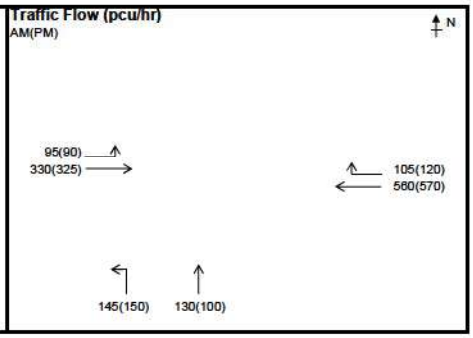
ATKINS

JOB NO. : 5205867

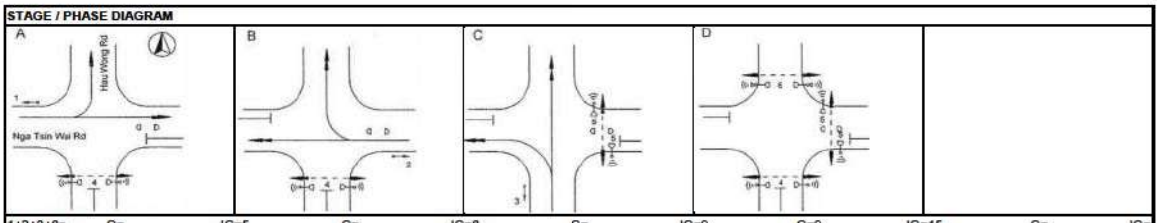
Junction : J10 - Nga Tsin Wai Road / Hau Wong Road Design Year: 2037

Scheme : Design Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+2+3+6p	G=	IG=5	G=	IG=8	G=	IG=9	G=9	IG=15	G=	IG=	
1+2+3+6p	G=	IG=5	G=	IG=8	G=	IG=9	G=9	IG=15	G=	IG=	

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Nga Tsin Wai Road EB														
1A	A	3.00	Y	N	10		173	55%	1415	0.122	170	53%	1420	**0.120**
1B	A	3.00	N	N			252		2055	**0.123**	245		2055	0.119
Nga Tsin Wai Road WB														
2A	B	3.00	Y	N			291		1530	**0.190**	302		1530	0.197
2B	B	3.00	N	N	10		374	28%	1970	0.190	388	31%	1965	**0.197**
Hau Wong Road NB														
3A	C	3.00	Y	N	5		145	100%	1180	**0.123**	150	100%	1180	**0.127**
3B	C	3.00	N	N			130		2055	0.063	100		2055	0.049
4p	A,B,D		8GM +	9FG =	17	sec								
5p	C,D		6GM +	7FG =	13	sec								
6p	D		9GM +	12FG =	21	sec								

Notes:
Site factor have been applied to cater the kerbside activities

AM Peak	1+2+3+6p	PM Peak	1+2+3+6p
Sum of Critical *y* **Y**	**0.436**	Sum of Critical *y* **Y**	**0.444**
Lost Time ***L*** (sec)	41	Lost Time ***L*** (sec)	41
Cycle Time ***c*** (sec)	120	Cycle Time ***c*** (sec)	115
Practical Y ***Ypr***	0.593	Practical Y ***Ypr***	0.579
Reserve Capacity ***RC***	**36%**	Reserve Capacity ***RC***	**30%**

Date : 5/13/2022 Junction : J10 - Nga Tsin Wai Road / Hau Wong Road

ATKINS CHINA LIMITED

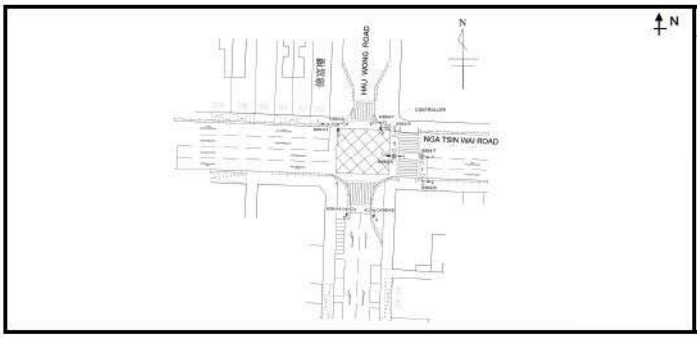
TRAFFIC SIGNAL CALCULATION SHEET

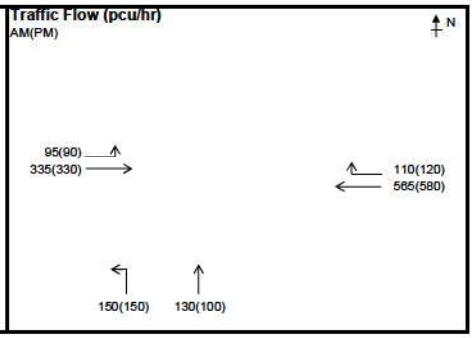
ATKINS

JOB NO. : 5205867

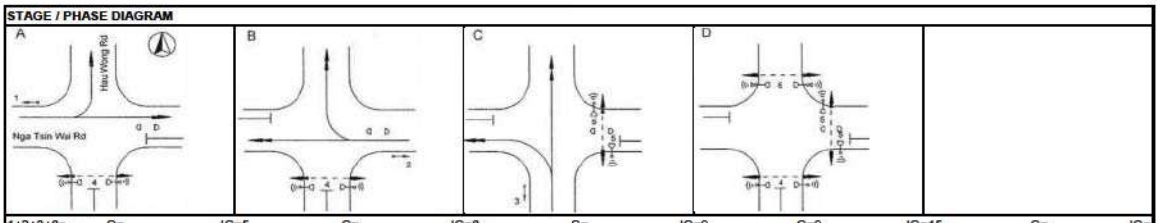
Junction : J10 - Nga Tsin Wai Road / Hau Wong Road Design Year: 2040

Scheme : Reference Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+2+3+6p	G=	IG=5	G=	IG=8	G=	IG=9	G=9	IG=15	G=	IG=	
1+2+3+6p	G=	IG=5	G=	IG=8	G=	IG=9	G=9	IG=15	G=	IG=	

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Nga Tsin Wai Road EB														
1A	A	3.00	Y	N	10		175	54%	1415	0.124	172	52%	1420	**0.121**
1B	A	3.00	N	N			255		2055	**0.124**	248		2055	0.121
Nga Tsin Wai Road WB														
2A	B	3.00	Y	N			295		1530	0.193	307		1530	**0.201**
2B	B	3.00	N	N	10		380	29%	1970	**0.193**	393	31%	1965	0.200
Hau Wong Road NB														
3A	C	3.00	Y	N	5		150	100%	1180	**0.127**	150	100%	1180	**0.127**
3B	C	3.00	N	N			130		2055	0.063	100		2055	0.049
4p	A,B,D		8GM +	9FG =	17	sec								
5p	C,D		6GM +	7FG =	13	sec								
6p	D		9GM +	12FG =	21	sec								

Notes:
Site factor have been applied to cater the kerbside activities

AM Peak	1+2+3+6p	PM Peak	1+2+3+6p
Sum of Critical *y* **Y**	**0.444**	Sum of Critical *y* **Y**	**0.449**
Lost Time ***L*** (sec)	41	Lost Time ***L*** (sec)	41
Cycle Time ***c*** (sec)	120	Cycle Time ***c*** (sec)	115
Practical Y ***Ypr***	0.593	Practical Y ***Ypr***	0.579
Reserve Capacity ***RC***	**33%**	Reserve Capacity ***RC***	**29%**

Date : 5/13/2022 Junction : J10 - Nga Tsin Wai Road / Hau Wong Road

ATKINS CHINA LIMITED

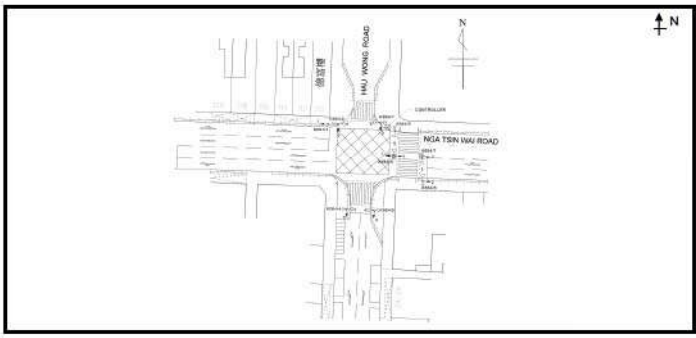
TRAFFIC SIGNAL CALCULATION SHEET

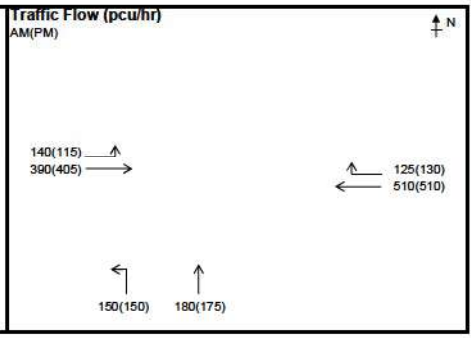
ATKINS

JOB NO. : 5205867

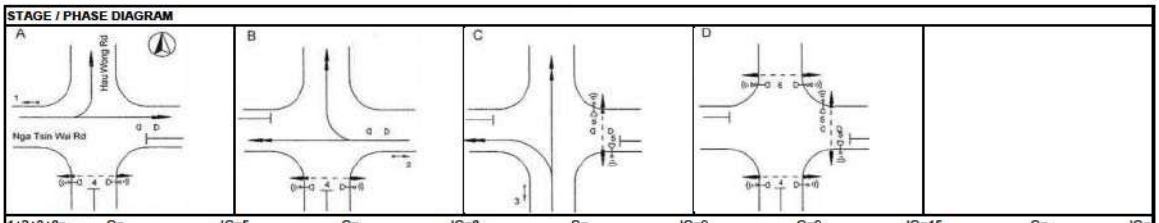
Junction : J10 - Nga Tsin Wai Road / Hau Wong Road Design Year: 2040

Scheme : Design Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



1+2+3+6p	G=	IG=5	G=	IG=8	G=	IG=9	G=9	IG=15	G=	IG=	
1+2+3+6p	G=	IG=5	G=	IG=8	G=	IG=9	G=9	IG=15	G=	IG=	

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Nga Tsin Wai Road EB														
1A	A	3.00	Y	N	10		214	65%	1395	0.153	212	54%	1415	0.150
1B	A	3.00	N	N			316		2055	**0.154**	308		2055	**0.150**
Nga Tsin Wai Road WB														
2A	B	3.00	Y	N			279		1530	0.182	282		1530	**0.184**
2B	B	3.00	N	N	10		356	35%	1950	**0.183**	358	36%	1950	0.184
Hau Wong Road NB														
3A	C	3.00	Y	N	5		150	100%	1180	**0.127**	150	100%	1180	**0.127**
3B	C	3.00	N	N			180		2055	0.088	175		2055	0.085
4p	A,B,D		8GM +	9FG =	17	sec								
5p	C,D		6GM +	7FG =	13	sec								
6p	D		9GM +	12FG =	21	sec								

Notes:
Site factor have been applied to cater the kerbside activities

AM Peak	1+2+3+6p	PM Peak	1+2+3+6p
Sum of Critical *y* **Y**	**0.463**	Sum of Critical *y* **Y**	**0.461**
Lost Time ***L*** (sec)	41	Lost Time ***L*** (sec)	41
Cycle Time ***c*** (sec)	120	Cycle Time ***c*** (sec)	115
Practical Y ***Ypr***	0.593	Practical Y ***Ypr***	0.579
Reserve Capacity ***RC***	**28%**	Reserve Capacity ***RC***	**26%**

Date : 5/13/2022 Junction : J10 - Nga Tsin Wai Road / Hau Wong Road

ATKINS CHINA LIMITED

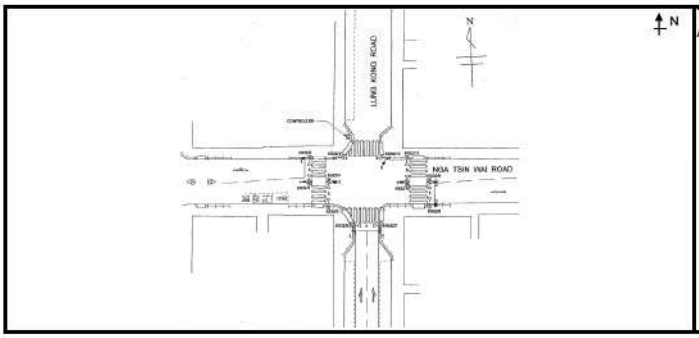
TRAFFIC SIGNAL CALCULATION SHEET

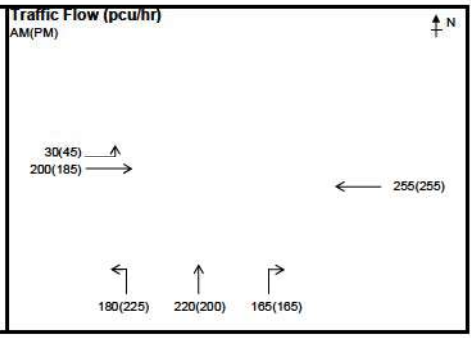
ATKINS

JOB NO. : 5205867

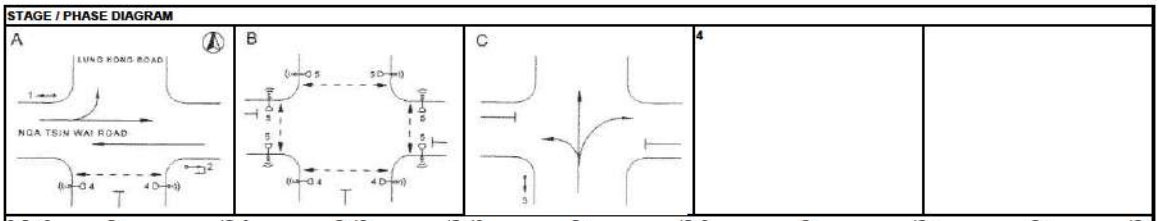
Junction : J11 - Nga Tsin Wai Road / Lung Kong Road Design Year: 2021

Scheme : Existing Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



2+5p+3	G=	IG=8	G=10	IG=13	G=	IG=6	G=	IG=	G=	IG=
2+5p+3	G=	IG=8	G=10	IG=13	G=	IG=6	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Nga Tsin Wai Road EB														
1A	A	5.00	Y	N	10		230	13%	1660	0.139	230	20%	1645	0.140
Nga Tsin Wai Road WB														
2A	A	5.00	Y	N			255		1690	**0.151**	255		1690	**0.151**
Lung Kong Road NB														
3A	C	3.20	Y	N	8		270	67%	1720	**0.157**	278	81%	1680	**0.165**
3B	C	3.20	N	N	8		295	56%	1880	0.157	312	53%	1890	0.165
4p	A,B		10GM +	10FG =	20	sec								
5p	B		10GM +	10FG =	20	sec								

Notes:
Site factor have been applied onto NCW rd both bound to cater the kerbside activities

AM Peak	2+5p+3	PM Peak	2+5p+3
Sum of Critical *y* **Y**	**0.308**	Sum of Critical *y* **Y**	**0.316**
Lost Time ***L*** (sec)	35	Lost Time ***L*** (sec)	35
Cycle Time ***c*** (sec)	120	Cycle Time ***c*** (sec)	115
Practical Y ***Ypr***	0.638	Practical Y ***Ypr***	0.626
Reserve Capacity ***RC***	**107%**	Reserve Capacity ***RC***	**98%**

Date : 5/13/2022 Junction : J11 - Nga Tsin Wai Road / Lung Kong Road

ATKINS CHINA LIMITED

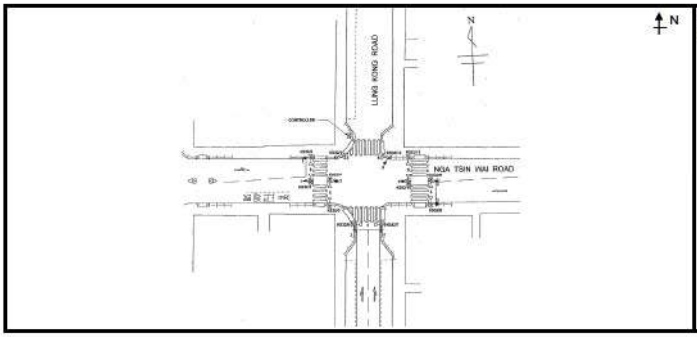
TRAFFIC SIGNAL CALCULATION SHEET

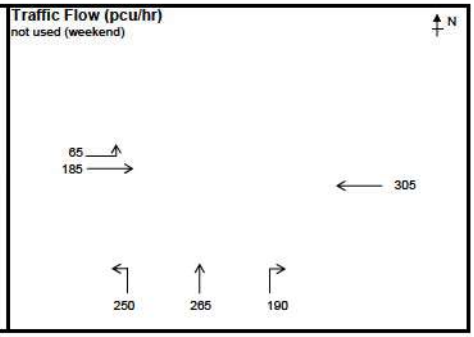
ATKINS

JOB NO. : 5205867

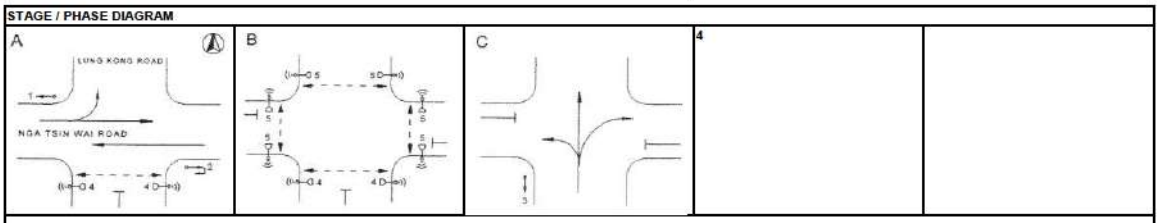
Junction : J11 - Nga Tsin Wai Road / Lung Kong Road Design Year: 2021

Scheme : Existing - Weekend Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



2+5p+3 G= IG=8 G=10 IG=13 G= IG=6 G= IG= G= IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	Weekend Peak: Design Flow *q* (pcu/hr)	Proportion turning (%) *f*	Saturation flow *S* (pcu/hr)	Flow factor *y*
Nga Tsin Wai Road EB										
1A	A	5.00	Y	N	10		250	26%	1630	0.153
Nga Tsin Wai Road WB										
2A	A	5.00	Y	N			305		1690	0.180
Lung Kong Road NB										
3A	C	3.20	Y	N	8		333	75%	1695	0.196
3B	C	3.20	N	N	8		372	51%	1895	0.196
4p	A,B		10GM +	10FG =	20	sec				
5p	B		10GM +	10FG =	20	sec				

Notes:
Site factor have been applied onto NCW rd both bound to cater the kerbside activities

Weekend Peak	2+5p+3
Sum of Critical *y* *Y*	0.377
Lost Time *L* (sec)	35
Cycle Time *c* (sec)	115
Practical *Y* *Ypr*	0.626
Reserve Capacity *RC*	66%

Date : 5/19/2022 Junction : J11 - Nga Tsin Wai Road / Lung Kong Road

ATKINS CHINA LIMITED

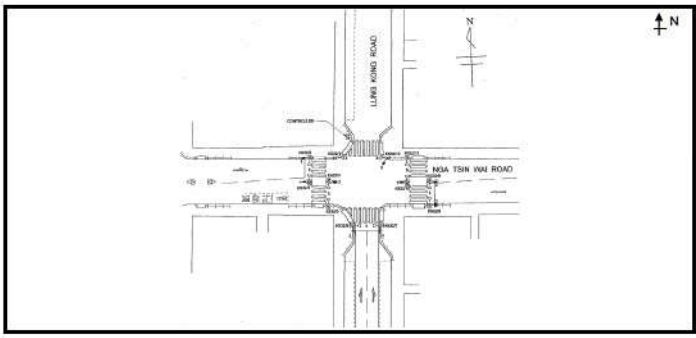
TRAFFIC SIGNAL CALCULATION SHEET

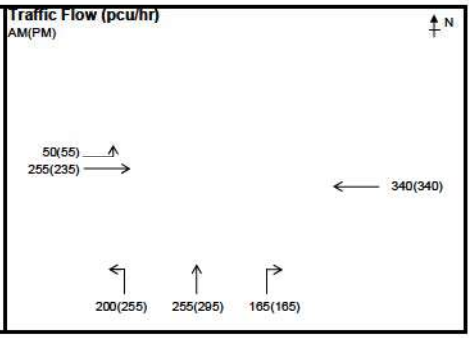
ATKINS

JOB NO. : 5205867

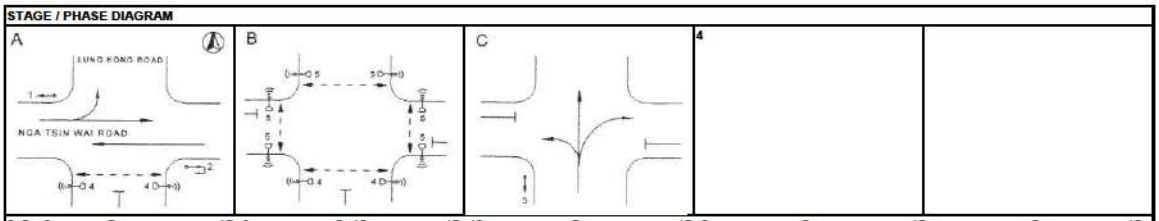
Junction : J11 - Nga Tsin Wai Road / Lung Kong Road Design Year: 2033

Scheme : Reference Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



2+5p+3	G=	IG=8	G=10	IG=13	G=	IG=6	G=	IG=	G=	IG=	
2+5p+3	G=	IG=8	G=10	IG=13	G=	IG=6	G=	IG=	G=	IG=	

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Nga Tsin Wai Road EB														
1A	A	5.00	Y	N	10		305	16%	1650	0.185	290	19%	1645	0.176
Nga Tsin Wai Road WB														
2A	A	5.00	Y	N			340		1690	**0.201**	340		1690	**0.201**
Lung Kong Road NB														
3A	C	3.20	Y	N	8		295	68%	1715	**0.172**	335	76%	1695	0.198
3B	C	3.20	N	N	8		325	51%	1895	0.172	380	43%	1920	**0.198**
4p	A,B		10GM +	10FG =	20	sec								
5p	B		10GM +	10FG =	20	sec								

Notes:
Site factor have been applied onto NCW rd both bound to cater the kerbside activities

AM Peak	2+5p+3	PM Peak	2+5p+3
Sum of Critical *y* **Y**	**0.373**	Sum of Critical *y* **Y**	**0.399**
Lost Time ***L*** (sec)	35	Lost Time ***L*** (sec)	35
Cycle Time ***c*** (sec)	120	Cycle Time ***c*** (sec)	115
Practical Y ***Ypr***	0.638	Practical Y ***Ypr***	0.626
Reserve Capacity ***RC***	**71%**	Reserve Capacity ***RC***	**57%**

Date : 5/13/2022 Junction : J11 - Nga Tsin Wai Road / Lung Kong Road

ATKINS CHINA LIMITED

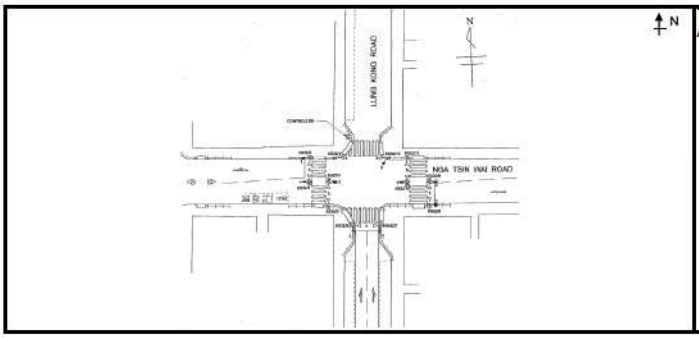
TRAFFIC SIGNAL CALCULATION SHEET

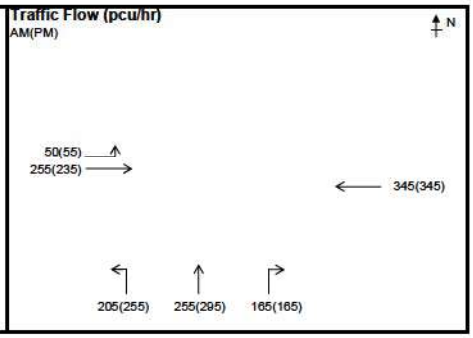
ATKINS

JOB NO. : 5205867

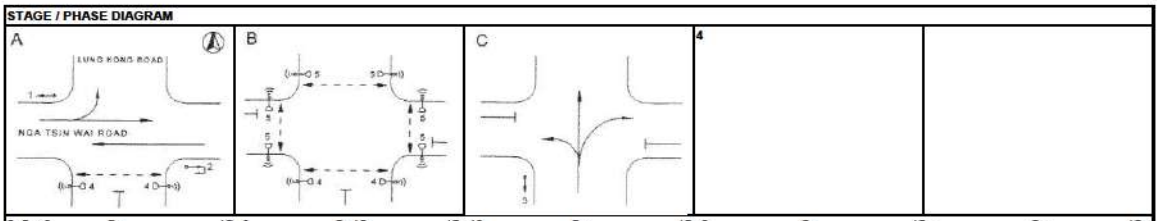
Junction : J11 - Nga Tsin Wai Road / Lung Kong Road Design Year: 2033

Scheme : Design Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



2+5p+3	G=	IG=8	G=10	IG=13	G=	IG=6	G=	IG=	G=	IG=
2+5p+3	G=	IG=8	G=10	IG=13	G=	IG=6	G=	IG=	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Nga Tsin Wai Road EB														
1A	A	5.00	Y	N	10		305	16%	1650	0.185	290	19%	1645	0.176
Nga Tsin Wai Road WB														
2A	A	5.00	Y	N			345		1690	**0.204**	345		1690	**0.204**
Lung Kong Road NB														
3A	C	3.20	Y	N	8		297	69%	1715	**0.173**	335	76%	1695	0.198
3B	C	3.20	N	N	8		328	50%	1895	0.173	380	43%	1920	**0.198**
4p	A,B		10GM +	10FG =	20	sec								
5p	B		10GM +	10FG =	20	sec								

Notes:
Site factor have been applied onto NCW rd both bound to cater the kerbside activities

AM Peak	2+5p+3	PM Peak	2+5p+3
Sum of Critical *y* **Y**	**0.377**	Sum of Critical *y* **Y**	**0.402**
Lost Time ***L*** (sec)	35	Lost Time ***L*** (sec)	35
Cycle Time ***c*** (sec)	120	Cycle Time ***c*** (sec)	115
Practical Y ***Ypr***	0.638	Practical Y ***Ypr***	0.626
Reserve Capacity ***RC***	**69%**	Reserve Capacity ***RC***	**56%**

Date : 5/13/2022 Junction : J11 - Nga Tsin Wai Road / Lung Kong Road

ATKINS CHINA LIMITED

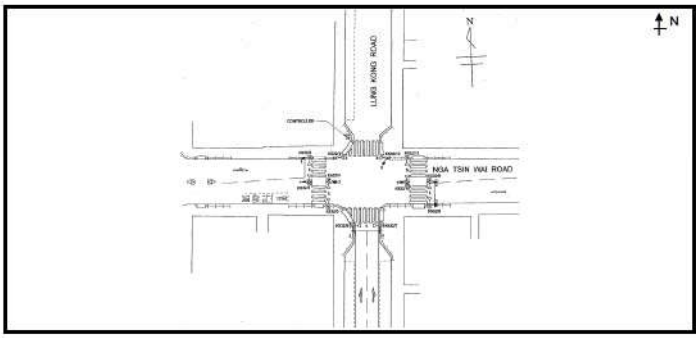
TRAFFIC SIGNAL CALCULATION SHEET

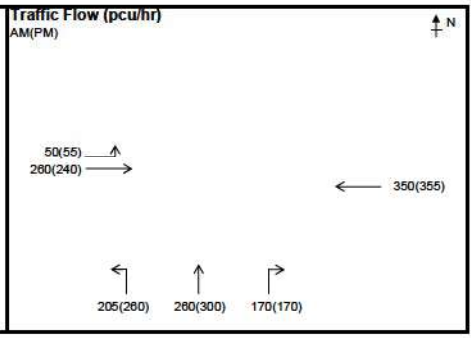
ATKINS

JOB NO. : 5205867

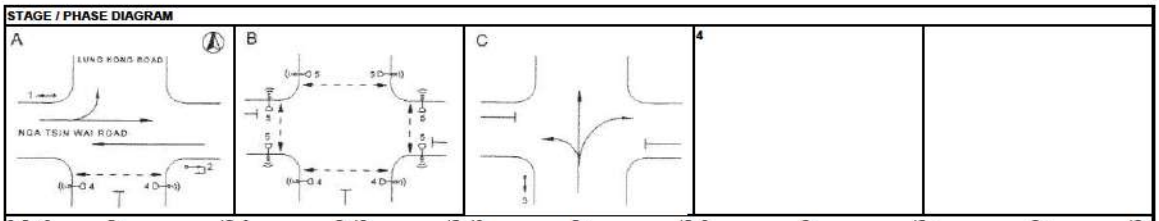
Junction : J11 - Nga Tsin Wai Road / Lung Kong Road Design Year: 2036

Scheme : Reference Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



2+5p+3	G=	IG=8	G=10	IG=13	G=	IG=6	G=	IG=	G=	IG=	
2+5p+3	G=	IG=8	G=10	IG=13	G=	IG=6	G=	IG=	G=	IG=	

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Nga Tsin Wai Road EB														
1A	A	5.00	Y	N	10		310	16%	1650	0.188	295	19%	1645	0.179
Nga Tsin Wai Road WB														
2A	A	5.00	Y	N			350		1690	**0.207**	355		1690	**0.210**
Lung Kong Road NB														
3A	C	3.20	Y	N	8		302	68%	1715	**0.176**	342	76%	1695	0.202
3B	C	3.20	N	N	8		333	51%	1895	0.176	388	44%	1915	**0.203**
4p	A,B		10GM +	10FG =	20	sec								
5p	B		10GM +	10FG =	20	sec								

Notes:
Site factor have been applied onto NCW rd both bound to cater the kerbside activities

AM Peak	2+5p+3	PM Peak	2+5p+3
Sum of Critical *y* **Y**	**0.383**	Sum of Critical *y* **Y**	**0.413**
Lost Time ***L*** (sec)	35	Lost Time ***L*** (sec)	35
Cycle Time ***c*** (sec)	120	Cycle Time ***c*** (sec)	115
Practical Y ***Ypr***	0.638	Practical Y ***Ypr***	0.626
Reserve Capacity ***RC***	**66%**	Reserve Capacity ***RC***	**52%**

Date : 5/13/2022 Junction : J11 - Nga Tsin Wai Road / Lung Kong Road

ATKINS CHINA LIMITED

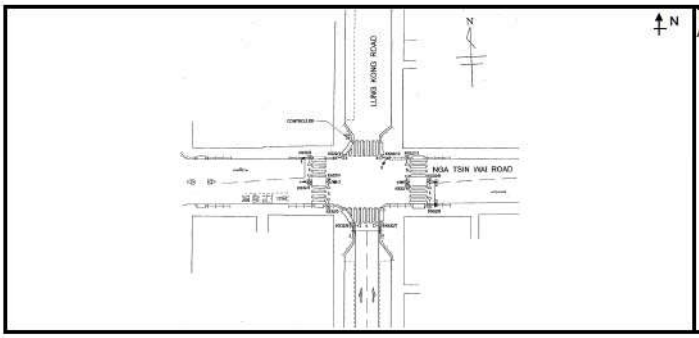
TRAFFIC SIGNAL CALCULATION SHEET

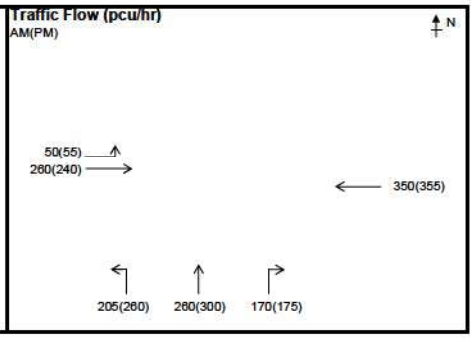
ATKINS

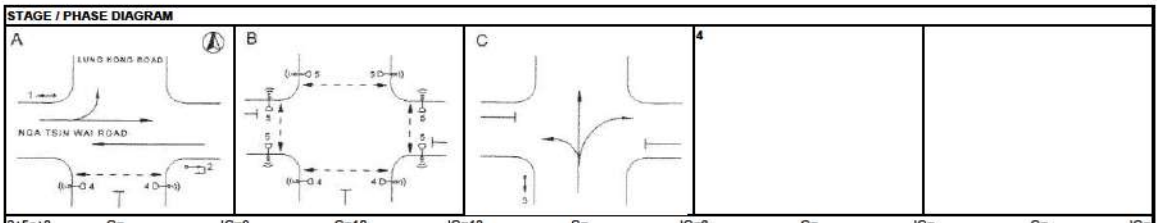
JOB NO. : 5205867

Junction : J11 - Nga Tsin Wai Road / Lung Kong Road Design Year: 2036

Scheme : Design Designed by: RC Checked by: EC







2+5p+3	G=	IG=8	G=10	IG=13	G=	IG=6	G=	IG=	G=	IG=	
2+5p+3	G=	IG=8	G=10	IG=13	G=	IG=6	G=	IG=	G=	IG=	

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Nga Tsin Wai Road EB														
1A	A	5.00	Y	N	10		310	16%	1650	0.188	295	19%	1645	0.179
Nga Tsin Wai Road WB														
2A	A	5.00	Y	N			350		1690	**0.207**	355		1690	**0.210**
Lung Kong Road NB														
3A	C	3.20	Y	N	8		302	68%	1715	**0.176**	345	75%	1695	0.204
3B	C	3.20	N	N	8		333	51%	1895	0.176	390	45%	1915	**0.204**
4p	A,B		10GM +	10FG =	20	sec								
5p	B		10GM +	10FG =	20	sec								

Notes:
Site factor have been applied onto NCW rd both bound to cater the kerbside activities

AM Peak	2+5p+3	PM Peak	2+5p+3
Sum of Critical *y* **Y**	**0.383**	Sum of Critical *y* **Y**	**0.414**
Lost Time ***L*** (sec)	35	Lost Time ***L*** (sec)	35
Cycle Time ***c*** (sec)	120	Cycle Time ***c*** (sec)	115
Practical Y ***Ypr***	0.638	Practical Y ***Ypr***	0.626
Reserve Capacity ***RC***	**66%**	Reserve Capacity ***RC***	**51%**

Date : 5/13/2022 Junction : J11 - Nga Tsin Wai Road / Lung Kong Road

ATKINS CHINA LIMITED

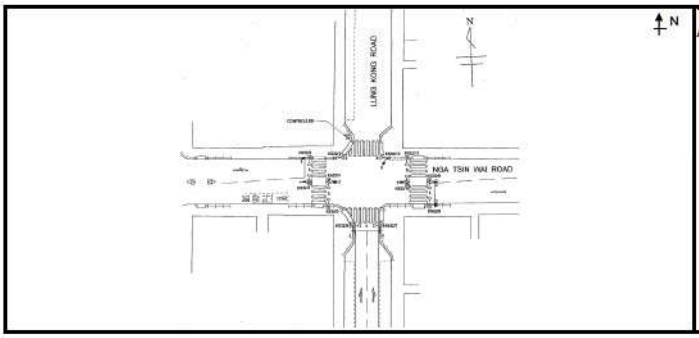
TRAFFIC SIGNAL CALCULATION SHEET

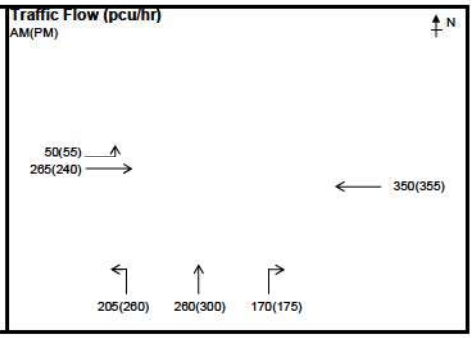
ATKINS

JOB NO. : 5205867

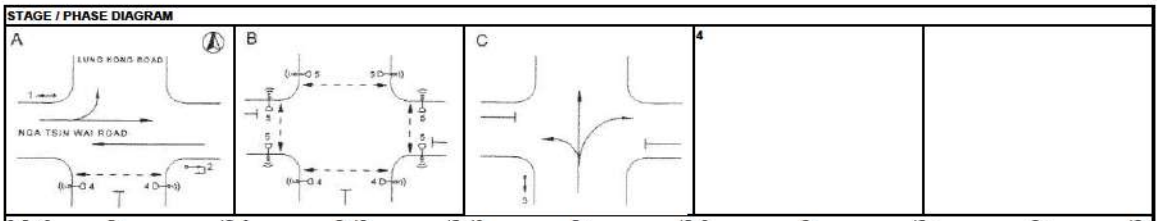
Junction : J11 - Nga Tsin Wai Road / Lung Kong Road Design Year: 2037

Scheme : Reference Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



2+5p+3	G=	IG=8	G=10	IG=13	G=	IG=6	G=	IG=	G=	IG=	
2+5p+3	G=	IG=8	G=10	IG=13	G=	IG=6	G=	IG=	G=	IG=	

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Nga Tsin Wai Road EB														
1A	A	5.00	Y	N	10		315	16%	1655	0.190	295	19%	1645	0.179
Nga Tsin Wai Road WB														
2A	A	5.00	Y	N			350		1690	**0.207**	355		1690	**0.210**
Lung Kong Road NB														
3A	C	3.20	Y	N	8		302	68%	1715	**0.176**	345	75%	1695	0.204
3B	C	3.20	N	N	8		333	51%	1895	0.176	390	45%	1915	**0.204**
4p	A,B		10GM +	10FG =	20	sec								
5p	B		10GM +	10FG =	20	sec								

Notes:
Site factor have been applied onto NCW rd both bound to cater the kerbside activities

AM Peak	2+5p+3	PM Peak	2+5p+3
Sum of Critical *y* **Y**	**0.383**	Sum of Critical *y* **Y**	**0.414**
Lost Time ***L*** (sec)	35	Lost Time ***L*** (sec)	35
Cycle Time ***c*** (sec)	120	Cycle Time ***c*** (sec)	115
Practical Y ***Ypr***	0.638	Practical Y ***Ypr***	0.626
Reserve Capacity ***RC***	**66%**	Reserve Capacity ***RC***	**51%**

Date : 5/13/2022 Junction : J11 - Nga Tsin Wai Road / Lung Kong Road

ATKINS CHINA LIMITED

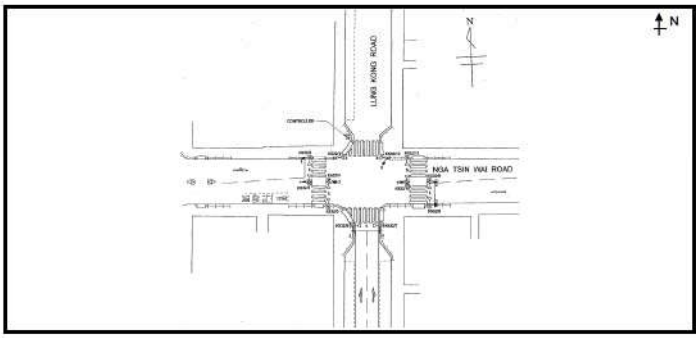
TRAFFIC SIGNAL CALCULATION SHEET

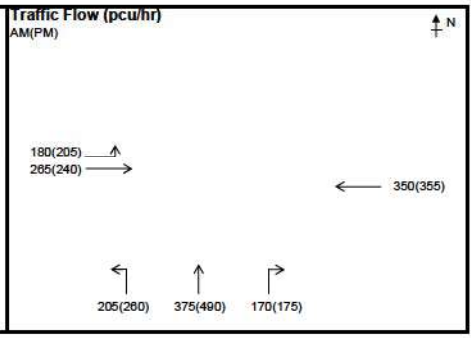
ATKINS

JOB NO. : 5205867

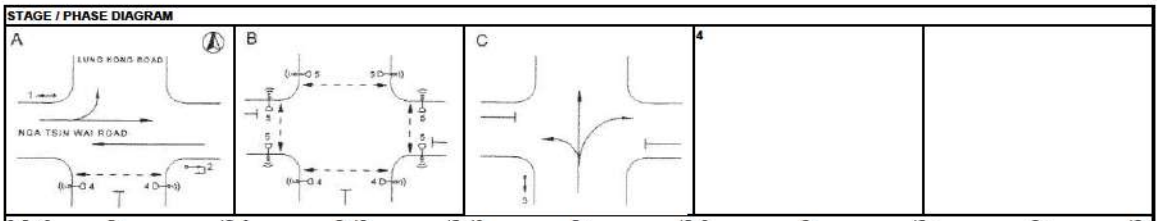
Junction : J11 - Nga Tsin Wai Road / Lung Kong Road Design Year: 2037

Scheme : Design Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



2+5p+3	G=	IG=8	G=10	IG=13	G=	IG=6	G=	IG=	G=	IG=	
2+5p+3	G=	IG=8	G=10	IG=13	G=	IG=6	G=	IG=	G=	IG=	

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Nga Tsin Wai Road EB														
1A	A	5.00	Y	N	10		445	40%	1595	0.279	445	46%	1585	0.281
Nga Tsin Wai Road WB														
2A	A	5.00	Y	N			350		1690	**0.207**	355		1690	**0.210**
Lung Kong Road NB														
3A	C	3.20	Y	N	8		357	57%	1745	0.205	437	59%	1740	**0.251**
3B	C	3.20	N	N	8		393	43%	1920	**0.205**	488	36%	1945	0.251
4p	A,B		10GM +	10FG =	20	sec								
5p	B		10GM +	10FG =	20	sec								

Notes:
Site factor have been applied onto NCW rd both bound to cater the kerbside activities

AM Peak	2+5p+3	PM Peak	2+5p+3
Sum of Critical *y* **Y**	**0.412**	Sum of Critical *y* **Y**	**0.461**
Lost Time ***L*** (sec)	35	Lost Time ***L*** (sec)	35
Cycle Time ***c*** (sec)	120	Cycle Time ***c*** (sec)	115
Practical Y ***Ypr***	0.638	Practical Y ***Ypr***	0.626
Reserve Capacity ***RC***	**55%**	Reserve Capacity ***RC***	**36%**

Date : 5/13/2022 Junction : J11 - Nga Tsin Wai Road / Lung Kong Road

ATKINS CHINA LIMITED

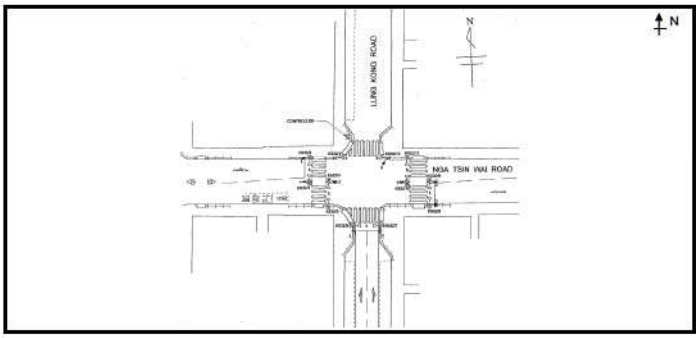
TRAFFIC SIGNAL CALCULATION SHEET

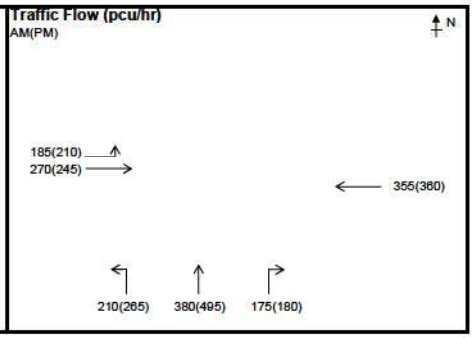
ATKINS

JOB NO. : 5205867

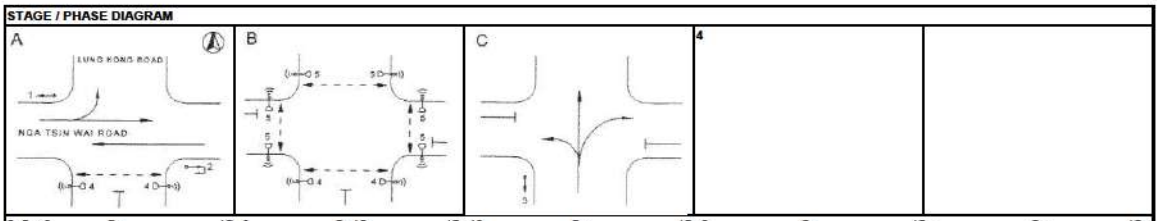
Junction : J11 - Nga Tsin Wai Road / Lung Kong Road Design Year: 2040

Scheme : Reference Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



2+5p+3	G=	IG=8	G=10	IG=13	G=	IG=6	G=	IG=	G=	IG=	
2+5p+3	G=	IG=8	G=10	IG=13	G=	IG=6	G=	IG=	G=	IG=	

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Nga Tsin Wai Road EB														
1A	A	5.00	Y	N	10		455	41%	1595	0.285	455	46%	1580	0.288
Nga Tsin Wai Road WB														
2A	A	5.00	Y	N			355		1690	**0.210**	360		1690	**0.213**
Lung Kong Road NB														
3A	C	3.20	Y	N	8		365	58%	1745	**0.209**	444	60%	1740	**0.255**
3B	C	3.20	N	N	8		400	44%	1920	0.208	496	36%	1945	0.255
4p	A,B		10GM +	10FG =	20	sec								
5p	B		10GM +	10FG =	20	sec								

Notes:
Site factor have been applied onto NCW rd both bound to cater the kerbside activities

AM Peak	2+5p+3	PM Peak	2+5p+3
Sum of Critical *y* ***Y***	**0.419**	Sum of Critical *y* ***Y***	**0.468**
Lost Time ***L*** (sec)	35	Lost Time ***L*** (sec)	35
Cycle Time ***c*** (sec)	120	Cycle Time ***c*** (sec)	115
Practical *Y* ***Ypr***	0.638	Practical *Y* ***Ypr***	0.626
Reserve Capacity ***RC***	**52%**	Reserve Capacity ***RC***	**34%**

Date : 5/13/2022 Junction : J11 - Nga Tsin Wai Road / Lung Kong Road

ATKINS CHINA LIMITED

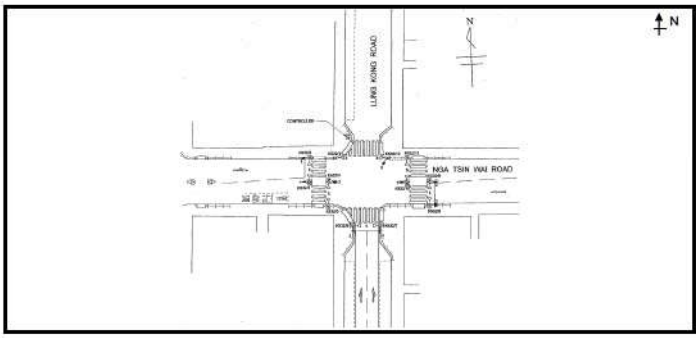
TRAFFIC SIGNAL CALCULATION SHEET

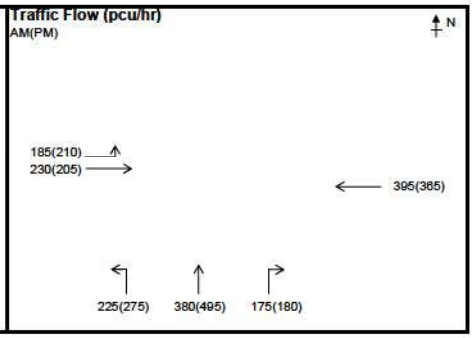
ATKINS

JOB NO. : 5205867

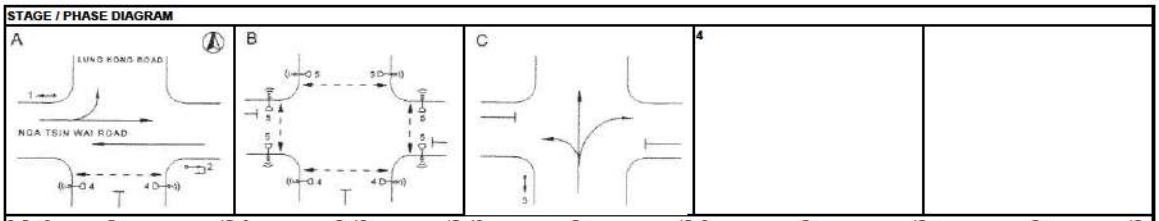
Junction : J11 - Nga Tsin Wai Road / Lung Kong Road Design Year: 2040

Scheme : Design Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



2+5p+3	G=	IG=8	G=10	IG=13	G=	IG=6	G=	IG=	G=	IG=	
2+5p+3	G=	IG=8	G=10	IG=13	G=	IG=6	G=	IG=	G=	IG=	

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Nga Tsin Wai Road EB														
1A	A	5.00	Y	N	10		415	45%	1585	0.262	415	51%	1575	0.263
Nga Tsin Wai Road WB														
2A	A	5.00	Y	N			395		1690	**0.234**	365		1690	**0.216**
Lung Kong Road NB														
3A	C	3.20	Y	N	8		370	61%	1735	0.213	448	61%	1735	**0.258**
3B	C	3.20	N	N	8		410	43%	1920	**0.214**	502	36%	1945	0.258
4p	A,B		10GM +	10FG =	20	sec								
5p	B		10GM +	10FG =	20	sec								

Notes:
Site factor have been applied onto NCW rd both bound to cater the kerbside activities

AM Peak	2+5p+3	PM Peak	2+5p+3
Sum of Critical *y* **Y**	**0.447**	Sum of Critical *y* **Y**	**0.474**
Lost Time ***L*** (sec)	35	Lost Time ***L*** (sec)	35
Cycle Time ***c*** (sec)	120	Cycle Time ***c*** (sec)	115
Practical Y ***Ypr***	0.638	Practical Y ***Ypr***	0.626
Reserve Capacity ***RC***	**43%**	Reserve Capacity ***RC***	**32%**

Date : 5/13/2022 Junction : J11 - Nga Tsin Wai Road / Lung Kong Road

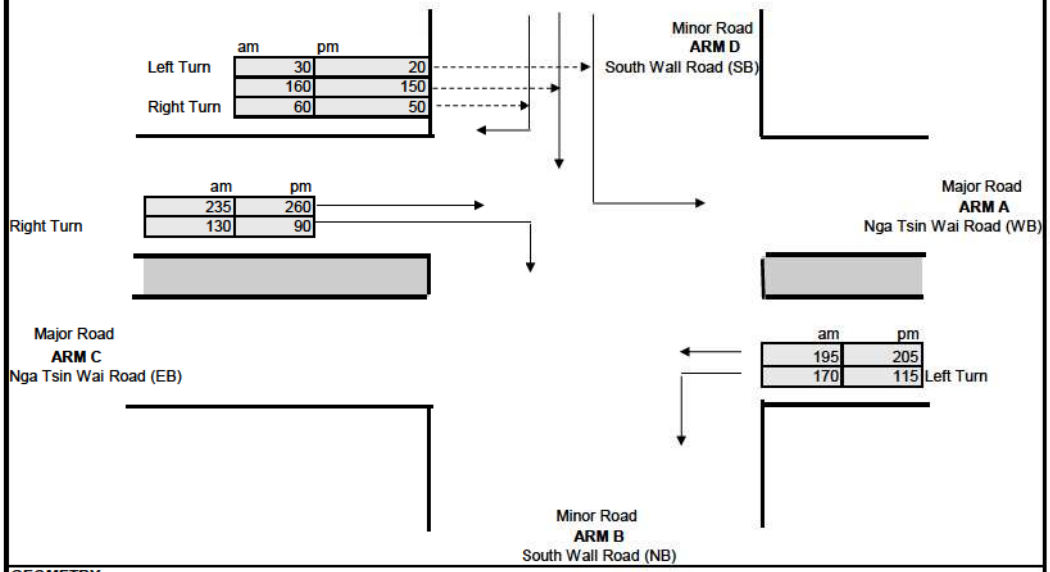
ATKINS CHINA LIMITED

Simplified Priority Junction Capacity Calculation

SNC·LAVALIN ATKINS Member of the SNC Lavalin Group

(Single Lane Minor Arm B)

Job Title:	URA KC-017				
Junction:	J12 - Nga Tsin Wai Road / South Wall Road			Designed by:	RC
Scheme:	Existing			Checked by:	EC
Design Year:	2021	Job No.:	5205867	Date :	5/13/2022
ARM A:	Nga Tsin Wai Road (WB)	ARM C:	Nga Tsin Wai Road (EB)		
ARM B:	South Wall Road (NB)	ARM D:	South Wall Road (SB)		



GEOMETRY

Major road width		W	11.60	Residual width		Wr(c-a)	2.70
Central Reserve width		Wcr		Residual width		Wr(a-c)	3.10
Arm B				**Arm D**			
Lane widths		w(b-a)		Lane widths		w(d-c)	3.00
		w(b-c)				w(d-a)	3.00
		w(c-b)	5.40			w(a-d)	
Visibilities	Vr(b-a)	D	0.53	Visibilities	Vr(d-c) 30	D	0.81
	Vl(b-a)	E	0.59		Vl(d-c) 40	E	0.86
	Vr(b-c)	F	1.08		Vr(d-a) 30	F	0.59
	Vr(c-b) 40	Y	0.60		Vr(a-d)	Y	0.60

ANALYSIS

Arm B		AM PEAK	PM PEAK	Arm D		AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	235	260	TRAFFIC FLOWS	q(a-c)	195	205
	q(c-b)	130	90		q(a-d)	0	0
	q(a-b)	170	115		q(c-d)	0	0
	q(a-c)	195	205		q(c-a)	235	260
	q(b-a)	0	0		q(d-c)	60	50
	q(b-c)	0	0		q(d-a)	30	20
	q(b-d)	0	0		q(d-b)	160	150
	f	0.00	0.00		f	0.33	0.29
CAPACITIES	Q(b-a)	239	248	CAPACITIES	Q(d-c)	419	421
	Q(b-c)	403	404		Q(d-a)	599	594
	Q(c-b)	719	730		Q(a-d)	383	387
	Q(b-ac)	239	248		Q(d-ca)	466	459
	Q(b-d)left	265	271		Q(d-b)left	401	408
	Q(b-d)right	265	271		Q(d-b)right	401	408
DFC's	b-ad	0.000	0.000	DFC's	d-c	0.314	0.281
	b-cd	0.000	0.000		d-a	0.278	0.239
	c-b	0.181	0.123		a-d	0.000	0.000
	b-acd	0.000	0.000		d-abc	0.592	0.520
DFC		**0.18**	**0.12**	**DFC**		**0.59**	**0.52**

	AM PEAK	PM PEAK
Critical DFC	0.59	0.52

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a) Capacity of combined streams

T.P.D.M.V.2.4
Appendix 1

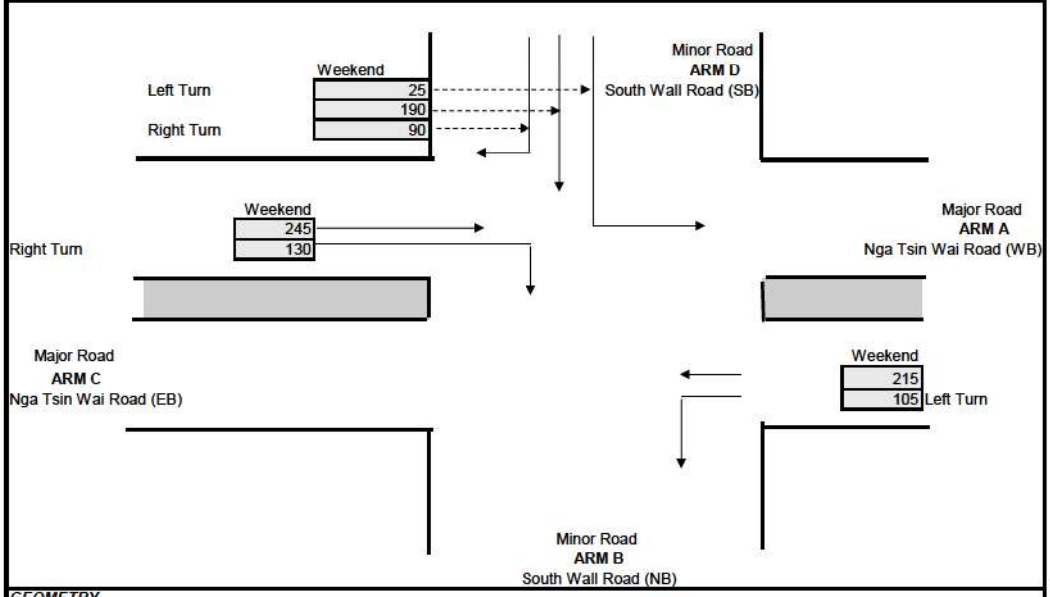
- In accordance with TPDM V2.4

Simplified Priority Junction Capacity Calculation

SNC·LAVALIN ATKINS Member of the SNC Lavalin Group

(Single Lane Minor Arm B)

Job Title:	URA KC-017				
Junction:	J12 - Nga Tsin Wai Road / South Wall Road			Designed by:	RC
Scheme:	Existing - Weekend			Checked by:	EC
Design Year:	2021	Job No.:	5205867	Date :	5/19/2022
ARM A:	Nga Tsin Wai Road (WB)	ARM C:	Nga Tsin Wai Road (EB)		
ARM B:	South Wall Road (NB)	ARM D:	South Wall Road (SB)		



GEOMETRY

Major road width		W	11.60	Residual width		Wr(c-a)	2.70
Central Reserve width		Wcr		Residual width		Wr(a-c)	3.10
Arm B				**Arm D**			
Lane widths		w(b-a)		Lane widths		w(d-c)	3.00
		w(b-c)				w(d-a)	3.00
		w(c-b)	5.40			w(a-d)	
Visibilities	Vr(b-a)	D	0.53	Visibilities	Vr(d-c)	30 D	0.81
	Vl(b-a)	E	0.59		Vl(d-c)	40 E	0.86
	Vr(b-c)	F	1.08		Vr(d-a)	30 F	0.59
	Vr(c-b)	40 Y	0.60		Vr(a-d)	Y	0.60

ANALYSIS

Arm B		**PM PEAK**	**Arm D**		**PM PEAK**
TRAFFIC FLOWS	q(c-a)	245	TRAFFIC FLOWS	q(a-c)	215
	q(c-b)	130		q(a-d)	0
	q(a-b)	105		q(c-d)	0
	q(a-c)	215		q(c-a)	245
	q(b-a)	0		q(d-c)	90
	q(b-c)	0		q(d-a)	25
	q(b-d)	0		q(d-b)	190
	f	0.00		f	0.22
CAPACITIES	Q(b-a)	235	CAPACITIES	Q(d-c)	416
	Q(b-c)	404		Q(d-a)	597
	Q(c-b)	730		Q(a-d)	381
	Q(b-ac)	235		Q(d-ca)	445
	Q(b-d)left	265		Q(d-b)left	404
	Q(b-d)right	265		Q(d-b)right	404
DFC's	b-ad	0.000	DFC's	d-c	0.401
	b-cd	0.000		d-a	0.328
	c-b	0.178		a-d	0.000
	b-acd	0.000		d-abc	0.729
DFC		**0.18**	**DFC**		**0.73**

	Weekend PEAK
Critical DFC	0.73

Where Vl and Vr are visibility distances to the left or right of the respective streams

D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))

E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))

F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))

Y = 1-0.0345W

f = proportion of minor traffic turning left

Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a)

T.P.D.M.V.2.4
Appendix 1

Capacity of combined streams

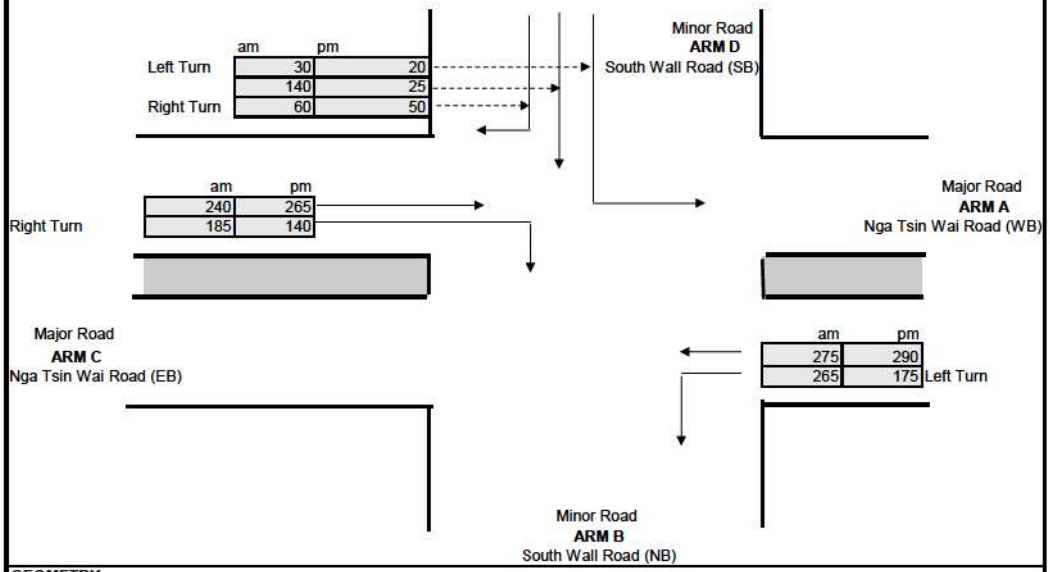
- In accordance with TPDM V2.4

Simplified Priority Junction Capacity Calculation

SNC·LAVALIN ATKINS

(Single Lane Minor Arm B)

Job Title:	URA KC-017				
Junction:	J12 - Nga Tsin Wai Road / South Wall Road			Designed by:	RC
Scheme:	Reference			Checked by:	EC
Design Year:	2033	Job No.:	5205867	Date :	5/13/2022
ARM A:	Nga Tsin Wai Road (WB)	ARM C:	Nga Tsin Wai Road (EB)		
ARM B:	South Wall Road (NB)	ARM D:	South Wall Road (SB)		



GEOMETRY

Major road width		W	11.60	Residual width		Wr(c-a)	2.70
Central Reserve width		Wcr		Residual width		Wr(a-c)	3.10
Arm B				**Arm D**			
Lane widths		w(b-a)		Lane widths		w(d-c)	3.00
		w(b-c)				w(d-a)	3.00
		w(c-b)	5.40			w(a-d)	
Visibilities	Vr(b-a)	D	0.53	Visibilities	Vr(d-c)	30 D	0.81
	Vl(b-a)	E	0.59		Vl(d-c)	40 E	0.86
	Vr(b-c)	F	1.08		Vr(d-a)	30 F	0.59
	Vr(c-b)	40 Y	0.60		Vr(a-d)	Y	0.60

ANALYSIS

Arm B		AM PEAK	PM PEAK	Arm D		AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	240	265	TRAFFIC FLOWS	q(a-c)	275	290
	q(c-b)	185	140		q(a-d)	0	0
	q(a-b)	265	175		q(c-d)	0	0
	q(a-c)	275	290		q(c-a)	240	265
	q(b-a)	0	0		q(d-c)	60	50
	q(b-c)	0	0		q(d-a)	30	20
	q(b-d)	0	0		q(d-b)	140	25
	f	0.00	0.00		f	0.33	0.29
CAPACITIES	Q(b-a)	218	242	CAPACITIES	Q(d-c)	400	402
	Q(b-c)	388	391		Q(d-a)	598	593
	Q(c-b)	678	695		Q(a-d)	372	377
	Q(b-ac)	218	242		Q(d-ca)	450	443
	Q(b-d)left	242	250		Q(d-b)left	371	383
	Q(b-d)right	242	250		Q(d-b)right	371	383
DFC's	b-ad	0.000	0.000	DFC's	d-c	0.310	0.153
	b-cd	0.000	0.000		d-a	0.267	0.070
	c-b	0.273	0.201		a-d	0.000	0.000
	b-acd	0.000	0.000		d-abc	0.578	0.223
DFC		**0.27**	**0.20**	**DFC**		**0.58**	**0.22**

	AM PEAK	PM PEAK
Critical DFC	0.58	0.22

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a)

T.P.D.M.V.2.4
Appendix 1

Capacity of combined streams

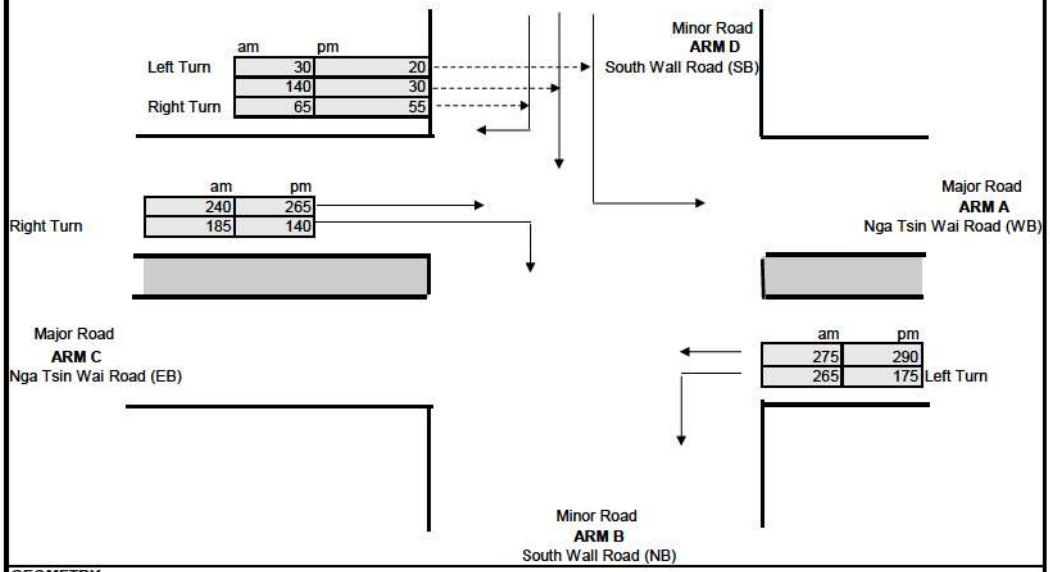
- In accordance with TPDM V2.4

Simplified Priority Junction Capacity Calculation

SNC·LAVALIN ATKINS

(Single Lane Minor Arm B)

Job Title:	URA KC-017				
Junction:	J12 - Nga Tsin Wai Road / South Wall Road			Designed by:	RC
Scheme:	Design			Checked by:	EC
Design Year:	2033	Job No.:	5205867	Date :	5/13/2022
ARM A:	Nga Tsin Wai Road (WB)	ARM C:	Nga Tsin Wai Road (EB)		
ARM B:	South Wall Road (NB)	ARM D:	South Wall Road (SB)		



GEOMETRY

Major road width		W	11.60	Residual width		Wr(c-a)	2.70
Central Reserve width		Wcr		Residual width		Wr(a-c)	3.10
Arm B				**Arm D**			
Lane widths		w(b-a)		Lane widths		w(d-c)	3.00
		w(b-c)				w(d-a)	3.00
		w(c-b)	5.40			w(a-d)	
Visibilities	Vr(b-a)	D	0.53	Visibilities	Vr(d-c) 30	D	0.81
	Vl(b-a)	E	0.59		Vl(d-c) 40	E	0.86
	Vr(b-c)	F	1.08		Vr(d-a) 30	F	0.59
	Vr(c-b) 40	Y	0.60		Vr(a-d)	Y	0.60

ANALYSIS

Arm B		AM PEAK	PM PEAK	Arm D		AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	240	265	TRAFFIC FLOWS	q(a-c)	275	290
	q(c-b)	185	140		q(a-d)	0	0
	q(a-b)	265	175		q(c-d)	0	0
	q(a-c)	275	290		q(c-a)	240	265
	q(b-a)	0	0		q(d-c)	65	55
	q(b-c)	0	0		q(d-a)	30	20
	q(b-d)	0	0		q(d-b)	140	30
	f	0.00	0.00		f	0.32	0.27
CAPACITIES	Q(b-a)	218	241	CAPACITIES	Q(d-c)	400	402
	Q(b-c)	388	391		Q(d-a)	598	593
	Q(c-b)	678	695		Q(a-d)	372	377
	Q(b-ac)	218	241		Q(d-ca)	447	440
	Q(b-d)left	242	250		Q(d-b)left	371	383
	Q(b-d)right	242	250		Q(d-b)right	371	383
DFC's	b-ad	0.000	0.000	DFC's	d-c	0.321	0.171
	b-cd	0.000	0.000		d-a	0.270	0.078
	c-b	0.273	0.201		a-d	0.000	0.000
	b-acd	0.000	0.000		d-abc	0.590	0.249
DFC		**0.27**	**0.20**	**DFC**		**0.59**	**0.25**

	AM PEAK	PM PEAK
Critical DFC	0.59	0.25

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a)

T.P.D.M.V.2.4
Appendix 1

Capacity of combined streams

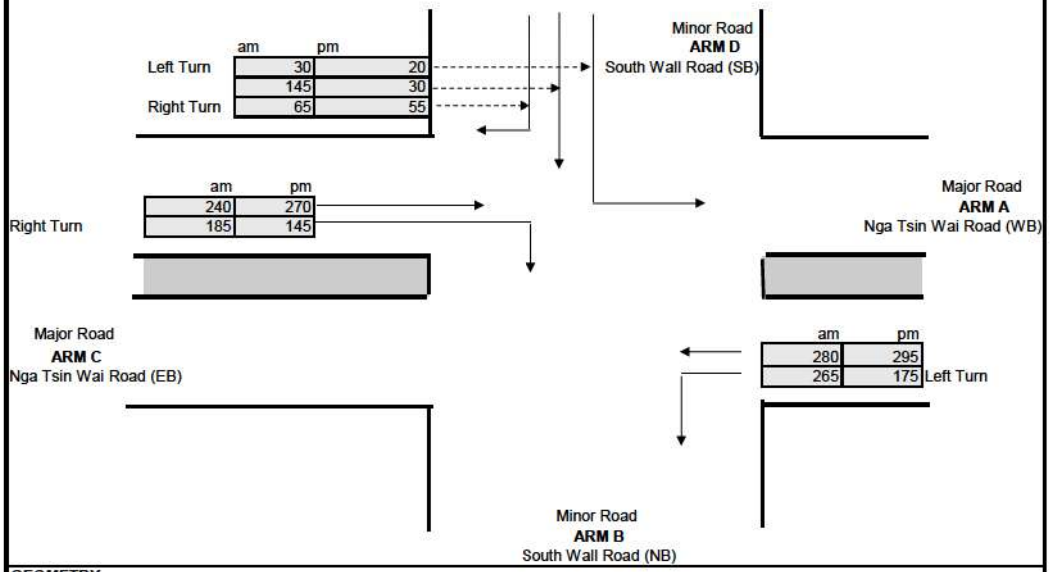
- In accordance with TPDM V2.4

Simplified Priority Junction Capacity Calculation

SNC·LAVALIN ATKINS Member of the SNC Lavalin Group

(Single Lane Minor Arm B)

Job Title:	URA KC-017				
Junction:	J12 - Nga Tsin Wai Road / South Wall Road			Designed by:	RC
Scheme:	Reference			Checked by:	EC
Design Year:	2036	Job No.:	5205867	Date :	5/13/2022
ARM A:	Nga Tsin Wai Road (WB)	ARM C:	Nga Tsin Wai Road (EB)		
ARM B:	South Wall Road (NB)	ARM D:	South Wall Road (SB)		



GEOMETRY

Major road width		W	11.60	Residual width		Wr(c-a)	2.70
Central Reserve width		Wcr		Residual width		Wr(a-c)	3.10
Arm B				**Arm D**			
Lane widths		w(b-a)		Lane widths		w(d-c)	3.00
		w(b-c)				w(d-a)	3.00
		w(c-b)	5.40			w(a-d)	
Visibilities	Vr(b-a)	D	0.53	Visibilities	Vr(d-c) 30	D	0.81
	Vl(b-a)	E	0.59		Vl(d-c) 40	E	0.86
	Vr(b-c)	F	1.08		Vr(d-a) 30	F	0.59
	Vr(c-b) 40	Y	0.60		Vr(a-d)	Y	0.60

ANALYSIS

Arm B		AM PEAK	PM PEAK	Arm D		AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	240	270	TRAFFIC FLOWS	q(a-c)	280	295
	q(c-b)	185	145		q(a-d)	0	0
	q(a-b)	265	175		q(c-d)	0	0
	q(a-c)	280	295		q(c-a)	240	270
	q(b-a)	0	0		q(d-c)	65	55
	q(b-c)	0	0		q(d-a)	30	20
	q(b-d)	0	0		q(d-b)	145	30
	f	0.00	0.00		f	0.32	0.27
CAPACITIES	Q(b-a)	217	239	CAPACITIES	Q(d-c)	400	400
	Q(b-c)	387	390		Q(d-a)	598	592
	Q(c-b)	677	694		Q(a-d)	372	375
	Q(b-ac)	217	239		Q(d-ca)	446	438
	Q(b-d)left	241	248		Q(d-b)left	370	380
	Q(b-d)right	241	248		Q(d-b)right	370	380
DFC's	b-ad	0.000	0.000	DFC's	d-c	0.327	0.172
	b-cd	0.000	0.000		d-a	0.278	0.079
	c-b	0.273	0.209		a-d	0.000	0.000
	b-acd	0.000	0.000		d-abc	0.605	0.250
DFC		**0.27**	**0.21**	**DFC**		**0.60**	**0.25**

	AM PEAK	PM PEAK
Critical DFC	0.60	0.25

Where Vl and Vr are visibility distances to the left or right of the respective streams

D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))

E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))

F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))

Y = 1-0.0345W

f = proportion of minor traffic turning left

Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a) Capacity of combined streams

T.P.D.M.V.2.4
Appendix 1

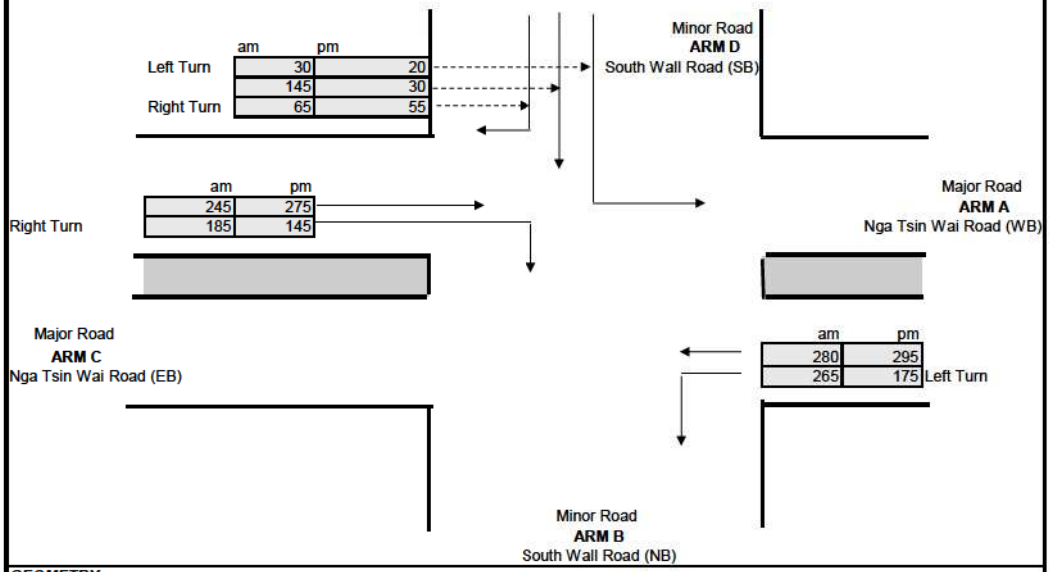
- In accordance with TPDM V2.4

Simplified Priority Junction Capacity Calculation

SNC·LAVALIN ATKINS Member of the SNC-Lavalin Group

(Single Lane Minor Arm B)

Job Title:	URA KC-017				
Junction:	J12 - Nga Tsin Wai Road / South Wall Road			Designed by:	RC
Scheme:	Design			Checked by:	EC
Design Year:	2036	Job No.:	5205867	Date :	5/13/2022
ARM A:	Nga Tsin Wai Road (WB)	ARM C:	Nga Tsin Wai Road (EB)		
ARM B:	South Wall Road (NB)	ARM D:	South Wall Road (SB)		



GEOMETRY

Major road width		W	11.60	Residual width		Wr(c-a)	2.70
Central Reserve width		Wcr		Residual width		Wr(a-c)	3.10
Arm B				**Arm D**			
Lane widths		w(b-a)		Lane widths		w(d-c)	3.00
		w(b-c)				w(d-a)	3.00
		w(c-b)	5.40			w(a-d)	
Visibilities	Vr(b-a)	D	0.53	Visibilities	Vr(d-c) 30	D	0.81
	Vl(b-a)	E	0.59		Vl(d-c) 40	E	0.86
	Vr(b-c)	F	1.08		Vr(d-a) 30	F	0.59
	Vr(c-b) 40	Y	0.60		Vr(a-d)	Y	0.60

ANALYSIS

Arm B		AM PEAK	PM PEAK	Arm D		AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	245	275	TRAFFIC FLOWS	q(a-c)	280	295
	q(c-b)	185	145		q(a-d)	0	0
	q(a-b)	265	175		q(c-d)	0	0
	q(a-c)	280	295		q(c-a)	245	275
	q(b-a)	0	0		q(d-c)	65	55
	q(b-c)	0	0		q(d-a)	30	20
	q(b-d)	0	0		q(d-b)	145	30
	f	0.00	0.00		f	0.32	0.27
CAPACITIES	Q(b-a)	217	239	CAPACITIES	Q(d-c)	399	399
	Q(b-c)	387	390		Q(d-a)	597	591
	Q(c-b)	677	694		Q(a-d)	371	375
	Q(b-ac)	217	239		Q(d-ca)	445	437
	Q(b-d)left	241	248		Q(d-b)left	369	379
	Q(b-d)right	241	248		Q(d-b)right	369	379
DFC's	b-ad	0.000	0.000	DFC's	d-c	0.327	0.172
	b-cd	0.000	0.000		d-a	0.279	0.079
	c-b	0.273	0.209		a-d	0.000	0.000
	b-acd	0.000	0.000		d-abc	0.606	0.251
DFC		**0.27**	**0.21**	**DFC**		**0.61**	**0.25**

	AM PEAK	PM PEAK
Critical DFC	0.61	0.25

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a) Capacity of combined streams

T.P.D.M.V.2.4
Appendix 1

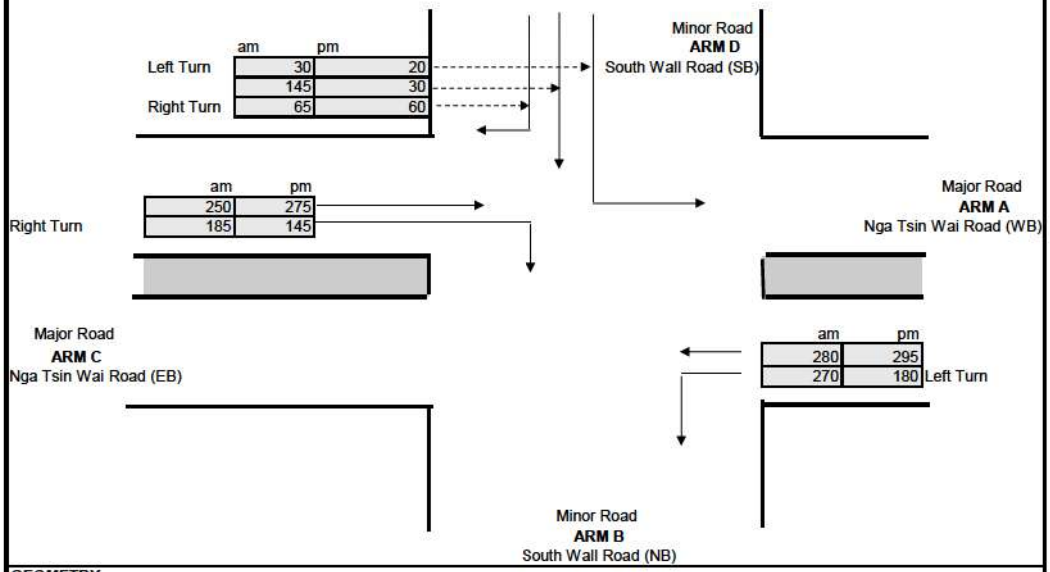
- In accordance with TPDM V2.4

Simplified Priority Junction Capacity Calculation

SNC·LAVALIN ATKINS Member of the SNC-Lavalin Group

(Single Lane Minor Arm B)

Job Title:	URA KC-017				
Junction:	J12 - Nga Tsin Wai Road / South Wall Road			Designed by:	RC
Scheme:	Reference			Checked by:	EC
Design Year:	2037	Job No.:	5205867	Date :	5/13/2022
ARM A:	Nga Tsin Wai Road (WB)	ARM C:	Nga Tsin Wai Road (EB)		
ARM B:	South Wall Road (NB)	ARM D:	South Wall Road (SB)		



GEOMETRY

Major road width		W	11.60	Residual width		Wr(c-a)	2.70
Central Reserve width		Wcr		Residual width		Wr(a-c)	3.10
Arm B				**Arm D**			
Lane widths		w(b-a)		Lane widths		w(d-c)	3.00
		w(b-c)				w(d-a)	3.00
		w(c-b)	5.40			w(a-d)	
Visibilities	Vr(b-a)	D	0.53	Visibilities	Vr(d-c) 30	D	0.81
	Vl(b-a)	E	0.59		Vl(d-c) 40	E	0.86
	Vr(b-c)	F	1.08		Vr(d-a) 30	F	0.59
	Vr(c-b) 40	Y	0.60		Vr(a-d)	Y	0.60

ANALYSIS

Arm B		AM PEAK	PM PEAK	Arm D		AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	250	275	TRAFFIC FLOWS	q(a-c)	280	295
	q(c-b)	185	145		q(a-d)	0	0
	q(a-b)	270	180		q(c-d)	0	0
	q(a-c)	280	295		q(c-a)	250	275
	q(b-a)	0	0		q(d-c)	65	60
	q(b-c)	0	0		q(d-a)	30	20
	q(b-d)	0	0		q(d-b)	145	30
	f	0.00	0.00		f	0.32	0.25
CAPACITIES	Q(b-a)	216	238	CAPACITIES	Q(d-c)	398	399
	Q(b-c)	387	390		Q(d-a)	596	591
	Q(c-b)	675	693		Q(a-d)	371	375
	Q(b-ac)	216	238		Q(d-ca)	444	434
	Q(b-d)left	240	247		Q(d-b)left	368	379
	Q(b-d)right	240	247		Q(d-b)right	368	379
DFC's	b-ad	0.000	0.000	DFC's	d-c	0.328	0.184
	b-cd	0.000	0.000		d-a	0.280	0.079
	c-b	0.274	0.209		a-d	0.000	0.000
	b-acd	0.000	0.000		d-abc	0.608	0.264
DFC		**0.27**	**0.21**	**DFC**		**0.61**	**0.26**

	AM PEAK	PM PEAK
Critical DFC	0.61	0.26

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a)

T.P.D.M.V.2.4
Appendix 1

Capacity of combined streams

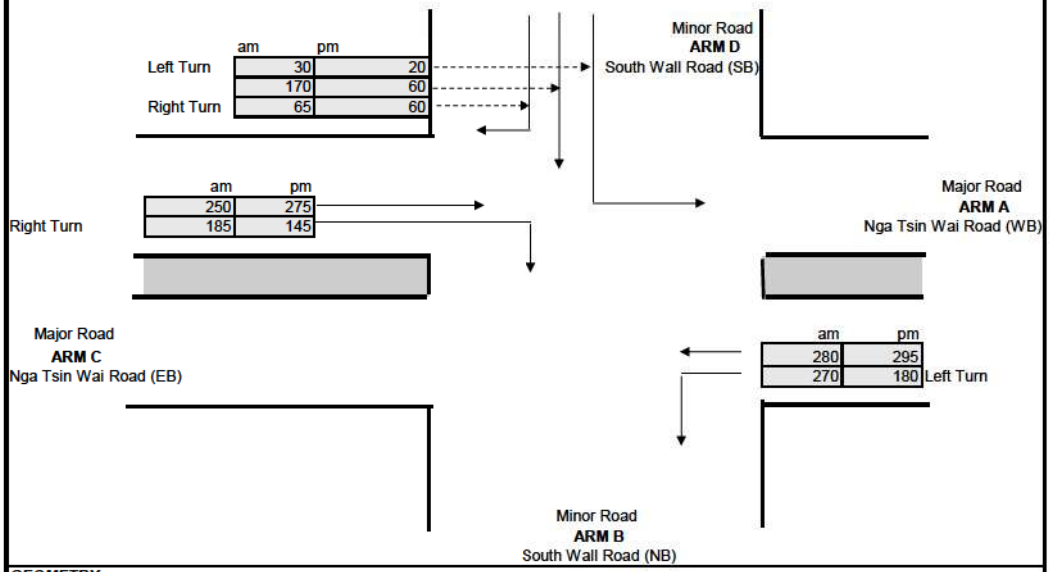
- In accordance with TPDM V2.4

Simplified Priority Junction Capacity Calculation

SNC·LAVALIN ATKINS Member of the SNC Lavalin Group

(Single Lane Minor Arm B)

Job Title:	URA KC-017				
Junction:	J12 - Nga Tsin Wai Road / South Wall Road			Designed by:	RC
Scheme:	Design			Checked by:	EC
Design Year:	2037	Job No.:	5205867	Date :	5/13/2022
ARM A:	Nga Tsin Wai Road (WB)	ARM C:	Nga Tsin Wai Road (EB)		
ARM B:	South Wall Road (NB)	ARM D:	South Wall Road (SB)		



GEOMETRY

Major road width		W	11.60	Residual width		Wr(c-a)	2.70
Central Reserve width		Wcr		Residual width		Wr(a-c)	3.10
Arm B				**Arm D**			
Lane widths		w(b-a)		Lane widths		w(d-c)	3.00
		w(b-c)				w(d-a)	3.00
		w(c-b)	5.40			w(a-d)	
Visibilities	Vr(b-a)	D	0.53	Visibilities	Vr(d-c) 30	D	0.81
	Vl(b-a)	E	0.59		Vl(d-c) 40	E	0.86
	Vr(b-c)	F	1.08		Vr(d-a) 30	F	0.59
	Vr(c-b) 40	Y	0.60		Vr(a-d)	Y	0.60

ANALYSIS

Arm B		AM PEAK	PM PEAK	Arm D		AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	250	275	TRAFFIC FLOWS	q(a-c)	280	295
	q(c-b)	185	145		q(a-d)	0	0
	q(a-b)	270	180		q(c-d)	0	0
	q(a-c)	280	295		q(c-a)	250	275
	q(b-a)	0	0		q(d-c)	65	60
	q(b-c)	0	0		q(d-a)	30	20
	q(b-d)	0	0		q(d-b)	170	60
	f	0.00	0.00		f	0.32	0.25
CAPACITIES	Q(b-a)	213	235	CAPACITIES	Q(d-c)	398	399
	Q(b-c)	387	390		Q(d-a)	596	591
	Q(c-b)	675	693		Q(a-d)	371	375
	Q(b-ac)	213	235		Q(d-ca)	444	434
	Q(b-d)left	240	247		Q(d-b)left	368	379
	Q(b-d)right	240	247		Q(d-b)right	368	379
DFC's	b-ad	0.000	0.000	DFC's	d-c	0.357	0.218
	b-cd	0.000	0.000		d-a	0.319	0.125
	c-b	0.274	0.209		a-d	0.000	0.000
	b-acd	0.000	0.000		d-abc	0.676	0.343
DFC		**0.27**	**0.21**	**DFC**		**0.68**	**0.34**

	AM PEAK	PM PEAK
Critical DFC	0.68	0.34

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a)

T.P.D.M.V.2.4
Appendix 1

Capacity of combined streams

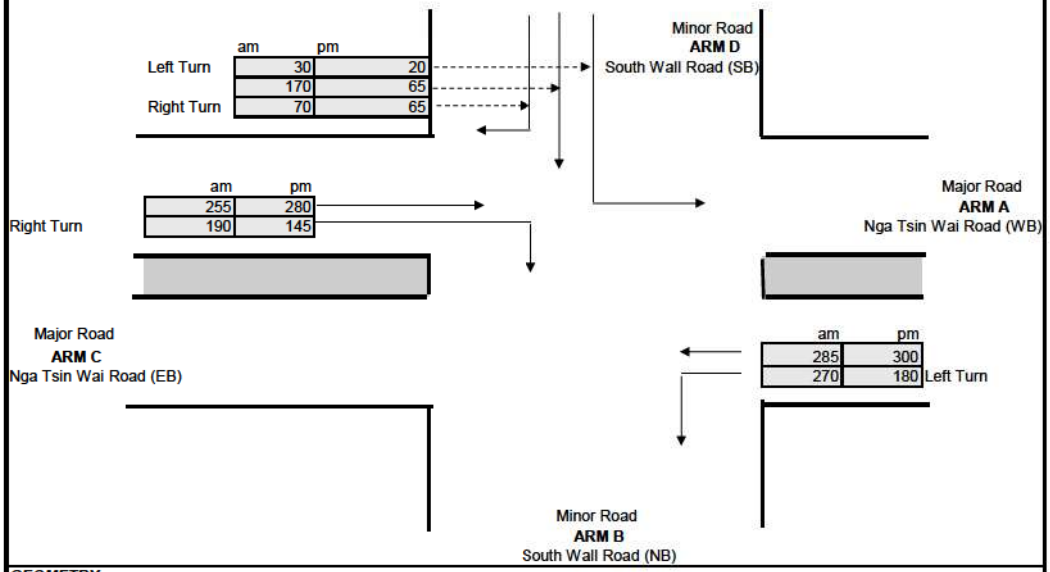
- In accordance with TPDM V2.4

Simplified Priority Junction Capacity Calculation

SNC·LAVALIN ATKINS

(Single Lane Minor Arm B)

Job Title:	URA KC-017				
Junction:	J12 - Nga Tsin Wai Road / South Wall Road			Designed by:	RC
Scheme:	Reference			Checked by:	EC
Design Year:	2040	Job No.:	5205867	Date :	5/13/2022
ARM A:	Nga Tsin Wai Road (WB)	ARM C:	Nga Tsin Wai Road (EB)		
ARM B:	South Wall Road (NB)	ARM D:	South Wall Road (SB)		



GEOMETRY

Major road width		W	11.60	Residual width		Wr(c-a)	2.70
Central Reserve width		Wcr		Residual width		Wr(a-c)	3.10
Arm B				**Arm D**			
Lane widths		w(b-a)		Lane widths		w(d-c)	3.00
		w(b-c)				w(d-a)	3.00
		w(c-b)	5.40			w(a-d)	
Visibilities	Vr(b-a)	D	0.53	Visibilities	Vr(d-c) 30	D	0.81
	Vl(b-a)	E	0.59		Vl(d-c) 40	E	0.86
	Vr(b-c)	F	1.08		Vr(d-a) 30	F	0.59
	Vr(c-b) 40	Y	0.60		Vr(a-d)	Y	0.60

ANALYSIS

Arm B		AM PEAK	PM PEAK	Arm D		AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	255	280	TRAFFIC FLOWS	q(a-c)	285	300
	q(c-b)	190	145		q(a-d)	0	0
	q(a-b)	270	180		q(c-d)	0	0
	q(a-c)	285	300		q(c-a)	255	280
	q(b-a)	0	0		q(d-c)	70	65
	q(b-c)	0	0		q(d-a)	30	20
	q(b-d)	0	0		q(d-b)	170	65
	f	0.00	0.00		f	0.30	0.24
CAPACITIES	Q(b-a)	211	233	CAPACITIES	Q(d-c)	395	397
	Q(b-c)	386	389		Q(d-a)	595	590
	Q(c-b)	674	692		Q(a-d)	369	374
	Q(b-ac)	211	233		Q(d-ca)	440	430
	Q(b-d)left	238	246		Q(d-b)left	366	377
	Q(b-d)right	238	246		Q(d-b)right	366	377
DFC's	b-ad	0.000	0.000	DFC's	d-c	0.368	0.236
	b-cd	0.000	0.000		d-a	0.324	0.134
	c-b	0.282	0.210		a-d	0.000	0.000
	b-acd	0.000	0.000		d-abc	0.692	0.370
DFC		**0.28**	**0.21**	**DFC**		**0.69**	**0.37**

	AM PEAK	PM PEAK
Critical DFC	0.69	0.37

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a) Capacity of combined streams

T.P.D.M.V.2.4
Appendix 1

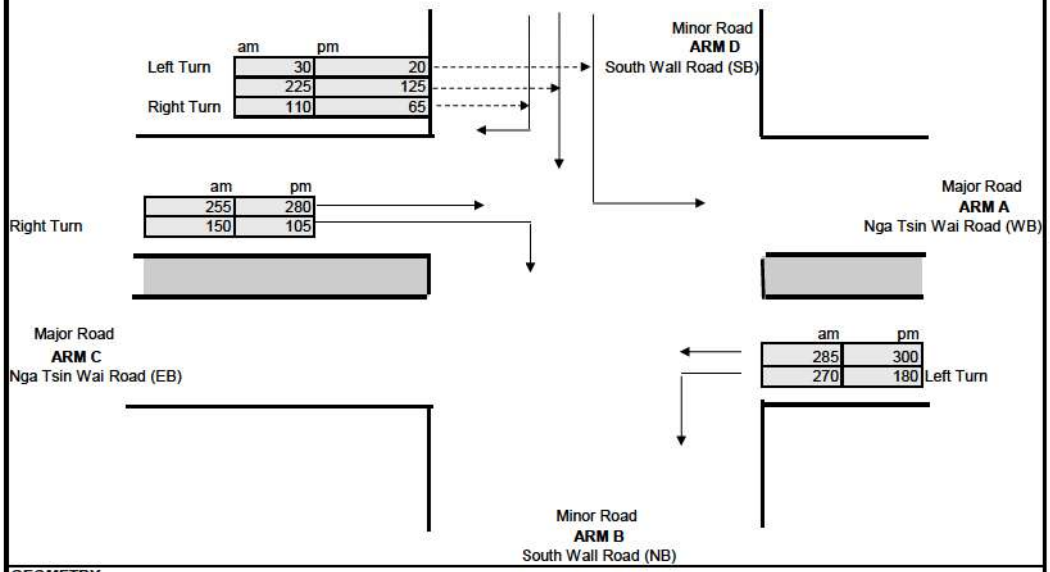
- In accordance with TPDM V2.4

Simplified Priority Junction Capacity Calculation

SNC·LAVALIN ATKINS Member of the SNC Lavalin Group

(Single Lane Minor Arm B)

Job Title:	URA KC-017				
Junction:	J12 - Nga Tsin Wai Road / South Wall Road			Designed by:	RC
Scheme:	Design			Checked by:	EC
Design Year:	2040	Job No.:	5205867	Date :	5/13/2022
ARM A:	Nga Tsin Wai Road (WB)	ARM C:	Nga Tsin Wai Road (EB)		
ARM B:	South Wall Road (NB)	ARM D:	South Wall Road (SB)		



GEOMETRY

Major road width		W	11.60	Residual width		Wr(c-a)	2.70
Central Reserve width		Wcr		Residual width		Wr(a-c)	3.10
Arm B				**Arm D**			
Lane widths		w(b-a)		Lane widths		w(d-c)	3.00
		w(b-c)				w(d-a)	3.00
		w(c-b)	5.40			w(a-d)	
Visibilities	Vr(b-a)	D	0.53	Visibilities	Vr(d-c) 30	D	0.81
	Vl(b-a)	E	0.59		Vl(d-c) 40	E	0.86
	Vr(b-c)	F	1.08		Vr(d-a) 30	F	0.59
	Vr(c-b) 40	Y	0.60		Vr(a-d)	Y	0.60

ANALYSIS

Arm B		AM PEAK	PM PEAK	Arm D		AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	255	280	TRAFFIC FLOWS	q(a-c)	285	300
	q(c-b)	150	105		q(a-d)	0	0
	q(a-b)	270	180		q(c-d)	0	0
	q(a-c)	285	300		q(c-a)	255	280
	q(b-a)	0	0		q(d-c)	110	65
	q(b-c)	0	0		q(d-a)	30	20
	q(b-d)	0	0		q(d-b)	225	125
	f	0.00	0.00		f	0.21	0.24
CAPACITIES	Q(b-a)	209	232	CAPACITIES	Q(d-c)	402	404
	Q(b-c)	386	389		Q(d-a)	595	590
	Q(c-b)	674	692		Q(a-d)	377	382
	Q(b-ac)	209	232		Q(d-ca)	432	437
	Q(b-d)left	245	253		Q(d-b)left	373	384
	Q(b-d)right	245	253		Q(d-b)right	373	384
DFC's	b-ad	0.000	0.000	DFC's	d-c	0.493	0.297
	b-cd	0.000	0.000		d-a	0.435	0.223
	c-b	0.223	0.152		a-d	0.000	0.000
	b-acd	0.000	0.000		d-abc	0.928	0.520
DFC		**0.22**	**0.15**	**DFC**		**0.93**	**0.52**

	AM PEAK	PM PEAK
Critical DFC	0.93	0.52

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a)

Capacity of combined streams

T.P.D.M.V.2.4
Appendix 1

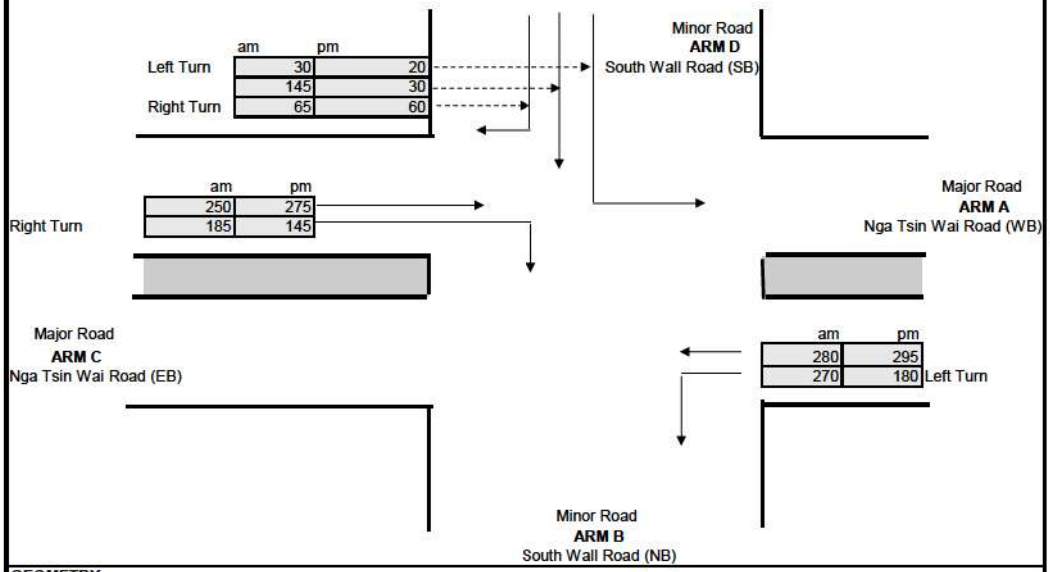
- In accordance with TPDM V2.4

Simplified Priority Junction Capacity Calculation

SNC·LAVALIN ATKINS Member of the SNC Lavalin Group

(Single Lane Minor Arm B)

Job Title:	URA KC-017				
Junction:	J12 - Nga Tsin Wai Road / South Wall Road			Designed by:	RC
Scheme:	Reference (with improvement)			Checked by:	EC
Design Year:	2037	Job No.:	5205867	Date :	5/13/2022
ARM A:	Nga Tsin Wai Road (WB)	ARM C:	Nga Tsin Wai Road (EB)		
ARM B:	South Wall Road (NB)	ARM D:	South Wall Road (SB)		



GEOMETRY

Major road width		W	11.60	Residual width		Wr(c-a)	2.70
Central Reserve width		Wcr		Residual width		Wr(a-c)	3.10
Arm B				**Arm D**			
Lane widths		w(b-a)		Lane widths		w(d-c)	4.00
		w(b-c)				w(d-a)	4.00
		w(c-b)	5.40			w(a-d)	
Visibilities	Vr(b-a)	D	0.53	Visibilities	Vr(d-c) 30	D	0.89
	Vl(b-a)	E	0.59		Vl(d-c) 40	E	0.95
	Vr(b-c)	F	1.08		Vr(d-a) 30	F	0.59
	Vr(c-b) 40	Y	0.60		Vr(a-d)	Y	0.60

ANALYSIS

Arm B		AM PEAK	PM PEAK	Arm D		AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	250	275	TRAFFIC FLOWS	q(a-c)	280	295
	q(c-b)	185	145		q(a-d)	0	0
	q(a-b)	270	180		q(c-d)	0	0
	q(a-c)	280	295		q(c-a)	250	275
	q(b-a)	0	0		q(d-c)	65	60
	q(b-c)	0	0		q(d-a)	30	20
	q(b-d)	0	0		q(d-b)	145	30
	f	0.00	0.00		f	0.32	0.25
CAPACITIES	Q(b-a)	216	238	CAPACITIES	Q(d-c)	438	439
	Q(b-c)	387	390		Q(d-a)	655	650
	Q(c-b)	675	693		Q(a-d)	371	375
	Q(b-ac)	216	238		Q(d-ca)	489	478
	Q(b-d)left	240	247		Q(d-b)left	405	417
	Q(b-d)right	240	247		Q(d-b)right	405	417
DFC's	b-ad	0.000	0.000	DFC's	d-c	0.301	0.168
	b-cd	0.000	0.000		d-a	0.252	0.072
	c-b	0.274	0.209		a-d	0.000	0.000
	b-acd	0.000	0.000		d-abc	0.553	0.240
DFC		**0.27**	**0.21**	**DFC**		**0.55**	**0.24**

	AM PEAK	PM PEAK
Critical DFC	0.55	0.24

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a)

T.P.D.M.V.2.4
Appendix 1

Capacity of combined streams

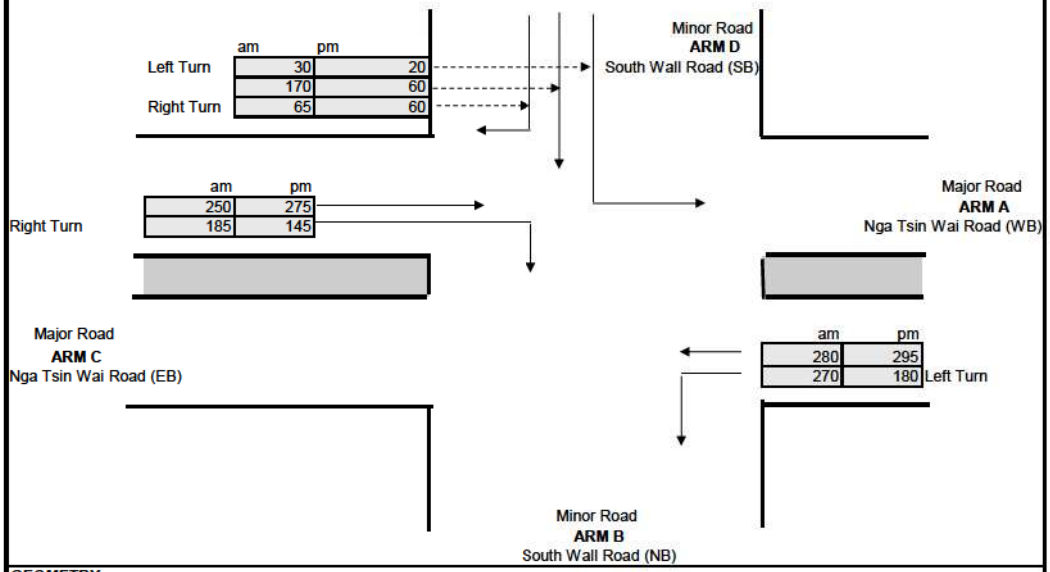
- In accordance with TPDM V2.4

Simplified Priority Junction Capacity Calculation

SNC·LAVALIN ATKINS

(Single Lane Minor Arm B)

Job Title:	URA KC-017				
Junction:	J12 - Nga Tsin Wai Road / South Wall Road			Designed by:	RC
Scheme:	Design (with improvement)			Checked by:	EC
Design Year:	2037	Job No.:	5205867	Date :	5/13/2022
ARM A:	Nga Tsin Wai Road (WB)	ARM C:	Nga Tsin Wai Road (EB)		
ARM B:	South Wall Road (NB)	ARM D:	South Wall Road (SB)		



GEOMETRY

Major road width		W	11.60	Residual width		Wr(c-a)	2.70
Central Reserve width		Wcr		Residual width		Wr(a-c)	3.10
Arm B				**Arm D**			
Lane widths		w(b-a)		Lane widths		w(d-c)	4.00
		w(b-c)				w(d-a)	4.00
		w(c-b)	5.40			w(a-d)	
Visibilities	Vr(b-a)	D	0.53	Visibilities	Vr(d-c) 30	D	0.89
	Vl(b-a)	E	0.59		Vl(d-c) 40	E	0.95
	Vr(b-c)	F	1.08		Vr(d-a) 30	F	0.59
	Vr(c-b) 40	Y	0.60		Vr(a-d)	Y	0.60

ANALYSIS

Arm B		AM PEAK	PM PEAK	Arm D		AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	250	275	TRAFFIC FLOWS	q(a-c)	280	295
	q(c-b)	185	145		q(a-d)	0	0
	q(a-b)	270	180		q(c-d)	0	0
	q(a-c)	280	295		q(c-a)	250	275
	q(b-a)	0	0		q(d-c)	65	60
	q(b-c)	0	0		q(d-a)	30	20
	q(b-d)	0	0		q(d-b)	170	60
	f	0.00	0.00		f	0.32	0.25
CAPACITIES	Q(b-a)	213	235	CAPACITIES	Q(d-c)	438	439
	Q(b-c)	387	390		Q(d-a)	655	650
	Q(c-b)	675	693		Q(a-d)	371	375
	Q(b-ac)	213	235		Q(d-ca)	489	478
	Q(b-d)left	240	247		Q(d-b)left	405	417
	Q(b-d)right	240	247		Q(d-b)right	405	417
DFC's	b-ad	0.000	0.000	DFC's	d-c	0.327	0.199
	b-cd	0.000	0.000		d-a	0.287	0.113
	c-b	0.274	0.209		a-d	0.000	0.000
	b-acd	0.000	0.000		d-abc	0.614	0.312
DFC		**0.27**	**0.21**	**DFC**		**0.61**	**0.31**

	AM PEAK	PM PEAK
Critical DFC	0.61	0.31

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a)

Capacity of combined streams

T.P.D.M.V.2.4
Appendix 1

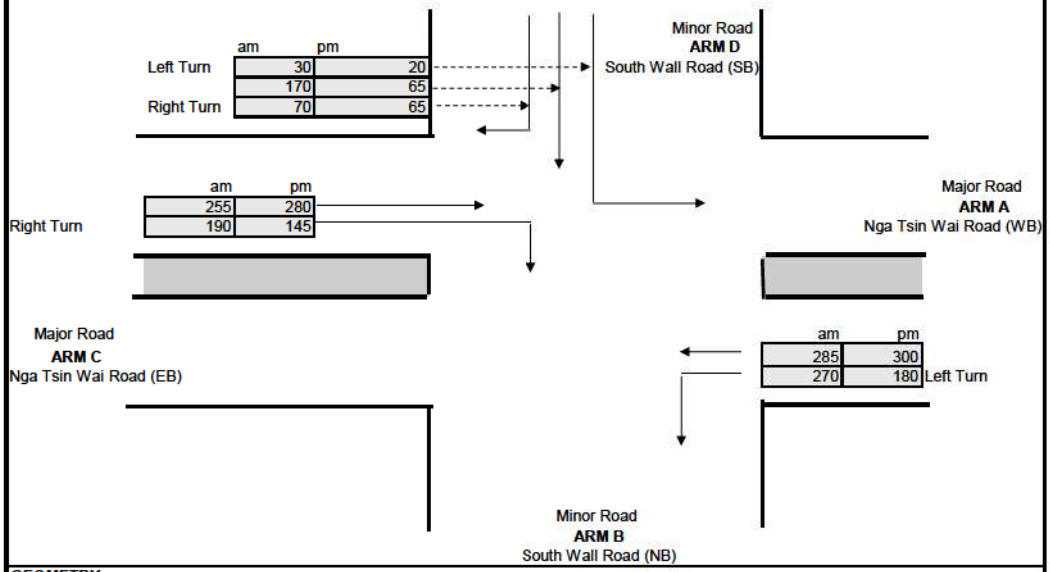
- In accordance with TPDM V2.4

Simplified Priority Junction Capacity Calculation

SNC·LAVALIN ATKINS Member of the SNC-Lavalin Group

(Single Lane Minor Arm B)

Job Title:	URA KC-017				
Junction:	J12 - Nga Tsin Wai Road / South Wall Road			Designed by:	RC
Scheme:	Reference (with improvement)			Checked by:	EC
Design Year:	2040	Job No.:	5205867	Date :	5/13/2022
ARM A:	Nga Tsin Wai Road (WB)	ARM C:	Nga Tsin Wai Road (EB)		
ARM B:	South Wall Road (NB)	ARM D:	South Wall Road (SB)		



GEOMETRY

Major road width		W	11.60	Residual width		Wr(c-a)	2.70
Central Reserve width		Wcr		Residual width		Wr(a-c)	3.10
Arm B				**Arm D**			
Lane widths		w(b-a)		Lane widths		w(d-c)	4.00
		w(b-c)				w(d-a)	4.00
		w(c-b)	5.40			w(a-d)	
Visibilities	Vr(b-a)	D	0.53	Visibilities	Vr(d-c) 30	D	0.89
	Vl(b-a)	E	0.59		Vl(d-c) 40	E	0.95
	Vr(b-c)	F	1.08		Vr(d-a) 30	F	0.59
	Vr(c-b) 40	Y	0.60		Vr(a-d)	Y	0.60

ANALYSIS

Arm B		AM PEAK	PM PEAK	Arm D		AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	255	280	TRAFFIC FLOWS	q(a-c)	285	300
	q(c-b)	190	145		q(a-d)	0	0
	q(a-b)	270	180		q(c-d)	0	0
	q(a-c)	285	300		q(c-a)	255	280
	q(b-a)	0	0		q(d-c)	70	65
	q(b-c)	0	0		q(d-a)	30	20
	q(b-d)	0	0		q(d-b)	170	65
	f	0.00	0.00		f	0.30	0.24
CAPACITIES	Q(b-a)	211	233	CAPACITIES	Q(d-c)	435	437
	Q(b-c)	386	389		Q(d-a)	654	649
	Q(c-b)	674	692		Q(a-d)	369	374
	Q(b-ac)	211	233		Q(d-ca)	484	473
	Q(b-d)left	238	246		Q(d-b)left	402	415
	Q(b-d)right	238	246		Q(d-b)right	402	415
DFC's	b-ad	0.000	0.000	DFC's	d-c	0.338	0.215
	b-cd	0.000	0.000		d-a	0.291	0.121
	c-b	0.282	0.210		a-d	0.000	0.000
	b-acd	0.000	0.000		d-abc	0.629	0.336
DFC		**0.28**	**0.21**	**DFC**		**0.63**	**0.34**

	AM PEAK	PM PEAK
Critical DFC	0.63	0.34

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a)

T.P.D.M.V.2.4
Appendix 1

Capacity of combined streams

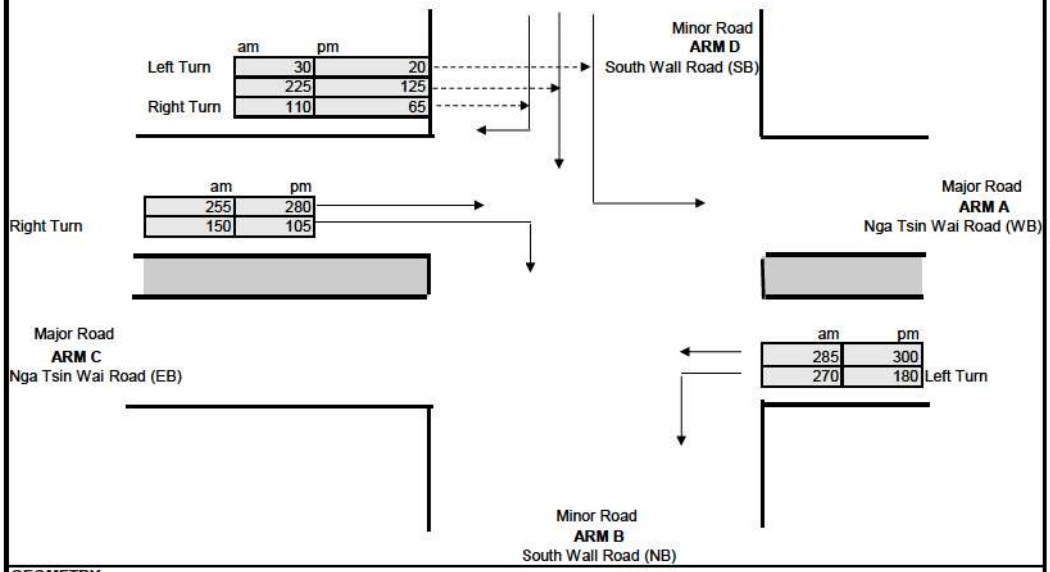
- In accordance with TPDM V2.4

Simplified Priority Junction Capacity Calculation

SNC·LAVALIN ATKINS Member of the SNC Lavalin Group

(Single Lane Minor Arm B)

Job Title:	URA KC-017				
Junction:	J12 - Nga Tsin Wai Road / South Wall Road			Designed by:	RC
Scheme:	Design (with improvement)			Checked by:	EC
Design Year:	2040	Job No.:	5205867	Date :	5/13/2022
ARM A:	Nga Tsin Wai Road (WB)	ARM C:	Nga Tsin Wai Road (EB)		
ARM B:	South Wall Road (NB)	ARM D:	South Wall Road (SB)		



GEOMETRY

Major road width		W	11.60	Residual width		Wr(c-a)	2.70
Central Reserve width		Wcr		Residual width		Wr(a-c)	3.10
Arm B				**Arm D**			
Lane widths		w(b-a)		Lane widths		w(d-c)	4.00
		w(b-c)				w(d-a)	4.00
		w(c-b)	5.40			w(a-d)	
Visibilities	Vr(b-a)	D	0.53	Visibilities	Vr(d-c) 30	D	0.89
	Vl(b-a)	E	0.59		Vl(d-c) 40	E	0.95
	Vr(b-c)	F	1.08		Vr(d-a) 30	F	0.59
	Vr(c-b) 40	Y	0.60		Vr(a-d)	Y	0.60

ANALYSIS

Arm B		AM PEAK	PM PEAK	Arm D		AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	255	280	TRAFFIC FLOWS	q(a-c)	285	300
	q(c-b)	150	105		q(a-d)	0	0
	q(a-b)	270	180		q(c-d)	0	0
	q(a-c)	285	300		q(c-a)	255	280
	q(b-a)	0	0		q(d-c)	110	65
	q(b-c)	0	0		q(d-a)	30	20
	q(b-d)	0	0		q(d-b)	225	125
	f	0.00	0.00		f	0.21	0.24
CAPACITIES	Q(b-a)	209	232	CAPACITIES	Q(d-c)	443	445
	Q(b-c)	386	389		Q(d-a)	654	649
	Q(c-b)	674	692		Q(a-d)	377	382
	Q(b-ac)	209	232		Q(d-ca)	476	480
	Q(b-d)left	245	253		Q(d-b)left	410	423
	Q(b-d)right	245	253		Q(d-b)right	410	423
DFC's	b-ad	0.000	0.000	DFC's	d-c	0.455	0.272
	b-cd	0.000	0.000		d-a	0.388	0.200
	c-b	0.223	0.152		a-d	0.000	0.000
	b-acd	0.000	0.000		d-abc	0.843	0.473
DFC		**0.22**	**0.15**	**DFC**		**0.84**	**0.47**

	AM PEAK	PM PEAK
Critical DFC	0.84	0.47

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a) Capacity of combined streams

T.P.D.M.V.2.4
Appendix 1

- In accordance with TPDM V2.4

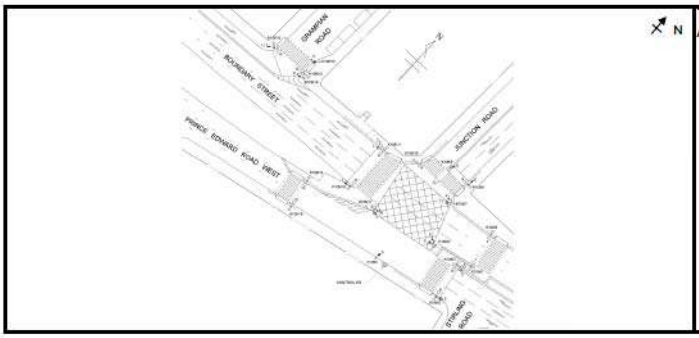
TRAFFIC SIGNAL CALCULATION SHEET

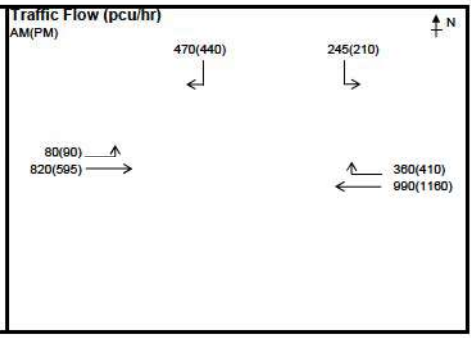
ATKINS

JOB NO. : 5205867

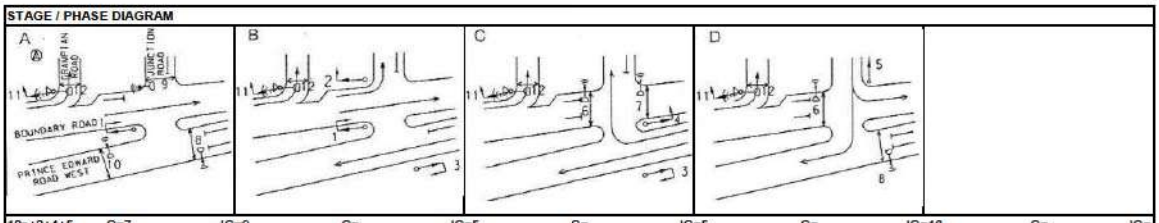
Junction : J13 - Prince Edward Road West / Boundary Street / Grampian Road Design Year: 2021

Scheme : Existing Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



10p+2+4+5	G=7	IG=9	G=	IG=5	G=	IG=5	G=	IG=16	G=	IG=
10p+2+4+5	G=7	IG=9	G=	IG=5	G=	IG=5	G=	IG=16	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Boundary Street EB														
2A	B	3.30	Y	N	15		80	100%	1240	**0.065**	90	100%	1240	**0.073**
1A	A,B	3.30	N	N			273		2085	0.131	198		2085	0.095
1B	A,B	3.30	N	N			274		2085	0.131	199		2085	0.095
1C	A,B	3.30	N	N			273		2085	0.131	198		2085	0.095
Prince Edward Road West WB														
3A	B,C	3.30	Y	N			478		1945	0.246	560		1945	0.288
3B	B,C	3.30	N	N			512		2085	0.246	600		2085	0.288
4A	C	3.30	N	N	17.5		360	100%	1920	**0.188**	410	100%	1920	**0.214**
Junction Road SB														
5A	D	3.20	Y	N	12.5/30		338	72% / 28%	1760	0.192	308	68% / 32%	1765	**0.175**
5B	D	3.20	N	N	25		377	100%	1960	**0.192**	342	100%	1960	0.174
6p	C,D		7GM +	13FG =	20	sec								
7p	C		5GM +	9FG =	14	sec								
8p	A,D		5GM +	9FG =	14	sec								
9p	A		7GM +	5FG =	12	sec								
10p	A		7GM +	7FG =	14	sec								

Notes:

AM Peak	10p+2+4+5	PM Peak	10p+2+4+5
Sum of Critical *y* **Y**	**0.444**	Sum of Critical *y* **Y**	**0.461**
Lost Time *L* (sec)	39	Lost Time *L* (sec)	39
Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
Practical Y ***Ypr***	0.608	Practical Y ***Ypr***	0.595
Reserve Capacity ***RC***	**37%**	Reserve Capacity ***RC***	**29%**

Date : 5/13/2022 Junction : J13 - Prince Edward Road West / Boundary Street / Grampian Road

ATKINS CHINA LIMITED

TRAFFIC SIGNAL CALCULATION SHEET

ATKINS

JOB NO. : 5205867

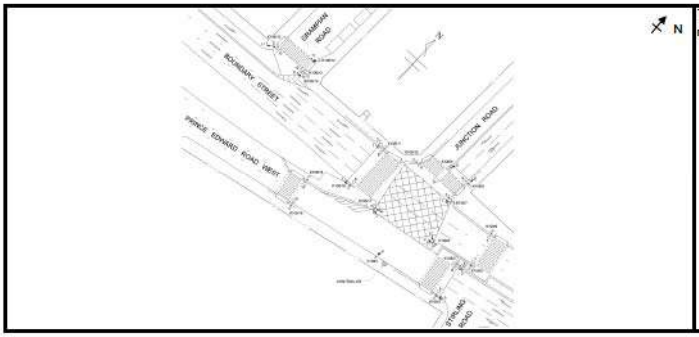
Junction : J13 - Prince Edward Road West / Boundary Street / Grampian Road

Design Year: 2021

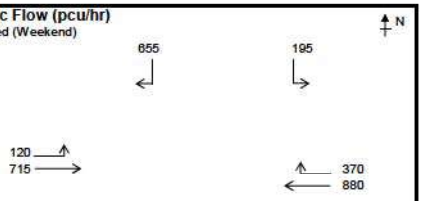
Scheme : Existing - Weekend

Designed by: RC

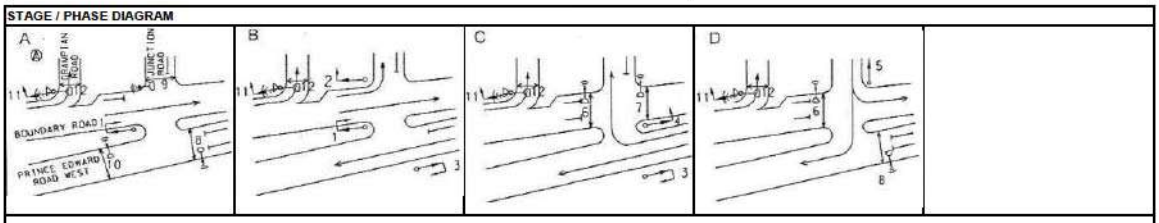
Checked by: EC



Traffic Flow (pcu/hr)
not used (Weekend)



STAGE / PHASE DIAGRAM



10p+2+4+5	G=7	IG=9	G=	IG=5	G=	IG=5	G=	IG=16	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	Weekend Peak: Design Flow *q* (pcu/hr)	Proportion turning (%) *f*	Saturation flow *S* (pcu/hr)	Flow factor *y*
Boundary Street EB										
2A	B	3.30	Y	N	15		120	100%	1240	**0.097**
1A	A,B	3.30	N	N			230		2085	0.114
1B	A,B	3.30	N	N			239		2085	0.115
1C	A,B	3.30	N	N			238		2085	0.114
Prince Edward Road West WB										
3A	B,C	3.30	Y	N			425		1945	0.219
3B	B,C	3.30	N	N			455		2085	0.218
4A	C	3.30	N	N	17.5		370	100%	1920	**0.193**
Junction Road SB										
5A	D	3.20	Y	N	12.5/30		405	48% / 52%	1785	0.227
5B	D	3.20	N	N	25		445	100%	1960	**0.227**
6p	C,D		7GM +	13FG =	20	sec				
7p	C		5GM +	9FG =	14	sec				
8p	A,D		5GM +	9FG =	14	sec				
9p	A		7GM +	5FG =	12	sec				
10p	A		7GM +	7FG =	14	sec				

Notes:

Weekend Peak	10p+2+4+5
Sum of Critical *y* **Y**	0.517
Lost Time *L* (sec)	39
Cycle Time *c* (sec)	115
Practical *Y* **Ypr**	0.595
Reserve Capacity *RC*	15%

Date : 5/19/2022 Junction : J13 - Prince Edward Road West / Boundary Street / Grampian Road

ATKINS CHINA LIMITED

TRAFFIC SIGNAL CALCULATION SHEET

ATKINS

JOB NO. : 5205867

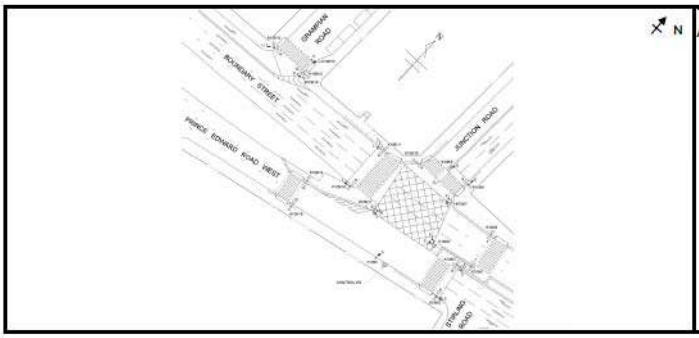
Junction : J13 - Prince Edward Road West / Boundary Street / Grampian Road

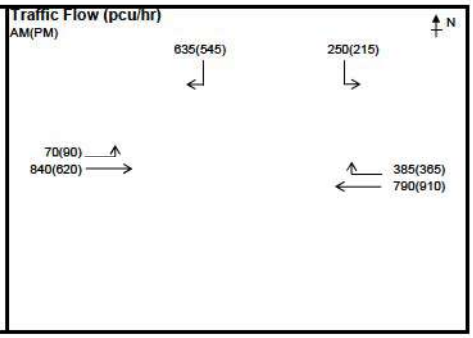
Design Year: 2033

Scheme : Reference

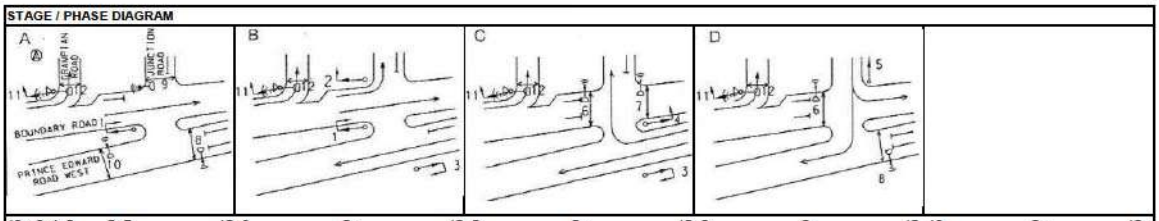
Designed by: RC

Checked by: EC





STAGE / PHASE DIAGRAM



10p+2+4+5	G=7	IG=9	G=	IG=5	G=	IG=5	G=	IG=16	G=	IG=
10p+2+4+5	G=7	IG=9	G=	IG=5	G=	IG=5	G=	IG=16	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Boundary Street EB														
2A	B	3.30	Y	N	15		70	100%	1240	**0.056**	90	100%	1240	**0.073**
1A	A,B	3.30	N	N			280		2085	0.134	207		2085	0.099
1B	A,B	3.30	N	N			280		2085	0.134	206		2085	0.099
1C	A,B	3.30	N	N			280		2085	0.134	207		2085	0.099
Prince Edward Road West WB														
3A	B,C	3.30	Y	N			381		1945	0.196	439		1945	0.226
3B	B,C	3.30	N	N			409		2085	0.196	471		2085	0.226
4A	C	3.30	N	N	17.5		385	100%	1920	**0.201**	365	100%	1920	**0.190**
Junction Road SB														
5A	D	3.20	Y	N	12.5/30		420	60% / 40%	1775	0.237	361	60% / 40%	1770	**0.204**
5B	D	3.20	N	N	25		465	100%	1960	**0.237**	399	100%	1960	0.204
6p	C,D		7GM +	13FG =	20	sec								
7p	C		5GM +	9FG =	14	sec								
8p	A,D		5GM +	9FG =	14	sec								
9p	A		7GM +	5FG =	12	sec								
10p	A		7GM +	7FG =	14	sec								

Notes:

AM Peak	10p+2+4+5	PM Peak	10p+2+4+5
Sum of Critical *y* *Y*	0.494	Sum of Critical *y* *Y*	0.467
Lost Time *L* (sec)	39	Lost Time *L* (sec)	39
Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
Practical *Y* *Ypr*	0.608	Practical *Y* *Ypr*	0.595
Reserve Capacity *RC*	23%	Reserve Capacity *RC*	27%

Date : 5/13/2022 Junction : J13 - Prince Edward Road West / Boundary Street / Grampian Road

ATKINS CHINA LIMITED

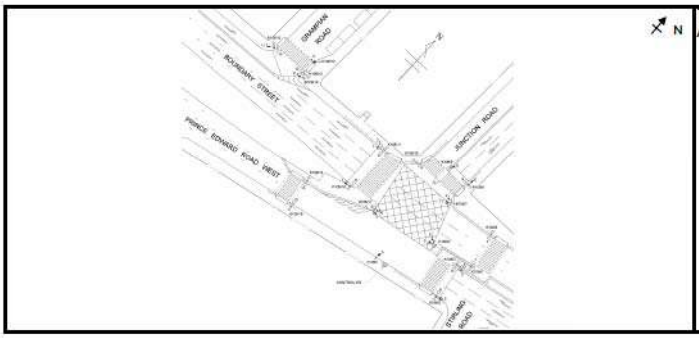
TRAFFIC SIGNAL CALCULATION SHEET

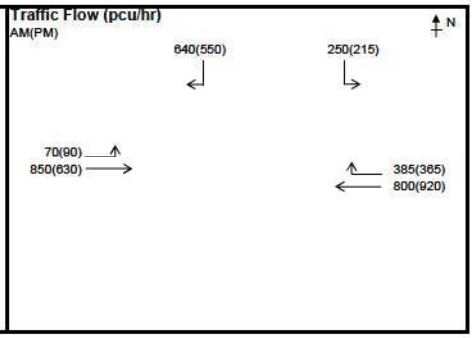
ATKINS

JOB NO. : 5205867

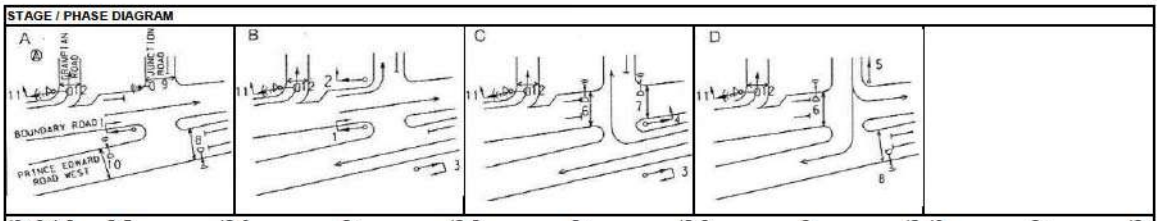
Junction : J13 - Prince Edward Road West / Boundary Street / Grampian Road Design Year: 2033

Scheme : Design Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



10p+2+4+5	G=7	IG=9	G=	IG=5	G=	IG=5	G=	IG=16	G=	IG=			
10p+2+4+5	G=7	IG=9	G=	IG=5	G=	IG=5	G=	IG=16	G=	IG=			

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Boundary Street EB														
2A	B	3.30	Y	N	15		70	100%	1240	**0.056**	90	100%	1240	**0.073**
1A	A,B	3.30	N	N			283		2085	0.136	210		2085	0.101
1B	A,B	3.30	N	N			284		2085	0.136	210		2085	0.101
1C	A,B	3.30	N	N			283		2085	0.136	210		2085	0.101
Prince Edward Road West WB														
3A	B,C	3.30	Y	N			386		1945	0.198	444		1945	0.228
3B	B,C	3.30	N	N			414		2085	0.199	476		2085	0.228
4A	C	3.30	N	N	17.5		385	100%	1920	**0.201**	365	100%	1920	**0.190**
Junction Road SB														
5A	D	3.20	Y	N	12.5/30		423	59% / 41%	1775	**0.238**	363	59% / 41%	1775	0.205
5B	D	3.20	N	N	25		467	100%	1960	0.238	402	100%	1960	**0.205**
6p	C,D		7GM +	13FG =	20	sec								
7p	C		5GM +	9FG =	14	sec								
8p	A,D		5GM +	9FG =	14	sec								
9p	A		7GM +	5FG =	12	sec								
10p	A		7GM +	7FG =	14	sec								

Notes:

AM Peak	10p+2+4+5	PM Peak	10p+2+4+5
Sum of Critical *y* *Y*	0.495	Sum of Critical *y* *Y*	0.468
Lost Time *L* (sec)	39	Lost Time *L* (sec)	39
Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
Practical *Y* *Ypr*	0.608	Practical *Y* *Ypr*	0.595
Reserve Capacity *RC*	23%	Reserve Capacity *RC*	27%

Date : 5/13/2022 Junction : J13 - Prince Edward Road West / Boundary Street / Grampian Road

ATKINS CHINA LIMITED

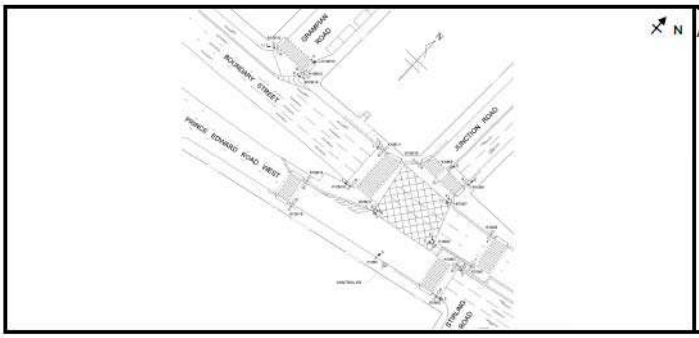
TRAFFIC SIGNAL CALCULATION SHEET

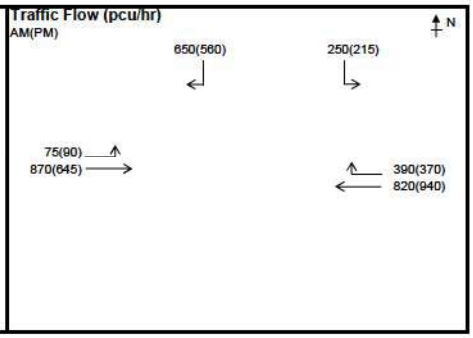
ATKINS

JOB NO. : 5205867

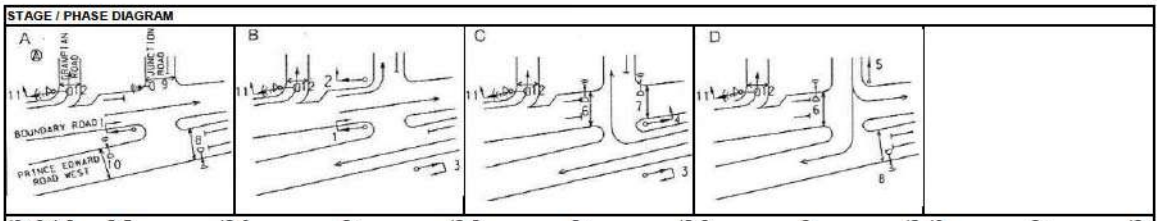
Junction : J13 - Prince Edward Road West / Boundary Street / Grampian Road Design Year: 2036

Scheme : Reference Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



10p+2+4+5	G=7	IG=9	G=	IG=5	G=	IG=5	G=	IG=16	G=	IG=
10p+2+4+5	G=7	IG=9	G=	IG=5	G=	IG=5	G=	IG=16	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Boundary Street EB														
2A	B	3.30	Y	N	15		75	100%	1240	**0.060**	90	100%	1240	**0.073**
1A	A,B	3.30	N	N			290		2085	0.139	215		2085	0.103
1B	A,B	3.30	N	N			290		2085	0.139	215		2085	0.103
1C	A,B	3.30	N	N			290		2085	0.139	215		2085	0.103
Prince Edward Road West WB														
3A	B,C	3.30	Y	N			396		1945	0.204	454		1945	0.233
3B	B,C	3.30	N	N			424		2085	0.203	486		2085	0.233
4A	C	3.30	N	N	17.5		390	100%	1920	**0.203**	370	100%	1920	**0.193**
Junction Road SB														
5A	D	3.20	Y	N	12.5/30		428	58% / 42%	1775	**0.241**	368	58% / 42%	1775	0.207
5B	D	3.20	N	N	25		472	100%	1960	0.241	407	100%	1960	**0.208**
6p	C,D		7GM +	13FG =	20	sec								
7p	C		5GM +	9FG =	14	sec								
8p	A,D		5GM +	9FG =	14	sec								
9p	A		7GM +	5FG =	12	sec								
10p	A		7GM +	7FG =	14	sec								

Notes:

AM Peak	10p+2+4+5	PM Peak	10p+2+4+5
Sum of Critical *y* *Y*	0.505	Sum of Critical *y* *Y*	0.473
Lost Time *L* (sec)	39	Lost Time *L* (sec)	39
Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
Practical *Y* *Ypr*	0.608	Practical *Y* *Ypr*	0.595
Reserve Capacity *RC*	20%	Reserve Capacity *RC*	26%

Date : 5/13/2022 Junction : J13 - Prince Edward Road West / Boundary Street / Grampian Road

ATKINS CHINA LIMITED

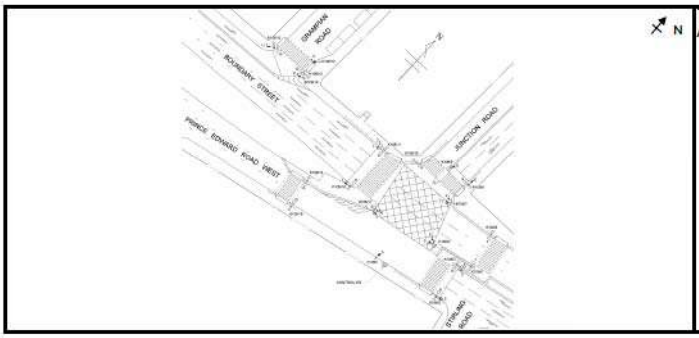
TRAFFIC SIGNAL CALCULATION SHEET

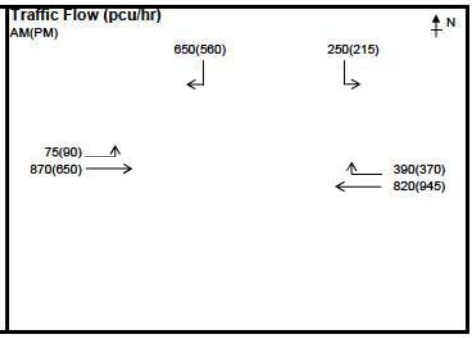
ATKINS

JOB NO. : 5205867

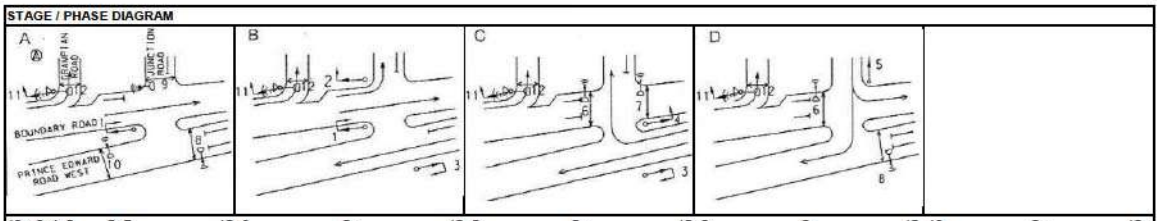
Junction : J13 - Prince Edward Road West / Boundary Street / Grampian Road Design Year: 2036

Scheme : Design Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



10p+2+4+5	G=7	IG=9	G=	IG=5	G=	IG=5	G=	IG=16	G=	IG=
10p+2+4+5	G=7	IG=9	G=	IG=5	G=	IG=5	G=	IG=16	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Boundary Street EB														
2A	B	3.30	Y	N	15		75	100%	1240	**0.060**	90	100%	1240	**0.073**
1A	A,B	3.30	N	N			290		2085	0.139	217		2085	0.104
1B	A,B	3.30	N	N			290		2085	0.139	216		2085	0.104
1C	A,B	3.30	N	N			290		2085	0.139	217		2085	0.104
Prince Edward Road West WB														
3A	B,C	3.30	Y	N			396		1945	0.204	456		1945	0.234
3B	B,C	3.30	N	N			424		2085	0.203	489		2085	0.235
4A	C	3.30	N	N	17.5		390	100%	1920	**0.203**	370	100%	1920	**0.193**
Junction Road SB														
5A	D	3.20	Y	N	12.5/30		428	58% / 42%	1775	**0.241**	368	58% / 42%	1775	0.207
5B	D	3.20	N	N	25		472	100%	1960	0.241	407	100%	1960	**0.208**
6p	C,D		7GM +	13FG =	20	sec								
7p	C		5GM +	9FG =	14	sec								
8p	A,D		5GM +	9FG =	14	sec								
9p	A		7GM +	5FG =	12	sec								
10p	A		7GM +	7FG =	14	sec								

Notes:

AM Peak	10p+2+4+5	PM Peak	10p+2+4+5
Sum of Critical *y* *Y*	0.505	Sum of Critical *y* *Y*	0.473
Lost Time *L* (sec)	39	Lost Time *L* (sec)	39
Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
Practical *Y* *Ypr*	0.608	Practical *Y* *Ypr*	0.595
Reserve Capacity *RC*	20%	Reserve Capacity *RC*	26%

Date : 5/13/2022 Junction : J13 - Prince Edward Road West / Boundary Street / Grampian Road

ATKINS CHINA LIMITED

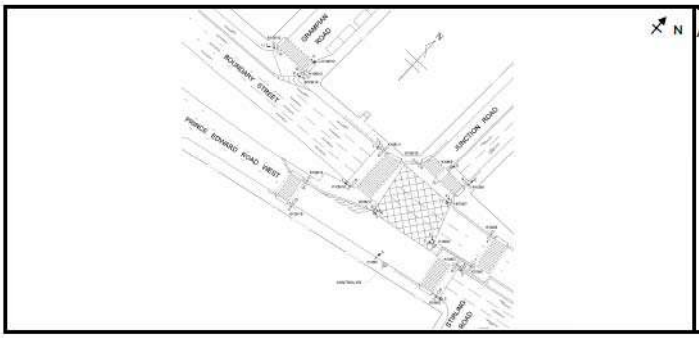
TRAFFIC SIGNAL CALCULATION SHEET

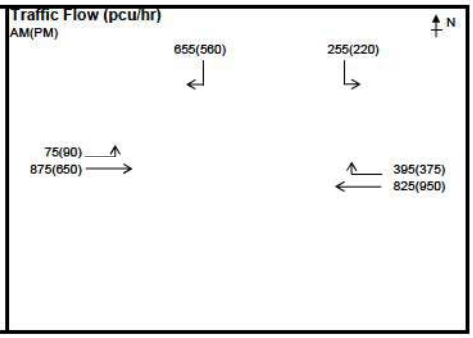
ATKINS

JOB NO. : 5205867

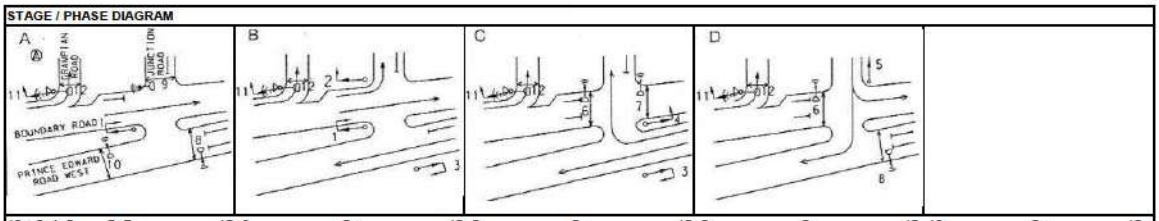
Junction : J13 - Prince Edward Road West / Boundary Street / Grampian Road Design Year: 2037

Scheme : Reference Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



10p+2+4+5	G=7	IG=9	G=	IG=5	G=	IG=5	G=	IG=16	G=	IG=
10p+2+4+5	G=7	IG=9	G=	IG=5	G=	IG=5	G=	IG=16	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Boundary Street EB														
2A	B	3.30	Y	N	15		75	100%	1240	**0.060**	90	100%	1240	**0.073**
1A	A,B	3.30	N	N			292		2085	0.140	217		2085	0.104
1B	A,B	3.30	N	N			291		2085	0.140	216		2085	0.104
1C	A,B	3.30	N	N			292		2085	0.140	217		2085	0.104
Prince Edward Road West WB														
3A	B,C	3.30	Y	N			398		1945	0.205	458		1945	0.235
3B	B,C	3.30	N	N			427		2085	0.205	492		2085	0.236
4A	C	3.30	N	N	17.5		395	100%	1920	**0.206**	375	100%	1920	**0.195**
Junction Road SB														
5A	D	3.20	Y	N	12.5/30		432	59% / 41%	1775	0.243	370	59% / 41%	1775	0.208
5B	D	3.20	N	N	25		478	100%	1960	**0.244**	410	100%	1960	**0.209**
6p	C,D		7GM +	13FG =	20	sec								
7p	C		5GM +	9FG =	14	sec								
8p	A,D		5GM +	9FG =	14	sec								
9p	A		7GM +	5FG =	12	sec								
10p	A		7GM +	7FG =	14	sec								

Notes:

AM Peak	10p+2+4+5	PM Peak	10p+2+4+5
Sum of Critical *y* **Y**	**0.510**	Sum of Critical *y* **Y**	**0.477**
Lost Time *L* (sec)	39	Lost Time *L* (sec)	39
Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
Practical Y ***Ypr***	0.608	Practical Y ***Ypr***	0.595
Reserve Capacity ***RC***	**19%**	Reserve Capacity ***RC***	**25%**

Date : 5/13/2022 Junction : J13 - Prince Edward Road West / Boundary Street / Grampian Road

ATKINS CHINA LIMITED

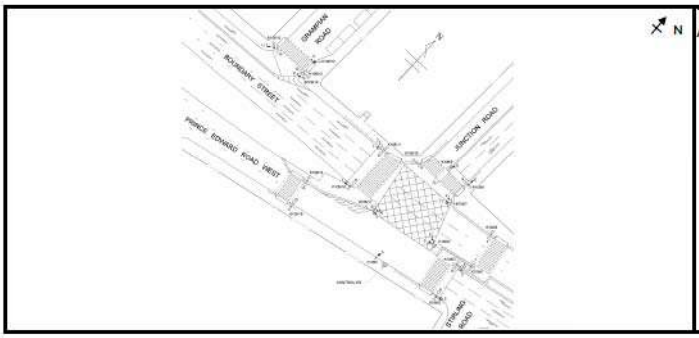
TRAFFIC SIGNAL CALCULATION SHEET

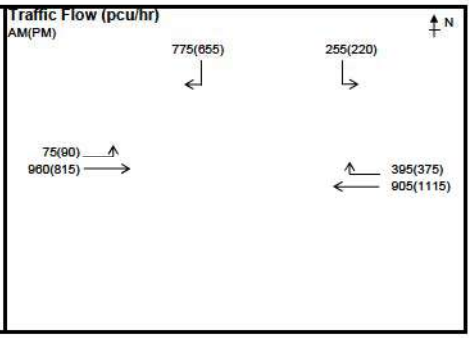
ATKINS

JOB NO. : 5205867

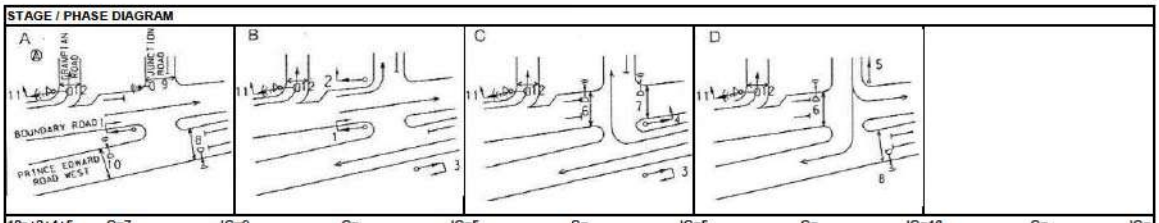
Junction : J13 - Prince Edward Road West / Boundary Street / Grampian Road Design Year: 2037

Scheme : Design Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



10p+2+4+5	G=7	IG=9	G=	IG=5	G=	IG=5	G=	IG=16	G=	IG=
10p+2+4+5	G=7	IG=9	G=	IG=5	G=	IG=5	G=	IG=16	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Boundary Street EB														
2A	B	3.30	Y	N	15		75	100%	1240	**0.060**	90	100%	1240	**0.073**
1A	A,B	3.30	N	N			320		2085	0.153	272		2085	0.130
1B	A,B	3.30	N	N			320		2085	0.153	271		2085	0.130
1C	A,B	3.30	N	N			320		2085	0.153	272		2085	0.130
Prince Edward Road West WB														
3A	B,C	3.30	Y	N			437		1945	0.225	538		1945	0.277
3B	B,C	3.30	N	N			468		2085	0.224	577		2085	0.277
4A	C	3.30	N	N	17.5		395	100%	1920	**0.206**	375	100%	1920	**0.195**
Junction Road SB														
5A	D	3.20	Y	N	12.5/30		490	52% / 48%	1780	0.275	416	53% / 47%	1780	0.234
5B	D	3.20	N	N	25		540	100%	1960	**0.276**	459	100%	1960	**0.234**
6p	C,D		7GM +	13FG =	20	sec								
7p	C		5GM +	9FG =	14	sec								
8p	A,D		5GM +	9FG =	14	sec								
9p	A		7GM +	5FG =	12	sec								
10p	A		7GM +	7FG =	14	sec								

Notes:

AM Peak	10p+2+4+5	PM Peak	10p+2+4+5
Sum of Critical *y* *Y*	**0.542**	Sum of Critical *y* *Y*	**0.502**
Lost Time *L* (sec)	39	Lost Time *L* (sec)	39
Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
Practical *Y* *Ypr*	0.608	Practical *Y* *Ypr*	0.595
Reserve Capacity *RC*	**12%**	Reserve Capacity *RC*	**18%**

Date : 5/13/2022 Junction : J13 - Prince Edward Road West / Boundary Street / Grampian Road

ATKINS CHINA LIMITED

TRAFFIC SIGNAL CALCULATION SHEET

ATKINS

JOB NO. : 5205867

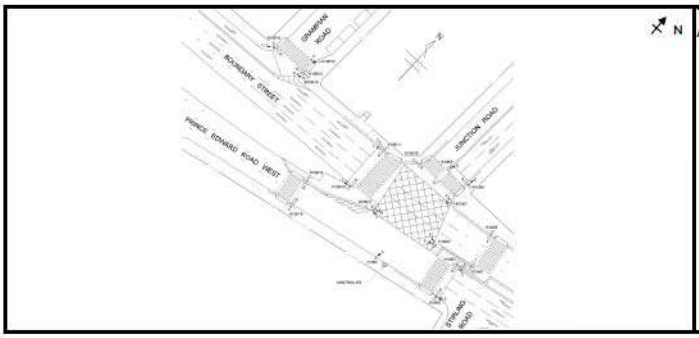
Junction : J13 - Prince Edward Road West / Boundary Street / Grampian Road

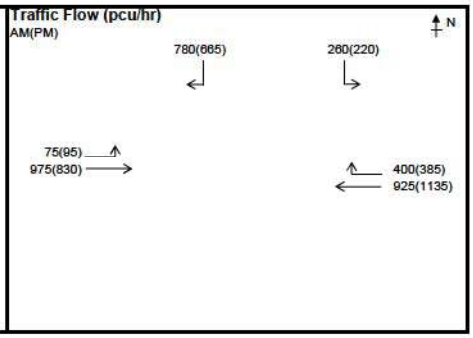
Design Year: 2040

Scheme : Reference

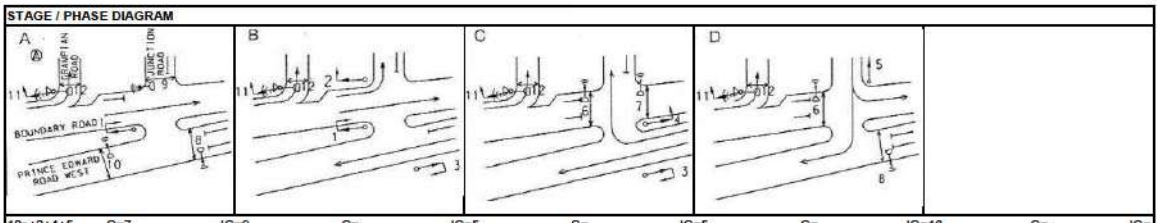
Designed by: RC

Checked by: EC





STAGE / PHASE DIAGRAM



10p+2+4+5	G=7	IG=9	G=	IG=5	G=	IG=5	G=	IG=16	G=	IG=
10p+2+4+5	G=7	IG=9	G=	IG=5	G=	IG=5	G=	IG=16	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Boundary Street EB														
2A	B	3.30	Y	N	15		75	100%	1240	**0.060**	95	100%	1240	**0.077**
1A	A,B	3.30	N	N			325		2085	0.156	277		2085	0.133
1B	A,B	3.30	N	N			325		2085	0.156	276		2085	0.132
1C	A,B	3.30	N	N			325		2085	0.156	277		2085	0.133
Prince Edward Road West WB														
3A	B,C	3.30	Y	N			446		1945	0.229	548		1945	0.282
3B	B,C	3.30	N	N			479		2085	0.230	587		2085	0.282
4A	C	3.30	N	N	17.5		400	100%	1920	**0.208**	385	100%	1920	**0.201**
Junction Road SB														
5A	D	3.20	Y	N	12.5/30		495	53% / 47%	1780	**0.278**	421	52% / 48%	1780	0.237
5B	D	3.20	N	N	25		545	100%	1960	0.278	464	100%	1960	**0.237**
6p	C,D		7GM +	13FG =	20	sec								
7p	C		5GM +	9FG =	14	sec								
8p	A,D		5GM +	9FG =	14	sec								
9p	A		7GM +	5FG =	12	sec								
10p	A		7GM +	7FG =	14	sec								

Notes:

AM Peak	10p+2+4+5	PM Peak	10p+2+4+5
Sum of Critical *y* *Y*	**0.547**	Sum of Critical *y* *Y*	**0.514**
Lost Time *L* (sec)	39	Lost Time *L* (sec)	39
Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
Practical *Y* *Ypr*	0.608	Practical *Y* *Ypr*	0.595
Reserve Capacity *RC*	**11%**	Reserve Capacity *RC*	**16%**

Date : 5/13/2022 Junction : J13 - Prince Edward Road West / Boundary Street / Grampian Road

ATKINS CHINA LIMITED

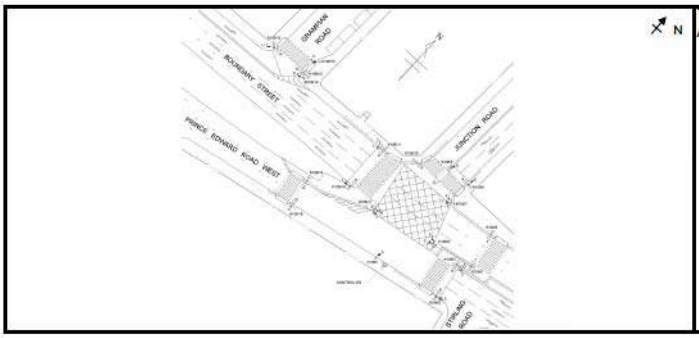
TRAFFIC SIGNAL CALCULATION SHEET

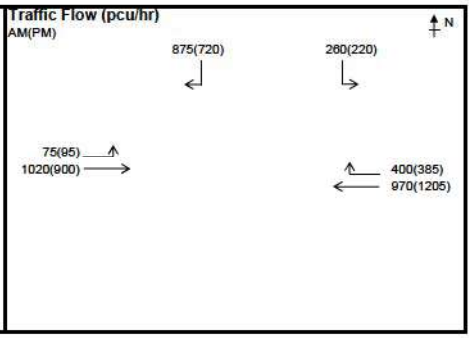
ATKINS

JOB NO. : 5205867

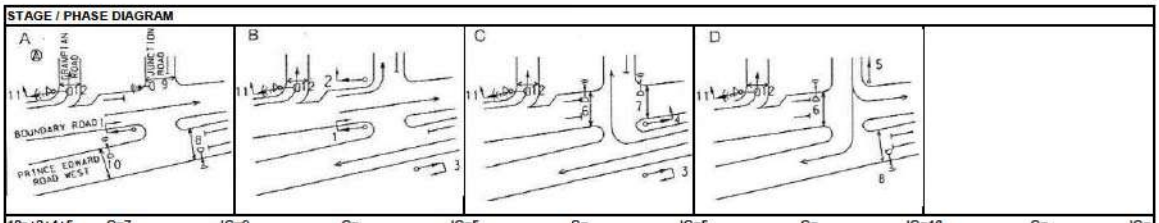
Junction : J13 - Prince Edward Road West / Boundary Street / Grampian Road Design Year: 2040

Scheme : Design Designed by: RC Checked by: EC





STAGE / PHASE DIAGRAM



10p+2+4+5	G=7	IG=9	G=	IG=5	G=	IG=5	G=	IG=16	G=	IG=			
10p+2+4+5	G=7	IG=9	G=	IG=5	G=	IG=5	G=	IG=16	G=	IG=			

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Boundary Street EB														
2A	B	3.30	Y	N	15		75	100%	1240	**0.060**	95	100%	1240	**0.077**
1A	A,B	3.30	N	N			340		2085	0.163	300		2085	0.144
1B	A,B	3.30	N	N			340		2085	0.163	300		2085	0.144
1C	A,B	3.30	N	N			340		2085	0.163	300		2085	0.144
Prince Edward Road West WB														
3A	B,C	3.30	Y	N			468		1945	0.241	582		1945	0.299
3B	B,C	3.30	N	N			502		2085	0.241	623		2085	0.299
4A	C	3.30	N	N	17.5		400	100%	1920	**0.208**	385	100%	1920	**0.201**
Junction Road SB														
5A	D	3.20	Y	N	12.5/30		541	48% / 52%	1785	**0.303**	448	49% / 51%	1785	0.251
5B	D	3.20	N	N	25		594	100%	1960	0.303	492	100%	1960	**0.251**
6p	C,D		7GM +	13FG =	20	sec								
7p	C		5GM +	9FG =	14	sec								
8p	A,D		5GM +	9FG =	14	sec								
9p	A		7GM +	5FG =	12	sec								
10p	A		7GM +	7FG =	14	sec								

Notes:

AM Peak	10p+2+4+5	PM Peak	10p+2+4+5
Sum of Critical *y* **Y**	**0.572**	Sum of Critical *y* **Y**	**0.528**
Lost Time *L* (sec)	39	Lost Time *L* (sec)	39
Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
Practical Y ***Ypr***	0.608	Practical Y ***Ypr***	0.595
Reserve Capacity *RC*	**6%**	Reserve Capacity *RC*	**13%**

Date : 5/13/2022 Junction : J13 - Prince Edward Road West / Boundary Street / Grampian Road

ATKINS CHINA LIMITED

TRAFFIC SIGNAL CALCULATION SHEET

ATKINS

JOB NO. : 5205867

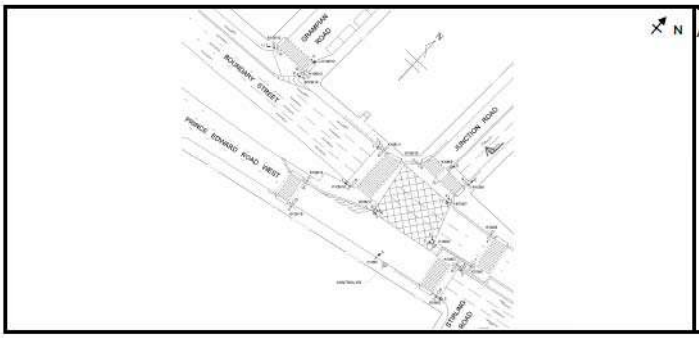
Junction : J13 - Prince Edward Road West / Boundary Street / Grampian Road

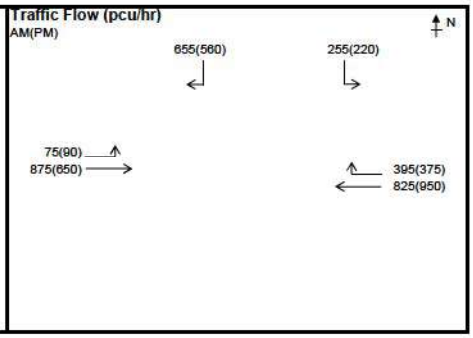
Design Year: 2037

Scheme : Reference (with improvement)

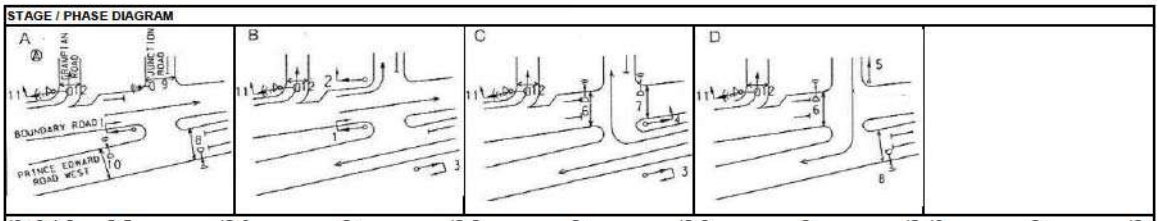
Designed by: RC

Checked by: EC





STAGE / PHASE DIAGRAM



10p+2+4+5	G=7	IG=9	G=	IG=5	G=	IG=5	G=	IG=16	G=	IG=
10p+2+4+5	G=7	IG=9	G=	IG=5	G=	IG=5	G=	IG=16	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Boundary Street EB														
2A	B	3.30	Y	N	15		75	100%	1240	**0.060**	90	100%	1240	**0.073**
1A	A,B	3.30	N	N			292		2085	0.140	217		2085	0.104
1B	A,B	3.30	N	N			291		2085	0.140	216		2085	0.104
1C	A,B	3.30	N	N			292		2085	0.140	217		2085	0.104
Prince Edward Road West WB														
3A	B,C	3.30	Y	N			398		1945	0.205	458		1945	0.235
3B	B,C	3.30	N	N			427		2085	0.205	492		2085	0.236
4A	C	3.30	N	N	17.5		395	100%	1920	**0.206**	375	100%	1920	**0.195**
Junction Road SB														
5A	D	3.20	Y	N	30		318	100%	1845	0.172	272	100%	1845	0.147
5B	D	3.20	N	N	25		337	100%	1960	**0.172**	288	100%	1960	**0.147**
6p	C,D		7GM +	13FG =	20	sec								
7p	C		5GM +	9FG =	14	sec								
8p	A,D		5GM +	9FG =	14	sec								
9p	A		7GM +	5FG =	12	sec								
10p	A		7GM +	7FG =	14	sec								

Notes:

AM Peak	10p+2+4+5	PM Peak	10p+2+4+5
Sum of Critical *y* *Y*	0.439	Sum of Critical *y* *Y*	0.415
Lost Time *L* (sec)	39	Lost Time *L* (sec)	39
Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
Practical *Y* *Ypr*	0.608	Practical *Y* *Ypr*	0.595
Reserve Capacity *RC*	39%	Reserve Capacity *RC*	43%

Date : 5/13/2022 Junction : J13 - Prince Edward Road West / Boundary Street / Grampian Road

ATKINS CHINA LIMITED

TRAFFIC SIGNAL CALCULATION SHEET

ATKINS

JOB NO. : 5205867

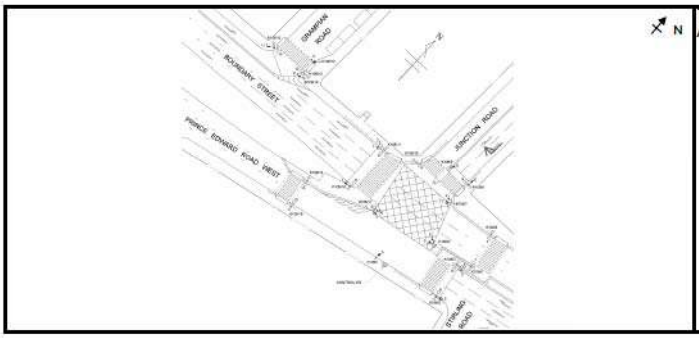
Junction : J13 - Prince Edward Road West / Boundary Street / Grampian Road

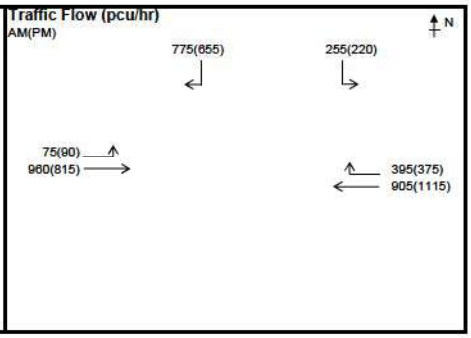
Design Year: 2037

Scheme : Design (with improvement)

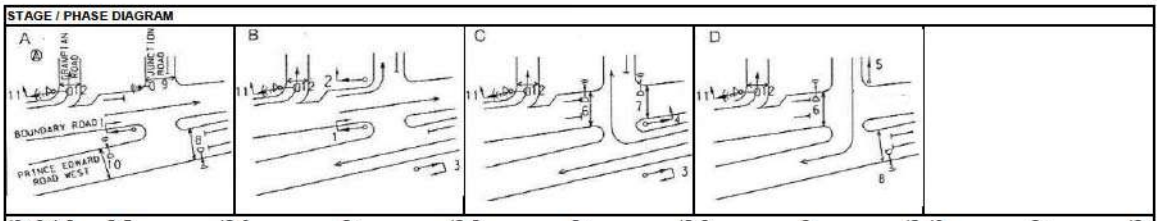
Designed by: RC

Checked by: EC





STAGE / PHASE DIAGRAM



10p+2+4+5	G=7	IG=9	G=	IG=5	G=	IG=5	G=	IG=16	G=	IG=
10p+2+4+5	G=7	IG=9	G=	IG=5	G=	IG=5	G=	IG=16	G=	IG=

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Boundary Street EB														
2A	B	3.30	Y	N	15		75	100%	1240	**0.060**	90	100%	1240	**0.073**
1A	A,B	3.30	N	N			320		2085	0.153	272		2085	0.130
1B	A,B	3.30	N	N			320		2085	0.153	271		2085	0.130
1C	A,B	3.30	N	N			320		2085	0.153	272		2085	0.130
Prince Edward Road West WB														
3A	B,C	3.30	Y	N			437		1945	0.225	538		1945	0.277
3B	B,C	3.30	N	N			468		2085	0.224	577		2085	0.277
4A	C	3.30	N	N	17.5		395	100%	1920	**0.206**	375	100%	1920	**0.195**
Junction Road SB														
5A	D	3.20	Y	N	30		376	100%	1845	0.204	318	100%	1845	0.172
5B	D	3.20	N	N	25		399	100%	1960	**0.204**	337	100%	1960	**0.172**
6p	C,D		7GM +	13FG =	20	sec								
7p	C		5GM +	9FG =	14	sec								
8p	A,D		5GM +	9FG =	14	sec								
9p	A		7GM +	5FG =	12	sec								
10p	A		7GM +	7FG =	14	sec								

Notes:	AM Peak	10p+2+4+5	PM Peak	10p+2+4+5
	Sum of Critical *y* *Y*	0.470	Sum of Critical *y* *Y*	0.440
	Lost Time *L* (sec)	39	Lost Time *L* (sec)	39
	Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
	Practical *Y* *Ypr*	0.608	Practical *Y* *Ypr*	0.595
	Reserve Capacity *RC*	29%	Reserve Capacity *RC*	35%

Date : 5/13/2022 Junction : J13 - Prince Edward Road West / Boundary Street / Grampian Road

ATKINS CHINA LIMITED

TRAFFIC SIGNAL CALCULATION SHEET

ATKINS

JOB NO. : 5205867

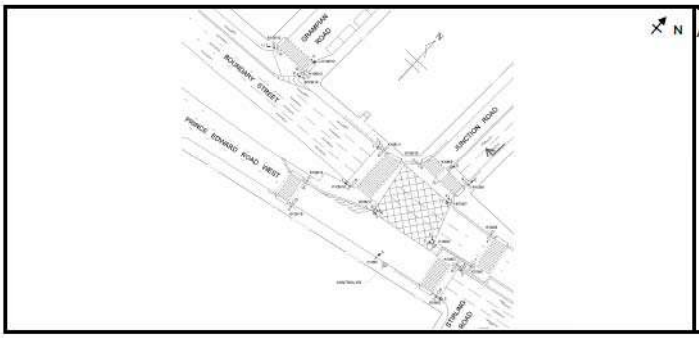
Junction : J13 - Prince Edward Road West / Boundary Street / Grampian Road

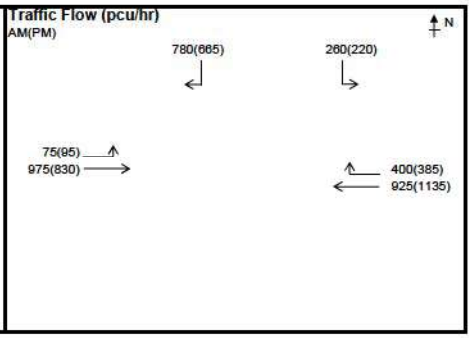
Design Year: 2040

Scheme : Reference (with improvement)

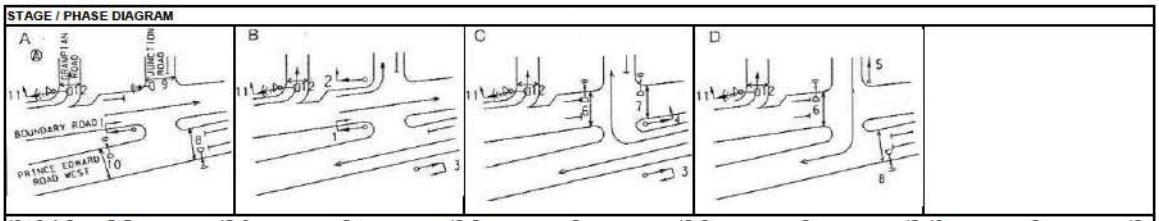
Designed by: RC

Checked by: EC





STAGE / PHASE DIAGRAM



10p+2+4+5	G=7	IG=9	G=	IG=5	G=	IG=5	G=	IG=16	G=	IG=			
10p+2+4+5	G=7	IG=9	G=	IG=5	G=	IG=5	G=	IG=16	G=	IG=			

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Boundary Street EB														
2A	B	3.30	Y	N	15		75	100%	1240	**0.060**	95	100%	1240	**0.077**
1A	A,B	3.30	N	N			325		2085	0.156	277		2085	0.133
1B	A,B	3.30	N	N			325		2085	0.156	276		2085	0.132
1C	A,B	3.30	N	N			325		2085	0.156	277		2085	0.133
Prince Edward Road West WB														
3A	B,C	3.30	Y	N			446		1945	0.229	548		1945	0.282
3B	B,C	3.30	N	N			479		2085	0.230	587		2085	0.282
4A	C	3.30	N	N	17.5		400	100%	1920	**0.208**	385	100%	1920	**0.201**
Junction Road SB														
5A	D	3.20	Y	N	30		378	100%	1845	0.205	322	100%	1845	0.175
5B	D	3.20	N	N	25		402	100%	1960	0.205	343	100%	1960	0.175
6p	C,D		7GM +	13FG =	20	sec								
7p	C		5GM +	9FG =	14	sec								
8p	A,D		5GM +	9FG =	14	sec								
9p	A		7GM +	5FG =	12	sec								
10p	A		7GM +	7FG =	14	sec								

Notes:

AM Peak	10p+2+4+5	PM Peak	10p+2+4+5
Sum of Critical *y* *Y*	0.474	Sum of Critical *y* *Y*	0.452
Lost Time *L* (sec)	39	Lost Time *L* (sec)	39
Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
Practical *Y* *Ypr*	0.608	Practical *Y* *Ypr*	0.595
Reserve Capacity *RC*	28%	Reserve Capacity *RC*	32%

Date : 5/13/2022 Junction : J13 - Prince Edward Road West / Boundary Street / Grampian Road

ATKINS CHINA LIMITED

TRAFFIC SIGNAL CALCULATION SHEET

ATKINS

JOB NO. : 5205867

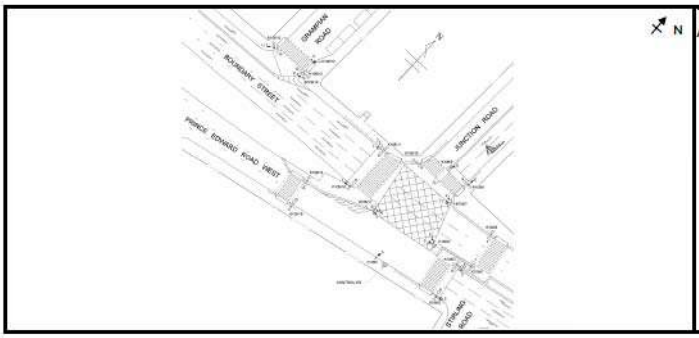
Junction : J13 - Prince Edward Road West / Boundary Street / Grampian Road

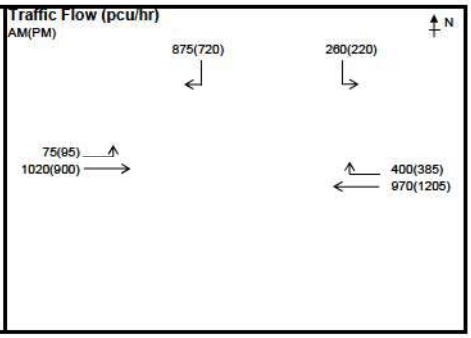
Design Year: 2040

Scheme : Design (with improvement)

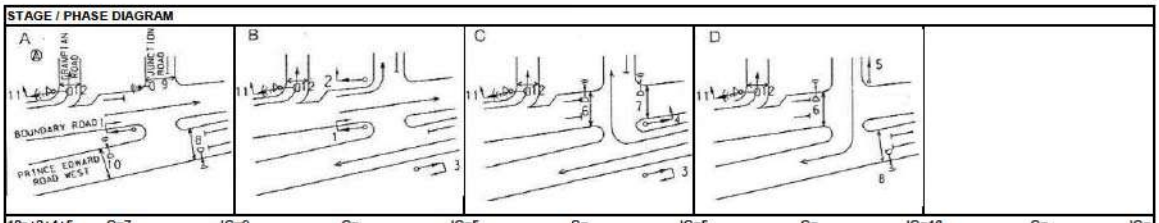
Designed by: RC

Checked by: EC





STAGE / PHASE DIAGRAM



10p+2+4+5	G=7	IG=9	G=	IG=5	G=	IG=5	G=	IG=16	G=	IG=			
10p+2+4+5	G=7	IG=9	G=	IG=5	G=	IG=5	G=	IG=16	G=	IG=			

Capacity Calculations

Phase	Stage	Lane Width (m) *w*	Nearside lane? (Y/N)	Opposed turn? (Y/N)	Radius for turning (m) *r*	Gradient in % *g*	AM Peak Design Flow *q* (pcu/hr)	AM Peak Proportion turning (%) *f*	AM Peak Saturation flow *S* (pcu/hr)	AM Peak Flow factor *y*	PM Peak Design Flow *q* (pcu/hr)	PM Peak Proportion turning (%) *f*	PM Peak Saturation flow *S* (pcu/hr)	PM Peak Flow factor *y*
Boundary Street EB														
2A	B	3.30	Y	N	15		75	100%	1240	**0.060**	95	100%	1240	**0.077**
1A	A,B	3.30	N	N			340		2085	0.163	300		2085	0.144
1B	A,B	3.30	N	N			340		2085	0.163	300		2085	0.144
1C	A,B	3.30	N	N			340		2085	0.163	300		2085	0.144
Prince Edward Road West WB														
3A	B,C	3.30	Y	N			468		1945	0.241	582		1945	0.299
3B	B,C	3.30	N	N			502		2085	0.241	623		2085	0.299
4A	C	3.30	N	N	17.5		400	100%	1920	**0.208**	385	100%	1920	**0.201**
Junction Road SB														
5A	D	3.20	Y	N	30		424	100%	1845	0.230	349	100%	1845	0.189
5B	D	3.20	N	N	25		451	100%	1960	0.230	371	100%	1960	0.189
6p	C,D		7GM +	13FG =	20	sec								
7p	C		5GM +	9FG =	14	sec								
8p	A,D		5GM +	9FG =	14	sec								
9p	A		7GM +	5FG =	12	sec								
10p	A		7GM +	7FG =	14	sec								

Notes:

AM Peak	10p+2+4+5	PM Peak	10p+2+4+5
Sum of Critical *y* *Y*	0.499	Sum of Critical *y* *Y*	0.466
Lost Time *L* (sec)	39	Lost Time *L* (sec)	39
Cycle Time *c* (sec)	120	Cycle Time *c* (sec)	115
Practical *Y* *Ypr*	0.608	Practical *Y* *Ypr*	0.595
Reserve Capacity *RC*	22%	Reserve Capacity *RC*	28%

Date : 5/13/2022 Junction : J13 - Prince Edward Road West / Boundary Street / Grampian Road

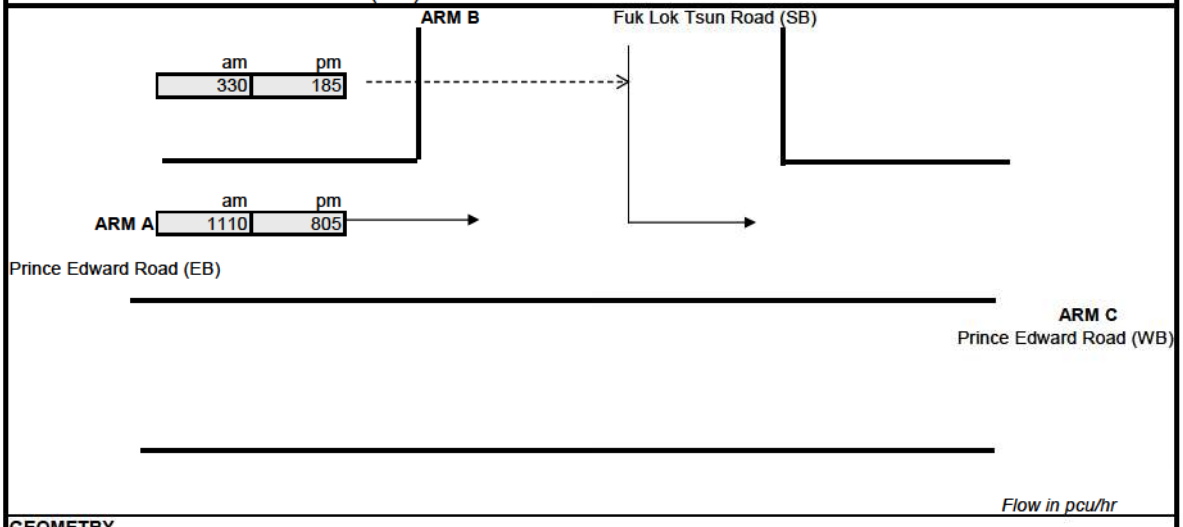
ATKINS CHINA LIMITED

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(One Lane Minor Arm B)

Job Title:	URA KC-017			
Junction:	J14 - Prince Edward Road West / Fuk Lo Tsun Road		Designed by:	RC
Scheme:	Existing		Checked by:	EC
Design Year:	2021	Job No.: 5205867	Date :	5/13/2022
ARM A:	Prince Edward Road (EB)			
ARM B:	Fuk Lok Tsun Road (SB)			
ARM C:	Prince Edward Road (WB)			



Flow in pcu/hr

GEOMETRY					
Major road width	W	20.00	Lane widths	w(b-a)	
Central Reserve width	Wcr			w(b-c)	11.00
Residual width	Wr(c-a)			w(c-b)	
Visibilities	Vr(b-a)		Calculated	D	0.55
	Vl(b-a)	60		E	1.51
	Vr(b-c)			F	0.59
	Vr(c-b)			Y	0.31

ANALYSIS			AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	(pcu/hr)	0	0
	q(a-c)	(pcu/hr)	1110	805
	q(b-a)	(pcu/hr)	0	0
	q(b-c)	(pcu/hr)	330	185
	f		1.00	1.00
	q(b-ac)	(pcu/hr)	**330**	**185**
CAPACITIES	Q(b-a)	(pcu/hr)	278	297
	Q(b-c)	(pcu/hr)	935	987
	Q(b-ac)	(pcu/hr)	**935**	**987**
	Q(c-a)		1800	1800
DFC's	b-a		0.000	0.000
	b-c		0.353	0.188
	c-a		0.000	0.000
Critical DFC			**0.35**	**0.19**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a) Capacity of combined streams

T.P.D.M.V.2.4
Appendix 1

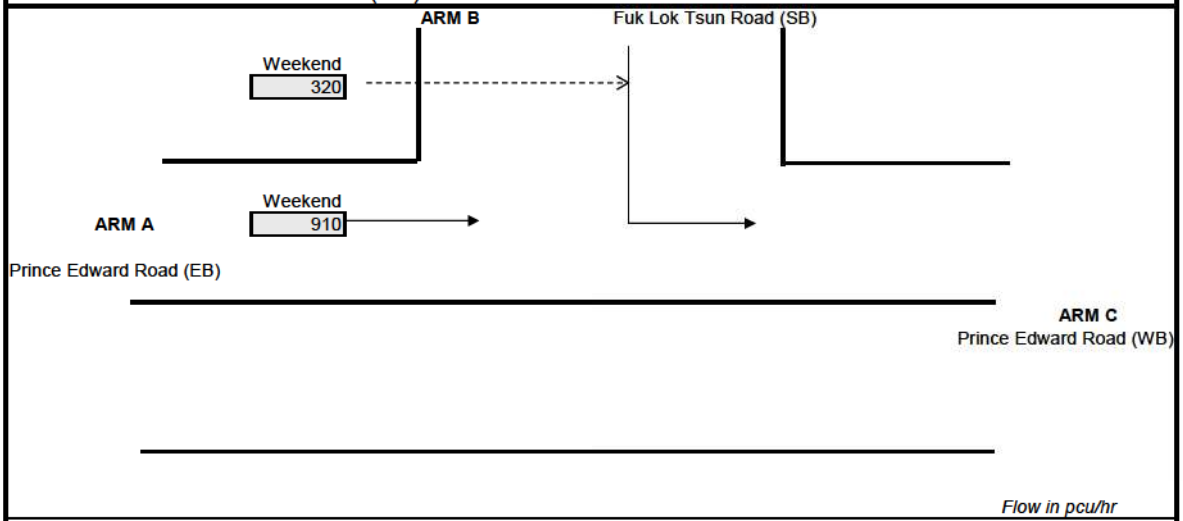
- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(One Lane Minor Arm B)

Job Title:	URA KC-017				
Junction:	J14 - Prince Edward Road West / Fuk Lo Tsun Road			Designed by:	RC
Scheme:	Existing - Weekend			Checked by:	EC
Design Year:	2021	Job No.:	5205867	Date :	5/19/2022
ARM A:	Prince Edward Road (EB)				
ARM B:	Fuk Lok Tsun Road (SB)				
ARM C:	Prince Edward Road (WB)				



Flow in pcu/hr

GEOMETRY					
Major road width	W	20.00	Lane widths	w(b-a)	
Central Reserve width	Wcr			w(b-c)	11.00
Residual width	Wr(c-a)			w(c-b)	
Visibilities	Vr(b-a)		Calculated	D	0.55
	Vl(b-a)	60		E	1.51
	Vr(b-c)			F	0.59
	Vr(c-b)			Y	0.31

ANALYSIS			Weekend PEAK
TRAFFIC FLOWS	q(c-a)	(pcu/hr)	0
	q(a-c)	(pcu/hr)	910
	q(b-a)	(pcu/hr)	0
	q(b-c)	(pcu/hr)	320
	f		1.00
	q(b-ac)	(pcu/hr)	**320**
CAPACITIES	Q(b-a)	(pcu/hr)	291
	Q(b-c)	(pcu/hr)	969
	Q(b-ac)	(pcu/hr)	**969**
	Q(c-a)		1800
DFC's	b-a		0.000
	b-c		0.330
	c-a		0.000
Critical DFC			**0.33**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a)

T.P.D.M.V.2.4
Appendix 1

Capacity of combined streams

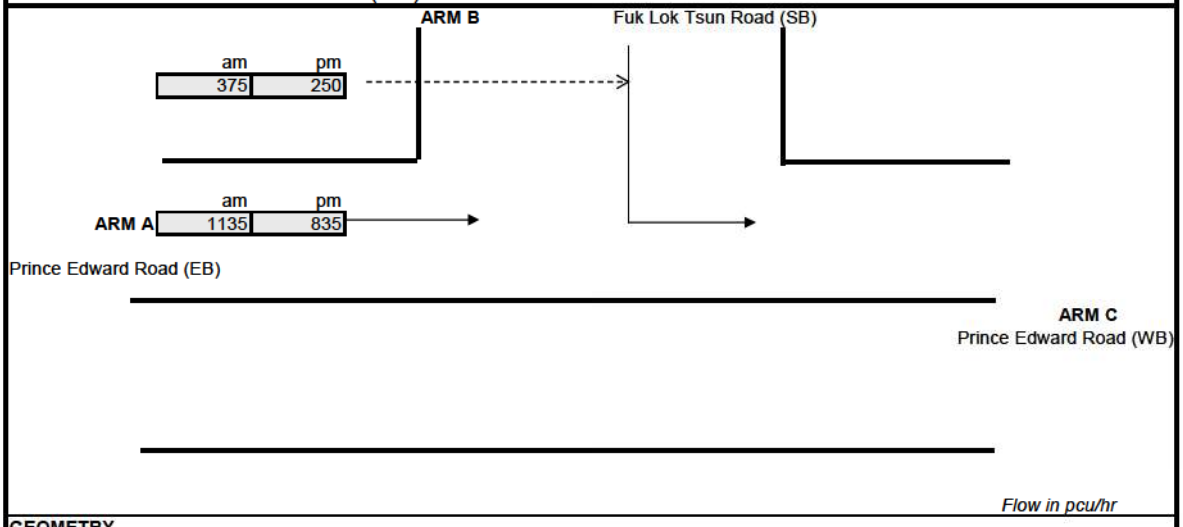
- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(One Lane Minor Arm B)

Job Title:	URA KC-017			
Junction:	J14 - Prince Edward Road West / Fuk Lo Tsun Road		Designed by:	RC
Scheme:	Reference		Checked by:	EC
Design Year:	2033	Job No.: 5205867	Date :	5/13/2022
ARM A:	Prince Edward Road (EB)			
ARM B:	Fuk Lok Tsun Road (SB)			
ARM C:	Prince Edward Road (WB)			



Flow in pcu/hr

GEOMETRY					
Major road width	W	20.00	Lane widths	w(b-a)	
Central Reserve width	Wcr			w(b-c)	11.00
Residual width	Wr(c-a)			w(c-b)	
Visibilities	Vr(b-a)		Calculated	D	0.55
	Vl(b-a)	60		E	1.51
	Vr(b-c)			F	0.59
	Vr(c-b)			Y	0.31

ANALYSIS			AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	(pcu/hr)	0	0
	q(a-c)	(pcu/hr)	1135	835
	q(b-a)	(pcu/hr)	0	0
	q(b-c)	(pcu/hr)	375	250
	f		1.00	1.00
	q(b-ac)	(pcu/hr)	**375**	**250**
CAPACITIES	Q(b-a)	(pcu/hr)	277	295
	Q(b-c)	(pcu/hr)	930	982
	Q(b-ac)	(pcu/hr)	**930**	**982**
	Q(c-a)		1800	1800
DFC's	b-a		0.000	0.000
	b-c		0.403	0.255
	c-a		0.000	0.000
Critical DFC			**0.40**	**0.25**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a) Capacity of combined streams

T.P.D.M.V.2.4
Appendix 1

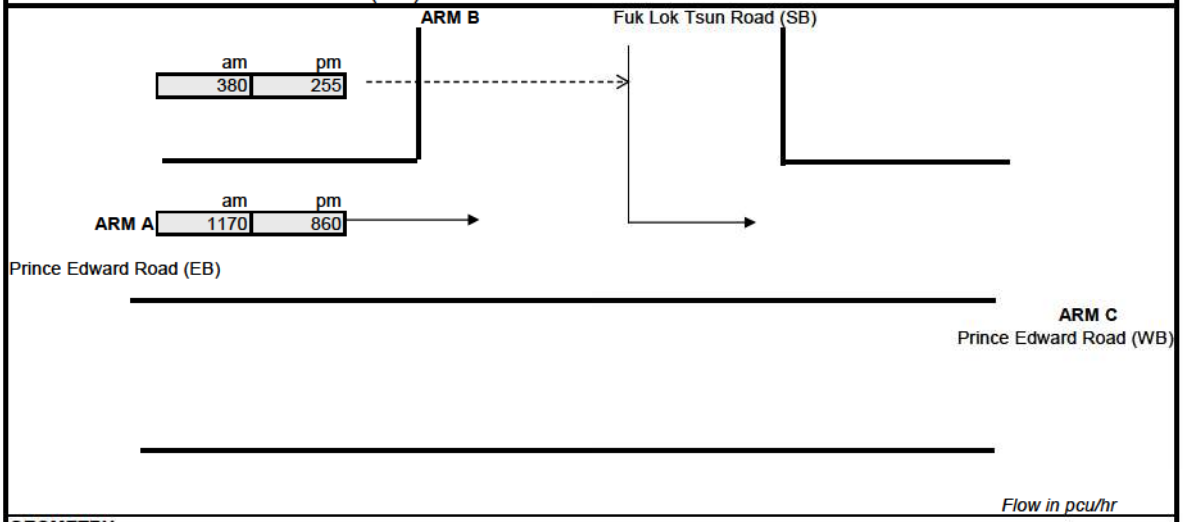
- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(One Lane Minor Arm B)

Job Title:	URA KC-017			
Junction:	J14 - Prince Edward Road West / Fuk Lo Tsun Road		Designed by:	RC
Scheme:	Reference		Checked by:	EC
Design Year:	2036	Job No.: 5205867	Date :	5/13/2022
ARM A:	Prince Edward Road (EB)			
ARM B:	Fuk Lok Tsun Road (SB)			
ARM C:	Prince Edward Road (WB)			



Flow in pcu/hr

GEOMETRY					
Major road width	W	20.00	Lane widths	w(b-a)	
Central Reserve width	Wcr			w(b-c)	11.00
Residual width	Wr(c-a)			w(c-b)	
Visibilities	Vr(b-a)		Calculated	D	0.55
	Vl(b-a)	60		E	1.51
	Vr(b-c)			F	0.59
	Vr(c-b)			Y	0.31

ANALYSIS			AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	(pcu/hr)	0	0
	q(a-c)	(pcu/hr)	1170	860
	q(b-a)	(pcu/hr)	0	0
	q(b-c)	(pcu/hr)	380	255
	f		1.00	1.00
	q(b-ac)	(pcu/hr)	**380**	**255**
CAPACITIES	Q(b-a)	(pcu/hr)	274	294
	Q(b-c)	(pcu/hr)	925	977
	Q(b-ac)	(pcu/hr)	**925**	**977**
	Q(c-a)		1800	1800
DFC's	b-a		0.000	0.000
	b-c		0.411	0.261
	c-a		0.000	0.000
Critical DFC			**0.41**	**0.26**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a) Capacity of combined streams

T.P.D.M.V.2.4
Appendix 1

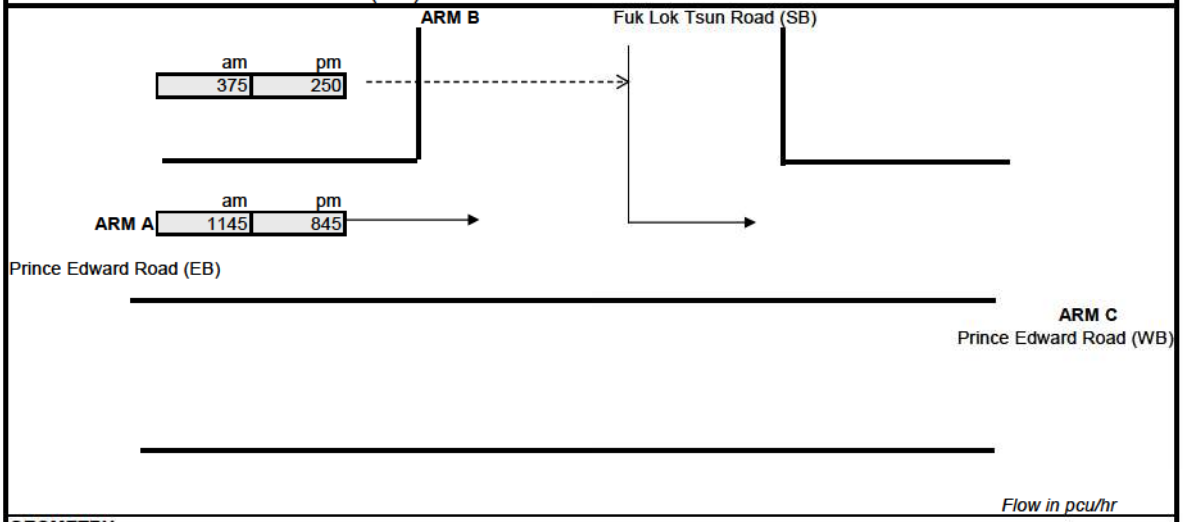
- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(One Lane Minor Arm B)

Job Title:	URA KC-017			
Junction:	J14 - Prince Edward Road West / Fuk Lo Tsun Road		Designed by:	RC
Scheme:	Design		Checked by:	EC
Design Year:	2033	Job No.: 5205867	Date :	5/13/2022
ARM A:	Prince Edward Road (EB)			
ARM B:	Fuk Lok Tsun Road (SB)			
ARM C:	Prince Edward Road (WB)			



Flow in pcu/hr

GEOMETRY					
Major road width	W	20.00	Lane widths	w(b-a)	
Central Reserve width	Wcr			w(b-c)	11.00
Residual width	Wr(c-a)			w(c-b)	
Visibilities	Vr(b-a)		Calculated	D	0.55
	Vl(b-a)	60		E	1.51
	Vr(b-c)			F	0.59
	Vr(c-b)			Y	0.31

ANALYSIS			AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	(pcu/hr)	0	0
	q(a-c)	(pcu/hr)	1145	845
	q(b-a)	(pcu/hr)	0	0
	q(b-c)	(pcu/hr)	375	250
	f		1.00	1.00
	q(b-ac)	(pcu/hr)	**375**	**250**
CAPACITIES	Q(b-a)	(pcu/hr)	276	295
	Q(b-c)	(pcu/hr)	929	980
	Q(b-ac)	(pcu/hr)	**929**	**980**
	Q(c-a)		1800	1800
DFC's	b-a		0.000	0.000
	b-c		0.404	0.255
	c-a		0.000	0.000
Critical DFC			**0.40**	**0.26**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a)

T.P.D.M.V.2.4
Appendix 1

Capacity of combined streams

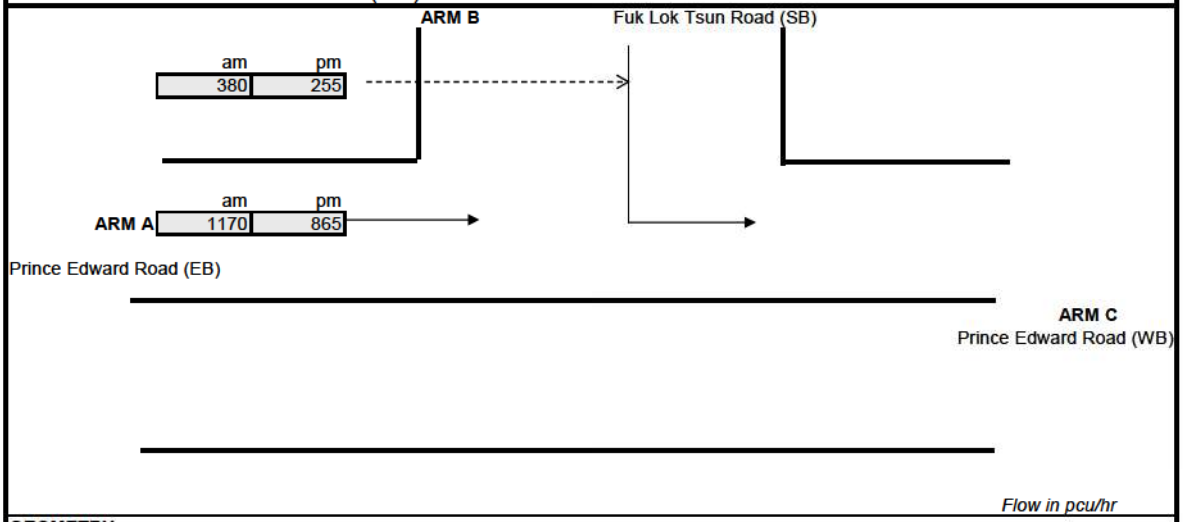
- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(One Lane Minor Arm B)

Job Title:	URA KC-017			
Junction:	J14 - Prince Edward Road West / Fuk Lo Tsun Road		Designed by:	RC
Scheme:	Design		Checked by:	EC
Design Year:	2036	Job No.: 5205867	Date :	5/13/2022
ARM A:	Prince Edward Road (EB)			
ARM B:	Fuk Lok Tsun Road (SB)			
ARM C:	Prince Edward Road (WB)			



Flow in pcu/hr

GEOMETRY					
Major road width	W	20.00	Lane widths	w(b-a)	
Central Reserve width	Wcr			w(b-c)	11.00
Residual width	Wr(c-a)			w(c-b)	
Visibilities	Vr(b-a)		Calculated	D	0.55
	Vl(b-a)	60		E	1.51
	Vr(b-c)			F	0.59
	Vr(c-b)			Y	0.31

ANALYSIS			AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	(pcu/hr)	0	0
	q(a-c)	(pcu/hr)	1170	865
	q(b-a)	(pcu/hr)	0	0
	q(b-c)	(pcu/hr)	380	255
	f		1.00	1.00
	q(b-ac)	(pcu/hr)	**380**	**255**
CAPACITIES	Q(b-a)	(pcu/hr)	274	293
	Q(b-c)	(pcu/hr)	925	976
	Q(b-ac)	(pcu/hr)	**925**	**976**
	Q(c-a)		1800	1800
DFC's	b-a		0.000	0.000
	b-c		0.411	0.261
	c-a		0.000	0.000
Critical DFC			**0.41**	**0.26**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a)

T.P.D.M.V.2.4
Appendix 1

Capacity of combined streams

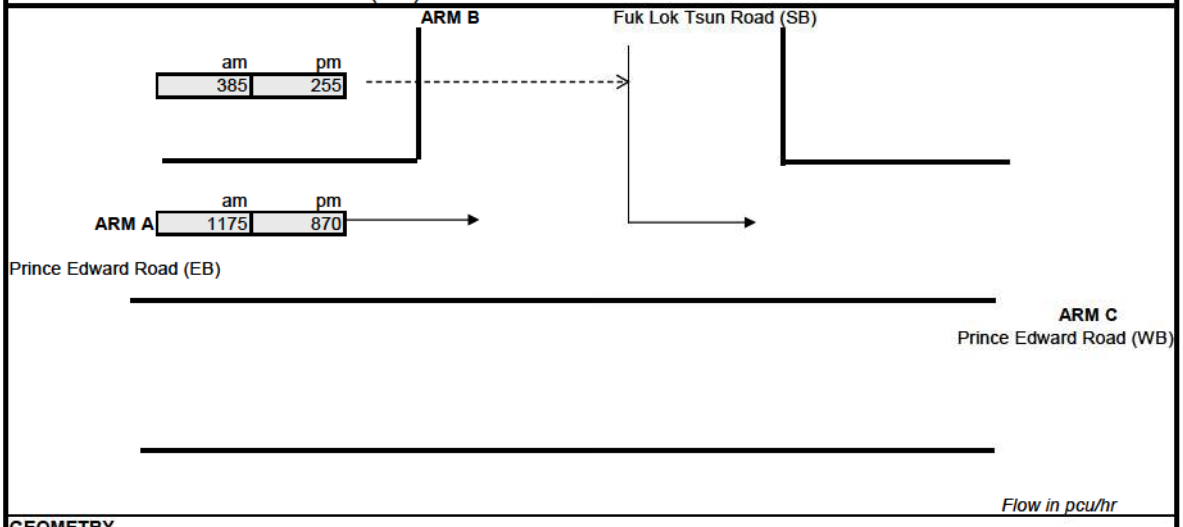
- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(One Lane Minor Arm B)

Job Title:	URA KC-017			
Junction:	J14 - Prince Edward Road West / Fuk Lo Tsun Road		Designed by:	RC
Scheme:	Reference		Checked by:	EC
Design Year:	2037	Job No.: 5205867	Date :	5/13/2022
ARM A:	Prince Edward Road (EB)			
ARM B:	Fuk Lok Tsun Road (SB)			
ARM C:	Prince Edward Road (WB)			



Flow in pcu/hr

GEOMETRY					
Major road width	W	20.00	Lane widths	w(b-a)	
Central Reserve width	Wcr			w(b-c)	11.00
Residual width	Wr(c-a)			w(c-b)	
Visibilities	Vr(b-a)		Calculated	D	0.55
	Vl(b-a)	60		E	1.51
	Vr(b-c)			F	0.59
	Vr(c-b)			Y	0.31

ANALYSIS			AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	(pcu/hr)	0	0
	q(a-c)	(pcu/hr)	1175	870
	q(b-a)	(pcu/hr)	0	0
	q(b-c)	(pcu/hr)	385	255
	f		1.00	1.00
	q(b-ac)	(pcu/hr)	**385**	**255**
CAPACITIES	Q(b-a)	(pcu/hr)	274	293
	Q(b-c)	(pcu/hr)	924	976
	Q(b-ac)	(pcu/hr)	**924**	**976**
	Q(c-a)		1800	1800
DFC's	b-a		0.000	0.000
	b-c		0.417	0.261
	c-a		0.000	0.000
Critical DFC			**0.42**	**0.26**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a) Capacity of combined streams

T.P.D.M.V.2.4
Appendix 1

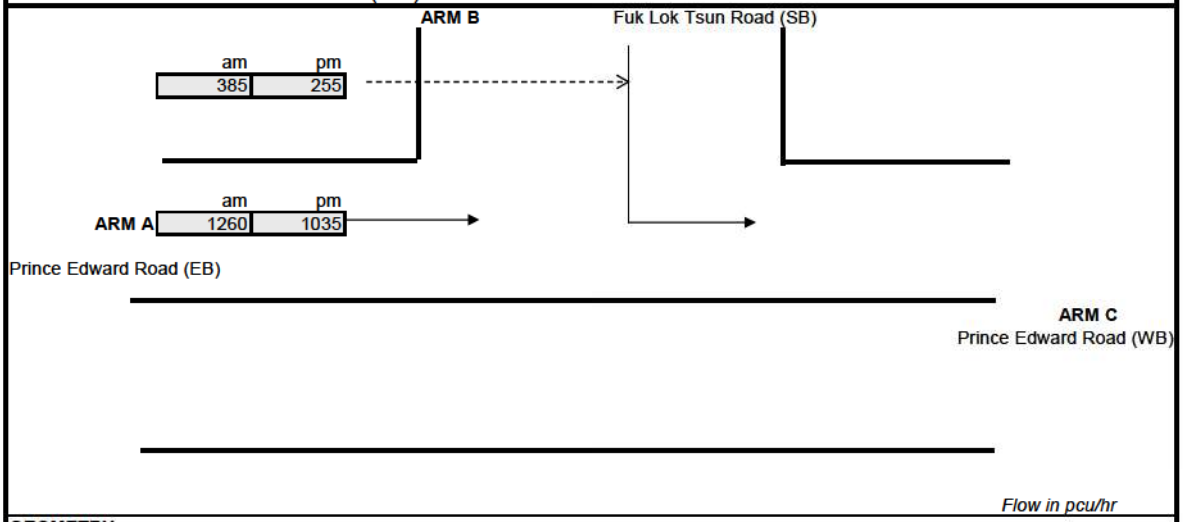
- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(One Lane Minor Arm B)

Job Title:	URA KC-017			
Junction:	J14 - Prince Edward Road West / Fuk Lo Tsun Road		Designed by:	RC
Scheme:	Design		Checked by:	EC
Design Year:	2037	Job No.: 5205867	Date :	5/13/2022
ARM A:	Prince Edward Road (EB)			
ARM B:	Fuk Lok Tsun Road (SB)			
ARM C:	Prince Edward Road (WB)			



Flow in pcu/hr

GEOMETRY					
Major road width	W	20.00	Lane widths	w(b-a)	
Central Reserve width	Wcr			w(b-c)	11.00
Residual width	Wr(c-a)			w(c-b)	
Visibilities	Vr(b-a)		Calculated	D	0.55
	Vl(b-a)	60		E	1.51
	Vr(b-c)			F	0.59
	Vr(c-b)			Y	0.31

ANALYSIS			AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	(pcu/hr)	0	0
	q(a-c)	(pcu/hr)	1260	1035
	q(b-a)	(pcu/hr)	0	0
	q(b-c)	(pcu/hr)	385	255
	f		1.00	1.00
	q(b-ac)	(pcu/hr)	**385**	**255**
CAPACITIES	Q(b-a)	(pcu/hr)	269	283
	Q(b-c)	(pcu/hr)	909	948
	Q(b-ac)	(pcu/hr)	**909**	**948**
	Q(c-a)		1800	1800
DFC's	b-a		0.000	0.000
	b-c		0.423	0.269
	c-a		0.000	0.000
Critical DFC			**0.42**	**0.27**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a) Capacity of combined streams

T.P.D.M.V.2.4
Appendix 1

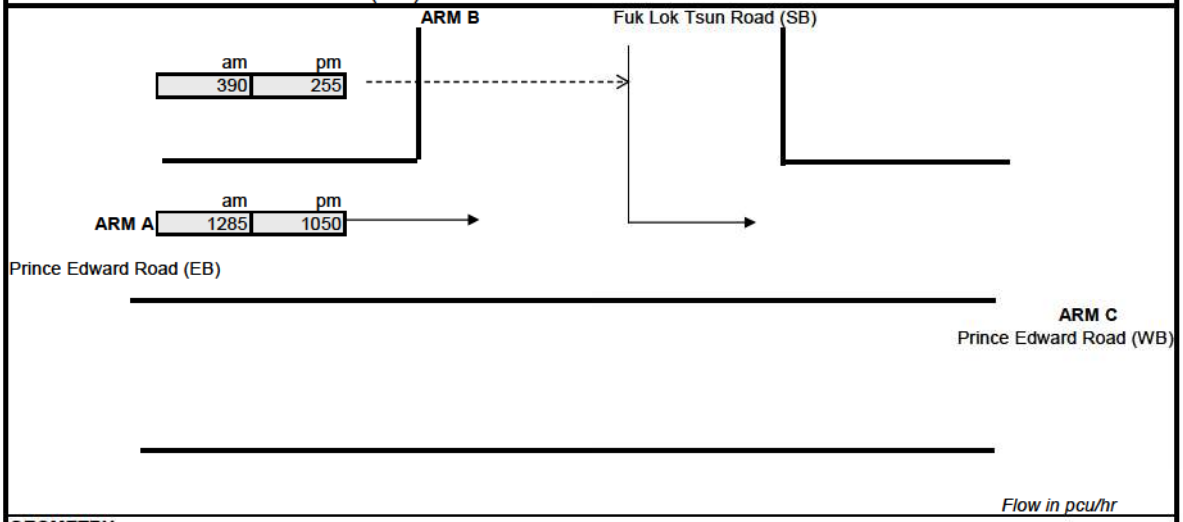
- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(One Lane Minor Arm B)

Job Title:	URA KC-017			
Junction:	J14 - Prince Edward Road West / Fuk Lo Tsun Road		Designed by:	RC
Scheme:	Reference		Checked by:	EC
Design Year:	2040	Job No.: 5205867	Date :	5/13/2022
ARM A:	Prince Edward Road (EB)			
ARM B:	Fuk Lok Tsun Road (SB)			
ARM C:	Prince Edward Road (WB)			



Flow in pcu/hr

GEOMETRY					
Major road width	W	20.00	Lane widths	w(b-a)	
Central Reserve width	Wcr			w(b-c)	11.00
Residual width	Wr(c-a)			w(c-b)	
Visibilities	Vr(b-a)		Calculated	D	0.55
	Vl(b-a)	60		E	1.51
	Vr(b-c)			F	0.59
	Vr(c-b)			Y	0.31

ANALYSIS			AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	(pcu/hr)	0	0
	q(a-c)	(pcu/hr)	1285	1050
	q(b-a)	(pcu/hr)	0	0
	q(b-c)	(pcu/hr)	390	255
	f		1.00	1.00
	q(b-ac)	(pcu/hr)	**390**	**255**
CAPACITIES	Q(b-a)	(pcu/hr)	267	282
	Q(b-c)	(pcu/hr)	905	945
	Q(b-ac)	(pcu/hr)	**905**	**945**
	Q(c-a)		1800	1800
DFC's	b-a		0.000	0.000
	b-c		0.431	0.270
	c-a		0.000	0.000
Critical DFC			**0.43**	**0.27**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a)

T.P.D.M.V.2.4
Appendix 1

Capacity of combined streams

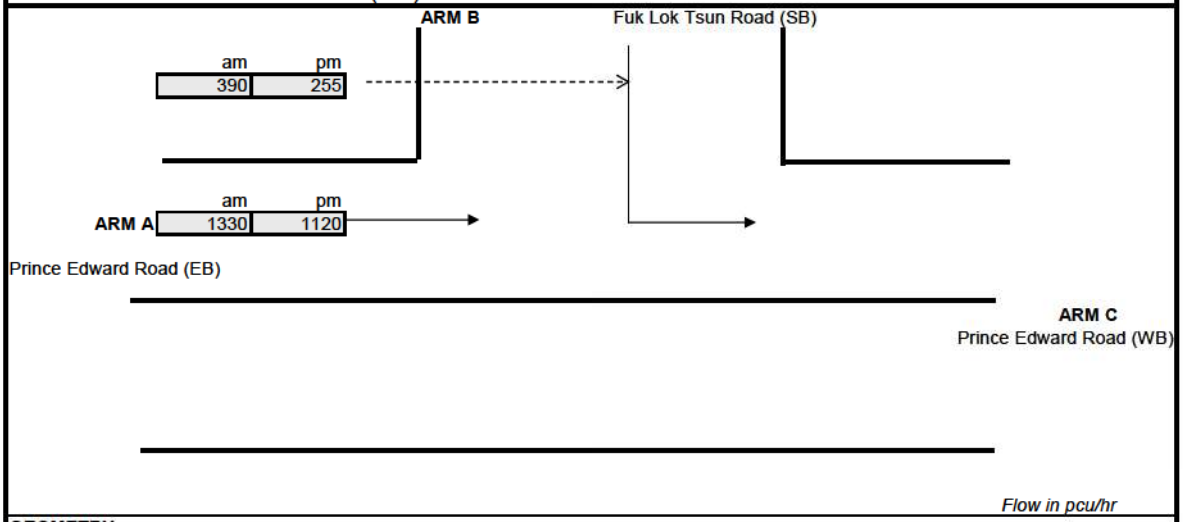
- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(One Lane Minor Arm B)

Job Title:	URA KC-017			
Junction:	J14 - Prince Edward Road West / Fuk Lo Tsun Road		Designed by:	RC
Scheme:	Design		Checked by:	EC
Design Year:	2040	Job No.: 5205867	Date :	5/13/2022
ARM A:	Prince Edward Road (EB)			
ARM B:	Fuk Lok Tsun Road (SB)			
ARM C:	Prince Edward Road (WB)			



Flow in pcu/hr

GEOMETRY					
Major road width	W	20.00	Lane widths	w(b-a)	
Central Reserve width	Wcr			w(b-c)	11.00
Residual width	Wr(c-a)			w(c-b)	
Visibilities	Vr(b-a)		Calculated	D	0.55
	Vl(b-a)	60		E	1.51
	Vr(b-c)			F	0.59
	Vr(c-b)			Y	0.31

ANALYSIS			AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	(pcu/hr)	0	0
	q(a-c)	(pcu/hr)	1330	1120
	q(b-a)	(pcu/hr)	0	0
	q(b-c)	(pcu/hr)	390	255
	f		1.00	1.00
	q(b-ac)	(pcu/hr)	**390**	**255**
CAPACITIES	Q(b-a)	(pcu/hr)	264	277
	Q(b-c)	(pcu/hr)	897	933
	Q(b-ac)	(pcu/hr)	**897**	**933**
	Q(c-a)		1800	1800
DFC's	b-a		0.000	0.000
	b-c		0.435	0.273
	c-a		0.000	0.000
Critical DFC			**0.43**	**0.27**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a)

T.P.D.M.V.2.4
Appendix 1

Capacity of combined streams

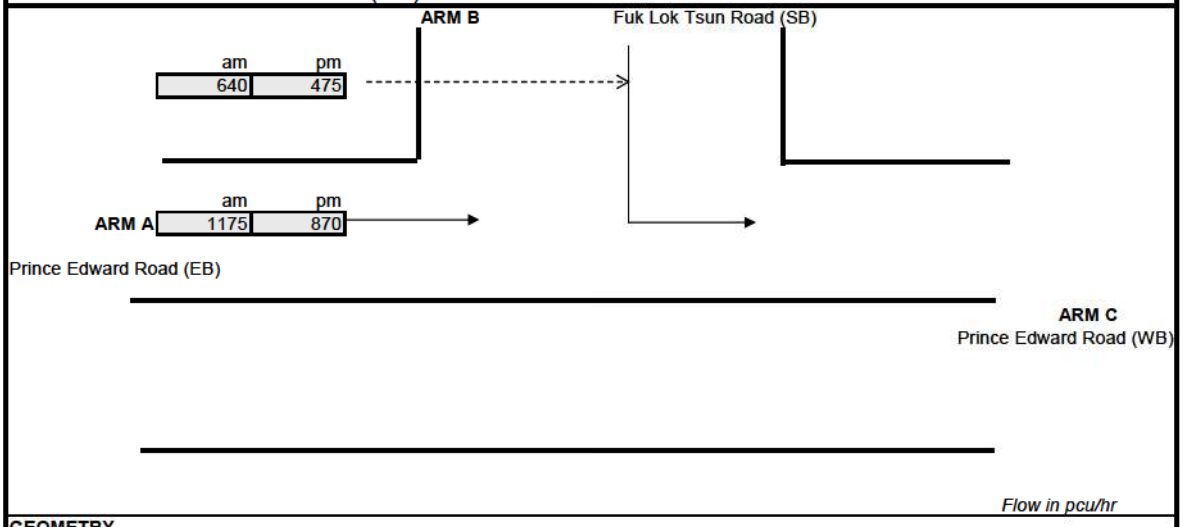
- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(One Lane Minor Arm B)

Job Title:	URA KC-017				
Junction:	J14 - Prince Edward Road West / Fuk Lo Tsun Road			Designed by:	RC
Scheme:	Reference (with improvement at J15)			Checked by:	EC
Design Year:	2037	Job No.:	5205867	Date :	5/13/2022
ARM A:	Prince Edward Road (EB)				
ARM B:	Fuk Lok Tsun Road (SB)				
ARM C:	Prince Edward Road (WB)				



Flow in pcu/hr

GEOMETRY					
Major road width	W	20.00	Lane widths	w(b-a)	
Central Reserve width	Wcr			w(b-c)	11.00
Residual width	Wr(c-a)			w(c-b)	
Visibilities	Vr(b-a)		Calculated	D	0.55
	Vl(b-a)	60		E	1.51
	Vr(b-c)			F	0.59
	Vr(c-b)			Y	0.31

ANALYSIS			**AM PEAK**	**PM PEAK**
TRAFFIC FLOWS	q(c-a)	(pcu/hr)	0	0
	q(a-c)	(pcu/hr)	1175	870
	q(b-a)	(pcu/hr)	0	0
	q(b-c)	(pcu/hr)	640	475
	f		1.00	1.00
	q(b-ac)	(pcu/hr)	**640**	**475**
CAPACITIES	Q(b-a)	(pcu/hr)	274	293
	Q(b-c)	(pcu/hr)	924	976
	Q(b-ac)	(pcu/hr)	**924**	**976**
	Q(c-a)		1800	1800
DFC's	b-a		0.000	0.000
	b-c		0.693	0.487
	c-a		0.000	0.000
Critical DFC			**0.69**	**0.49**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a) Capacity of combined streams

T.P.D.M.V.2.4
Appendix 1

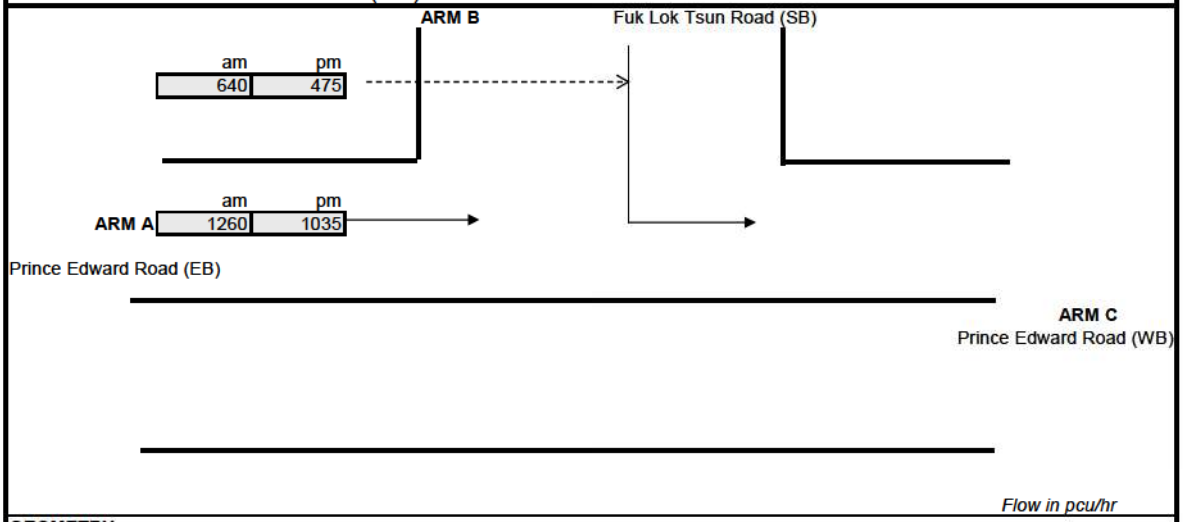
- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(One Lane Minor Arm B)

Job Title:	URA KC-017				
Junction:	J14 - Prince Edward Road West / Fuk Lo Tsun Road			Designed by:	RC
Scheme:	Design (with improvement at J15)			Checked by:	EC
Design Year:	2037	Job No.:	5205867	Date :	5/13/2022
ARM A:	Prince Edward Road (EB)				
ARM B:	Fuk Lok Tsun Road (SB)				
ARM C:	Prince Edward Road (WB)				



Flow in pcu/hr

GEOMETRY					
Major road width	W	20.00	Lane widths	w(b-a)	
Central Reserve width	Wcr			w(b-c)	11.00
Residual width	Wr(c-a)			w(c-b)	
Visibilities	Vr(b-a)		Calculated	D	0.55
	Vl(b-a)	60		E	1.51
	Vr(b-c)			F	0.59
	Vr(c-b)			Y	0.31

ANALYSIS			AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	(pcu/hr)	0	0
	q(a-c)	(pcu/hr)	1260	1035
	q(b-a)	(pcu/hr)	0	0
	q(b-c)	(pcu/hr)	640	475
	f		1.00	1.00
	q(b-ac)	(pcu/hr)	**640**	**475**
CAPACITIES	Q(b-a)	(pcu/hr)	269	283
	Q(b-c)	(pcu/hr)	909	948
	Q(b-ac)	(pcu/hr)	**909**	**948**
	Q(c-a)		1800	1800
DFC's	b-a		0.000	0.000
	b-c		0.704	0.501
	c-a		0.000	0.000
Critical DFC			**0.70**	**0.50**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a) Capacity of combined streams

T.P.D.M.V.2.4
Appendix 1

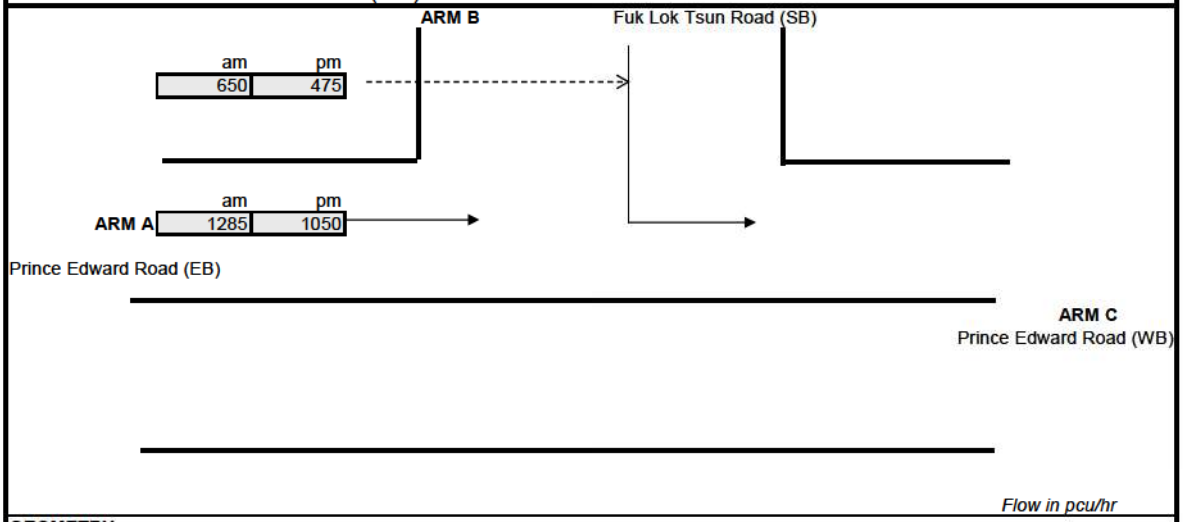
- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(One Lane Minor Arm B)

Job Title:	URA KC-017				
Junction:	J14 - Prince Edward Road West / Fuk Lo Tsun Road			Designed by:	RC
Scheme:	Reference (with improvement at J15)			Checked by:	EC
Design Year:	2040	Job No.:	5205867	Date :	5/13/2022
ARM A:	Prince Edward Road (EB)				
ARM B:	Fuk Lok Tsun Road (SB)				
ARM C:	Prince Edward Road (WB)				



Flow in pcu/hr

GEOMETRY					
Major road width	W	20.00	Lane widths	w(b-a)	
Central Reserve width	Wcr			w(b-c)	11.00
Residual width	Wr(c-a)			w(c-b)	
Visibilities	Vr(b-a)		Calculated	D	0.55
	Vl(b-a)	60		E	1.51
	Vr(b-c)			F	0.59
	Vr(c-b)			Y	0.31

ANALYSIS			AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	(pcu/hr)	0	0
	q(a-c)	(pcu/hr)	1285	1050
	q(b-a)	(pcu/hr)	0	0
	q(b-c)	(pcu/hr)	650	475
	f		1.00	1.00
	q(b-ac)	(pcu/hr)	**650**	**475**
CAPACITIES	Q(b-a)	(pcu/hr)	267	282
	Q(b-c)	(pcu/hr)	905	945
	Q(b-ac)	(pcu/hr)	**905**	**945**
	Q(c-a)		1800	1800
DFC's	b-a		0.000	0.000
	b-c		0.718	0.503
	c-a		0.000	0.000
Critical DFC			**0.72**	**0.50**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a) Capacity of combined streams

T.P.D.M.V.2.4
Appendix 1

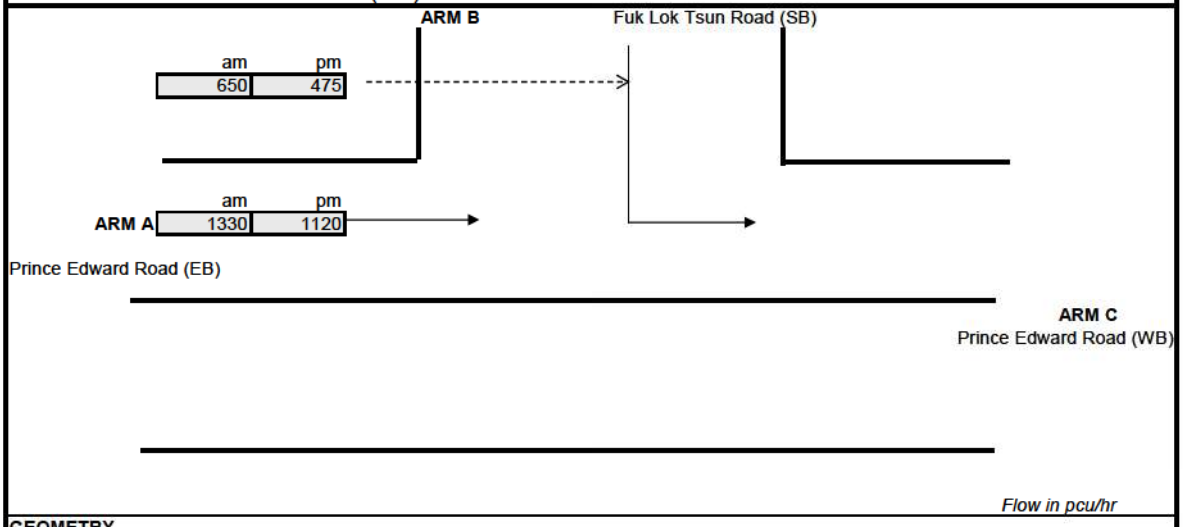
- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(One Lane Minor Arm B)

Job Title:	URA KC-017			
Junction:	J14 - Prince Edward Road West / Fuk Lo Tsun Road		Designed by:	RC
Scheme:	Design (with improvement at J15)		Checked by:	EC
Design Year:	2040	Job No.: 5205867	Date :	5/13/2022
ARM A:	Prince Edward Road (EB)			
ARM B:	Fuk Lok Tsun Road (SB)			
ARM C:	Prince Edward Road (WB)			



Flow in pcu/hr

GEOMETRY					
Major road width	W	20.00	Lane widths	w(b-a)	
Central Reserve width	Wcr			w(b-c)	11.00
Residual width	Wr(c-a)			w(c-b)	
Visibilities	Vr(b-a)		Calculated	D	0.55
	Vl(b-a)	60		E	1.51
	Vr(b-c)			F	0.59
	Vr(c-b)			Y	0.31

ANALYSIS			AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	(pcu/hr)	0	0
	q(a-c)	(pcu/hr)	1330	1120
	q(b-a)	(pcu/hr)	0	0
	q(b-c)	(pcu/hr)	650	475
	f		1.00	1.00
	q(b-ac)	(pcu/hr)	**650**	**475**
CAPACITIES	Q(b-a)	(pcu/hr)	264	277
	Q(b-c)	(pcu/hr)	897	933
	Q(b-ac)	(pcu/hr)	**897**	**933**
	Q(c-a)		1800	1800
DFC's	b-a		0.000	0.000
	b-c		0.724	0.509
	c-a		0.000	0.000
Critical DFC			**0.72**	**0.51**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a)

T.P.D.M.V.2.4
Appendix 1

Capacity of combined streams

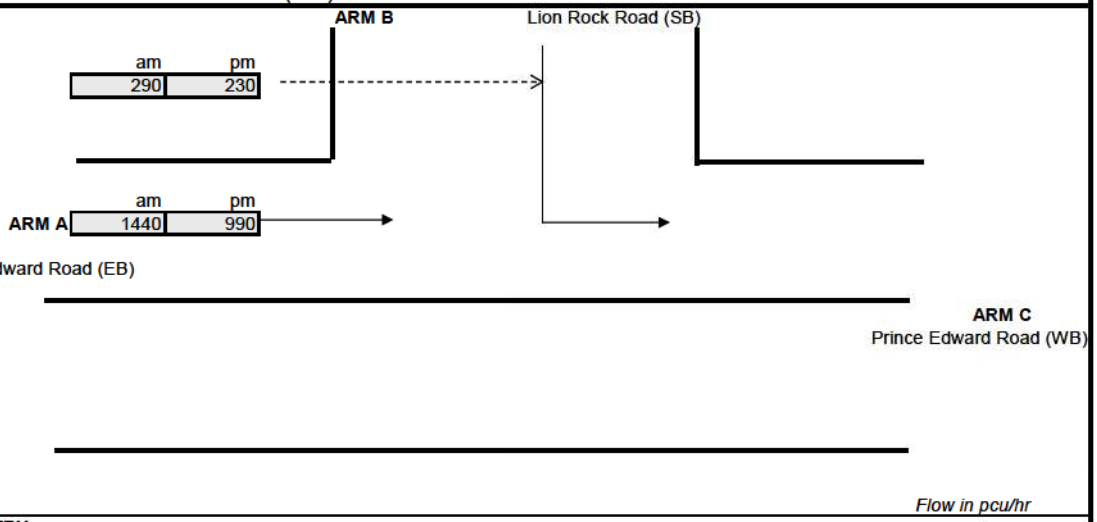
- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(One Lane Minor Arm B)

Job Title:	URA KC-017			
Junction:	J15 - Prince Edward Road West / Lion Rock Road		Designed by:	RC
Scheme:	Existing		Checked by:	EC
Design Year:	2021	Job No.: 5205867	Date :	5/13/2022
ARM A:	Prince Edward Road (EB)			
ARM B:	Lion Rock Road (SB)			
ARM C:	Prince Edward Road (WB)			



Flow in pcu/hr

GEOMETRY					
Major road width	W	20.00	Lane widths	w(b-a)	
Central Reserve width	Wcr			w(b-c)	5.50
Residual width	Wr(c-a)			w(c-b)	
Visibilities	Vr(b-a)		Calculated	D	0.53
	Vl(b-a)			E	1.08
	Vr(b-c)	35		F	0.59
	Vr(c-b)			Y	0.31

ANALYSIS			AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	(pcu/hr)	0	0
	q(a-c)	(pcu/hr)	1440	990
	q(b-a)	(pcu/hr)	0	0
	q(b-c)	(pcu/hr)	290	230
	f		1.00	1.00
	q(b-ac)	(pcu/hr)	**290**	**230**
CAPACITIES	Q(b-a)	(pcu/hr)	248	275
	Q(b-c)	(pcu/hr)	631	687
	Q(b-ac)	(pcu/hr)	**631**	**687**
	Q(c-a)		1800	1800
DFC's	b-a		0.000	0.000
	b-c		0.459	0.335
	c-a		0.000	0.000
Critical DFC			**0.46**	**0.34**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a) Capacity of combined streams

T.P.D.M.V.2.4
Appendix 1

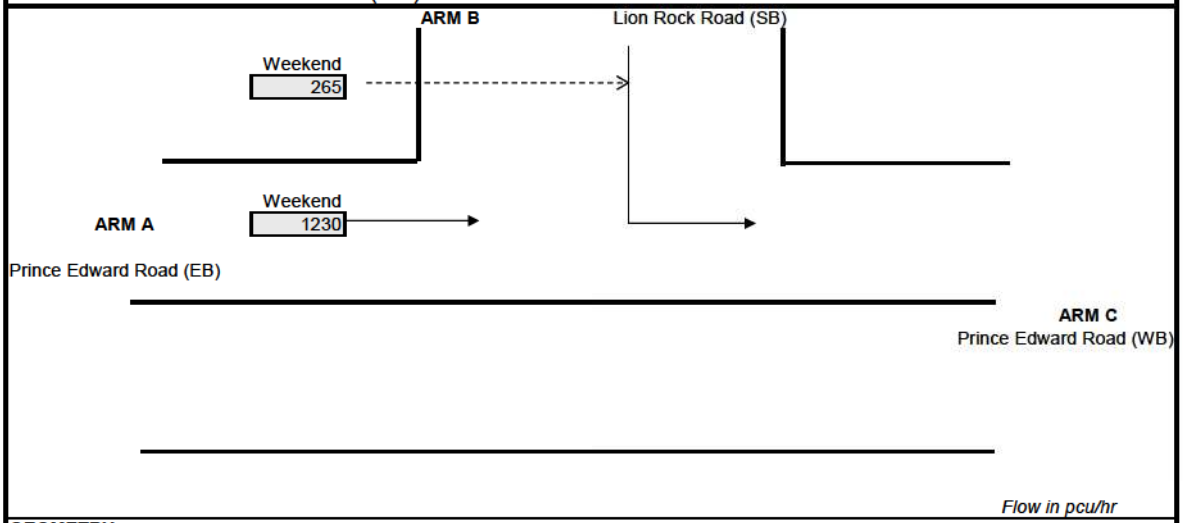
- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(One Lane Minor Arm B)

Job Title:	URA KC-017				
Junction:	J15 - Prince Edward Road West / Lion Rock Road			Designed by:	RC
Scheme:	Existing - Weekend			Checked by:	EC
Design Year:	2021	Job No.:	5205867	Date :	5/19/2022
ARM A:	Prince Edward Road (EB)				
ARM B:	Lion Rock Road (SB)				
ARM C:	Prince Edward Road (WB)				



Flow in pcu/hr

GEOMETRY					
Major road width	W	20.00	Lane widths	w(b-a)	
Central Reserve width	Wcr			w(b-c)	5.50
Residual width	Wr(c-a)			w(c-b)	
Visibilities	Vr(b-a)		Calculated	D	0.53
	Vl(b-a)			E	1.08
	Vr(b-c)	35		F	0.59
	Vr(c-b)			Y	0.31

ANALYSIS			Weekend PEAK
TRAFFIC FLOWS	q(c-a)	(pcu/hr)	0
	q(a-c)	(pcu/hr)	1230
	q(b-a)	(pcu/hr)	0
	q(b-c)	(pcu/hr)	265
	f		1.00
	q(b-ac)	(pcu/hr)	**265**
CAPACITIES	Q(b-a)	(pcu/hr)	260
	Q(b-c)	(pcu/hr)	657
	Q(b-ac)	(pcu/hr)	**657**
	Q(c-a)		1800
DFC's	b-a		0.000
	b-c		0.403
	c-a		0.000
Critical DFC			**0.40**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a)

T.P.D.M.V.2.4
Appendix 1

Capacity of combined streams

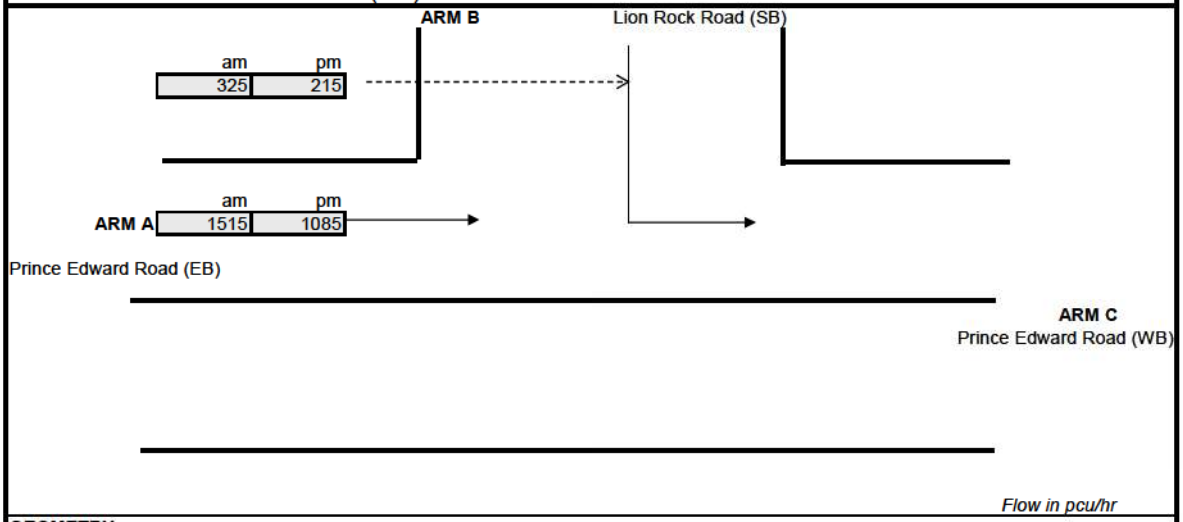
- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(One Lane Minor Arm B)

Job Title:	URA KC-017			
Junction:	J15 - Prince Edward Road West / Lion Rock Road		Designed by:	RC
Scheme:	Reference		Checked by:	EC
Design Year:	2033	Job No.: 5205867	Date :	5/13/2022
ARM A:	Prince Edward Road (EB)			
ARM B:	Lion Rock Road (SB)			
ARM C:	Prince Edward Road (WB)			



Flow in pcu/hr

GEOMETRY					
Major road width	W	20.00	Lane widths	w(b-a)	
Central Reserve width	Wcr			w(b-c)	5.50
Residual width	Wr(c-a)			w(c-b)	
Visibilities	Vr(b-a)		Calculated	D	0.53
	Vl(b-a)			E	1.08
	Vr(b-c)	35		F	0.59
	Vr(c-b)			Y	0.31

ANALYSIS			AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	(pcu/hr)	0	0
	q(a-c)	(pcu/hr)	1515	1085
	q(b-a)	(pcu/hr)	0	0
	q(b-c)	(pcu/hr)	325	215
	f		1.00	1.00
	q(b-ac)	(pcu/hr)	**325**	**215**
CAPACITIES	Q(b-a)	(pcu/hr)	243	269
	Q(b-c)	(pcu/hr)	622	675
	Q(b-ac)	(pcu/hr)	**622**	**675**
	Q(c-a)		1800	1800
DFC's	b-a		0.000	0.000
	b-c		0.522	0.319
	c-a		0.000	0.000
Critical DFC			**0.52**	**0.32**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a)

T.P.D.M.V.2.4
Appendix 1

Capacity of combined streams

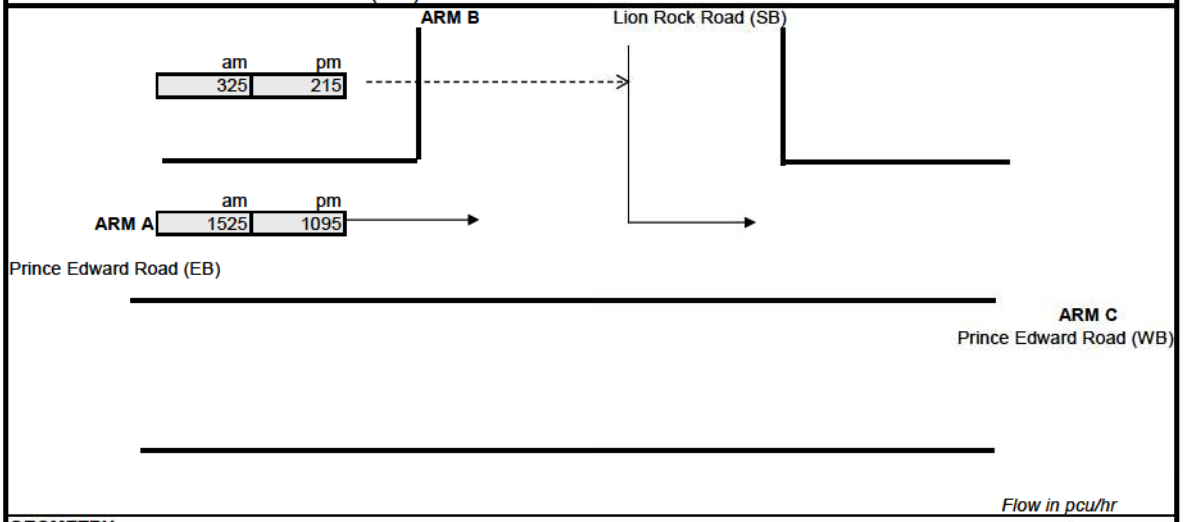
- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(One Lane Minor Arm B)

Job Title:	URA KC-017			
Junction:	J15 - Prince Edward Road West / Lion Rock Road		Designed by:	RC
Scheme:	Design		Checked by:	EC
Design Year:	2033	Job No.: 5205867	Date :	5/13/2022
ARM A:	Prince Edward Road (EB)			
ARM B:	Lion Rock Road (SB)			
ARM C:	Prince Edward Road (WB)			



Flow in pcu/hr

GEOMETRY					
Major road width	W	20.00	Lane widths	w(b-a)	
Central Reserve width	Wcr			w(b-c)	5.50
Residual width	Wr(c-a)			w(c-b)	
Visibilities	Vr(b-a)		Calculated	D	0.53
	Vl(b-a)			E	1.08
	Vr(b-c)	35		F	0.59
	Vr(c-b)			Y	0.31

ANALYSIS			AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	(pcu/hr)	0	0
	q(a-c)	(pcu/hr)	1525	1095
	q(b-a)	(pcu/hr)	0	0
	q(b-c)	(pcu/hr)	325	215
	f		1.00	1.00
	q(b-ac)	(pcu/hr)	**325**	**215**
CAPACITIES	Q(b-a)	(pcu/hr)	243	268
	Q(b-c)	(pcu/hr)	621	674
	Q(b-ac)	(pcu/hr)	**621**	**674**
	Q(c-a)		1800	1800
DFC's	b-a		0.000	0.000
	b-c		0.523	0.319
	c-a		0.000	0.000
Critical DFC			**0.52**	**0.32**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a)

T.P.D.M.V.2.4
Appendix 1

Capacity of combined streams

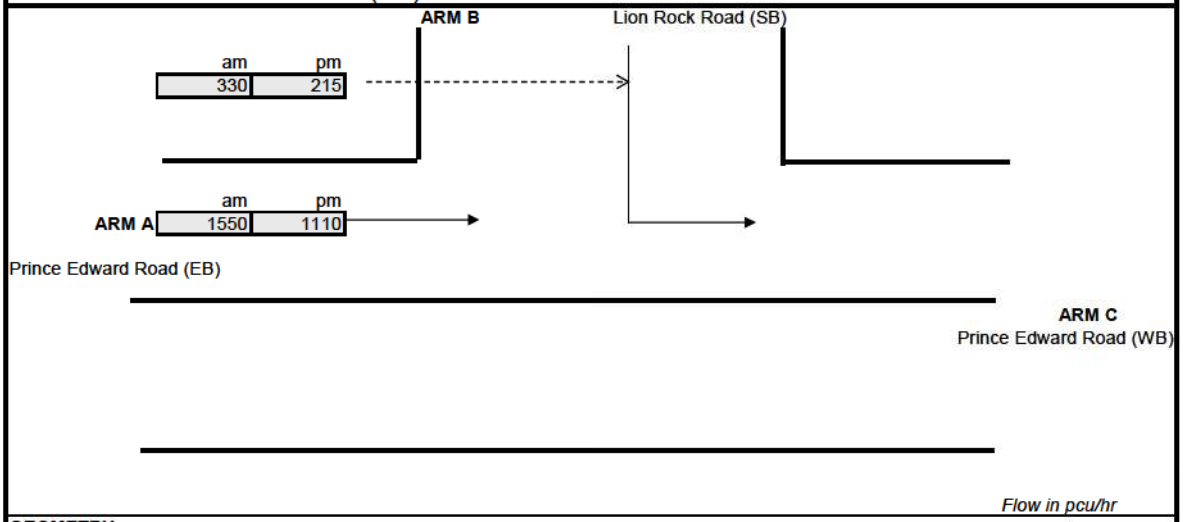
- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(One Lane Minor Arm B)

Job Title:	URA KC-017			
Junction:	J15 - Prince Edward Road West / Lion Rock Road		Designed by:	RC
Scheme:	Reference		Checked by:	EC
Design Year:	2036	Job No.: 5205867	Date :	5/13/2022
ARM A:	Prince Edward Road (EB)			
ARM B:	Lion Rock Road (SB)			
ARM C:	Prince Edward Road (WB)			



Flow in pcu/hr

GEOMETRY					
Major road width	W	20.00	Lane widths	w(b-a)	
Central Reserve width	Wcr			w(b-c)	5.50
Residual width	Wr(c-a)			w(c-b)	
Visibilities	Vr(b-a)		Calculated	D	0.53
	Vl(b-a)			E	1.08
	Vr(b-c)	35		F	0.59
	Vr(c-b)			Y	0.31

ANALYSIS			AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	(pcu/hr)	0	0
	q(a-c)	(pcu/hr)	1550	1110
	q(b-a)	(pcu/hr)	0	0
	q(b-c)	(pcu/hr)	330	215
	f		1.00	1.00
	q(b-ac)	(pcu/hr)	**330**	**215**
CAPACITIES	Q(b-a)	(pcu/hr)	241	268
	Q(b-c)	(pcu/hr)	618	672
	Q(b-ac)	(pcu/hr)	**618**	**672**
	Q(c-a)		1800	1800
DFC's	b-a		0.000	0.000
	b-c		0.534	0.320
	c-a		0.000	0.000
Critical DFC			**0.53**	**0.32**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a)

T.P.D.M.V.2.4
Appendix 1

Capacity of combined streams

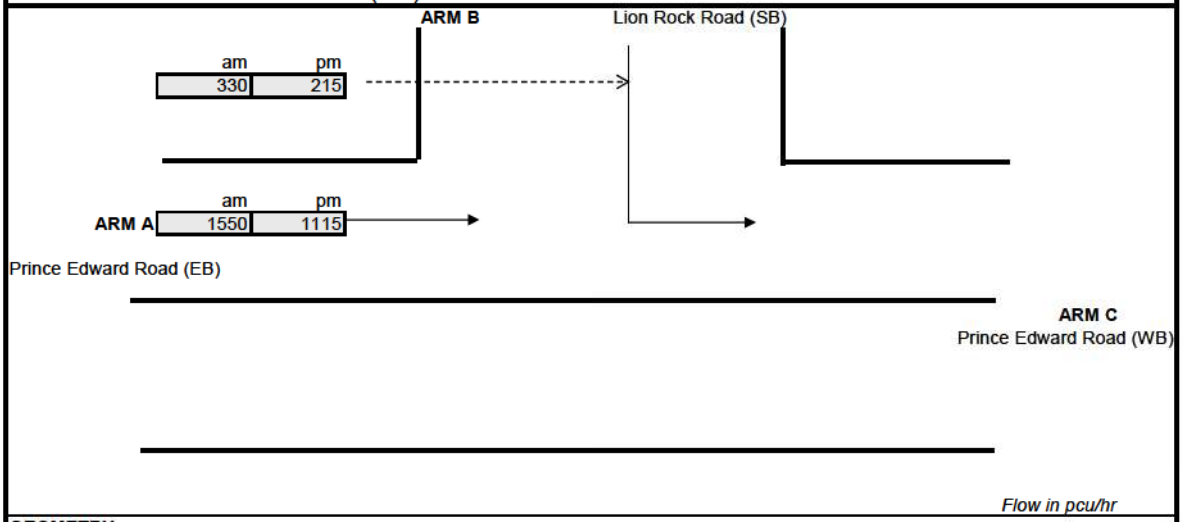
- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(One Lane Minor Arm B)

Job Title:	URA KC-017				
Junction:	J15 - Prince Edward Road West / Lion Rock Road			Designed by:	RC
Scheme:	Design			Checked by:	EC
Design Year:	2036	Job No.:	5205867	Date :	5/13/2022
ARM A:	Prince Edward Road (EB)				
ARM B:	Lion Rock Road (SB)				
ARM C:	Prince Edward Road (WB)				



Flow in pcu/hr

GEOMETRY					
Major road width	W	20.00	Lane widths	w(b-a)	
Central Reserve width	Wcr			w(b-c)	5.50
Residual width	Wr(c-a)			w(c-b)	
Visibilities	Vr(b-a)		Calculated	D	0.53
	Vl(b-a)			E	1.08
	Vr(b-c)	35		F	0.59
	Vr(c-b)			Y	0.31

ANALYSIS			AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	(pcu/hr)	0	0
	q(a-c)	(pcu/hr)	1550	1115
	q(b-a)	(pcu/hr)	0	0
	q(b-c)	(pcu/hr)	330	215
	f		1.00	1.00
	q(b-ac)	(pcu/hr)	**330**	**215**
CAPACITIES	Q(b-a)	(pcu/hr)	241	267
	Q(b-c)	(pcu/hr)	618	671
	Q(b-ac)	(pcu/hr)	**618**	**671**
	Q(c-a)		1800	1800
DFC's	b-a		0.000	0.000
	b-c		0.534	0.320
	c-a		0.000	0.000
Critical DFC			**0.53**	**0.32**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a)

T.P.D.M.V.2.4
Appendix 1

Capacity of combined streams

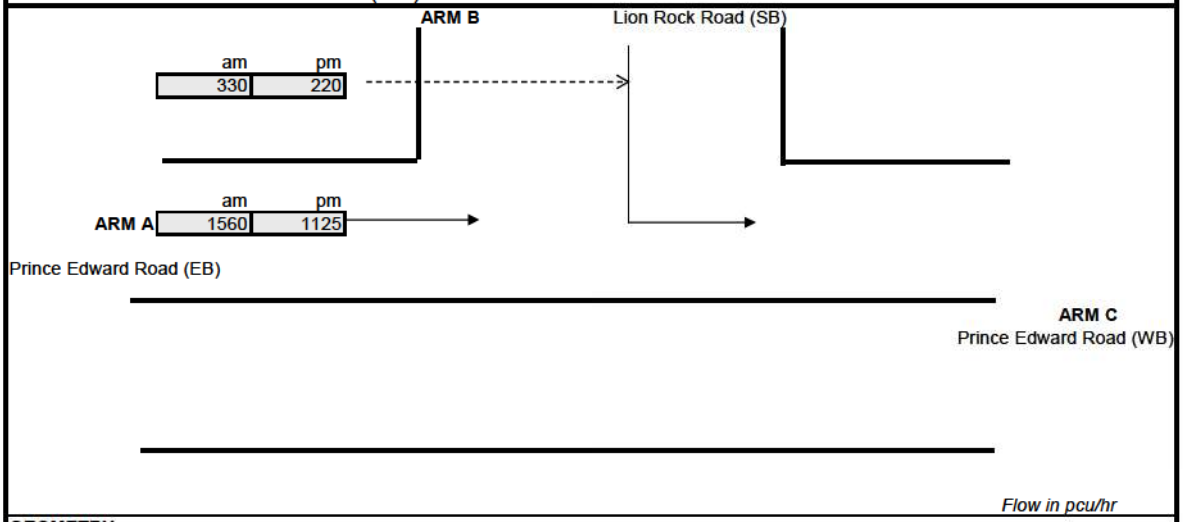
- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(One Lane Minor Arm B)

Job Title:	URA KC-017			
Junction:	J15 - Prince Edward Road West / Lion Rock Road		Designed by:	RC
Scheme:	Reference		Checked by:	EC
Design Year:	2037	Job No.: 5205867	Date :	5/13/2022
ARM A:	Prince Edward Road (EB)			
ARM B:	Lion Rock Road (SB)			
ARM C:	Prince Edward Road (WB)			



Flow in pcu/hr

GEOMETRY					
Major road width	W	20.00	Lane widths	w(b-a)	
Central Reserve width	Wcr			w(b-c)	5.50
Residual width	Wr(c-a)			w(c-b)	
Visibilities	Vr(b-a)		Calculated	D	0.53
	Vl(b-a)			E	1.08
	Vr(b-c)	35		F	0.59
	Vr(c-b)			Y	0.31

ANALYSIS			AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	(pcu/hr)	0	0
	q(a-c)	(pcu/hr)	1560	1125
	q(b-a)	(pcu/hr)	0	0
	q(b-c)	(pcu/hr)	330	220
	f		1.00	1.00
	q(b-ac)	(pcu/hr)	**330**	**220**
CAPACITIES	Q(b-a)	(pcu/hr)	240	267
	Q(b-c)	(pcu/hr)	617	670
	Q(b-ac)	(pcu/hr)	**617**	**670**
	Q(c-a)		1800	1800
DFC's	b-a		0.000	0.000
	b-c		0.535	0.328
	c-a		0.000	0.000
Critical DFC			**0.54**	**0.33**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a) Capacity of combined streams

T.P.D.M.V.2.4
Appendix 1

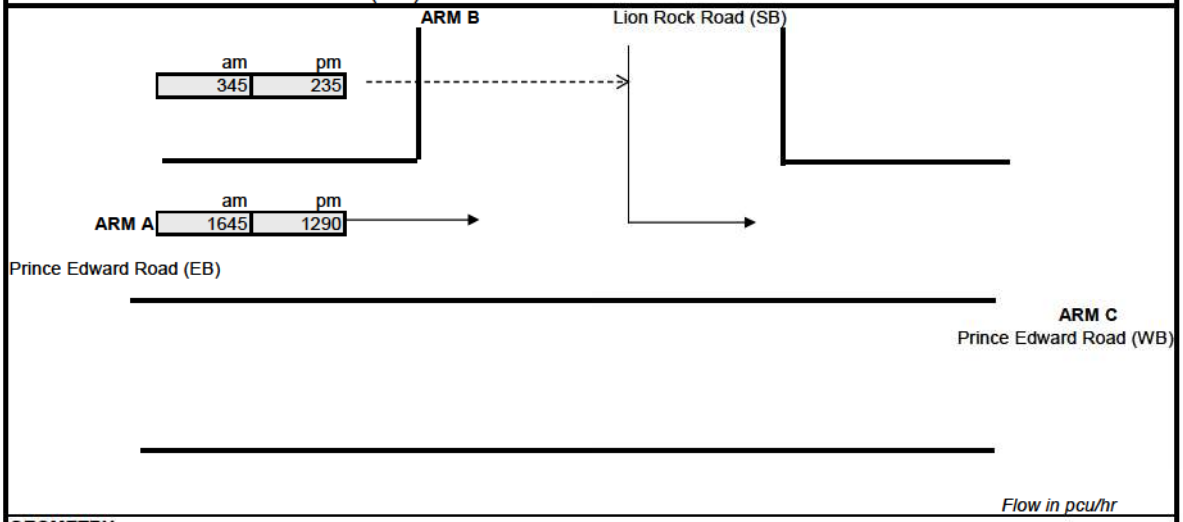
- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(One Lane Minor Arm B)

Job Title:	URA KC-017			
Junction:	J15 - Prince Edward Road West / Lion Rock Road		Designed by:	RC
Scheme:	Design		Checked by:	EC
Design Year:	2037	Job No.: 5205867	Date :	5/13/2022
ARM A:	Prince Edward Road (EB)			
ARM B:	Lion Rock Road (SB)			
ARM C:	Prince Edward Road (WB)			



Flow in pcu/hr

GEOMETRY					
Major road width	W	20.00	Lane widths	w(b-a)	
Central Reserve width	Wcr			w(b-c)	5.50
Residual width	Wr(c-a)			w(c-b)	
Visibilities	Vr(b-a)		Calculated	D	0.53
	Vl(b-a)			E	1.08
	Vr(b-c)	35		F	0.59
	Vr(c-b)			Y	0.31

ANALYSIS			AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	(pcu/hr)	0	0
	q(a-c)	(pcu/hr)	1645	1290
	q(b-a)	(pcu/hr)	0	0
	q(b-c)	(pcu/hr)	345	235
	f		1.00	1.00
	q(b-ac)	(pcu/hr)	**345**	**235**
CAPACITIES	Q(b-a)	(pcu/hr)	235	257
	Q(b-c)	(pcu/hr)	606	650
	Q(b-ac)	(pcu/hr)	**606**	**650**
	Q(c-a)		1800	1800
DFC's	b-a		0.000	0.000
	b-c		0.569	0.362
	c-a		0.000	0.000
Critical DFC			**0.57**	**0.36**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a)

T.P.D.M.V.2.4
Appendix 1

Capacity of combined streams

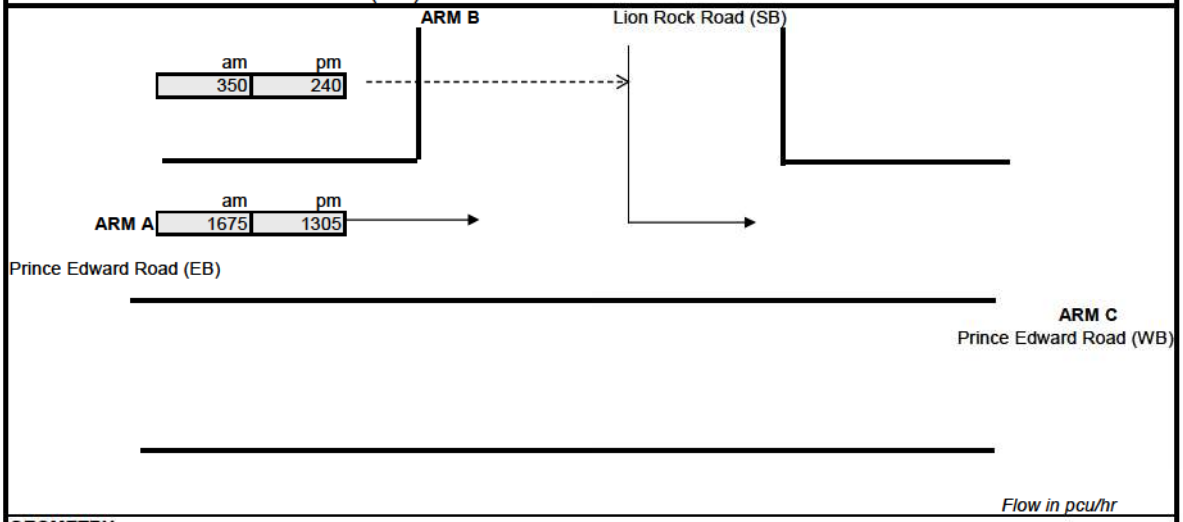
- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(One Lane Minor Arm B)

Job Title:	URA KC-017			
Junction:	J15 - Prince Edward Road West / Lion Rock Road		Designed by:	RC
Scheme:	Reference		Checked by:	EC
Design Year:	2040	Job No.: 5205867	Date :	5/13/2022
ARM A:	Prince Edward Road (EB)			
ARM B:	Lion Rock Road (SB)			
ARM C:	Prince Edward Road (WB)			



Flow in pcu/hr

GEOMETRY					
Major road width	W	20.00	Lane widths	w(b-a)	
Central Reserve width	Wcr			w(b-c)	5.50
Residual width	Wr(c-a)			w(c-b)	
Visibilities	Vr(b-a)		Calculated	D	0.53
	Vl(b-a)			E	1.08
	Vr(b-c)	35		F	0.59
	Vr(c-b)			Y	0.31

ANALYSIS			AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	(pcu/hr)	0	0
	q(a-c)	(pcu/hr)	1675	1305
	q(b-a)	(pcu/hr)	0	0
	q(b-c)	(pcu/hr)	350	240
	f		1.00	1.00
	q(b-ac)	(pcu/hr)	**350**	**240**
CAPACITIES	Q(b-a)	(pcu/hr)	234	256
	Q(b-c)	(pcu/hr)	603	648
	Q(b-ac)	(pcu/hr)	**603**	**648**
	Q(c-a)		1800	1800
DFC's	b-a		0.000	0.000
	b-c		0.581	0.370
	c-a		0.000	0.000
Critical DFC			**0.58**	**0.37**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a)

T.P.D.M.V.2.4
Appendix 1

Capacity of combined streams

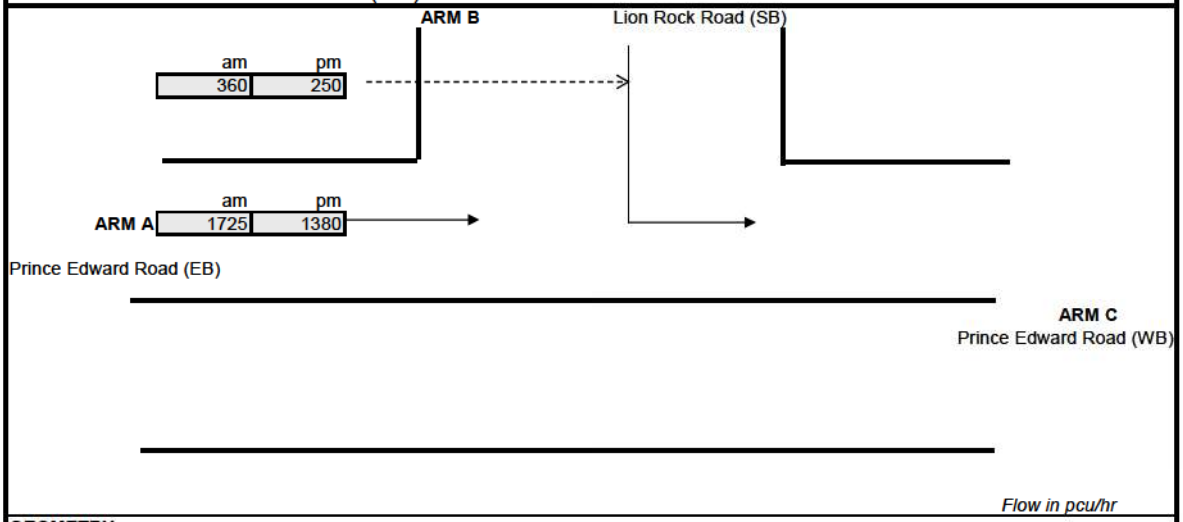
- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

(One Lane Minor Arm B)

Job Title:	URA KC-017			
Junction:	J15 - Prince Edward Road West / Lion Rock Road		Designed by:	RC
Scheme:	Design		Checked by:	EC
Design Year:	2040	Job No.: 5205867	Date :	5/13/2022
ARM A:	Prince Edward Road (EB)			
ARM B:	Lion Rock Road (SB)			
ARM C:	Prince Edward Road (WB)			



Flow in pcu/hr

GEOMETRY					
Major road width	W	20.00	Lane widths	w(b-a)	
Central Reserve width	Wcr			w(b-c)	5.50
Residual width	Wr(c-a)			w(c-b)	
Visibilities	Vr(b-a)		Calculated	D	0.53
	Vl(b-a)			E	1.08
	Vr(b-c)	35		F	0.59
	Vr(c-b)			Y	0.31

ANALYSIS			AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	(pcu/hr)	0	0
	q(a-c)	(pcu/hr)	1725	1380
	q(b-a)	(pcu/hr)	0	0
	q(b-c)	(pcu/hr)	360	250
	f		1.00	1.00
	q(b-ac)	(pcu/hr)	**360**	**250**
CAPACITIES	Q(b-a)	(pcu/hr)	231	251
	Q(b-c)	(pcu/hr)	597	639
	Q(b-ac)	(pcu/hr)	**597**	**639**
	Q(c-a)		1800	1800
DFC's	b-a		0.000	0.000
	b-c		0.603	0.391
	c-a		0.000	0.000
Critical DFC			**0.60**	**0.39**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a) Capacity of combined streams

T.P.D.M.V.2.4
Appendix 1

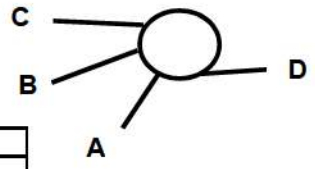
- In accordance with TPDM V2.4

SIMPLIFIED ROUNDABOUT CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

Job Title:	URA KC-017		
Junction:	J16 - Kowloon City Roundabout	Designed by:	RC
Scheme:	Existing	Checked by:	EC
Design Year:	2021	Job No.: 5205867	Date : 5/13/2022

ARM A: Ma Tau Chung Road NB
ARM B: Argyle Street WB
ARM C: Prince Edward Road West EB
ARM D: Prince Edward Road East WB



GEOMETRY *

ARM	*v (m)*	*e (m)*	*L (m)*	*r (m)*	*D (m)*	*Phi*	*S*
A	6.90	9.80	20	30	110	42	
B	5.50	7.00	15	30	100	48	
C	3.50	4.20	10	100	100	23	
D	7.30	8.90	150	250	110	4	

AM FLOWS

from/to	*A*	*B*	*C*	*D*	*Circ*	*Entry*
A					1,140	1,070
B					1,815	450
C					1,315	420
D					1,080	1,875

Flow in pcu/hr

PM FLOWS

from/to	*A*	*B*	*C*	*D*	*Circ*	*Entry*
A					1,320	1,100
B					2,335	325
C					1,365	290
D					710	1,865

Flow in pcu/hr

CALCULATIONS *

ARM	K	X_2	M	F	t_D	f_c	Q_E(AM)	Q_E(PM)	DFC AM	DFC PM
A	0.97	9.80	148.41	2969	1.00	0.62	2201	2092	0.49	0.53
B	0.95	7.00	54.60	2121	1.01	0.51	1143	890	0.39	0.36
C	1.06	4.20	54.60	1273	1.01	0.39	808	787	0.52	0.37
D	1.14	8.90	148.41	2697	1.00	0.59	2343	2589	**0.80**	**0.72**

Crtical Arm:	**D**	**D**
DFC:	**0.80**	**0.72**

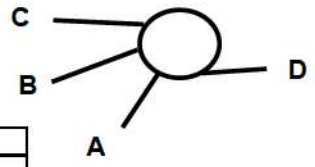
**- In accordance with TPDM V2.4 Appendix*

SIMPLIFIED ROUNDABOUT CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

Job Title:	URA KC-017		
Junction:	J16 - Kowloon City Roundabout	Designed by:	RC
Scheme:	Existing - Weekend	Checked by:	EC
Design Year:	2021	Job No.: 5205867	Date : 5/19/2022

ARM A: Ma Tau Chung Road NB
ARM B: Argyle Street WB
ARM C: Prince Edward Road West EB
ARM D: Prince Edward Road East WB



GEOMETRY *

ARM	*v (m)*	*e (m)*	*L (m)*	*r (m)*	*D (m)*	*Phi*	*S*
A	6.90	9.80	20	30	110	42	
B	5.50	7.00	15	30	100	48	
C	3.50	4.20	10	100	100	23	
D	7.30	8.90	150	250	110	4	

from/to	*A*	*B*	*C*	*D*	*Circ*	*Entry*
A						
B						
C						
D						

Flow in pcu/hr

Weekend FLOWS

from/to	*A*	*B*	*C*	*D*	*Circ*	*Entry*
A					695	1,685
B					1,990	515
C					1,445	545
D					825	1,495

Flow in pcu/hr

CALCULATIONS *

ARM	K	X_2	M	F	t_D	f_c	Q_E(weekend)	DFC Weekend
A	0.97	9.80	148.41	2969	1.00	0.62	2472	0.68
B	0.95	7.00	54.60	2121	1.01	0.51	1058	0.49
C	1.06	4.20	54.60	1273	1.01	0.39	754	**0.72**
D	1.14	8.90	148.41	2697	1.00	0.59	2513	0.59

Crtical Arm: **C**
DFC: **0.72**

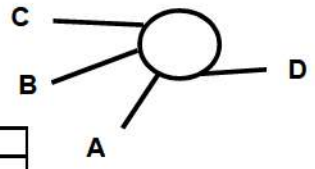
**- In accordance with TPDM V2.4 Appendix*

SIMPLIFIED ROUNDABOUT CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

Job Title:	URA KC-017		
Junction:	J16 - Kowloon City Roundabout	Designed by:	RC
Scheme:	Reference	Checked by:	EC
Design Year:	2033	Job No.: 5205867	Date : 5/13/2022

ARM A: Ma Tau Chung Road NB
ARM B: Argyle Street WB
ARM C: Prince Edward Road West EB
ARM D: Prince Edward Road East WB



GEOMETRY *

ARM	*v (m)*	*e (m)*	*L (m)*	*r (m)*	*D (m)*	*Phi*	*S*
A	6.90	9.80	20	30	110	42	
B	5.50	7.00	15	30	100	48	
C	3.50	4.20	10	100	100	23	
D	7.30	8.90	150	250	110	4	

AM FLOWS

from/to	*A*	*B*	*C*	*D*	*Circ*	*Entry*
A					1,155	1,090
B					1,825	445
C					1,315	485
D					1,135	1,920

Flow in pcu/hr

PM FLOWS

from/to	*A*	*B*	*C*	*D*	*Circ*	*Entry*
A					1,325	1,140
B					2,365	330
C					1,395	325
D					740	1,900

Flow in pcu/hr

CALCULATIONS *

ARM	K	X_2	M	F	t_D	f_c	Q_E(AM)	Q_E(PM)	DFC AM	DFC PM
A	0.97	9.80	148.41	2969	1.00	0.62	2192	2089	0.50	0.55
B	0.95	7.00	54.60	2121	1.01	0.51	1138	876	0.39	0.38
C	1.06	4.20	54.60	1273	1.01	0.39	808	775	0.60	0.42
D	1.14	8.90	148.41	2697	1.00	0.59	2307	2569	**0.83**	**0.74**

Crtical Arm:	**D**	**D**
DFC:	**0.83**	**0.74**

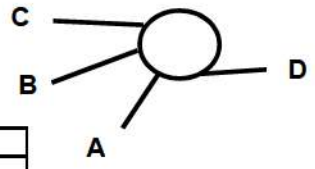
**- In accordance with TPDM V2.4 Appendix*

SIMPLIFIED ROUNDABOUT CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

Job Title:	URA KC-017		
Junction:	J16 - Kowloon City Roundabout	Designed by:	RC
Scheme:	Design	Checked by:	EC
Design Year:	2033	Job No.: 5205867	Date : 5/13/2022

ARM A: Ma Tau Chung Road NB
ARM B: Argyle Street WB
ARM C: Prince Edward Road West EB
ARM D: Prince Edward Road East WB



GEOMETRY *

ARM	*v (m)*	*e (m)*	*L (m)*	*r (m)*	*D (m)*	*Phi*	*S*
A	6.90	9.80	20	30	110	42	
B	5.50	7.00	15	30	100	48	
C	3.50	4.20	10	100	100	23	
D	7.30	8.90	150	250	110	4	

AM FLOWS

from/to	*A*	*B*	*C*	*D*	*Circ*	*Entry*
A					1,155	1,090
B					1,825	445
C					1,320	485
D					1,135	1,920

Flow in pcu/hr

PM FLOWS

from/to	*A*	*B*	*C*	*D*	*Circ*	*Entry*
A					1,325	1,140
B					2,365	330
C					1,395	325
D					740	1,900

Flow in pcu/hr

CALCULATIONS *

ARM	K	X_2	M	F	t_D	f_c	Q_E(AM)	Q_E(PM)	DFC AM	DFC PM
A	0.97	9.80	148.41	2969	1.00	0.62	2192	2089	0.50	0.55
B	0.95	7.00	54.60	2121	1.01	0.51	1138	876	0.39	0.38
C	1.06	4.20	54.60	1273	1.01	0.39	806	775	0.60	0.42
D	1.14	8.90	148.41	2697	1.00	0.59	2307	2569	**0.83**	**0.74**

Crtical Arm:	**D**	**D**
DFC:	**0.83**	**0.74**

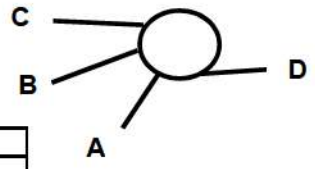
**- In accordance with TPDM V2.4 Appendix*

SIMPLIFIED ROUNDABOUT CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

Job Title:	URA KC-017		
Junction:	J16 - Kowloon City Roundabout	Designed by:	RC
Scheme:	Reference	Checked by:	EC
Design Year:	2036	Job No.: 5205867	Date : 5/13/2022

ARM A: Ma Tau Chung Road NB
ARM B: Argyle Street WB
ARM C: Prince Edward Road West EB
ARM D: Prince Edward Road East WB



GEOMETRY *

ARM	*v (m)*	*e (m)*	*L (m)*	*r (m)*	*D (m)*	*Phi*	*S*
A	6.90	9.80	20	30	110	42	
B	5.50	7.00	15	30	100	48	
C	3.50	4.20	10	100	100	23	
D	7.30	8.90	150	250	110	4	

AM FLOWS

from/to	*A*	*B*	*C*	*D*	*Circ*	*Entry*
A					1,175	1,110
B					1,860	455
C					1,340	495
D					1,160	1,955

Flow in pcu/hr

PM FLOWS

from/to	*A*	*B*	*C*	*D*	*Circ*	*Entry*
A					1,350	1,160
B					2,405	340
C					1,425	330
D					760	1,930

Flow in pcu/hr

CALCULATIONS *

ARM	K	X_2	M	F	t_D	f_c	Q_E(AM)	Q_E(PM)	DFC AM	DFC PM
A	0.97	9.80	148.41	2969	1.00	0.62	2180	2071	0.51	0.56
B	0.95	7.00	54.60	2121	1.01	0.51	1121	857	0.41	0.40
C	1.06	4.20	54.60	1273	1.01	0.39	798	762	0.62	0.43
D	1.14	8.90	148.41	2697	1.00	0.59	2290	2556	**0.85**	**0.76**

Crtical Arm:	**D**	**D**
DFC:	**0.85**	**0.76**

**- In accordance with TPDM V2.4 Appendix*

SIMPLIFIED ROUNDABOUT CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

Job Title:	URA KC-017		
Junction:	J16 - Kowloon City Roundabout	Designed by:	RC
Scheme:	Design	Checked by:	EC
Design Year:	2036	Job No.: 5205867	Date : 5/13/2022

ARM A: Ma Tau Chung Road NB
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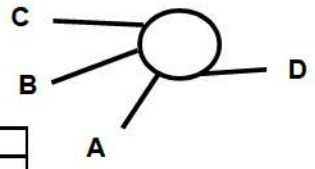

GEOMETRY *

ARM	*v (m)*	*e (m)*	*L (m)*	*r (m)*	*D (m)*	*Phi*	*S*
A	6.90	9.80	20	30	110	42	
B	5.50	7.00	15	30	100	48	
C	3.50	4.20	10	100	100	23	
D	7.30	8.90	150	250	110	4	

AM FLOWS

from/to	*A*	*B*	*C*	*D*	*Circ*	*Entry*
A					1,175	1,110
B					1,860	455
C					1,340	495
D					1,160	1,955

Flow in pcu/hr

PM FLOWS

from/to	*A*	*B*	*C*	*D*	*Circ*	*Entry*
A					1,350	1,160
B					2,405	340
C					1,425	330
D					760	1,930

Flow in pcu/hr

CALCULATIONS *

ARM	K	X_2	M	F	t_D	f_c	Q_E(AM)	Q_E(PM)	DFC AM	DFC PM
A	0.97	9.80	148.41	2969	1.00	0.62	2180	2074	0.51	0.56
B	0.95	7.00	54.60	2121	1.01	0.51	1121	857	0.41	0.40
C	1.06	4.20	54.60	1273	1.01	0.39	798	762	0.62	0.43
D	1.14	8.90	148.41	2697	1.00	0.59	2290	2556	**0.85**	**0.76**

Crtical Arm:	**D**	**D**
DFC:	**0.85**	**0.76**

**- In accordance with TPDM V2.4 Appendix*

SIMPLIFIED ROUNDABOUT CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

Job Title:	URA KC-017		
Junction:	J16 - Kowloon City Roundabout	Designed by:	RC
Scheme:	Reference	Checked by:	EC
Design Year:	2037	Job No.: 5205867	Date : 5/13/2022

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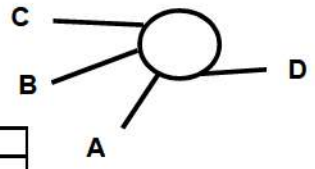
ARM C: Prince Edward Road West EB
ARM D: Prince Edward Road East WB



GEOMETRY *

ARM	*v (m)*	*e (m)*	*L (m)*	*r (m)*	*D (m)*	*Phi*	*S*
A	6.90	9.80	20	30	110	42	
B	5.50	7.00	15	30	100	48	
C	3.50	4.20	10	100	100	23	
D	7.30	8.90	150	250	110	4	

AM FLOWS

from/to	*A*	*B*	*C*	*D*	*Circ*	*Entry*
A					1,180	1,120
B					1,870	455
C					1,350	495
D					1,165	1,965

Flow in pcu/hr

PM FLOWS

from/to	*A*	*B*	*C*	*D*	*Circ*	*Entry*
A					1,355	1,170
B					2,420	345
C					1,430	330
D					765	1,945

Flow in pcu/hr

CALCULATIONS *

ARM	K	X_2	M	F	t_D	f_c	Q_E(AM)	Q_E(PM)	DFC AM	DFC PM
A	0.97	9.80	148.41	2969	1.00	0.62	2177	2070	0.51	0.57
B	0.95	7.00	54.60	2121	1.01	0.51	1116	849	0.41	0.41
C	1.06	4.20	54.60	1273	1.01	0.39	794	760	0.62	0.43
D	1.14	8.90	148.41	2697	1.00	0.59	2287	2553	**0.86**	**0.76**

Crtical Arm:	**D**	**D**
DFC:	**0.86**	**0.76**

**- In accordance with TPDM V2.4 Appendix*

SIMPLIFIED ROUNDABOUT CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

Job Title:	URA KC-017		
Junction:	J16 - Kowloon City Roundabout	Designed by:	RC
Scheme:	Design	Checked by:	EC
Design Year:	2037	Job No.: 5205867	Date : 5/13/2022

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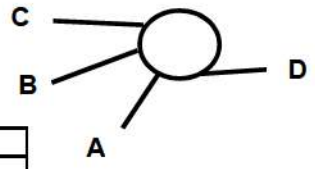

GEOMETRY *

ARM	*v (m)*	*e (m)*	*L (m)*	*r (m)*	*D (m)*	*Phi*	*S*
A	6.90	9.80	20	30	110	42	
B	5.50	7.00	15	30	100	48	
C	3.50	4.20	10	100	100	23	
D	7.30	8.90	150	250	110	4	

AM FLOWS

from/to	*A*	*B*	*C*	*D*	*Circ*	*Entry*
A					1,180	1,140
B					1,890	460
C					1,375	510
D					1,175	1,965

Flow in pcu/hr

PM FLOWS

from/to	*A*	*B*	*C*	*D*	*Circ*	*Entry*
A					1,360	1,180
B					2,430	355
C					1,450	345
D					780	1,945

Flow in pcu/hr

CALCULATIONS *

ARM	K	X_2	M	F	t_D	f_c	Q_E(AM)	Q_E(PM)	DFC AM	DFC PM
A	0.97	9.80	148.41	2969	1.00	0.62	2177	2067	0.52	0.57
B	0.95	7.00	54.60	2121	1.01	0.51	1106	844	0.42	0.42
C	1.06	4.20	54.60	1273	1.01	0.39	783	752	0.65	0.46
D	1.14	8.90	148.41	2697	1.00	0.59	2280	2543	**0.86**	**0.76**

Crtical Arm:	**D**	**D**
DFC:	**0.86**	**0.76**

**- In accordance with TPDM V2.4 Appendix*

SIMPLIFIED ROUNDABOUT CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

Job Title:	URA KC-017		
Junction:	J16 - Kowloon City Roundabout	Designed by:	RC
Scheme:	Reference	Checked by:	EC
Design Year:	2040	Job No.: 5205867	Date : 5/13/2022

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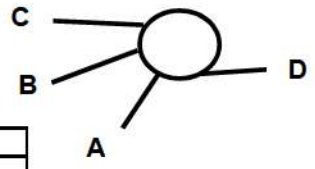

GEOMETRY *

ARM	*v (m)*	*e (m)*	*L (m)*	*r (m)*	*D (m)*	*Phi*	*S*
A	6.90	9.80	20	30	110	42	
B	5.50	7.00	15	30	100	48	
C	3.50	4.20	10	100	100	23	
D	7.30	8.90	150	250	110	4	

AM FLOWS

from/to	*A*	*B*	*C*	*D*	*Circ*	*Entry*
A					1,205	1,160
B					1,925	470
C					1,400	520
D					1,195	2,000

Flow in pcu/hr

PM FLOWS

from/to	*A*	*B*	*C*	*D*	*Circ*	*Entry*
A					1,385	1,200
B					2,475	360
C					1,475	350
D					790	1,980

Flow in pcu/hr

CALCULATIONS *

ARM	K	X_2	M	F	t_D	f_c	Q_E(AM)	Q_E(PM)	DFC AM	DFC PM
A	0.97	9.80	148.41	2969	1.00	0.62	2162	2052	0.54	0.58
B	0.95	7.00	54.60	2121	1.01	0.51	1089	823	0.43	0.44
C	1.06	4.20	54.60	1273	1.01	0.39	773	742	0.67	0.47
D	1.14	8.90	148.41	2697	1.00	0.59	2267	2536	**0.88**	**0.78**

Crtical Arm:	**D**	**D**
DFC:	**0.88**	**0.78**

**- In accordance with TPDM V2.4 Appendix*

SIMPLIFIED ROUNDABOUT CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

Job Title:	URA KC-017		
Junction:	J16 - Kowloon City Roundabout	Designed by:	RC
Scheme:	Design	Checked by:	EC
Design Year:	2040	Job No.: 5205867	Date : 5/13/2022

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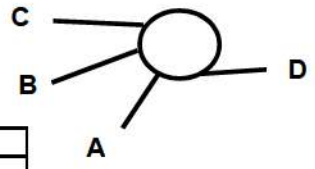

GEOMETRY *

ARM	*v (m)*	*e (m)*	*L (m)*	*r (m)*	*D (m)*	*Phi*	*S*
A	6.90	9.80	20	30	110	42	
B	5.50	7.00	15	30	100	48	
C	3.50	4.20	10	100	100	23	
D	7.30	8.90	150	250	110	4	

AM FLOWS

from/to	*A*	*B*	*C*	*D*	*Circ*	*Entry*
A					1,205	1,170
B					1,935	475
C					1,410	530
D					1,205	2,000

Flow in pcu/hr

PM FLOWS

from/to	*A*	*B*	*C*	*D*	*Circ*	*Entry*
A					1,390	1,200
B					2,480	365
C					1,485	360
D					800	1,980

Flow in pcu/hr

CALCULATIONS *

ARM	K	X_2	M	F	t_D	f_c	Q_E(AM)	Q_E(PM)	DFC AM	DFC PM
A	0.97	9.80	148.41	2969	1.00	0.62	2162	2049	0.54	0.59
B	0.95	7.00	54.60	2121	1.01	0.51	1085	820	0.44	0.45
C	1.06	4.20	54.60	1273	1.01	0.39	769	738	0.69	0.49
D	1.14	8.90	148.41	2697	1.00	0.59	2260	2529	**0.88**	**0.78**

Crtical Arm:	**D**	**D**
DFC:	**0.88**	**0.78**

**- In accordance with TPDM V2.4 Appendix*

SIMPLIFIED ROUNDABOUT CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

Job Title:	URA KC-017		
Junction:	J16 - Kowloon City Roundabout	Designed by:	RC
Scheme:	Reference (with improvement)	Checked by:	EC
Design Year:	2037	Job No.: 5205867	Date : 5/13/2022

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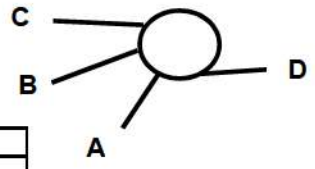

GEOMETRY *

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A	6.90	9.80	20	30	110	42	
B	5.50	7.00	15	30	100	48	
C	3.50	4.20	10	100	100	23	
D	7.30	10.70	150	250	110	4	

AM FLOWS

from/to	*A*	*B*	*C*	*D*	*Circ*	*Entry*
A					1,180	1,120
B					1,870	455
C					1,350	495
D					1,165	1,965

Flow in pcu/hr

PM FLOWS

from/to	*A*	*B*	*C*	*D*	*Circ*	*Entry*
A					1,355	1,170
B					2,420	345
C					1,430	330
D					765	1,945

Flow in pcu/hr

CALCULATIONS *

ARM	K	X_2	M	F	t_D	f_c	Q_E(AM)	Q_E(PM)	DFC AM	DFC PM
A	0.97	9.80	148.41	2969	1.00	0.62	2177	2070	0.51	0.57
B	0.95	7.00	54.60	2121	1.01	0.51	1116	849	0.41	0.41
C	1.06	4.20	54.60	1273	1.01	0.39	794	760	0.62	0.43
D	1.14	10.70	148.41	3242	1.00	0.66	2805	3106	**0.70**	**0.63**

Crtical Arm:	**D**	**D**
DFC:	**0.70**	**0.63**

**- In accordance with TPDM V2.4 Appendix*

SIMPLIFIED ROUNDABOUT CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

Job Title:	URA KC-017		
Junction:	J16 - Kowloon City Roundabout	Designed by:	RC
Scheme:	Design (with improvement)	Checked by:	EC
Design Year:	2037	Job No.: 5205867	Date : 5/13/2022

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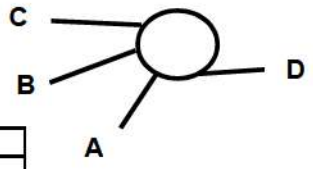

GEOMETRY *

ARM	*v (m)*	*e (m)*	*L (m)*	*r (m)*	*D (m)*	*Phi*	*S*
A	6.90	9.80	20	30	110	42	
B	5.50	7.00	15	30	100	48	
C	3.50	4.20	10	100	100	23	
D	7.30	10.70	150	250	110	4	

AM FLOWS

from/to	*A*	*B*	*C*	*D*	*Circ*	*Entry*
A					1,180	1,140
B					1,890	460
C					1,375	510
D					1,175	1,965

Flow in pcu/hr

PM FLOWS

from/to	*A*	*B*	*C*	*D*	*Circ*	*Entry*
A					1,360	1,180
B					2,430	355
C					1,450	345
D					780	1,945

Flow in pcu/hr

CALCULATIONS *

ARM	K	X_2	M	F	t_D	f_c	Q_E(AM)	Q_E(PM)	DFC AM	DFC PM
A	0.97	9.80	148.41	2969	1.00	0.62	2177	2067	0.52	0.57
B	0.95	7.00	54.60	2121	1.01	0.51	1106	844	0.42	0.42
C	1.06	4.20	54.60	1273	1.01	0.39	783	752	0.65	0.46
D	1.14	10.70	148.41	3242	1.00	0.66	2798	3095	**0.70**	**0.63**

Crtical Arm:	**D**	**D**
DFC:	**0.70**	**0.63**

**- In accordance with TPDM V2.4 Appendix*

SIMPLIFIED ROUNDABOUT CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

Job Title:	URA KC-017		
Junction:	J16 - Kowloon City Roundabout	Designed by:	RC
Scheme:	Reference (with improvement)	Checked by:	EC
Design Year:	2040	Job No.: 5205867	Date : 5/13/2022

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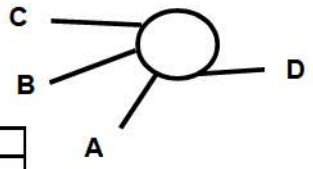


GEOMETRY *

ARM	*v (m)*	*e (m)*	*L (m)*	*r (m)*	*D (m)*	*Phi*	*S*
A	6.90	9.80	20	30	110	42	
B	5.50	7.00	15	30	100	48	
C	3.50	4.20	10	100	100	23	
D	7.30	10.70	150	250	110	4	

AM FLOWS

from/to	*A*	*B*	*C*	*D*	*Circ*	*Entry*
A					1,205	1,160
B					1,925	470
C					1,400	520
D					1,195	2,000

Flow in pcu/hr

PM FLOWS

from/to	*A*	*B*	*C*	*D*	*Circ*	*Entry*
A					1,385	1,200
B					2,475	360
C					1,475	350
D					790	1,980

Flow in pcu/hr

CALCULATIONS *

ARM	K	X_2	M	F	t_D	f_c	Q_E(AM)	Q_E(PM)	DFC AM	DFC PM
A	0.97	9.80	148.41	2969	1.00	0.62	2162	2052	0.54	0.58
B	0.95	7.00	54.60	2121	1.01	0.51	1089	823	0.43	0.44
C	1.06	4.20	54.60	1273	1.01	0.39	773	742	0.67	0.47
D	1.14	10.70	148.41	3242	1.00	0.66	2783	3087	**0.72**	**0.64**

Crtical Arm:	**D**	**D**
DFC:	**0.72**	**0.64**

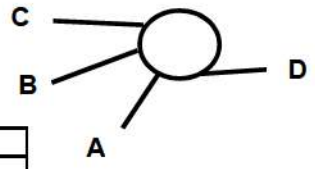
**- In accordance with TPDM V2.4 Appendix*

SIMPLIFIED ROUNDABOUT CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

Job Title:	URA KC-017		
Junction:	J16 - Kowloon City Roundabout	Designed by:	RC
Scheme:	Design (with improvement)	Checked by:	EC
Design Year:	2040	Job No.: 5205867	Date : 5/13/2022

ARM A: Ma Tau Chung Road NB
ARM B: Argyle Street WB
ARM C: Prince Edward Road West EB
ARM D: Prince Edward Road East WB



GEOMETRY *

ARM	*v (m)*	*e (m)*	*L (m)*	*r (m)*	*D (m)*	*Phi*	*S*
A	6.90	9.80	20	30	110	42	
B	5.50	7.00	15	30	100	48	
C	3.50	4.20	10	100	100	23	
D	7.30	10.70	150	250	110	4	

AM FLOWS

from/to	*A*	*B*	*C*	*D*	*Circ*	*Entry*
A					1,205	1,170
B					1,935	475
C					1,410	530
D					1,205	2,000

Flow in pcu/hr

PM FLOWS

from/to	*A*	*B*	*C*	*D*	*Circ*	*Entry*
A					1,390	1,200
B					2,480	365
C					1,485	360
D					800	1,980

Flow in pcu/hr

CALCULATIONS *

ARM	K	X_2	M	F	t_D	f_c	Q_E(AM)	Q_E(PM)	DFC AM	DFC PM
A	0.97	9.80	148.41	2969	1.00	0.62	2162	2049	0.54	0.59
B	0.95	7.00	54.60	2121	1.01	0.51	1085	820	0.44	0.45
C	1.06	4.20	54.60	1273	1.01	0.39	769	738	0.69	0.49
D	1.14	10.70	148.41	3242	1.00	0.66	2775	3080	**0.72**	**0.64**

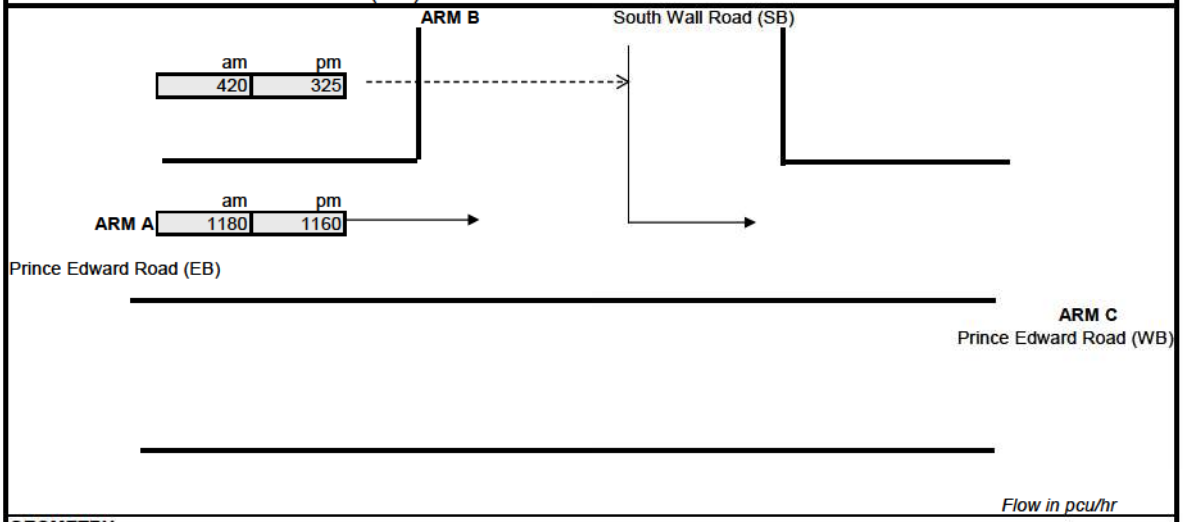
Crtical Arm: **D** **D**
DFC: **0.72** **0.64**

**- In accordance with TPDM V2.4 Appendix*

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

Job Title:	URA KC-017			
Junction:	J17 - Prince Edward Road West / South Wall Road		Designed by:	RC
Scheme:	Existing		Checked by:	EC
Design Year:	2021	Job No.: 5205867	Date :	5/13/2022
ARM A:	Prince Edward Road (EB)			
ARM B:	South Wall Road (SB)			
ARM C:	Prince Edward Road (WB)			



Flow in pcu/hr

GEOMETRY					
Major road width	W	16.00	Lane widths	w(b-a)	
Central Reserve width	Wcr			w(b-c)	5.00
Residual width	Wr(c-a)			w(c-b)	
Visibilities	Vr(b-a)		Calculated	D	0.53
	Vl(b-a)			E	1.12
	Vr(b-c)	115		F	0.59
	Vr(c-b)			Y	0.45

ANALYSIS			AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	(pcu/hr)	0	0
	q(a-c)	(pcu/hr)	1180	1160
	q(b-a)	(pcu/hr)	0	0
	q(b-c)	(pcu/hr)	420	325
	f		1.00	1.00
	q(b-ac)	(pcu/hr)	**420**	**325**
CAPACITIES	Q(b-a)	(pcu/hr)	232	233
	Q(b-c)	(pcu/hr)	620	624
	Q(b-ac)	(pcu/hr)	**620**	**624**
	Q(c-a)		1800	1800
DFC's	b-a		0.000	0.000
	b-c		0.678	0.521
	c-a		0.000	0.000
Critical DFC			**0.68**	**0.52**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a) Capacity of combined streams

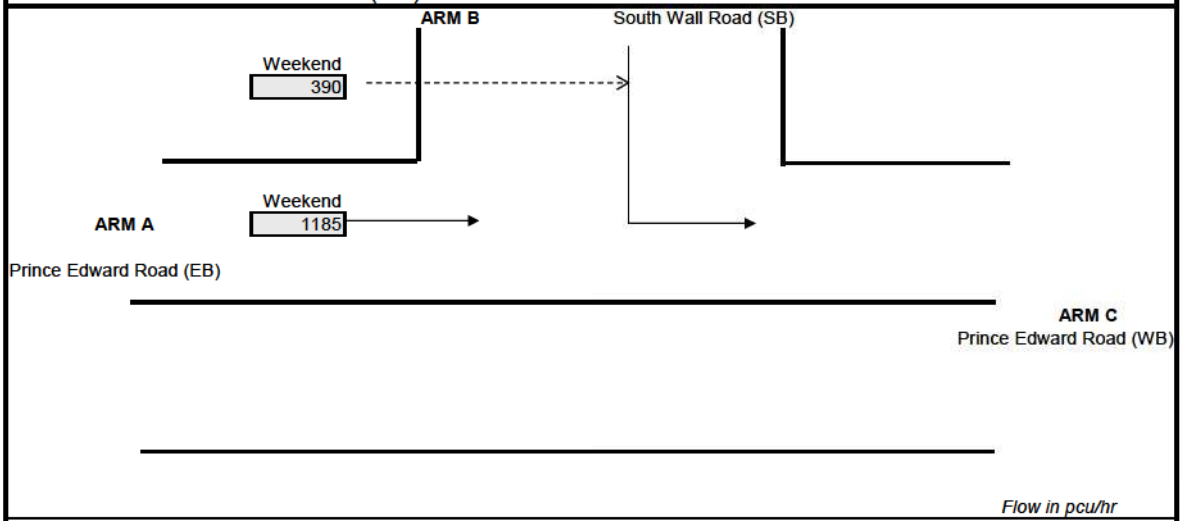
T.P.D.M.V.2.4
Appendix 1

- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

Job Title:	URA KC-017				
Junction:	J17 - Prince Edward Road West / South Wall Road			Designed by:	RC
Scheme:	Existing - Weekend			Checked by:	EC
Design Year:	2021	Job No.:	5205867	Date :	5/19/2022
ARM A:	Prince Edward Road (EB)				
ARM B:	South Wall Road (SB)				
ARM C:	Prince Edward Road (WB)				



Flow in pcu/hr

GEOMETRY					
Major road width	W	16.00	Lane widths	w(b-a)	
Central Reserve width	Wcr			w(b-c)	5.00
Residual width	Wr(c-a)			w(c-b)	
Visibilities	Vr(b-a)		Calculated	D	0.53
	Vl(b-a)			E	1.12
	Vr(b-c)	115		F	0.59
	Vr(c-b)			Y	0.45

ANALYSIS			Weekend PEAK
TRAFFIC FLOWS	q(c-a)	(pcu/hr)	0
	q(a-c)	(pcu/hr)	1185
	q(b-a)	(pcu/hr)	0
	q(b-c)	(pcu/hr)	390
	f		1.00
	q(b-ac)	(pcu/hr)	**390**
CAPACITIES	Q(b-a)	(pcu/hr)	231
	Q(b-c)	(pcu/hr)	619
	Q(b-ac)	(pcu/hr)	**619**
	Q(c-a)		1800
DFC's	b-a		0.000
	b-c		0.630
	c-a		0.000
Critical DFC			**0.63**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a)

T.P.D.M.V.2.4
Appendix 1

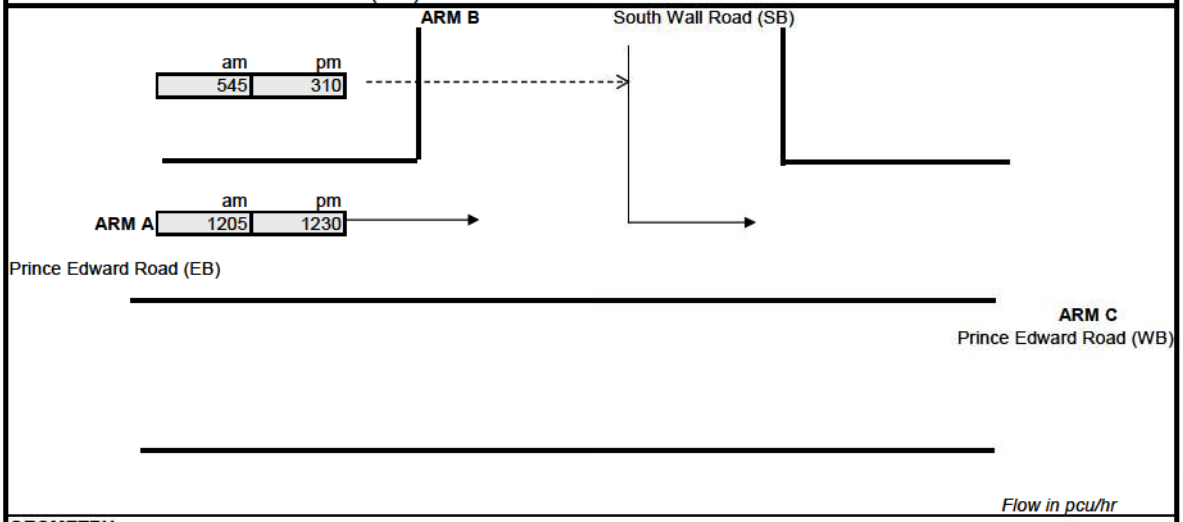
Capacity of combined streams

- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

Job Title:	URA KC-017			
Junction:	J17 - Prince Edward Road West / South Wall Road		Designed by:	RC
Scheme:	Reference		Checked by:	EC
Design Year:	2033	Job No.: 5205867	Date :	5/13/2022
ARM A:	Prince Edward Road (EB)			
ARM B:	South Wall Road (SB)			
ARM C:	Prince Edward Road (WB)			



Flow in pcu/hr

GEOMETRY					
Major road width	W	16.00	Lane widths	w(b-a)	
Central Reserve width	Wcr			w(b-c)	5.00
Residual width	Wr(c-a)			w(c-b)	
Visibilities	Vr(b-a)		Calculated	D	0.53
	Vl(b-a)			E	1.12
	Vr(b-c)	115		F	0.59
	Vr(c-b)			Y	0.45

ANALYSIS			AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	(pcu/hr)	0	0
	q(a-c)	(pcu/hr)	1205	1230
	q(b-a)	(pcu/hr)	0	0
	q(b-c)	(pcu/hr)	545	310
	f		1.00	1.00
	q(b-ac)	(pcu/hr)	**545**	**310**
CAPACITIES	Q(b-a)	(pcu/hr)	230	227
	Q(b-c)	(pcu/hr)	615	611
	Q(b-ac)	(pcu/hr)	**615**	**611**
	Q(c-a)		1800	1800
DFC's	b-a		0.000	0.000
	b-c		0.886	0.508
	c-a		0.000	0.000
Critical DFC			**0.89**	**0.51**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a)

T.P.D.M.V.2.4
Appendix 1

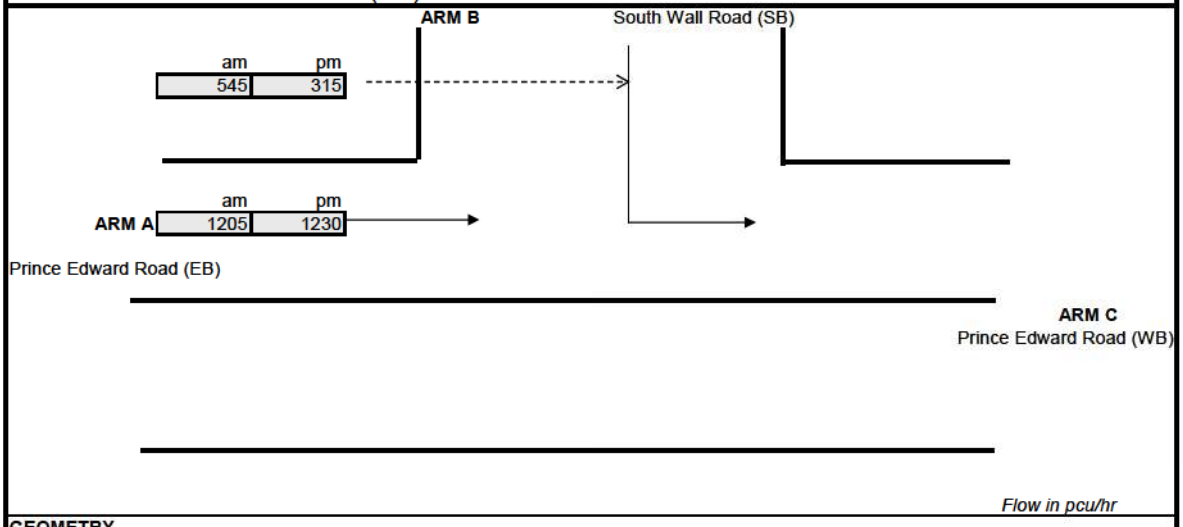
Capacity of combined streams

- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

Job Title:	URA KC-017			
Junction:	J17 - Prince Edward Road West / South Wall Road		Designed by:	RC
Scheme:	Design		Checked by:	EC
Design Year:	2033	Job No.: 5205867	Date :	5/13/2022
ARM A:	Prince Edward Road (EB)			
ARM B:	South Wall Road (SB)			
ARM C:	Prince Edward Road (WB)			



Flow in pcu/hr

GEOMETRY					
Major road width	W	16.00	Lane widths	w(b-a)	
Central Reserve width	Wcr			w(b-c)	5.00
Residual width	Wr(c-a)			w(c-b)	
Visibilities	Vr(b-a)		Calculated	D	0.53
	Vl(b-a)			E	1.12
	Vr(b-c)	115		F	0.59
	Vr(c-b)			Y	0.45

ANALYSIS			AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	(pcu/hr)	0	0
	q(a-c)	(pcu/hr)	1205	1230
	q(b-a)	(pcu/hr)	0	0
	q(b-c)	(pcu/hr)	545	315
	f		1.00	1.00
	q(b-ac)	(pcu/hr)	**545**	**315**
CAPACITIES	Q(b-a)	(pcu/hr)	230	227
	Q(b-c)	(pcu/hr)	615	611
	Q(b-ac)	(pcu/hr)	**615**	**611**
	Q(c-a)		1800	1800
DFC's	b-a		0.000	0.000
	b-c		0.886	0.516
	c-a		0.000	0.000
Critical DFC			**0.89**	**0.52**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a) Capacity of combined streams

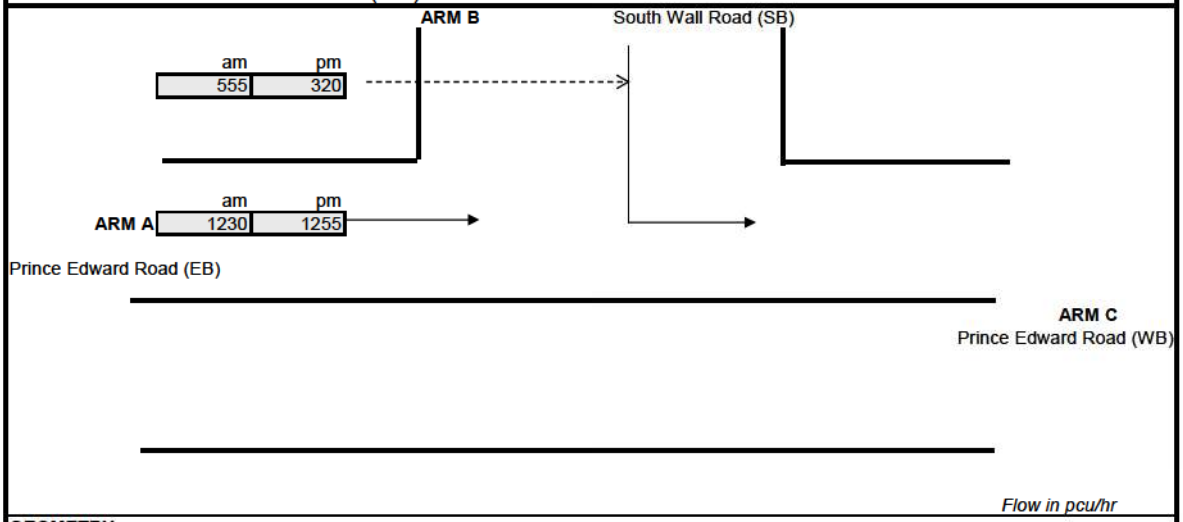
T.P.D.M.V.2.4
Appendix 1

- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

Job Title:	URA KC-017			
Junction:	J17 - Prince Edward Road West / South Wall Road		Designed by:	RC
Scheme:	Reference		Checked by:	EC
Design Year:	2036	Job No.: 5205867	Date :	5/13/2022
ARM A:	Prince Edward Road (EB)			
ARM B:	South Wall Road (SB)			
ARM C:	Prince Edward Road (WB)			



Flow in pcu/hr

GEOMETRY					
Major road width	W	16.00	Lane widths	w(b-a)	
Central Reserve width	Wcr			w(b-c)	5.00
Residual width	Wr(c-a)			w(c-b)	
Visibilities	Vr(b-a)		Calculated	D	0.53
	Vl(b-a)			E	1.12
	Vr(b-c)	115		F	0.59
	Vr(c-b)			Y	0.45

ANALYSIS			AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	(pcu/hr)	0	0
	q(a-c)	(pcu/hr)	1230	1255
	q(b-a)	(pcu/hr)	0	0
	q(b-c)	(pcu/hr)	555	320
	f		1.00	1.00
	q(b-ac)	(pcu/hr)	**555**	**320**
CAPACITIES	Q(b-a)	(pcu/hr)	227	225
	Q(b-c)	(pcu/hr)	611	606
	Q(b-ac)	(pcu/hr)	**611**	**606**
	Q(c-a)		1800	1800
DFC's	b-a		0.000	0.000
	b-c		0.909	0.528
	c-a		0.000	0.000
Critical DFC			**0.91**	**0.53**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a) Capacity of combined streams

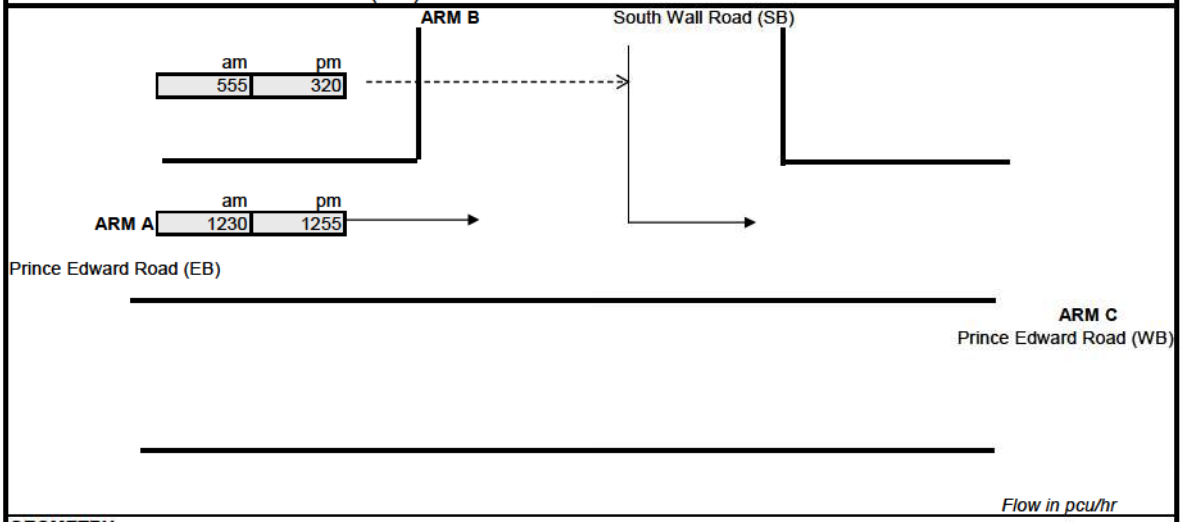
T.P.D.M.V.2.4
Appendix 1

- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

Job Title:	URA KC-017			
Junction:	J17 - Prince Edward Road West / South Wall Road		Designed by:	RC
Scheme:	Design		Checked by:	EC
Design Year:	2036	Job No.: 5205867	Date :	5/13/2022
ARM A:	Prince Edward Road (EB)			
ARM B:	South Wall Road (SB)			
ARM C:	Prince Edward Road (WB)			



Flow in pcu/hr

GEOMETRY					
Major road width	W	16.00	Lane widths	w(b-a)	
Central Reserve width	Wcr			w(b-c)	5.00
Residual width	Wr(c-a)			w(c-b)	
Visibilities	Vr(b-a)		Calculated	D	0.53
	Vl(b-a)			E	1.12
	Vr(b-c)	115		F	0.59
	Vr(c-b)			Y	0.45

ANALYSIS			AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	(pcu/hr)	0	0
	q(a-c)	(pcu/hr)	1230	1255
	q(b-a)	(pcu/hr)	0	0
	q(b-c)	(pcu/hr)	555	320
	f		1.00	1.00
	q(b-ac)	(pcu/hr)	**555**	**320**
CAPACITIES	Q(b-a)	(pcu/hr)	227	225
	Q(b-c)	(pcu/hr)	611	606
	Q(b-ac)	(pcu/hr)	**611**	**606**
	Q(c-a)		1800	1800
DFC's	b-a		0.000	0.000
	b-c		0.909	0.528
	c-a		0.000	0.000
Critical DFC			**0.91**	**0.53**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a)

T.P.D.M.V.2.4
Appendix 1

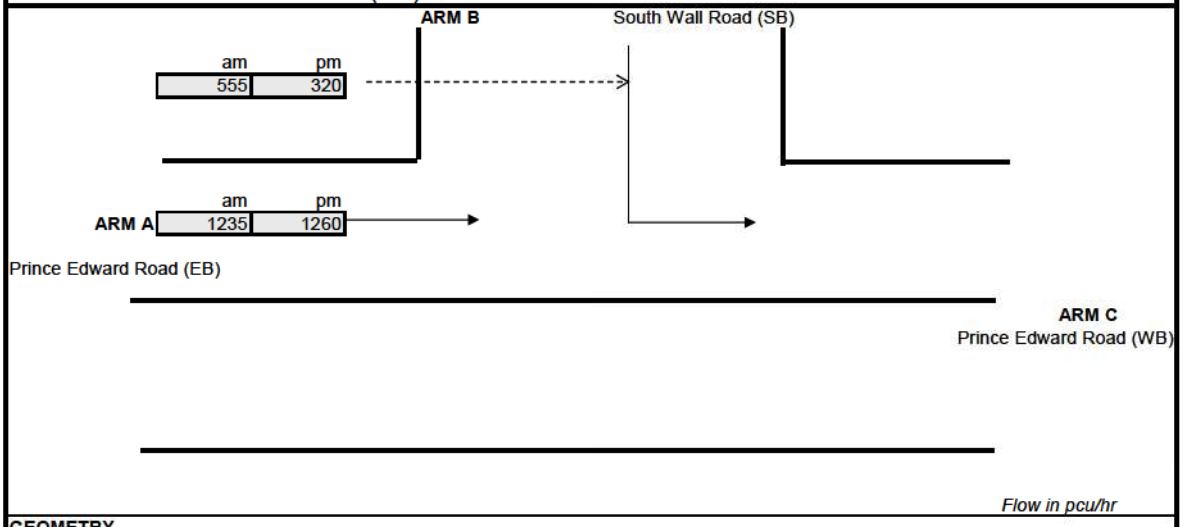
Capacity of combined streams

- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

Job Title:	URA KC-017			
Junction:	J17 - Prince Edward Road West / South Wall Road		Designed by:	RC
Scheme:	Reference		Checked by:	EC
Design Year:	2037	Job No.: 5205867	Date :	5/13/2022
ARM A:	Prince Edward Road (EB)			
ARM B:	South Wall Road (SB)			
ARM C:	Prince Edward Road (WB)			



Flow in pcu/hr

GEOMETRY					
Major road width	W	16.00	Lane widths	w(b-a)	
Central Reserve width	Wcr			w(b-c)	5.00
Residual width	Wr(c-a)			w(c-b)	
Visibilities	Vr(b-a)		Calculated	D	0.53
	Vl(b-a)			E	1.12
	Vr(b-c)	115		F	0.59
	Vr(c-b)			Y	0.45

ANALYSIS			AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	(pcu/hr)	0	0
	q(a-c)	(pcu/hr)	1235	1260
	q(b-a)	(pcu/hr)	0	0
	q(b-c)	(pcu/hr)	555	320
	f		1.00	1.00
	q(b-ac)	(pcu/hr)	**555**	**320**
CAPACITIES	Q(b-a)	(pcu/hr)	227	225
	Q(b-c)	(pcu/hr)	610	605
	Q(b-ac)	(pcu/hr)	**610**	**605**
	Q(c-a)		1800	1800
DFC's	b-a		0.000	0.000
	b-c		0.910	0.529
	c-a		0.000	0.000
Critical DFC			**0.91**	**0.53**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a)

T.P.D.M.V.2.4
Appendix 1

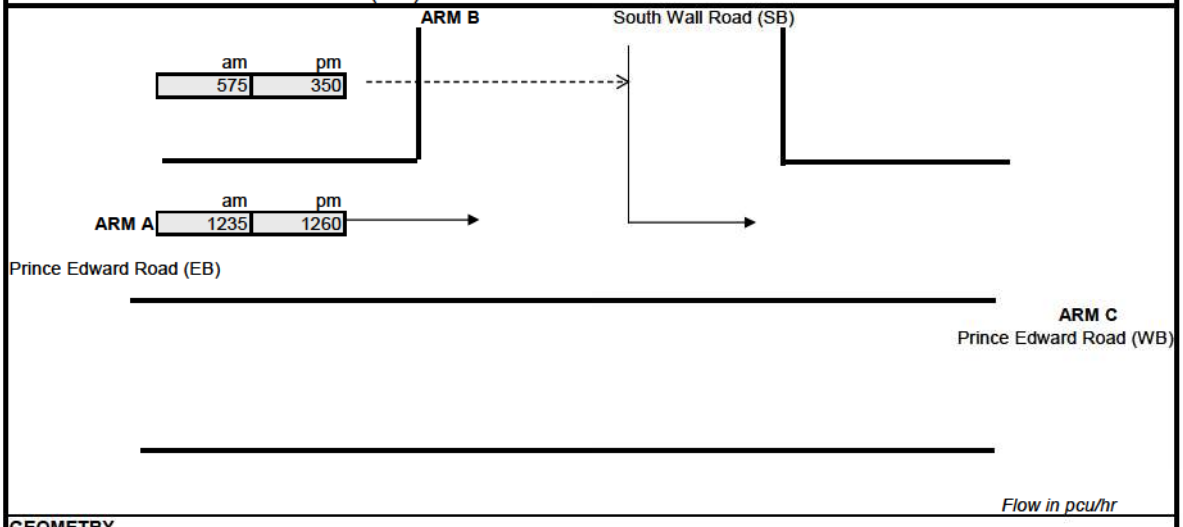
Capacity of combined streams

- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

Job Title:	URA KC-017			
Junction:	J17 - Prince Edward Road West / South Wall Road		Designed by:	RC
Scheme:	Design		Checked by:	EC
Design Year:	2037	Job No.: 5205867	Date :	5/13/2022
ARM A:	Prince Edward Road (EB)			
ARM B:	South Wall Road (SB)			
ARM C:	Prince Edward Road (WB)			



Flow in pcu/hr

GEOMETRY					
Major road width	W	16.00	Lane widths	w(b-a)	
Central Reserve width	Wcr			w(b-c)	5.00
Residual width	Wr(c-a)			w(c-b)	
Visibilities	Vr(b-a)		Calculated	D	0.53
	Vl(b-a)			E	1.12
	Vr(b-c)	115		F	0.59
	Vr(c-b)			Y	0.45

ANALYSIS			AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	(pcu/hr)	0	0
	q(a-c)	(pcu/hr)	1235	1260
	q(b-a)	(pcu/hr)	0	0
	q(b-c)	(pcu/hr)	575	350
	f		1.00	1.00
	q(b-ac)	(pcu/hr)	**575**	**350**
CAPACITIES	Q(b-a)	(pcu/hr)	227	225
	Q(b-c)	(pcu/hr)	610	605
	Q(b-ac)	(pcu/hr)	**610**	**605**
	Q(c-a)		1800	1800
DFC's	b-a		0.000	0.000
	b-c		0.943	0.578
	c-a		0.000	0.000
Critical DFC			**0.94**	**0.58**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a) Capacity of combined streams

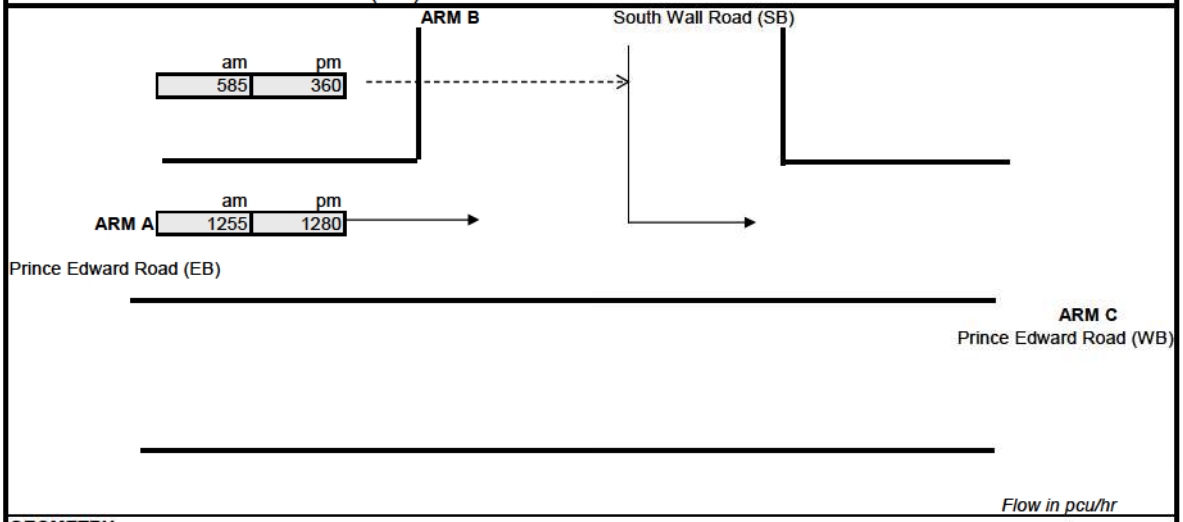
T.P.D.M.V.2.4
Appendix 1

- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

Job Title:	URA KC-017			
Junction:	J17 - Prince Edward Road West / South Wall Road		Designed by:	RC
Scheme:	Reference		Checked by:	EC
Design Year:	2040	Job No.: 5205867	Date :	5/13/2022
ARM A:	Prince Edward Road (EB)			
ARM B:	South Wall Road (SB)			
ARM C:	Prince Edward Road (WB)			



Flow in pcu/hr

GEOMETRY					
Major road width	W	16.00	Lane widths	w(b-a)	
Central Reserve width	Wcr			w(b-c)	5.00
Residual width	Wr(c-a)			w(c-b)	
Visibilities	Vr(b-a)		Calculated	D	0.53
	Vl(b-a)			E	1.12
	Vr(b-c)	115		F	0.59
	Vr(c-b)			Y	0.45

ANALYSIS			AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	(pcu/hr)	0	0
	q(a-c)	(pcu/hr)	1255	1280
	q(b-a)	(pcu/hr)	0	0
	q(b-c)	(pcu/hr)	585	360
	f		1.00	1.00
	q(b-ac)	(pcu/hr)	**585**	**360**
CAPACITIES	Q(b-a)	(pcu/hr)	225	223
	Q(b-c)	(pcu/hr)	606	602
	Q(b-ac)	(pcu/hr)	**606**	**602**
	Q(c-a)		1800	1800
DFC's	b-a		0.000	0.000
	b-c		0.965	0.598
	c-a		0.000	0.000
Critical DFC			**0.97**	**0.60**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a)

T.P.D.M.V.2.4
Appendix 1

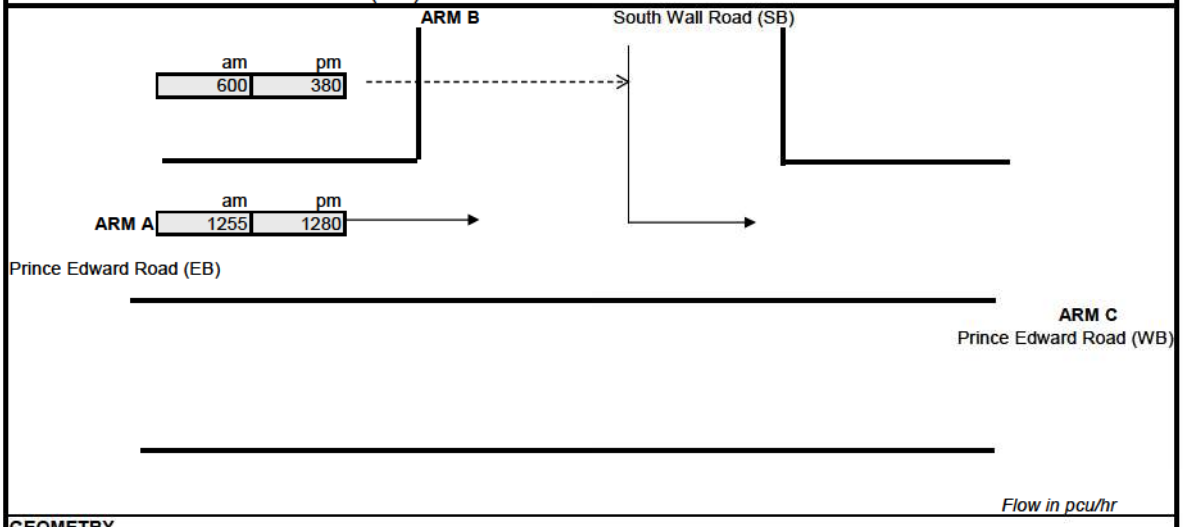
Capacity of combined streams

- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

Job Title:	URA KC-017			
Junction:	J17 - Prince Edward Road West / South Wall Road		Designed by:	RC
Scheme:	Design		Checked by:	EC
Design Year:	2040	Job No.: 5205867	Date :	5/13/2022
ARM A:	Prince Edward Road (EB)			
ARM B:	South Wall Road (SB)			
ARM C:	Prince Edward Road (WB)			



Flow in pcu/hr

GEOMETRY					
Major road width	W	16.00	Lane widths	w(b-a)	
Central Reserve width	Wcr			w(b-c)	5.00
Residual width	Wr(c-a)			w(c-b)	
Visibilities	Vr(b-a)		Calculated	D	0.53
	Vl(b-a)			E	1.12
	Vr(b-c)	115		F	0.59
	Vr(c-b)			Y	0.45

ANALYSIS			AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	(pcu/hr)	0	0
	q(a-c)	(pcu/hr)	1255	1280
	q(b-a)	(pcu/hr)	0	0
	q(b-c)	(pcu/hr)	600	380
	f		1.00	1.00
	q(b-ac)	(pcu/hr)	**600**	**380**
CAPACITIES	Q(b-a)	(pcu/hr)	225	223
	Q(b-c)	(pcu/hr)	606	602
	Q(b-ac)	(pcu/hr)	**606**	**602**
	Q(c-a)		1800	1800
DFC's	b-a		0.000	0.000
	b-c		0.990	0.632
	c-a		0.000	0.000
Critical DFC			**0.99**	**0.63**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a) Capacity of combined streams

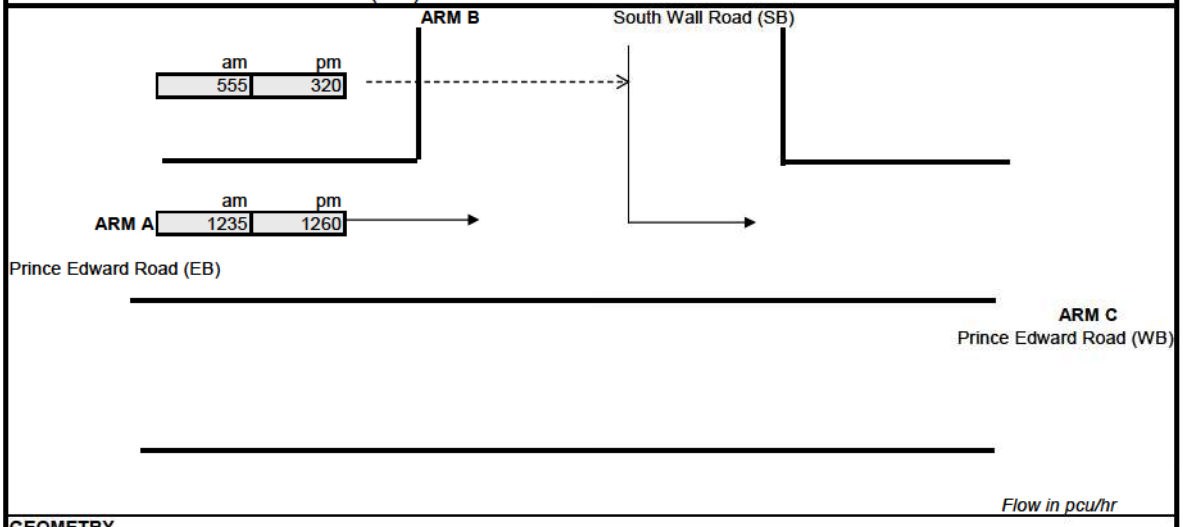
T.P.D.M.V.2.4
Appendix 1

- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

Job Title:	URA KC-017			
Junction:	J17 - Prince Edward Road West / South Wall Road		Designed by:	RC
Scheme:	Reference (with improvement)		Checked by:	EC
Design Year:	2037	Job No.: 5205867	Date :	5/13/2022
ARM A:	Prince Edward Road (EB)			
ARM B:	South Wall Road (SB)			
ARM C:	Prince Edward Road (WB)			



Flow in pcu/hr

GEOMETRY					
Major road width	W	18.70	Lane widths	w(b-a)	
Central Reserve width	Wcr			w(b-c)	5.00
Residual width	Wr(c-a)			w(c-b)	
Visibilities	Vr(b-a)		Calculated	D	0.53
	Vl(b-a)			E	1.12
	Vr(b-c)	115		F	0.59
	Vr(c-b)			Y	0.35

ANALYSIS			AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	(pcu/hr)	0	0
	q(a-c)	(pcu/hr)	1235	1260
	q(b-a)	(pcu/hr)	0	0
	q(b-c)	(pcu/hr)	555	320
	f		1.00	1.00
	q(b-ac)	(pcu/hr)	**555**	**320**
CAPACITIES	Q(b-a)	(pcu/hr)	249	248
	Q(b-c)	(pcu/hr)	657	653
	Q(b-ac)	(pcu/hr)	**657**	**653**
	Q(c-a)		1800	1800
DFC's	b-a		0.000	0.000
	b-c		0.845	0.490
	c-a		0.000	0.000
Critical DFC			**0.84**	**0.49**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a)

T.P.D.M.V.2.4
Appendix 1

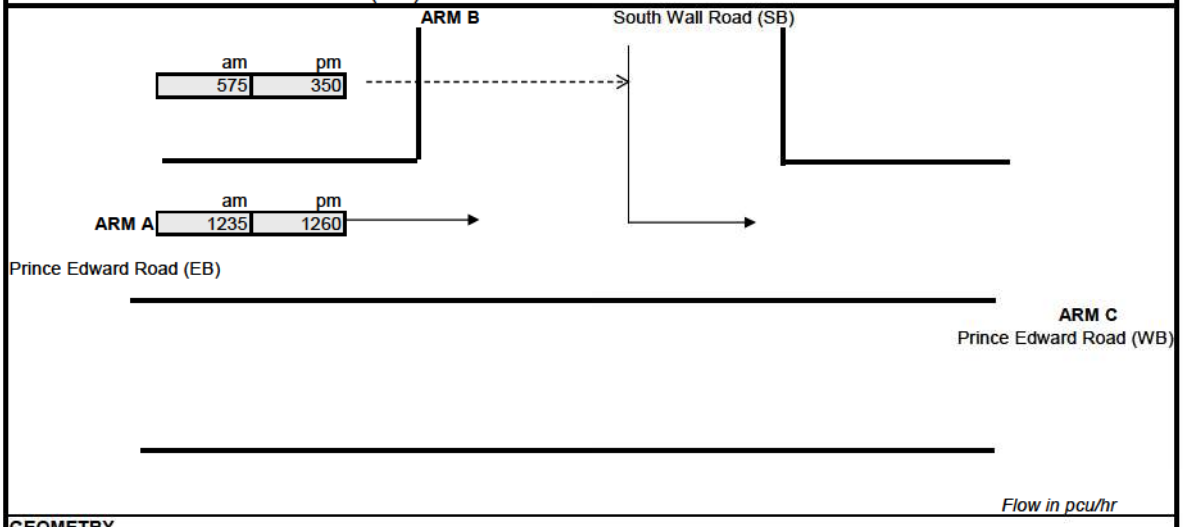
Capacity of combined streams

- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

Job Title:	URA KC-017			
Junction:	J17 - Prince Edward Road West / South Wall Road		Designed by:	RC
Scheme:	Design (with improvement)		Checked by:	EC
Design Year:	2037	Job No.: 5205867	Date :	5/13/2022
ARM A:	Prince Edward Road (EB)			
ARM B:	South Wall Road (SB)			
ARM C:	Prince Edward Road (WB)			



Flow in pcu/hr

GEOMETRY					
Major road width	W	18.70	Lane widths	w(b-a)	
Central Reserve width	Wcr			w(b-c)	5.00
Residual width	Wr(c-a)			w(c-b)	
Visibilities	Vr(b-a)		Calculated	D	0.53
	Vl(b-a)			E	1.12
	Vr(b-c)	115		F	0.59
	Vr(c-b)			Y	0.35

ANALYSIS			AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	(pcu/hr)	0	0
	q(a-c)	(pcu/hr)	1235	1260
	q(b-a)	(pcu/hr)	0	0
	q(b-c)	(pcu/hr)	575	350
	f		1.00	1.00
	q(b-ac)	(pcu/hr)	**575**	**350**
CAPACITIES	Q(b-a)	(pcu/hr)	249	248
	Q(b-c)	(pcu/hr)	657	653
	Q(b-ac)	(pcu/hr)	**657**	**653**
	Q(c-a)		1800	1800
DFC's	b-a		0.000	0.000
	b-c		0.875	0.536
	c-a		0.000	0.000
Critical DFC			**0.88**	**0.54**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a)

T.P.D.M.V.2.4
Appendix 1

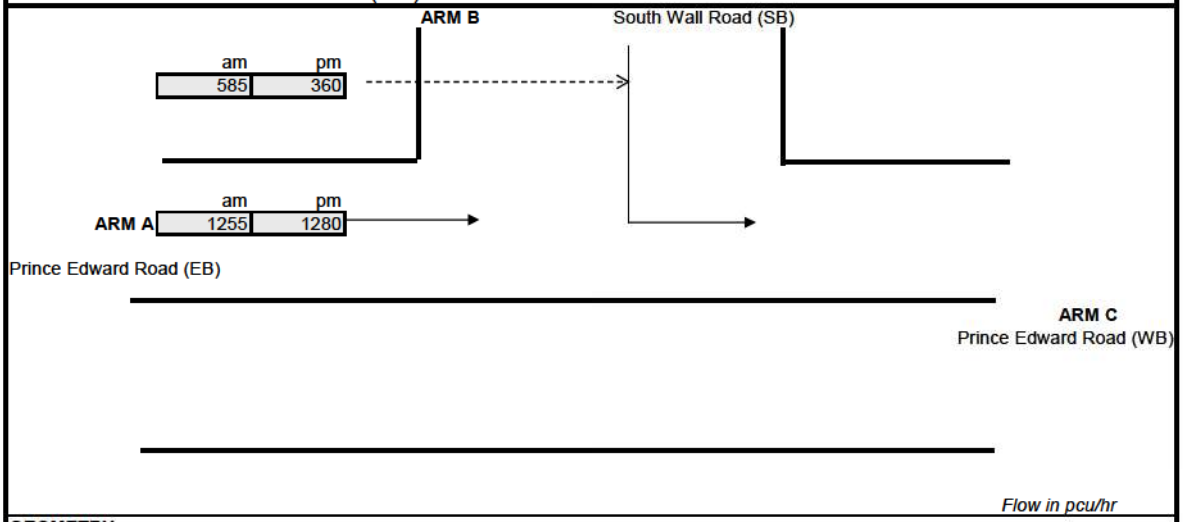
Capacity of combined streams

- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

Job Title:	URA KC-017				
Junction:	J17 - Prince Edward Road West / South Wall Road			Designed by:	RC
Scheme:	Reference (with improvement)			Checked by:	EC
Design Year:	2040	Job No.:	5205867	Date :	5/13/2022
ARM A:	Prince Edward Road (EB)				
ARM B:	South Wall Road (SB)				
ARM C:	Prince Edward Road (WB)				



Flow in pcu/hr

GEOMETRY					
Major road width	W	18.70	Lane widths	w(b-a)	
Central Reserve width	Wcr			w(b-c)	5.00
Residual width	Wr(c-a)			w(c-b)	
Visibilities	Vr(b-a)		Calculated	D	0.53
	Vl(b-a)			E	1.12
	Vr(b-c)	115		F	0.59
	Vr(c-b)			Y	0.35

ANALYSIS			AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	(pcu/hr)	0	0
	q(a-c)	(pcu/hr)	1255	1280
	q(b-a)	(pcu/hr)	0	0
	q(b-c)	(pcu/hr)	585	360
	f		1.00	1.00
	q(b-ac)	(pcu/hr)	**585**	**360**
CAPACITIES	Q(b-a)	(pcu/hr)	248	246
	Q(b-c)	(pcu/hr)	654	650
	Q(b-ac)	(pcu/hr)	**654**	**650**
	Q(c-a)		1800	1800
DFC's	b-a		0.000	0.000
	b-c		0.895	0.554
	c-a		0.000	0.000
Critical DFC			**0.89**	**0.55**

Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a)

T.P.D.M.V.2.4
Appendix 1

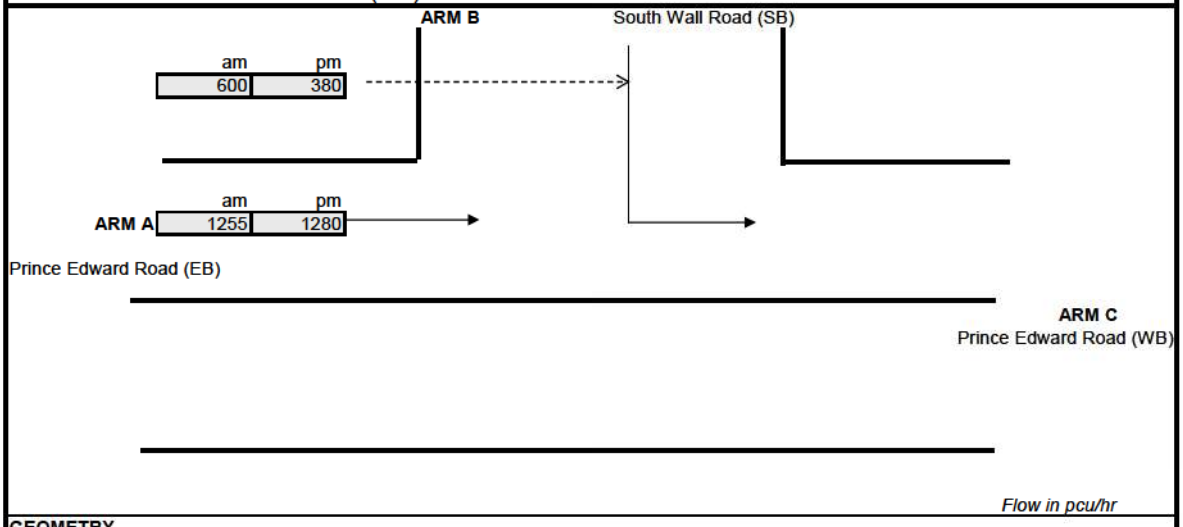
Capacity of combined streams

- In accordance with TPDM V2.4

SIMPLIFIED PRIORITY JUNCTION CAPACITY CALCULATION

ATKINS
Member of the SNC-Lavalin Group

Job Title:	URA KC-017			
Junction:	J17 - Prince Edward Road West / South Wall Road		Designed by:	RC
Scheme:	Design (with improvement)		Checked by:	EC
Design Year:	2040	Job No.: 5205867	Date :	5/13/2022
ARM A:	Prince Edward Road (EB)			
ARM B:	South Wall Road (SB)			
ARM C:	Prince Edward Road (WB)			



Flow in pcu/hr

GEOMETRY					
Major road width	W	18.70	Lane widths	w(b-a)	
Central Reserve width	Wcr			w(b-c)	5.00
Residual width	Wr(c-a)			w(c-b)	
Visibilities	Vr(b-a)		Calculated	D	0.53
	Vl(b-a)			E	1.12
	Vr(b-c)	115		F	0.59
	Vr(c-b)			Y	0.35

ANALYSIS			AM PEAK	PM PEAK
TRAFFIC FLOWS	q(c-a)	(pcu/hr)	0	0
	q(a-c)	(pcu/hr)	1255	1280
	q(b-a)	(pcu/hr)	0	0
	q(b-c)	(pcu/hr)	600	380
	f		1.00	1.00
	q(b-ac)	(pcu/hr)	**600**	**380**
CAPACITIES	Q(b-a)	(pcu/hr)	248	246
	Q(b-c)	(pcu/hr)	654	650
	Q(b-ac)	(pcu/hr)	**654**	**650**
	Q(c-a)		1800	1800
DFC's	b-a		0.000	0.000
	b-c		0.918	0.584
	c-a		0.000	0.000
Critical DFC			**0.92**	**0.58**

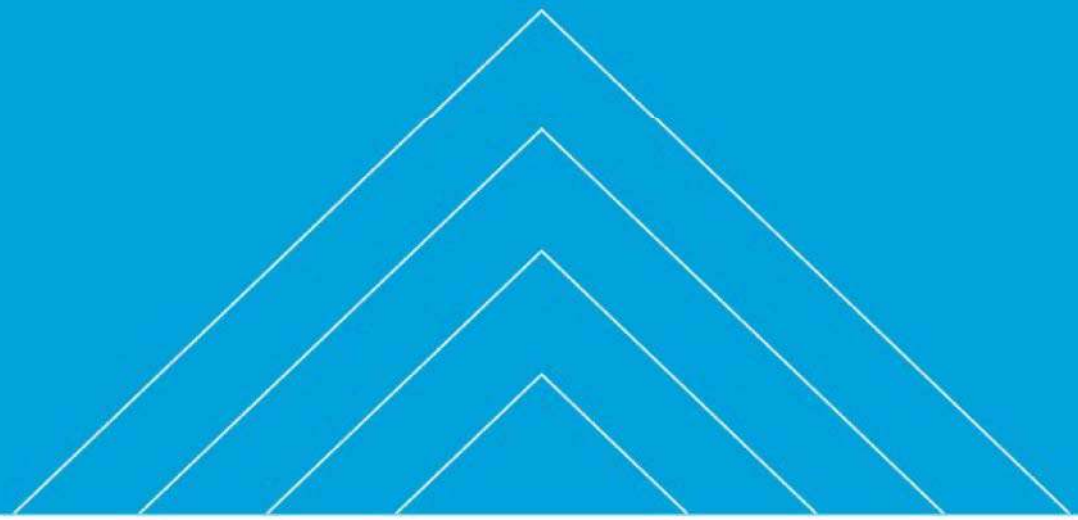
Where Vl and Vr are visibility distances to the left or right of the respective streams
D = (1+0.094(w(b-a)-3.65))(1+0.0009(Vr(b-a)-120))(1+0.0006(Vl(b-a)-150))
E = (1+0.094(w(b-c)-3.65))(1+0.0009(Vr(b-c)-120))
F = (1+0.094(w(c-b)-3.65))(1+0.0009(Vr(c-b)-120))
Y = 1-0.0345W
f = proportion of minor traffic turning left
Q (b-ac) = Q(b-c)*Q(b-a)/(1-f)*Q(b-c)+f*Q(b-a)

T.P.D.M.V.2.4
Appendix 1

Capacity of combined streams

- In accordance with TPDM V2.4

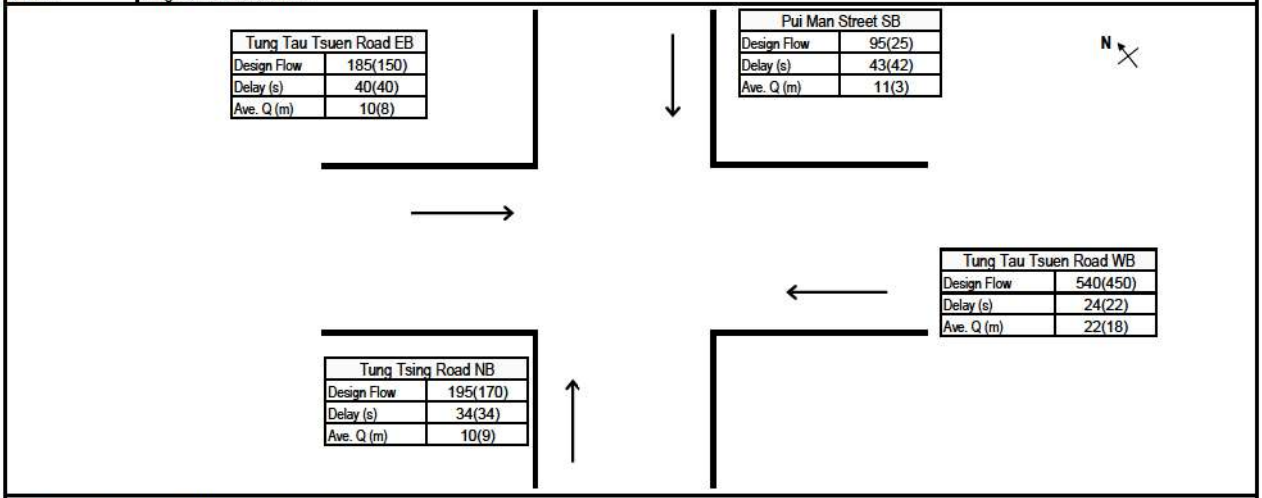
Appendix B –
Queue Length Calculation Sheets



QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J1 - Tung Tau Tsuen Road / Tung Tsing Road / Pui Man Street	Ref. No.:			
Scheme:	Existing	Design year:	2021		
		Designed by:	RC	Checked by:	PK
Arm A:	Tung Tau Tsuen Road WB				
Arm B:	Tung Tsing Road NB				
Arm C:	Pui Man Street SB				
Arm D:	Tung Tau Tsuen Road EB				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Tung Tau Tsuen Road	2	30	90	540	3765	1.2	31	90	450	3785	1.2
Tung Tsing Road NB	2	15	90	195	3710	1.2	14	90	170	3705	1.2
Pui Man Street SB	1	9	90	95	2025	1.2	6	90	25	2040	1.2
Tung Tau Tsuen Road	2	9	90	185	3865	1.2	8	90	150	3895	1.2

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Tung Tau Tsuen Road	60	0.33	0.43	11.3	16		24	20	22	22	22
Tung Tsing Road NB	75	0.17	0.31	4.1	10		34	10	10	10	10
Pui Man Street SB	81	0.10	0.49	2.0	7		43	11	11	11	11
Tung Tau Tsuen Road	81	0.10	0.49	3.9	9		40	10	10	10	10

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Tung Tau Tsuen Road	59	0.35	0.34	9.4	14		22	16	18	18	18
Tung Tsing Road NB	76	0.16	0.29	3.5	9		34	9	9	9	9
Pui Man Street SB	84	0.07	0.18	0.5	6		42	3	3	3	3
Tung Tau Tsuen Road	82	0.09	0.41	3.1	9		40	8	8	8	8

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Tung Tau Tsuen Road WB	**22**	**18**
Arm B:	Tung Tsing Road NB	**10**	**9**
Arm C:	Pui Man Street SB	**11**	**3**
Arm D:	Tung Tau Tsuen Road EB	**10**	**8**

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

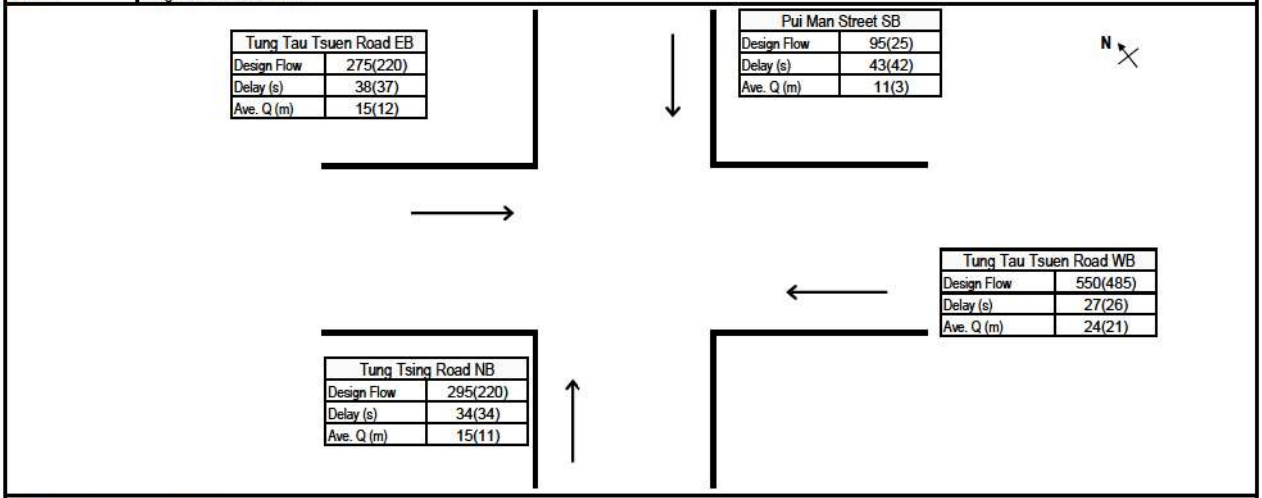
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	450	veh/hr		q '=	163	veh/hr		q '=	79	veh/hr		q '=	154	veh/hr	
c=	90	sec		c=	90	sec		c=	90	sec		c=	90	sec	
S '=	3138	veh/hr		S '=	3092	veh/hr		S '=	1688	veh/hr		S '=	3221	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.43			X=	0.31			X=	0.49			X=	0.49		
Q =	1046	veh/hr		Q =	523	veh/hr		Q =	162	veh/hr		Q =	314	veh/hr	
y=	0.14			y=	0.05			y=	0.05			y=	0.05		
L =	0.33			L=	0.17			L=	0.10			L=	0.10		
n =	2	lane		n =	2	lane		n =	1	lane		n =	2	lane	
X ' =	0.71			X ' =	0.69			X ' =	0.68			X ' =	0.68		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	FALSE		
Z =	-0.57			Z =	-0.69			Z =	-0.51			Z =	-0.51		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	7	vehs		N =	3	vehs		N =	2	vehs		N =	3	vehs	
Avg queue length =	22	metres		Avg queue leng	10	metres		Avg queue length	11	metres		Avg queue length	10	metres	
Average delay =	23.3	seconds		Average delay	32.8	seconds		Average delay =	38.6	seconds		Average delay =	38.5	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	375	veh/hr		q=	142	veh/hr		q=	21	veh/hr		q=	125	veh/hr	
c=	90	sec		c=	90	sec		c=	90	sec		c=	90	sec	
S=	3154	veh/hr		S=	3088	veh/hr		S=	1700	veh/hr		S=	3246	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.34			X=	0.29			X=	0.18			X=	0.41		
Q =	1099	veh/hr		Q =	487	veh/hr		Q =	113	veh/hr		Q =	304	veh/hr	
y=	0.12			y=	0.05			y=	0.01			y=	0.04		
L =	0.35			L=	0.16			L=	0.07			L=	0.09		
n =	2	lane		n =	2	lane		n =	1	lane		n =	2	lane	
X ' =	0.72			X ' =	0.69			X ' =	0.67			X ' =	0.68		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	FALSE		
Z =	-0.66			Z =	-0.71			Z =	-0.82			Z =	-0.59		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	6	vehs		N =	3	vehs		N =	0	vehs		N =	3	vehs	
Avg queue length =	18	metres		Avg queue leng	9	metres		Avg queue length	3	metres		Avg queue length	8	metres	
Average delay =	21.7	seconds		Average delay	33.5	seconds		Average delay =	39.7	seconds		Average delay =	38.4	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J1 - Tung Tau Tsuen Road / Tung Tsing Road / Pui Man Street	Ref. No.:			
Scheme:	Reference	Design year:	2033		
		Designed by:	RC	Checked by:	PK
Arm A:	Tung Tau Tsuen Road WB				
Arm B:	Tung Tsing Road NB				
Arm C:	Pui Man Street SB				
Arm D:	Tung Tau Tsuen Road EB				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Tung Tau Tsuen Road	2	26	90	550	3765	1.2	27	90	485	3785	1.2
Tung Tsing Road NB	2	16	90	295	3710	1.2	15	90	220	3705	1.2
Pui Man Street SB	1	8	90	95	2025	1.2	6	90	25	2040	1.2
Tung Tau Tsuen Road	2	12	90	275	3875	1.2	11	90	220	3875	1.2

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Tung Tau Tsuen Road	64	0.29	0.50	11.5	17		27	23	24	24	24
Tung Tsing Road NB	74	0.17	0.46	6.1	12		34	15	15	15	15
Pui Man Street SB	82	0.09	0.50	2.0	7		43	11	11	11	11
Tung Tau Tsuen Road	78	0.13	0.54	5.7	12		38	15	15	15	15

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Tung Tau Tsuen Road	63	0.30	0.42	10.1	16		26	19	21	21	21
Tung Tsing Road NB	75	0.17	0.35	4.6	10		34	11	11	11	11
Pui Man Street SB	84	0.07	0.18	0.5	6		42	3	3	3	3
Tung Tau Tsuen Road	79	0.13	0.45	4.6	10		37	12	12	12	12

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Tung Tau Tsuen Road WB	**24**	**21**
Arm B:	Tung Tsing Road NB	**15**	**11**
Arm C:	Pui Man Street SB	**11**	**3**
Arm D:	Tung Tau Tsuen Road EB	**15**	**12**

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

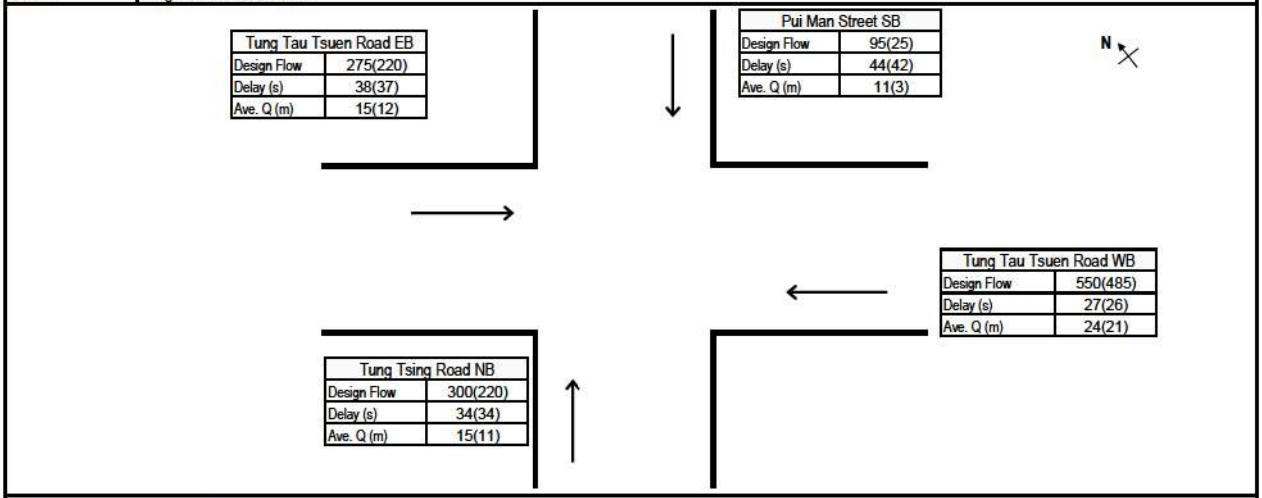
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	458	veh/hr		q '=	246	veh/hr		q '=	79	veh/hr		q '=	229	veh/hr	
c=	90	sec		c=	90	sec		c=	90	sec		c=	90	sec	
S '=	3138	veh/hr		S '=	3092	veh/hr		S '=	1688	veh/hr		S '=	3229	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.50			X=	0.46			X=	0.50			X=	0.54		
Q =	922	veh/hr		Q =	538	veh/hr		Q =	159	veh/hr		Q =	427	veh/hr	
y=	0.15			y=	0.08			y=	0.05			y=	0.07		
L =	0.29			L=	0.17			L=	0.09			L=	0.13		
n =	2	lane		n =	2	lane		n =	1	lane		n =	2	lane	
X ' =	0.71			X ' =	0.69			X ' =	0.68			X ' =	0.69		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	FALSE		
Z =	-0.50			Z =	-0.54			Z =	-0.50			Z =	-0.46		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	8	vehs		N =	5	vehs		N =	2	vehs		N =	5	vehs	
Avg queue length =	24	metres		Avg queue leng	15	metres		Avg queue length	11	metres		Avg queue length	15	metres	
Average delay =	26.3	seconds		Average delay	33.4	seconds		Average delay =	38.7	seconds		Average delay =	36.5	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	404	veh/hr		q=	183	veh/hr		q=	21	veh/hr		q=	183	veh/hr	
c=	90	sec		c=	90	sec		c=	90	sec		c=	90	sec	
S=	3154	veh/hr		S=	3088	veh/hr		S=	1700	veh/hr		S=	3229	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.42			X=	0.35			X=	0.18			X=	0.45		
Q =	956	veh/hr		Q =	523	veh/hr		Q =	113	veh/hr		Q =	411	veh/hr	
y=	0.13			y=	0.06			y=	0.01			y=	0.06		
L =	0.30			L=	0.17			L=	0.07			L=	0.13		
n =	2	lane		n =	2	lane		n =	1	lane		n =	2	lane	
X ' =	0.71			X ' =	0.69			X ' =	0.67			X ' =	0.69		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	FALSE		
Z =	-0.58			Z =	-0.65			Z =	-0.82			Z =	-0.55		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	7	vehs		N =	4	vehs		N =	0	vehs		N =	4	vehs	
Avg queue length =	21	metres		Avg queue leng	11	metres		Avg queue length	3	metres		Avg queue length	12	metres	
Average delay =	25.1	seconds		Average delay	33.0	seconds		Average delay =	39.7	seconds		Average delay =	36.3	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J1 - Tung Tau Tsuen Road / Tung Tsing Road / Pui Man Street	Ref. No.:			
Scheme:	Design	Design year:	2033		
		Designed by:	RC	Checked by:	PK
Arm A:	Tung Tau Tsuen Road WB				
Arm B:	Tung Tsing Road NB				
Arm C:	Pui Man Street SB				
Arm D:	Tung Tau Tsuen Road EB				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Tung Tau Tsuen Road	2	26	90	550	3765	1.2	27	90	485	3785	1.2
Tung Tsing Road NB	2	16	90	300	3710	1.2	15	90	220	3705	1.2
Pui Man Street SB	1	8	90	95	2025	1.2	6	90	25	2040	1.2
Tung Tau Tsuen Road	2	12	90	275	3875	1.2	11	90	220	3875	1.2

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Tung Tau Tsuen Road	64	0.29	0.50	11.5	17		27	23	24	24	24
Tung Tsing Road NB	74	0.18	0.46	6.3	12		34	15	15	15	15
Pui Man Street SB	82	0.09	0.50	2.0	7		44	11	11	11	11
Tung Tau Tsuen Road	78	0.13	0.54	5.7	12		38	15	15	15	15

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Tung Tau Tsuen Road	63	0.30	0.42	10.1	16		26	19	21	21	21
Tung Tsing Road NB	75	0.17	0.35	4.6	10		34	11	11	11	11
Pui Man Street SB	84	0.07	0.18	0.5	6		42	3	3	3	3
Tung Tau Tsuen Road	79	0.13	0.45	4.6	10		37	12	12	12	12

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Tung Tau Tsuen Road WB	**24**	**21**
Arm B:	Tung Tsing Road NB	**15**	**11**
Arm C:	Pui Man Street SB	**11**	**3**
Arm D:	Tung Tau Tsuen Road EB	**15**	**12**

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

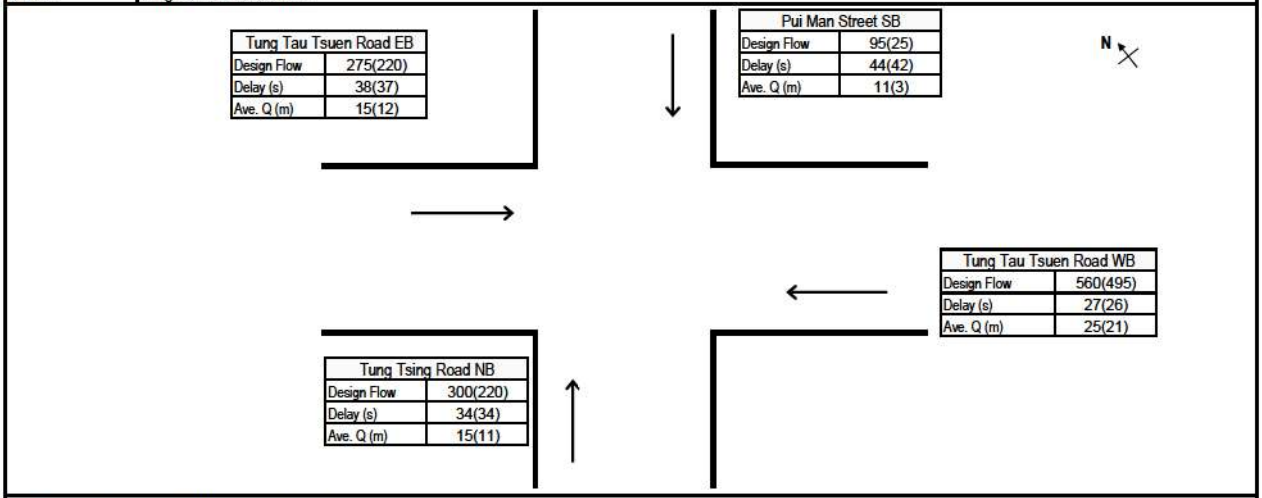
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	458	veh/hr		q '=	250	veh/hr		q '=	79	veh/hr		q '=	229	veh/hr	
c=	90	sec		c=	90	sec		c=	90	sec		c=	90	sec	
S '=	3138	veh/hr		S '=	3092	veh/hr		S '=	1688	veh/hr		S '=	3229	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.50			X=	0.46			X=	0.50			X=	0.54		
Q =	915	veh/hr		Q =	548	veh/hr		Q =	158	veh/hr		Q =	423	veh/hr	
y=	0.15			y=	0.08			y=	0.05			y=	0.07		
L =	0.29			L=	0.18			L=	0.09			L=	0.13		
n =	2	lane		n =	2	lane		n =	1	lane		n =	2	lane	
X ' =	0.71			X ' =	0.69			X ' =	0.68			X ' =	0.69		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	FALSE		
Z =	-0.50			Z =	-0.54			Z =	-0.50			Z =	-0.46		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	8	vehs		N =	5	vehs		N =	2	vehs		N =	5	vehs	
Avg queue length =	24	metres		Avg queue leng	15	metres		Avg queue length	11	metres		Avg queue length	15	metres	
Average delay =	26.4	seconds		Average delay	33.1	seconds		Average delay =	38.8	seconds		Average delay =	36.6	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	404	veh/hr		q=	183	veh/hr		q=	21	veh/hr		q=	183	veh/hr	
c=	90	sec		c=	90	sec		c=	90	sec		c=	90	sec	
S=	3154	veh/hr		S=	3088	veh/hr		S=	1700	veh/hr		S=	3229	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.42			X=	0.35			X=	0.18			X=	0.45		
Q =	956	veh/hr		Q =	523	veh/hr		Q =	113	veh/hr		Q =	411	veh/hr	
y=	0.13			y=	0.06			y=	0.01			y=	0.06		
L =	0.30			L=	0.17			L=	0.07			L=	0.13		
n =	2	lane		n =	2	lane		n =	1	lane		n =	2	lane	
X ' =	0.71			X ' =	0.69			X ' =	0.67			X ' =	0.69		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	FALSE		
Z =	-0.58			Z =	-0.65			Z =	-0.82			Z =	-0.55		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	7	vehs		N =	4	vehs		N =	0	vehs		N =	4	vehs	
Avg queue length =	21	metres		Avg queue leng	11	metres		Avg queue length	3	metres		Avg queue length	12	metres	
Average delay =	25.1	seconds		Average delay	33.0	seconds		Average delay =	39.7	seconds		Average delay =	36.3	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J1 - Tung Tau Tsuen Road / Tung Tsing Road / Pui Man Street	Ref. No.:			
Scheme:	Reference	Design year:	2036		
		Designed by:	RC	Checked by:	PK
Arm A:	Tung Tau Tsuen Road WB				
Arm B:	Tung Tsing Road NB				
Arm C:	Pui Man Street SB				
Arm D:	Tung Tau Tsuen Road EB				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Tung Tau Tsuen Road	2	26	90	560	3765	1.2	28	90	495	3785	1.2
Tung Tsing Road NB	2	16	90	300	3710	1.2	15	90	220	3705	1.2
Pui Man Street SB	1	8	90	95	2025	1.2	6	90	25	2040	1.2
Tung Tau Tsuen Road	2	12	90	275	3875	1.2	11	90	220	3875	1.2

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Tung Tau Tsuen Road	64	0.29	0.51	11.7	18		27	23	25	25	25
Tung Tsing Road NB	74	0.18	0.46	6.3	12		34	15	15	15	15
Pui Man Street SB	82	0.09	0.51	2.0	7		44	11	11	11	11
Tung Tau Tsuen Road	78	0.13	0.55	5.7	12		38	15	15	15	15

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Tung Tau Tsuen Road	62	0.31	0.43	10.3	16		26	20	21	21	21
Tung Tsing Road NB	75	0.17	0.35	4.6	10		34	11	11	11	11
Pui Man Street SB	84	0.07	0.18	0.5	6		42	3	3	3	3
Tung Tau Tsuen Road	79	0.13	0.45	4.6	10		37	12	12	12	12

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Tung Tau Tsuen Road WB	**25**	**21**
Arm B:	Tung Tsing Road NB	**15**	**11**
Arm C:	Pui Man Street SB	**11**	**3**
Arm D:	Tung Tau Tsuen Road EB	**15**	**12**

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

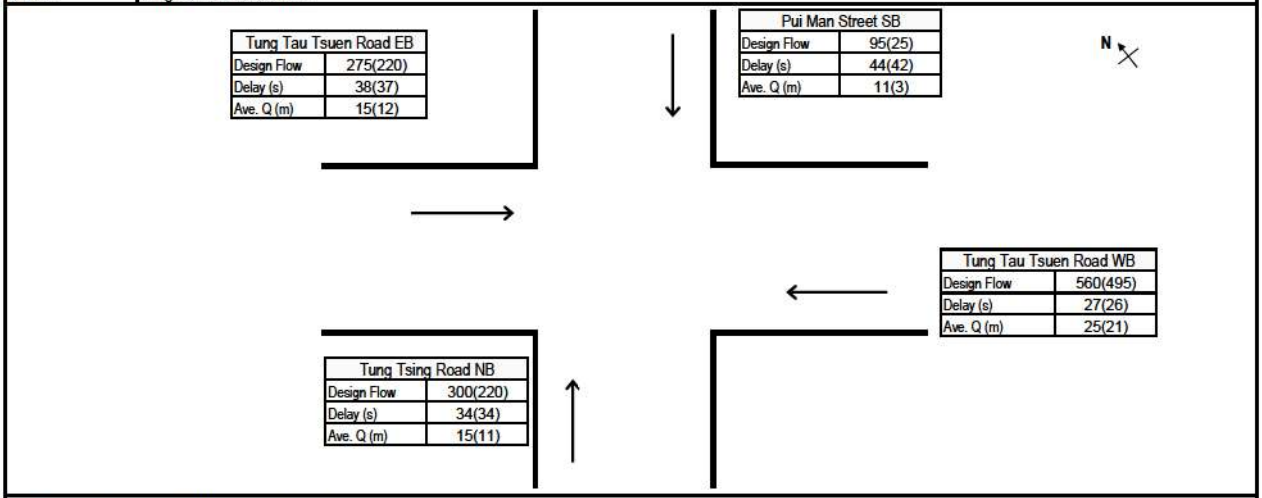
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	467	veh/hr		q '=	250	veh/hr		q '=	79	veh/hr		q '=	229	veh/hr	
c=	90	sec		c=	90	sec		c=	90	sec		c=	90	sec	
S '=	3138	veh/hr		S '=	3092	veh/hr		S '=	1688	veh/hr		S '=	3229	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.51			X=	0.46			X=	0.51			X=	0.55		
Q =	923	veh/hr		Q =	543	veh/hr		Q =	156	veh/hr		Q =	420	veh/hr	
y=	0.15			y=	0.08			y=	0.05			y=	0.07		
L =	0.29			L=	0.18			L=	0.09			L=	0.13		
n =	2	lane		n =	2	lane		n =	1	lane		n =	2	lane	
X ' =	0.71			X ' =	0.69			X ' =	0.68			X ' =	0.69		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	FALSE		
Z =	-0.49			Z =	-0.54			Z =	-0.49			Z =	-0.45		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	8	vehs		N =	5	vehs		N =	2	vehs		N =	5	vehs	
Avg queue length =	25	metres		Avg queue leng	15	metres		Avg queue length	11	metres		Avg queue length	15	metres	
Average delay =	26.3	seconds		Average delay	33.3	seconds		Average delay =	38.9	seconds		Average delay =	36.7	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	413	veh/hr		q=	183	veh/hr		q=	21	veh/hr		q=	183	veh/hr	
c=	90	sec		c=	90	sec		c=	90	sec		c=	90	sec	
S=	3154	veh/hr		S=	3088	veh/hr		S=	1700	veh/hr		S=	3229	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.43			X=	0.35			X=	0.18			X=	0.45		
Q =	966	veh/hr		Q =	518	veh/hr		Q =	113	veh/hr		Q =	407	veh/hr	
y=	0.13			y=	0.06			y=	0.01			y=	0.06		
L =	0.31			L=	0.17			L=	0.07			L=	0.13		
n =	2	lane		n =	2	lane		n =	1	lane		n =	2	lane	
X ' =	0.71			X ' =	0.69			X ' =	0.67			X ' =	0.69		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	FALSE		
Z =	-0.57			Z =	-0.65			Z =	-0.82			Z =	-0.55		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	7	vehs		N =	4	vehs		N =	0	vehs		N =	4	vehs	
Avg queue length =	21	metres		Avg queue leng	11	metres		Avg queue length	3	metres		Avg queue length	12	metres	
Average delay =	24.9	seconds		Average delay	33.1	seconds		Average delay =	39.7	seconds		Average delay =	36.4	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J1 - Tung Tau Tsuen Road / Tung Tsing Road / Pui Man Street	Ref. No.:			
Scheme:	Design	Design year:	2036		
		Designed by:	RC	Checked by:	PK
Arm A:	Tung Tau Tsuen Road WB				
Arm B:	Tung Tsing Road NB				
Arm C:	Pui Man Street SB				
Arm D:	Tung Tau Tsuen Road EB				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Tung Tau Tsuen Road	2	26	90	560	3765	1.2	28	90	495	3785	1.2
Tung Tsing Road NB	2	16	90	300	3710	1.2	15	90	220	3705	1.2
Pui Man Street SB	1	8	90	95	2025	1.2	6	90	25	2040	1.2
Tung Tau Tsuen Road	2	12	90	275	3875	1.2	11	90	220	3875	1.2

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Tung Tau Tsuen Road	64	0.29	0.51	11.7	18		27	23	25	25	25
Tung Tsing Road NB	74	0.18	0.46	6.3	12		34	15	15	15	15
Pui Man Street SB	82	0.09	0.51	2.0	7		44	11	11	11	11
Tung Tau Tsuen Road	78	0.13	0.55	5.7	12		38	15	15	15	15

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Tung Tau Tsuen Road	62	0.31	0.43	10.3	16		26	20	21	21	21
Tung Tsing Road NB	75	0.17	0.35	4.6	10		34	11	11	11	11
Pui Man Street SB	84	0.07	0.18	0.5	6		42	3	3	3	3
Tung Tau Tsuen Road	79	0.13	0.45	4.6	10		37	12	12	12	12

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Tung Tau Tsuen Road WB	**25**	**21**
Arm B:	Tung Tsing Road NB	**15**	**11**
Arm C:	Pui Man Street SB	**11**	**3**
Arm D:	Tung Tau Tsuen Road EB	**15**	**12**

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

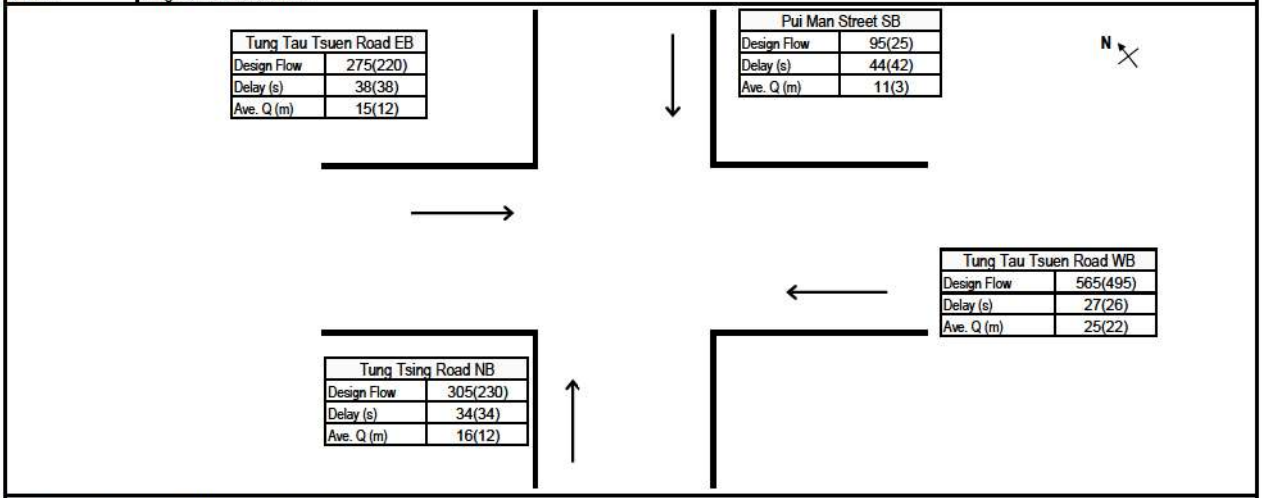
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	467	veh/hr		q '=	250	veh/hr		q '=	79	veh/hr		q '=	229	veh/hr	
c=	90	sec		c=	90	sec		c=	90	sec		c=	90	sec	
S '=	3138	veh/hr		S '=	3092	veh/hr		S '=	1688	veh/hr		S '=	3229	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.51			X=	0.46			X=	0.51			X=	0.55		
Q =	923	veh/hr		Q =	543	veh/hr		Q =	156	veh/hr		Q =	420	veh/hr	
y=	0.15			y=	0.08			y=	0.05			y=	0.07		
L =	0.29			L=	0.18			L=	0.09			L=	0.13		
n =	2	lane		n =	2	lane		n =	1	lane		n =	2	lane	
X ' =	0.71			X ' =	0.69			X ' =	0.68			X ' =	0.69		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	FALSE		
Z =	-0.49			Z =	-0.54			Z =	-0.49			Z =	-0.45		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	8	vehs		N =	5	vehs		N =	2	vehs		N =	5	vehs	
Avg queue length =	25	metres		Avg queue leng	15	metres		Avg queue length	11	metres		Avg queue length	15	metres	
Average delay =	26.3	seconds		Average delay	33.3	seconds		Average delay =	38.9	seconds		Average delay =	36.7	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	413	veh/hr		q=	183	veh/hr		q=	21	veh/hr		q=	183	veh/hr	
c=	90	sec		c=	90	sec		c=	90	sec		c=	90	sec	
S=	3154	veh/hr		S=	3088	veh/hr		S=	1700	veh/hr		S=	3229	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.43			X=	0.35			X=	0.18			X=	0.45		
Q =	966	veh/hr		Q =	518	veh/hr		Q =	113	veh/hr		Q =	407	veh/hr	
y=	0.13			y=	0.06			y=	0.01			y=	0.06		
L =	0.31			L=	0.17			L=	0.07			L=	0.13		
n =	2	lane		n =	2	lane		n =	1	lane		n =	2	lane	
X ' =	0.71			X ' =	0.69			X ' =	0.67			X ' =	0.69		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	FALSE		
Z =	-0.57			Z =	-0.65			Z =	-0.82			Z =	-0.55		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	7	vehs		N =	4	vehs		N =	0	vehs		N =	4	vehs	
Avg queue length =	21	metres		Avg queue leng	11	metres		Avg queue length	3	metres		Avg queue length	12	metres	
Average delay =	24.9	seconds		Average delay	33.1	seconds		Average delay =	39.7	seconds		Average delay =	36.4	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J1 - Tung Tau Tsuen Road / Tung Tsing Road / Pui Man Street	Ref. No.:			
Scheme:	Reference	Design year:	2037		
		Designed by:	RC	Checked by:	PK
Arm A:	Tung Tau Tsuen Road WB				
Arm B:	Tung Tsing Road NB				
Arm C:	Pui Man Street SB				
Arm D:	Tung Tau Tsuen Road EB				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Tung Tau Tsuen Road	2	27	90	565	3765	1.2	27	90	495	3785	1.2
Tung Tsing Road NB	2	16	90	305	3710	1.2	15	90	230	3705	1.2
Pui Man Street SB	1	8	90	95	2025	1.2	6	90	25	2040	1.2
Tung Tau Tsuen Road	2	12	90	275	3875	1.2	11	90	220	3875	1.2

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Tung Tau Tsuen Road	63	0.29	0.51	11.8	18		27	23	25	25	25
Tung Tsing Road NB	74	0.18	0.46	6.4	12		34	15	16	16	16
Pui Man Street SB	82	0.09	0.52	2.0	8		44	11	11	11	11
Tung Tau Tsuen Road	78	0.13	0.56	5.7	12		38	15	15	15	15

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Tung Tau Tsuen Road	63	0.30	0.43	10.3	16		26	20	22	22	22
Tung Tsing Road NB	75	0.17	0.36	4.8	10		34	11	12	12	12
Pui Man Street SB	84	0.07	0.18	0.5	6		42	3	3	3	3
Tung Tau Tsuen Road	79	0.12	0.45	4.6	10		38	12	12	12	12

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Tung Tau Tsuen Road WB	**25**	**22**
Arm B:	Tung Tsing Road NB	**16**	**12**
Arm C:	Pui Man Street SB	**11**	**3**
Arm D:	Tung Tau Tsuen Road EB	**15**	**12**

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

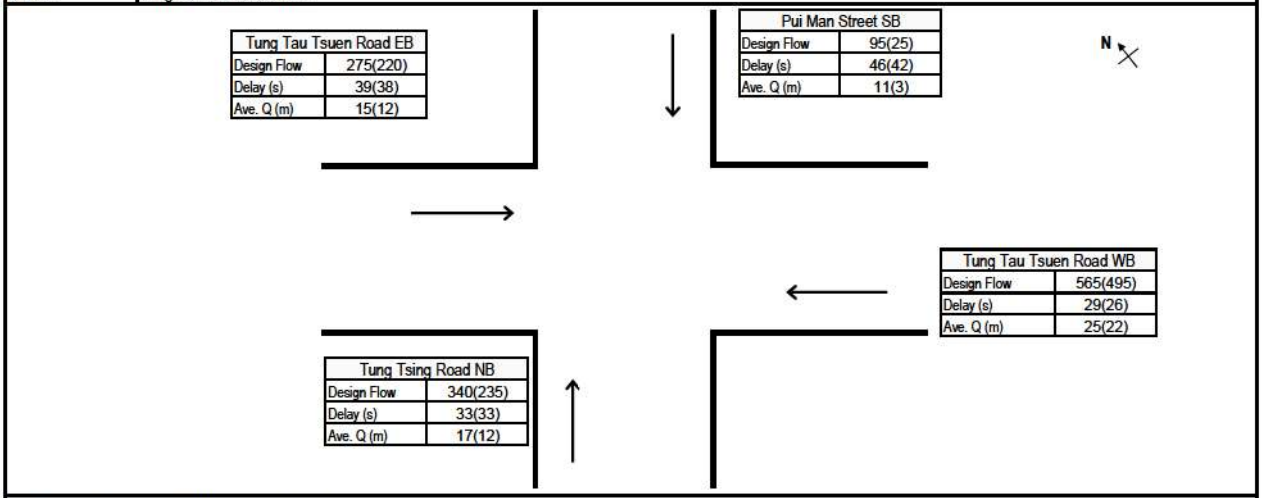
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	471	veh/hr		q '=	254	veh/hr		q '=	79	veh/hr		q '=	229	veh/hr	
c=	90	sec		c=	90	sec		c=	90	sec		c=	90	sec	
S '=	3138	veh/hr		S '=	3092	veh/hr		S '=	1688	veh/hr		S '=	3229	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.51			X=	0.46			X=	0.52			X=	0.56		
Q =	924	veh/hr		Q =	549	veh/hr		Q =	154	veh/hr		Q =	413	veh/hr	
y=	0.15			y=	0.08			y=	0.05			y=	0.07		
L =	0.29			L=	0.18			L=	0.09			L=	0.13		
n =	2	lane		n =	2	lane		n =	1	lane		n =	2	lane	
X ' =	0.71			X ' =	0.69			X ' =	0.68			X ' =	0.69		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	FALSE		
Z =	-0.49			Z =	-0.54			Z =	-0.48			Z =	-0.44		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	8	vehs		N =	5	vehs		N =	2	vehs		N =	5	vehs	
Avg queue length =	25	metres		Avg queue leng	16	metres		Avg queue lengtl	11	metres		Avg queue lengtl	15	metres	
Average delay =	26.3	seconds		Average delay	33.2	seconds		Average delay =	39.0	seconds		Average delay =	36.8	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	413	veh/hr		q=	192	veh/hr		q=	21	veh/hr		q=	183	veh/hr	
c=	90	sec		c=	90	sec		c=	90	sec		c=	90	sec	
S=	3154	veh/hr		S=	3088	veh/hr		S=	1700	veh/hr		S=	3229	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.43			X=	0.36			X=	0.18			X=	0.45		
Q =	957	veh/hr		Q =	530	veh/hr		Q =	113	veh/hr		Q =	403	veh/hr	
y=	0.13			y=	0.06			y=	0.01			y=	0.06		
L =	0.30			L=	0.17			L=	0.07			L=	0.12		
n =	2	lane		n =	2	lane		n =	1	lane		n =	2	lane	
X ' =	0.71			X ' =	0.69			X ' =	0.67			X ' =	0.69		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	FALSE		
Z =	-0.57			Z =	-0.64			Z =	-0.82			Z =	-0.55		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	7	vehs		N =	4	vehs		N =	0	vehs		N =	4	vehs	
Avg queue length =	22	metres		Avg queue leng	12	metres		Avg queue lengtl	3	metres		Avg queue lengtl	12	metres	
Average delay =	25.1	seconds		Average delay	32.9	seconds		Average delay =	39.7	seconds		Average delay =	36.5	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J1 - Tung Tau Tsuen Road / Tung Tsing Road / Pui Man Street	Ref. No.:			
Scheme:	Design	Design year:	2037		
		Designed by:	RC	Checked by:	PK
Arm A:	Tung Tau Tsuen Road WB				
Arm B:	Tung Tsing Road NB				
Arm C:	Pui Man Street SB				
Arm D:	Tung Tau Tsuen Road EB				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Tung Tau Tsuen Road	2	25	90	565	3765	1.2	27	90	495	3785	1.2
Tung Tsing Road NB	2	18	90	340	3705	1.2	16	90	235	3705	1.2
Pui Man Street SB	1	8	90	95	2025	1.2	6	90	25	2040	1.2
Tung Tau Tsuen Road	2	11	90	275	3875	1.2	11	90	220	3875	1.2

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Tung Tau Tsuen Road	65	0.28	0.54	11.8	18		29	24	25	25	25
Tung Tsing Road NB	72	0.20	0.46	7.1	13		33	16	17	17	17
Pui Man Street SB	82	0.09	0.55	2.0	8		46	11	11	11	11
Tung Tau Tsuen Road	79	0.12	0.59	5.7	12		39	15	15	15	15

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Tung Tau Tsuen Road	63	0.30	0.44	10.3	16		26	20	22	22	22
Tung Tsing Road NB	74	0.18	0.36	4.9	11		33	12	12	12	12
Pui Man Street SB	84	0.07	0.18	0.5	6		42	3	3	3	3
Tung Tau Tsuen Road	79	0.12	0.46	4.6	10		38	12	12	12	12

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Tung Tau Tsuen Road WB	**25**	**22**
Arm B:	Tung Tsing Road NB	**17**	**12**
Arm C:	Pui Man Street SB	**11**	**3**
Arm D:	Tung Tau Tsuen Road EB	**15**	**12**

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

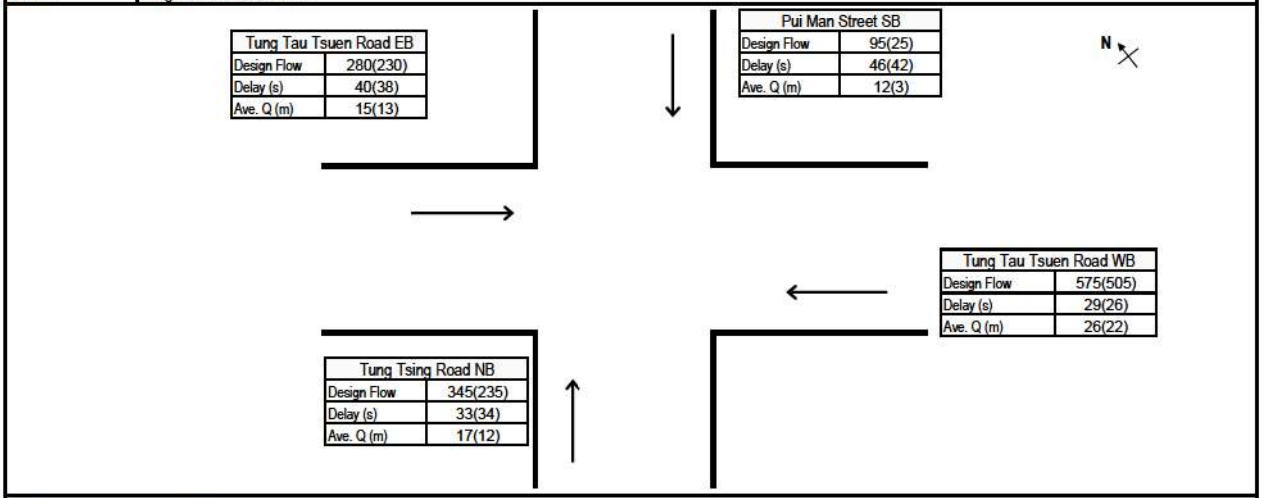
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	471	veh/hr		q '=	283	veh/hr		q '=	79	veh/hr		q '=	229	veh/hr	
c=	90	sec		c=	90	sec		c=	90	sec		c=	90	sec	
S '=	3138	veh/hr		S '=	3088	veh/hr		S '=	1688	veh/hr		S '=	3229	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.54			X=	0.46			X=	0.55			X=	0.59		
Q =	876	veh/hr		Q =	617	veh/hr		Q =	145	veh/hr		Q =	391	veh/hr	
y=	0.15			y=	0.09			y=	0.05			y=	0.07		
L =	0.28			L=	0.20			L=	0.09			L=	0.12		
n =	2	lane		n =	2	lane		n =	1	lane		n =	2	lane	
X ' =	0.71			X ' =	0.70			X ' =	0.68			X ' =	0.69		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	FALSE		
Z =	-0.46			Z =	-0.54			Z =	-0.45			Z =	-0.41		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	8	vehs		N =	6	vehs		N =	2	vehs		N =	5	vehs	
Avg queue length =	25	metres		Avg queue leng	17	metres		Avg queue lengtl	11	metres		Avg queue lengtl	15	metres	
Average delay =	27.5	seconds		Average delay	31.7	seconds		Average delay =	39.5	seconds		Average delay =	37.4	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	413	veh/hr		q=	196	veh/hr		q=	21	veh/hr		q=	183	veh/hr	
c=	90	sec		c=	90	sec		c=	90	sec		c=	90	sec	
S=	3154	veh/hr		S=	3088	veh/hr		S=	1700	veh/hr		S=	3229	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.44			X=	0.36			X=	0.18			X=	0.46		
Q =	948	veh/hr		Q =	543	veh/hr		Q =	113	veh/hr		Q =	399	veh/hr	
y=	0.13			y=	0.06			y=	0.01			y=	0.06		
L =	0.30			L=	0.18			L=	0.07			L=	0.12		
n =	2	lane		n =	2	lane		n =	1	lane		n =	2	lane	
X ' =	0.71			X ' =	0.69			X ' =	0.67			X ' =	0.69		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	FALSE		
Z =	-0.56			Z =	-0.64			Z =	-0.82			Z =	-0.54		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	7	vehs		N =	4	vehs		N =	0	vehs		N =	4	vehs	
Avg queue length =	22	metres		Avg queue leng	12	metres		Avg queue lengtl	3	metres		Avg queue lengtl	12	metres	
Average delay =	25.3	seconds		Average delay	32.6	seconds		Average delay =	39.7	seconds		Average delay =	36.6	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J1 - Tung Tau Tsuen Road / Tung Tsing Road / Pui Man Street	Ref. No.:			
Scheme:	Reference	Design year:	2040		
		Designed by:	RC	Checked by:	PK
Arm A:	Tung Tau Tsuen Road WB				
Arm B:	Tung Tsing Road NB				
Arm C:	Pui Man Street SB				
Arm D:	Tung Tau Tsuen Road EB				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Tung Tau Tsuen Road	2	25	90	575	3765	1.2	27	90	505	3785	1.2
Tung Tsing Road NB	2	18	90	345	3705	1.2	16	90	235	3705	1.2
Pui Man Street SB	1	8	90	95	2025	1.2	6	90	25	2040	1.2
Tung Tau Tsuen Road	2	11	90	280	3875	1.2	11	90	230	3870	1.2

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Tung Tau Tsuen Road	65	0.28	0.55	12.0	18		29	24	26	26	26
Tung Tsing Road NB	72	0.20	0.46	7.2	13		33	16	17	17	17
Pui Man Street SB	82	0.08	0.56	2.0	8		46	12	11	11	12
Tung Tau Tsuen Road	79	0.12	0.60	5.8	13		40	15	15	15	15

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Tung Tau Tsuen Road	63	0.30	0.44	10.5	16		26	20	22	22	22
Tung Tsing Road NB	74	0.17	0.37	4.9	11		34	12	12	12	12
Pui Man Street SB	84	0.07	0.18	0.5	6		42	3	3	3	3
Tung Tau Tsuen Road	79	0.13	0.47	4.8	10		38	12	13	13	13

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Tung Tau Tsuen Road WB	**26**	**22**
Arm B:	Tung Tsing Road NB	**17**	**12**
Arm C:	Pui Man Street SB	**12**	**3**
Arm D:	Tung Tau Tsuen Road EB	**15**	**13**

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

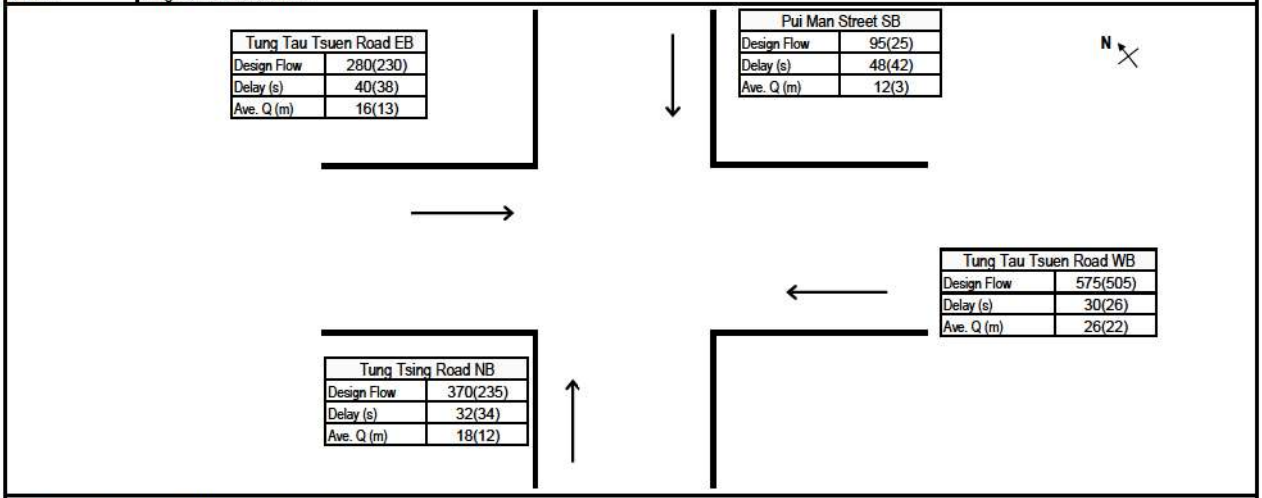
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	479	veh/hr		q '=	288	veh/hr		q '=	79	veh/hr		q '=	233	veh/hr	
c=	90	sec		c=	90	sec		c=	90	sec		c=	90	sec	
S '=	3138	veh/hr		S '=	3088	veh/hr		S '=	1688	veh/hr		S '=	3229	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.55			X=	0.46			X=	0.56			X=	0.60		
Q =	874	veh/hr		Q =	618	veh/hr		Q =	142	veh/hr		Q =	391	veh/hr	
y=	0.15			y=	0.09			y=	0.05			y=	0.07		
L =	0.28			L=	0.20			L=	0.08			L=	0.12		
n =	2	lane		n =	2	lane		n =	1	lane		n =	2	lane	
X ' =	0.71			X ' =	0.70			X ' =	0.68			X ' =	0.69		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	FALSE		
Z =	-0.45			Z =	-0.54			Z =	-0.44			Z =	-0.40		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	9	vehs		N =	6	vehs		N =	2	vehs		N =	5	vehs	
Avg queue length =	26	metres		Avg queue leng	17	metres		Avg queue lengtl	11	metres		Avg queue lengtl	15	metres	
Average delay =	27.6	seconds		Average delay	31.7	seconds		Average delay =	39.6	seconds		Average delay =	37.5	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	421	veh/hr		q=	196	veh/hr		q=	21	veh/hr		q=	192	veh/hr	
c=	90	sec		c=	90	sec		c=	90	sec		c=	90	sec	
S=	3154	veh/hr		S=	3088	veh/hr		S=	1700	veh/hr		S=	3225	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.44			X=	0.37			X=	0.18			X=	0.47		
Q =	948	veh/hr		Q =	532	veh/hr		Q =	113	veh/hr		Q =	410	veh/hr	
y=	0.13			y=	0.06			y=	0.01			y=	0.06		
L =	0.30			L=	0.17			L=	0.07			L=	0.13		
n =	2	lane		n =	2	lane		n =	1	lane		n =	2	lane	
X ' =	0.71			X ' =	0.69			X ' =	0.67			X ' =	0.69		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	FALSE		
Z =	-0.56			Z =	-0.63			Z =	-0.82			Z =	-0.53		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	7	vehs		N =	4	vehs		N =	0	vehs		N =	4	vehs	
Avg queue length =	22	metres		Avg queue leng	12	metres		Avg queue lengtl	3	metres		Avg queue lengtl	13	metres	
Average delay =	25.4	seconds		Average delay	32.9	seconds		Average delay =	39.7	seconds		Average delay =	36.5	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J1 - Tung Tau Tsuen Road / Tung Tsing Road / Pui Man Street	Ref. No.:			
Scheme:	Design	Design year:	2040		
		Designed by:	RC	Checked by:	PK
Arm A:	Tung Tau Tsuen Road WB				
Arm B:	Tung Tsing Road NB				
Arm C:	Pui Man Street SB				
Arm D:	Tung Tau Tsuen Road EB				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Tung Tau Tsuen Road	2	24	90	575	3765	1.2	27	90	505	3785	1.2
Tung Tsing Road NB	2	19	90	370	3705	1.2	16	90	235	3705	1.2
Pui Man Street SB	1	7	90	95	2025	1.2	6	90	25	2040	1.2
Tung Tau Tsuen Road	2	11	90	280	3875	1.2	11	90	230	3870	1.2

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Tung Tau Tsuen Road	66	0.27	0.57	12.0	18		30	25	26	26	26
Tung Tsing Road NB	71	0.21	0.47	7.7	14		32	17	18	18	18
Pui Man Street SB	83	0.08	0.58	2.0	8		48	12	11	11	12
Tung Tau Tsuen Road	79	0.12	0.62	5.8	13		40	16	15	15	16

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Tung Tau Tsuen Road	63	0.30	0.44	10.5	16		26	20	22	22	22
Tung Tsing Road NB	74	0.17	0.37	4.9	11		34	12	12	12	12
Pui Man Street SB	84	0.07	0.18	0.5	6		42	3	3	3	3
Tung Tau Tsuen Road	79	0.13	0.47	4.8	10		38	12	13	13	13

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Tung Tau Tsuen Road WB	**26**	**22**
Arm B:	Tung Tsing Road NB	**18**	**12**
Arm C:	Pui Man Street SB	**12**	**3**
Arm D:	Tung Tau Tsuen Road EB	**16**	**13**

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

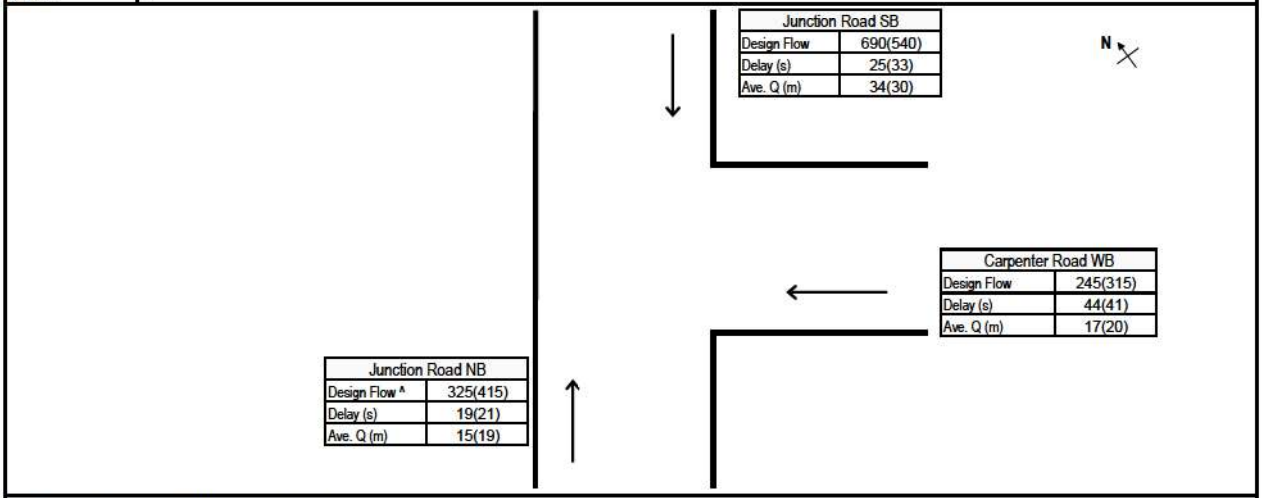
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	479	veh/hr		q '=	308	veh/hr		q '=	79	veh/hr		q '=	233	veh/hr	
c=	90	sec		c=	90	sec		c=	90	sec		c=	90	sec	
S '=	3138	veh/hr		S '=	3088	veh/hr		S '=	1688	veh/hr		S '=	3229	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.57			X=	0.47			X=	0.58			X=	0.62		
Q =	844	veh/hr		Q =	662	veh/hr		Q =	137	veh/hr		Q =	377	veh/hr	
y=	0.15			y=	0.10			y=	0.05			y=	0.07		
L =	0.27			L=	0.21			L=	0.08			L=	0.12		
n =	2	lane		n =	2	lane		n =	1	lane		n =	2	lane	
X ' =	0.71			X ' =	0.70			X ' =	0.68			X ' =	0.69		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	FALSE		
Z =	-0.43			Z =	-0.53			Z =	-0.42			Z =	-0.38		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	9	vehs		N =	6	vehs		N =	2	vehs		N =	5	vehs	
Avg queue length =	26	metres		Avg queue leng	18	metres		Avg queue lengtl	11	metres		Avg queue lengtl	15	metres	
Average delay =	28.4	seconds		Average delay	30.9	seconds		Average delay =	39.9	seconds		Average delay =	37.8	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	421	veh/hr		q=	196	veh/hr		q=	21	veh/hr		q=	192	veh/hr	
c=	90	sec		c=	90	sec		c=	90	sec		c=	90	sec	
S=	3154	veh/hr		S=	3088	veh/hr		S=	1700	veh/hr		S=	3225	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.44			X=	0.37			X=	0.18			X=	0.47		
Q =	948	veh/hr		Q =	532	veh/hr		Q =	113	veh/hr		Q =	410	veh/hr	
y=	0.13			y=	0.06			y=	0.01			y=	0.06		
L =	0.30			L=	0.17			L=	0.07			L=	0.13		
n =	2	lane		n =	2	lane		n =	1	lane		n =	2	lane	
X ' =	0.71			X ' =	0.69			X ' =	0.67			X ' =	0.69		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	FALSE		
Z =	-0.56			Z =	-0.63			Z =	-0.82			Z =	-0.53		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	7	vehs		N =	4	vehs		N =	0	vehs		N =	4	vehs	
Avg queue length =	22	metres		Avg queue leng	12	metres		Avg queue lengtl	3	metres		Avg queue lengtl	13	metres	
Average delay =	25.4	seconds		Average delay	32.9	seconds		Average delay =	39.7	seconds		Average delay =	36.5	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J2 - Junction Road / Carpenter Road	Ref. No.:			
Scheme:	Existing	Design year:	2021		
		Designed by:	RC	Checked by:	PK
Arm A:	Carpenter Road WB				
Arm B:	Junction Road NB				
Arm C:	Junction Road SB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Carpenter Road WB	2	22	120	245	3395	1.2	24	115	315	3395	1.2
Junction Road NB	2	55	120	325	3705	1.2	49	115	415	3705	1.2
Junction Road SB	2	50	120	690	3865	1.2	35	115	540	3810	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	98	0.18	0.40	6.8	11		44	16	17	17	17
Junction Road NB	65	0.46	0.19	9.0	10		19	12	15	15	15
Junction Road SB	70	0.42	0.43	19.2	19		25	29	34	34	34
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	91	0.21	0.45	8.4	12		41	19	20	20	20
Junction Road NB	66	0.43	0.26	11.0	13		21	16	19	19	19
Junction Road SB	80	0.30	0.47	14.4	18		33	28	30	30	30
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Carpenter Road WB	**17**	**20**
Arm B:	Junction Road NB	**15**	**19**
Arm C:	Junction Road SB	**34**	**30**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 20) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

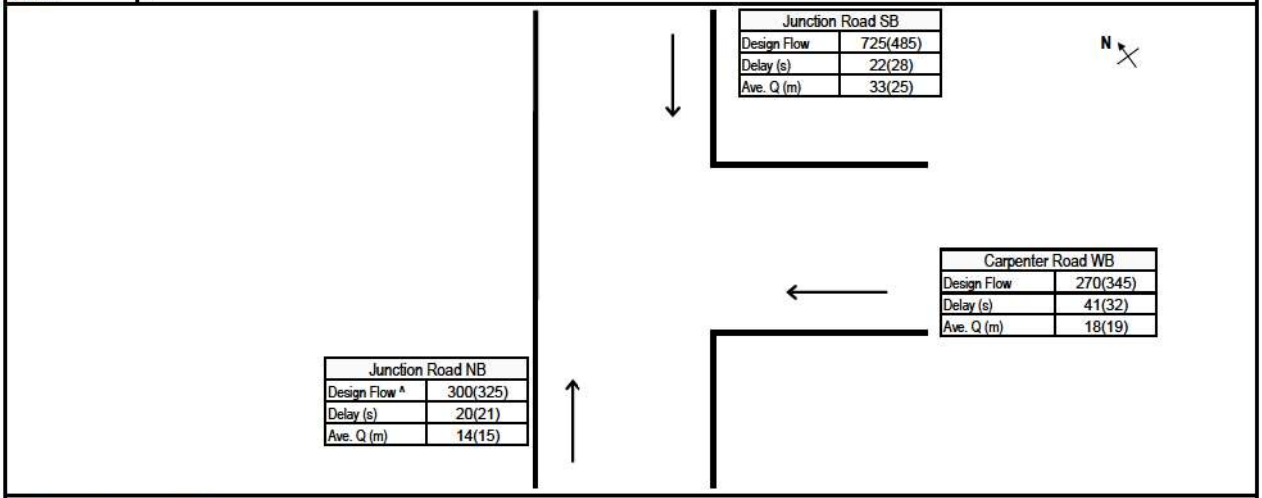
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	204	veh/hr		q '=	271	veh/hr		q '=	575	veh/hr		q '=	#DIV/0!		veh/hr
c=	120	sec		c=	120	sec		c=	120	sec		c=	0		sec
S '=	2829	veh/hr		S '=	3088	veh/hr		S '=	3221	veh/hr		S '=	#DIV/0!		veh/hr
t=	1	hr		t=	1	hr		t=	1	hr		t=	1		hr
X=	0.40			X=	0.19			X=	0.43			X=	#DIV/0!		
Q =	513	veh/hr		Q =	1428	veh/hr		Q =	1343	veh/hr		Q =	#VALUE!		veh/hr
y=	0.07			y=	0.09			y=	0.18			y=	#DIV/0!		
L =	0.18			L=	0.46			L=	0.42			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.70			X ' =	0.75			X ' =	0.74			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.60			Z =	-0.81			Z =	-0.57			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	6	vehs		N =	5	vehs		N =	11	vehs		N =	#DIV/0!		vehs
Avg queue length =	17	metres		Avg queue leng	15	metres		Avg queue length	34	metres		Avg queue length	#DIV/0!		metres
Average delay =	43.3	seconds		Average delay	19.0	seconds		Average delay =	24.8	seconds		Average delay =	#VALUE!		seconds

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	263	veh/hr		q=	346	veh/hr		q=	450	veh/hr		q=	#DIV/0!		veh/hr
c=	115	sec		c=	115	sec		c=	115	sec		c=	115		sec
S=	2829	veh/hr		S=	3088	veh/hr		S=	3175	veh/hr		S=	#DIV/0!		veh/hr
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5		hr
X=	0.45			X=	0.26			X=	0.47			X=	#DIV/0!		
Q =	585	veh/hr		Q =	1327	veh/hr		Q =	961	veh/hr		Q =	#VALUE!		veh/hr
y=	0.09			y=	0.11			y=	0.14			y=	#DIV/0!		
L =	0.21			L=	0.43			L=	0.30			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.70			X ' =	0.74			X ' =	0.72			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.55			Z =	-0.74			Z =	-0.53			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	7	vehs		N =	6	vehs		N =	10	vehs		N =	#DIV/0!		vehs
Avg queue length =	20	metres		Avg queue leng	19	metres		Avg queue length	30	metres		Avg queue length	#DIV/0!		metres
Average delay =	39.9	seconds		Average delay	21.1	seconds		Average delay =	32.6	seconds		Average delay =	#VALUE!		seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J2 - Junction Road / Carpenter Road	Ref. No.:			
Scheme:	Reference	Design year:	2033		
		Designed by:	RC	Checked by:	PK
Arm A:	Carpenter Road WB				
Arm B:	Junction Road NB				
Arm C:	Junction Road SB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Carpenter Road WB	2	25	120	270	3395	1.2	34	115	345	3395	1.2
Junction Road NB	2	54	120	300	3705	1.2	49	115	325	3705	1.2
Junction Road SB	2	55	120	725	3960	1.2	41	115	485	3990	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	95	0.21	0.38	7.5	11		41	17	18	18	18
Junction Road NB	66	0.45	0.18	8.3	10		20	11	14	14	14
Junction Road SB	65	0.46	0.40	20.1	19		22	28	33	33	33
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	81	0.30	0.34	9.2	13		32	17	19	19	19
Junction Road NB	66	0.42	0.21	8.7	10		21	12	15	15	15
Junction Road SB	74	0.35	0.34	12.9	15		28	22	25	25	25
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Carpenter Road WB	**18**	**19**
Arm B:	Junction Road NB	**14**	**15**
Arm C:	Junction Road SB	**33**	**25**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 20) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

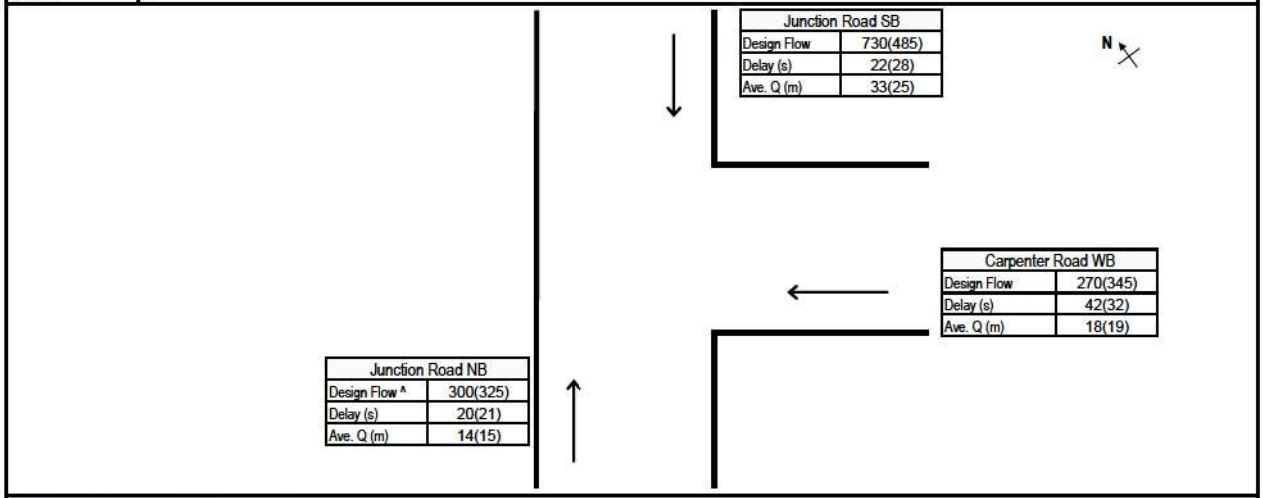
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	225	veh/hr		q '=	250	veh/hr		q '=	604	veh/hr		q '=	#DIV/0!		veh/hr
c=	120	sec		c=	120	sec		c=	120	sec		c=	0		sec
S '=	2829	veh/hr		S '=	3088	veh/hr		S '=	3300	veh/hr		S '=	#DIV/0!		veh/hr
t=	1	hr		t=	1	hr		t=	1	hr		t=	1		hr
X=	0.38			X=	0.18			X=	0.40			X=	#DIV/0!		
Q =	594	veh/hr		Q =	1397	veh/hr		Q =	1508	veh/hr		Q =	#VALUE!		veh/hr
y=	0.08			y=	0.08			y=	0.18			y=	#DIV/0!		
L =	0.21			L=	0.45			L=	0.46			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.70			X ' =	0.75			X ' =	0.75			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.62			Z =	-0.82			Z =	-0.60			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	6	vehs		N =	5	vehs		N =	11	vehs		N =	#DIV/0!		vehs
Avg queue length =	18	metres		Avg queue leng	14	metres		Avg queue length	33	metres		Avg queue length	#DIV/0!		metres
Average delay =	40.7	seconds		Average delay	19.6	seconds		Average delay =	21.7	seconds		Average delay =	#VALUE!		seconds

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	288	veh/hr		q=	271	veh/hr		q=	404	veh/hr		q=	#DIV/0!		veh/hr
c=	115	sec		c=	115	sec		c=	115	sec		c=	115		sec
S=	2829	veh/hr		S=	3088	veh/hr		S=	3325	veh/hr		S=	#DIV/0!		veh/hr
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5		hr
X=	0.34			X=	0.21			X=	0.34			X=	#DIV/0!		
Q =	844	veh/hr		Q =	1307	veh/hr		Q =	1177	veh/hr		Q =	#VALUE!		veh/hr
y=	0.10			y=	0.09			y=	0.12			y=	#DIV/0!		
L =	0.30			L=	0.42			L=	0.35			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.71			X ' =	0.74			X ' =	0.73			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.66			Z =	-0.79			Z =	-0.66			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	6	vehs		N =	5	vehs		N =	8	vehs		N =	#DIV/0!		vehs
Avg queue length =	19	metres		Avg queue leng	15	metres		Avg queue length	25	metres		Avg queue length	#DIV/0!		metres
Average delay =	31.5	seconds		Average delay	21.0	seconds		Average delay =	27.3	seconds		Average delay =	#VALUE!		seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J2 - Junction Road / Carpenter Road	Ref. No.:			
Scheme:	Design	Design year:	2033		
		Designed by:	RC	Checked by:	PK
Arm A:	Carpenter Road WB				
Arm B:	Junction Road NB				
Arm C:	Junction Road SB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Carpenter Road WB	2	25	120	270	3395	1.2	34	115	345	3395	1.2
Junction Road NB	2	54	120	300	3705	1.2	49	115	325	3705	1.2
Junction Road SB	2	55	120	730	3955	1.2	41	115	485	3990	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	95	0.21	0.38	7.5	11		42	17	18	18	18
Junction Road NB	66	0.45	0.18	8.3	10		20	11	14	14	14
Junction Road SB	65	0.46	0.40	20.3	19		22	28	33	33	33
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	81	0.30	0.34	9.2	13		32	17	19	19	19
Junction Road NB	66	0.42	0.21	8.7	10		21	12	15	15	15
Junction Road SB	74	0.35	0.34	12.9	15		28	22	25	25	25
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Carpenter Road WB	**18**	**19**
Arm B:	Junction Road NB	**14**	**15**
Arm C:	Junction Road SB	**33**	**25**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 20) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

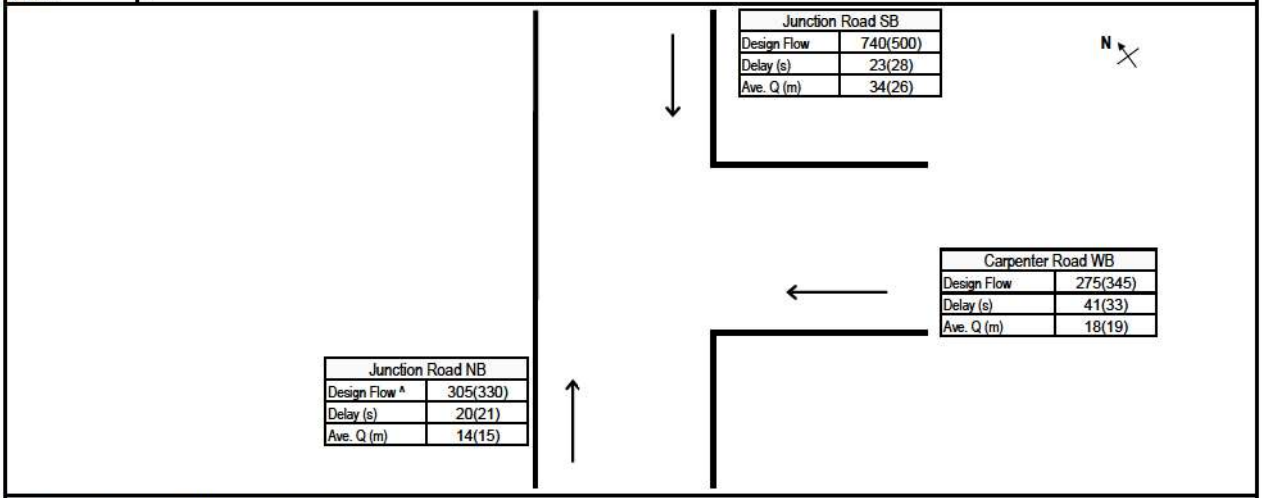
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	225	veh/hr		q '=	250	veh/hr		q '=	608	veh/hr		q '=	#DIV/0!		veh/hr
c=	120	sec		c=	120	sec		c=	120	sec		c=	0	sec	
S '=	2829	veh/hr		S '=	3088	veh/hr		S '=	3296	veh/hr		S '=	#DIV/0!		veh/hr
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.38			X=	0.18			X=	0.40			X=	#DIV/0!		
Q =	590	veh/hr		Q =	1397	veh/hr		Q =	1509	veh/hr		Q =	#VALUE!		veh/hr
y=	0.08			y=	0.08			y=	0.18			y=	#DIV/0!		
L =	0.21			L=	0.45			L=	0.46			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.70			X ' =	0.75			X ' =	0.75			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.62			Z =	-0.82			Z =	-0.60			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	6	vehs		N =	5	vehs		N =	11	vehs		N =	#DIV/0!		vehs
Avg queue length =	18	metres		Avg queue leng	14	metres		Avg queue length	33	metres		Avg queue length	#DIV/0!		metres
Average delay =	40.8	seconds		Average delay	19.6	seconds		Average delay =	21.6	seconds		Average delay =	#VALUE!		seconds

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	288	veh/hr		q=	271	veh/hr		q=	404	veh/hr		q=	#DIV/0!		veh/hr
c=	115	sec		c=	115	sec		c=	115	sec		c=	115	sec	
S=	2829	veh/hr		S=	3088	veh/hr		S=	3325	veh/hr		S=	#DIV/0!		veh/hr
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.34			X=	0.21			X=	0.34			X=	#DIV/0!		
Q =	844	veh/hr		Q =	1307	veh/hr		Q =	1177	veh/hr		Q =	#VALUE!		veh/hr
y=	0.10			y=	0.09			y=	0.12			y=	#DIV/0!		
L =	0.30			L=	0.42			L=	0.35			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.71			X ' =	0.74			X ' =	0.73			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.66			Z =	-0.79			Z =	-0.66			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	6	vehs		N =	5	vehs		N =	8	vehs		N =	#DIV/0!		vehs
Avg queue length =	19	metres		Avg queue leng	15	metres		Avg queue length	25	metres		Avg queue length	#DIV/0!		metres
Average delay =	31.5	seconds		Average delay	21.0	seconds		Average delay =	27.3	seconds		Average delay =	#VALUE!		seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J2 - Junction Road / Carpenter Road	Ref. No.:			
Scheme:	Reference	Design year:	2036		
		Designed by:	RC	Checked by:	PK
Arm A:	Carpenter Road WB				
Arm B:	Junction Road NB				
Arm C:	Junction Road SB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Carpenter Road WB	2	25	120	275	3395	1.2	34	115	345	3395	1.2
Junction Road NB	2	54	120	305	3705	1.2	49	115	330	3705	1.2
Junction Road SB	2	55	120	740	3955	1.2	41	115	500	3980	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	95	0.21	0.38	7.6	12		41	17	18	18	18
Junction Road NB	66	0.45	0.18	8.5	10		20	11	14	14	14
Junction Road SB	65	0.45	0.41	20.6	20		23	28	34	34	34
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	81	0.29	0.35	9.2	13		33	18	19	19	19
Junction Road NB	66	0.43	0.21	8.8	10		21	12	15	15	15
Junction Road SB	74	0.36	0.35	13.3	15		28	22	26	26	26
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Carpenter Road WB	**18**	**19**
Arm B:	Junction Road NB	**14**	**15**
Arm C:	Junction Road SB	**34**	**26**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 20) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

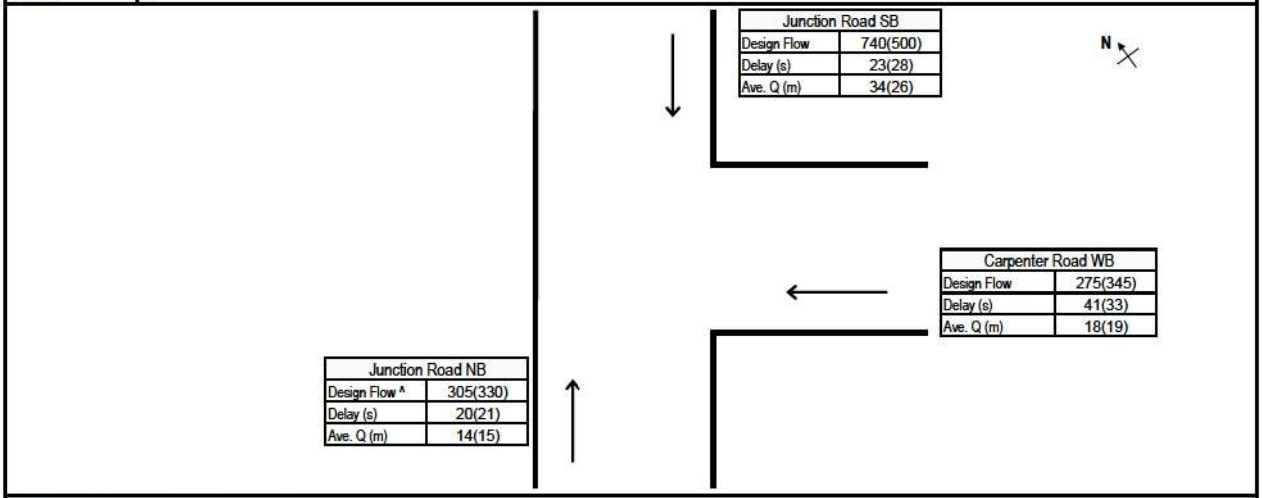
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	229	veh/hr		q '=	254	veh/hr		q '=	617	veh/hr		q '=	#DIV/0!	veh/hr	
c=	120	sec		c=	120	sec		c=	120	sec		c=	0	sec	
S '=	2829	veh/hr		S '=	3088	veh/hr		S '=	3296	veh/hr		S '=	#DIV/0!	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.38			X=	0.18			X=	0.41			X=	#DIV/0!		
Q =	600	veh/hr		Q =	1387	veh/hr		Q =	1498	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.08			y=	0.08			y=	0.19			y=	#DIV/0!		
L =	0.21			L=	0.45			L=	0.45			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.70			X ' =	0.75			X ' =	0.75			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.62			Z =	-0.82			Z =	-0.59			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	6	vehs		N =	5	vehs		N =	11	vehs		N =	#DIV/0!	vehs	
Avg queue length =	18	metres		Avg queue leng	14	metres		Avg queue length	34	metres		Avg queue length	#DIV/0!	metres	
Average delay =	40.5	seconds		Average delay	19.8	seconds		Average delay =	22.0	seconds		Average delay =	#VALUE!	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	288	veh/hr		q=	275	veh/hr		q=	417	veh/hr		q=	#DIV/0!	veh/hr	
c=	115	sec		c=	115	sec		c=	115	sec		c=	115	sec	
S=	2829	veh/hr		S=	3088	veh/hr		S=	3317	veh/hr		S=	#DIV/0!	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.35			X=	0.21			X=	0.35			X=	#DIV/0!		
Q =	830	veh/hr		Q =	1316	veh/hr		Q =	1190	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.10			y=	0.09			y=	0.13			y=	#DIV/0!		
L =	0.29			L=	0.43			L=	0.36			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.71			X ' =	0.74			X ' =	0.73			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.65			Z =	-0.79			Z =	-0.65			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	6	vehs		N =	5	vehs		N =	9	vehs		N =	#DIV/0!	vehs	
Avg queue length =	19	metres		Avg queue leng	15	metres		Avg queue length	26	metres		Avg queue length	#DIV/0!	metres	
Average delay =	32.0	seconds		Average delay	20.8	seconds		Average delay =	27.0	seconds		Average delay =	#VALUE!	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J2 - Junction Road / Carpenter Road	Ref. No.:			
Scheme:	Design	Design year:	2036		
		Designed by:	RC	Checked by:	PK
Arm A:	Carpenter Road WB				
Arm B:	Junction Road NB				
Arm C:	Junction Road SB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Carpenter Road WB	2	25	120	275	3395	1.2	34	115	345	3395	1.2
Junction Road NB	2	54	120	305	3705	1.2	49	115	330	3705	1.2
Junction Road SB	2	55	120	740	3955	1.2	41	115	500	3980	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	95	0.21	0.38	7.6	12		41	17	18	18	18
Junction Road NB	66	0.45	0.18	8.5	10		20	11	14	14	14
Junction Road SB	65	0.45	0.41	20.6	20		23	28	34	34	34
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	81	0.29	0.35	9.2	13		33	18	19	19	19
Junction Road NB	66	0.43	0.21	8.8	10		21	12	15	15	15
Junction Road SB	74	0.36	0.35	13.3	15		28	22	26	26	26
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Carpenter Road WB	**18**	**19**
Arm B:	Junction Road NB	**14**	**15**
Arm C:	Junction Road SB	**34**	**26**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 20) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

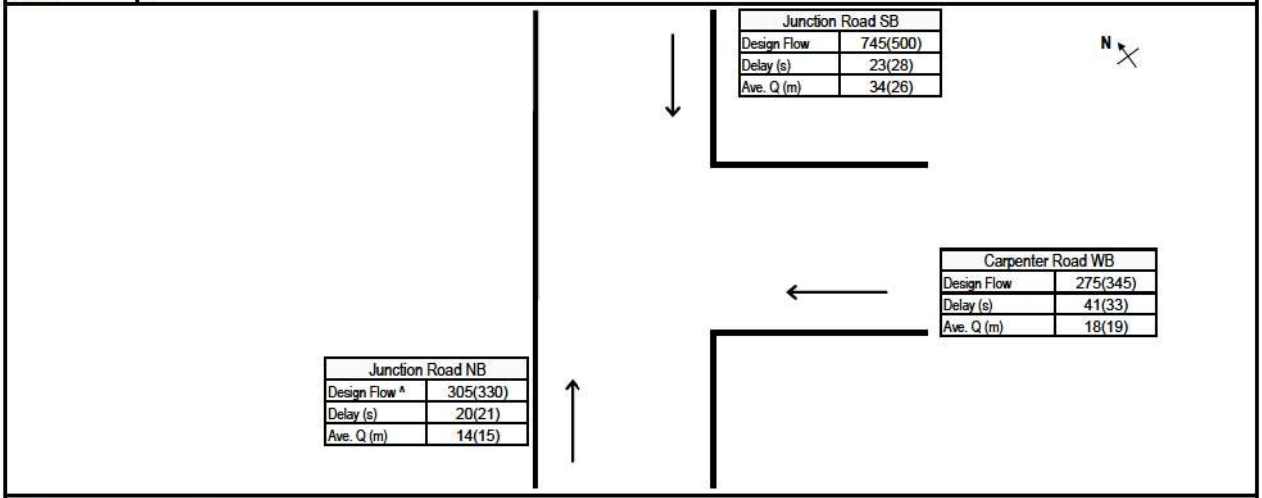
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	229	veh/hr		q '=	254	veh/hr		q '=	617	veh/hr		q '=	#DIV/0!	veh/hr	
c=	120	sec		c=	120	sec		c=	120	sec		c=	0	sec	
S '=	2829	veh/hr		S '=	3088	veh/hr		S '=	3296	veh/hr		S '=	#DIV/0!	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.38			X=	0.18			X=	0.41			X=	#DIV/0!		
Q =	600	veh/hr		Q =	1387	veh/hr		Q =	1498	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.08			y=	0.08			y=	0.19			y=	#DIV/0!		
L =	0.21			L=	0.45			L=	0.45			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.70			X ' =	0.75			X ' =	0.75			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.62			Z =	-0.82			Z =	-0.59			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	6	vehs		N =	5	vehs		N =	11	vehs		N =	#DIV/0!	vehs	
Avg queue length =	18	metres		Avg queue leng	14	metres		Avg queue length	34	metres		Avg queue length	#DIV/0!	metres	
Average delay =	40.5	seconds		Average delay	19.8	seconds		Average delay =	22.0	seconds		Average delay =	#VALUE!	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	288	veh/hr		q=	275	veh/hr		q=	417	veh/hr		q=	#DIV/0!	veh/hr	
c=	115	sec		c=	115	sec		c=	115	sec		c=	115	sec	
S=	2829	veh/hr		S=	3088	veh/hr		S=	3317	veh/hr		S=	#DIV/0!	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.35			X=	0.21			X=	0.35			X=	#DIV/0!		
Q =	830	veh/hr		Q =	1316	veh/hr		Q =	1190	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.10			y=	0.09			y=	0.13			y=	#DIV/0!		
L =	0.29			L=	0.43			L=	0.36			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.71			X ' =	0.74			X ' =	0.73			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.65			Z =	-0.79			Z =	-0.65			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	6	vehs		N =	5	vehs		N =	9	vehs		N =	#DIV/0!	vehs	
Avg queue length =	19	metres		Avg queue leng	15	metres		Avg queue length	26	metres		Avg queue length	#DIV/0!	metres	
Average delay =	32.0	seconds		Average delay	20.8	seconds		Average delay =	27.0	seconds		Average delay =	#VALUE!	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J2 - Junction Road / Carpenter Road	Ref. No.:			
Scheme:	Reference	Design year:	2037		
		Designed by:	RC	Checked by:	PK
Arm A:	Carpenter Road WB				
Arm B:	Junction Road NB				
Arm C:	Junction Road SB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Carpenter Road WB	2	25	120	275	3395	1.2	34	115	345	3395	1.2
Junction Road NB	2	54	120	305	3705	1.2	49	115	330	3705	1.2
Junction Road SB	2	55	120	745	3955	1.2	41	115	500	3980	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	95	0.21	0.38	7.6	12		41	17	18	18	18
Junction Road NB	66	0.45	0.18	8.5	10		20	11	14	14	14
Junction Road SB	65	0.46	0.41	20.7	20		23	29	34	34	34
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	81	0.29	0.35	9.2	13		33	18	19	19	19
Junction Road NB	66	0.43	0.21	8.8	10		21	12	15	15	15
Junction Road SB	74	0.36	0.35	13.3	15		28	22	26	26	26
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Carpenter Road WB	**18**	**19**
Arm B:	Junction Road NB	**14**	**15**
Arm C:	Junction Road SB	**34**	**26**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 20) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

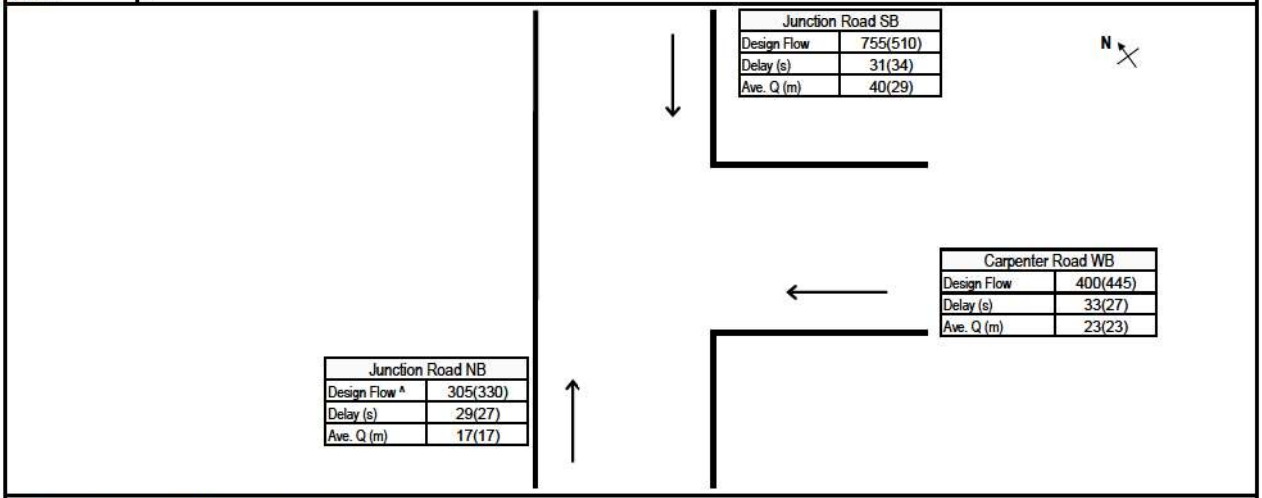
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	229	veh/hr		q '=	254	veh/hr		q '=	621	veh/hr		q '=	#DIV/0!	veh/hr	
c=	120	sec		c=	120	sec		c=	120	sec		c=	0	sec	
S '=	2829	veh/hr		S '=	3088	veh/hr		S '=	3296	veh/hr		S '=	#DIV/0!	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.38			X=	0.18			X=	0.41			X=	#DIV/0!		
Q =	597	veh/hr		Q =	1387	veh/hr		Q =	1501	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.08			y=	0.08			y=	0.19			y=	#DIV/0!		
L =	0.21			L=	0.45			L=	0.46			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.70			X ' =	0.75			X ' =	0.75			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.62			Z =	-0.82			Z =	-0.59			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	6	vehs		N =	5	vehs		N =	11	vehs		N =	#DIV/0!	vehs	
Avg queue length =	18	metres		Avg queue leng	14	metres		Avg queue length	34	metres		Avg queue length	#DIV/0!	metres	
Average delay =	40.6	seconds		Average delay	19.8	seconds		Average delay =	21.9	seconds		Average delay =	#VALUE!	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	288	veh/hr		q=	275	veh/hr		q=	417	veh/hr		q=	#DIV/0!	veh/hr	
c=	115	sec		c=	115	sec		c=	115	sec		c=	115	sec	
S=	2829	veh/hr		S=	3088	veh/hr		S=	3317	veh/hr		S=	#DIV/0!	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.35			X=	0.21			X=	0.35			X=	#DIV/0!		
Q =	830	veh/hr		Q =	1316	veh/hr		Q =	1190	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.10			y=	0.09			y=	0.13			y=	#DIV/0!		
L =	0.29			L=	0.43			L=	0.36			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.71			X ' =	0.74			X ' =	0.73			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.65			Z =	-0.79			Z =	-0.65			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	6	vehs		N =	5	vehs		N =	9	vehs		N =	#DIV/0!	vehs	
Avg queue length =	19	metres		Avg queue leng	15	metres		Avg queue length	26	metres		Avg queue length	#DIV/0!	metres	
Average delay =	32.0	seconds		Average delay	20.8	seconds		Average delay =	27.0	seconds		Average delay =	#VALUE!	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J2 - Junction Road / Carpenter Road	Ref. No.:			
Scheme:	Design	Design year:	2037		
		Designed by:	RC	Checked by:	PK
Arm A:	Carpenter Road WB				
Arm B:	Junction Road NB				
Arm C:	Junction Road SB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Carpenter Road WB	2	37	120	400	3395	1.2	42	115	445	3395	1.2
Junction Road NB	2	40	120	305	3705	1.2	40	115	330	3705	1.2
Junction Road SB	2	43	120	755	3955	1.2	33	115	510	3985	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	83	0.31	0.38	11.1	14		33	21	23	23	23
Junction Road NB	80	0.34	0.24	8.5	12		29	15	17	17	17
Junction Road SB	77	0.36	0.53	21.0	22		31	37	40	40	40
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	73	0.36	0.36	11.8	14		27	20	23	23	23
Junction Road NB	75	0.35	0.26	8.8	12		27	15	17	17	17
Junction Road SB	82	0.29	0.44	13.6	17		34	27	29	29	29
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Carpenter Road WB	**23**	**23**
Arm B:	Junction Road NB	**17**	**17**
Arm C:	Junction Road SB	**40**	**29**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 20) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

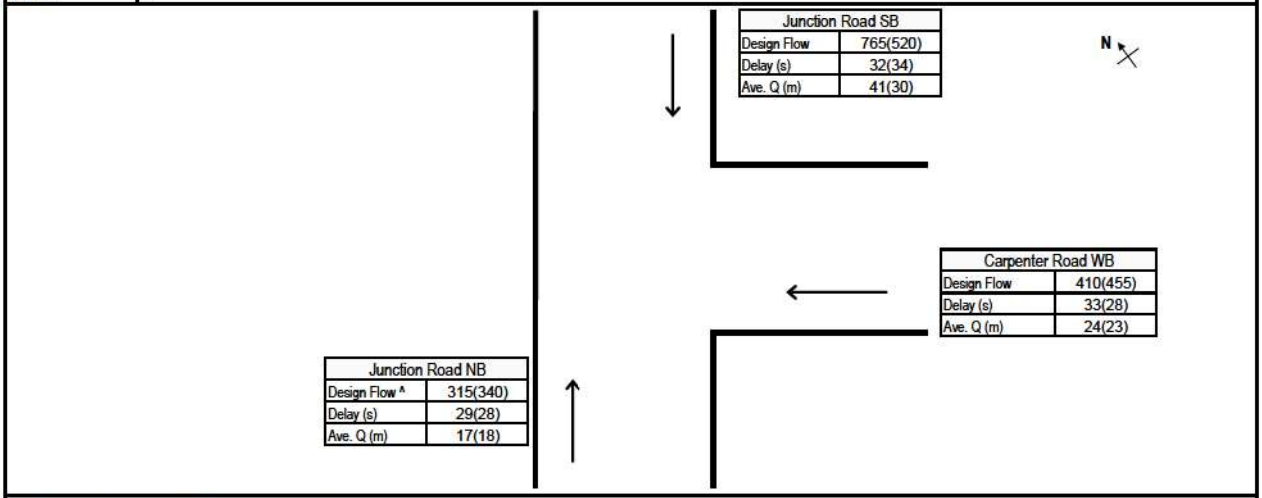
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	333	veh/hr		q '=	254	veh/hr		q '=	629	veh/hr		q '=	#DIV/0!		veh/hr
c=	120	sec		c=	120	sec		c=	120	sec		c=	0		sec
S '=	2829	veh/hr		S '=	3088	veh/hr		S '=	3296	veh/hr		S '=	#DIV/0!		veh/hr
t=	1	hr		t=	1	hr		t=	1	hr		t=	1		hr
X=	0.38			X=	0.24			X=	0.53			X=	#DIV/0!		
Q =	875	veh/hr		Q =	1041	veh/hr		Q =	1178	veh/hr		Q =	#VALUE!		veh/hr
y=	0.12			y=	0.08			y=	0.19			y=	#DIV/0!		
L =	0.31			L=	0.34			L=	0.36			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.72			X ' =	0.73			X ' =	0.74			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.62			Z =	-0.76			Z =	-0.47			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	8	vehs		N =	6	vehs		N =	13	vehs		N =	#DIV/0!		vehs
Avg queue length =	23	metres		Avg queue leng	17	metres		Avg queue length	40	metres		Avg queue length	#DIV/0!		metres
Average delay =	32.5	seconds		Average delay	28.7	seconds		Average delay =	30.6	seconds		Average delay =	#VALUE!		seconds

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	371	veh/hr		q=	275	veh/hr		q=	425	veh/hr		q=	#DIV/0!		veh/hr
c=	115	sec		c=	115	sec		c=	115	sec		c=	115		sec
S=	2829	veh/hr		S=	3088	veh/hr		S=	3321	veh/hr		S=	#DIV/0!		veh/hr
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5		hr
X=	0.36			X=	0.26			X=	0.44			X=	#DIV/0!		
Q =	1030	veh/hr		Q =	1072	veh/hr		Q =	957	veh/hr		Q =	#VALUE!		veh/hr
y=	0.13			y=	0.09			y=	0.13			y=	#DIV/0!		
L =	0.36			L=	0.35			L=	0.29			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.72			X ' =	0.73			X ' =	0.72			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.64			Z =	-0.74			Z =	-0.56			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	8	vehs		N =	6	vehs		N =	10	vehs		N =	#DIV/0!		vehs
Avg queue length =	23	metres		Avg queue leng	17	metres		Avg queue length	29	metres		Avg queue length	#DIV/0!		metres
Average delay =	26.8	seconds		Average delay	26.9	seconds		Average delay =	33.4	seconds		Average delay =	#VALUE!		seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J2 - Junction Road / Carpenter Road	Ref. No.:			
Scheme:	Reference	Design year:	2040		
		Designed by:	RC	Checked by:	PK
Arm A:	Carpenter Road WB				
Arm B:	Junction Road NB				
Arm C:	Junction Road SB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Carpenter Road WB	2	37	120	410	3395	1.2	42	115	455	3395	1.2
Junction Road NB	2	40	120	315	3705	1.2	40	115	340	3705	1.2
Junction Road SB	2	43	120	765	3960	1.2	33	115	520	3975	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	83	0.31	0.39	11.4	15		33	21	24	24	24
Junction Road NB	80	0.34	0.25	8.8	12		29	15	17	17	17
Junction Road SB	77	0.36	0.54	21.3	22		32	37	41	41	41
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	73	0.36	0.37	12.1	14		28	20	23	23	23
Junction Road NB	75	0.35	0.26	9.1	12		28	15	18	18	18
Junction Road SB	82	0.29	0.45	13.8	17		34	27	30	30	30
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Carpenter Road WB	**24**	**23**
Arm B:	Junction Road NB	**17**	**18**
Arm C:	Junction Road SB	**41**	**30**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 20) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

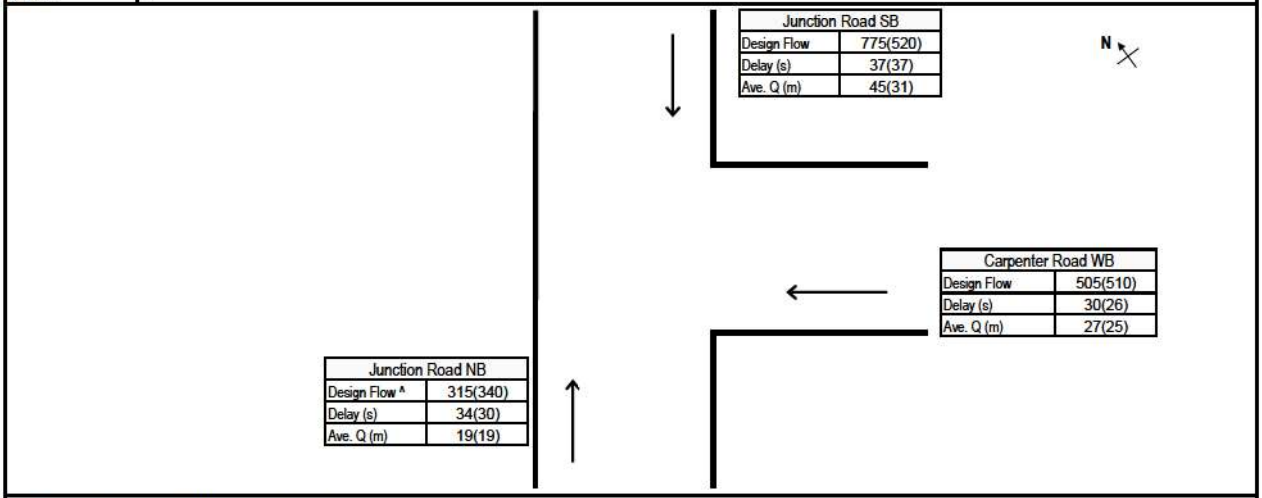
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	342	veh/hr		q '=	263	veh/hr		q '=	638	veh/hr		q '=	#DIV/0!		veh/hr
c=	120	sec		c=	120	sec		c=	120	sec		c=	0		sec
S '=	2829	veh/hr		S '=	3088	veh/hr		S '=	3300	veh/hr		S '=	#DIV/0!		veh/hr
t=	1	hr		t=	1	hr		t=	1	hr		t=	1		hr
X=	0.39			X=	0.25			X=	0.54			X=	#DIV/0!		
Q =	878	veh/hr		Q =	1040	veh/hr		Q =	1176	veh/hr		Q =	#VALUE!		veh/hr
y=	0.12			y=	0.09			y=	0.19			y=	#DIV/0!		
L =	0.31			L=	0.34			L=	0.36			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.72			X ' =	0.73			X ' =	0.74			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.61			Z =	-0.75			Z =	-0.46			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	8	vehs		N =	6	vehs		N =	14	vehs		N =	#DIV/0!		vehs
Avg queue length =	24	metres		Avg queue leng	17	metres		Avg queue length	41	metres		Avg queue length	#DIV/0!		metres
Average delay =	32.5	seconds		Average delay	28.8	seconds		Average delay =	30.8	seconds		Average delay =	#VALUE!		seconds

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	379	veh/hr		q=	283	veh/hr		q=	433	veh/hr		q=	#DIV/0!		veh/hr
c=	115	sec		c=	115	sec		c=	115	sec		c=	115		sec
S=	2829	veh/hr		S=	3088	veh/hr		S=	3313	veh/hr		S=	#DIV/0!		veh/hr
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5		hr
X=	0.37			X=	0.26			X=	0.45			X=	#DIV/0!		
Q =	1029	veh/hr		Q =	1070	veh/hr		Q =	956	veh/hr		Q =	#VALUE!		veh/hr
y=	0.13			y=	0.09			y=	0.13			y=	#DIV/0!		
L =	0.36			L=	0.35			L=	0.29			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.72			X ' =	0.73			X ' =	0.72			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.63			Z =	-0.74			Z =	-0.55			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	8	vehs		N =	6	vehs		N =	10	vehs		N =	#DIV/0!		vehs
Avg queue length =	23	metres		Avg queue leng	18	metres		Avg queue length	30	metres		Avg queue length	#DIV/0!		metres
Average delay =	26.9	seconds		Average delay	27.0	seconds		Average delay =	33.5	seconds		Average delay =	#VALUE!		seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J2 - Junction Road / Carpenter Road	Ref. No.:			
Scheme:	Design	Design year:	2040		
		Designed by:	RC	Checked by:	PK
Arm A:	Carpenter Road WB				
Arm B:	Junction Road NB				
Arm C:	Junction Road SB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Carpenter Road WB	2	43	120	505	3395	1.2	45	115	510	3395	1.2
Junction Road NB	2	34	120	315	3705	1.2	36	115	340	3705	1.2
Junction Road SB	2	37	120	775	3960	1.2	30	115	520	3975	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	77	0.36	0.41	14.0	16		30	24	27	27	27
Junction Road NB	86	0.28	0.30	8.8	12		34	17	19	19	19
Junction Road SB	83	0.31	0.64	21.5	24		37	42	45	45	45
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	70	0.39	0.38	13.6	15		26	21	25	25	25
Junction Road NB	79	0.31	0.29	9.1	13		30	17	19	19	19
Junction Road SB	85	0.26	0.51	13.8	18		37	29	31	31	31
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Carpenter Road WB	**27**	**25**
Arm B:	Junction Road NB	**19**	**19**
Arm C:	Junction Road SB	**45**	**31**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 20) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

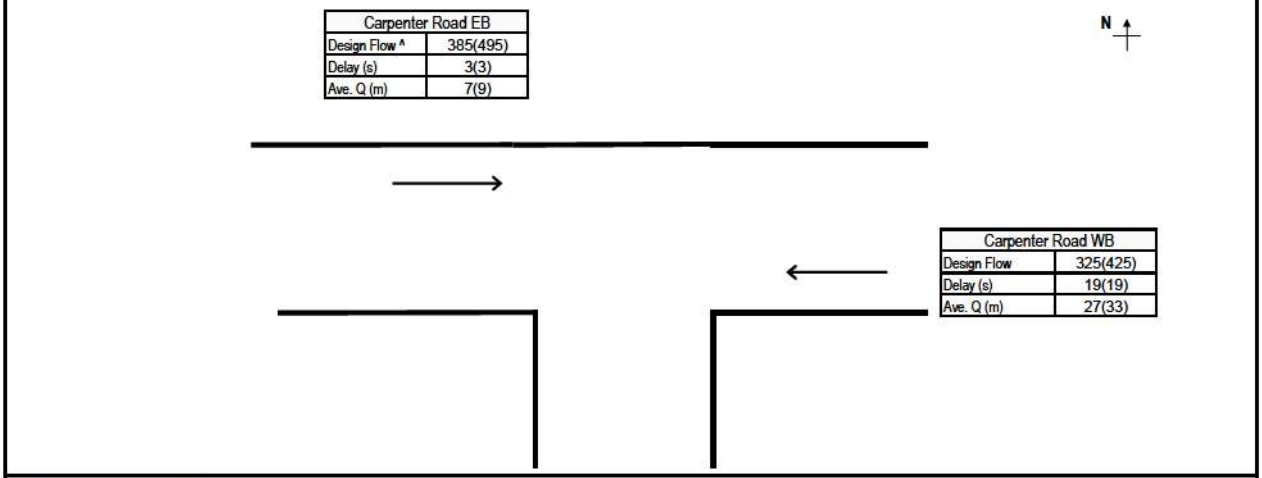
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	421	veh/hr		q '=	263	veh/hr		q '=	646	veh/hr		q '=	#DIV/0!		veh/hr
c=	120	sec		c=	120	sec		c=	120	sec		c=	0		sec
S '=	2829	veh/hr		S '=	3088	veh/hr		S '=	3300	veh/hr		S '=	#DIV/0!		veh/hr
t=	1	hr		t=	1	hr		t=	1	hr		t=	1		hr
X=	0.41			X=	0.30			X=	0.64			X=	#DIV/0!		
Q =	1018	veh/hr		Q =	872	veh/hr		Q =	1012	veh/hr		Q =	#VALUE!		veh/hr
y=	0.15			y=	0.09			y=	0.20			y=	#DIV/0!		
L =	0.36			L=	0.28			L=	0.31			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.73			X ' =	0.72			X ' =	0.73			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.59			Z =	-0.70			Z =	-0.36			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	9	vehs		N =	6	vehs		N =	15	vehs		N =	#DIV/0!		vehs
Avg queue length =	27	metres		Avg queue leng	19	metres		Avg queue length	45	metres		Avg queue length	#DIV/0!		metres
Average delay =	28.9	seconds		Average delay	33.8	seconds		Average delay =	35.9	seconds		Average delay =	#VALUE!		seconds

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	425	veh/hr		q=	283	veh/hr		q=	433	veh/hr		q=	#DIV/0!		veh/hr
c=	115	sec		c=	115	sec		c=	115	sec		c=	115		sec
S=	2829	veh/hr		S=	3088	veh/hr		S=	3313	veh/hr		S=	#DIV/0!		veh/hr
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5		hr
X=	0.38			X=	0.29			X=	0.51			X=	#DIV/0!		
Q =	1117	veh/hr		Q =	965	veh/hr		Q =	853	veh/hr		Q =	#VALUE!		veh/hr
y=	0.15			y=	0.09			y=	0.13			y=	#DIV/0!		
L =	0.39			L=	0.31			L=	0.26			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.73			X ' =	0.72			X ' =	0.72			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.62			Z =	-0.71			Z =	-0.49			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	8	vehs		N =	6	vehs		N =	10	vehs		N =	#DIV/0!		vehs
Avg queue length =	25	metres		Avg queue leng	19	metres		Avg queue length	31	metres		Avg queue length	#DIV/0!		metres
Average delay =	24.8	seconds		Average delay	29.9	seconds		Average delay =	36.5	seconds		Average delay =	#VALUE!		seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J3 - Carpenter Road / Lion Rock Road	Ref. No.:			
Scheme:	Existing	Design year:	2021		
		Designed by:	RC	Checked by:	PK
Arm A:	Carpenter Road WB				
Arm B:	Carpenter Road EB				
Arm C:	-				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Carpenter Road WB	1	60	120	325	1880	1.2	59	115	425	1910	1.2
Carpenter Road EB	2	95	120	385	3570	1.2	90	115	495	3570	1.2
-											
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	60	0.50	0.34	9.0	10		19	22	27	27	27
Carpenter Road EB	25	0.79	0.14	10.7	6		3	4	7	7	7
-											
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	56	0.51	0.43	11.3	11		19	28	33	33	33
Carpenter Road EB	25	0.78	0.18	13.2	7		3	5	9	9	9
-											
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Carpenter Road WB	**27**	**33**
Arm B:	Carpenter Road EB	**7**	**9**
Arm C:	-		
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, $d = c(1-L)^2/2(1-LX) + 3600pX^2/2q(1-X) - 0.65(c/(q/3600p)^2)^{(1/3)}*X^{(2+5L)}$ OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 20) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

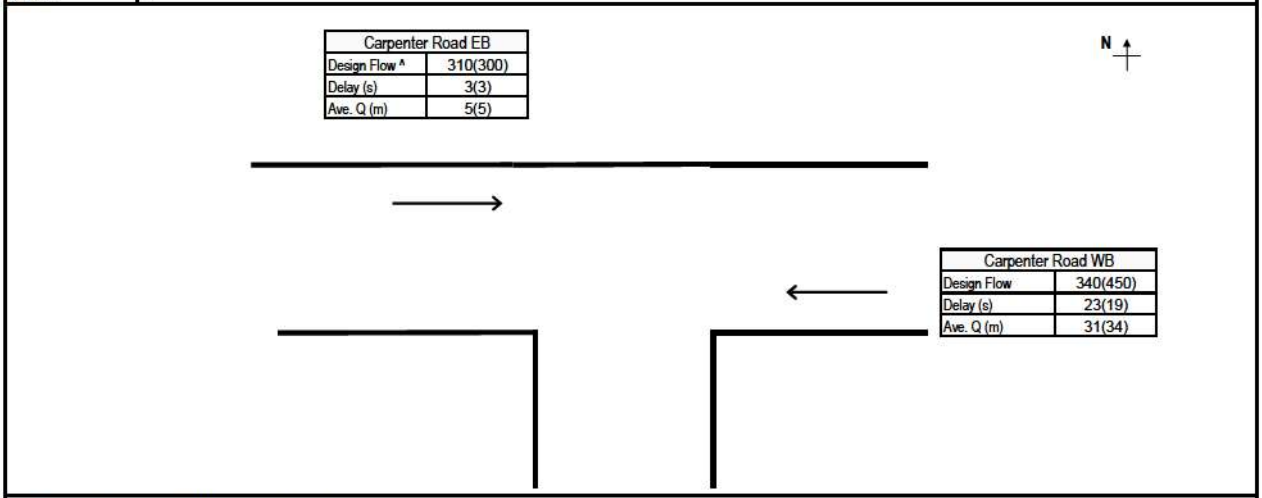
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	271	veh/hr		q '=	321	veh/hr		q '=	#DIV/0!	veh/hr		q '=	#DIV/0!	veh/hr	
c=	120	sec		c=	120	sec		c=	0	sec		c=	0	sec	
S '=	1567	veh/hr		S '=	2975	veh/hr		S '=	#DIV/0!	veh/hr		S '=	#DIV/0!	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.34			X=	0.14			X=	#DIV/0!			X=	#DIV/0!		
Q =	786	veh/hr		Q =	2355	veh/hr		Q =	#VALUE!	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.17			y=	0.11			y=	#DIV/0!			y=	#DIV/0!		
L =	0.50			L=	0.79			L=				L=			
n =	1	lane		n =	2	lane		n =	0	lane		n =	0	lane	
X ' =	0.71			X ' =	0.80			X ' =	#DIV/0!			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!			X > X '	#DIV/0!		
Z =	-0.66			Z =	-0.86			Z =	#DIV/0!			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs		No=	#DIV/0!	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	4	vehs		N =	2	vehs		N =	#DIV/0!	vehs		N =	#DIV/0!	vehs	
Avg queue length =	27	metres		Avg queue leng	7	metres		Avg queue lengtl	#DIV/0!	metres		Avg queue lengtl	#DIV/0!	metres	
Average delay =	18.0	seconds		Average delay	2.9	seconds		Average delay =	#VALUE!	seconds		Average delay =	#VALUE!	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	354	veh/hr		q=	413	veh/hr		q=	#DIV/0!	veh/hr		q=	#DIV/0!	veh/hr	
c=	115	sec		c=	115	sec		c=	115	sec		c=	115	sec	
S=	1592	veh/hr		S=	2975	veh/hr		S=	#DIV/0!	veh/hr		S=	#DIV/0!	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.43			X=	0.18			X=	#DIV/0!			X=	#DIV/0!		
Q =	819	veh/hr		Q =	2328	veh/hr		Q =	#VALUE!	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.22			y=	0.14			y=	#DIV/0!			y=	#DIV/0!		
L =	0.51			L=	0.78			L=				L=			
n =	1	lane		n =	2	lane		n =	0	lane		n =	0	lane	
X ' =	0.71			X ' =	0.79			X ' =	#DIV/0!			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!			X > X '	#DIV/0!		
Z =	-0.57			Z =	-0.82			Z =	#DIV/0!			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs		No=	#DIV/0!	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	5	vehs		N =	3	vehs		N =	#DIV/0!	vehs		N =	#DIV/0!	vehs	
Avg queue length =	33	metres		Avg queue leng	9	metres		Avg queue lengtl	#DIV/0!	metres		Avg queue lengtl	#DIV/0!	metres	
Average delay =	17.4	seconds		Average delay	3.2	seconds		Average delay =	#VALUE!	seconds		Average delay =	#VALUE!	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J3 - Carpenter Road / Lion Rock Road	Ref. No.:			
Scheme:	Reference	Design year:	2033		
		Designed by:	RC	Checked by:	PK
Arm A:	Carpenter Road WB				
Arm B:	Carpenter Road EB				
Arm C:	-				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Carpenter Road WB	1	55	120	340	1885	1.2	60	115	450	1920	1.2
Carpenter Road EB	2	95	120	310	3570	1.2	90	115	300	3570	1.2
-											
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	65	0.46	0.40	9.4	11		23	26	31	31	31
Carpenter Road EB	25	0.79	0.11	8.6	6		3	3	5	5	5
-											
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	55	0.52	0.45	12.0	11		19	29	34	34	34
Carpenter Road EB	25	0.78	0.11	8.0	5		3	3	5	5	5
-											
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Carpenter Road WB	**31**	**34**
Arm B:	Carpenter Road EB	**5**	**5**
Arm C:	-		
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, $d = c(1-L)^2/2(1-LX) + 3600pX^2/2q(1-X) - 0.65(c/(q/3600p)^2)^{(1/3)}*X^{(2+5L)}$ OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 20) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

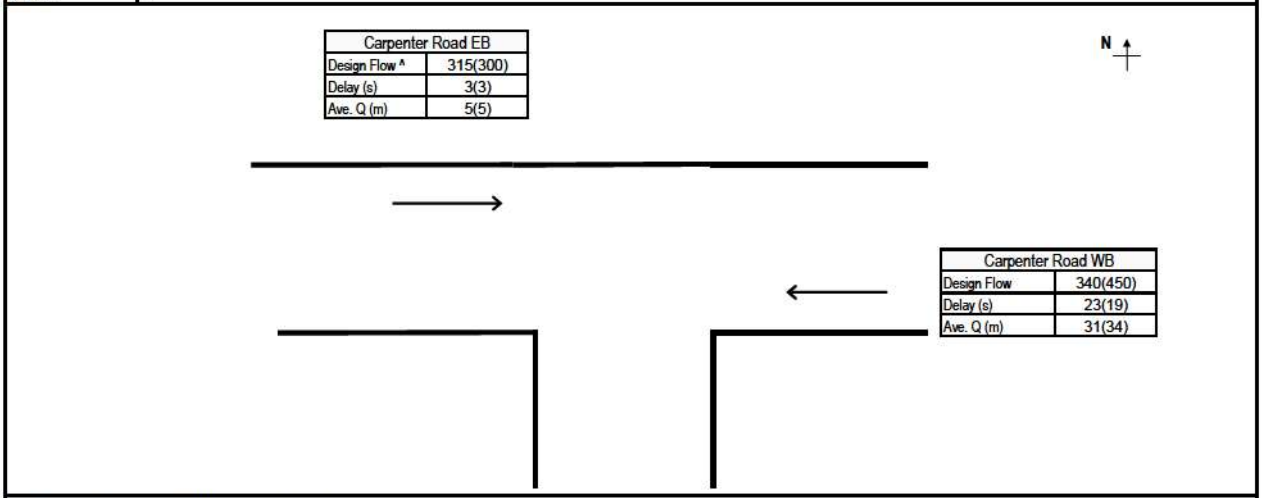
Akcelik's time -dependent formula			Akcelik's time -dependent formula			Akcelik's time -dependent formula			Akcelik's time -dependent formula		
AM	ARM A		AM	ARM B		AM	ARM C		AM	ARM D	
q '=	283	veh/hr	q '=	258	veh/hr	q '=	#DIV/0!	veh/hr	q '=	#DIV/0!	veh/hr
c=	120	sec	c=	120	sec	c=	0	sec	c=	0	sec
S '=	1571	veh/hr	S '=	2975	veh/hr	S '=	#DIV/0!	veh/hr	S '=	#DIV/0!	veh/hr
t=	1	hr	t=	1	hr	t=	1	hr	t=	1	hr
X=	0.40		X=	0.11		X=	#DIV/0!		X=	#DIV/0!	
Q =	716	veh/hr	Q =	2355	veh/hr	Q =	#VALUE!	veh/hr	Q =	#VALUE!	veh/hr
y=	0.18		y=	0.09		y=	#DIV/0!		y=	#DIV/0!	
L =	0.46		L=	0.79		L=			L=		
n =	1	lane	n =	2	lane	n =	0	lane	n =	0	lane
X ' =	0.71		X ' =	0.80		X ' =	#DIV/0!		X ' =	#DIV/0!	
X > X '	FALSE		X > X '	FALSE		X > X '	#DIV/0!		X > X '	#DIV/0!	
Z =	-0.60		Z =	-0.89		Z =	#DIV/0!		Z =	#DIV/0!	
No=	0.0	vehs	No=	0.0	vehs	No=	#DIV/0!	vehs	No=	#DIV/0!	vehs
Avg stop-line queue at start of green (in vehs)			Avg stop-line queue at start of green (in vehs)			Avg stop-line queue at start of green (in vehs)			Avg stop-line queue at start of green (in vehs)		
N= qr + No			N= qr + No			N= qr + No			N= qr + No		
N =	5	vehs	N =	2	vehs	N =	#DIV/0!	vehs	N =	#DIV/0!	vehs
Avg queue length =	31	metres	Avg queue leng	5	metres	Avg queue lengtl	#DIV/0!	metres	Avg queue lengtl	#DIV/0!	metres
Average delay =	21.7	seconds	Average delay	2.9	seconds	Average delay =	#VALUE!	seconds	Average delay =	#VALUE!	seconds

Akcelik's time -dependent formula			Akcelik's time -dependent formula			Akcelik's time -dependent formula			Akcelik's time -dependent formula		
PM	ARM A		PM	ARM B		PM	ARM C		PM	ARM D	
q=	375	veh/hr	q=	250	veh/hr	q=	#DIV/0!	veh/hr	q=	#DIV/0!	veh/hr
c=	115	sec	c=	115	sec	c=	115	sec	c=	115	sec
S=	1600	veh/hr	S=	2975	veh/hr	S=	#DIV/0!	veh/hr	S=	#DIV/0!	veh/hr
t=	0.5	hr	t=	0.5	hr	t=	0.5	hr	t=	0.5	hr
X=	0.45		X=	0.11		X=	#DIV/0!		X=	#DIV/0!	
Q =	836	veh/hr	Q =	2328	veh/hr	Q =	#VALUE!	veh/hr	Q =	#VALUE!	veh/hr
y=	0.23		y=	0.08		y=	#DIV/0!		y=	#DIV/0!	
L =	0.52		L=	0.78		L=			L=		
n =	1	lane	n =	2	lane	n =	0	lane	n =	0	lane
X ' =	0.71		X ' =	0.79		X ' =	#DIV/0!		X ' =	#DIV/0!	
X > X '	FALSE		X > X '	FALSE		X > X '	#DIV/0!		X > X '	#DIV/0!	
Z =	-0.55		Z =	-0.89		Z =	#DIV/0!		Z =	#DIV/0!	
No=	0.0	vehs	No=	0.0	vehs	No=	#DIV/0!	vehs	No=	#DIV/0!	vehs
Average Queue			Average Queue			Average Queue			Average Queue		
N= qr + No			N= qr + No			N= qr + No			N= qr + No		
N =	6	vehs	N =	2	vehs	N =	#DIV/0!	vehs	N =	#DIV/0!	vehs
Avg queue length =	34	metres	Avg queue leng	5	metres	Avg queue lengtl	#DIV/0!	metres	Avg queue lengtl	#DIV/0!	metres
Average delay =	17.1	seconds	Average delay	3.0	seconds	Average delay =	#VALUE!	seconds	Average delay =	#VALUE!	seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J3 - Carpenter Road / Lion Rock Road	Ref. No.:			
Scheme:	Design	Design year:	2033		
		Designed by:	RC	Checked by:	PK
Arm A:	Carpenter Road WB				
Arm B:	Carpenter Road EB				
Arm C:	-				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Carpenter Road WB	1	55	120	340	1885	1.2	60	115	450	1920	1.2
Carpenter Road EB	2	95	120	315	3570	1.2	90	115	300	3570	1.2
-											
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	65	0.46	0.40	9.4	11		23	26	31	31	31
Carpenter Road EB	25	0.79	0.11	8.8	6		3	3	5	5	5
-											
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	55	0.52	0.45	12.0	11		19	29	34	34	34
Carpenter Road EB	25	0.78	0.11	8.0	5		3	3	5	5	5
-											
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Carpenter Road WB	**31**	**34**
Arm B:	Carpenter Road EB	**5**	**5**
Arm C:	-		
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 20) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

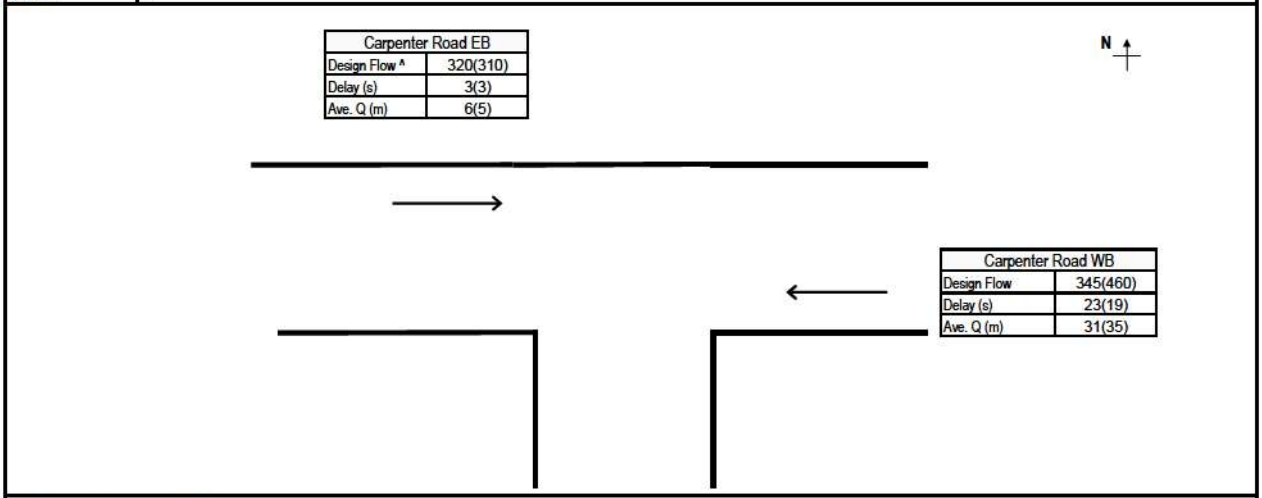
Akcelik's time -dependent formula			Akcelik's time -dependent formula			Akcelik's time -dependent formula			Akcelik's time -dependent formula		
AM	ARM A		AM	ARM B		AM	ARM C		AM	ARM D	
q '=	283	veh/hr	q '=	263	veh/hr	q '=	#DIV/0!	veh/hr	q '=	#DIV/0!	veh/hr
c=	120	sec	c=	120	sec	c=	0	sec	c=	0	sec
S '=	1571	veh/hr	S '=	2975	veh/hr	S '=	#DIV/0!	veh/hr	S '=	#DIV/0!	veh/hr
t=	1	hr	t=	1	hr	t=	1	hr	t=	1	hr
X=	0.40		X=	0.11		X=	#DIV/0!		X=	#DIV/0!	
Q =	716	veh/hr	Q =	2355	veh/hr	Q =	#VALUE!	veh/hr	Q =	#VALUE!	veh/hr
y=	0.18		y=	0.09		y=	#DIV/0!		y=	#DIV/0!	
L =	0.46		L=	0.79		L=			L=		
n =	1	lane	n =	2	lane	n =	0	lane	n =	0	lane
X ' =	0.71		X ' =	0.80		X ' =	#DIV/0!		X ' =	#DIV/0!	
X > X '	FALSE		X > X '	FALSE		X > X '	#DIV/0!		X > X '	#DIV/0!	
Z =	-0.60		Z =	-0.89		Z =	#DIV/0!		Z =	#DIV/0!	
No=	0.0	vehs	No=	0.0	vehs	No=	#DIV/0!	vehs	No=	#DIV/0!	vehs
Avg stop-line queue at start of green (in vehs)			Avg stop-line queue at start of green (in vehs)			Avg stop-line queue at start of green (in vehs)			Avg stop-line queue at start of green (in vehs)		
N= qr + No			N= qr + No			N= qr + No			N= qr + No		
N =	5	vehs	N =	2	vehs	N =	#DIV/0!	vehs	N =	#DIV/0!	vehs
Avg queue length =	31	metres	Avg queue leng	5	metres	Avg queue lengtl	#DIV/0!	metres	Avg queue lengtl	#DIV/0!	metres
Average delay =	21.7	seconds	Average delay	2.9	seconds	Average delay =	#VALUE!	seconds	Average delay =	#VALUE!	seconds

Akcelik's time -dependent formula			Akcelik's time -dependent formula			Akcelik's time -dependent formula			Akcelik's time -dependent formula		
PM	ARM A		PM	ARM B		PM	ARM C		PM	ARM D	
q=	375	veh/hr	q=	250	veh/hr	q=	#DIV/0!	veh/hr	q=	#DIV/0!	veh/hr
c=	115	sec	c=	115	sec	c=	115	sec	c=	115	sec
S=	1600	veh/hr	S=	2975	veh/hr	S=	#DIV/0!	veh/hr	S=	#DIV/0!	veh/hr
t=	0.5	hr	t=	0.5	hr	t=	0.5	hr	t=	0.5	hr
X=	0.45		X=	0.11		X=	#DIV/0!		X=	#DIV/0!	
Q =	836	veh/hr	Q =	2328	veh/hr	Q =	#VALUE!	veh/hr	Q =	#VALUE!	veh/hr
y=	0.23		y=	0.08		y=	#DIV/0!		y=	#DIV/0!	
L =	0.52		L=	0.78		L=			L=		
n =	1	lane	n =	2	lane	n =	0	lane	n =	0	lane
X ' =	0.71		X ' =	0.79		X ' =	#DIV/0!		X ' =	#DIV/0!	
X > X '	FALSE		X > X '	FALSE		X > X '	#DIV/0!		X > X '	#DIV/0!	
Z =	-0.55		Z =	-0.89		Z =	#DIV/0!		Z =	#DIV/0!	
No=	0.0	vehs	No=	0.0	vehs	No=	#DIV/0!	vehs	No=	#DIV/0!	vehs
Average Queue			Average Queue			Average Queue			Average Queue		
N= qr + No			N= qr + No			N= qr + No			N= qr + No		
N =	6	vehs	N =	2	vehs	N =	#DIV/0!	vehs	N =	#DIV/0!	vehs
Avg queue length =	34	metres	Avg queue leng	5	metres	Avg queue lengtl	#DIV/0!	metres	Avg queue lengtl	#DIV/0!	metres
Average delay =	17.1	seconds	Average delay	3.0	seconds	Average delay =	#VALUE!	seconds	Average delay =	#VALUE!	seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J3 - Carpenter Road / Lion Rock Road	Ref. No.:			
Scheme:	Reference	Design year:	2036		
		Designed by:	RC	Checked by:	PK
Arm A:	Carpenter Road WB				
Arm B:	Carpenter Road EB				
Arm C:	-				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Carpenter Road WB	1	55	120	345	1885	1.2	60	115	460	1920	1.2
Carpenter Road EB	2	95	120	320	3570	1.2	90	115	310	3570	1.2
-											
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	65	0.46	0.40	9.6	11		23	27	31	31	31
Carpenter Road EB	25	0.79	0.11	8.9	6		3	3	6	6	6
-											
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	55	0.52	0.46	12.2	12		19	30	35	35	35
Carpenter Road EB	25	0.78	0.11	8.3	6		3	3	5	5	5
-											
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Carpenter Road WB	**31**	**35**
Arm B:	Carpenter Road EB	**6**	**5**
Arm C:	-		
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, $d = c(1-L)^2/2(1-LX) + 3600pX^2/2q(1-X) - 0.65(c/(q/3600p)^2)^{(1/3)}*X^{(2+5L)}$ OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 20) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

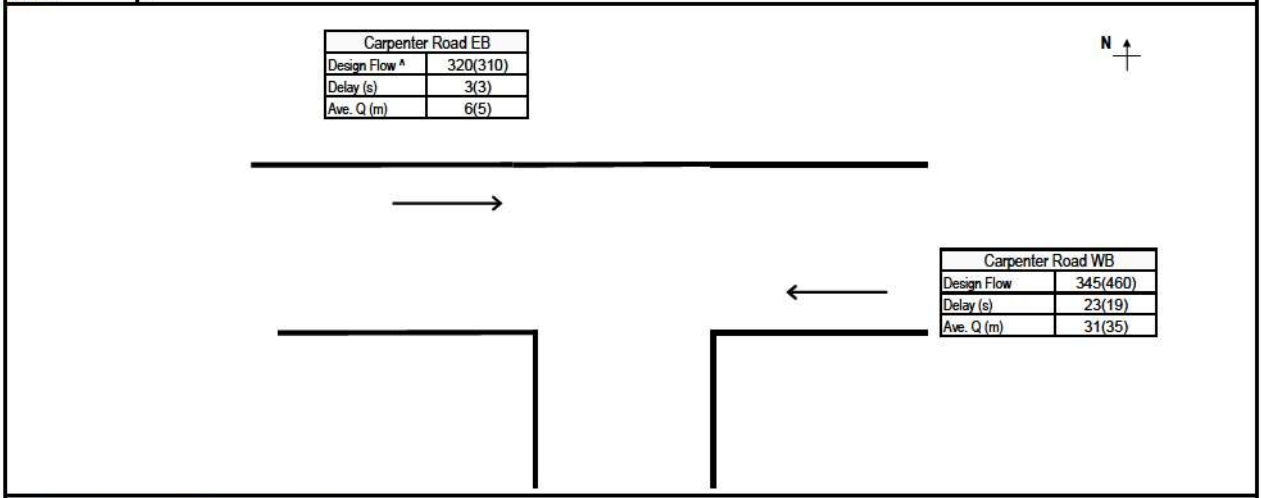
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	288	veh/hr		q '=	267	veh/hr		q '=	#DIV/0!	veh/hr		q '=	#DIV/0!	veh/hr	
c=	120	sec		c=	120	sec		c=	0	sec		c=	0	sec	
S '=	1571	veh/hr		S '=	2975	veh/hr		S '=	#DIV/0!	veh/hr		S '=	#DIV/0!	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.40			X=	0.11			X=	#DIV/0!			X=	#DIV/0!		
Q =	720	veh/hr		Q =	2355	veh/hr		Q =	#VALUE!	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.18			y=	0.09			y=	#DIV/0!			y=	#DIV/0!		
L =	0.46			L=	0.79			L=				L=			
n =	1	lane		n =	2	lane		n =	0	lane		n =	0	lane	
X ' =	0.71			X ' =	0.80			X ' =	#DIV/0!			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!			X > X '	#DIV/0!		
Z =	-0.60			Z =	-0.89			Z =	#DIV/0!			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs		No=	#DIV/0!	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	5	vehs		N =	2	vehs		N =	#DIV/0!	vehs		N =	#DIV/0!	vehs	
Avg queue length =	31	metres		Avg queue leng	6	metres		Avg queue lengtl	#DIV/0!	metres		Avg queue lengtl	#DIV/0!	metres	
Average delay =	21.6	seconds		Average delay	2.9	seconds		Average delay =	#VALUE!	seconds		Average delay =	#VALUE!	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	383	veh/hr		q=	258	veh/hr		q=	#DIV/0!	veh/hr		q=	#DIV/0!	veh/hr	
c=	115	sec		c=	115	sec		c=	115	sec		c=	115	sec	
S=	1600	veh/hr		S=	2975	veh/hr		S=	#DIV/0!	veh/hr		S=	#DIV/0!	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.46			X=	0.11			X=	#DIV/0!			X=	#DIV/0!		
Q =	834	veh/hr		Q =	2328	veh/hr		Q =	#VALUE!	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.24			y=	0.09			y=	#DIV/0!			y=	#DIV/0!		
L =	0.52			L=	0.78			L=				L=			
n =	1	lane		n =	2	lane		n =	0	lane		n =	0	lane	
X ' =	0.71			X ' =	0.79			X ' =	#DIV/0!			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!			X > X '	#DIV/0!		
Z =	-0.54			Z =	-0.89			Z =	#DIV/0!			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs		No=	#DIV/0!	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	6	vehs		N =	2	vehs		N =	#DIV/0!	vehs		N =	#DIV/0!	vehs	
Avg queue length =	35	metres		Avg queue leng	5	metres		Avg queue lengtl	#DIV/0!	metres		Avg queue lengtl	#DIV/0!	metres	
Average delay =	17.3	seconds		Average delay	3.0	seconds		Average delay =	#VALUE!	seconds		Average delay =	#VALUE!	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J3 - Carpenter Road / Lion Rock Road	Ref. No.:			
Scheme:	Design	Design year:	2036		
		Designed by:	RC	Checked by:	PK
Arm A:	Carpenter Road WB				
Arm B:	Carpenter Road EB				
Arm C:	-				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Carpenter Road WB	1	55	120	345	1885	1.2	60	115	460	1920	1.2
Carpenter Road EB	2	95	120	320	3570	1.2	90	115	310	3570	1.2
-											
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	65	0.46	0.40	9.6	11		23	27	31	31	31
Carpenter Road EB	25	0.79	0.11	8.9	6		3	3	6	6	6
-											
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	55	0.52	0.46	12.2	12		19	30	35	35	35
Carpenter Road EB	25	0.78	0.11	8.3	6		3	3	5	5	5
-											
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Carpenter Road WB	**31**	**35**
Arm B:	Carpenter Road EB	**6**	**5**
Arm C:	-		
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 20) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

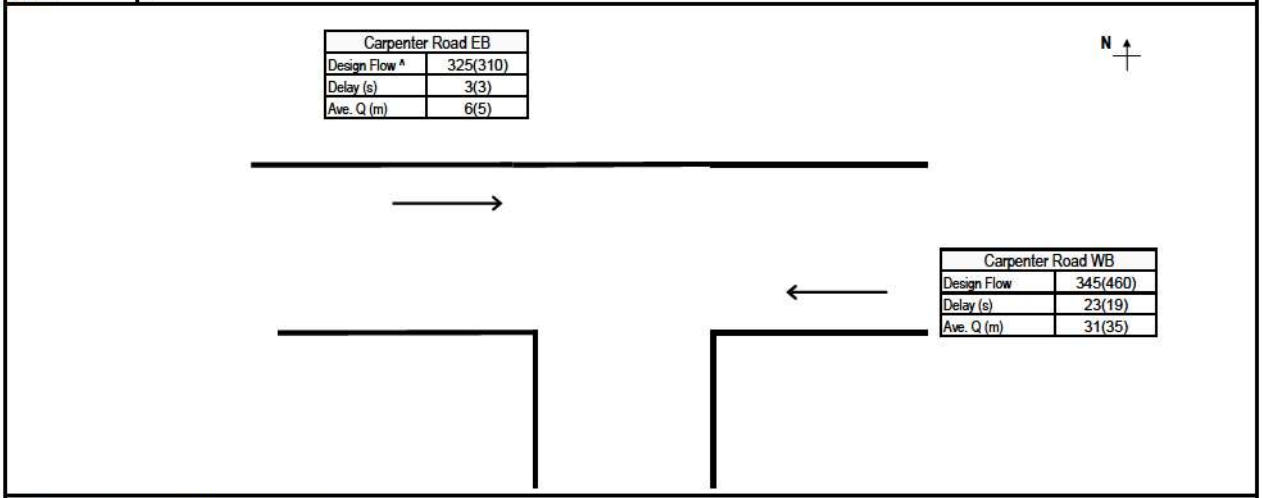
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	288	veh/hr		q '=	267	veh/hr		q '=	#DIV/0!	veh/hr		q '=	#DIV/0!	veh/hr	
c=	120	sec		c=	120	sec		c=	0	sec		c=	0	sec	
S '=	1571	veh/hr		S '=	2975	veh/hr		S '=	#DIV/0!	veh/hr		S '=	#DIV/0!	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.40			X=	0.11			X=	#DIV/0!			X=	#DIV/0!		
Q =	720	veh/hr		Q =	2355	veh/hr		Q =	#VALUE!	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.18			y=	0.09			y=	#DIV/0!			y=	#DIV/0!		
L =	0.46			L=	0.79			L=				L=			
n =	1	lane		n =	2	lane		n =	0	lane		n =	0	lane	
X '=	0.71			X '=	0.80			X '=	#DIV/0!			X '=	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!			X > X '	#DIV/0!		
Z =	-0.60			Z =	-0.89			Z =	#DIV/0!			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs		No=	#DIV/0!	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	5	vehs		N =	2	vehs		N =	#DIV/0!	vehs		N =	#DIV/0!	vehs	
Avg queue length =	31	metres		Avg queue leng	6	metres		Avg queue lengtl	#DIV/0!	metres		Avg queue lengtl	#DIV/0!	metres	
Average delay =	21.6	seconds		Average delay	2.9	seconds		Average delay =	#VALUE!	seconds		Average delay =	#VALUE!	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	383	veh/hr		q=	258	veh/hr		q=	#DIV/0!	veh/hr		q=	#DIV/0!	veh/hr	
c=	115	sec		c=	115	sec		c=	115	sec		c=	115	sec	
S=	1600	veh/hr		S=	2975	veh/hr		S=	#DIV/0!	veh/hr		S=	#DIV/0!	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.46			X=	0.11			X=	#DIV/0!			X=	#DIV/0!		
Q =	834	veh/hr		Q =	2328	veh/hr		Q =	#VALUE!	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.24			y=	0.09			y=	#DIV/0!			y=	#DIV/0!		
L =	0.52			L=	0.78			L=				L=			
n =	1	lane		n =	2	lane		n =	0	lane		n =	0	lane	
X '=	0.71			X '=	0.79			X '=	#DIV/0!			X '=	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!			X > X '	#DIV/0!		
Z =	-0.54			Z =	-0.89			Z =	#DIV/0!			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs		No=	#DIV/0!	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	6	vehs		N =	2	vehs		N =	#DIV/0!	vehs		N =	#DIV/0!	vehs	
Avg queue length =	35	metres		Avg queue leng	5	metres		Avg queue lengtl	#DIV/0!	metres		Avg queue lengtl	#DIV/0!	metres	
Average delay =	17.3	seconds		Average delay	3.0	seconds		Average delay =	#VALUE!	seconds		Average delay =	#VALUE!	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J3 - Carpenter Road / Lion Rock Road	Ref. No.:			
Scheme:	Reference	Design year:	2037		
		Designed by:	RC	Checked by:	PK
Arm A:	Carpenter Road WB				
Arm B:	Carpenter Road EB				
Arm C:	-				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Carpenter Road WB	1	54	120	345	1885	1.2	60	115	460	1920	1.2
Carpenter Road EB	2	95	120	325	3570	1.2	90	115	310	3570	1.2
-											
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	66	0.45	0.40	9.6	11		23	27	31	31	31
Carpenter Road EB	25	0.79	0.11	9.0	6		3	3	6	6	6
-											
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	55	0.52	0.46	12.2	12		19	30	35	35	35
Carpenter Road EB	25	0.78	0.11	8.3	6		3	3	5	5	5
-											
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Carpenter Road WB	**31**	**35**
Arm B:	Carpenter Road EB	**6**	**5**
Arm C:	-		
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 20) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

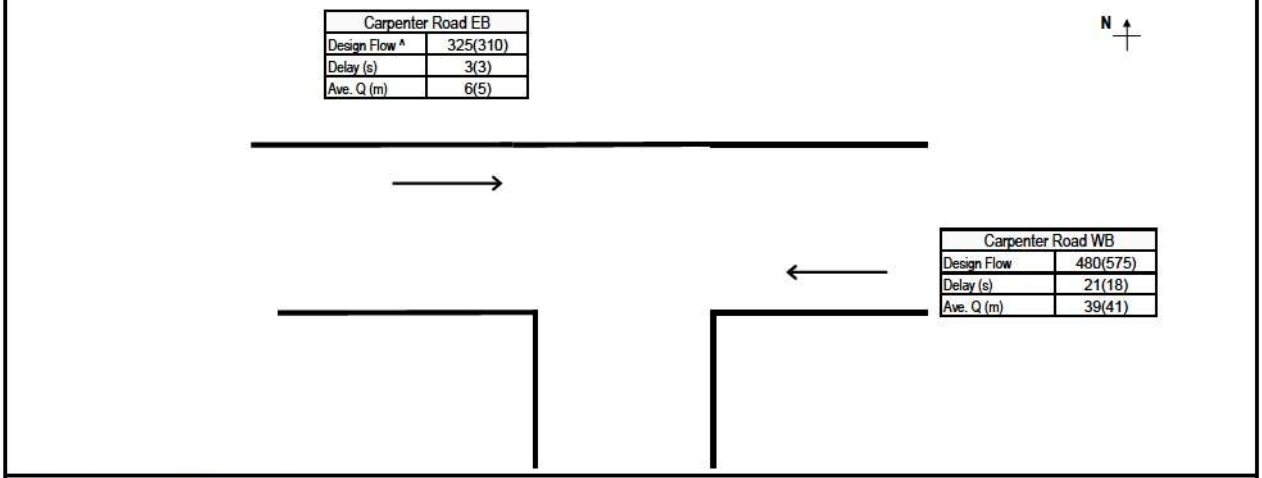
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	288	veh/hr		q '=	271	veh/hr		q '=	#DIV/0!	veh/hr		q '=	#DIV/0!	veh/hr	
c=	120	sec		c=	120	sec		c=	0	sec		c=	0	sec	
S '=	1571	veh/hr		S '=	2975	veh/hr		S '=	#DIV/0!	veh/hr		S '=	#DIV/0!	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.40			X=	0.11			X=	#DIV/0!			X=	#DIV/0!		
Q =	712	veh/hr		Q =	2355	veh/hr		Q =	#VALUE!	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.18			y=	0.09			y=	#DIV/0!			y=	#DIV/0!		
L =	0.45			L=	0.79			L=				L=			
n =	1	lane		n =	2	lane		n =	0	lane		n =	0	lane	
X ' =	0.71			X ' =	0.80			X ' =	#DIV/0!			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!			X > X '	#DIV/0!		
Z =	-0.60			Z =	-0.89			Z =	#DIV/0!			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs		No=	#DIV/0!	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	5	vehs		N =	2	vehs		N =	#DIV/0!	vehs		N =	#DIV/0!	vehs	
Avg queue length =	31	metres		Avg queue leng	6	metres		Avg queue lengtl	#DIV/0!	metres		Avg queue lengtl	#DIV/0!	metres	
Average delay =	21.9	seconds		Average delay	2.9	seconds		Average delay =	#VALUE!	seconds		Average delay =	#VALUE!	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	383	veh/hr		q=	258	veh/hr		q=	#DIV/0!	veh/hr		q=	#DIV/0!	veh/hr	
c=	115	sec		c=	115	sec		c=	115	sec		c=	115	sec	
S=	1600	veh/hr		S=	2975	veh/hr		S=	#DIV/0!	veh/hr		S=	#DIV/0!	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.46			X=	0.11			X=	#DIV/0!			X=	#DIV/0!		
Q =	834	veh/hr		Q =	2328	veh/hr		Q =	#VALUE!	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.24			y=	0.09			y=	#DIV/0!			y=	#DIV/0!		
L =	0.52			L=	0.78			L=				L=			
n =	1	lane		n =	2	lane		n =	0	lane		n =	0	lane	
X ' =	0.71			X ' =	0.79			X ' =	#DIV/0!			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!			X > X '	#DIV/0!		
Z =	-0.54			Z =	-0.89			Z =	#DIV/0!			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs		No=	#DIV/0!	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	6	vehs		N =	2	vehs		N =	#DIV/0!	vehs		N =	#DIV/0!	vehs	
Avg queue length =	35	metres		Avg queue leng	5	metres		Avg queue lengtl	#DIV/0!	metres		Avg queue lengtl	#DIV/0!	metres	
Average delay =	17.3	seconds		Average delay	3.0	seconds		Average delay =	#VALUE!	seconds		Average delay =	#VALUE!	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J3 - Carpenter Road / Lion Rock Road	Ref. No.:			
Scheme:	Design	Design year:	2037		
		Designed by:	RC	Checked by:	PK
Arm A:	Carpenter Road WB				
Arm B:	Carpenter Road EB				
Arm C:	-				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Carpenter Road WB	1	61	120	480	1930	1.2	64	115	575	1945	1.2
Carpenter Road EB	2	95	120	325	3570	1.2	90	115	310	3570	1.2
-											
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	59	0.51	0.49	13.3	13		21	34	39	39	39
Carpenter Road EB	25	0.79	0.11	9.0	6		3	3	6	6	6
-											
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	51	0.55	0.53	15.3	13		18	35	41	41	41
Carpenter Road EB	25	0.78	0.11	8.3	6		3	3	5	5	5
-											
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Carpenter Road WB	**39**	**41**
Arm B:	Carpenter Road EB	**6**	**5**
Arm C:	-		
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 20) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

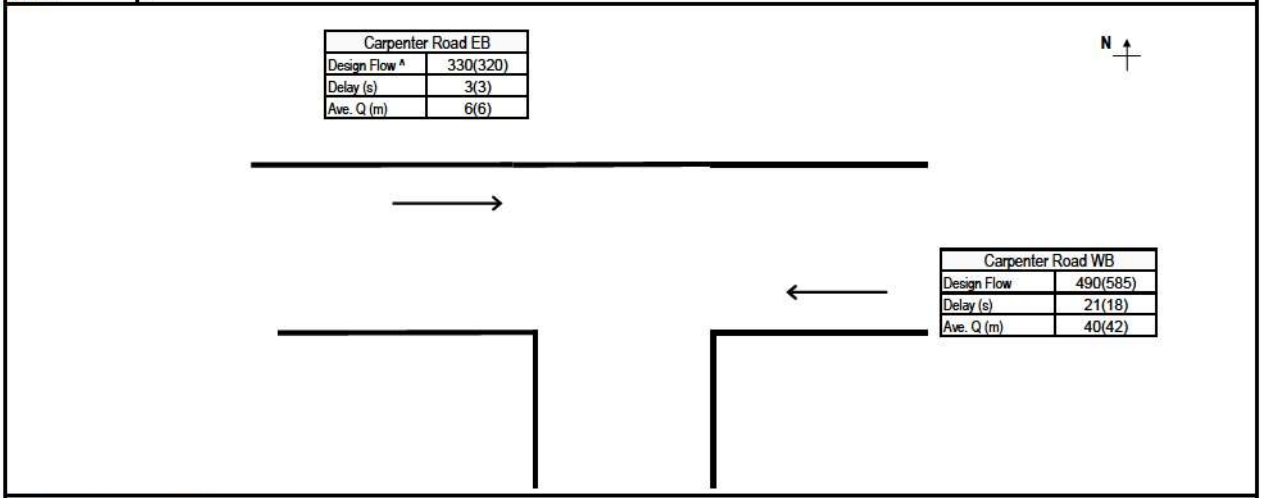
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	400	veh/hr		q '=	271	veh/hr		q '=	#DIV/0!	veh/hr		q '=	#DIV/0!	veh/hr	
c=	120	sec		c=	120	sec		c=	0	sec		c=	0	sec	
S '=	1608	veh/hr		S '=	2975	veh/hr		S '=	#DIV/0!	veh/hr		S '=	#DIV/0!	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.49			X=	0.11			X=	#DIV/0!			X=	#DIV/0!		
Q =	816	veh/hr		Q =	2355	veh/hr		Q =	#VALUE!	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.25			y=	0.09			y=	#DIV/0!			y=	#DIV/0!		
L =	0.51			L=	0.79			L=				L=			
n =	1	lane		n =	2	lane		n =	0	lane		n =	0	lane	
X ' =	0.72			X ' =	0.80			X ' =	#DIV/0!			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!			X > X '	#DIV/0!		
Z =	-0.51			Z =	-0.89			Z =	#DIV/0!			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs		No=	#DIV/0!	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	7	vehs		N =	2	vehs		N =	#DIV/0!	vehs		N =	#DIV/0!	vehs	
Avg queue length =	39	metres		Avg queue leng	6	metres		Avg queue lengtl	#DIV/0!	metres		Avg queue lengtl	#DIV/0!	metres	
Average delay =	19.4	seconds		Average delay	2.9	seconds		Average delay =	#VALUE!	seconds		Average delay =	#VALUE!	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	479	veh/hr		q=	258	veh/hr		q=	#DIV/0!	veh/hr		q=	#DIV/0!	veh/hr	
c=	115	sec		c=	115	sec		c=	115	sec		c=	115	sec	
S=	1621	veh/hr		S=	2975	veh/hr		S=	#DIV/0!	veh/hr		S=	#DIV/0!	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.53			X=	0.11			X=	#DIV/0!			X=	#DIV/0!		
Q =	896	veh/hr		Q =	2328	veh/hr		Q =	#VALUE!	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.30			y=	0.09			y=	#DIV/0!			y=	#DIV/0!		
L =	0.55			L=	0.78			L=				L=			
n =	1	lane		n =	2	lane		n =	0	lane		n =	0	lane	
X ' =	0.72			X ' =	0.79			X ' =	#DIV/0!			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!			X > X '	#DIV/0!		
Z =	-0.47			Z =	-0.89			Z =	#DIV/0!			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs		No=	#DIV/0!	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	7	vehs		N =	2	vehs		N =	#DIV/0!	vehs		N =	#DIV/0!	vehs	
Avg queue length =	41	metres		Avg queue leng	5	metres		Avg queue lengtl	#DIV/0!	metres		Avg queue lengtl	#DIV/0!	metres	
Average delay =	16.3	seconds		Average delay	3.0	seconds		Average delay =	#VALUE!	seconds		Average delay =	#VALUE!	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J3 - Carpenter Road / Lion Rock Road	Ref. No.:			
Scheme:	Reference	Design year:	2040		
		Designed by:	RC	Checked by:	PK
Arm A:	Carpenter Road WB				
Arm B:	Carpenter Road EB				
Arm C:	-				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Carpenter Road WB	1	61	120	490	1930	1.2	63	115	585	1940	1.2
Carpenter Road EB	2	95	120	330	3570	1.2	90	115	320	3570	1.2
-											
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	59	0.51	0.50	13.6	13		21	34	40	40	40
Carpenter Road EB	25	0.79	0.12	9.2	6		3	4	6	6	6
-											
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	52	0.55	0.55	15.6	13		18	36	42	42	42
Carpenter Road EB	25	0.78	0.11	8.5	6		3	3	6	6	6
-											
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Carpenter Road WB	**40**	**42**
Arm B:	Carpenter Road EB	**6**	**6**
Arm C:	-		
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 20) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

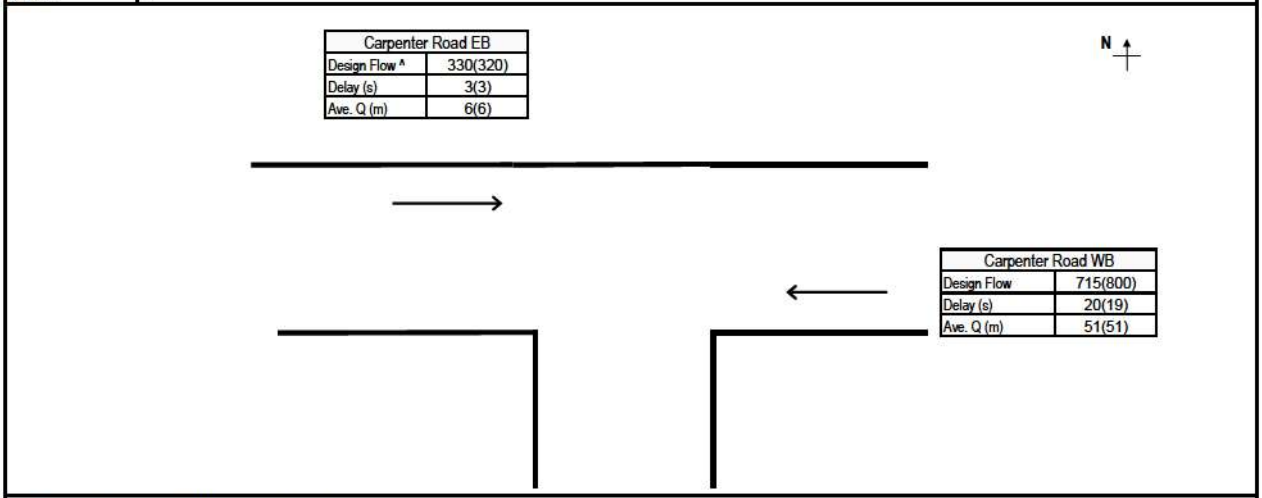
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	408	veh/hr		q '=	275	veh/hr		q '=	#DIV/0!	veh/hr		q '=	#DIV/0!	veh/hr	
c=	120	sec		c=	120	sec		c=	0	sec		c=	0	sec	
S '=	1608	veh/hr		S '=	2975	veh/hr		S '=	#DIV/0!	veh/hr		S '=	#DIV/0!	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.50			X=	0.12			X=	#DIV/0!			X=	#DIV/0!		
Q =	822	veh/hr		Q =	2355	veh/hr		Q =	#VALUE!	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.25			y=	0.09			y=	#DIV/0!			y=	#DIV/0!		
L =	0.51			L=	0.79			L=				L=			
n =	1	lane		n =	2	lane		n =	0	lane		n =	0	lane	
X ' =	0.72			X ' =	0.80			X ' =	#DIV/0!			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!			X > X '	#DIV/0!		
Z =	-0.50			Z =	-0.88			Z =	#DIV/0!			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs		No=	#DIV/0!	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	7	vehs		N =	2	vehs		N =	#DIV/0!	vehs		N =	#DIV/0!	vehs	
Avg queue length =	40	metres		Avg queue leng	6	metres		Avg queue lengtl	#DIV/0!	metres		Avg queue lengtl	#DIV/0!	metres	
Average delay =	19.2	seconds		Average delay	2.9	seconds		Average delay =	#VALUE!	seconds		Average delay =	#VALUE!	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	488	veh/hr		q=	267	veh/hr		q=	#DIV/0!	veh/hr		q=	#DIV/0!	veh/hr	
c=	115	sec		c=	115	sec		c=	115	sec		c=	115	sec	
S=	1617	veh/hr		S=	2975	veh/hr		S=	#DIV/0!	veh/hr		S=	#DIV/0!	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.55			X=	0.11			X=	#DIV/0!			X=	#DIV/0!		
Q =	892	veh/hr		Q =	2328	veh/hr		Q =	#VALUE!	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.30			y=	0.09			y=	#DIV/0!			y=	#DIV/0!		
L =	0.55			L=	0.78			L=				L=			
n =	1	lane		n =	2	lane		n =	0	lane		n =	0	lane	
X ' =	0.72			X ' =	0.79			X ' =	#DIV/0!			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!			X > X '	#DIV/0!		
Z =	-0.45			Z =	-0.89			Z =	#DIV/0!			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs		No=	#DIV/0!	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	7	vehs		N =	2	vehs		N =	#DIV/0!	vehs		N =	#DIV/0!	vehs	
Avg queue length =	42	metres		Avg queue leng	6	metres		Avg queue lengtl	#DIV/0!	metres		Avg queue lengtl	#DIV/0!	metres	
Average delay =	16.6	seconds		Average delay	3.0	seconds		Average delay =	#VALUE!	seconds		Average delay =	#VALUE!	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J3 - Carpenter Road / Lion Rock Road	Ref. No.:			
Scheme:	Design	Design year:	2040		
		Designed by:	RC	Checked by:	PK
Arm A:	Carpenter Road WB				
Arm B:	Carpenter Road EB				
Arm C:	-				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Carpenter Road WB	1	69	120	715	1895	1.2	69	115	800	1880	1.2
Carpenter Road EB	2	95	120	330	3570	1.2	90	115	320	3570	1.2
-											
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	51	0.57	0.66	19.9	16		20	45	51	51	51
Carpenter Road EB	25	0.79	0.12	9.2	6		3	4	6	6	6
-											
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	46	0.60	0.71	21.3	15		19	47	51	51	51
Carpenter Road EB	25	0.78	0.11	8.5	6		3	3	6	6	6
-											
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Carpenter Road WB	**51**	**51**
Arm B:	Carpenter Road EB	**6**	**6**
Arm C:	-		
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, $d = c(1-L)^2/2(1-LX) + 3600pX^2/2q(1-X) - 0.65(c/(q/3600p)^2)^{(1/3)}*X^{(2+5L)}$ OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 20) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

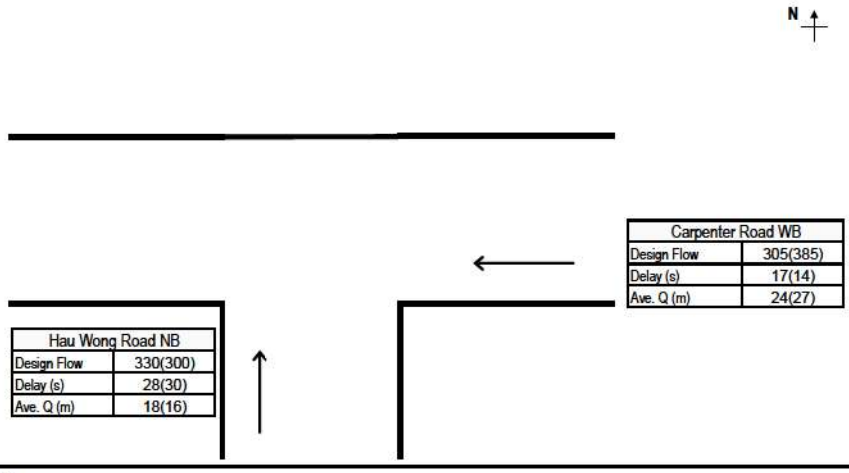
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	596	veh/hr		q '=	275	veh/hr		q '=	#DIV/0!	veh/hr		q '=	#DIV/0!	veh/hr	
c=	120	sec		c=	120	sec		c=	0	sec		c=	0	sec	
S '=	1579	veh/hr		S '=	2975	veh/hr		S '=	#DIV/0!	veh/hr		S '=	#DIV/0!	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.66			X=	0.12			X=	#DIV/0!			X=	#DIV/0!		
Q =	903	veh/hr		Q =	2355	veh/hr		Q =	#VALUE!	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.38			y=	0.09			y=	#DIV/0!			y=	#DIV/0!		
L =	0.57			L=	0.79			L=				L=			
n =	1	lane		n =	2	lane		n =	0	lane		n =	0	lane	
X ' =	0.72			X ' =	0.80			X ' =	#DIV/0!			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!			X > X '	#DIV/0!		
Z =	-0.34			Z =	-0.88			Z =	#DIV/0!			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs		No=	#DIV/0!	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	9	vehs		N =	2	vehs		N =	#DIV/0!	vehs		N =	#DIV/0!	vehs	
Avg queue length =	51	metres		Avg queue leng	6	metres		Avg queue lengtl	#DIV/0!	metres		Avg queue lengtl	#DIV/0!	metres	
Average delay =	17.7	seconds		Average delay	2.9	seconds		Average delay =	#VALUE!	seconds		Average delay =	#VALUE!	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	667	veh/hr		q=	267	veh/hr		q=	#DIV/0!	veh/hr		q=	#DIV/0!	veh/hr	
c=	115	sec		c=	115	sec		c=	115	sec		c=	115	sec	
S=	1567	veh/hr		S=	2975	veh/hr		S=	#DIV/0!	veh/hr		S=	#DIV/0!	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.71			X=	0.11			X=	#DIV/0!			X=	#DIV/0!		
Q =	936	veh/hr		Q =	2328	veh/hr		Q =	#VALUE!	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.43			y=	0.09			y=	#DIV/0!			y=	#DIV/0!		
L =	0.60			L=	0.78			L=				L=			
n =	1	lane		n =	2	lane		n =	0	lane		n =	0	lane	
X ' =	0.72			X ' =	0.79			X ' =	#DIV/0!			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!			X > X '	#DIV/0!		
Z =	-0.29			Z =	-0.89			Z =	#DIV/0!			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs		No=	#DIV/0!	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	9	vehs		N =	2	vehs		N =	#DIV/0!	vehs		N =	#DIV/0!	vehs	
Avg queue length =	51	metres		Avg queue leng	6	metres		Avg queue lengtl	#DIV/0!	metres		Avg queue lengtl	#DIV/0!	metres	
Average delay =	16.2	seconds		Average delay	3.0	seconds		Average delay =	#VALUE!	seconds		Average delay =	#VALUE!	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J4 - Carpenter Road / Hau Wong Road	Ref. No.:			
Scheme:	Design (with improvement)	Design year:	2037		
		Designed by:	RC	Checked by:	PK
Arm A:	Carpenter Road WB				
Arm B:	Hau Wong Road NB				
Arm C:	-				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Carpenter Road WB	1	63	120	305	1965	1.2	65	115	385	1965	1.2
Hau Wong Road NB	2	43	120	330	3540	1.2	36	115	300	3540	1.2
-											
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	57	0.53	0.29	8.5	11		17	19	24	24	24
Hau Wong Road NB	77	0.36	0.26	9.2	14		28	15	18	18	18
-											
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	50	0.57	0.35	10.2	11		14	21	27	27	27
Hau Wong Road NB	79	0.31	0.27	8.0	14		30	15	16	16	16
-											
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Carpenter Road WB	**24**	**27**
Arm B:	Hau Wong Road NB	**18**	**16**
Arm C:	-		
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

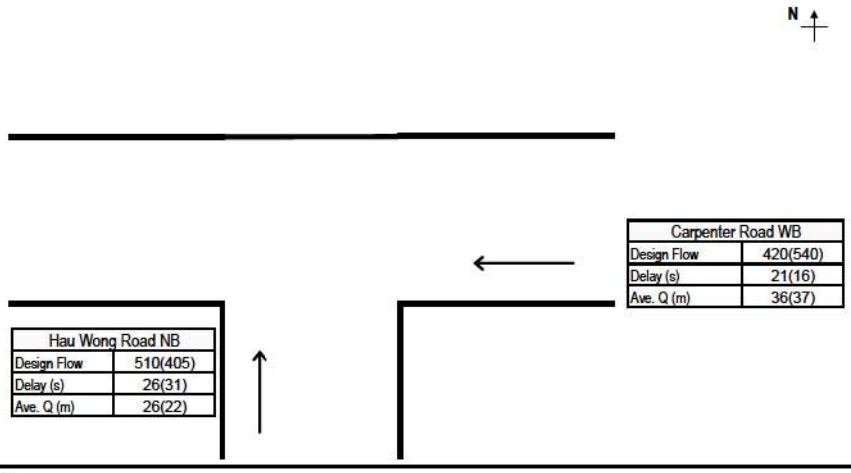
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	254	veh/hr		q '=	275	veh/hr		q '=	#DIV/0!	veh/hr		q '=	#DIV/0!	veh/hr	
c=	120	sec		c=	120	sec		c=	0	sec		c=	0	sec	
S '=	1638	veh/hr		S '=	2950	veh/hr		S '=	#DIV/0!	veh/hr		S '=	#DIV/0!	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.29			X=	0.26			X=	#DIV/0!			X=	#DIV/0!		
Q =	862	veh/hr		Q =	1053	veh/hr		Q =	#VALUE!	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.16			y=	0.09			y=	#DIV/0!			y=	#DIV/0!		
L =	0.53			L=	0.36			L=				L=			
n =	1	lane		n =	2	lane		n =	0	lane		n =	0	lane	
X ' =	0.72			X ' =	0.73			X ' =	#DIV/0!			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!			X > X '	#DIV/0!		
Z =	-0.71			Z =	-0.74			Z =	#DIV/0!			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs		No=	#DIV/0!	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	4	vehs		N =	6	vehs		N =	#DIV/0!	vehs		N =	#DIV/0!	vehs	
Avg queue length =	24	metres		Avg queue leng	18	metres		Avg queue lengtl	#DIV/0!	metres		Avg queue lengtl	#DIV/0!	metres	
Average delay =	15.9	seconds		Average delay	27.4	seconds		Average delay =	#VALUE!	seconds		Average delay =	#VALUE!	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	321	veh/hr		q=	250	veh/hr		q=	#DIV/0!	veh/hr		q=	#DIV/0!	veh/hr	
c=	115	sec		c=	115	sec		c=	115	sec		c=	115	sec	
S=	1638	veh/hr		S=	2950	veh/hr		S=	#DIV/0!	veh/hr		S=	#DIV/0!	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.35			X=	0.27			X=	#DIV/0!			X=	#DIV/0!		
Q =	927	veh/hr		Q =	922	veh/hr		Q =	#VALUE!	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.20			y=	0.08			y=	#DIV/0!			y=	#DIV/0!		
L =	0.57			L=	0.31			L=				L=			
n =	1	lane		n =	2	lane		n =	0	lane		n =	0	lane	
X ' =	0.72			X ' =	0.72			X ' =	#DIV/0!			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!			X > X '	#DIV/0!		
Z =	-0.65			Z =	-0.73			Z =	#DIV/0!			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs		No=	#DIV/0!	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	4	vehs		N =	5	vehs		N =	#DIV/0!	vehs		N =	#DIV/0!	vehs	
Avg queue length =	27	metres		Avg queue leng	16	metres		Avg queue lengtl	#DIV/0!	metres		Avg queue lengtl	#DIV/0!	metres	
Average delay =	13.5	seconds		Average delay	29.7	seconds		Average delay =	#VALUE!	seconds		Average delay =	#VALUE!	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J4 - Carpenter Road / Hau Wong Road	Ref. No.:			
Scheme:	Design (with improvement)	Design year:	2040		
		Designed by:	RC	Checked by:	PK
Arm A:	Carpenter Road WB				
Arm B:	Hau Wong Road NB				
Arm C:	-				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Carpenter Road WB	1	59	120	420	1965	1.2	65	115	540	1965	1.2
Hau Wong Road NB	2	47	120	510	3540	1.2	36	115	405	3540	1.2
-											
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	61	0.49	0.44	11.7	14		21	30	36	36	36
Hau Wong Road NB	73	0.39	0.37	14.2	18		26	22	26	26	26
-											
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	50	0.57	0.49	14.4	14		16	31	37	37	37
Hau Wong Road NB	79	0.31	0.37	10.8	16		31	20	22	22	22
-											
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Carpenter Road WB	**36**	**37**
Arm B:	Hau Wong Road NB	**26**	**22**
Arm C:	-		
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

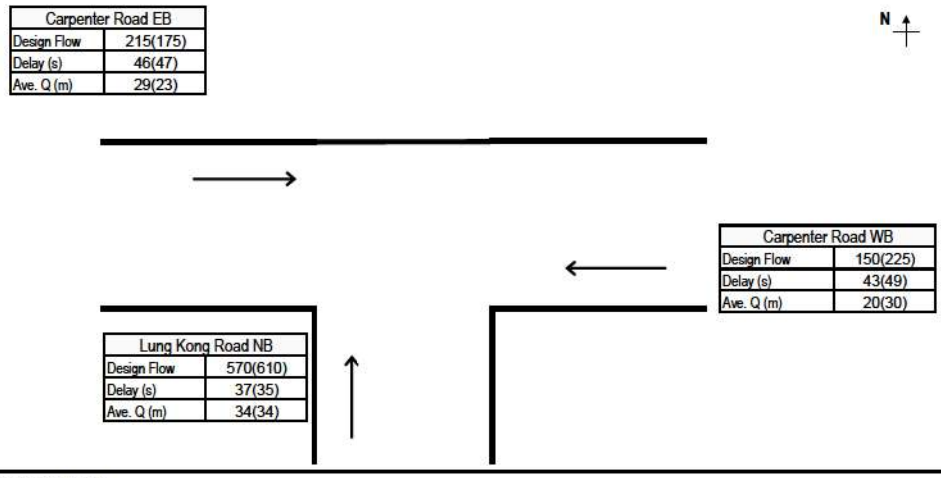
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	350	veh/hr		q '=	425	veh/hr		q '=	#DIV/0!	veh/hr		q '=	#DIV/0!	veh/hr	
c=	120	sec		c=	120	sec		c=	0	sec		c=	0	sec	
S '=	1638	veh/hr		S '=	2950	veh/hr		S '=	#DIV/0!	veh/hr		S '=	#DIV/0!	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.44			X=	0.37			X=	#DIV/0!			X=	#DIV/0!		
Q =	800	veh/hr		Q =	1164	veh/hr		Q =	#VALUE!	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.21			y=	0.14			y=	#DIV/0!			y=	#DIV/0!		
L =	0.49			L=	0.39			L=				L=			
n =	1	lane		n =	2	lane		n =	0	lane		n =	0	lane	
X ' =	0.71			X ' =	0.73			X ' =	#DIV/0!			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!			X > X '	#DIV/0!		
Z =	-0.56			Z =	-0.63			Z =	#DIV/0!			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs		No=	#DIV/0!	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	6	vehs		N =	9	vehs		N =	#DIV/0!	vehs		N =	#DIV/0!	vehs	
Avg queue length =	36	metres		Avg queue leng	26	metres		Avg queue lengtl	#DIV/0!	metres		Avg queue lengtl	#DIV/0!	metres	
Average delay =	19.9	seconds		Average delay	25.7	seconds		Average delay =	#VALUE!	seconds		Average delay =	#VALUE!	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	450	veh/hr		q=	338	veh/hr		q=	#DIV/0!	veh/hr		q=	#DIV/0!	veh/hr	
c=	115	sec		c=	115	sec		c=	115	sec		c=	115	sec	
S=	1638	veh/hr		S=	2950	veh/hr		S=	#DIV/0!	veh/hr		S=	#DIV/0!	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.49			X=	0.37			X=	#DIV/0!			X=	#DIV/0!		
Q =	926	veh/hr		Q =	923	veh/hr		Q =	#VALUE!	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.27			y=	0.11			y=	#DIV/0!			y=	#DIV/0!		
L =	0.57			L=	0.31			L=				L=			
n =	1	lane		n =	2	lane		n =	0	lane		n =	0	lane	
X ' =	0.72			X ' =	0.72			X ' =	#DIV/0!			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!			X > X '	#DIV/0!		
Z =	-0.51			Z =	-0.63			Z =	#DIV/0!			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs		No=	#DIV/0!	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	6	vehs		N =	7	vehs		N =	#DIV/0!	vehs		N =	#DIV/0!	vehs	
Avg queue length =	37	metres		Avg queue leng	22	metres		Avg queue lengtl	#DIV/0!	metres		Avg queue lengtl	#DIV/0!	metres	
Average delay =	15.0	seconds		Average delay	30.7	seconds		Average delay =	#VALUE!	seconds		Average delay =	#VALUE!	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J5 - Carpenter Road / Lung Kong Road	Ref. No.:			
Scheme:	Design (with improvement)	Design year:	2037		
		Designed by:	RC	Checked by:	PK
Arm A:	Carpenter Road WB				
Arm B:	Lung Kong Road NB				
Arm C:	Carpenter Road EB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Carpenter Road WB	1	24	120	150	2075	1.2	19	115	225	2075	1.2
Lung Kong Road NB	2	35	120	570	3590	1.2	35	115	610	3590	1.2
Carpenter Road EB	1	24	120	215	1965	1.2	19	115	175	1965	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	96	0.20	0.36	4.2	9		43	19	20	20	20
Lung Kong Road NB	85	0.29	0.54	15.8	22		37	31	34	34	34
Carpenter Road EB	96	0.20	0.55	6.0	12		46	28	29	29	29
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	96	0.17	0.64	6.0	12		49	30	30	30	30
Lung Kong Road NB	80	0.30	0.57	16.2	22		35	32	34	34	34
Carpenter Road EB	96	0.17	0.53	4.7	9		47	23	23	23	23
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Carpenter Road WB	**20**	**30**
Arm B:	Lung Kong Road NB	**34**	**34**
Arm C:	Carpenter Road EB	**29**	**23**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

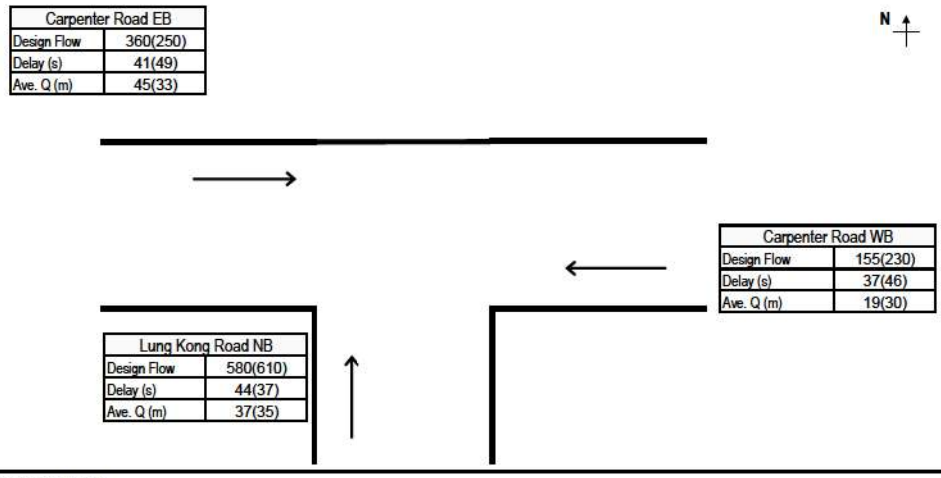
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	125	veh/hr		q '=	475	veh/hr		q '=	179	veh/hr		q '=	#DIV/0!	veh/hr	
c=	120	sec		c=	120	sec		c=	120	sec		c=	0	sec	
S '=	1729	veh/hr		S '=	2992	veh/hr		S '=	1638	veh/hr		S '=	#DIV/0!	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.36			X=	0.54			X=	0.55			X=	#DIV/0!		
Q =	344	veh/hr		Q =	875	veh/hr		Q =	326	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.07			y=	0.16			y=	0.11			y=	#DIV/0!		
L =	0.20			L=	0.29			L=	0.20			L=			
n =	1	lane		n =	2	lane		n =	1	lane		n =	0	lane	
X ' =	0.69			X ' =	0.72			X ' =	0.69			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.64			Z =	-0.46			Z =	-0.45			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	3	vehs		N =	11	vehs		N =	5	vehs		N =	#DIV/0!	vehs	
Avg queue length =	20	metres		Avg queue leng	34	metres		Avg queue lengtl	29	metres		Avg queue lengtl	#DIV/0!	metres	
Average delay =	41.5	seconds		Average delay	35.7	seconds		Average delay =	43.2	seconds		Average delay =	#VALUE!	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	188	veh/hr		q=	508	veh/hr		q=	146	veh/hr		q=	#DIV/0!	veh/hr	
c=	115	sec		c=	115	sec		c=	115	sec		c=	115	sec	
S=	1729	veh/hr		S=	2992	veh/hr		S=	1638	veh/hr		S=	#DIV/0!	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.64			X=	0.57			X=	0.53			X=	#DIV/0!		
Q =	292	veh/hr		Q =	899	veh/hr		Q =	277	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.11			y=	0.17			y=	0.09			y=	#DIV/0!		
L =	0.17			L=	0.30			L=	0.17			L=			
n =	1	lane		n =	2	lane		n =	1	lane		n =	0	lane	
X ' =	0.69			X ' =	0.72			X ' =	0.68			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.36			Z =	-0.43			Z =	-0.47			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	5	vehs		N =	11	vehs		N =	4	vehs		N =	#DIV/0!	vehs	
Avg queue length =	30	metres		Avg queue leng	34	metres		Avg queue lengtl	23	metres		Avg queue lengtl	#DIV/0!	metres	
Average delay =	44.5	seconds		Average delay	33.9	seconds		Average delay =	43.6	seconds		Average delay =	#VALUE!	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J5 - Carpenter Road / Lung Kong Road	Ref. No.:			
Scheme:	Design (with improvement)	Design year:	2040		
		Designed by:	RC	Checked by:	PK
Arm A:	Carpenter Road WB				
Arm B:	Lung Kong Road NB				
Arm C:	Carpenter Road EB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Carpenter Road WB	1	31	120	155	2075	1.2	21	115	230	2075	1.2
Lung Kong Road NB	2	28	120	580	3590	1.2	33	115	610	3590	1.2
Carpenter Road EB	1	31	120	360	1965	1.2	21	115	250	1965	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	89	0.26	0.29	4.3	10		37	17	19	19	19
Lung Kong Road NB	92	0.23	0.70	16.1	23		44	36	37	37	37
Carpenter Road EB	89	0.26	0.71	10.0	17		41		44	45	45
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	94	0.19	0.59	6.1	12		46	30	30	30	30
Lung Kong Road NB	82	0.28	0.60	16.2	22		37	33	35	35	35
Carpenter Road EB	94	0.19	0.68	6.7	13		49	33	32	32	33
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Carpenter Road WB	**19**	**30**
Arm B:	Lung Kong Road NB	**37**	**35**
Arm C:	Carpenter Road EB	**45**	**33**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

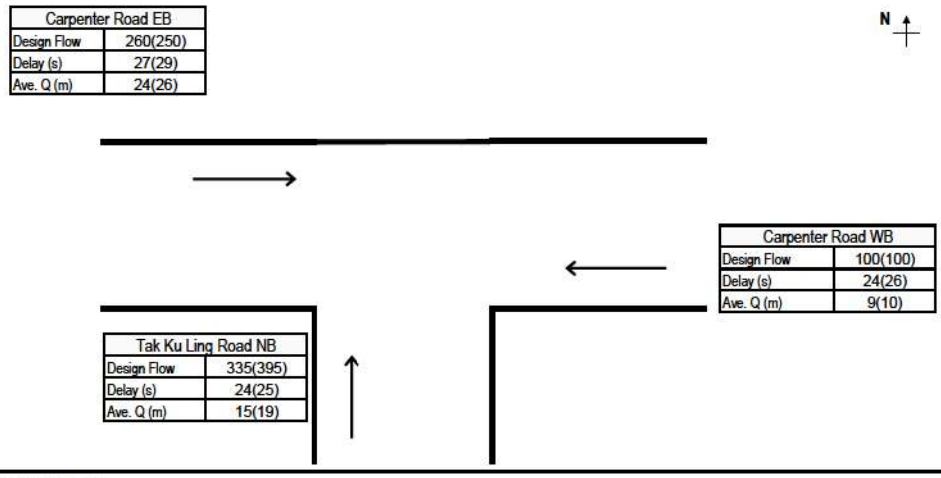
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	129	veh/hr		q '=	483	veh/hr		q '=	300	veh/hr		q '=	#DIV/0!	veh/hr	
c=	120	sec		c=	120	sec		c=	120	sec		c=	0	sec	
S '=	1729	veh/hr		S '=	2992	veh/hr		S '=	1638	veh/hr		S '=	#DIV/0!	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.29			X=	0.70			X=	0.71			X=	#DIV/0!		
Q =	449	veh/hr		Q =	694	veh/hr		Q =	425	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.07			y=	0.16			y=	0.18			y=	#DIV/0!		
L =	0.26			L=	0.23			L=	0.26			L=			
n =	1	lane		n =	2	lane		n =	1	lane		n =	0	lane	
X ' =	0.69			X ' =	0.71			X ' =	0.69			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	TRUE			X > X '	#DIV/0!		
Z =	-0.71			Z =	-0.30			Z =	-0.29			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.1	vehs		No=	#DIV/0!	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	3	vehs		N =	12	vehs		N =	7	vehs		N =	#DIV/0!	vehs	
Avg queue length =	19	metres		Avg queue leng	37	metres		Avg queue length	45	metres		Avg queue length	#DIV/0!	metres	
Average delay =	35.5	seconds		Average delay	42.2	seconds		Average delay =	40.8	seconds		Average delay =	#VALUE!	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	192	veh/hr		q=	508	veh/hr		q=	208	veh/hr		q=	#DIV/0!	veh/hr	
c=	115	sec		c=	115	sec		c=	115	sec		c=	115	sec	
S=	1729	veh/hr		S=	2992	veh/hr		S=	1638	veh/hr		S=	#DIV/0!	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.59			X=	0.60			X=	0.68			X=	#DIV/0!		
Q =	323	veh/hr		Q =	847	veh/hr		Q =	306	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.11			y=	0.17			y=	0.13			y=	#DIV/0!		
L =	0.19			L=	0.28			L=	0.19			L=			
n =	1	lane		n =	2	lane		n =	1	lane		n =	0	lane	
X ' =	0.69			X ' =	0.72			X ' =	0.69			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.41			Z =	-0.40			Z =	-0.32			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	5	vehs		N =	12	vehs		N =	5	vehs		N =	#DIV/0!	vehs	
Avg queue length =	30	metres		Avg queue leng	35	metres		Avg queue length	32	metres		Avg queue length	#DIV/0!	metres	
Average delay =	42.8	seconds		Average delay	35.6	seconds		Average delay =	43.6	seconds		Average delay =	#VALUE!	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J6 - Carpenter Road / Tak Ku Ling Road	Ref. No.:			
Scheme:	Existing	Design year:	2021		
		Designed by:	RC	Checked by:	PK
Arm A:	Carpenter Road WB				
Arm B:	Tak Ku Ling Road NB				
Arm C:	Carpenter Road EB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Carpenter Road WB	1	33	100	100	2115	1.2	36	110	100	2115	1.2
Tak Ku Ling Road NB	2	34	100	335	3640	1.2	41	110	395	3640	1.2
Carpenter Road EB	1	33	100	260	2165	1.2	36	110	250	2165	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	67	0.33	0.15	2.3	7		24	8	9	9	9
Tak Ku Ling Road NB	66	0.34	0.27	7.8	13		24	13	15	15	15
Carpenter Road EB	67	0.33	0.37	6.0	11		27	22	24	24	24
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	74	0.33	0.14	2.5	7		26	9	10	10	10
Tak Ku Ling Road NB	69	0.37	0.29	10.1	14		25	16	19	19	19
Carpenter Road EB	74	0.33	0.35	6.4	11		29	23	26	26	26
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Carpenter Road WB	**9**	**10**
Arm B:	Tak Ku Ling Road NB	**15**	**19**
Arm C:	Carpenter Road EB	**24**	**26**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

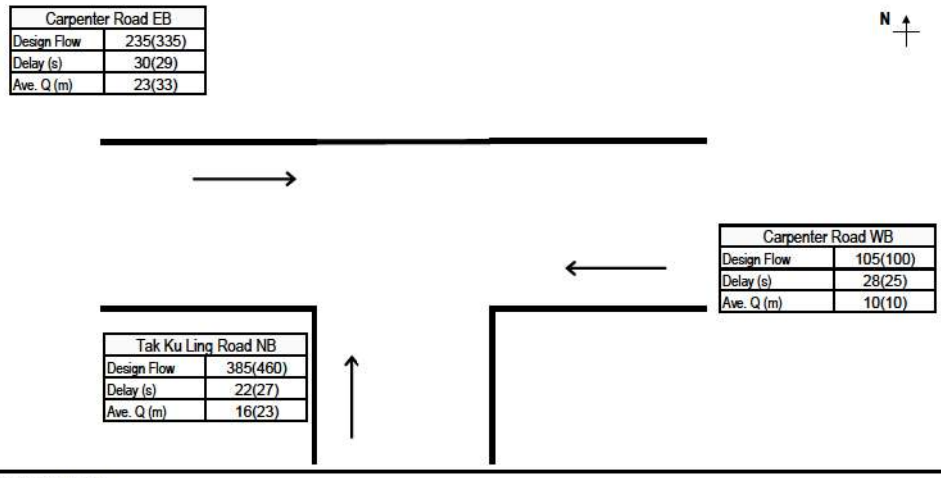
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	83	veh/hr		q '=	279	veh/hr		q '=	217	veh/hr		q '=	#DIV/0!		veh/hr
c=	100	sec		c=	100	sec		c=	100	sec		c=	0		sec
S '=	1763	veh/hr		S '=	3033	veh/hr		S '=	1804	veh/hr		S '=	#DIV/0!		veh/hr
t=	1	hr		t=	1	hr		t=	1	hr		t=	1		hr
X=	0.15			X=	0.27			X=	0.37			X=	#DIV/0!		
Q =	573	veh/hr		Q =	1046	veh/hr		Q =	587	veh/hr		Q =	#VALUE!		veh/hr
y=	0.05			y=	0.09			y=	0.12			y=	#DIV/0!		
L =	0.33			L=	0.34			L=	0.33			L=			
n =	1	lane		n =	2	lane		n =	1	lane		n =	0	lane	
X ' =	0.70			X ' =	0.72			X ' =	0.70			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.85			Z =	-0.73			Z =	-0.63			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	2	vehs		N =	5	vehs		N =	4	vehs		N =	#DIV/0!		vehs
Avg queue length =	9	metres		Avg queue leng	15	metres		Avg queue length	24	metres		Avg queue length	#DIV/0!		metres
Average delay =	23.9	seconds		Average delay	23.6	seconds		Average delay =	25.9	seconds		Average delay =	#VALUE!		seconds

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	83	veh/hr		q=	329	veh/hr		q=	208	veh/hr		q=	#DIV/0!		veh/hr
c=	110	sec		c=	110	sec		c=	110	sec		c=	110		sec
S=	1763	veh/hr		S=	3033	veh/hr		S=	1804	veh/hr		S=	#DIV/0!		veh/hr
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5		hr
X=	0.14			X=	0.29			X=	0.35			X=	#DIV/0!		
Q =	581	veh/hr		Q =	1124	veh/hr		Q =	594	veh/hr		Q =	#VALUE!		veh/hr
y=	0.05			y=	0.11			y=	0.12			y=	#DIV/0!		
L =	0.33			L=	0.37			L=	0.33			L=			
n =	1	lane		n =	2	lane		n =	1	lane		n =	0	lane	
X ' =	0.70			X ' =	0.73			X ' =	0.70			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.86			Z =	-0.71			Z =	-0.65			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	2	vehs		N =	6	vehs		N =	4	vehs		N =	#DIV/0!		vehs
Avg queue length =	10	metres		Avg queue leng	19	metres		Avg queue length	26	metres		Avg queue length	#DIV/0!		metres
Average delay =	26.0	seconds		Average delay	24.4	seconds		Average delay =	28.0	seconds		Average delay =	#VALUE!		seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J6 - Carpenter Road / Tak Ku Ling Road	Ref. No.:			
Scheme:	Reference	Design year:	2033		
		Designed by:	RC	Checked by:	PK
Arm A:	Carpenter Road WB				
Arm B:	Tak Ku Ling Road NB				
Arm C:	Carpenter Road EB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Carpenter Road WB	1	28	100	105	2115	1.2	39	110	100	2115	1.2
Tak Ku Ling Road NB	2	39	100	385	3640	1.2	38	110	460	3640	1.2
Carpenter Road EB	1	28	100	235	2165	1.2	39	110	335	2165	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	72	0.28	0.18	2.4	7		28	9	10	10	10
Tak Ku Ling Road NB	61	0.39	0.27	8.9	14		22	14	16	16	16
Carpenter Road EB	72	0.28	0.38	5.4	11		30	22	23	23	23
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	71	0.35	0.13	2.5	7		25	8	10	10	10
Tak Ku Ling Road NB	72	0.35	0.36	11.7	16		27	20	23	23	23
Carpenter Road EB	71	0.35	0.44	8.5	13		29	30	33	33	33
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Carpenter Road WB	**10**	**10**
Arm B:	Tak Ku Ling Road NB	**16**	**23**
Arm C:	Carpenter Road EB	**23**	**33**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

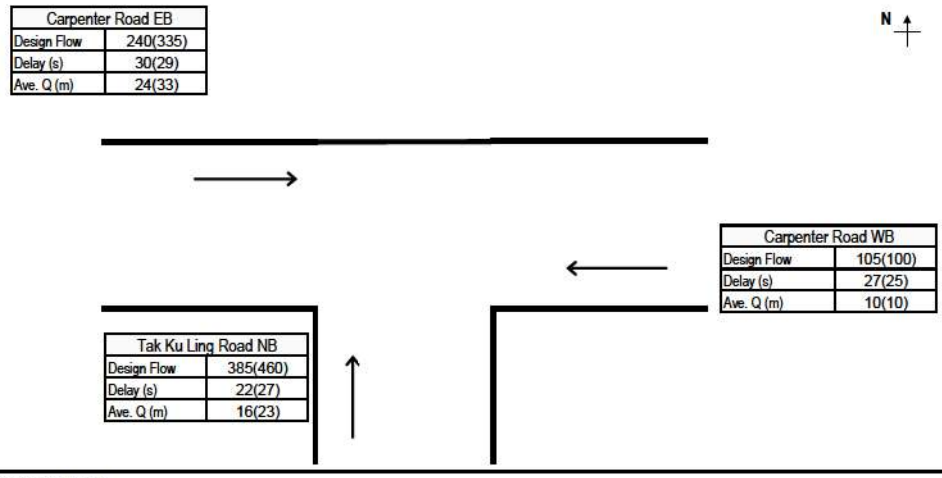
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	88	veh/hr		q '=	321	veh/hr		q '=	196	veh/hr		q '=	#DIV/0!	veh/hr	
c=	100	sec		c=	100	sec		c=	100	sec		c=	0	sec	
S '=	1763	veh/hr		S '=	3033	veh/hr		S '=	1804	veh/hr		S '=	#DIV/0!	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.18			X=	0.27			X=	0.38			X=	#DIV/0!		
Q =	500	veh/hr		Q =	1173	veh/hr		Q =	511	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.05			y=	0.11			y=	0.11			y=	#DIV/0!		
L =	0.28			L=	0.39			L=	0.28			L=			
n =	1	lane		n =	2	lane		n =	1	lane		n =	0	lane	
X ' =	0.69			X ' =	0.72			X ' =	0.69			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.82			Z =	-0.73			Z =	-0.62			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	2	vehs		N =	5	vehs		N =	4	vehs		N =	#DIV/0!	vehs	
Avg queue length =	10	metres		Avg queue leng	16	metres		Avg queue length	23	metres		Avg queue length	#DIV/0!	metres	
Average delay =	27.0	seconds		Average delay	21.0	seconds		Average delay =	28.8	seconds		Average delay =	#VALUE!	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	83	veh/hr		q=	383	veh/hr		q=	279	veh/hr		q=	#DIV/0!	veh/hr	
c=	110	sec		c=	110	sec		c=	110	sec		c=	110	sec	
S=	1763	veh/hr		S=	3033	veh/hr		S=	1804	veh/hr		S=	#DIV/0!	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.13			X=	0.36			X=	0.44			X=	#DIV/0!		
Q =	620	veh/hr		Q =	1057	veh/hr		Q =	635	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.05			y=	0.13			y=	0.15			y=	#DIV/0!		
L =	0.35			L=	0.35			L=	0.35			L=			
n =	1	lane		n =	2	lane		n =	1	lane		n =	0	lane	
X ' =	0.70			X ' =	0.72			X ' =	0.70			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.87			Z =	-0.64			Z =	-0.56			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	2	vehs		N =	8	vehs		N =	6	vehs		N =	#DIV/0!	vehs	
Avg queue length =	10	metres		Avg queue leng	23	metres		Avg queue length	33	metres		Avg queue length	#DIV/0!	metres	
Average delay =	24.3	seconds		Average delay	26.7	seconds		Average delay =	27.3	seconds		Average delay =	#VALUE!	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J6 - Carpenter Road / Tak Ku Ling Road	Ref. No.:			
Scheme:	Design	Design year:	2033		
		Designed by:	RC	Checked by:	PK
Arm A:	Carpenter Road WB				
Arm B:	Tak Ku Ling Road NB				
Arm C:	Carpenter Road EB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Carpenter Road WB	1	29	100	105	2115	1.2	39	110	100	2115	1.2
Tak Ku Ling Road NB	2	38	100	385	3640	1.2	38	110	460	3640	1.2
Carpenter Road EB	1	29	100	240	2165	1.2	39	110	335	2165	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	71	0.29	0.17	2.4	7		27	9	10	10	10
Tak Ku Ling Road NB	62	0.38	0.28	8.9	14		22	14	16	16	16
Carpenter Road EB	71	0.29	0.39	5.6	11		30	22	24	24	24
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	71	0.35	0.13	2.5	7		25	8	10	10	10
Tak Ku Ling Road NB	72	0.35	0.36	11.7	16		27	20	23	23	23
Carpenter Road EB	71	0.35	0.44	8.5	13		29	30	33	33	33
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Carpenter Road WB	**10**	**10**
Arm B:	Tak Ku Ling Road NB	**16**	**23**
Arm C:	Carpenter Road EB	**24**	**33**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

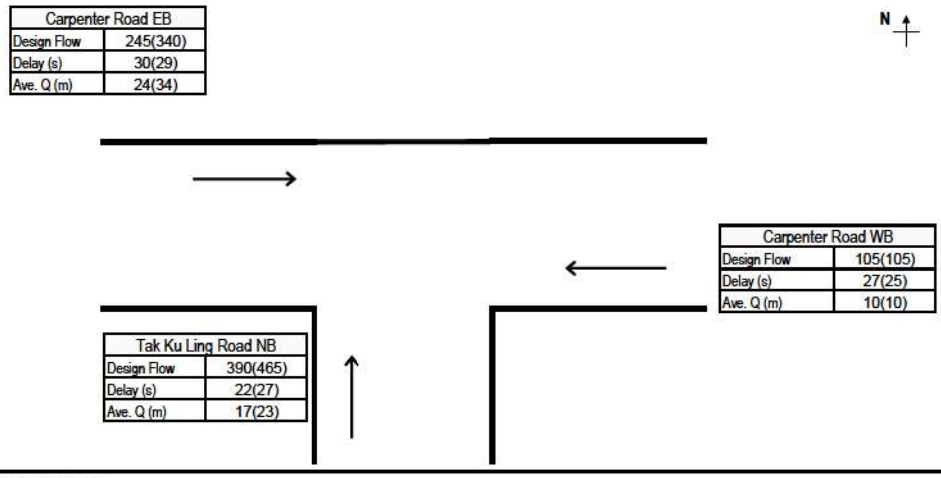
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	88	veh/hr		q '=	321	veh/hr		q '=	200	veh/hr		q '=	#DIV/0!	veh/hr	
c=	100	sec		c=	100	sec		c=	100	sec		c=	0	sec	
S '=	1763	veh/hr		S '=	3033	veh/hr		S '=	1804	veh/hr		S '=	#DIV/0!	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.17			X=	0.28			X=	0.39			X=	#DIV/0!		
Q =	506	veh/hr		Q =	1162	veh/hr		Q =	518	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.05			y=	0.11			y=	0.11			y=	#DIV/0!		
L =	0.29			L=	0.38			L=	0.29			L=			
n =	1	lane		n =	2	lane		n =	1	lane		n =	0	lane	
X ' =	0.69			X ' =	0.72			X ' =	0.69			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.83			Z =	-0.72			Z =	-0.61			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	2	vehs		N =	5	vehs		N =	4	vehs		N =	#DIV/0!	vehs	
Avg queue length =	10	metres		Avg queue leng	16	metres		Avg queue length	24	metres		Avg queue length	#DIV/0!	metres	
Average delay =	26.8	seconds		Average delay	21.3	seconds		Average delay =	28.6	seconds		Average delay =	#VALUE!	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	83	veh/hr		q=	383	veh/hr		q=	279	veh/hr		q=	#DIV/0!	veh/hr	
c=	110	sec		c=	110	sec		c=	110	sec		c=	110	sec	
S=	1763	veh/hr		S=	3033	veh/hr		S=	1804	veh/hr		S=	#DIV/0!	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.13			X=	0.36			X=	0.44			X=	#DIV/0!		
Q =	620	veh/hr		Q =	1057	veh/hr		Q =	635	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.05			y=	0.13			y=	0.15			y=	#DIV/0!		
L =	0.35			L=	0.35			L=	0.35			L=			
n =	1	lane		n =	2	lane		n =	1	lane		n =	0	lane	
X ' =	0.70			X ' =	0.72			X ' =	0.70			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.87			Z =	-0.64			Z =	-0.56			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	2	vehs		N =	8	vehs		N =	6	vehs		N =	#DIV/0!	vehs	
Avg queue length =	10	metres		Avg queue leng	23	metres		Avg queue length	33	metres		Avg queue length	#DIV/0!	metres	
Average delay =	24.3	seconds		Average delay	26.7	seconds		Average delay =	27.3	seconds		Average delay =	#VALUE!	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J6 - Carpenter Road / Tak Ku Ling Road	Ref. No.:			
Scheme:	Reference	Design year:	2036		
		Designed by:	RC	Checked by:	PK
Arm A:	Carpenter Road WB				
Arm B:	Tak Ku Ling Road NB				
Arm C:	Carpenter Road EB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Carpenter Road WB	1	29	100	105	2115	1.2	39	110	105	2115	1.2
Tak Ku Ling Road NB	2	38	100	390	3640	1.2	38	110	465	3640	1.2
Carpenter Road EB	1	29	100	245	2165	1.2	39	110	340	2165	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	71	0.29	0.17	2.4	7		27	9	10	10	10
Tak Ku Ling Road NB	62	0.38	0.28	9.0	14		22	14	17	17	17
Carpenter Road EB	71	0.29	0.39	5.7	11		30	22	24	24	24
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	71	0.35	0.14	2.7	7		25	9	10	10	10
Tak Ku Ling Road NB	72	0.35	0.37	11.8	16		27	20	23	23	23
Carpenter Road EB	71	0.35	0.45	8.7	13		29	31	34	34	34
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Carpenter Road WB	**10**	**10**
Arm B:	Tak Ku Ling Road NB	**17**	**23**
Arm C:	Carpenter Road EB	**24**	**34**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

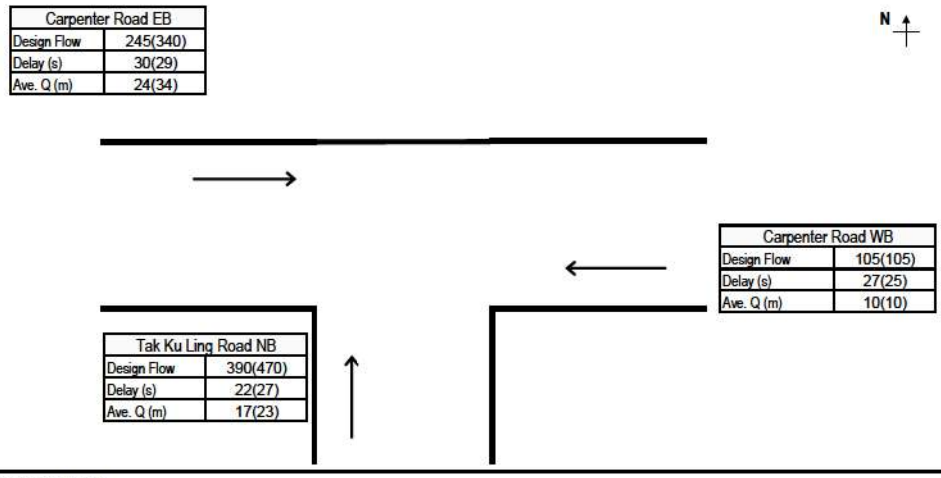
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	88	veh/hr		q '=	325	veh/hr		q '=	204	veh/hr		q '=	#DIV/0!		veh/hr
c=	100	sec		c=	100	sec		c=	100	sec		c=	0	sec	
S '=	1763	veh/hr		S '=	3033	veh/hr		S '=	1804	veh/hr		S '=	#DIV/0!		veh/hr
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.17			X=	0.28			X=	0.39			X=	#DIV/0!		
Q =	507	veh/hr		Q =	1161	veh/hr		Q =	519	veh/hr		Q =	#VALUE!		veh/hr
y=	0.05			y=	0.11			y=	0.11			y=	#DIV/0!		
L =	0.29			L=	0.38			L=	0.29			L=			
n =	1	lane		n =	2	lane		n =	1	lane		n =	0	lane	
X ' =	0.69			X ' =	0.72			X ' =	0.69			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.83			Z =	-0.72			Z =	-0.61			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	2	vehs		N =	6	vehs		N =	4	vehs		N =	#DIV/0!		vehs
Avg queue length =	10	metres		Avg queue leng	17	metres		Avg queue length	24	metres		Avg queue length	#DIV/0!		metres
Average delay =	26.7	seconds		Average delay	21.3	seconds		Average delay =	28.6	seconds		Average delay =	#VALUE!		seconds

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	88	veh/hr		q=	388	veh/hr		q=	283	veh/hr		q=	#DIV/0!		veh/hr
c=	110	sec		c=	110	sec		c=	110	sec		c=	110	sec	
S=	1763	veh/hr		S=	3033	veh/hr		S=	1804	veh/hr		S=	#DIV/0!		veh/hr
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.14			X=	0.37			X=	0.45			X=	#DIV/0!		
Q =	619	veh/hr		Q =	1058	veh/hr		Q =	634	veh/hr		Q =	#VALUE!		veh/hr
y=	0.05			y=	0.13			y=	0.16			y=	#DIV/0!		
L =	0.35			L=	0.35			L=	0.35			L=			
n =	1	lane		n =	2	lane		n =	1	lane		n =	0	lane	
X ' =	0.70			X ' =	0.72			X ' =	0.70			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.86			Z =	-0.63			Z =	-0.55			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	2	vehs		N =	8	vehs		N =	6	vehs		N =	#DIV/0!		vehs
Avg queue length =	10	metres		Avg queue leng	23	metres		Avg queue length	34	metres		Avg queue length	#DIV/0!		metres
Average delay =	24.4	seconds		Average delay	26.8	seconds		Average delay =	27.5	seconds		Average delay =	#VALUE!		seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J6 - Carpenter Road / Tak Ku Ling Road	Ref. No.:			
Scheme:	Design	Design year:	2036		
		Designed by:	RC	Checked by:	PK
Arm A:	Carpenter Road WB				
Arm B:	Tak Ku Ling Road NB				
Arm C:	Carpenter Road EB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Carpenter Road WB	1	29	100	105	2115	1.2	39	110	105	2115	1.2
Tak Ku Ling Road NB	2	38	100	390	3640	1.2	38	110	470	3640	1.2
Carpenter Road EB	1	29	100	245	2165	1.2	39	110	340	2165	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	71	0.29	0.17	2.4	7		27	9	10	10	10
Tak Ku Ling Road NB	62	0.38	0.28	9.0	14		22	14	17	17	17
Carpenter Road EB	71	0.29	0.39	5.7	11		30	22	24	24	24
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	71	0.35	0.14	2.7	7		25	9	10	10	10
Tak Ku Ling Road NB	72	0.35	0.37	12.0	16		27	21	23	23	23
Carpenter Road EB	71	0.35	0.45	8.7	13		29	31	34	34	34
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Carpenter Road WB	**10**	**10**
Arm B:	Tak Ku Ling Road NB	**17**	**23**
Arm C:	Carpenter Road EB	**24**	**34**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

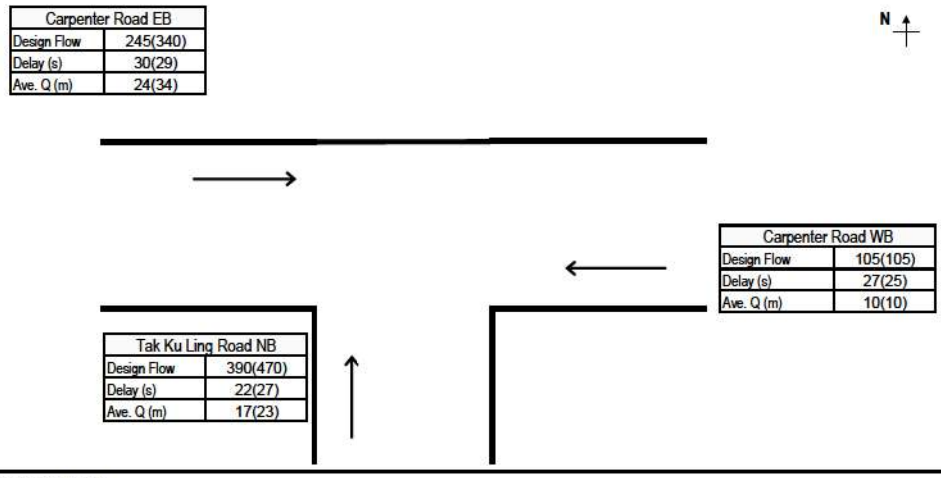
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	88	veh/hr		q '=	325	veh/hr		q '=	204	veh/hr		q '=	#DIV/0!		veh/hr
c=	100	sec		c=	100	sec		c=	100	sec		c=	0	sec	
S '=	1763	veh/hr		S '=	3033	veh/hr		S '=	1804	veh/hr		S '=	#DIV/0!		veh/hr
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.17			X=	0.28			X=	0.39			X=	#DIV/0!		
Q =	507	veh/hr		Q =	1161	veh/hr		Q =	519	veh/hr		Q =	#VALUE!		veh/hr
y=	0.05			y=	0.11			y=	0.11			y=	#DIV/0!		
L =	0.29			L=	0.38			L=	0.29			L=			
n =	1	lane		n =	2	lane		n =	1	lane		n =	0	lane	
X ' =	0.69			X ' =	0.72			X ' =	0.69			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.83			Z =	-0.72			Z =	-0.61			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	2	vehs		N =	6	vehs		N =	4	vehs		N =	#DIV/0!		vehs
Avg queue length =	10	metres		Avg queue leng	17	metres		Avg queue length	24	metres		Avg queue length	#DIV/0!		metres
Average delay =	26.7	seconds		Average delay	21.3	seconds		Average delay =	28.6	seconds		Average delay =	#VALUE!		seconds

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	88	veh/hr		q=	392	veh/hr		q=	283	veh/hr		q=	#DIV/0!		veh/hr
c=	110	sec		c=	110	sec		c=	110	sec		c=	110	sec	
S=	1763	veh/hr		S=	3033	veh/hr		S=	1804	veh/hr		S=	#DIV/0!		veh/hr
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.14			X=	0.37			X=	0.45			X=	#DIV/0!		
Q =	619	veh/hr		Q =	1058	veh/hr		Q =	634	veh/hr		Q =	#VALUE!		veh/hr
y=	0.05			y=	0.13			y=	0.16			y=	#DIV/0!		
L =	0.35			L=	0.35			L=	0.35			L=			
n =	1	lane		n =	2	lane		n =	1	lane		n =	0	lane	
X ' =	0.70			X ' =	0.72			X ' =	0.70			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.86			Z =	-0.63			Z =	-0.55			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	2	vehs		N =	8	vehs		N =	6	vehs		N =	#DIV/0!		vehs
Avg queue length =	10	metres		Avg queue leng	23	metres		Avg queue length	34	metres		Avg queue length	#DIV/0!		metres
Average delay =	24.4	seconds		Average delay	26.8	seconds		Average delay =	27.5	seconds		Average delay =	#VALUE!		seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J6 - Carpenter Road / Tak Ku Ling Road	Ref. No.:			
Scheme:	Reference	Design year:	2037		
		Designed by:	RC	Checked by:	PK
Arm A:	Carpenter Road WB				
Arm B:	Tak Ku Ling Road NB				
Arm C:	Carpenter Road EB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Carpenter Road WB	1	29	100	105	2115	1.2	39	110	105	2115	1.2
Tak Ku Ling Road NB	2	38	100	390	3640	1.2	38	110	470	3640	1.2
Carpenter Road EB	1	29	100	245	2165	1.2	39	110	340	2165	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	71	0.29	0.17	2.4	7		27	9	10	10	10
Tak Ku Ling Road NB	62	0.38	0.28	9.0	14		22	14	17	17	17
Carpenter Road EB	71	0.29	0.39	5.7	11		30	22	24	24	24
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	71	0.35	0.14	2.7	7		25	9	10	10	10
Tak Ku Ling Road NB	72	0.35	0.37	12.0	16		27	21	23	23	23
Carpenter Road EB	71	0.35	0.45	8.7	13		29	31	34	34	34
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Carpenter Road WB	**10**	**10**
Arm B:	Tak Ku Ling Road NB	**17**	**23**
Arm C:	Carpenter Road EB	**24**	**34**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

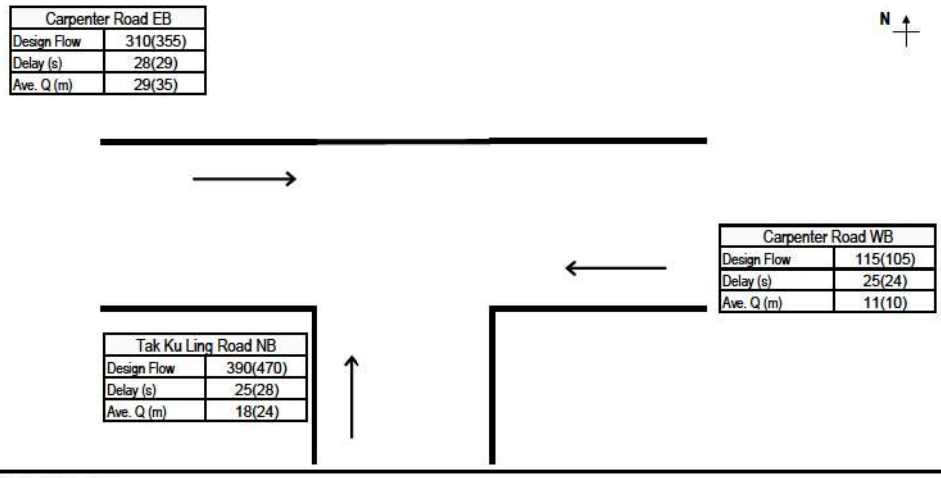
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	88	veh/hr		q '=	325	veh/hr		q '=	204	veh/hr		q '=	#DIV/0!	veh/hr	
c=	100	sec		c=	100	sec		c=	100	sec		c=	0	sec	
S '=	1763	veh/hr		S '=	3033	veh/hr		S '=	1804	veh/hr		S '=	#DIV/0!	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.17			X=	0.28			X=	0.39			X=	#DIV/0!		
Q =	507	veh/hr		Q =	1161	veh/hr		Q =	519	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.05			y=	0.11			y=	0.11			y=	#DIV/0!		
L =	0.29			L=	0.38			L=	0.29			L=			
n =	1	lane		n =	2	lane		n =	1	lane		n =	0	lane	
X ' =	0.69			X ' =	0.72			X ' =	0.69			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.83			Z =	-0.72			Z =	-0.61			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	2	vehs		N =	6	vehs		N =	4	vehs		N =	#DIV/0!	vehs	
Avg queue length =	10	metres		Avg queue leng	17	metres		Avg queue length	24	metres		Avg queue length	#DIV/0!	metres	
Average delay =	26.7	seconds		Average delay	21.3	seconds		Average delay =	28.6	seconds		Average delay =	#VALUE!	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	88	veh/hr		q=	392	veh/hr		q=	283	veh/hr		q=	#DIV/0!	veh/hr	
c=	110	sec		c=	110	sec		c=	110	sec		c=	110	sec	
S=	1763	veh/hr		S=	3033	veh/hr		S=	1804	veh/hr		S=	#DIV/0!	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.14			X=	0.37			X=	0.45			X=	#DIV/0!		
Q =	619	veh/hr		Q =	1058	veh/hr		Q =	634	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.05			y=	0.13			y=	0.16			y=	#DIV/0!		
L =	0.35			L=	0.35			L=	0.35			L=			
n =	1	lane		n =	2	lane		n =	1	lane		n =	0	lane	
X ' =	0.70			X ' =	0.72			X ' =	0.70			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.86			Z =	-0.63			Z =	-0.55			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	2	vehs		N =	8	vehs		N =	6	vehs		N =	#DIV/0!	vehs	
Avg queue length =	10	metres		Avg queue leng	23	metres		Avg queue length	34	metres		Avg queue length	#DIV/0!	metres	
Average delay =	24.4	seconds		Average delay	26.8	seconds		Average delay =	27.5	seconds		Average delay =	#VALUE!	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J6 - Carpenter Road / Tak Ku Ling Road	Ref. No.:			
Scheme:	Design	Design year:	2037		
		Designed by:	RC	Checked by:	PK
Arm A:	Carpenter Road WB				
Arm B:	Tak Ku Ling Road NB				
Arm C:	Carpenter Road EB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Carpenter Road WB	1	33	100	115	2115	1.2	39	110	105	2115	1.2
Tak Ku Ling Road NB	2	34	100	390	3640	1.2	38	110	470	3640	1.2
Carpenter Road EB	1	33	100	310	2165	1.2	39	110	355	2165	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	67	0.33	0.17	2.7	7		25	9	11	11	11
Tak Ku Ling Road NB	66	0.34	0.31	9.0	14		25	16	18	18	18
Carpenter Road EB	67	0.33	0.44	7.2	12		28	27	29	29	29
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	71	0.36	0.14	2.7	7		24	9	10	10	10
Tak Ku Ling Road NB	72	0.34	0.38	12.0	17		28	21	24	24	24
Carpenter Road EB	71	0.36	0.46	9.0	14		29	31	35	35	35
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Carpenter Road WB	**11**	**10**
Arm B:	Tak Ku Ling Road NB	**18**	**24**
Arm C:	Carpenter Road EB	**29**	**35**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, $d = c(1-L)^2/2(1-LX) + 3600pX^2/2q(1-X) - 0.65(c/(q/3600p)^2)^{(1/3)}*X^{(2+5L)}$ OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

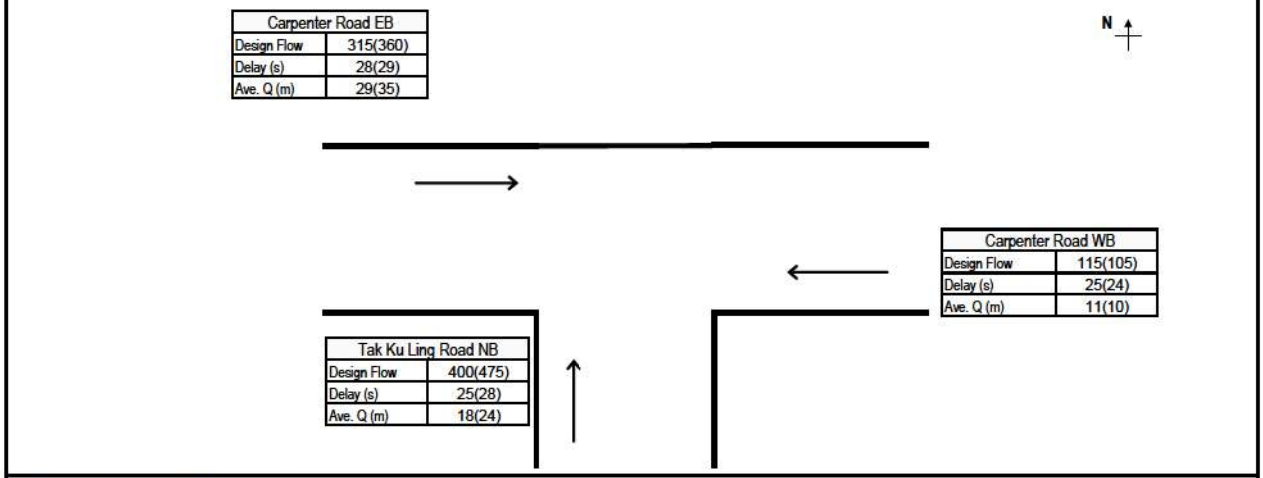
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	96	veh/hr		q '=	325	veh/hr		q '=	258	veh/hr		q '=	#DIV/0!		veh/hr
c=	100	sec		c=	100	sec		c=	100	sec		c=	0	sec	
S '=	1763	veh/hr		S '=	3033	veh/hr		S '=	1804	veh/hr		S '=	#DIV/0!		veh/hr
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.17			X=	0.31			X=	0.44			X=	#DIV/0!		
Q =	575	veh/hr		Q =	1042	veh/hr		Q =	589	veh/hr		Q =	#VALUE!		veh/hr
y=	0.05			y=	0.11			y=	0.14			y=	#DIV/0!		
L =	0.33			L=	0.34			L=	0.33			L=			
n =	1	lane		n =	2	lane		n =	1	lane		n =	0	lane	
X ' =	0.70			X ' =	0.72			X ' =	0.70			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.83			Z =	-0.69			Z =	-0.56			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	2	vehs		N =	6	vehs		N =	5	vehs		N =	#DIV/0!		vehs
Avg queue length =	11	metres		Avg queue leng	18	metres		Avg queue length	29	metres		Avg queue length	#DIV/0!		metres
Average delay =	24.0	seconds		Average delay	24.1	seconds		Average delay =	26.5	seconds		Average delay =	#VALUE!		seconds

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	88	veh/hr		q=	392	veh/hr		q=	296	veh/hr		q=	#DIV/0!		veh/hr
c=	110	sec		c=	110	sec		c=	110	sec		c=	110	sec	
S=	1763	veh/hr		S=	3033	veh/hr		S=	1804	veh/hr		S=	#DIV/0!		veh/hr
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.14			X=	0.38			X=	0.46			X=	#DIV/0!		
Q =	633	veh/hr		Q =	1035	veh/hr		Q =	648	veh/hr		Q =	#VALUE!		veh/hr
y=	0.05			y=	0.13			y=	0.16			y=	#DIV/0!		
L =	0.36			L=	0.34			L=	0.36			L=			
n =	1	lane		n =	2	lane		n =	1	lane		n =	0	lane	
X ' =	0.70			X ' =	0.72			X ' =	0.70			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.86			Z =	-0.62			Z =	-0.54			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	2	vehs		N =	8	vehs		N =	6	vehs		N =	#DIV/0!		vehs
Avg queue length =	10	metres		Avg queue leng	24	metres		Avg queue length	35	metres		Avg queue length	#DIV/0!		metres
Average delay =	23.8	seconds		Average delay	27.4	seconds		Average delay =	27.0	seconds		Average delay =	#VALUE!		seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J6 - Carpenter Road / Tak Ku Ling Road	Ref. No.:			
Scheme:	Reference	Design year:	2040		
		Designed by:	RC	Checked by:	PK
Arm A:	Carpenter Road WB				
Arm B:	Tak Ku Ling Road NB				
Arm C:	Carpenter Road EB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Carpenter Road WB	1	33	100	115	2115	1.2	39	110	105	2115	1.2
Tak Ku Ling Road NB	2	34	100	400	3640	1.2	38	110	475	3640	1.2
Carpenter Road EB	1	33	100	315	2165	1.2	39	110	360	2165	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	67	0.33	0.17	2.7	7		25	9	11	11	11
Tak Ku Ling Road NB	66	0.34	0.32	9.3	14		25	16	18	18	18
Carpenter Road EB	67	0.33	0.45	7.3	12		28	27	29	29	29
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	71	0.36	0.14	2.7	7		24	9	10	10	10
Tak Ku Ling Road NB	72	0.34	0.38	12.1	17		28	21	24	24	24
Carpenter Road EB	71	0.36	0.46	9.2	14		29	32	35	35	35
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Carpenter Road WB	**11**	**10**
Arm B:	Tak Ku Ling Road NB	**18**	**24**
Arm C:	Carpenter Road EB	**29**	**35**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

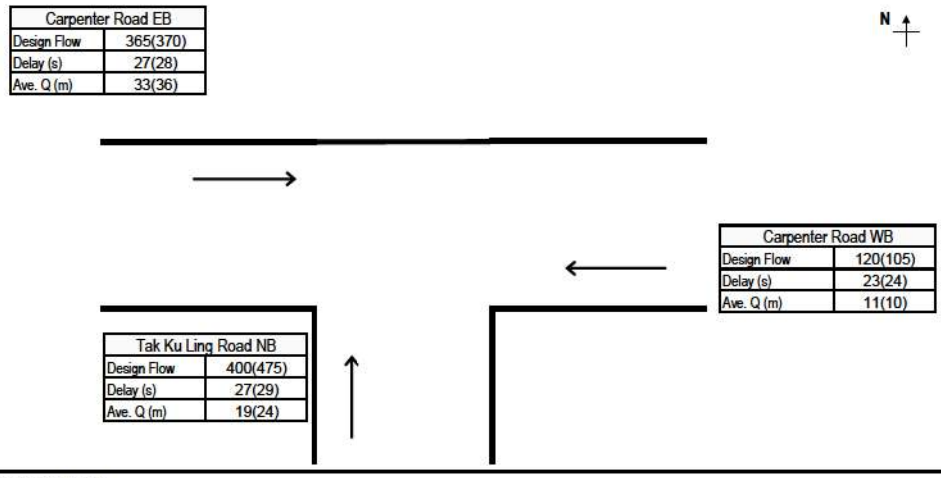
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	96	veh/hr		q '=	333	veh/hr		q '=	263	veh/hr		q '=	#DIV/0!		veh/hr
c=	100	sec		c=	100	sec		c=	100	sec		c=	0	sec	
S '=	1763	veh/hr		S '=	3033	veh/hr		S '=	1804	veh/hr		S '=	#DIV/0!		veh/hr
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.17			X=	0.32			X=	0.45			X=	#DIV/0!		
Q =	575	veh/hr		Q =	1043	veh/hr		Q =	589	veh/hr		Q =	#VALUE!		veh/hr
y=	0.05			y=	0.11			y=	0.15			y=	#DIV/0!		
L =	0.33			L=	0.34			L=	0.33			L=			
n =	1	lane		n =	2	lane		n =	1	lane		n =	0	lane	
X ' =	0.70			X ' =	0.72			X ' =	0.70			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.83			Z =	-0.68			Z =	-0.55			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	2	vehs		N =	6	vehs		N =	5	vehs		N =	#DIV/0!		vehs
Avg queue length =	11	metres		Avg queue leng	18	metres		Avg queue lengtl	29	metres		Avg queue lengtl	#DIV/0!		metres
Average delay =	24.0	seconds		Average delay	24.2	seconds		Average delay =	26.6	seconds		Average delay =	#VALUE!		seconds

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	88	veh/hr		q=	396	veh/hr		q=	300	veh/hr		q=	#DIV/0!		veh/hr
c=	110	sec		c=	110	sec		c=	110	sec		c=	110	sec	
S=	1763	veh/hr		S=	3033	veh/hr		S=	1804	veh/hr		S=	#DIV/0!		veh/hr
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.14			X=	0.38			X=	0.46			X=	#DIV/0!		
Q =	632	veh/hr		Q =	1036	veh/hr		Q =	647	veh/hr		Q =	#VALUE!		veh/hr
y=	0.05			y=	0.13			y=	0.17			y=	#DIV/0!		
L =	0.36			L=	0.34			L=	0.36			L=			
n =	1	lane		n =	2	lane		n =	1	lane		n =	0	lane	
X ' =	0.70			X ' =	0.72			X ' =	0.70			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.86			Z =	-0.62			Z =	-0.54			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	2	vehs		N =	8	vehs		N =	6	vehs		N =	#DIV/0!		vehs
Avg queue length =	10	metres		Avg queue leng	24	metres		Avg queue lengtl	35	metres		Avg queue lengtl	#DIV/0!		metres
Average delay =	23.8	seconds		Average delay	27.4	seconds		Average delay =	27.2	seconds		Average delay =	#VALUE!		seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J6 - Carpenter Road / Tak Ku Ling Road	Ref. No.:			
Scheme:	Design	Design year:	2040		
		Designed by:	RC	Checked by:	PK
Arm A:	Carpenter Road WB				
Arm B:	Tak Ku Ling Road NB				
Arm C:	Carpenter Road EB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Carpenter Road WB	1	35	100	120	2115	1.2	40	110	105	2115	1.2
Tak Ku Ling Road NB	2	32	100	400	3640	1.2	37	110	475	3640	1.2
Carpenter Road EB	1	35	100	365	2165	1.2	40	110	370	2165	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	65	0.35	0.16	2.8	7		23	9	11	11	11
Tak Ku Ling Road NB	68	0.32	0.34	9.3	15		27	17	19	19	19
Carpenter Road EB	65	0.35	0.48	8.4	13		27	30	33	33	33
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Carpenter Road WB	70	0.36	0.14	2.7	7		24	9	10	10	10
Tak Ku Ling Road NB	73	0.34	0.39	12.1	17		29	21	24	24	24
Carpenter Road EB	70	0.36	0.47	9.4	14		28	33	36	36	36
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Carpenter Road WB	**11**	**10**
Arm B:	Tak Ku Ling Road NB	**19**	**24**
Arm C:	Carpenter Road EB	**33**	**36**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

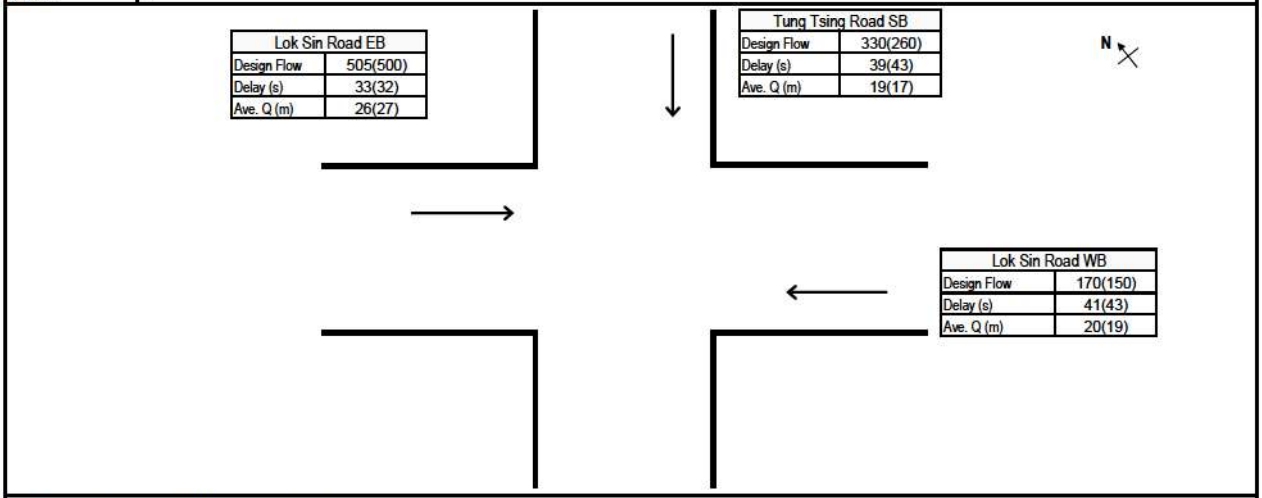
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	100	veh/hr		q '=	333	veh/hr		q '=	304	veh/hr		q '=	#DIV/0!	veh/hr	
c=	100	sec		c=	100	sec		c=	100	sec		c=	0	sec	
S '=	1763	veh/hr		S '=	3033	veh/hr		S '=	1804	veh/hr		S '=	#DIV/0!	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.16			X=	0.34			X=	0.48			X=	#DIV/0!		
Q =	619	veh/hr		Q =	968	veh/hr		Q =	633	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.06			y=	0.11			y=	0.17			y=	#DIV/0!		
L =	0.35			L=	0.32			L=	0.35			L=			
n =	1	lane		n =	2	lane		n =	1	lane		n =	0	lane	
X ' =	0.70			X ' =	0.71			X ' =	0.70			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.84			Z =	-0.66			Z =	-0.52			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	2	vehs		N =	6	vehs		N =	5	vehs		N =	#DIV/0!	vehs	
Avg queue length =	11	metres		Avg queue leng	19	metres		Avg queue length	33	metres		Avg queue length	#DIV/0!	metres	
Average delay =	22.3	seconds		Average delay	26.0	seconds		Average delay =	25.3	seconds		Average delay =	#VALUE!	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	88	veh/hr		q=	396	veh/hr		q=	308	veh/hr		q=	#DIV/0!	veh/hr	
c=	110	sec		c=	110	sec		c=	110	sec		c=	110	sec	
S=	1763	veh/hr		S=	3033	veh/hr		S=	1804	veh/hr		S=	#DIV/0!	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.14			X=	0.39			X=	0.47			X=	#DIV/0!		
Q =	640	veh/hr		Q =	1022	veh/hr		Q =	655	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.05			y=	0.13			y=	0.17			y=	#DIV/0!		
L =	0.36			L=	0.34			L=	0.36			L=			
n =	1	lane		n =	2	lane		n =	1	lane		n =	0	lane	
X ' =	0.70			X ' =	0.72			X ' =	0.70			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.86			Z =	-0.61			Z =	-0.53			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	2	vehs		N =	8	vehs		N =	6	vehs		N =	#DIV/0!	vehs	
Avg queue length =	10	metres		Avg queue leng	24	metres		Avg queue length	36	metres		Avg queue length	#DIV/0!	metres	
Average delay =	23.5	seconds		Average delay	27.8	seconds		Average delay =	26.9	seconds		Average delay =	#VALUE!	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J7 - Tung Tsing Road / Lok Sin Road / Sa Po Road	Ref. No.:			
Scheme:	Existing	Design year:	2021		
		Designed by:	RC	Checked by:	PK
Arm A:	Lok Sin Road WB				
Arm B:	Lok Sin Road EB				
Arm C:	Tung Tsing Road SB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Lok Sin Road WB	1	17	100	170	1855	1.2	20	110	150	1850	1.2
Lok Sin Road EB	2	26	100	505	3645	1.2	33	110	500	3625	1.2
Tung Tsing Road SB	2	17	100	330	3720	1.2	17	110	260	3705	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Lok Sin Road WB	83	0.17	0.53	3.9	9		41	19	20	20	20
Lok Sin Road EB	74	0.26	0.53	11.7	18		33	24	26	26	26
Tung Tsing Road SB	83	0.17	0.53	7.6	14		39	19	19	19	19
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Lok Sin Road WB	90	0.18	0.46	3.8	9		43	18	19	19	19
Lok Sin Road EB	77	0.30	0.45	12.7	18		32	24	27	27	27
Tung Tsing Road SB	93	0.15	0.45	6.6	13		43	16	17	17	17
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Lok Sin Road WB	**20**	**19**
Arm B:	Lok Sin Road EB	**26**	**27**
Arm C:	Tung Tsing Road SB	**19**	**17**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

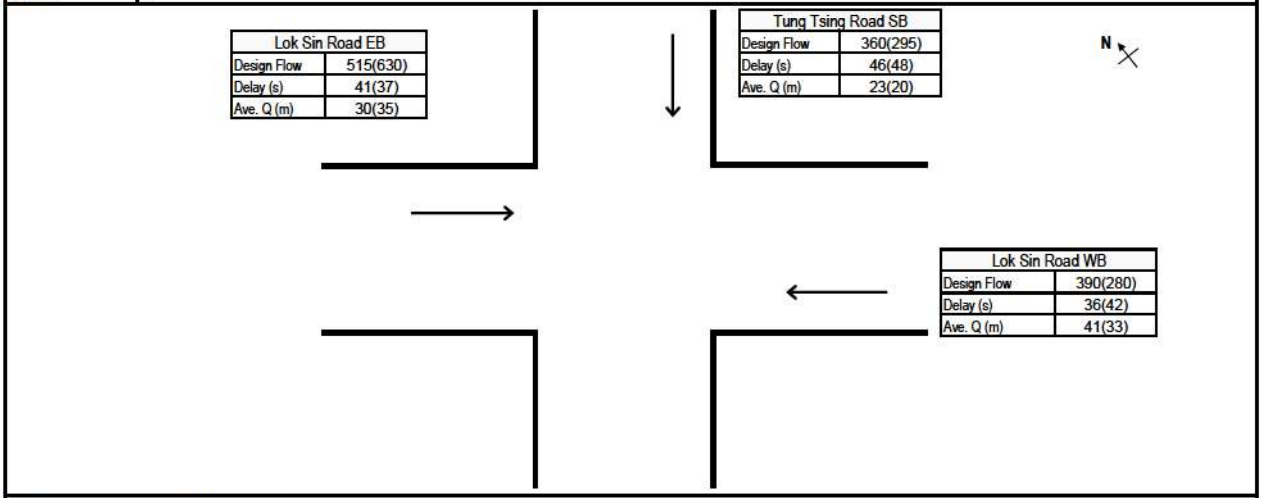
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	142	veh/hr		q '=	421	veh/hr		q '=	275	veh/hr		q '=	#DIV/0!		veh/hr
c=	100	sec		c=	100	sec		c=	100	sec		c=	0	sec	
S '=	1546	veh/hr		S '=	3038	veh/hr		S '=	3100	veh/hr		S '=	#DIV/0!		veh/hr
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.53			X=	0.53			X=	0.53			X=	#DIV/0!		
Q =	266	veh/hr		Q =	792	veh/hr		Q =	518	veh/hr		Q =	#VALUE!		veh/hr
y=	0.09			y=	0.14			y=	0.09			y=	#DIV/0!		
L =	0.17			L=	0.26			L=	0.17			L=			
n =	1	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.68			X ' =	0.71			X ' =	0.69			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.47			Z =	-0.47			Z =	-0.47			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	3	vehs		N =	9	vehs		N =	6	vehs		N =	#DIV/0!		vehs
Avg queue length =	20	metres		Avg queue leng	26	metres		Avg queue lengtl	19	metres		Avg queue lengtl	#DIV/0!		metres
Average delay =	37.7	seconds		Average delay	31.7	seconds		Average delay =	38.1	seconds		Average delay =	#VALUE!		seconds

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	125	veh/hr		q=	417	veh/hr		q=	217	veh/hr		q=	#DIV/0!		veh/hr
c=	110	sec		c=	110	sec		c=	110	sec		c=	110	sec	
S=	1542	veh/hr		S=	3021	veh/hr		S=	3088	veh/hr		S=	#DIV/0!		veh/hr
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.46			X=	0.45			X=	0.45			X=	#DIV/0!		
Q =	275	veh/hr		Q =	917	veh/hr		Q =	477	veh/hr		Q =	#VALUE!		veh/hr
y=	0.08			y=	0.14			y=	0.07			y=	#DIV/0!		
L =	0.18			L=	0.30			L=	0.15			L=			
n =	1	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.68			X ' =	0.72			X ' =	0.69			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.54			Z =	-0.55			Z =	-0.55			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	3	vehs		N =	9	vehs		N =	6	vehs		N =	#DIV/0!		vehs
Avg queue length =	19	metres		Avg queue leng	27	metres		Avg queue lengtl	17	metres		Avg queue lengtl	#DIV/0!		metres
Average delay =	40.4	seconds		Average delay	30.9	seconds		Average delay =	42.3	seconds		Average delay =	#VALUE!		seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J7 - Tung Tsing Road / Lok Sin Road / Sa Po Road	Ref. No.:			
Scheme:	Reference	Design year:	2033		
		Designed by:	RC	Checked by:	PK
Arm A:	Lok Sin Road WB				
Arm B:	Lok Sin Road EB				
Arm C:	Tung Tsing Road SB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Lok Sin Road WB	1	28	100	390	1820	1.2	26	110	280	1825	1.2
Lok Sin Road EB	2	19	100	515	3590	1.2	30	110	630	3600	1.2
Tung Tsing Road SB	2	13	100	360	3735	1.2	14	110	295	3730	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Lok Sin Road WB	72	0.28	0.76	9.0	16		36		39	41	41
Lok Sin Road EB	81	0.19	0.76	11.9	21		41		29	30	30
Tung Tsing Road SB	87	0.13	0.76	8.3	18		46		22	23	23
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Lok Sin Road WB	84	0.24	0.64	7.1	13		42	33	33	33	33
Lok Sin Road EB	80	0.27	0.64	16.0	22		37	34	35	35	35
Tung Tsing Road SB	96	0.12	0.64	7.5	15		48	20	20	20	20
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Lok Sin Road WB	**41**	**33**
Arm B:	Lok Sin Road EB	**30**	**35**
Arm C:	Tung Tsing Road SB	**23**	**20**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

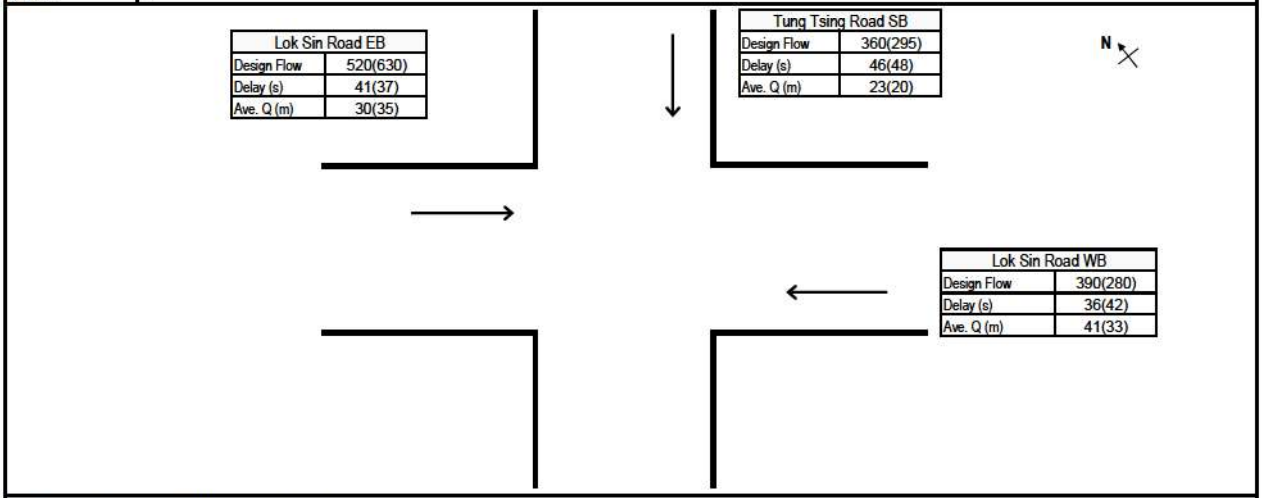
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	325	veh/hr		q '=	429	veh/hr		q '=	300	veh/hr		q '=	#DIV/0!	veh/hr	
c=	100	sec		c=	100	sec		c=	100	sec		c=	0	sec	
S '=	1517	veh/hr		S '=	2992	veh/hr		S '=	3113	veh/hr		S '=	#DIV/0!	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.76			X=	0.76			X=	0.76			X=	#DIV/0!		
Q =	429	veh/hr		Q =	567	veh/hr		Q =	397	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.21			y=	0.14			y=	0.10			y=	#DIV/0!		
L =	0.28			L=	0.19			L=	0.13			L=			
n =	1	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.69			X ' =	0.70			X ' =	0.69			X ' =	#DIV/0!		
X > X '	TRUE			X > X '	TRUE			X > X '	TRUE			X > X '	#DIV/0!		
Z =	-0.24			Z =	-0.24			Z =	-0.24			Z =	#DIV/0!		
No=	0.4	vehs		No=	0.4	vehs		No=	0.4	vehs		No=	#DIV/0!	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	7	vehs		N =	10	vehs		N =	8	vehs		N =	#DIV/0!	vehs	
Avg queue length =	41	metres		Avg queue leng	30	metres		Avg queue length	23	metres		Avg queue length	#DIV/0!	metres	
Average delay =	36.2	seconds		Average delay	40.7	seconds		Average delay =	45.8	seconds		Average delay =	#VALUE!	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	233	veh/hr		q=	525	veh/hr		q=	246	veh/hr		q=	#DIV/0!	veh/hr	
c=	110	sec		c=	110	sec		c=	110	sec		c=	110	sec	
S=	1521	veh/hr		S=	3000	veh/hr		S=	3108	veh/hr		S=	#DIV/0!	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.64			X=	0.64			X=	0.64			X=	#DIV/0!		
Q =	364	veh/hr		Q =	820	veh/hr		Q =	385	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.15			y=	0.18			y=	0.08			y=	#DIV/0!		
L =	0.24			L=	0.27			L=	0.12			L=			
n =	1	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.69			X ' =	0.71			X ' =	0.69			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.36			Z =	-0.36			Z =	-0.36			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	5	vehs		N =	12	vehs		N =	7	vehs		N =	#DIV/0!	vehs	
Avg queue length =	33	metres		Avg queue leng	35	metres		Avg queue length	20	metres		Avg queue length	#DIV/0!	metres	
Average delay =	37.6	seconds		Average delay	35.2	seconds		Average delay =	45.8	seconds		Average delay =	#VALUE!	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J7 - Tung Tsing Road / Lok Sin Road / Sa Po Road	Ref. No.:			
Scheme:	Design	Design year:	2033		
		Designed by:	RC	Checked by:	PK
Arm A:	Lok Sin Road WB				
Arm B:	Lok Sin Road EB				
Arm C:	Tung Tsing Road SB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Lok Sin Road WB	1	28	100	390	1820	1.2	26	110	280	1825	1.2
Lok Sin Road EB	2	19	100	520	3595	1.2	30	110	630	3600	1.2
Tung Tsing Road SB	2	13	100	360	3735	1.2	14	110	295	3730	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Lok Sin Road WB	72	0.28	0.76	9.0	17		36		39	41	41
Lok Sin Road EB	81	0.19	0.76	12.0	21		41		29	30	30
Tung Tsing Road SB	87	0.13	0.76	8.3	18		46		22	23	23
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Lok Sin Road WB	84	0.24	0.64	7.1	13		42	33	33	33	33
Lok Sin Road EB	80	0.27	0.64	16.0	22		37	34	35	35	35
Tung Tsing Road SB	96	0.12	0.64	7.5	15		48	20	20	20	20
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Lok Sin Road WB	**41**	**33**
Arm B:	Lok Sin Road EB	**30**	**35**
Arm C:	Tung Tsing Road SB	**23**	**20**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

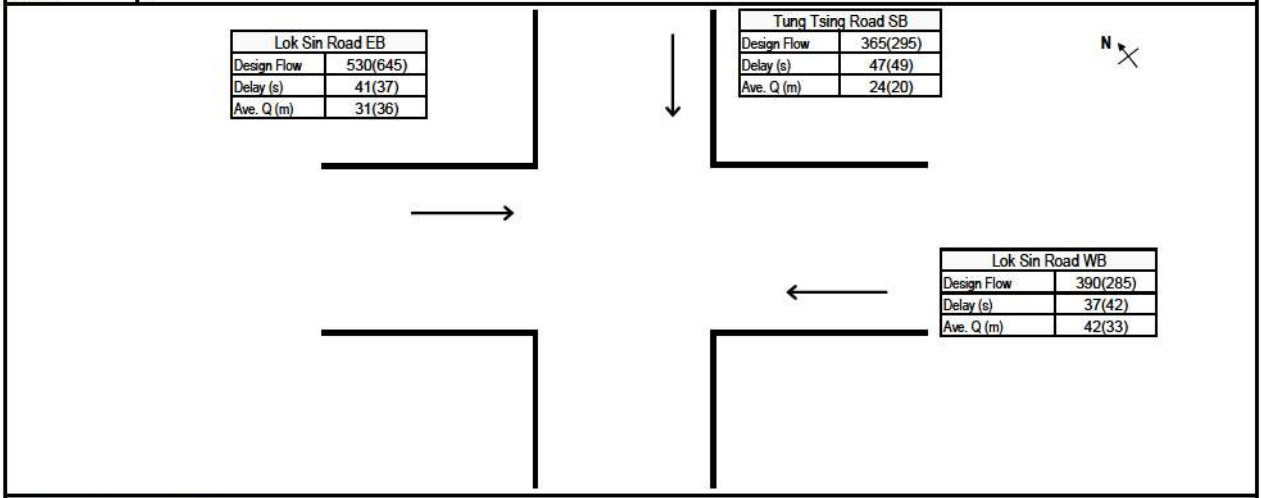
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	325	veh/hr		q '=	433	veh/hr		q '=	300	veh/hr		q '=	#DIV/0!		veh/hr
c=	100	sec		c=	100	sec		c=	100	sec		c=	0		sec
S '=	1517	veh/hr		S '=	2996	veh/hr		S '=	3113	veh/hr		S '=	#DIV/0!		veh/hr
t=	1	hr		t=	1	hr		t=	1	hr		t=	1		hr
X=	0.76			X=	0.76			X=	0.76			X=	#DIV/0!		
Q =	428	veh/hr		Q =	571	veh/hr		Q =	396	veh/hr		Q =	#VALUE!		veh/hr
y=	0.21			y=	0.14			y=	0.10			y=	#DIV/0!		
L =	0.28			L=	0.19			L=	0.13			L=			
n =	1	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.69			X ' =	0.70			X ' =	0.69			X ' =	#DIV/0!		
X > X '	TRUE			X > X '	TRUE			X > X '	TRUE			X > X '	#DIV/0!		
Z =	-0.24			Z =	-0.24			Z =	-0.24			Z =	#DIV/0!		
No=	0.4	vehs		No=	0.4	vehs		No=	0.4	vehs		No=	#DIV/0!		vehs
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	7	vehs		N =	10	vehs		N =	8	vehs		N =	#DIV/0!		vehs
Avg queue length =	41	metres		Avg queue leng	30	metres		Avg queue length	23	metres		Avg queue length	#DIV/0!		metres
Average delay =	36.4	seconds		Average delay	40.7	seconds		Average delay =	46.0	seconds		Average delay =	#VALUE!		seconds

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	233	veh/hr		q=	525	veh/hr		q=	246	veh/hr		q=	#DIV/0!		veh/hr
c=	110	sec		c=	110	sec		c=	110	sec		c=	110		sec
S=	1521	veh/hr		S=	3000	veh/hr		S=	3108	veh/hr		S=	#DIV/0!		veh/hr
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5		hr
X=	0.64			X=	0.64			X=	0.64			X=	#DIV/0!		
Q =	364	veh/hr		Q =	820	veh/hr		Q =	385	veh/hr		Q =	#VALUE!		veh/hr
y=	0.15			y=	0.18			y=	0.08			y=	#DIV/0!		
L =	0.24			L=	0.27			L=	0.12			L=			
n =	1	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.69			X ' =	0.71			X ' =	0.69			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.36			Z =	-0.36			Z =	-0.36			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	5	vehs		N =	12	vehs		N =	7	vehs		N =	#DIV/0!		vehs
Avg queue length =	33	metres		Avg queue leng	35	metres		Avg queue length	20	metres		Avg queue length	#DIV/0!		metres
Average delay =	37.6	seconds		Average delay	35.2	seconds		Average delay =	45.8	seconds		Average delay =	#VALUE!		seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J7 - Tung Tsing Road / Lok Sin Road / Sa Po Road	Ref. No.:			
Scheme:	Reference	Design year:	2036		
		Designed by:	RC	Checked by:	PK
Arm A:	Lok Sin Road WB				
Arm B:	Lok Sin Road EB				
Arm C:	Tung Tsing Road SB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Lok Sin Road WB	1	28	100	390	1820	1.2	26	110	285	1825	1.2
Lok Sin Road EB	2	19	100	530	3590	1.2	30	110	645	3600	1.2
Tung Tsing Road SB	2	13	100	365	3740	1.2	13	110	295	3730	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Lok Sin Road WB	72	0.28	0.77	9.0	17		37		39	42	42
Lok Sin Road EB	81	0.19	0.77	12.3	21		41		30	31	31
Tung Tsing Road SB	87	0.13	0.77	8.4	18		47		22	24	24
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Lok Sin Road WB	84	0.24	0.65	7.3	13		42	33	33	33	33
Lok Sin Road EB	80	0.27	0.65	16.4	23		37	34	36	36	36
Tung Tsing Road SB	97	0.12	0.65	7.5	15		49	20	20	20	20
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Lok Sin Road WB	**42**	**33**
Arm B:	Lok Sin Road EB	**31**	**36**
Arm C:	Tung Tsing Road SB	**24**	**20**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

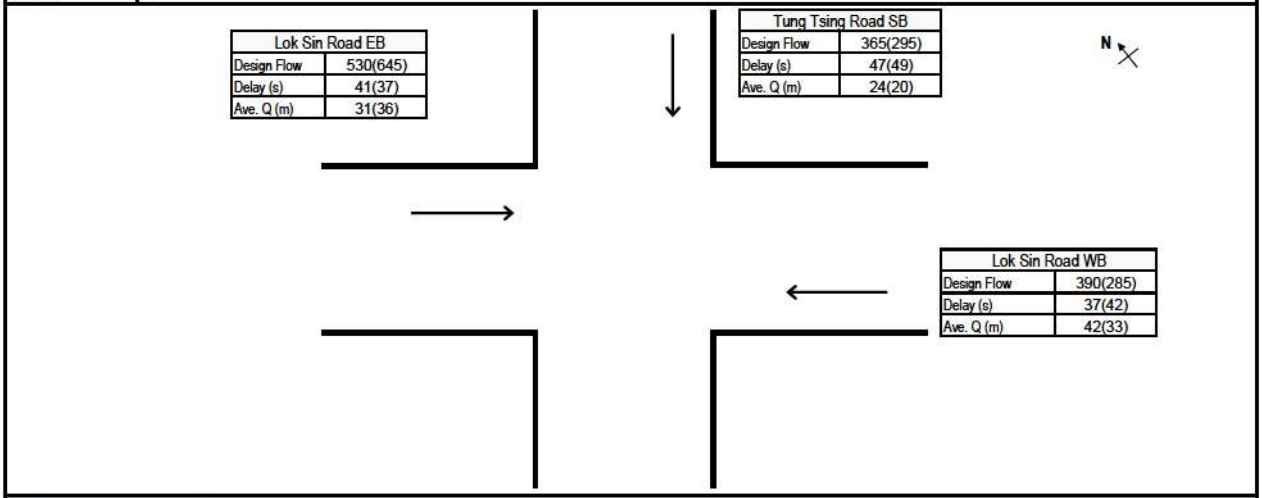
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	325	veh/hr		q '=	442	veh/hr		q '=	304	veh/hr		q '=	#DIV/0!	veh/hr	
c=	100	sec		c=	100	sec		c=	100	sec		c=	0	sec	
S '=	1517	veh/hr		S '=	2992	veh/hr		S '=	3117	veh/hr		S '=	#DIV/0!	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.77			X=	0.77			X=	0.77			X=	#DIV/0!		
Q =	424	veh/hr		Q =	577	veh/hr		Q =	398	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.21			y=	0.15			y=	0.10			y=	#DIV/0!		
L =	0.28			L=	0.19			L=	0.13			L=			
n =	1	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.69			X ' =	0.70			X ' =	0.69			X ' =	#DIV/0!		
X > X '	TRUE			X > X '	TRUE			X > X '	TRUE			X > X '	#DIV/0!		
Z =	-0.23			Z =	-0.23			Z =	-0.23			Z =	#DIV/0!		
No=	0.5	vehs		No=	0.4	vehs		No=	0.5	vehs		No=	#DIV/0!	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	7	vehs		N =	10	vehs		N =	8	vehs		N =	#DIV/0!	vehs	
Avg queue length =	42	metres		Avg queue leng	31	metres		Avg queue length	24	metres		Avg queue length	#DIV/0!	metres	
Average delay =	37.2	seconds		Average delay	40.9	seconds		Average delay =	46.6	seconds		Average delay =	#VALUE!	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	238	veh/hr		q=	538	veh/hr		q=	246	veh/hr		q=	#DIV/0!	veh/hr	
c=	110	sec		c=	110	sec		c=	110	sec		c=	110	sec	
S=	1521	veh/hr		S=	3000	veh/hr		S=	3108	veh/hr		S=	#DIV/0!	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.65			X=	0.65			X=	0.65			X=	#DIV/0!		
Q =	364	veh/hr		Q =	825	veh/hr		Q =	379	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.16			y=	0.18			y=	0.08			y=	#DIV/0!		
L =	0.24			L=	0.27			L=	0.12			L=			
n =	1	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.69			X ' =	0.71			X ' =	0.69			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.35			Z =	-0.35			Z =	-0.35			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	6	vehs		N =	12	vehs		N =	7	vehs		N =	#DIV/0!	vehs	
Avg queue length =	33	metres		Avg queue leng	36	metres		Avg queue length	20	metres		Avg queue length	#DIV/0!	metres	
Average delay =	37.7	seconds		Average delay	35.2	seconds		Average delay =	46.1	seconds		Average delay =	#VALUE!	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J7 - Tung Tsing Road / Lok Sin Road / Sa Po Road	Ref. No.:			
Scheme:	Design	Design year:	2036		
		Designed by:	RC	Checked by:	PK
Arm A:	Lok Sin Road WB				
Arm B:	Lok Sin Road EB				
Arm C:	Tung Tsing Road SB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Lok Sin Road WB	1	28	100	390	1820	1.2	26	110	285	1825	1.2
Lok Sin Road EB	2	19	100	530	3590	1.2	30	110	645	3600	1.2
Tung Tsing Road SB	2	13	100	365	3740	1.2	13	110	295	3730	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Lok Sin Road WB	72	0.28	0.77	9.0	17		37		39	42	42
Lok Sin Road EB	81	0.19	0.77	12.3	21		41		30	31	31
Tung Tsing Road SB	87	0.13	0.77	8.4	18		47		22	24	24
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Lok Sin Road WB	84	0.24	0.65	7.3	13		42	33	33	33	33
Lok Sin Road EB	80	0.27	0.65	16.4	23		37	34	36	36	36
Tung Tsing Road SB	97	0.12	0.65	7.5	15		49	20	20	20	20
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Lok Sin Road WB	**42**	**33**
Arm B:	Lok Sin Road EB	**31**	**36**
Arm C:	Tung Tsing Road SB	**24**	**20**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

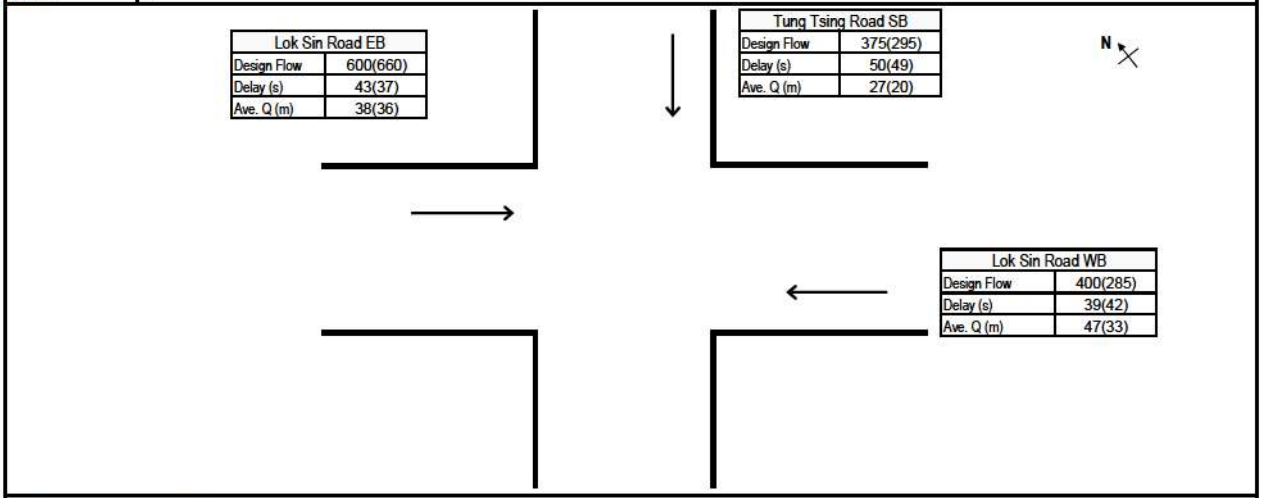
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	325	veh/hr		q '=	442	veh/hr		q '=	304	veh/hr		q '=	#DIV/0!	veh/hr	
c=	100	sec		c=	100	sec		c=	100	sec		c=	0	sec	
S '=	1517	veh/hr		S '=	2992	veh/hr		S '=	3117	veh/hr		S '=	#DIV/0!	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.77			X=	0.77			X=	0.77			X=	#DIV/0!		
Q =	424	veh/hr		Q =	577	veh/hr		Q =	398	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.21			y=	0.15			y=	0.10			y=	#DIV/0!		
L =	0.28			L=	0.19			L=	0.13			L=			
n =	1	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.69			X ' =	0.70			X ' =	0.69			X ' =	#DIV/0!		
X > X '	TRUE			X > X '	TRUE			X > X '	TRUE			X > X '	#DIV/0!		
Z =	-0.23			Z =	-0.23			Z =	-0.23			Z =	#DIV/0!		
No=	0.5	vehs		No=	0.4	vehs		No=	0.5	vehs		No=	#DIV/0!	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	7	vehs		N =	10	vehs		N =	8	vehs		N =	#DIV/0!	vehs	
Avg queue length =	42	metres		Avg queue leng	31	metres		Avg queue length	24	metres		Avg queue length	#DIV/0!	metres	
Average delay =	37.2	seconds		Average delay	40.9	seconds		Average delay =	46.6	seconds		Average delay =	#VALUE!	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	238	veh/hr		q=	538	veh/hr		q=	246	veh/hr		q=	#DIV/0!	veh/hr	
c=	110	sec		c=	110	sec		c=	110	sec		c=	110	sec	
S=	1521	veh/hr		S=	3000	veh/hr		S=	3108	veh/hr		S=	#DIV/0!	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.65			X=	0.65			X=	0.65			X=	#DIV/0!		
Q =	364	veh/hr		Q =	825	veh/hr		Q =	379	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.16			y=	0.18			y=	0.08			y=	#DIV/0!		
L =	0.24			L=	0.27			L=	0.12			L=			
n =	1	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.69			X ' =	0.71			X ' =	0.69			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.35			Z =	-0.35			Z =	-0.35			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	6	vehs		N =	12	vehs		N =	7	vehs		N =	#DIV/0!	vehs	
Avg queue length =	33	metres		Avg queue leng	36	metres		Avg queue length	20	metres		Avg queue length	#DIV/0!	metres	
Average delay =	37.7	seconds		Average delay	35.2	seconds		Average delay =	46.1	seconds		Average delay =	#VALUE!	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J7 - Tung Tsing Road / Lok Sin Road / Sa Po Road	Ref. No.:			
Scheme:	Design (with improvement)	Design year:	2037		
		Designed by:	RC	Checked by:	PK
Arm A:	Lok Sin Road WB				
Arm B:	Lok Sin Road EB				
Arm C:	Tung Tsing Road SB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Lok Sin Road WB	1	34	115	400	1825	1.2	26	110	285	1825	1.2
Lok Sin Road EB	2	26	115	600	3600	1.2	31	110	660	3605	1.2
Tung Tsing Road SB	2	15	115	375	3735	1.2	13	110	295	3730	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Lok Sin Road WB	81	0.29	0.75	10.6	18		39		45	47	47
Lok Sin Road EB	89	0.22	0.75	16.0	23		43		37	38	38
Tung Tsing Road SB	100	0.13	0.74	10.0	19		50		26	27	27
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Lok Sin Road WB	84	0.24	0.66	7.3	13		42	33	33	33	33
Lok Sin Road EB	79	0.28	0.66	16.8	23		37	35	36	36	36
Tung Tsing Road SB	97	0.12	0.66	7.5	15		49	20	20	20	20
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Lok Sin Road WB	**47**	**33**
Arm B:	Lok Sin Road EB	**38**	**36**
Arm C:	Tung Tsing Road SB	**27**	**20**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

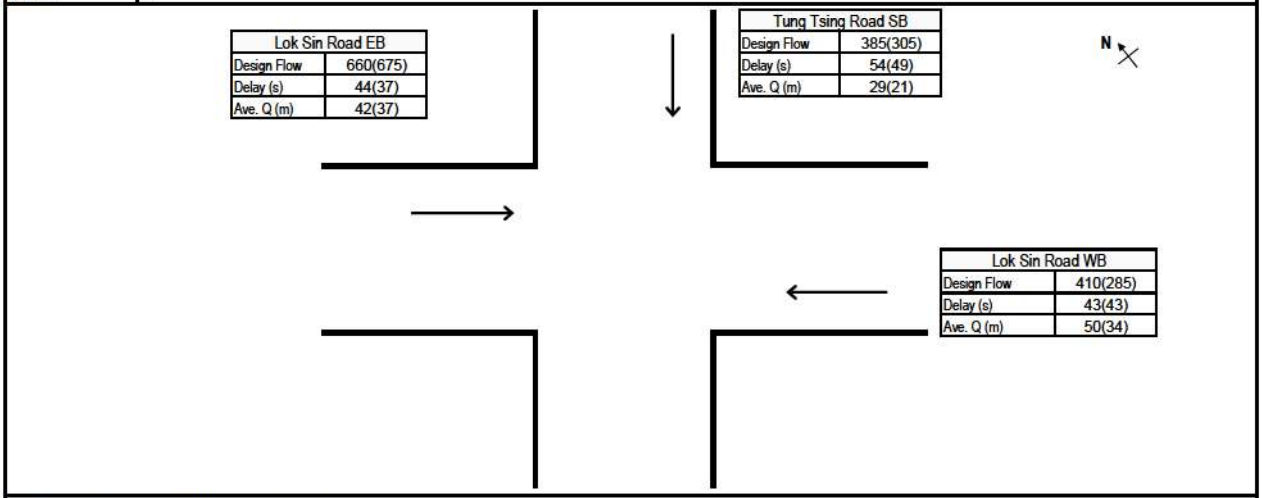
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	333	veh/hr		q '=	500	veh/hr		q '=	313	veh/hr		q '=	#DIV/0!	veh/hr	
c=	115	sec		c=	115	sec		c=	115	sec		c=	0	sec	
S '=	1521	veh/hr		S '=	3000	veh/hr		S '=	3113	veh/hr		S '=	#DIV/0!	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.75			X=	0.75			X=	0.74			X=	#DIV/0!		
Q =	447	veh/hr		Q =	671	veh/hr		Q =	420	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.22			y=	0.17			y=	0.10			y=	#DIV/0!		
L =	0.29			L=	0.22			L=	0.13			L=			
n =	1	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.69			X ' =	0.71			X ' =	0.69			X ' =	#DIV/0!		
X > X '	TRUE			X > X '	TRUE			X > X '	TRUE			X > X '	#DIV/0!		
Z =	-0.25			Z =	-0.25			Z =	-0.26			Z =	#DIV/0!		
No=	0.3	vehs		No=	0.2	vehs		No=	0.3	vehs		No=	#DIV/0!	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	8	vehs		N =	13	vehs		N =	9	vehs		N =	#DIV/0!	vehs	
Avg queue length =	47	metres		Avg queue leng	38	metres		Avg queue length	27	metres		Avg queue length	#DIV/0!	metres	
Average delay =	39.2	seconds		Average delay	42.8	seconds		Average delay =	50.5	seconds		Average delay =	#VALUE!	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	238	veh/hr		q=	550	veh/hr		q=	246	veh/hr		q=	#DIV/0!	veh/hr	
c=	110	sec		c=	110	sec		c=	110	sec		c=	110	sec	
S=	1521	veh/hr		S=	3004	veh/hr		S=	3108	veh/hr		S=	#DIV/0!	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.66			X=	0.66			X=	0.66			X=	#DIV/0!		
Q =	361	veh/hr		Q =	836	veh/hr		Q =	375	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.16			y=	0.18			y=	0.08			y=	#DIV/0!		
L =	0.24			L=	0.28			L=	0.12			L=			
n =	1	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.69			X ' =	0.71			X ' =	0.69			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.34			Z =	-0.34			Z =	-0.34			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	6	vehs		N =	12	vehs		N =	7	vehs		N =	#DIV/0!	vehs	
Avg queue length =	33	metres		Avg queue leng	36	metres		Avg queue length	20	metres		Avg queue length	#DIV/0!	metres	
Average delay =	37.9	seconds		Average delay	35.1	seconds		Average delay =	46.2	seconds		Average delay =	#VALUE!	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J7 - Tung Tsing Road / Lok Sin Road / Sa Po Road	Ref. No.:			
Scheme:	Design (with improvement)	Design year:	2040		
		Designed by:	RC	Checked by:	PK
Arm A:	Lok Sin Road WB				
Arm B:	Lok Sin Road EB				
Arm C:	Tung Tsing Road SB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Lok Sin Road WB	1	33	115	410	1830	1.2	26	110	285	1825	1.2
Lok Sin Road EB	2	27	115	660	3605	1.2	31	110	675	3605	1.2
Tung Tsing Road SB	2	15	115	385	3730	1.2	13	110	305	3730	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Lok Sin Road WB	82	0.29	0.78	10.9	18		43		47	50	50
Lok Sin Road EB	88	0.23	0.78	17.6	25		44		40	42	42
Tung Tsing Road SB	100	0.13	0.78	10.2	20		54		27	29	29
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Lok Sin Road WB	84	0.23	0.67	7.3	13		43	34	33	33	34
Lok Sin Road EB	79	0.28	0.67	17.2	23		37	36	37	37	37
Tung Tsing Road SB	97	0.12	0.67	7.8	15		49	21	20	20	21
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Lok Sin Road WB	**50**	**34**
Arm B:	Lok Sin Road EB	**42**	**37**
Arm C:	Tung Tsing Road SB	**29**	**21**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

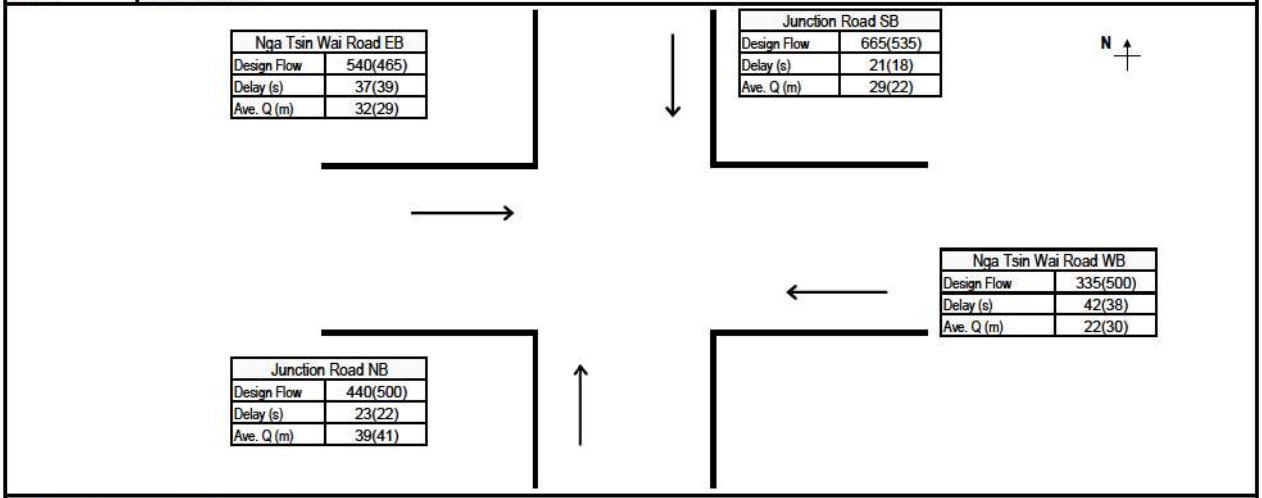
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	342	veh/hr		q '=	550	veh/hr		q '=	321	veh/hr		q '=	#DIV/0!	veh/hr	
c=	115	sec		c=	115	sec		c=	115	sec		c=	0	sec	
S '=	1525	veh/hr		S '=	3004	veh/hr		S '=	3108	veh/hr		S '=	#DIV/0!	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.78			X=	0.78			X=	0.78			X=	#DIV/0!		
Q =	436	veh/hr		Q =	703	veh/hr		Q =	410	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.22			y=	0.18			y=	0.10			y=	#DIV/0!		
L =	0.29			L=	0.23			L=	0.13			L=			
n =	1	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.69			X ' =	0.71			X ' =	0.69			X ' =	#DIV/0!		
X > X '	TRUE			X > X '	TRUE			X > X '	TRUE			X > X '	#DIV/0!		
Z =	-0.22			Z =	-0.22			Z =	-0.22			Z =	#DIV/0!		
No=	0.6	vehs		No=	0.5	vehs		No=	0.6	vehs		No=	#DIV/0!	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	8	vehs		N =	14	vehs		N =	10	vehs		N =	#DIV/0!	vehs	
Avg queue length =	50	metres		Avg queue leng	42	metres		Avg queue lengtl	29	metres		Avg queue lengtl	#DIV/0!	metres	
Average delay =	42.8	seconds		Average delay	43.9	seconds		Average delay =	53.7	seconds		Average delay =	#VALUE!	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	238	veh/hr		q=	563	veh/hr		q=	254	veh/hr		q=	#DIV/0!	veh/hr	
c=	110	sec		c=	110	sec		c=	110	sec		c=	110	sec	
S=	1521	veh/hr		S=	3004	veh/hr		S=	3108	veh/hr		S=	#DIV/0!	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.67			X=	0.67			X=	0.67			X=	#DIV/0!		
Q =	355	veh/hr		Q =	843	veh/hr		Q =	380	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.16			y=	0.19			y=	0.08			y=	#DIV/0!		
L =	0.23			L=	0.28			L=	0.12			L=			
n =	1	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.69			X ' =	0.71			X ' =	0.69			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.33			Z =	-0.33			Z =	-0.33			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	6	vehs		N =	12	vehs		N =	7	vehs		N =	#DIV/0!	vehs	
Avg queue length =	33	metres		Avg queue leng	37	metres		Avg queue lengtl	20	metres		Avg queue lengtl	#DIV/0!	metres	
Average delay =	38.3	seconds		Average delay	35.0	seconds		Average delay =	46.1	seconds		Average delay =	#VALUE!	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J8 - Nga Tsin Wai Road / Junction Road	Ref. No.:			
Scheme:	Existing	Design year:	2021		
		Designed by:	RC	Checked by:	PK
Arm A:	Nga Tsin Wai Road WB				
Arm B:	Nga Tsin Wai Road EB				
Arm C:	Junction Road SB				
Arm D:	Junction Road NB				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Nga Tsin Wai Road WB	2	25	120	335	3850	1.2	29	115	500	3840	1.2
Nga Tsin Wai Road EB	2	34	120	540	3970	1.2	27	115	465	3970	1.2
Junction Road SB	2	56	120	665	3955	1.2	56	115	535	3920	1.2
Junction Road NB	1	56	120	440	1915	1.2	56	115	500	1950	1.2

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	95	0.21	0.42	9.3	16		42	21	22	22	22
Nga Tsin Wai Road EB	86	0.28	0.49	15.0	21		37	30	32	32	32
Junction Road SB	64	0.47	0.36	18.5	20		21	24	29	29	29
Junction Road NB	64	0.47	0.49	12.2	15		23	34	39	39	39

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	86	0.25	0.52	13.3	20		38	28	30	30	30
Nga Tsin Wai Road EB	88	0.23	0.50	12.4	19		39	27	29	29	29
Junction Road SB	59	0.49	0.28	14.2	16		18	17	22	22	22
Junction Road NB	59	0.49	0.52	13.3	15		22	36	41	41	41

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Nga Tsin Wai Road WB	**22**	**30**
Arm B:	Nga Tsin Wai Road EB	**32**	**29**
Arm C:	Junction Road SB	**29**	**22**
Arm D:	Junction Road NB	**39**	**41**

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

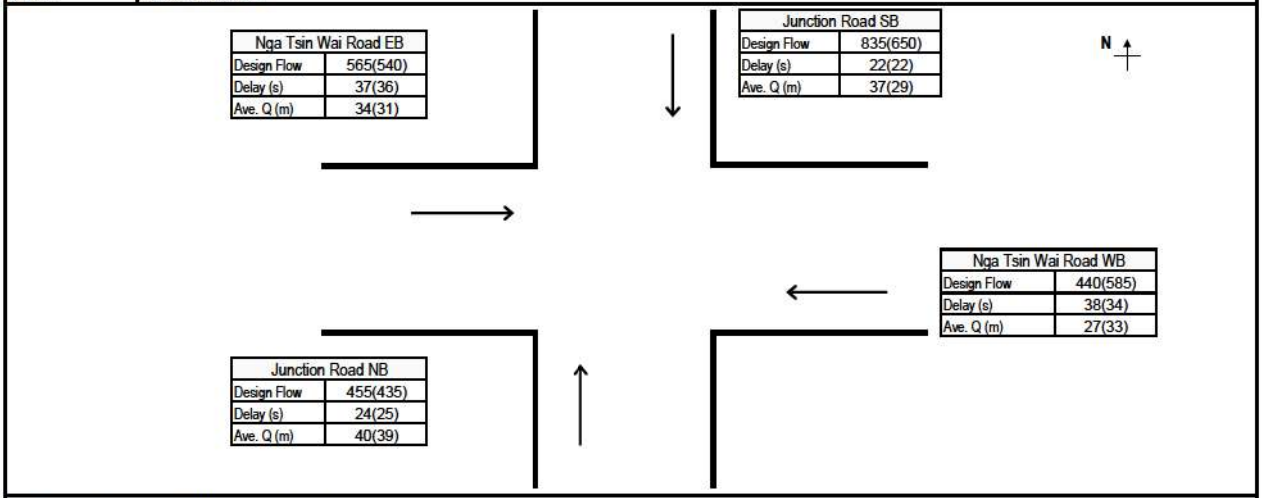
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	279	veh/hr		q '=	450	veh/hr		q '=	554	veh/hr		q '=	367	veh/hr	
c=	120	sec		c=	120	sec		c=	120	sec		c=	120	sec	
S '=	3208	veh/hr		S '=	3308	veh/hr		S '=	3296	veh/hr		S '=	1596	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.42			X=	0.49			X=	0.36			X=	0.49		
Q =	662	veh/hr		Q =	924	veh/hr		Q =	1552	veh/hr		Q =	751	veh/hr	
y=	0.09			y=	0.14			y=	0.17			y=	0.23		
L =	0.21			L=	0.28			L=	0.47			L=	0.47		
n =	2	lane		n =	2	lane		n =	2	lane		n =	1	lane	
X ' =	0.71			X ' =	0.72			X ' =	0.76			X ' =	0.71		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	FALSE		
Z =	-0.58			Z =	-0.51			Z =	-0.64			Z =	-0.51		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	7	vehs		N =	11	vehs		N =	10	vehs		N =	6	vehs	
Avg queue length =	22	metres		Avg queue leng	32	metres		Avg queue length	29	metres		Avg queue length	39	metres	
Average delay =	41.4	seconds		Average delay	36.1	seconds		Average delay =	20.2	seconds		Average delay =	21.8	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	417	veh/hr		q=	388	veh/hr		q=	446	veh/hr		q=	417	veh/hr	
c=	115	sec		c=	115	sec		c=	115	sec		c=	115	sec	
S=	3200	veh/hr		S=	3308	veh/hr		S=	3267	veh/hr		S=	1625	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.52			X=	0.50			X=	0.28			X=	0.52		
Q =	798	veh/hr		Q =	767	veh/hr		Q =	1600	veh/hr		Q =	796	veh/hr	
y=	0.13			y=	0.12			y=	0.14			y=	0.26		
L =	0.25			L=	0.23			L=	0.49			L=	0.49		
n =	2	lane		n =	2	lane		n =	2	lane		n =	1	lane	
X ' =	0.71			X ' =	0.71			X ' =	0.76			X ' =	0.71		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	FALSE		
Z =	-0.48			Z =	-0.50			Z =	-0.72			Z =	-0.48		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	10	vehs		N =	10	vehs		N =	7	vehs		N =	7	vehs	
Avg queue length =	30	metres		Avg queue leng	29	metres		Avg queue length	22	metres		Avg queue length	41	metres	
Average delay =	37.3	seconds		Average delay	38.4	seconds		Average delay =	17.3	seconds		Average delay =	20.1	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J8 - Nga Tsin Wai Road / Junction Road	Ref. No.:			
Scheme:	Reference	Design year:	2033		
		Designed by:	RC	Checked by:	PK
Arm A:	Nga Tsin Wai Road WB				
Arm B:	Nga Tsin Wai Road EB				
Arm C:	Junction Road SB				
Arm D:	Junction Road NB				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Nga Tsin Wai Road WB	2	31	120	440	3820	1.2	34	115	585	3820	1.2
Nga Tsin Wai Road EB	2	33	120	565	3970	1.2	32	115	540	3970	1.2
Junction Road SB	2	57	120	835	3890	1.2	51	115	650	3860	1.2
Junction Road NB	1	57	120	455	1885	1.2	51	115	435	1915	1.2

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	89	0.26	0.45	12.2	19		38	25	27	27	27
Nga Tsin Wai Road EB	87	0.28	0.51	15.7	22		37	32	34	34	34
Junction Road SB	63	0.47	0.46	23.2	23		22	31	37	37	37
Junction Road NB	63	0.47	0.51	12.6	15		24	35	40	40	40

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	81	0.30	0.51	15.6	21		34	30	33	33	33
Nga Tsin Wai Road EB	83	0.28	0.49	14.4	21		36	29	31	31	31
Junction Road SB	64	0.44	0.38	17.3	19		22	25	29	29	29
Junction Road NB	64	0.44	0.51	11.6	15		25	35	39	39	39

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Nga Tsin Wai Road WB	**27**	**33**
Arm B:	Nga Tsin Wai Road EB	**34**	**31**
Arm C:	Junction Road SB	**37**	**29**
Arm D:	Junction Road NB	**40**	**39**

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

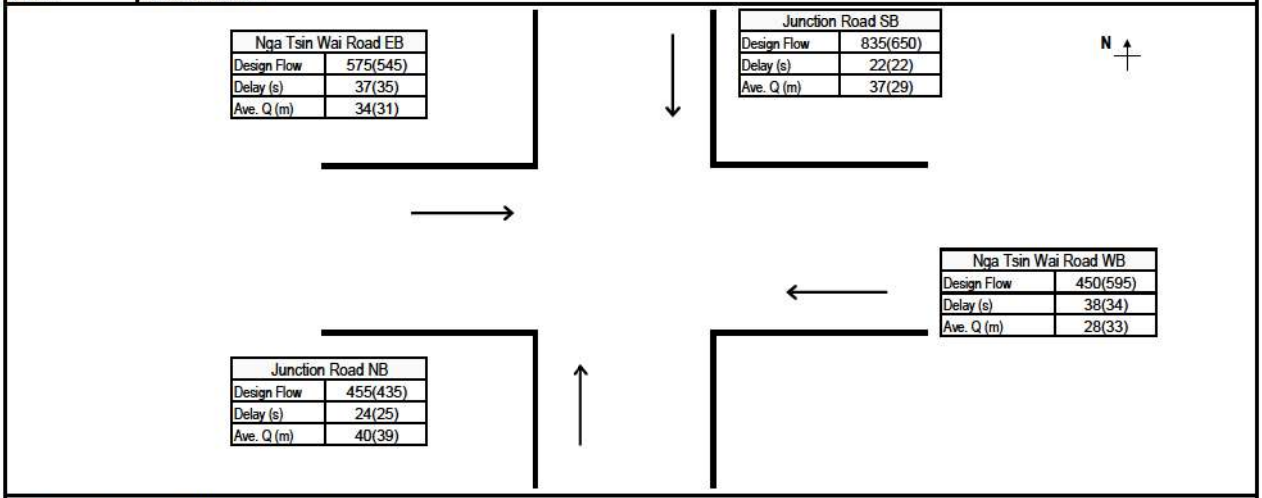
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	367	veh/hr		q '=	471	veh/hr		q '=	696	veh/hr		q '=	379	veh/hr	
c=	120	sec		c=	120	sec		c=	120	sec		c=	120	sec	
S '=	3183	veh/hr		S '=	3308	veh/hr		S '=	3242	veh/hr		S '=	1571	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.45			X=	0.51			X=	0.46			X=	0.51		
Q =	822	veh/hr		Q =	921	veh/hr		Q =	1529	veh/hr		Q =	741	veh/hr	
y=	0.12			y=	0.14			y=	0.21			y=	0.24		
L =	0.26			L=	0.28			L=	0.47			L=	0.47		
n =	2	lane		n =	2	lane		n =	2	lane		n =	1	lane	
X ' =	0.72			X ' =	0.72			X ' =	0.75			X ' =	0.71		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	FALSE		
Z =	-0.55			Z =	-0.49			Z =	-0.54			Z =	-0.49		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	9	vehs		N =	11	vehs		N =	12	vehs		N =	7	vehs	
Avg queue length =	27	metres		Avg queue leng	34	metres		Avg queue length	37	metres		Avg queue length	40	metres	
Average delay =	37.3	seconds		Average delay	36.4	seconds		Average delay =	21.3	seconds		Average delay =	22.1	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	488	veh/hr		q=	450	veh/hr		q=	542	veh/hr		q=	363	veh/hr	
c=	115	sec		c=	115	sec		c=	115	sec		c=	115	sec	
S=	3183	veh/hr		S=	3308	veh/hr		S=	3217	veh/hr		S=	1596	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.51			X=	0.49			X=	0.38			X=	0.51		
Q =	948	veh/hr		Q =	917	veh/hr		Q =	1419	veh/hr		Q =	704	veh/hr	
y=	0.15			y=	0.14			y=	0.17			y=	0.23		
L =	0.30			L=	0.28			L=	0.44			L=	0.44		
n =	2	lane		n =	2	lane		n =	2	lane		n =	1	lane	
X ' =	0.72			X ' =	0.72			X ' =	0.75			X ' =	0.71		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	FALSE		
Z =	-0.49			Z =	-0.51			Z =	-0.62			Z =	-0.49		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	11	vehs		N =	10	vehs		N =	10	vehs		N =	6	vehs	
Avg queue length =	33	metres		Avg queue leng	31	metres		Avg queue length	29	metres		Avg queue length	39	metres	
Average delay =	33.5	seconds		Average delay	34.8	seconds		Average delay =	21.6	seconds		Average delay =	23.2	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J8 - Nga Tsin Wai Road / Junction Road	Ref. No.:			
Scheme:	Design	Design year:	2033		
		Designed by:	RC	Checked by:	PK
Arm A:	Nga Tsin Wai Road WB				
Arm B:	Nga Tsin Wai Road EB				
Arm C:	Junction Road SB				
Arm D:	Junction Road NB				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Nga Tsin Wai Road WB	2	31	120	450	3820	1.2	35	115	595	3820	1.2
Nga Tsin Wai Road EB	2	34	120	575	3970	1.2	32	115	545	3970	1.2
Junction Road SB	2	56	120	835	3890	1.2	50	115	650	3860	1.2
Junction Road NB	1	56	120	455	1885	1.2	50	115	435	1915	1.2

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	89	0.26	0.45	12.5	19		38	26	28	28	28
Nga Tsin Wai Road EB	86	0.28	0.51	16.0	22		37	32	34	34	34
Junction Road SB	64	0.47	0.46	23.2	23		22	31	37	37	37
Junction Road NB	64	0.47	0.52	12.6	15		24	35	40	40	40

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	80	0.30	0.52	15.8	22		34	31	33	33	33
Nga Tsin Wai Road EB	83	0.28	0.49	14.5	21		35	29	31	31	31
Junction Road SB	65	0.44	0.38	17.3	19		22	25	29	29	29
Junction Road NB	65	0.44	0.52	11.6	15		25	35	39	39	39

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Nga Tsin Wai Road WB	**28**	**33**
Arm B:	Nga Tsin Wai Road EB	**34**	**31**
Arm C:	Junction Road SB	**37**	**29**
Arm D:	Junction Road NB	**40**	**39**

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

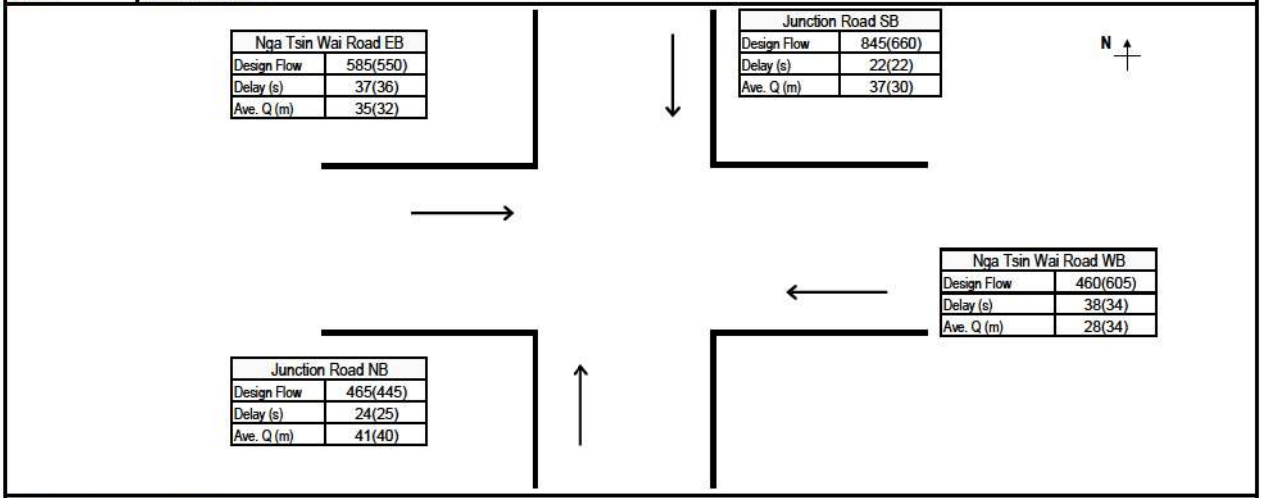
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	375	veh/hr		q '=	479	veh/hr		q '=	696	veh/hr		q '=	379	veh/hr	
c=	120	sec		c=	120	sec		c=	120	sec		c=	120	sec	
S '=	3183	veh/hr		S '=	3308	veh/hr		S '=	3242	veh/hr		S '=	1571	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.45			X=	0.51			X=	0.46			X=	0.52		
Q =	834	veh/hr		Q =	931	veh/hr		Q =	1519	veh/hr		Q =	736	veh/hr	
y=	0.12			y=	0.14			y=	0.21			y=	0.24		
L =	0.26			L=	0.28			L=	0.47			L=	0.47		
n =	2	lane		n =	2	lane		n =	2	lane		n =	1	lane	
X ' =	0.72			X ' =	0.72			X ' =	0.75			X ' =	0.71		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	FALSE		
Z =	-0.55			Z =	-0.49			Z =	-0.54			Z =	-0.48		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	9	vehs		N =	11	vehs		N =	12	vehs		N =	7	vehs	
Avg queue length =	28	metres		Avg queue leng	34	metres		Avg queue length	37	metres		Avg queue length	40	metres	
Average delay =	37.0	seconds		Average delay	36.2	seconds		Average delay =	21.6	seconds		Average delay =	22.3	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	496	veh/hr		q=	454	veh/hr		q=	542	veh/hr		q=	363	veh/hr	
c=	115	sec		c=	115	sec		c=	115	sec		c=	115	sec	
S=	3183	veh/hr		S=	3308	veh/hr		S=	3217	veh/hr		S=	1596	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.52			X=	0.49			X=	0.38			X=	0.52		
Q =	958	veh/hr		Q =	921	veh/hr		Q =	1410	veh/hr		Q =	700	veh/hr	
y=	0.16			y=	0.14			y=	0.17			y=	0.23		
L =	0.30			L=	0.28			L=	0.44			L=	0.44		
n =	2	lane		n =	2	lane		n =	2	lane		n =	1	lane	
X ' =	0.72			X ' =	0.72			X ' =	0.75			X ' =	0.71		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	FALSE		
Z =	-0.48			Z =	-0.51			Z =	-0.62			Z =	-0.48		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	11	vehs		N =	10	vehs		N =	10	vehs		N =	7	vehs	
Avg queue length =	33	metres		Avg queue leng	31	metres		Avg queue length	29	metres		Avg queue length	39	metres	
Average delay =	33.3	seconds		Average delay	34.7	seconds		Average delay =	21.8	seconds		Average delay =	23.5	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J8 - Nga Tsin Wai Road / Junction Road	Ref. No.:			
Scheme:	Reference	Design year:	2036		
		Designed by:	RC	Checked by:	PK
Arm A:	Nga Tsin Wai Road WB				
Arm B:	Nga Tsin Wai Road EB				
Arm C:	Junction Road SB				
Arm D:	Junction Road NB				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Nga Tsin Wai Road WB	2	31	120	460	3820	1.2	34	115	605	3820	1.2
Nga Tsin Wai Road EB	2	34	120	585	3970	1.2	32	115	550	3970	1.2
Junction Road SB	2	56	120	845	3895	1.2	51	115	660	3865	1.2
Junction Road NB	1	56	120	465	1885	1.2	51	115	445	1915	1.2

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	89	0.26	0.46	12.8	19		38	26	28	28	28
Nga Tsin Wai Road EB	86	0.28	0.53	16.3	22		37	33	35	35	35
Junction Road SB	64	0.47	0.46	23.5	23		22	32	37	37	37
Junction Road NB	64	0.47	0.53	12.9	15		24	36	41	41	41

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	81	0.30	0.53	16.1	22		34	31	34	34	34
Nga Tsin Wai Road EB	83	0.28	0.50	14.6	21		36	30	32	32	32
Junction Road SB	64	0.44	0.39	17.6	20		22	25	30	30	30
Junction Road NB	64	0.44	0.53	11.8	15		25	36	40	40	40

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Nga Tsin Wai Road WB	**28**	**34**
Arm B:	Nga Tsin Wai Road EB	**35**	**32**
Arm C:	Junction Road SB	**37**	**30**
Arm D:	Junction Road NB	**41**	**40**

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

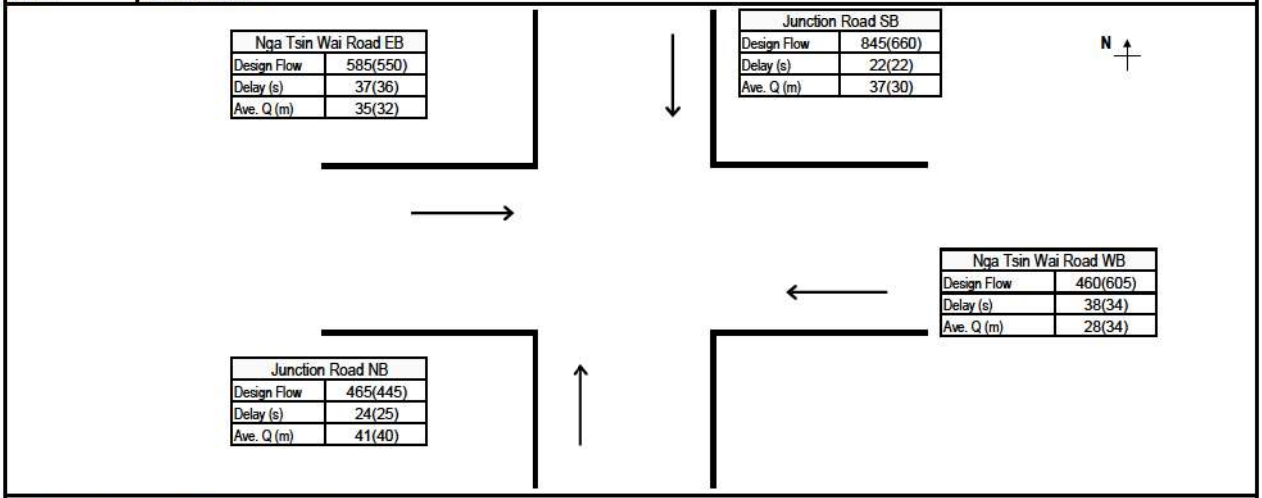
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	383	veh/hr		q '=	488	veh/hr		q '=	704	veh/hr		q '=	388	veh/hr	
c=	120	sec		c=	120	sec		c=	120	sec		c=	120	sec	
S '=	3183	veh/hr		S '=	3308	veh/hr		S '=	3246	veh/hr		S '=	1571	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.46			X=	0.53			X=	0.46			X=	0.53		
Q =	835	veh/hr		Q =	928	veh/hr		Q =	1524	veh/hr		Q =	737	veh/hr	
y=	0.12			y=	0.15			y=	0.22			y=	0.25		
L =	0.26			L=	0.28			L=	0.47			L=	0.47		
n =	2	lane		n =	2	lane		n =	2	lane		n =	1	lane	
X ' =	0.72			X ' =	0.72			X ' =	0.75			X ' =	0.71		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	FALSE		
Z =	-0.54			Z =	-0.47			Z =	-0.54			Z =	-0.47		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	9	vehs		N =	12	vehs		N =	12	vehs		N =	7	vehs	
Avg queue length =	28	metres		Avg queue leng	35	metres		Avg queue length	37	metres		Avg queue length	41	metres	
Average delay =	37.1	seconds		Average delay	36.4	seconds		Average delay =	21.6	seconds		Average delay =	22.4	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	504	veh/hr		q=	458	veh/hr		q=	550	veh/hr		q=	371	veh/hr	
c=	115	sec		c=	115	sec		c=	115	sec		c=	115	sec	
S=	3183	veh/hr		S=	3308	veh/hr		S=	3221	veh/hr		S=	1596	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.53			X=	0.50			X=	0.39			X=	0.53		
Q =	954	veh/hr		Q =	914	veh/hr		Q =	1415	veh/hr		Q =	701	veh/hr	
y=	0.16			y=	0.14			y=	0.17			y=	0.23		
L =	0.30			L=	0.28			L=	0.44			L=	0.44		
n =	2	lane		n =	2	lane		n =	2	lane		n =	1	lane	
X ' =	0.72			X ' =	0.72			X ' =	0.75			X ' =	0.71		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	FALSE		
Z =	-0.47			Z =	-0.50			Z =	-0.61			Z =	-0.47		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	11	vehs		N =	11	vehs		N =	10	vehs		N =	7	vehs	
Avg queue length =	34	metres		Avg queue leng	32	metres		Avg queue length	30	metres		Avg queue length	40	metres	
Average delay =	33.5	seconds		Average delay	35.0	seconds		Average delay =	21.8	seconds		Average delay =	23.5	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J8 - Nga Tsin Wai Road / Junction Road	Ref. No.:			
Scheme:	Design	Design year:	2036		
		Designed by:	RC	Checked by:	PK
Arm A:	Nga Tsin Wai Road WB				
Arm B:	Nga Tsin Wai Road EB				
Arm C:	Junction Road SB				
Arm D:	Junction Road NB				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Nga Tsin Wai Road WB	2	31	120	460	3820	1.2	34	115	605	3820	1.2
Nga Tsin Wai Road EB	2	34	120	585	3970	1.2	32	115	550	3970	1.2
Junction Road SB	2	56	120	845	3895	1.2	51	115	660	3865	1.2
Junction Road NB	1	56	120	465	1885	1.2	51	115	445	1915	1.2

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	89	0.26	0.46	12.8	19		38	26	28	28	28
Nga Tsin Wai Road EB	86	0.28	0.53	16.3	22		37	33	35	35	35
Junction Road SB	64	0.47	0.46	23.5	23		22	32	37	37	37
Junction Road NB	64	0.47	0.53	12.9	15		24	36	41	41	41

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	81	0.30	0.53	16.1	22		34	31	34	34	34
Nga Tsin Wai Road EB	83	0.28	0.50	14.6	21		36	30	32	32	32
Junction Road SB	64	0.44	0.39	17.6	20		22	25	30	30	30
Junction Road NB	64	0.44	0.53	11.8	15		25	36	40	40	40

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Nga Tsin Wai Road WB	**28**	**34**
Arm B:	Nga Tsin Wai Road EB	**35**	**32**
Arm C:	Junction Road SB	**37**	**30**
Arm D:	Junction Road NB	**41**	**40**

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

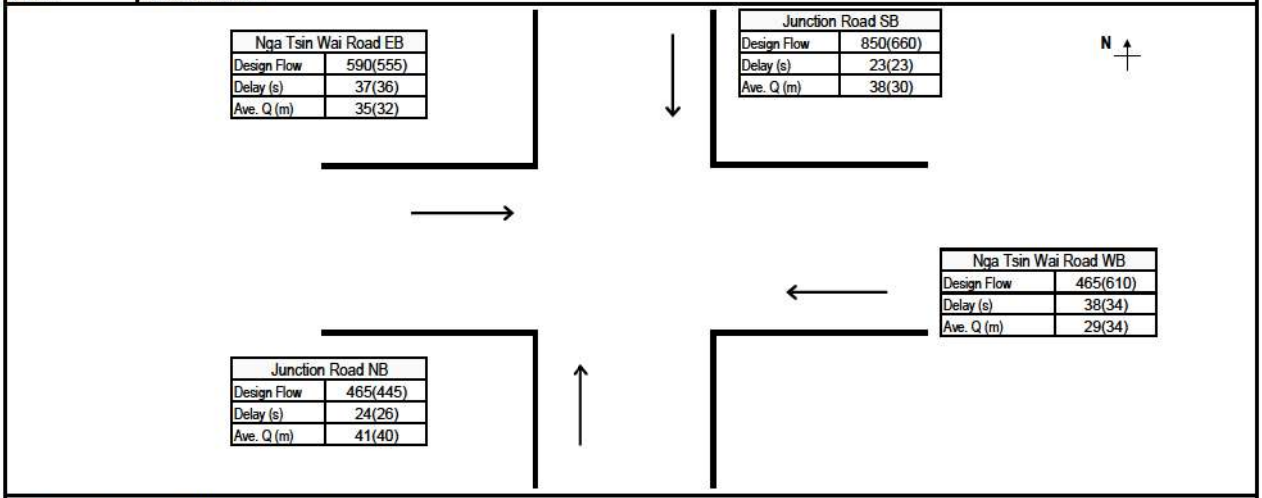
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	383	veh/hr		q '=	488	veh/hr		q '=	704	veh/hr		q '=	388	veh/hr	
c=	120	sec		c=	120	sec		c=	120	sec		c=	120	sec	
S '=	3183	veh/hr		S '=	3308	veh/hr		S '=	3246	veh/hr		S '=	1571	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.46			X=	0.53			X=	0.46			X=	0.53		
Q =	835	veh/hr		Q =	928	veh/hr		Q =	1524	veh/hr		Q =	737	veh/hr	
y=	0.12			y=	0.15			y=	0.22			y=	0.25		
L =	0.26			L=	0.28			L=	0.47			L=	0.47		
n =	2	lane		n =	2	lane		n =	2	lane		n =	1	lane	
X ' =	0.72			X ' =	0.72			X ' =	0.75			X ' =	0.71		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	FALSE		
Z =	-0.54			Z =	-0.47			Z =	-0.54			Z =	-0.47		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	9	vehs		N =	12	vehs		N =	12	vehs		N =	7	vehs	
Avg queue length =	28	metres		Avg queue leng	35	metres		Avg queue lengtl	37	metres		Avg queue lengtl	41	metres	
Average delay =	37.1	seconds		Average delay	36.4	seconds		Average delay =	21.6	seconds		Average delay =	22.4	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	504	veh/hr		q=	458	veh/hr		q=	550	veh/hr		q=	371	veh/hr	
c=	115	sec		c=	115	sec		c=	115	sec		c=	115	sec	
S=	3183	veh/hr		S=	3308	veh/hr		S=	3221	veh/hr		S=	1596	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.53			X=	0.50			X=	0.39			X=	0.53		
Q =	954	veh/hr		Q =	914	veh/hr		Q =	1415	veh/hr		Q =	701	veh/hr	
y=	0.16			y=	0.14			y=	0.17			y=	0.23		
L =	0.30			L=	0.28			L=	0.44			L=	0.44		
n =	2	lane		n =	2	lane		n =	2	lane		n =	1	lane	
X ' =	0.72			X ' =	0.72			X ' =	0.75			X ' =	0.71		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	FALSE		
Z =	-0.47			Z =	-0.50			Z =	-0.61			Z =	-0.47		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	11	vehs		N =	11	vehs		N =	10	vehs		N =	7	vehs	
Avg queue length =	34	metres		Avg queue leng	32	metres		Avg queue lengtl	30	metres		Avg queue lengtl	40	metres	
Average delay =	33.5	seconds		Average delay	35.0	seconds		Average delay =	21.8	seconds		Average delay =	23.5	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J8 - Nga Tsin Wai Road / Junction Road	Ref. No.:			
Scheme:	Reference (with improvement at J15)	Design year:	2037		
		Designed by:	RC	Checked by:	PK
Arm A:	Nga Tsin Wai Road WB				
Arm B:	Nga Tsin Wai Road EB				
Arm C:	Junction Road SB				
Arm D:	Junction Road NB				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Nga Tsin Wai Road WB	2	31	120	465	3820	1.2	35	115	610	3825	1.2
Nga Tsin Wai Road EB	2	34	120	590	3970	1.2	32	115	555	3970	1.2
Junction Road SB	2	56	120	850	3725	1.2	50	115	660	3725	1.2
Junction Road NB	1	56	120	465	1885	1.2	50	115	445	1915	1.2

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	89	0.26	0.46	12.9	19		38	27	29	29	29
Nga Tsin Wai Road EB	86	0.28	0.53	16.4	22		37	33	35	35	35
Junction Road SB	64	0.47	0.49	23.6	24		23	32	38	38	38
Junction Road NB	64	0.47	0.53	12.9	16		24	36	41	41	41

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	80	0.30	0.53	16.2	22		34	32	34	34	34
Nga Tsin Wai Road EB	83	0.28	0.50	14.8	21		36	30	32	32	32
Junction Road SB	65	0.44	0.40	17.6	20		23	25	30	30	30
Junction Road NB	65	0.44	0.53	11.8	15		26	36	40	40	40

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Nga Tsin Wai Road WB	**29**	**34**
Arm B:	Nga Tsin Wai Road EB	**35**	**32**
Arm C:	Junction Road SB	**38**	**30**
Arm D:	Junction Road NB	**41**	**40**

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

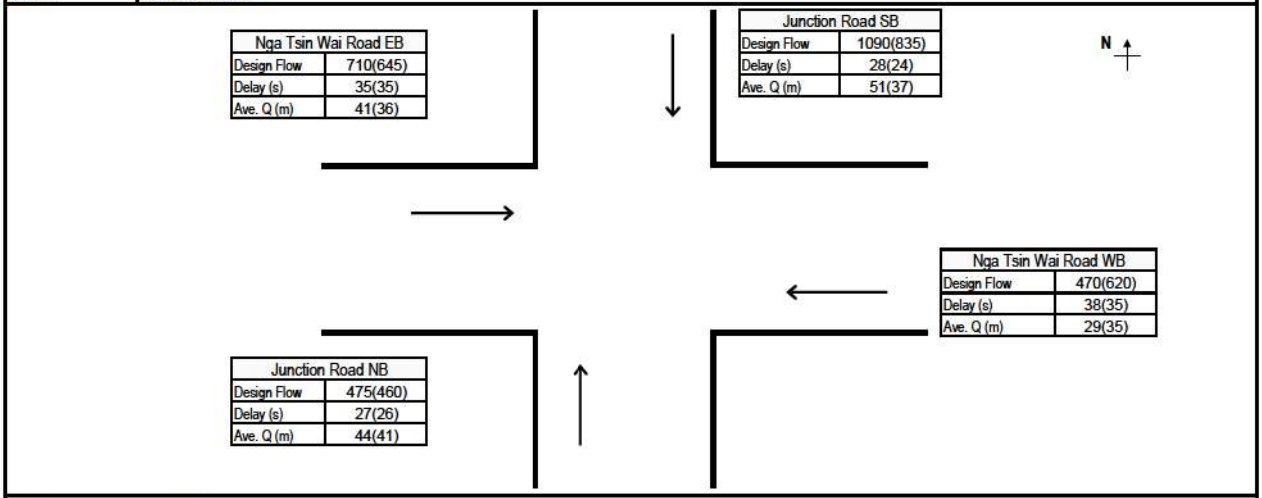
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	388	veh/hr		q '=	492	veh/hr		q '=	708	veh/hr		q '=	388	veh/hr	
c=	120	sec		c=	120	sec		c=	120	sec		c=	120	sec	
S '=	3183	veh/hr		S '=	3308	veh/hr		S '=	3104	veh/hr		S '=	1571	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.46			X=	0.53			X=	0.49			X=	0.53		
Q =	835	veh/hr		Q =	934	veh/hr		Q =	1452	veh/hr		Q =	735	veh/hr	
y=	0.12			y=	0.15			y=	0.23			y=	0.25		
L =	0.26			L=	0.28			L=	0.47			L=	0.47		
n =	2	lane		n =	2	lane		n =	2	lane		n =	1	lane	
X ' =	0.72			X ' =	0.72			X ' =	0.75			X ' =	0.71		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	FALSE		
Z =	-0.54			Z =	-0.47			Z =	-0.51			Z =	-0.47		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	10	vehs		N =	12	vehs		N =	13	vehs		N =	7	vehs	
Avg queue length =	29	metres		Avg queue leng	35	metres		Avg queue lengtl	38	metres		Avg queue lengtl	41	metres	
Average delay =	37.2	seconds		Average delay	36.3	seconds		Average delay =	22.0	seconds		Average delay =	22.6	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	508	veh/hr		q=	463	veh/hr		q=	550	veh/hr		q=	371	veh/hr	
c=	115	sec		c=	115	sec		c=	115	sec		c=	115	sec	
S=	3188	veh/hr		S=	3308	veh/hr		S=	3104	veh/hr		S=	1596	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.53			X=	0.50			X=	0.40			X=	0.53		
Q =	960	veh/hr		Q =	919	veh/hr		Q =	1360	veh/hr		Q =	699	veh/hr	
y=	0.16			y=	0.14			y=	0.18			y=	0.23		
L =	0.30			L=	0.28			L=	0.44			L=	0.44		
n =	2	lane		n =	2	lane		n =	2	lane		n =	1	lane	
X ' =	0.72			X ' =	0.72			X ' =	0.74			X ' =	0.71		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	FALSE		
Z =	-0.47			Z =	-0.50			Z =	-0.60			Z =	-0.47		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	11	vehs		N =	11	vehs		N =	10	vehs		N =	7	vehs	
Avg queue length =	34	metres		Avg queue leng	32	metres		Avg queue lengtl	30	metres		Avg queue lengtl	40	metres	
Average delay =	33.4	seconds		Average delay	34.9	seconds		Average delay =	22.1	seconds		Average delay =	23.7	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J8 - Nga Tsin Wai Road / Junction Road	Ref. No.:			
Scheme:	Design (with improvement at J15)	Design year:	2040		
		Designed by:	RC	Checked by:	PK
Arm A:	Nga Tsin Wai Road WB				
Arm B:	Nga Tsin Wai Road EB				
Arm C:	Junction Road SB				
Arm D:	Junction Road NB				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Nga Tsin Wai Road WB	2	31	120	470	3820	1.2	34	115	620	3825	1.2
Nga Tsin Wai Road EB	2	37	120	710	3970	1.2	34	115	645	3970	1.2
Junction Road SB	2	53	120	1090	3745	1.2	51	115	835	3725	1.2
Junction Road NB	1	53	120	475	1890	1.2	51	115	460	1915	1.2

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	89	0.26	0.48	13.1	20		38	27	29	29	29
Nga Tsin Wai Road EB	83	0.31	0.57	19.7	25		35	38	41	41	41
Junction Road SB	67	0.44	0.66	30.3	29		28	47	51	51	51
Junction Road NB	67	0.44	0.57	13.2	17		27	40	44	44	44

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	81	0.30	0.54	16.5	22		35	32	35	35	35
Nga Tsin Wai Road EB	81	0.30	0.54	17.2	23		35	34	36	36	36
Junction Road SB	64	0.44	0.51	22.2	24		24	33	37	37	37
Junction Road NB	64	0.44	0.54	12.2	16		26	37	41	41	41

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Nga Tsin Wai Road WB	**29**	**35**
Arm B:	Nga Tsin Wai Road EB	**41**	**36**
Arm C:	Junction Road SB	**51**	**37**
Arm D:	Junction Road NB	**44**	**41**

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

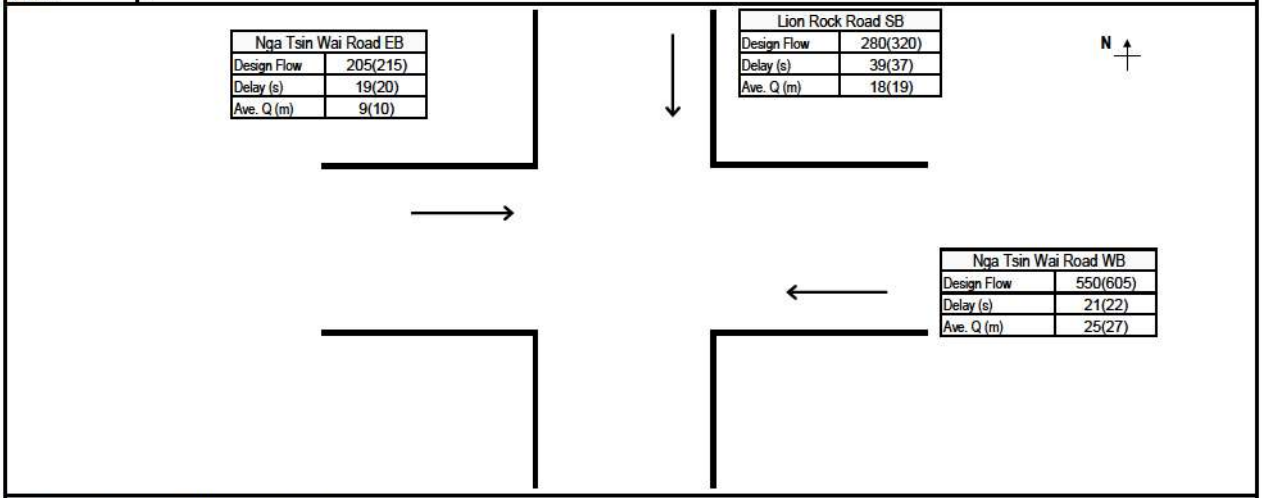
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	392	veh/hr		q '=	592	veh/hr		q '=	908	veh/hr		q '=	396	veh/hr	
c=	120	sec		c=	120	sec		c=	120	sec		c=	120	sec	
S '=	3183	veh/hr		S '=	3308	veh/hr		S '=	3121	veh/hr		S '=	1575	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.48			X=	0.57			X=	0.66			X=	0.57		
Q =	824	veh/hr		Q =	1032	veh/hr		Q =	1367	veh/hr		Q =	690	veh/hr	
y=	0.12			y=	0.18			y=	0.29			y=	0.25		
L =	0.26			L=	0.31			L=	0.44			L=	0.44		
n =	2	lane		n =	2	lane		n =	2	lane		n =	1	lane	
X ' =	0.72			X ' =	0.73			X ' =	0.75			X ' =	0.71		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	FALSE		
Z =	-0.52			Z =	-0.43			Z =	-0.34			Z =	-0.43		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	10	vehs		N =	14	vehs		N =	17	vehs		N =	7	vehs	
Avg queue length =	29	metres		Avg queue leng	41	metres		Avg queue length	51	metres		Avg queue length	44	metres	
Average delay =	37.6	seconds		Average delay	34.6	seconds		Average delay =	26.7	seconds		Average delay =	25.3	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	517	veh/hr		q=	538	veh/hr		q=	696	veh/hr		q=	383	veh/hr	
c=	115	sec		c=	115	sec		c=	115	sec		c=	115	sec	
S=	3188	veh/hr		S=	3308	veh/hr		S=	3104	veh/hr		S=	1596	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.54			X=	0.54			X=	0.51			X=	0.54		
Q =	949	veh/hr		Q =	987	veh/hr		Q =	1370	veh/hr		Q =	704	veh/hr	
y=	0.16			y=	0.16			y=	0.22			y=	0.24		
L =	0.30			L=	0.30			L=	0.44			L=	0.44		
n =	2	lane		n =	2	lane		n =	2	lane		n =	1	lane	
X ' =	0.72			X ' =	0.72			X ' =	0.74			X ' =	0.71		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	FALSE		
Z =	-0.46			Z =	-0.46			Z =	-0.49			Z =	-0.46		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	12	vehs		N =	12	vehs		N =	12	vehs		N =	7	vehs	
Avg queue length =	35	metres		Avg queue leng	36	metres		Avg queue length	37	metres		Avg queue length	41	metres	
Average delay =	33.8	seconds		Average delay	33.8	seconds		Average delay =	23.1	seconds		Average delay =	23.6	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J9 - Nga Tsin Wai Road / Lion Rock Road	Ref. No.:			
Scheme:	Existing	Design year:	2021		
		Designed by:	RC	Checked by:	PK
Arm A:	Nga Tsin Wai Road WB				
Arm B:	Nga Tsin Wai Road EB				
Arm C:	Lion Rock Road SB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Nga Tsin Wai Road WB	2	55	120	550	3715	1.2	50	115	605	3795	1.2
Nga Tsin Wai Road EB	2	55	120	205	3970	1.2	50	115	215	3970	1.2
Lion Rock Road SB	2	28	120	280	3660	1.2	28	115	320	3600	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	65	0.46	0.32	15.3	17		21	21	25	25	25
Nga Tsin Wai Road EB	65	0.46	0.11	5.7	9		19	7	9	9	9
Lion Rock Road SB	92	0.24	0.32	7.8	14		39	16	18	18	18
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	65	0.44	0.37	16.1	19		22	23	27	27	27
Nga Tsin Wai Road EB	65	0.44	0.12	5.7	9		20	8	10	10	10
Lion Rock Road SB	87	0.24	0.37	8.5	15		37	18	19	19	19
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Nga Tsin Wai Road WB	**25**	**27**
Arm B:	Nga Tsin Wai Road EB	**9**	**10**
Arm C:	Lion Rock Road SB	**18**	**19**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

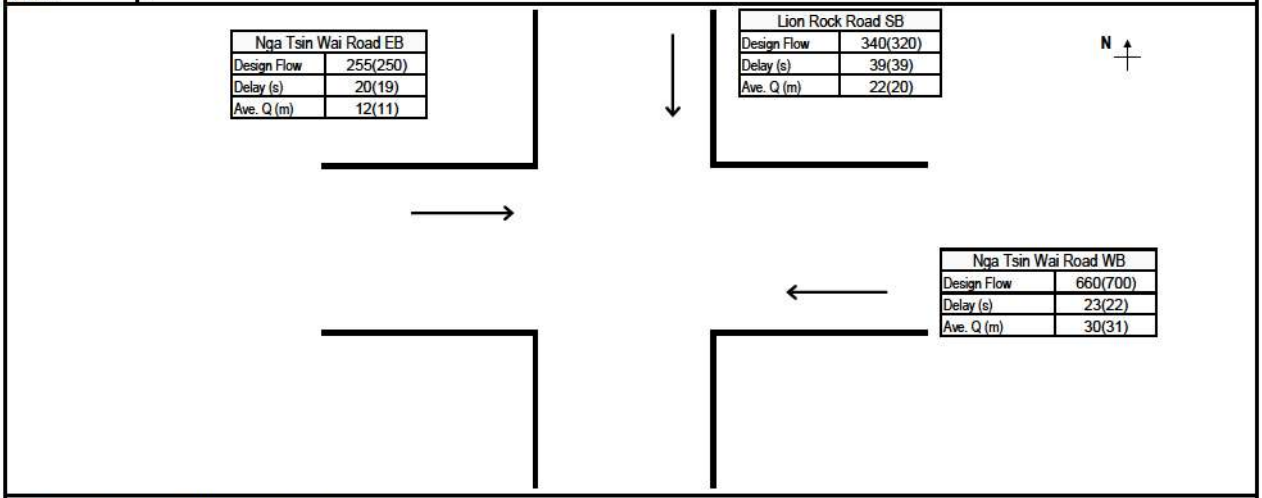
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	458	veh/hr		q '=	171	veh/hr		q '=	233	veh/hr		q '=	#DIV/0!		veh/hr
c=	120	sec		c=	120	sec		c=	120	sec		c=	0		sec
S '=	3096	veh/hr		S '=	3308	veh/hr		S '=	3050	veh/hr		S '=	#DIV/0!		veh/hr
t=	1	hr		t=	1	hr		t=	1	hr		t=	1		hr
X=	0.32			X=	0.11			X=	0.32			X=	#DIV/0!		
Q =	1412	veh/hr		Q =	1509	veh/hr		Q =	718	veh/hr		Q =	#VALUE!		veh/hr
y=	0.15			y=	0.05			y=	0.08			y=	#DIV/0!		
L =	0.46			L=	0.46			L=	0.24			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.75			X ' =	0.75			X ' =	0.71			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.68			Z =	-0.89			Z =	-0.68			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	8	vehs		N =	3	vehs		N =	6	vehs		N =	#DIV/0!		vehs
Avg queue length =	25	metres		Avg queue leng	9	metres		Avg queue lengtl	18	metres		Avg queue lengtl	#DIV/0!		metres
Average delay =	20.8	seconds		Average delay	18.7	seconds		Average delay =	38.0	seconds		Average delay =	#VALUE!		seconds

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	504	veh/hr		q=	179	veh/hr		q=	267	veh/hr		q=	#DIV/0!		veh/hr
c=	115	sec		c=	115	sec		c=	115	sec		c=	115		sec
S=	3163	veh/hr		S=	3308	veh/hr		S=	3000	veh/hr		S=	#DIV/0!		veh/hr
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5		hr
X=	0.37			X=	0.12			X=	0.37			X=	#DIV/0!		
Q =	1377	veh/hr		Q =	1441	veh/hr		Q =	728	veh/hr		Q =	#VALUE!		veh/hr
y=	0.16			y=	0.05			y=	0.09			y=	#DIV/0!		
L =	0.44			L=	0.44			L=	0.24			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.74			X ' =	0.75			X ' =	0.71			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.63			Z =	-0.88			Z =	-0.63			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	9	vehs		N =	3	vehs		N =	6	vehs		N =	#DIV/0!		vehs
Avg queue length =	27	metres		Avg queue leng	10	metres		Avg queue lengtl	19	metres		Avg queue lengtl	#DIV/0!		metres
Average delay =	21.8	seconds		Average delay	19.4	seconds		Average delay =	36.2	seconds		Average delay =	#VALUE!		seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J9 - Nga Tsin Wai Road / Lion Rock Road	Ref. No.:			
Scheme:	Reference	Design year:	2033		
		Designed by:	RC	Checked by:	PK
Arm A:	Nga Tsin Wai Road WB				
Arm B:	Nga Tsin Wai Road EB				
Arm C:	Lion Rock Road SB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Nga Tsin Wai Road WB	2	54	120	660	3730	1.2	52	115	700	3795	1.2
Nga Tsin Wai Road EB	2	54	120	255	3970	1.2	52	115	250	3970	1.2
Lion Rock Road SB	2	29	120	340	3605	1.2	26	115	320	3510	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	66	0.45	0.39	18.3	20		23	25	30	30	30
Nga Tsin Wai Road EB	66	0.45	0.14	7.1	10		20	9	12	12	12
Lion Rock Road SB	91	0.24	0.39	9.4	16		39	20	22	22	22
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	63	0.45	0.41	18.6	20		22	26	31	31	31
Nga Tsin Wai Road EB	63	0.45	0.14	6.7	10		19	9	11	11	11
Lion Rock Road SB	89	0.23	0.40	8.5	15		39	18	20	20	20
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Nga Tsin Wai Road WB	**30**	**31**
Arm B:	Nga Tsin Wai Road EB	**12**	**11**
Arm C:	Lion Rock Road SB	**22**	**20**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

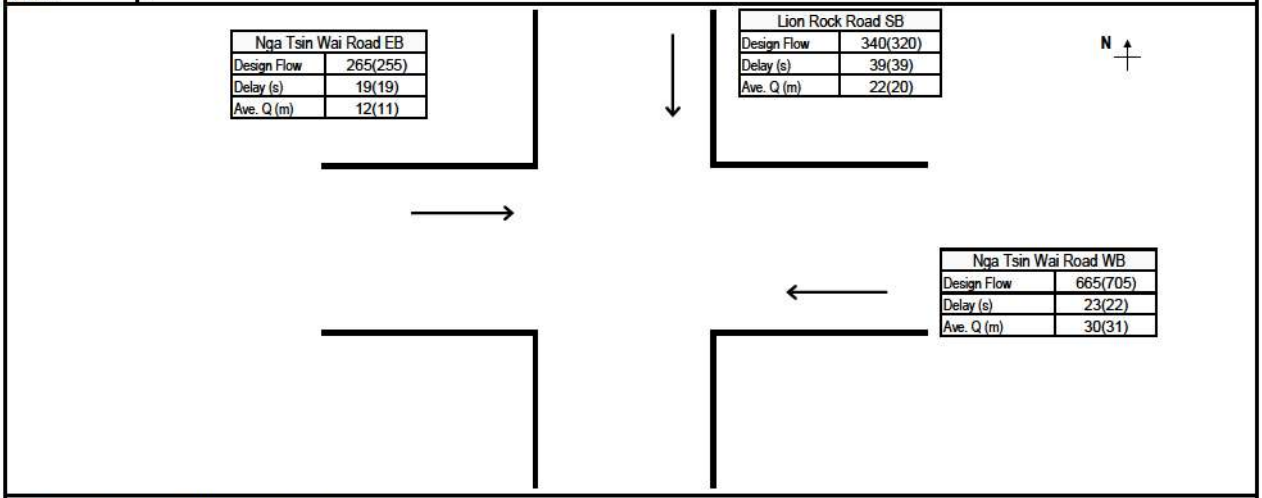
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	550	veh/hr		q '=	213	veh/hr		q '=	283	veh/hr		q '=	#DIV/0!		veh/hr
c=	120	sec		c=	120	sec		c=	120	sec		c=	0		sec
S '=	3108	veh/hr		S '=	3308	veh/hr		S '=	3004	veh/hr		S '=	#DIV/0!		veh/hr
t=	1	hr		t=	1	hr		t=	1	hr		t=	1		hr
X=	0.39			X=	0.14			X=	0.39			X=	#DIV/0!		
Q =	1402	veh/hr		Q =	1492	veh/hr		Q =	723	veh/hr		Q =	#VALUE!		veh/hr
y=	0.18			y=	0.06			y=	0.09			y=	#DIV/0!		
L =	0.45			L=	0.45			L=	0.24			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.75			X ' =	0.75			X ' =	0.71			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.61			Z =	-0.86			Z =	-0.61			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	10	vehs		N =	4	vehs		N =	7	vehs		N =	#DIV/0!		vehs
Avg queue length =	30	metres		Avg queue leng	12	metres		Avg queue length	22	metres		Avg queue length	#DIV/0!		metres
Average delay =	22.0	seconds		Average delay	19.3	seconds		Average delay =	38.2	seconds		Average delay =	#VALUE!		seconds

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	583	veh/hr		q=	208	veh/hr		q=	267	veh/hr		q=	#DIV/0!		veh/hr
c=	115	sec		c=	115	sec		c=	115	sec		c=	115		sec
S=	3163	veh/hr		S=	3308	veh/hr		S=	2925	veh/hr		S=	#DIV/0!		veh/hr
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5		hr
X=	0.41			X=	0.14			X=	0.40			X=	#DIV/0!		
Q =	1427	veh/hr		Q =	1492	veh/hr		Q =	664	veh/hr		Q =	#VALUE!		veh/hr
y=	0.18			y=	0.06			y=	0.09			y=	#DIV/0!		
L =	0.45			L=	0.45			L=	0.23			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.75			X ' =	0.75			X ' =	0.71			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.59			Z =	-0.86			Z =	-0.60			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	10	vehs		N =	4	vehs		N =	7	vehs		N =	#DIV/0!		vehs
Avg queue length =	31	metres		Avg queue leng	11	metres		Avg queue length	20	metres		Avg queue length	#DIV/0!		metres
Average delay =	21.2	seconds		Average delay	18.5	seconds		Average delay =	37.8	seconds		Average delay =	#VALUE!		seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J9 - Nga Tsin Wai Road / Lion Rock Road	Ref. No.:			
Scheme:	Design	Design year:	2033		
		Designed by:	RC	Checked by:	PK
Arm A:	Nga Tsin Wai Road WB				
Arm B:	Nga Tsin Wai Road EB				
Arm C:	Lion Rock Road SB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Nga Tsin Wai Road WB	2	54	120	665	3730	1.2	52	115	705	3795	1.2
Nga Tsin Wai Road EB	2	54	120	265	3970	1.2	52	115	255	3970	1.2
Lion Rock Road SB	2	29	120	340	3605	1.2	26	115	320	3510	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	66	0.45	0.39	18.5	20		23	26	30	30	30
Nga Tsin Wai Road EB	66	0.45	0.15	7.4	10		19	10	12	12	12
Lion Rock Road SB	91	0.24	0.39	9.4	16		39	20	22	22	22
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	63	0.45	0.41	18.8	20		22	26	31	31	31
Nga Tsin Wai Road EB	63	0.45	0.14	6.8	10		19	9	11	11	11
Lion Rock Road SB	89	0.23	0.40	8.5	15		39	18	20	20	20
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Nga Tsin Wai Road WB	**30**	**31**
Arm B:	Nga Tsin Wai Road EB	**12**	**11**
Arm C:	Lion Rock Road SB	**22**	**20**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

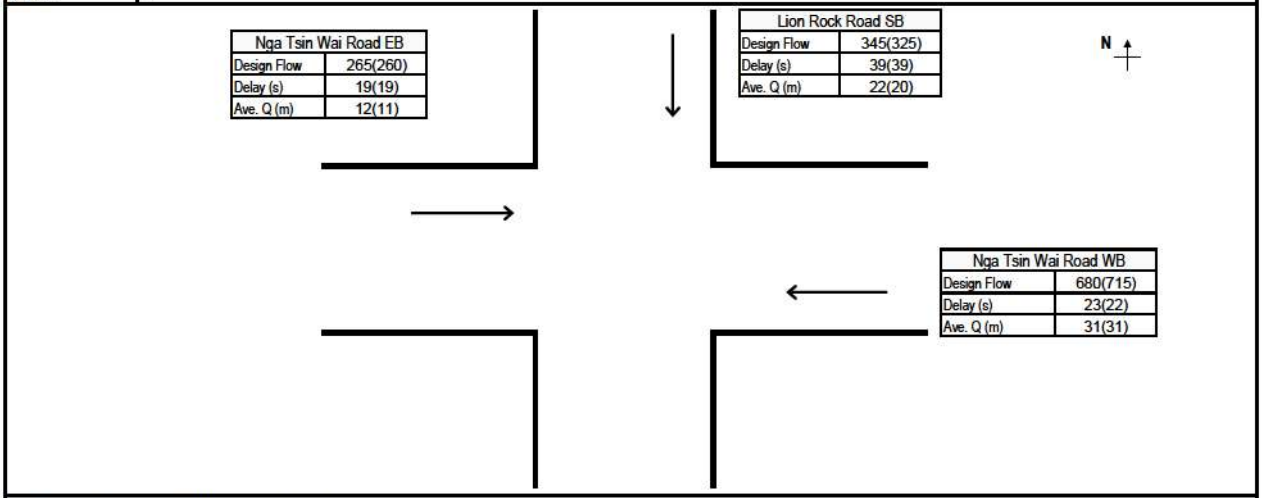
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	554	veh/hr		q '=	221	veh/hr		q '=	283	veh/hr		q '=	#DIV/0!		veh/hr
c=	120	sec		c=	120	sec		c=	120	sec		c=	0	sec	
S '=	3108	veh/hr		S '=	3308	veh/hr		S '=	3004	veh/hr		S '=	#DIV/0!		veh/hr
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.39			X=	0.15			X=	0.39			X=	#DIV/0!		
Q =	1406	veh/hr		Q =	1496	veh/hr		Q =	719	veh/hr		Q =	#VALUE!		veh/hr
y=	0.18			y=	0.07			y=	0.09			y=	#DIV/0!		
L =	0.45			L=	0.45			L=	0.24			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.75			X ' =	0.75			X ' =	0.71			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.61			Z =	-0.85			Z =	-0.61			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	10	vehs		N =	4	vehs		N =	7	vehs		N =	#DIV/0!		vehs
Avg queue length =	30	metres		Avg queue leng	12	metres		Avg queue length	22	metres		Avg queue length	#DIV/0!		metres
Average delay =	21.9	seconds		Average delay	19.3	seconds		Average delay =	38.3	seconds		Average delay =	#VALUE!		seconds

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	588	veh/hr		q=	213	veh/hr		q=	267	veh/hr		q=	#DIV/0!		veh/hr
c=	115	sec		c=	115	sec		c=	115	sec		c=	115	sec	
S=	3163	veh/hr		S=	3308	veh/hr		S=	2925	veh/hr		S=	#DIV/0!		veh/hr
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.41			X=	0.14			X=	0.40			X=	#DIV/0!		
Q =	1430	veh/hr		Q =	1496	veh/hr		Q =	661	veh/hr		Q =	#VALUE!		veh/hr
y=	0.19			y=	0.06			y=	0.09			y=	#DIV/0!		
L =	0.45			L=	0.45			L=	0.23			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.75			X ' =	0.75			X ' =	0.71			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.59			Z =	-0.86			Z =	-0.60			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	10	vehs		N =	4	vehs		N =	7	vehs		N =	#DIV/0!		vehs
Avg queue length =	31	metres		Avg queue leng	11	metres		Avg queue length	20	metres		Avg queue length	#DIV/0!		metres
Average delay =	21.2	seconds		Average delay	18.4	seconds		Average delay =	37.9	seconds		Average delay =	#VALUE!		seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J9 - Nga Tsin Wai Road / Lion Rock Road	Ref. No.:			
Scheme:	Reference	Design year:	2036		
		Designed by:	RC	Checked by:	PK
Arm A:	Nga Tsin Wai Road WB				
Arm B:	Nga Tsin Wai Road EB				
Arm C:	Lion Rock Road SB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Nga Tsin Wai Road WB	2	54	120	680	3730	1.2	52	115	715	3800	1.2
Nga Tsin Wai Road EB	2	54	120	265	3970	1.2	52	115	260	3970	1.2
Lion Rock Road SB	2	29	120	345	3610	1.2	26	115	325	3510	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	66	0.45	0.40	18.9	20		23	26	31	31	31
Nga Tsin Wai Road EB	66	0.45	0.15	7.4	10		19	10	12	12	12
Lion Rock Road SB	91	0.24	0.40	9.6	16		39	20	22	22	22
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	63	0.45	0.42	19.0	20		22	27	31	31	31
Nga Tsin Wai Road EB	63	0.45	0.15	6.9	10		19	9	11	11	11
Lion Rock Road SB	89	0.23	0.41	8.7	15		39	19	20	20	20
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Nga Tsin Wai Road WB	**31**	**31**
Arm B:	Nga Tsin Wai Road EB	**12**	**11**
Arm C:	Lion Rock Road SB	**22**	**20**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

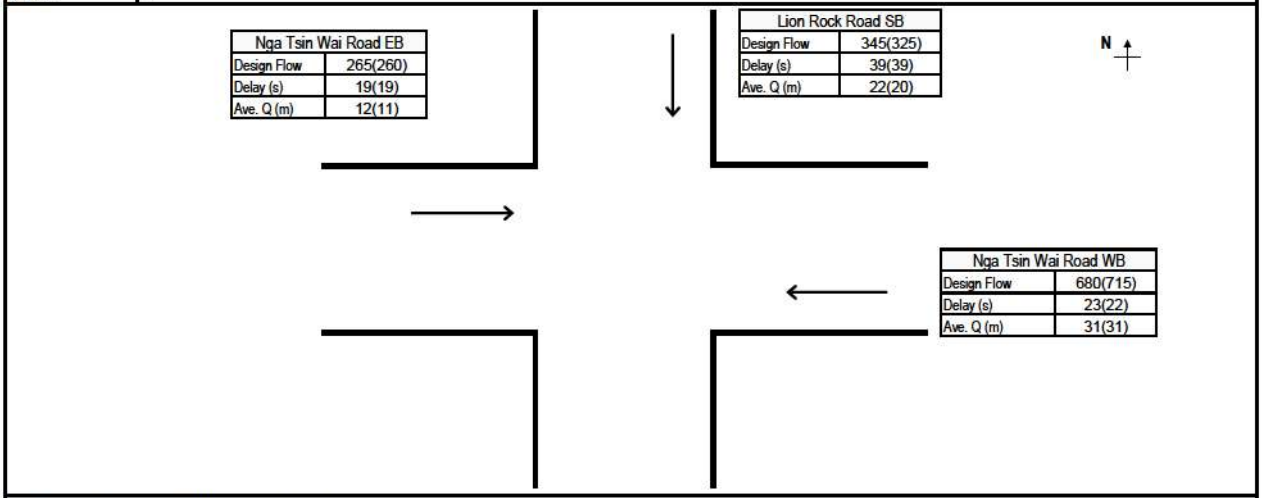
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	567	veh/hr		q '=	221	veh/hr		q '=	288	veh/hr		q '=	#DIV/0!		veh/hr
c=	120	sec		c=	120	sec		c=	120	sec		c=	0		sec
S '=	3108	veh/hr		S '=	3308	veh/hr		S '=	3008	veh/hr		S '=	#DIV/0!		veh/hr
t=	1	hr		t=	1	hr		t=	1	hr		t=	1		hr
X=	0.40			X=	0.15			X=	0.40			X=	#DIV/0!		
Q =	1410	veh/hr		Q =	1501	veh/hr		Q =	716	veh/hr		Q =	#VALUE!		veh/hr
y=	0.18			y=	0.07			y=	0.10			y=	#DIV/0!		
L =	0.45			L=	0.45			L=	0.24			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.75			X ' =	0.75			X ' =	0.71			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.60			Z =	-0.85			Z =	-0.60			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	10	vehs		N =	4	vehs		N =	7	vehs		N =	#DIV/0!		vehs
Avg queue length =	31	metres		Avg queue leng	12	metres		Avg queue length	22	metres		Avg queue length	#DIV/0!		metres
Average delay =	21.9	seconds		Average delay	19.2	seconds		Average delay =	38.5	seconds		Average delay =	#VALUE!		seconds

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	596	veh/hr		q=	217	veh/hr		q=	271	veh/hr		q=	#DIV/0!		veh/hr
c=	115	sec		c=	115	sec		c=	115	sec		c=	115		sec
S=	3167	veh/hr		S=	3308	veh/hr		S=	2925	veh/hr		S=	#DIV/0!		veh/hr
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5		hr
X=	0.42			X=	0.15			X=	0.41			X=	#DIV/0!		
Q =	1424	veh/hr		Q =	1488	veh/hr		Q =	668	veh/hr		Q =	#VALUE!		veh/hr
y=	0.19			y=	0.07			y=	0.09			y=	#DIV/0!		
L =	0.45			L=	0.45			L=	0.23			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.75			X ' =	0.75			X ' =	0.71			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.58			Z =	-0.85			Z =	-0.59			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	10	vehs		N =	4	vehs		N =	7	vehs		N =	#DIV/0!		vehs
Avg queue length =	31	metres		Avg queue leng	11	metres		Avg queue length	20	metres		Avg queue length	#DIV/0!		metres
Average delay =	21.4	seconds		Average delay	18.6	seconds		Average delay =	37.7	seconds		Average delay =	#VALUE!		seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J9 - Nga Tsin Wai Road / Lion Rock Road	Ref. No.:			
Scheme:	Design	Design year:	2036		
		Designed by:	RC	Checked by:	PK
Arm A:	Nga Tsin Wai Road WB				
Arm B:	Nga Tsin Wai Road EB				
Arm C:	Lion Rock Road SB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Nga Tsin Wai Road WB	2	54	120	680	3730	1.2	52	115	715	3800	1.2
Nga Tsin Wai Road EB	2	54	120	265	3970	1.2	52	115	260	3970	1.2
Lion Rock Road SB	2	29	120	345	3610	1.2	26	115	325	3510	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	66	0.45	0.40	18.9	20		23	26	31	31	31
Nga Tsin Wai Road EB	66	0.45	0.15	7.4	10		19	10	12	12	12
Lion Rock Road SB	91	0.24	0.40	9.6	16		39	20	22	22	22
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	63	0.45	0.42	19.0	20		22	27	31	31	31
Nga Tsin Wai Road EB	63	0.45	0.15	6.9	10		19	9	11	11	11
Lion Rock Road SB	89	0.23	0.41	8.7	15		39	19	20	20	20
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Nga Tsin Wai Road WB	**31**	**31**
Arm B:	Nga Tsin Wai Road EB	**12**	**11**
Arm C:	Lion Rock Road SB	**22**	**20**
Arm D:	-		

Effective Red, $r = c-g$
Effective Green Ratio, $L = g/c$
Degree of Saturation, $X = q/(SL)$
Average Arrival Rate, $M = qc/3600p$
Maximum Queue Length $= 6 * \text{Maximum Queue}/n$
Estimated Delay, $d = c(1-L)^2/2(1-LX) + 3600pX^2/2q(1-X) - 0.65(c/(q/3600p)^2)^{(1/3)}*X^{(2+5L)}$ OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, $L1 = 6q(r/2+d)/3600pn$ OR $L2 = 6qr/3600pn$ whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks

^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

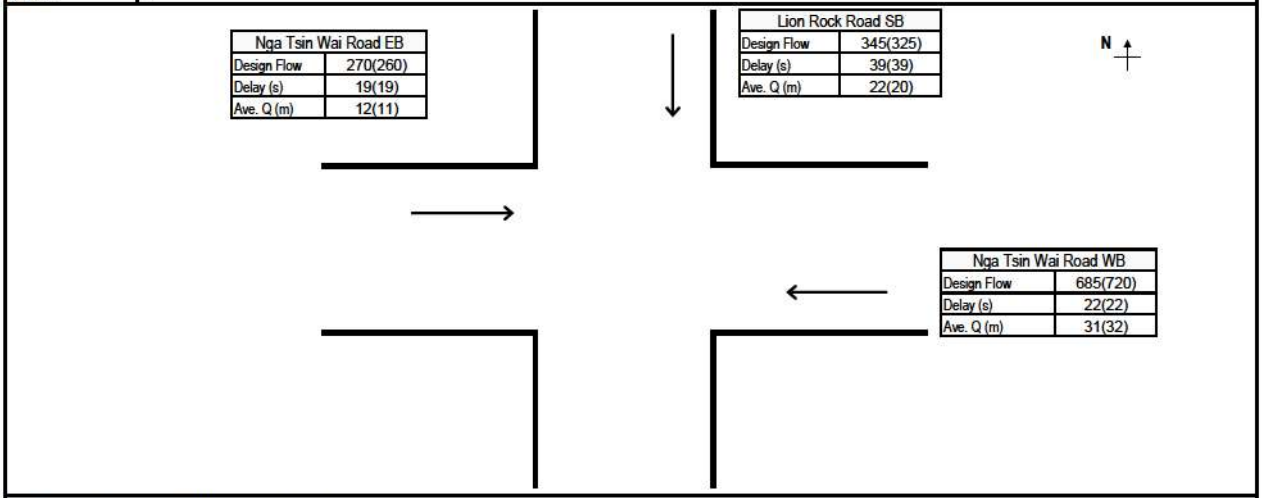
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	567	veh/hr		q '=	221	veh/hr		q '=	288	veh/hr		q '=	#DIV/0!		veh/hr
c=	120	sec		c=	120	sec		c=	120	sec		c=	0		sec
S '=	3108	veh/hr		S '=	3308	veh/hr		S '=	3008	veh/hr		S '=	#DIV/0!		veh/hr
t=	1	hr		t=	1	hr		t=	1	hr		t=	1		hr
X=	0.40			X=	0.15			X=	0.40			X=	#DIV/0!		
Q =	1410	veh/hr		Q =	1501	veh/hr		Q =	716	veh/hr		Q =	#VALUE!		veh/hr
y=	0.18			y=	0.07			y=	0.10			y=	#DIV/0!		
L =	0.45			L=	0.45			L=	0.24			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.75			X ' =	0.75			X ' =	0.71			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.60			Z =	-0.85			Z =	-0.60			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	10	vehs		N =	4	vehs		N =	7	vehs		N =	#DIV/0!		vehs
Avg queue length =	31	metres		Avg queue leng	12	metres		Avg queue length	22	metres		Avg queue length	#DIV/0!		metres
Average delay =	21.9	seconds		Average delay	19.2	seconds		Average delay =	38.5	seconds		Average delay =	#VALUE!		seconds

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	596	veh/hr		q=	217	veh/hr		q=	271	veh/hr		q=	#DIV/0!		veh/hr
c=	115	sec		c=	115	sec		c=	115	sec		c=	115		sec
S=	3167	veh/hr		S=	3308	veh/hr		S=	2925	veh/hr		S=	#DIV/0!		veh/hr
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5		hr
X=	0.42			X=	0.15			X=	0.41			X=	#DIV/0!		
Q =	1424	veh/hr		Q =	1488	veh/hr		Q =	668	veh/hr		Q =	#VALUE!		veh/hr
y=	0.19			y=	0.07			y=	0.09			y=	#DIV/0!		
L =	0.45			L=	0.45			L=	0.23			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.75			X ' =	0.75			X ' =	0.71			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.58			Z =	-0.85			Z =	-0.59			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	10	vehs		N =	4	vehs		N =	7	vehs		N =	#DIV/0!		vehs
Avg queue length =	31	metres		Avg queue leng	11	metres		Avg queue length	20	metres		Avg queue length	#DIV/0!		metres
Average delay =	21.4	seconds		Average delay	18.6	seconds		Average delay =	37.7	seconds		Average delay =	#VALUE!		seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J9 - Nga Tsin Wai Road / Lion Rock Road	Ref. No.:			
Scheme:	Reference	Design year:	2037		
		Designed by:	RC	Checked by:	PK
Arm A:	Nga Tsin Wai Road WB				
Arm B:	Nga Tsin Wai Road EB				
Arm C:	Lion Rock Road SB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Nga Tsin Wai Road WB	2	55	120	685	3725	1.2	52	115	720	3795	1.2
Nga Tsin Wai Road EB	2	55	120	270	3970	1.2	52	115	260	3970	1.2
Lion Rock Road SB	2	28	120	345	3610	1.2	26	115	325	3510	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	65	0.45	0.40	19.0	20		22	26	31	31	31
Nga Tsin Wai Road EB	65	0.45	0.15	7.5	10		19	10	12	12	12
Lion Rock Road SB	92	0.24	0.40	9.6	16		39	20	22	22	22
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	63	0.45	0.42	19.2	20		22	27	32	32	32
Nga Tsin Wai Road EB	63	0.45	0.15	6.9	10		19	9	11	11	11
Lion Rock Road SB	89	0.23	0.41	8.7	15		39	19	20	20	20
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Nga Tsin Wai Road WB	**31**	**32**
Arm B:	Nga Tsin Wai Road EB	**12**	**11**
Arm C:	Lion Rock Road SB	**22**	**20**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

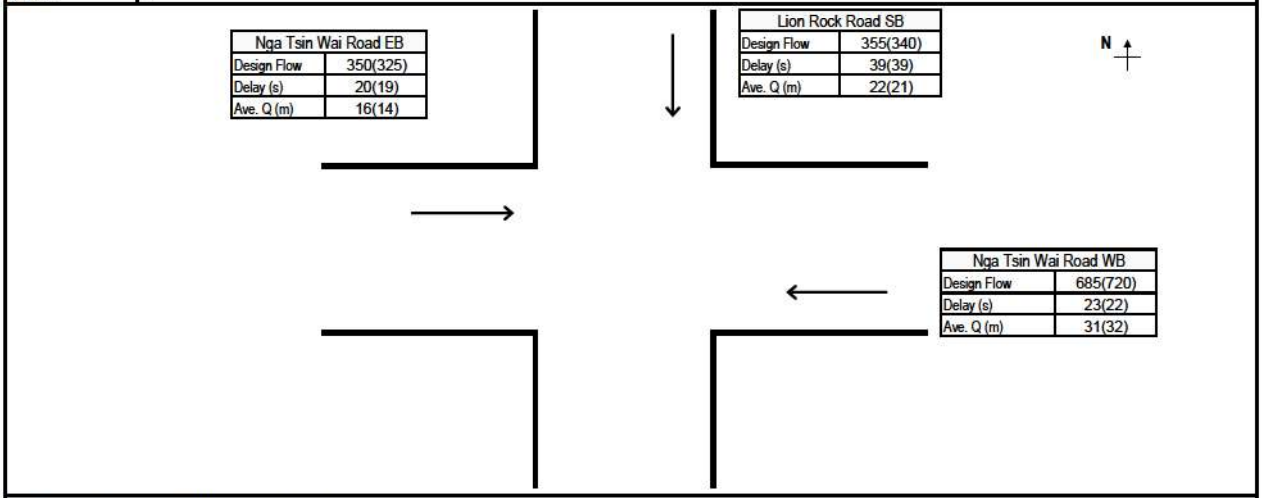
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	571	veh/hr		q '=	225	veh/hr		q '=	288	veh/hr		q '=	#DIV/0!		veh/hr
c=	120	sec		c=	120	sec		c=	120	sec		c=	0		sec
S '=	3104	veh/hr		S '=	3308	veh/hr		S '=	3008	veh/hr		S '=	#DIV/0!		veh/hr
t=	1	hr		t=	1	hr		t=	1	hr		t=	1		hr
X=	0.40			X=	0.15			X=	0.40			X=	#DIV/0!		
Q =	1412	veh/hr		Q =	1505	veh/hr		Q =	712	veh/hr		Q =	#VALUE!		veh/hr
y=	0.18			y=	0.07			y=	0.10			y=	#DIV/0!		
L =	0.45			L=	0.45			L=	0.24			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.75			X ' =	0.75			X ' =	0.71			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.60			Z =	-0.85			Z =	-0.60			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	10	vehs		N =	4	vehs		N =	7	vehs		N =	#DIV/0!		vehs
Avg queue length =	31	metres		Avg queue leng	12	metres		Avg queue lengtl	22	metres		Avg queue lengtl	#DIV/0!		metres
Average delay =	21.8	seconds		Average delay	19.1	seconds		Average delay =	38.6	seconds		Average delay =	#VALUE!		seconds

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	600	veh/hr		q=	217	veh/hr		q=	271	veh/hr		q=	#DIV/0!		veh/hr
c=	115	sec		c=	115	sec		c=	115	sec		c=	115		sec
S=	3163	veh/hr		S=	3308	veh/hr		S=	2925	veh/hr		S=	#DIV/0!		veh/hr
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5		hr
X=	0.42			X=	0.15			X=	0.41			X=	#DIV/0!		
Q =	1426	veh/hr		Q =	1492	veh/hr		Q =	665	veh/hr		Q =	#VALUE!		veh/hr
y=	0.19			y=	0.07			y=	0.09			y=	#DIV/0!		
L =	0.45			L=	0.45			L=	0.23			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.75			X ' =	0.75			X ' =	0.71			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.58			Z =	-0.85			Z =	-0.59			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	11	vehs		N =	4	vehs		N =	7	vehs		N =	#DIV/0!		vehs
Avg queue length =	32	metres		Avg queue leng	11	metres		Avg queue lengtl	20	metres		Avg queue lengtl	#DIV/0!		metres
Average delay =	21.4	seconds		Average delay	18.5	seconds		Average delay =	37.8	seconds		Average delay =	#VALUE!		seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J9 - Nga Tsin Wai Road / Lion Rock Road	Ref. No.:			
Scheme:	Design	Design year:	2037		
		Designed by:	RC	Checked by:	PK
Arm A:	Nga Tsin Wai Road WB				
Arm B:	Nga Tsin Wai Road EB				
Arm C:	Lion Rock Road SB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Nga Tsin Wai Road WB	2	54	120	685	3725	1.2	52	115	720	3795	1.2
Nga Tsin Wai Road EB	2	54	120	350	3970	1.2	52	115	325	3970	1.2
Lion Rock Road SB	2	29	120	355	3620	1.2	26	115	340	3530	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	66	0.45	0.41	19.0	20		23	27	31	31	31
Nga Tsin Wai Road EB	66	0.45	0.20	9.7	13		20	13	16	16	16
Lion Rock Road SB	91	0.24	0.41	9.9	16		39	21	22	22	22
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	63	0.45	0.42	19.2	21		22	27	32	32	32
Nga Tsin Wai Road EB	63	0.45	0.18	8.7	12		19	11	14	14	14
Lion Rock Road SB	89	0.23	0.42	9.1	15		39	20	21	21	21
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Nga Tsin Wai Road WB	**31**	**32**
Arm B:	Nga Tsin Wai Road EB	**16**	**14**
Arm C:	Lion Rock Road SB	**22**	**21**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

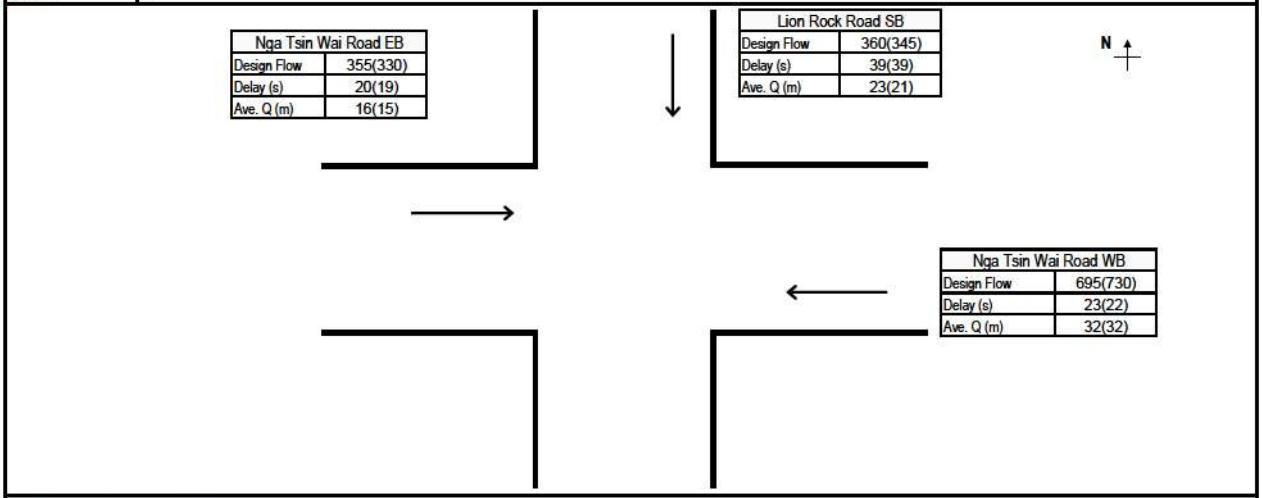
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	571	veh/hr		q '=	292	veh/hr		q '=	296	veh/hr		q '=	#DIV/0!		veh/hr
c=	120	sec		c=	120	sec		c=	120	sec		c=	0		sec
S '=	3104	veh/hr		S '=	3308	veh/hr		S '=	3017	veh/hr		S '=	#DIV/0!		veh/hr
t=	1	hr		t=	1	hr		t=	1	hr		t=	1		hr
X=	0.41			X=	0.20			X=	0.41			X=	#DIV/0!		
Q =	1400	veh/hr		Q =	1492	veh/hr		Q =	726	veh/hr		Q =	#VALUE!		veh/hr
y=	0.18			y=	0.09			y=	0.10			y=	#DIV/0!		
L =	0.45			L=	0.45			L=	0.24			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.75			X ' =	0.75			X ' =	0.71			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.59			Z =	-0.80			Z =	-0.59			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	10	vehs		N =	5	vehs		N =	7	vehs		N =	#DIV/0!		vehs
Avg queue length =	31	metres		Avg queue leng	16	metres		Avg queue length	22	metres		Avg queue length	#DIV/0!		metres
Average delay =	22.2	seconds		Average delay	19.8	seconds		Average delay =	38.4	seconds		Average delay =	#VALUE!		seconds

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	600	veh/hr		q=	271	veh/hr		q=	283	veh/hr		q=	#DIV/0!		veh/hr
c=	115	sec		c=	115	sec		c=	115	sec		c=	115		sec
S=	3163	veh/hr		S=	3308	veh/hr		S=	2942	veh/hr		S=	#DIV/0!		veh/hr
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5		hr
X=	0.42			X=	0.18			X=	0.42			X=	#DIV/0!		
Q =	1422	veh/hr		Q =	1488	veh/hr		Q =	672	veh/hr		Q =	#VALUE!		veh/hr
y=	0.19			y=	0.08			y=	0.10			y=	#DIV/0!		
L =	0.45			L=	0.45			L=	0.23			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.75			X ' =	0.75			X ' =	0.71			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.58			Z =	-0.82			Z =	-0.58			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	11	vehs		N =	5	vehs		N =	7	vehs		N =	#DIV/0!		vehs
Avg queue length =	32	metres		Avg queue leng	14	metres		Avg queue length	21	metres		Avg queue length	#DIV/0!		metres
Average delay =	21.5	seconds		Average delay	19.0	seconds		Average delay =	37.9	seconds		Average delay =	#VALUE!		seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J9 - Nga Tsin Wai Road / Lion Rock Road	Ref. No.:			
Scheme:	Reference	Design year:	2040		
		Designed by:	RC	Checked by:	PK
Arm A:	Nga Tsin Wai Road WB				
Arm B:	Nga Tsin Wai Road EB				
Arm C:	Lion Rock Road SB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Nga Tsin Wai Road WB	2	54	120	695	3730	1.2	52	115	730	3795	1.2
Nga Tsin Wai Road EB	2	54	120	355	3970	1.2	52	115	330	3970	1.2
Lion Rock Road SB	2	29	120	360	3625	1.2	26	115	345	3530	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	66	0.45	0.41	19.3	21		23	27	32	32	32
Nga Tsin Wai Road EB	66	0.45	0.20	9.9	13		20	13	16	16	16
Lion Rock Road SB	91	0.24	0.41	10.0	16		39	21	23	23	23
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	63	0.45	0.43	19.4	21		22	27	32	32	32
Nga Tsin Wai Road EB	63	0.45	0.19	8.8	12		19	12	15	15	15
Lion Rock Road SB	89	0.23	0.43	9.2	15		39	20	21	21	21
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Nga Tsin Wai Road WB	**32**	**32**
Arm B:	Nga Tsin Wai Road EB	**16**	**15**
Arm C:	Lion Rock Road SB	**23**	**21**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

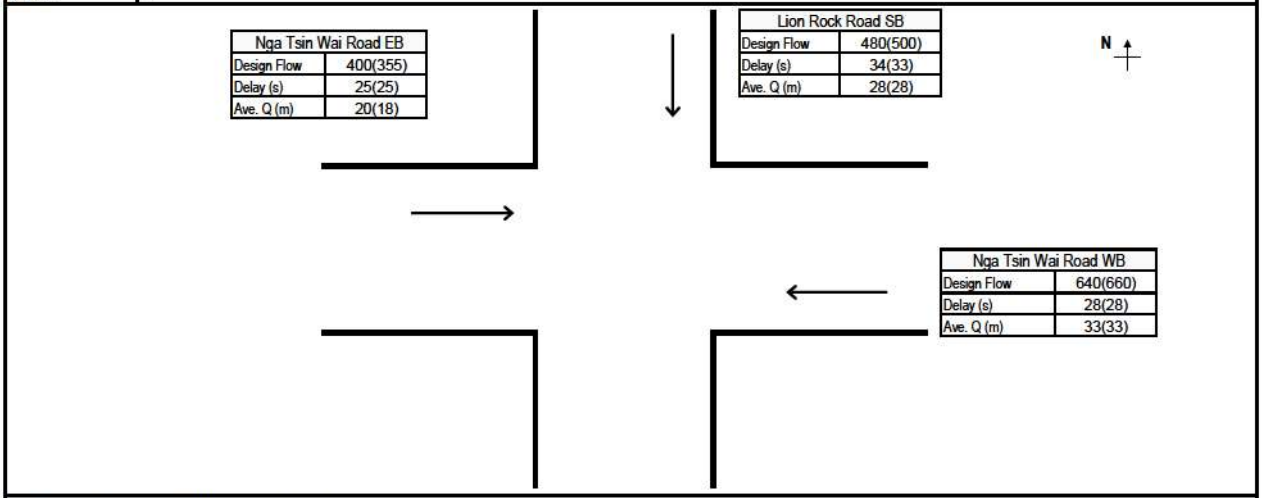
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	579	veh/hr		q '=	296	veh/hr		q '=	300	veh/hr		q '=	#DIV/0!		veh/hr
c=	120	sec		c=	120	sec		c=	120	sec		c=	0		sec
S '=	3108	veh/hr		S '=	3308	veh/hr		S '=	3021	veh/hr		S '=	#DIV/0!		veh/hr
t=	1	hr		t=	1	hr		t=	1	hr		t=	1		hr
X=	0.41			X=	0.20			X=	0.41			X=	#DIV/0!		
Q =	1402	veh/hr		Q =	1492	veh/hr		Q =	727	veh/hr		Q =	#VALUE!		veh/hr
y=	0.19			y=	0.09			y=	0.10			y=	#DIV/0!		
L =	0.45			L=	0.45			L=	0.24			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.75			X ' =	0.75			X ' =	0.71			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.59			Z =	-0.80			Z =	-0.59			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	11	vehs		N =	5	vehs		N =	8	vehs		N =	#DIV/0!		vehs
Avg queue length =	32	metres		Avg queue leng	16	metres		Avg queue length	23	metres		Avg queue length	#DIV/0!		metres
Average delay =	22.2	seconds		Average delay	19.9	seconds		Average delay =	38.4	seconds		Average delay =	#VALUE!		seconds

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	608	veh/hr		q=	275	veh/hr		q=	288	veh/hr		q=	#DIV/0!		veh/hr
c=	115	sec		c=	115	sec		c=	115	sec		c=	115		sec
S=	3163	veh/hr		S=	3308	veh/hr		S=	2942	veh/hr		S=	#DIV/0!		veh/hr
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5		hr
X=	0.43			X=	0.19			X=	0.43			X=	#DIV/0!		
Q =	1420	veh/hr		Q =	1485	veh/hr		Q =	675	veh/hr		Q =	#VALUE!		veh/hr
y=	0.19			y=	0.08			y=	0.10			y=	#DIV/0!		
L =	0.45			L=	0.45			L=	0.23			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.75			X ' =	0.75			X ' =	0.71			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.57			Z =	-0.81			Z =	-0.57			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	11	vehs		N =	5	vehs		N =	7	vehs		N =	#DIV/0!		vehs
Avg queue length =	32	metres		Avg queue leng	15	metres		Avg queue length	21	metres		Avg queue length	#DIV/0!		metres
Average delay =	21.6	seconds		Average delay	19.0	seconds		Average delay =	37.8	seconds		Average delay =	#VALUE!		seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J9 - Nga Tsin Wai Road / Lion Rock Road	Ref. No.:			
Scheme:	Design	Design year:	2040		
		Designed by:	RC	Checked by:	PK
Arm A:	Nga Tsin Wai Road WB				
Arm B:	Nga Tsin Wai Road EB				
Arm C:	Lion Rock Road SB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Nga Tsin Wai Road WB	2	47	120	640	3710	1.2	43	115	660	3780	1.2
Nga Tsin Wai Road EB	2	47	120	400	3970	1.2	43	115	355	3970	1.2
Lion Rock Road SB	2	36	120	480	3560	1.2	35	115	500	3475	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	73	0.39	0.44	17.8	22		28	29	33	33	33
Nga Tsin Wai Road EB	73	0.39	0.26	11.1	15		25	17	20	20	20
Lion Rock Road SB	84	0.30	0.44	13.3	19		34	25	28	28	28
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	72	0.37	0.47	17.6	22		28	30	33	33	33
Nga Tsin Wai Road EB	72	0.37	0.24	9.5	15		25	15	18	18	18
Lion Rock Road SB	80	0.31	0.47	13.3	19		33	25	28	28	28
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Nga Tsin Wai Road WB	**33**	**33**
Arm B:	Nga Tsin Wai Road EB	**20**	**18**
Arm C:	Lion Rock Road SB	**28**	**28**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

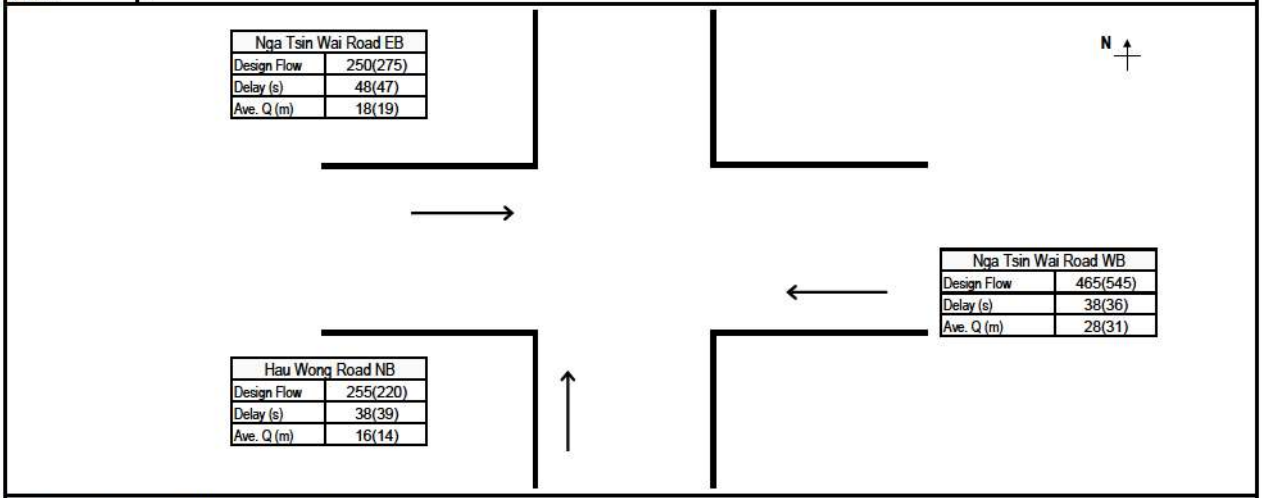
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	533	veh/hr		q '=	333	veh/hr		q '=	400	veh/hr		q '=	#DIV/0!		veh/hr
c=	120	sec		c=	120	sec		c=	120	sec		c=	0	sec	
S '=	3092	veh/hr		S '=	3308	veh/hr		S '=	2967	veh/hr		S '=	#DIV/0!		veh/hr
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.44			X=	0.26			X=	0.44			X=	#DIV/0!		
Q =	1201	veh/hr		Q =	1285	veh/hr		Q =	900	veh/hr		Q =	#VALUE!		veh/hr
y=	0.17			y=	0.10			y=	0.13			y=	#DIV/0!		
L =	0.39			L=	0.39			L=	0.30			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.74			X ' =	0.74			X ' =	0.72			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.56			Z =	-0.74			Z =	-0.56			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	11	vehs		N =	7	vehs		N =	9	vehs		N =	#DIV/0!		vehs
Avg queue length =	33	metres		Avg queue leng	20	metres		Avg queue lengtl	28	metres		Avg queue lengtl	#DIV/0!		metres
Average delay =	27.1	seconds		Average delay	25.0	seconds		Average delay =	33.7	seconds		Average delay =	#VALUE!		seconds

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	550	veh/hr		q=	296	veh/hr		q=	417	veh/hr		q=	#DIV/0!		veh/hr
c=	115	sec		c=	115	sec		c=	115	sec		c=	115	sec	
S=	3150	veh/hr		S=	3308	veh/hr		S=	2896	veh/hr		S=	#DIV/0!		veh/hr
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.47			X=	0.24			X=	0.47			X=	#DIV/0!		
Q =	1171	veh/hr		Q =	1229	veh/hr		Q =	888	veh/hr		Q =	#VALUE!		veh/hr
y=	0.17			y=	0.09			y=	0.14			y=	#DIV/0!		
L =	0.37			L=	0.37			L=	0.31			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.73			X ' =	0.74			X ' =	0.72			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.53			Z =	-0.76			Z =	-0.53			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	11	vehs		N =	6	vehs		N =	9	vehs		N =	#DIV/0!		vehs
Avg queue length =	33	metres		Avg queue leng	18	metres		Avg queue lengtl	28	metres		Avg queue lengtl	#DIV/0!		metres
Average delay =	27.5	seconds		Average delay	24.9	seconds		Average delay =	32.3	seconds		Average delay =	#VALUE!		seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J10 - Nga Tsin Wai Road / Hau Wong Road	Ref. No.:			
Scheme:	Existing	Design year:	2021		
		Designed by:	RC	Checked by:	PK
Arm A:	Nga Tsin Wai Road WB				
Arm B:	Nga Tsin Wai Road EB				
Arm C:	Hau Wong Road NB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Nga Tsin Wai Road WB	2	32	120	465	3520	1.2	33	115	545	3510	1.2
Nga Tsin Wai Road EB	2	18	120	250	3425	1.2	17	115	275	3440	1.2
Hau Wong Road NB	2	29	120	255	3235	1.2	24	115	220	3235	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	88	0.27	0.49	12.9	19		38	26	28	28	28
Nga Tsin Wai Road EB	102	0.15	0.49	6.9	13		48	17	18	18	18
Hau Wong Road NB	91	0.24	0.33	7.1	13		38	15	16	16	16
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	82	0.29	0.54	14.5	21		36	29	31	31	31
Nga Tsin Wai Road EB	98	0.15	0.54	7.3	14		47	18	19	19	19
Hau Wong Road NB	91	0.21	0.32	5.9	12		39	13	14	14	14
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Nga Tsin Wai Road WB	**28**	**31**
Arm B:	Nga Tsin Wai Road EB	**18**	**19**
Arm C:	Hau Wong Road NB	**16**	**14**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

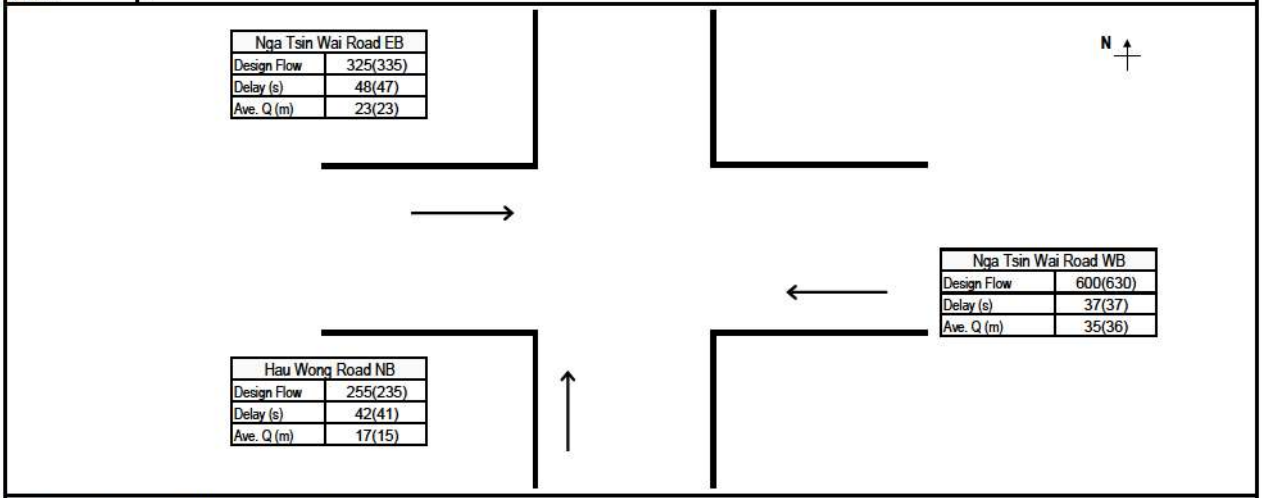
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	388	veh/hr		q '=	208	veh/hr		q '=	213	veh/hr		q '=	#DIV/0!		veh/hr
c=	120	sec		c=	120	sec		c=	120	sec		c=	0	sec	
S '=	2933	veh/hr		S '=	2854	veh/hr		S '=	2696	veh/hr		S '=	#DIV/0!		veh/hr
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.49			X=	0.49			X=	0.33			X=	#DIV/0!		
Q =	788	veh/hr		Q =	424	veh/hr		Q =	650	veh/hr		Q =	#VALUE!		veh/hr
y=	0.13			y=	0.07			y=	0.08			y=	#DIV/0!		
L =	0.27			L=	0.15			L=	0.24			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.71			X ' =	0.69			X ' =	0.71			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.51			Z =	-0.51			Z =	-0.67			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	9	vehs		N =	6	vehs		N =	5	vehs		N =	#DIV/0!		vehs
Avg queue length =	28	metres		Avg queue leng	18	metres		Avg queue length	16	metres		Avg queue length	#DIV/0!		metres
Average delay =	37.0	seconds		Average delay	46.9	seconds		Average delay =	37.5	seconds		Average delay =	#VALUE!		seconds

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	454	veh/hr		q=	229	veh/hr		q=	183	veh/hr		q=	#DIV/0!		veh/hr
c=	115	sec		c=	115	sec		c=	115	sec		c=	115	sec	
S=	2925	veh/hr		S=	2867	veh/hr		S=	2696	veh/hr		S=	#DIV/0!		veh/hr
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.54			X=	0.54			X=	0.32			X=	#DIV/0!		
Q =	836	veh/hr		Q =	422	veh/hr		Q =	567	veh/hr		Q =	#VALUE!		veh/hr
y=	0.16			y=	0.08			y=	0.07			y=	#DIV/0!		
L =	0.29			L=	0.15			L=	0.21			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.71			X ' =	0.69			X ' =	0.70			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.46			Z =	-0.46			Z =	-0.68			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	10	vehs		N =	6	vehs		N =	5	vehs		N =	#DIV/0!		vehs
Avg queue length =	31	metres		Avg queue leng	19	metres		Avg queue length	14	metres		Avg queue length	#DIV/0!		metres
Average delay =	34.7	seconds		Average delay	45.4	seconds		Average delay =	38.5	seconds		Average delay =	#VALUE!		seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J10 - Nga Tsin Wai Road / Hau Wong Road	Ref. No.:			
Scheme:	Reference	Design year:	2033		
		Designed by:	RC	Checked by:	PK
Arm A:	Nga Tsin Wai Road WB				
Arm B:	Nga Tsin Wai Road EB				
Arm C:	Hau Wong Road NB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Nga Tsin Wai Road WB	2	35	120	600	3535	1.2	33	115	630	3520	1.2
Nga Tsin Wai Road EB	2	19	120	325	3460	1.2	18	115	335	3465	1.2
Hau Wong Road NB	2	25	120	255	3235	1.2	23	115	235	3235	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	85	0.29	0.58	16.7	23		37	33	35	35	35
Nga Tsin Wai Road EB	101	0.16	0.58	9.0	16		48	22	23	23	23
Hau Wong Road NB	95	0.20	0.39	7.1	13		42	16	17	17	17
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	82	0.29	0.62	16.8	23		37	34	36	36	36
Nga Tsin Wai Road EB	97	0.16	0.62	8.9	16		47	22	23	23	23
Hau Wong Road NB	92	0.20	0.37	6.3	12		41	14	15	15	15
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Nga Tsin Wai Road WB	**35**	**36**
Arm B:	Nga Tsin Wai Road EB	**23**	**23**
Arm C:	Hau Wong Road NB	**17**	**15**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

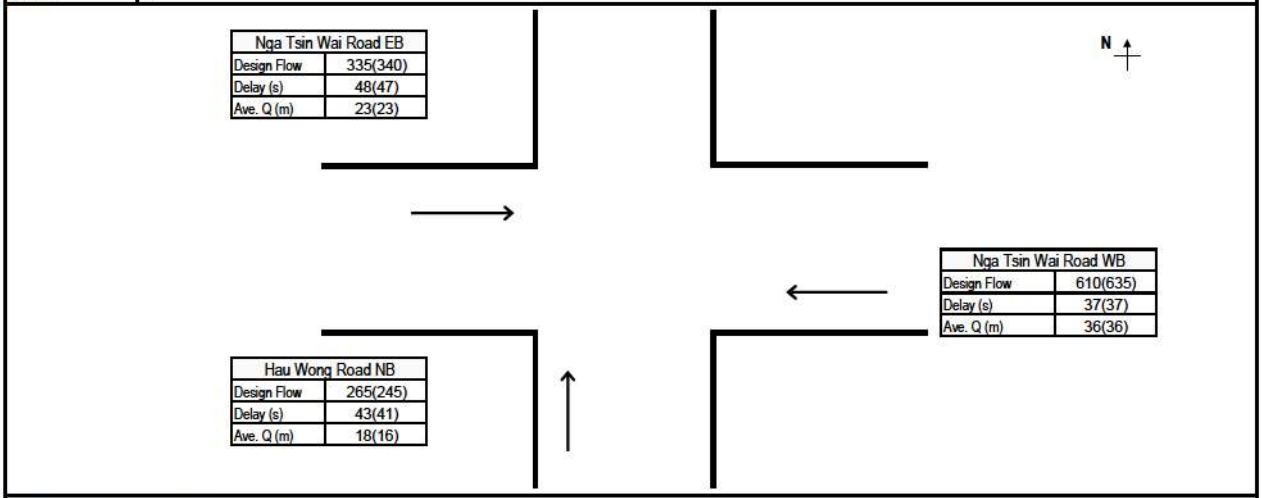
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	500	veh/hr		q '=	271	veh/hr		q '=	213	veh/hr		q '=	#DIV/0!		veh/hr
c=	120	sec		c=	120	sec		c=	120	sec		c=	0	sec	
S '=	2946	veh/hr		S '=	2883	veh/hr		S '=	2696	veh/hr		S '=	#DIV/0!		veh/hr
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.58			X=	0.58			X=	0.39			X=	#DIV/0!		
Q =	862	veh/hr		Q =	466	veh/hr		Q =	550	veh/hr		Q =	#VALUE!		veh/hr
y=	0.17			y=	0.09			y=	0.08			y=	#DIV/0!		
L =	0.29			L=	0.16			L=	0.20			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.72			X ' =	0.70			X ' =	0.70			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.42			Z =	-0.42			Z =	-0.61			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	12	vehs		N =	8	vehs		N =	6	vehs		N =	#DIV/0!		vehs
Avg queue length =	35	metres		Avg queue leng	23	metres		Avg queue lengtl	17	metres		Avg queue lengtl	#DIV/0!		metres
Average delay =	36.2	seconds		Average delay	46.5	seconds		Average delay =	41.3	seconds		Average delay =	#VALUE!		seconds

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	525	veh/hr		q=	279	veh/hr		q=	196	veh/hr		q=	#DIV/0!		veh/hr
c=	115	sec		c=	115	sec		c=	115	sec		c=	115	sec	
S=	2933	veh/hr		S=	2888	veh/hr		S=	2696	veh/hr		S=	#DIV/0!		veh/hr
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.62			X=	0.62			X=	0.37			X=	#DIV/0!		
Q =	848	veh/hr		Q =	451	veh/hr		Q =	535	veh/hr		Q =	#VALUE!		veh/hr
y=	0.18			y=	0.10			y=	0.07			y=	#DIV/0!		
L =	0.29			L=	0.16			L=	0.20			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.72			X ' =	0.69			X ' =	0.70			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.38			Z =	-0.38			Z =	-0.63			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	12	vehs		N =	8	vehs		N =	5	vehs		N =	#DIV/0!		vehs
Avg queue length =	36	metres		Avg queue leng	23	metres		Avg queue lengtl	15	metres		Avg queue lengtl	#DIV/0!		metres
Average delay =	35.4	seconds		Average delay	45.3	seconds		Average delay =	39.9	seconds		Average delay =	#VALUE!		seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J10 - Nga Tsin Wai Road / Hau Wong Road	Ref. No.:			
Scheme:	Design	Design year:	2033		
		Designed by:	RC	Checked by:	PK
Arm A:	Nga Tsin Wai Road WB				
Arm B:	Nga Tsin Wai Road EB				
Arm C:	Hau Wong Road NB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Nga Tsin Wai Road WB	2	35	120	610	3535	1.2	33	115	635	3525	1.2
Nga Tsin Wai Road EB	2	20	120	335	3450	1.2	18	115	340	3455	1.2
Hau Wong Road NB	2	24	120	265	3235	1.2	23	115	245	3235	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	85	0.29	0.59	16.9	23		37	34	36	36	36
Nga Tsin Wai Road EB	100	0.16	0.59	9.3	16		48	23	23	23	23
Hau Wong Road NB	96	0.20	0.41	7.4	14		43	17	18	18	18
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	82	0.29	0.62	16.9	23		37	34	36	36	36
Nga Tsin Wai Road EB	97	0.16	0.62	9.1	16		47	23	23	23	23
Hau Wong Road NB	92	0.20	0.38	6.5	13		41	15	16	16	16
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Nga Tsin Wai Road WB	**36**	**36**
Arm B:	Nga Tsin Wai Road EB	**23**	**23**
Arm C:	Hau Wong Road NB	**18**	**16**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

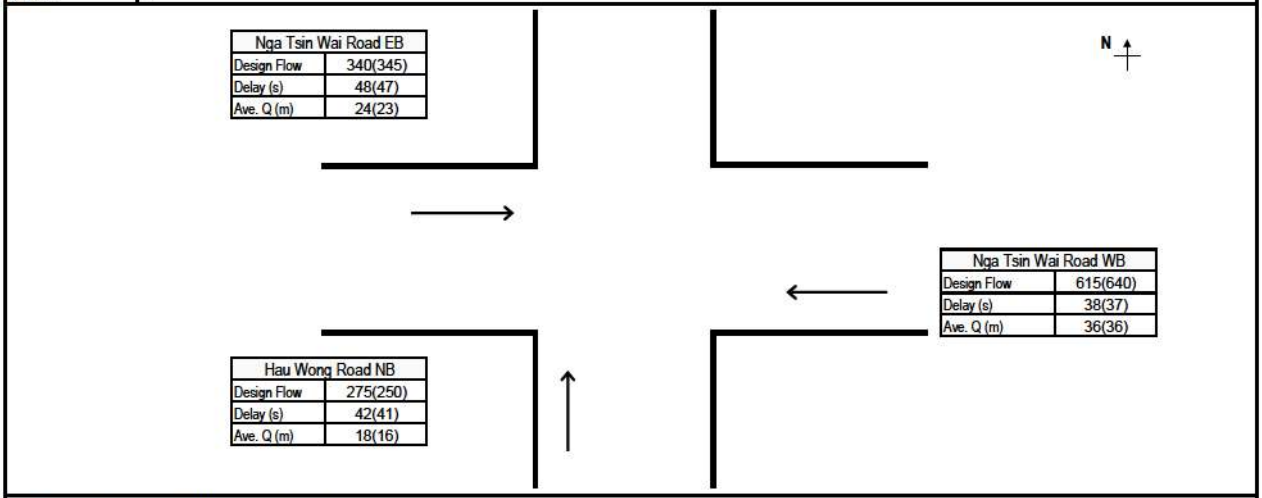
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	508	veh/hr		q '=	279	veh/hr		q '=	221	veh/hr		q '=	#DIV/0!		veh/hr
c=	120	sec		c=	120	sec		c=	120	sec		c=	0		sec
S '=	2946	veh/hr		S '=	2875	veh/hr		S '=	2696	veh/hr		S '=	#DIV/0!		veh/hr
t=	1	hr		t=	1	hr		t=	1	hr		t=	1		hr
X=	0.59			X=	0.59			X=	0.41			X=	#DIV/0!		
Q =	861	veh/hr		Q =	474	veh/hr		Q =	542	veh/hr		Q =	#VALUE!		veh/hr
y=	0.17			y=	0.10			y=	0.08			y=	#DIV/0!		
L =	0.29			L=	0.16			L=	0.20			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.72			X ' =	0.70			X ' =	0.70			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.41			Z =	-0.41			Z =	-0.59			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	12	vehs		N =	8	vehs		N =	6	vehs		N =	#DIV/0!		vehs
Avg queue length =	36	metres		Avg queue leng	23	metres		Avg queue length	18	metres		Avg queue length	#DIV/0!		metres
Average delay =	36.3	seconds		Average delay	46.3	seconds		Average delay =	41.7	seconds		Average delay =	#VALUE!		seconds

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	529	veh/hr		q=	283	veh/hr		q=	204	veh/hr		q=	#DIV/0!		veh/hr
c=	115	sec		c=	115	sec		c=	115	sec		c=	115		sec
S=	2938	veh/hr		S=	2879	veh/hr		S=	2696	veh/hr		S=	#DIV/0!		veh/hr
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5		hr
X=	0.62			X=	0.62			X=	0.38			X=	#DIV/0!		
Q =	849	veh/hr		Q =	454	veh/hr		Q =	530	veh/hr		Q =	#VALUE!		veh/hr
y=	0.18			y=	0.10			y=	0.08			y=	#DIV/0!		
L =	0.29			L=	0.16			L=	0.20			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.72			X ' =	0.69			X ' =	0.70			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.38			Z =	-0.38			Z =	-0.62			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	12	vehs		N =	8	vehs		N =	5	vehs		N =	#DIV/0!		vehs
Avg queue length =	36	metres		Avg queue leng	23	metres		Avg queue length	16	metres		Avg queue length	#DIV/0!		metres
Average delay =	35.5	seconds		Average delay	45.2	seconds		Average delay =	40.1	seconds		Average delay =	#VALUE!		seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J10 - Nga Tsin Wai Road / Hau Wong Road	Ref. No.:			
Scheme:	Reference	Design year:	2036		
		Designed by:	RC	Checked by:	PK
Arm A:	Nga Tsin Wai Road WB				
Arm B:	Nga Tsin Wai Road EB				
Arm C:	Hau Wong Road NB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Nga Tsin Wai Road WB	2	35	120	615	3535	1.2	33	115	640	3525	1.2
Nga Tsin Wai Road EB	2	20	120	340	3445	1.2	18	115	345	3460	1.2
Hau Wong Road NB	2	25	120	275	3235	1.2	23	115	250	3235	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	85	0.29	0.60	17.1	23		38	34	36	36	36
Nga Tsin Wai Road EB	100	0.16	0.60	9.4	16		48	23	24	24	24
Hau Wong Road NB	95	0.20	0.42	7.6	14		42	17	18	18	18
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	82	0.29	0.63	17.0	23		37	35	36	36	36
Nga Tsin Wai Road EB	97	0.16	0.63	9.2	16		47	23	23	23	23
Hau Wong Road NB	92	0.20	0.39	6.7	13		41	15	16	16	16
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Nga Tsin Wai Road WB	**36**	**36**
Arm B:	Nga Tsin Wai Road EB	**24**	**23**
Arm C:	Hau Wong Road NB	**18**	**16**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

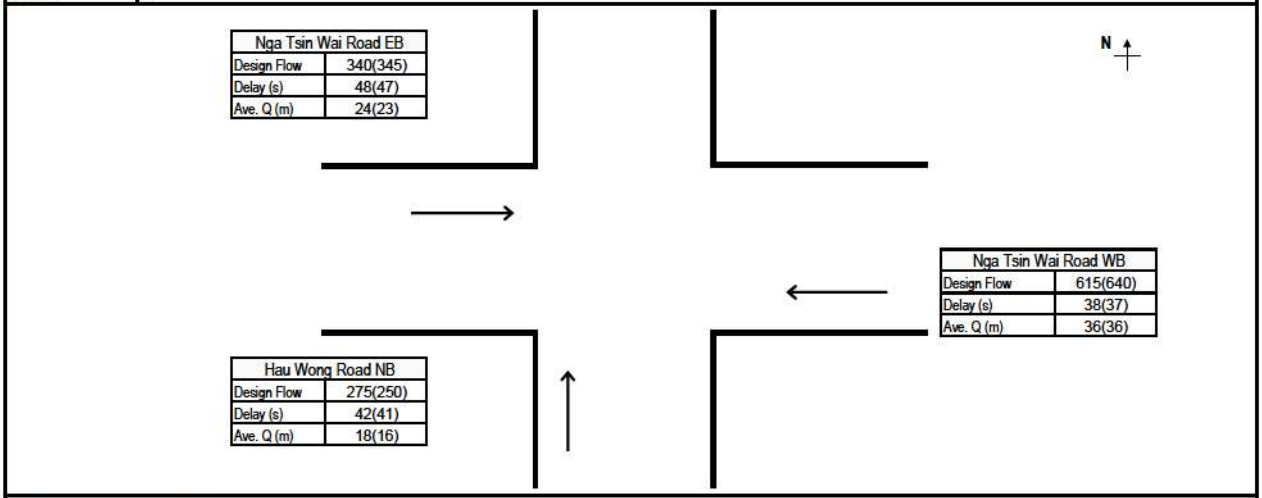
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	513	veh/hr		q '=	283	veh/hr		q '=	229	veh/hr		q '=	#DIV/0!		veh/hr
c=	120	sec		c=	120	sec		c=	120	sec		c=	0		sec
S '=	2946	veh/hr		S '=	2871	veh/hr		S '=	2696	veh/hr		S '=	#DIV/0!		veh/hr
t=	1	hr		t=	1	hr		t=	1	hr		t=	1		hr
X=	0.60			X=	0.60			X=	0.42			X=	#DIV/0!		
Q =	854	veh/hr		Q =	471	veh/hr		Q =	550	veh/hr		Q =	#VALUE!		veh/hr
y=	0.17			y=	0.10			y=	0.09			y=	#DIV/0!		
L =	0.29			L=	0.16			L=	0.20			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.72			X ' =	0.70			X ' =	0.70			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.40			Z =	-0.40			Z =	-0.58			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	12	vehs		N =	8	vehs		N =	6	vehs		N =	#DIV/0!		vehs
Avg queue length =	36	metres		Avg queue leng	24	metres		Avg queue length	18	metres		Avg queue length	#DIV/0!		metres
Average delay =	36.6	seconds		Average delay	46.5	seconds		Average delay =	41.5	seconds		Average delay =	#VALUE!		seconds

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	533	veh/hr		q=	288	veh/hr		q=	208	veh/hr		q=	#DIV/0!		veh/hr
c=	115	sec		c=	115	sec		c=	115	sec		c=	115		sec
S=	2938	veh/hr		S=	2883	veh/hr		S=	2696	veh/hr		S=	#DIV/0!		veh/hr
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5		hr
X=	0.63			X=	0.63			X=	0.39			X=	#DIV/0!		
Q =	841	veh/hr		Q =	453	veh/hr		Q =	540	veh/hr		Q =	#VALUE!		veh/hr
y=	0.18			y=	0.10			y=	0.08			y=	#DIV/0!		
L =	0.29			L=	0.16			L=	0.20			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.71			X ' =	0.69			X ' =	0.70			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.37			Z =	-0.37			Z =	-0.61			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	12	vehs		N =	8	vehs		N =	5	vehs		N =	#DIV/0!		vehs
Avg queue length =	36	metres		Avg queue leng	23	metres		Avg queue length	16	metres		Avg queue length	#DIV/0!		metres
Average delay =	35.8	seconds		Average delay	45.4	seconds		Average delay =	39.9	seconds		Average delay =	#VALUE!		seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J10 - Nga Tsin Wai Road / Hau Wong Road	Ref. No.:			
Scheme:	Design	Design year:	2036		
		Designed by:	RC	Checked by:	PK
Arm A:	Nga Tsin Wai Road WB				
Arm B:	Nga Tsin Wai Road EB				
Arm C:	Hau Wong Road NB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Nga Tsin Wai Road WB	2	35	120	615	3535	1.2	33	115	640	3525	1.2
Nga Tsin Wai Road EB	2	20	120	340	3445	1.2	18	115	345	3460	1.2
Hau Wong Road NB	2	25	120	275	3235	1.2	23	115	250	3235	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	85	0.29	0.60	17.1	23		38	34	36	36	36
Nga Tsin Wai Road EB	100	0.16	0.60	9.4	16		48	23	24	24	24
Hau Wong Road NB	95	0.20	0.42	7.6	14		42	17	18	18	18
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	82	0.29	0.63	17.0	23		37	35	36	36	36
Nga Tsin Wai Road EB	97	0.16	0.63	9.2	16		47	23	23	23	23
Hau Wong Road NB	92	0.20	0.39	6.7	13		41	15	16	16	16
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Nga Tsin Wai Road WB	**36**	**36**
Arm B:	Nga Tsin Wai Road EB	**24**	**23**
Arm C:	Hau Wong Road NB	**18**	**16**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

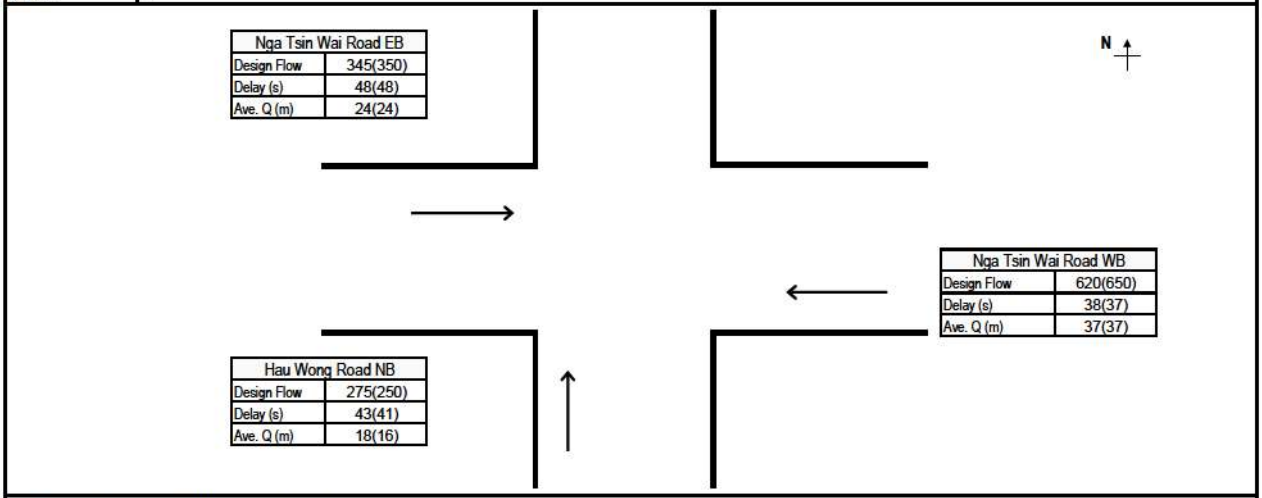
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	513	veh/hr		q '=	283	veh/hr		q '=	229	veh/hr		q '=	#DIV/0!		veh/hr
c=	120	sec		c=	120	sec		c=	120	sec		c=	0		sec
S '=	2946	veh/hr		S '=	2871	veh/hr		S '=	2696	veh/hr		S '=	#DIV/0!		veh/hr
t=	1	hr		t=	1	hr		t=	1	hr		t=	1		hr
X=	0.60			X=	0.60			X=	0.42			X=	#DIV/0!		
Q =	854	veh/hr		Q =	471	veh/hr		Q =	550	veh/hr		Q =	#VALUE!		veh/hr
y=	0.17			y=	0.10			y=	0.09			y=	#DIV/0!		
L =	0.29			L=	0.16			L=	0.20			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.72			X ' =	0.70			X ' =	0.70			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.40			Z =	-0.40			Z =	-0.58			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	12	vehs		N =	8	vehs		N =	6	vehs		N =	#DIV/0!		vehs
Avg queue length =	36	metres		Avg queue leng	24	metres		Avg queue lengtl	18	metres		Avg queue lengtl	#DIV/0!		metres
Average delay =	36.6	seconds		Average delay	46.5	seconds		Average delay =	41.5	seconds		Average delay =	#VALUE!		seconds

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	533	veh/hr		q=	288	veh/hr		q=	208	veh/hr		q=	#DIV/0!		veh/hr
c=	115	sec		c=	115	sec		c=	115	sec		c=	115		sec
S=	2938	veh/hr		S=	2883	veh/hr		S=	2696	veh/hr		S=	#DIV/0!		veh/hr
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5		hr
X=	0.63			X=	0.63			X=	0.39			X=	#DIV/0!		
Q =	841	veh/hr		Q =	453	veh/hr		Q =	540	veh/hr		Q =	#VALUE!		veh/hr
y=	0.18			y=	0.10			y=	0.08			y=	#DIV/0!		
L =	0.29			L=	0.16			L=	0.20			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.71			X ' =	0.69			X ' =	0.70			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.37			Z =	-0.37			Z =	-0.61			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	12	vehs		N =	8	vehs		N =	5	vehs		N =	#DIV/0!		vehs
Avg queue length =	36	metres		Avg queue leng	23	metres		Avg queue lengtl	16	metres		Avg queue lengtl	#DIV/0!		metres
Average delay =	35.8	seconds		Average delay	45.4	seconds		Average delay =	39.9	seconds		Average delay =	#VALUE!		seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J10 - Nga Tsin Wai Road / Hau Wong Road	Ref. No.:			
Scheme:	Reference	Design year:	2037		
		Designed by:	RC	Checked by:	PK
Arm A:	Nga Tsin Wai Road WB				
Arm B:	Nga Tsin Wai Road EB				
Arm C:	Hau Wong Road NB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Nga Tsin Wai Road WB	2	35	120	620	3535	1.2	33	115	650	3520	1.2
Nga Tsin Wai Road EB	2	20	120	345	3445	1.2	18	115	350	3455	1.2
Hau Wong Road NB	2	24	120	275	3235	1.2	23	115	250	3235	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	85	0.29	0.60	17.2	23		38	35	37	37	37
Nga Tsin Wai Road EB	100	0.17	0.61	9.6	17		48	24	24	24	24
Hau Wong Road NB	96	0.20	0.42	7.6	14		43	17	18	18	18
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	82	0.29	0.64	17.3	23		37	35	37	37	37
Nga Tsin Wai Road EB	97	0.16	0.64	9.3	17		48	23	24	24	24
Hau Wong Road NB	92	0.20	0.39	6.7	13		41	15	16	16	16
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Nga Tsin Wai Road WB	**37**	**37**
Arm B:	Nga Tsin Wai Road EB	**24**	**24**
Arm C:	Hau Wong Road NB	**18**	**16**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

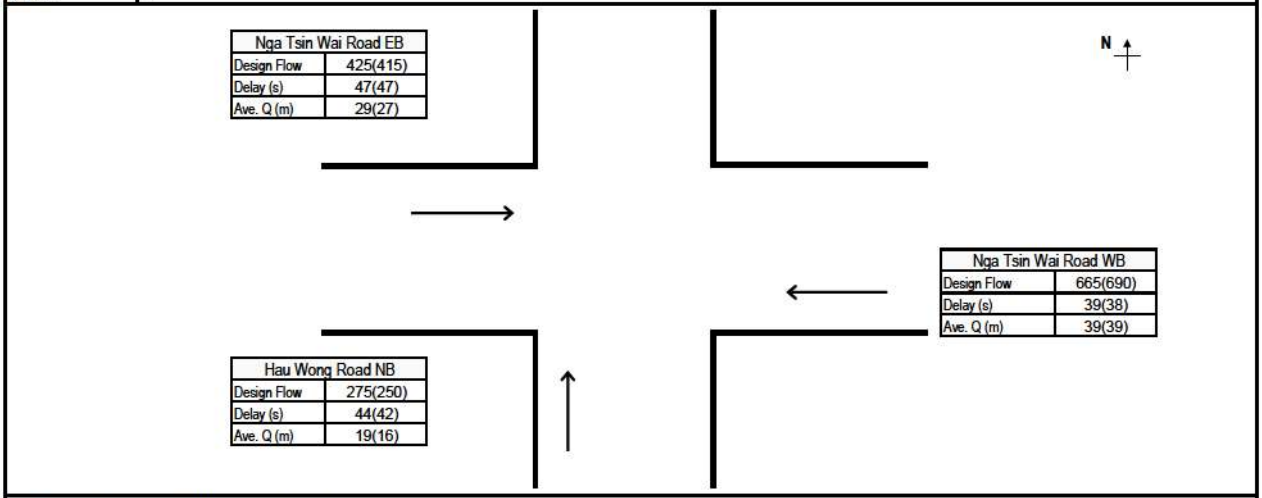
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	517	veh/hr		q '=	288	veh/hr		q '=	229	veh/hr		q '=	#DIV/0!		veh/hr
c=	120	sec		c=	120	sec		c=	120	sec		c=	0		sec
S '=	2946	veh/hr		S '=	2871	veh/hr		S '=	2696	veh/hr		S '=	#DIV/0!		veh/hr
t=	1	hr		t=	1	hr		t=	1	hr		t=	1		hr
X=	0.60			X=	0.61			X=	0.42			X=	#DIV/0!		
Q =	855	veh/hr		Q =	475	veh/hr		Q =	547	veh/hr		Q =	#VALUE!		veh/hr
y=	0.18			y=	0.10			y=	0.09			y=	#DIV/0!		
L =	0.29			L=	0.17			L=	0.20			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.72			X ' =	0.70			X ' =	0.70			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.40			Z =	-0.39			Z =	-0.58			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	12	vehs		N =	8	vehs		N =	6	vehs		N =	#DIV/0!		vehs
Avg queue length =	37	metres		Avg queue leng	24	metres		Avg queue length	18	metres		Avg queue length	#DIV/0!		metres
Average delay =	36.7	seconds		Average delay	46.4	seconds		Average delay =	41.7	seconds		Average delay =	#VALUE!		seconds

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	542	veh/hr		q=	292	veh/hr		q=	208	veh/hr		q=	#DIV/0!		veh/hr
c=	115	sec		c=	115	sec		c=	115	sec		c=	115		sec
S=	2933	veh/hr		S=	2879	veh/hr		S=	2696	veh/hr		S=	#DIV/0!		veh/hr
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5		hr
X=	0.64			X=	0.64			X=	0.39			X=	#DIV/0!		
Q =	844	veh/hr		Q =	454	veh/hr		Q =	533	veh/hr		Q =	#VALUE!		veh/hr
y=	0.18			y=	0.10			y=	0.08			y=	#DIV/0!		
L =	0.29			L=	0.16			L=	0.20			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.71			X ' =	0.69			X ' =	0.70			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.36			Z =	-0.36			Z =	-0.61			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	12	vehs		N =	8	vehs		N =	5	vehs		N =	#DIV/0!		vehs
Avg queue length =	37	metres		Avg queue leng	24	metres		Avg queue length	16	metres		Avg queue length	#DIV/0!		metres
Average delay =	35.8	seconds		Average delay	45.4	seconds		Average delay =	40.1	seconds		Average delay =	#VALUE!		seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J10 - Nga Tsin Wai Road / Hau Wong Road	Ref. No.:			
Scheme:	Design	Design year:	2037		
		Designed by:	RC	Checked by:	PK
Arm A:	Nga Tsin Wai Road WB				
Arm B:	Nga Tsin Wai Road EB				
Arm C:	Hau Wong Road NB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Nga Tsin Wai Road WB	2	34	120	665	3500	1.2	33	115	690	3495	1.2
Nga Tsin Wai Road EB	2	22	120	425	3470	1.2	20	115	415	3475	1.2
Hau Wong Road NB	2	22	120	275	3235	1.2	21	115	250	3235	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	86	0.29	0.66	18.5	24		39	38	39	39	39
Nga Tsin Wai Road EB	98	0.19	0.66	11.8	20		47	28	29	29	29
Hau Wong Road NB	98	0.19	0.46	7.6	14		44	18	19	19	19
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	82	0.29	0.69	18.4	24		38	38	39	39	39
Nga Tsin Wai Road EB	95	0.17	0.69	11.0	19		47	27	27	27	27
Hau Wong Road NB	94	0.18	0.42	6.7	13		42	16	16	16	16
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Nga Tsin Wai Road WB	**39**	**39**
Arm B:	Nga Tsin Wai Road EB	**29**	**27**
Arm C:	Hau Wong Road NB	**19**	**16**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

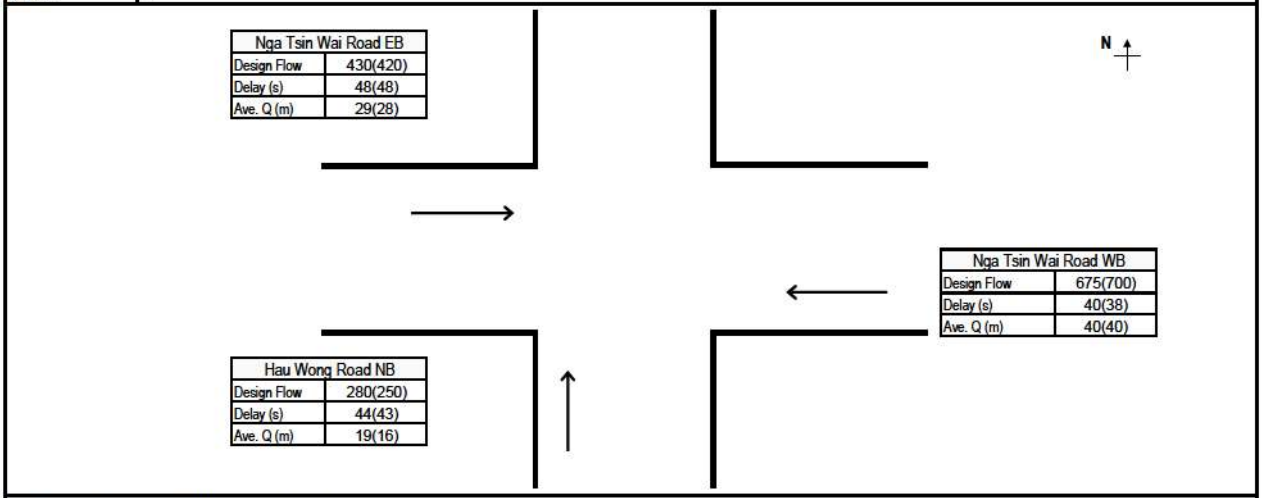
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	554	veh/hr		q '=	354	veh/hr		q '=	229	veh/hr		q '=	#DIV/0!		veh/hr
c=	120	sec		c=	120	sec		c=	120	sec		c=	0		sec
S '=	2917	veh/hr		S '=	2892	veh/hr		S '=	2696	veh/hr		S '=	#DIV/0!		veh/hr
t=	1	hr		t=	1	hr		t=	1	hr		t=	1		hr
X=	0.66			X=	0.66			X=	0.46			X=	#DIV/0!		
Q =	838	veh/hr		Q =	536	veh/hr		Q =	501	veh/hr		Q =	#VALUE!		veh/hr
y=	0.19			y=	0.12			y=	0.09			y=	#DIV/0!		
L =	0.29			L=	0.19			L=	0.19			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.72			X ' =	0.70			X ' =	0.70			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.34			Z =	-0.34			Z =	-0.54			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	13	vehs		N =	10	vehs		N =	6	vehs		N =	#DIV/0!		vehs
Avg queue length =	39	metres		Avg queue leng	29	metres		Avg queue lengtl	19	metres		Avg queue lengtl	#DIV/0!		metres
Average delay =	37.6	seconds		Average delay	45.4	seconds		Average delay =	43.5	seconds		Average delay =	#VALUE!		seconds

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	575	veh/hr		q=	346	veh/hr		q=	208	veh/hr		q=	#DIV/0!		veh/hr
c=	115	sec		c=	115	sec		c=	115	sec		c=	115		sec
S=	2913	veh/hr		S=	2896	veh/hr		S=	2696	veh/hr		S=	#DIV/0!		veh/hr
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5		hr
X=	0.69			X=	0.69			X=	0.42			X=	#DIV/0!		
Q =	833	veh/hr		Q =	502	veh/hr		Q =	496	veh/hr		Q =	#VALUE!		veh/hr
y=	0.20			y=	0.12			y=	0.08			y=	#DIV/0!		
L =	0.29			L=	0.17			L=	0.18			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.71			X ' =	0.70			X ' =	0.70			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.31			Z =	-0.31			Z =	-0.58			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	13	vehs		N =	9	vehs		N =	5	vehs		N =	#DIV/0!		vehs
Avg queue length =	39	metres		Avg queue leng	27	metres		Avg queue lengtl	16	metres		Avg queue lengtl	#DIV/0!		metres
Average delay =	36.5	seconds		Average delay	44.6	seconds		Average delay =	41.5	seconds		Average delay =	#VALUE!		seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J10 - Nga Tsin Wai Road / Hau Wong Road	Ref. No.:			
Scheme:	Reference	Design year:	2040		
		Designed by:	RC	Checked by:	PK
Arm A:	Nga Tsin Wai Road WB				
Arm B:	Nga Tsin Wai Road EB				
Arm C:	Hau Wong Road NB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Nga Tsin Wai Road WB	2	34	120	675	3500	1.2	33	115	700	3495	1.2
Nga Tsin Wai Road EB	2	22	120	430	3470	1.2	20	115	420	3475	1.2
Hau Wong Road NB	2	23	120	280	3235	1.2	21	115	250	3235	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	86	0.29	0.67	18.8	25		40	39	40	40	40
Nga Tsin Wai Road EB	98	0.18	0.67	11.9	20		48	29	29	29	29
Hau Wong Road NB	97	0.19	0.46	7.8	14		44	18	19	19	19
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	82	0.29	0.70	18.6	25		38	39	40	40	40
Nga Tsin Wai Road EB	95	0.17	0.70	11.2	19		48	28	28	28	28
Hau Wong Road NB	94	0.18	0.42	6.7	13		43	16	16	16	16
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Nga Tsin Wai Road WB	**40**	**40**
Arm B:	Nga Tsin Wai Road EB	**29**	**28**
Arm C:	Hau Wong Road NB	**19**	**16**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

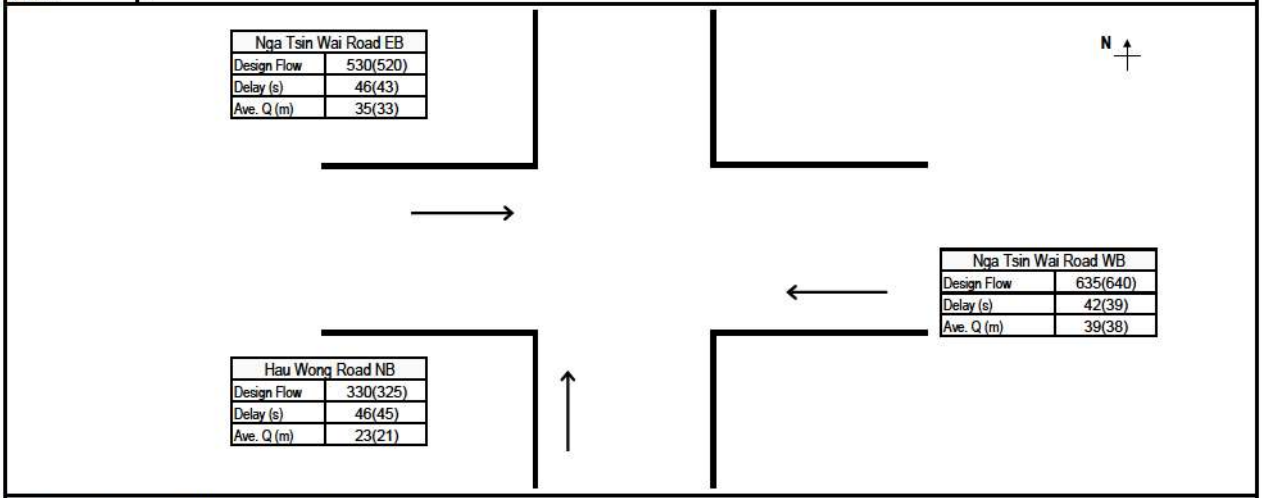
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	563	veh/hr		q '=	358	veh/hr		q '=	233	veh/hr		q '=	#DIV/0!	veh/hr	
c=	120	sec		c=	120	sec		c=	120	sec		c=	0	sec	
S '=	2917	veh/hr		S '=	2892	veh/hr		S '=	2696	veh/hr		S '=	#DIV/0!	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.67			X=	0.67			X=	0.46			X=	#DIV/0!		
Q =	834	veh/hr		Q =	532	veh/hr		Q =	508	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.19			y=	0.12			y=	0.09			y=	#DIV/0!		
L =	0.29			L=	0.18			L=	0.19			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.72			X ' =	0.70			X ' =	0.70			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.33			Z =	-0.33			Z =	-0.54			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	13	vehs		N =	10	vehs		N =	6	vehs		N =	#DIV/0!	vehs	
Avg queue length =	40	metres		Avg queue leng	29	metres		Avg queue lengtl	19	metres		Avg queue lengtl	#DIV/0!	metres	
Average delay =	37.9	seconds		Average delay	45.6	seconds		Average delay =	43.3	seconds		Average delay =	#VALUE!	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	583	veh/hr		q=	350	veh/hr		q=	208	veh/hr		q=	#DIV/0!	veh/hr	
c=	115	sec		c=	115	sec		c=	115	sec		c=	115	sec	
S=	2913	veh/hr		S=	2896	veh/hr		S=	2696	veh/hr		S=	#DIV/0!	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.70			X=	0.70			X=	0.42			X=	#DIV/0!		
Q =	838	veh/hr		Q =	503	veh/hr		Q =	491	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.20			y=	0.12			y=	0.08			y=	#DIV/0!		
L =	0.29			L=	0.17			L=	0.18			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.71			X ' =	0.70			X ' =	0.70			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.30			Z =	-0.30			Z =	-0.58			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	13	vehs		N =	9	vehs		N =	5	vehs		N =	#DIV/0!	vehs	
Avg queue length =	40	metres		Avg queue leng	28	metres		Avg queue lengtl	16	metres		Avg queue lengtl	#DIV/0!	metres	
Average delay =	36.5	seconds		Average delay	44.7	seconds		Average delay =	41.7	seconds		Average delay =	#VALUE!	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J10 - Nga Tsin Wai Road / Hau Wong Road	Ref. No.:			
Scheme:	Design	Design year:	2040		
		Designed by:	RC	Checked by:	PK
Arm A:	Nga Tsin Wai Road WB				
Arm B:	Nga Tsin Wai Road EB				
Arm C:	Hau Wong Road NB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Nga Tsin Wai Road WB	2	31	120	635	3480	1.2	30	115	640	3480	1.2
Nga Tsin Wai Road EB	2	26	120	530	3450	1.2	24	115	520	3470	1.2
Hau Wong Road NB	2	22	120	330	3235	1.2	20	115	325	3235	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	89	0.26	0.70	17.6	24		42	38	39	39	39
Nga Tsin Wai Road EB	94	0.22	0.70	14.7	22		46	34	35	35	35
Hau Wong Road NB	98	0.18	0.56	9.2	16		46	22	23	23	23
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	85	0.26	0.72	17.0	23		39		38	38	38
Nga Tsin Wai Road EB	91	0.21	0.72	13.8	21		43		33	33	33
Hau Wong Road NB	95	0.18	0.57	8.7	15		45	21	21	21	21
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Nga Tsin Wai Road WB	**39**	**38**
Arm B:	Nga Tsin Wai Road EB	**35**	**33**
Arm C:	Hau Wong Road NB	**23**	**21**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

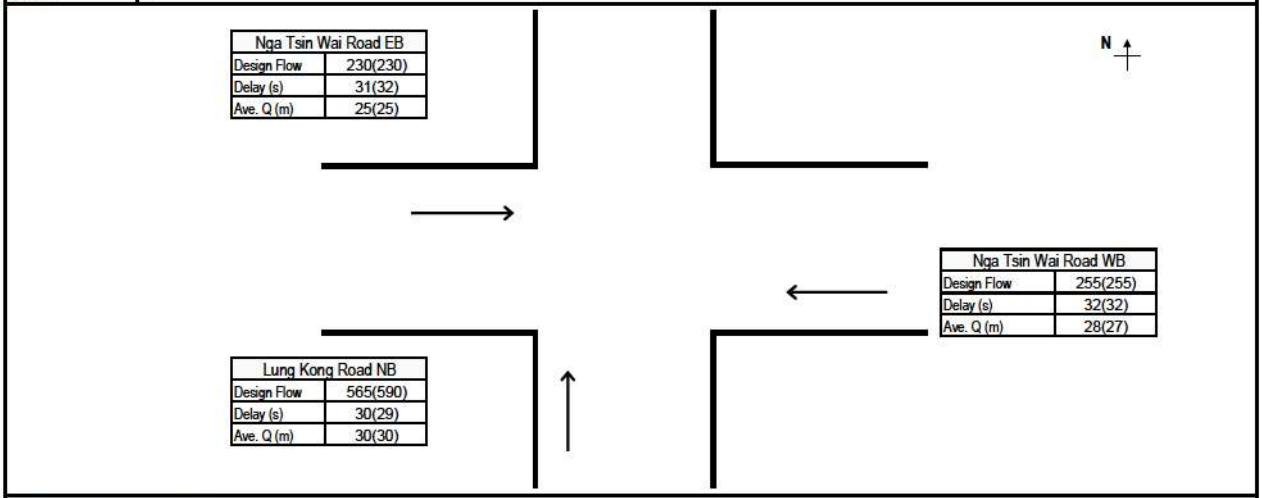
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	529	veh/hr		q '=	442	veh/hr		q '=	275	veh/hr		q '=	#DIV/0!		veh/hr
c=	120	sec		c=	120	sec		c=	120	sec		c=	0	sec	
S '=	2900	veh/hr		S '=	2875	veh/hr		S '=	2696	veh/hr		S '=	#DIV/0!		veh/hr
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.70			X=	0.70			X=	0.56			X=	#DIV/0!		
Q =	752	veh/hr		Q =	628	veh/hr		Q =	487	veh/hr		Q =	#VALUE!		veh/hr
y=	0.18			y=	0.15			y=	0.10			y=	#DIV/0!		
L =	0.26			L=	0.22			L=	0.18			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.71			X ' =	0.70			X ' =	0.70			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.30			Z =	-0.30			Z =	-0.44			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	13	vehs		N =	12	vehs		N =	8	vehs		N =	#DIV/0!		vehs
Avg queue length =	39	metres		Avg queue leng	35	metres		Avg queue lengtl	23	metres		Avg queue lengtl	#DIV/0!		metres
Average delay =	40.3	seconds		Average delay	43.3	seconds		Average delay =	44.9	seconds		Average delay =	#VALUE!		seconds

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	533	veh/hr		q=	433	veh/hr		q=	271	veh/hr		q=	#DIV/0!		veh/hr
c=	115	sec		c=	115	sec		c=	115	sec		c=	115	sec	
S=	2900	veh/hr		S=	2892	veh/hr		S=	2696	veh/hr		S=	#DIV/0!		veh/hr
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.72			X=	0.72			X=	0.57			X=	#DIV/0!		
Q =	746	veh/hr		Q =	605	veh/hr		Q =	478	veh/hr		Q =	#VALUE!		veh/hr
y=	0.18			y=	0.15			y=	0.10			y=	#DIV/0!		
L =	0.26			L=	0.21			L=	0.18			L=			
n =	2	lane		n =	2	lane		n =	2	lane		n =	0	lane	
X ' =	0.71			X ' =	0.70			X ' =	0.70			X ' =	#DIV/0!		
X > X '	TRUE			X > X '	TRUE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.28			Z =	-0.28			Z =	-0.43			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.1	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	13	vehs		N =	11	vehs		N =	7	vehs		N =	#DIV/0!		vehs
Avg queue length =	38	metres		Avg queue leng	33	metres		Avg queue lengtl	21	metres		Avg queue lengtl	#DIV/0!		metres
Average delay =	39.0	seconds		Average delay	42.8	seconds		Average delay =	43.3	seconds		Average delay =	#VALUE!		seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J11 - Nga Tsin Wai Road / Lung Kong Road	Ref. No.:			
Scheme:	Existing	Design year:	2021		
		Designed by:	RC	Checked by:	PK
Arm A:	Nga Tsin Wai Road WB				
Arm B:	Nga Tsin Wai Road EB				
Arm C:	Lung Kong Road NB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Nga Tsin Wai Road WB	1	42	120	255	1690	1.2	38	115	255	1690	1.2
Nga Tsin Wai Road EB	1	42	120	230	1660	1.2	38	115	230	1645	1.2
Lung Kong Road NB	2	43	120	565	3600	1.2	42	115	590	3570	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	78	0.35	0.43	7.1	11		32	25	28	28	28
Nga Tsin Wai Road EB	78	0.35	0.40	6.4	11		31	23	25	25	25
Lung Kong Road NB	77	0.36	0.43	15.7	20		30	27	30	30	30
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	77	0.33	0.45	6.8	11		32	25	27	27	27
Nga Tsin Wai Road EB	77	0.33	0.42	6.1	11		32	22	25	25	25
Lung Kong Road NB	73	0.36	0.45	15.7	20		29	27	30	30	30
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Nga Tsin Wai Road WB	**28**	**27**
Arm B:	Nga Tsin Wai Road EB	**25**	**25**
Arm C:	Lung Kong Road NB	**30**	**30**
Arm D:	-		

Effective Red, $r = c-g$
Effective Green Ratio, $L = g/c$
Degree of Saturation, $X = q/(SL)$
Average Arrival Rate, $M = qc/3600p$
Maximum Queue Length $= 6 * \text{Maximum Queue}/n$
Estimated Delay, $d = c(1-L)^2/2(1-LX) + 3600pX^2/2q(1-X) - 0.65(c/(q/3600p)^2)^{(1/3)}*X^{(2+5L)}$ OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, $L1 = 6q(r/2+d)/3600pn$ OR $L2 = 6qr/3600pn$ whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks

^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

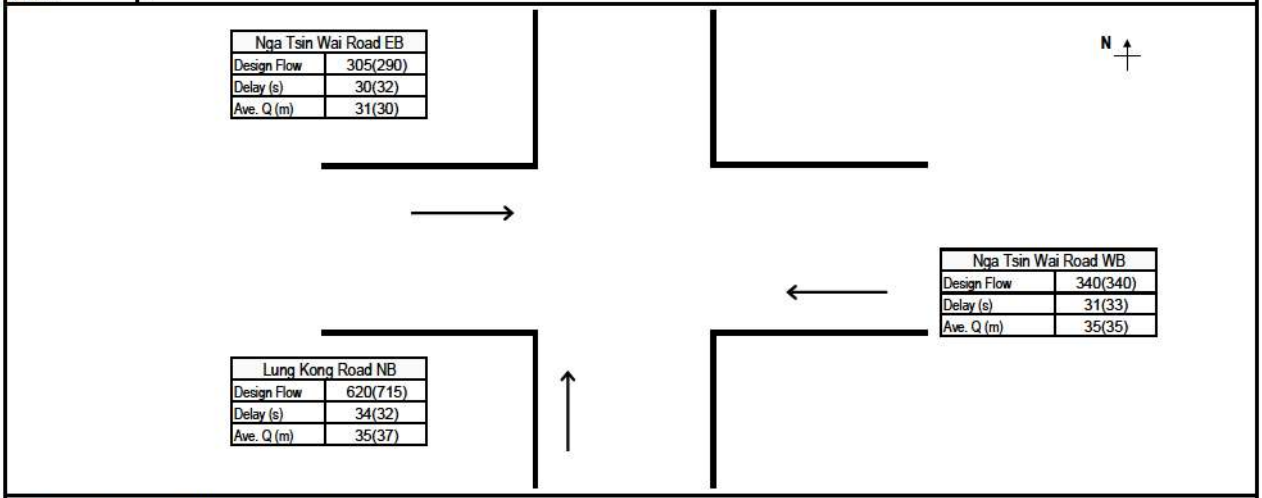
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	213	veh/hr		q '=	192	veh/hr		q '=	471	veh/hr		q '=	#DIV/0!		veh/hr
c=	120	sec		c=	120	sec		c=	120	sec		c=	0		sec
S '=	1408	veh/hr		S '=	1383	veh/hr		S '=	3000	veh/hr		S '=	#DIV/0!		veh/hr
t=	1	hr		t=	1	hr		t=	1	hr		t=	1		hr
X=	0.43			X=	0.40			X=	0.43			X=	#DIV/0!		
Q =	489	veh/hr		Q =	480	veh/hr		Q =	1084	veh/hr		Q =	#VALUE!		veh/hr
y=	0.15			y=	0.14			y=	0.16			y=	#DIV/0!		
L =	0.35			L=	0.35			L=	0.36			L=			
n =	1	lane		n =	1	lane		n =	2	lane		n =	0	lane	
X ' =	0.70			X ' =	0.70			X ' =	0.73			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.57			Z =	-0.60			Z =	-0.57			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	5	vehs		N =	4	vehs		N =	10	vehs		N =	#DIV/0!		vehs
Avg queue length =	28	metres		Avg queue leng	25	metres		Avg queue length	30	metres		Avg queue length	#DIV/0!		metres
Average delay =	30.1	seconds		Average delay	29.7	seconds		Average delay =	29.0	seconds		Average delay =	#VALUE!		seconds

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	213	veh/hr		q=	192	veh/hr		q=	492	veh/hr		q=	#DIV/0!		veh/hr
c=	115	sec		c=	115	sec		c=	115	sec		c=	115		sec
S=	1408	veh/hr		S=	1371	veh/hr		S=	2975	veh/hr		S=	#DIV/0!		veh/hr
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5		hr
X=	0.45			X=	0.42			X=	0.45			X=	#DIV/0!		
Q =	467	veh/hr		Q =	455	veh/hr		Q =	1082	veh/hr		Q =	#VALUE!		veh/hr
y=	0.15			y=	0.14			y=	0.17			y=	#DIV/0!		
L =	0.33			L=	0.33			L=	0.36			L=			
n =	1	lane		n =	1	lane		n =	2	lane		n =	0	lane	
X ' =	0.69			X ' =	0.69			X ' =	0.73			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.55			Z =	-0.58			Z =	-0.55			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	5	vehs		N =	4	vehs		N =	10	vehs		N =	#DIV/0!		vehs
Avg queue length =	27	metres		Avg queue leng	25	metres		Avg queue length	30	metres		Avg queue length	#DIV/0!		metres
Average delay =	30.2	seconds		Average delay	29.8	seconds		Average delay =	27.9	seconds		Average delay =	#VALUE!		seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J11 - Nga Tsin Wai Road / Lung Kong Road	Ref. No.:			
Scheme:	Reference	Design year:	2033		
		Designed by:	RC	Checked by:	PK
Arm A:	Nga Tsin Wai Road WB				
Arm B:	Nga Tsin Wai Road EB				
Arm C:	Lung Kong Road NB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Nga Tsin Wai Road WB	1	46	120	340	1690	1.2	40	115	340	1690	1.2
Nga Tsin Wai Road EB	1	46	120	305	1650	1.2	40	115	290	1645	1.2
Lung Kong Road NB	2	39	120	620	3610	1.2	40	115	715	3615	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	74	0.38	0.53	9.4	14		31	32	35	35	35
Nga Tsin Wai Road EB	74	0.38	0.48	8.5	13		30	29	31	31	31
Lung Kong Road NB	81	0.33	0.53	17.2	22		34	32	35	35	35
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	75	0.35	0.57	9.1	14		33	33	35	35	35
Nga Tsin Wai Road EB	75	0.35	0.50	7.7	12		32	28	30	30	30
Lung Kong Road NB	75	0.34	0.57	19.0	24		32	34	37	37	37
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Nga Tsin Wai Road WB	**35**	**35**
Arm B:	Nga Tsin Wai Road EB	**31**	**30**
Arm C:	Lung Kong Road NB	**35**	**37**
Arm D:	-		

Effective Red, $r = c-g$
Effective Green Ratio, $L = g/c$
Degree of Saturation, $X = q/(SL)$
Average Arrival Rate, $M = qc/3600p$
Maximum Queue Length $= 6 * \text{Maximum Queue}/n$
Estimated Delay, $d = c(1-L)^2/2(1-LX) + 3600pX^2/2q(1-X) - 0.65(c/(q/3600p)^2)^{(1/3)}*X^{(2+5L)}$ OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, $L1 = 6q(r/2+d)/3600pn$ OR $L2 = 6qr/3600pn$ whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

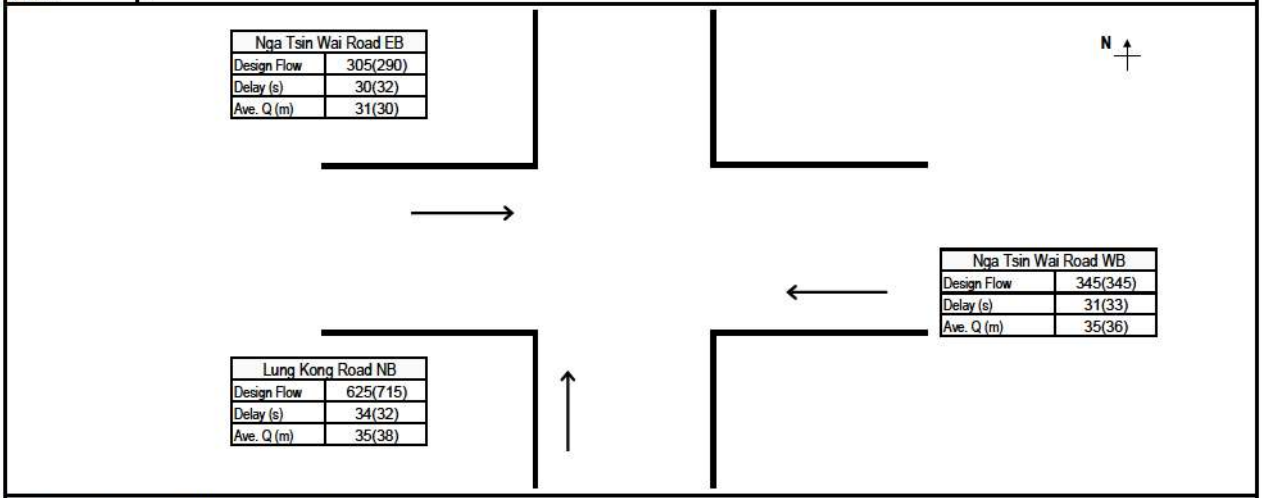
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	283	veh/hr		q '=	254	veh/hr		q '=	517	veh/hr		q '=	#DIV/0!		veh/hr
c=	120	sec		c=	120	sec		c=	120	sec		c=	0		sec
S '=	1408	veh/hr		S '=	1375	veh/hr		S '=	3008	veh/hr		S '=	#DIV/0!		veh/hr
t=	1	hr		t=	1	hr		t=	1	hr		t=	1		hr
X=	0.53			X=	0.48			X=	0.53			X=	#DIV/0!		
Q =	538	veh/hr		Q =	525	veh/hr		Q =	982	veh/hr		Q =	#VALUE!		veh/hr
y=	0.20			y=	0.18			y=	0.17			y=	#DIV/0!		
L =	0.38			L=	0.38			L=	0.33			L=			
n =	1	lane		n =	1	lane		n =	2	lane		n =	0	lane	
X ' =	0.70			X ' =	0.70			X ' =	0.72			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.47			Z =	-0.52			Z =	-0.47			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	6	vehs		N =	5	vehs		N =	12	vehs		N =	#DIV/0!		vehs
Avg queue length =	35	metres		Avg queue leng	31	metres		Avg queue lengtl	35	metres		Avg queue lengtl	#DIV/0!		metres
Average delay =	28.7	seconds		Average delay	28.1	seconds		Average delay =	32.9	seconds		Average delay =	#VALUE!		seconds

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	283	veh/hr		q=	242	veh/hr		q=	596	veh/hr		q=	#DIV/0!		veh/hr
c=	115	sec		c=	115	sec		c=	115	sec		c=	115		sec
S=	1408	veh/hr		S=	1371	veh/hr		S=	3013	veh/hr		S=	#DIV/0!		veh/hr
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5		hr
X=	0.57			X=	0.50			X=	0.57			X=	#DIV/0!		
Q =	494	veh/hr		Q =	481	veh/hr		Q =	1039	veh/hr		Q =	#VALUE!		veh/hr
y=	0.20			y=	0.18			y=	0.20			y=	#DIV/0!		
L =	0.35			L=	0.35			L=	0.34			L=			
n =	1	lane		n =	1	lane		n =	2	lane		n =	0	lane	
X ' =	0.70			X ' =	0.70			X ' =	0.73			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.43			Z =	-0.50			Z =	-0.43			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	6	vehs		N =	5	vehs		N =	12	vehs		N =	#DIV/0!		vehs
Avg queue length =	35	metres		Avg queue leng	30	metres		Avg queue lengtl	37	metres		Avg queue lengtl	#DIV/0!		metres
Average delay =	30.3	seconds		Average delay	29.4	seconds		Average delay =	30.8	seconds		Average delay =	#VALUE!		seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J11 - Nga Tsin Wai Road / Lung Kong Road	Ref. No.:			
Scheme:	Design	Design year:	2033		
		Designed by:	RC	Checked by:	PK
Arm A:	Nga Tsin Wai Road WB				
Arm B:	Nga Tsin Wai Road EB				
Arm C:	Lung Kong Road NB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Nga Tsin Wai Road WB	1	46	120	345	1690	1.2	41	115	345	1690	1.2
Nga Tsin Wai Road EB	1	46	120	305	1650	1.2	41	115	290	1645	1.2
Lung Kong Road NB	2	39	120	625	3610	1.2	39	115	715	3615	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	74	0.38	0.53	9.6	14		31	33	35	35	35
Nga Tsin Wai Road EB	74	0.38	0.48	8.5	12		30	28	31	31	31
Lung Kong Road NB	81	0.33	0.53	17.4	23		34	32	35	35	35
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	74	0.35	0.58	9.2	14		33	34	36	36	36
Nga Tsin Wai Road EB	74	0.35	0.50	7.7	12		32	28	30	30	30
Lung Kong Road NB	76	0.34	0.58	19.0	24		32	35	38	38	38
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Nga Tsin Wai Road WB	**35**	**36**
Arm B:	Nga Tsin Wai Road EB	**31**	**30**
Arm C:	Lung Kong Road NB	**35**	**38**
Arm D:	-		

Effective Red, $r = c-g$
Effective Green Ratio, $L = g/c$
Degree of Saturation, $X = q/(SL)$
Average Arrival Rate, $M = qc/3600p$
Maximum Queue Length $= 6 * \text{Maximum Queue}/n$
Estimated Delay, $d = c(1-L)^2/2(1-LX) + 3600pX^2/2q(1-X) - 0.65(c/(q/3600p)^2)^{(1/3)}*X^{(2+5L)}$ OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, $L1 = 6q(r/2+d)/3600pn$ OR $L2 = 6qr/3600pn$ whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks

^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

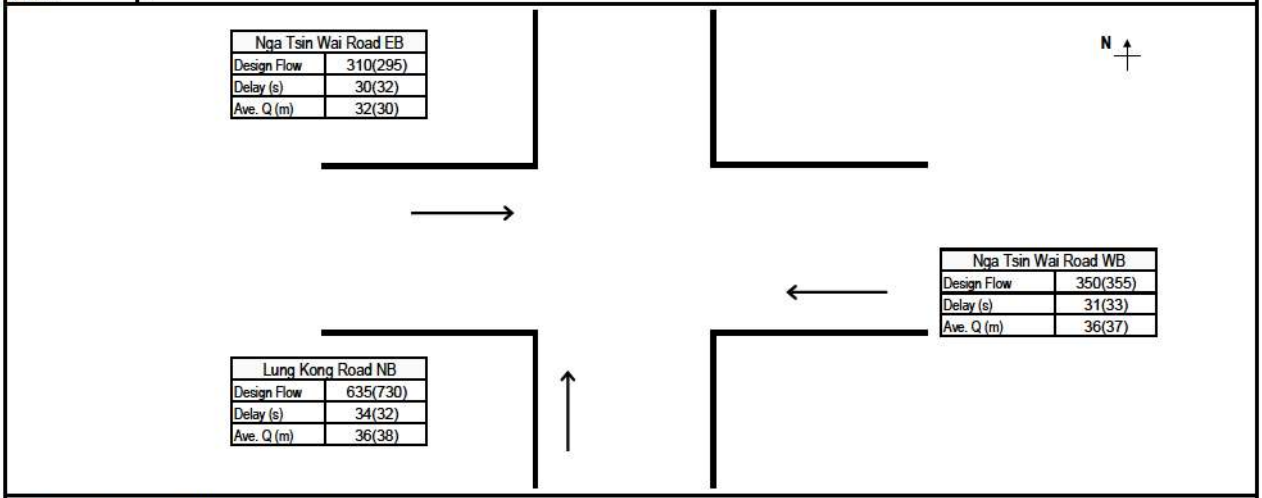
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	288	veh/hr		q '=	254	veh/hr		q '=	521	veh/hr		q '=	#DIV/0!		veh/hr
c=	120	sec		c=	120	sec		c=	120	sec		c=	0		sec
S '=	1408	veh/hr		S '=	1375	veh/hr		S '=	3008	veh/hr		S '=	#DIV/0!		veh/hr
t=	1	hr		t=	1	hr		t=	1	hr		t=	1		hr
X=	0.53			X=	0.48			X=	0.53			X=	#DIV/0!		
Q =	540	veh/hr		Q =	527	veh/hr		Q =	978	veh/hr		Q =	#VALUE!		veh/hr
y=	0.20			y=	0.18			y=	0.17			y=	#DIV/0!		
L =	0.38			L=	0.38			L=	0.33			L=			
n =	1	lane		n =	1	lane		n =	2	lane		n =	0	lane	
X ' =	0.70			X ' =	0.70			X ' =	0.72			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.47			Z =	-0.52			Z =	-0.47			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	6	vehs		N =	5	vehs		N =	12	vehs		N =	#DIV/0!		vehs
Avg queue length =	35	metres		Avg queue leng	31	metres		Avg queue length	35	metres		Avg queue length	#DIV/0!		metres
Average delay =	28.7	seconds		Average delay	28.0	seconds		Average delay =	33.1	seconds		Average delay =	#VALUE!		seconds

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	288	veh/hr		q=	242	veh/hr		q=	596	veh/hr		q=	#DIV/0!		veh/hr
c=	115	sec		c=	115	sec		c=	115	sec		c=	115		sec
S=	1408	veh/hr		S=	1371	veh/hr		S=	3013	veh/hr		S=	#DIV/0!		veh/hr
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5		hr
X=	0.58			X=	0.50			X=	0.58			X=	#DIV/0!		
Q =	497	veh/hr		Q =	484	veh/hr		Q =	1032	veh/hr		Q =	#VALUE!		veh/hr
y=	0.20			y=	0.18			y=	0.20			y=	#DIV/0!		
L =	0.35			L=	0.35			L=	0.34			L=			
n =	1	lane		n =	1	lane		n =	2	lane		n =	0	lane	
X ' =	0.70			X ' =	0.70			X ' =	0.72			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.42			Z =	-0.50			Z =	-0.42			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	6	vehs		N =	5	vehs		N =	13	vehs		N =	#DIV/0!		vehs
Avg queue length =	36	metres		Avg queue leng	30	metres		Avg queue length	38	metres		Avg queue length	#DIV/0!		metres
Average delay =	30.2	seconds		Average delay	29.2	seconds		Average delay =	31.0	seconds		Average delay =	#VALUE!		seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J11 - Nga Tsin Wai Road / Lung Kong Road	Ref. No.:			
Scheme:	Reference	Design year:	2036		
		Designed by:	RC	Checked by:	PK
Arm A:	Nga Tsin Wai Road WB				
Arm B:	Nga Tsin Wai Road EB				
Arm C:	Lung Kong Road NB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Nga Tsin Wai Road WB	1	46	120	350	1690	1.2	41	115	355	1690	1.2
Nga Tsin Wai Road EB	1	46	120	310	1650	1.2	41	115	295	1645	1.2
Lung Kong Road NB	2	39	120	635	3610	1.2	39	115	730	3610	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	74	0.38	0.54	9.7	14		31	33	36	36	36
Nga Tsin Wai Road EB	74	0.38	0.49	8.6	13		30	29	32	32	32
Lung Kong Road NB	81	0.33	0.54	17.6	23		34	33	36	36	36
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	74	0.35	0.59	9.5	15		33	35	37	37	37
Nga Tsin Wai Road EB	74	0.35	0.51	7.9	12		32	28	30	30	30
Lung Kong Road NB	76	0.34	0.59	19.4	24		32	36	38	38	38
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Nga Tsin Wai Road WB	**36**	**37**
Arm B:	Nga Tsin Wai Road EB	**32**	**30**
Arm C:	Lung Kong Road NB	**36**	**38**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

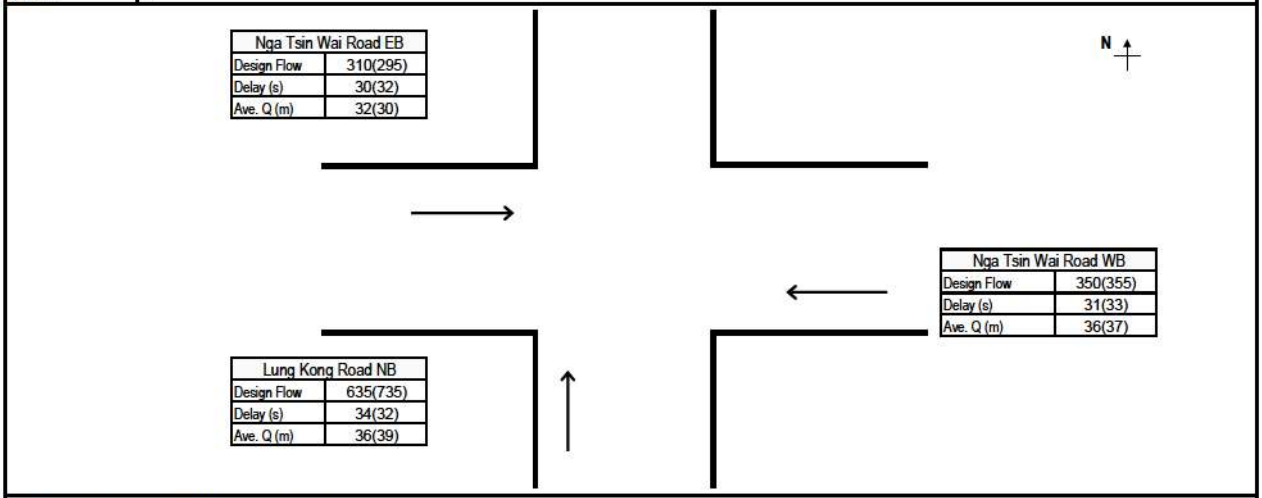
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	292	veh/hr		q '=	258	veh/hr		q '=	529	veh/hr		q '=	#DIV/0!		veh/hr
c=	120	sec		c=	120	sec		c=	120	sec		c=	0		sec
S '=	1408	veh/hr		S '=	1375	veh/hr		S '=	3008	veh/hr		S '=	#DIV/0!		veh/hr
t=	1	hr		t=	1	hr		t=	1	hr		t=	1		hr
X=	0.54			X=	0.49			X=	0.54			X=	#DIV/0!		
Q =	539	veh/hr		Q =	526	veh/hr		Q =	979	veh/hr		Q =	#VALUE!		veh/hr
y=	0.21			y=	0.19			y=	0.18			y=	#DIV/0!		
L =	0.38			L=	0.38			L=	0.33			L=			
n =	1	lane		n =	1	lane		n =	2	lane		n =	0	lane	
X ' =	0.70			X ' =	0.70			X ' =	0.72			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.46			Z =	-0.51			Z =	-0.46			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	6	vehs		N =	5	vehs		N =	12	vehs		N =	#DIV/0!		vehs
Avg queue length =	36	metres		Avg queue leng	32	metres		Avg queue lengtl	36	metres		Avg queue lengtl	#DIV/0!		metres
Average delay =	28.8	seconds		Average delay	28.1	seconds		Average delay =	33.1	seconds		Average delay =	#VALUE!		seconds

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	296	veh/hr		q=	246	veh/hr		q=	608	veh/hr		q=	#DIV/0!		veh/hr
c=	115	sec		c=	115	sec		c=	115	sec		c=	115		sec
S=	1408	veh/hr		S=	1371	veh/hr		S=	3008	veh/hr		S=	#DIV/0!		veh/hr
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5		hr
X=	0.59			X=	0.51			X=	0.59			X=	#DIV/0!		
Q =	499	veh/hr		Q =	485	veh/hr		Q =	1027	veh/hr		Q =	#VALUE!		veh/hr
y=	0.21			y=	0.18			y=	0.20			y=	#DIV/0!		
L =	0.35			L=	0.35			L=	0.34			L=			
n =	1	lane		n =	1	lane		n =	2	lane		n =	0	lane	
X ' =	0.70			X ' =	0.70			X ' =	0.72			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.41			Z =	-0.49			Z =	-0.41			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	6	vehs		N =	5	vehs		N =	13	vehs		N =	#DIV/0!		vehs
Avg queue length =	37	metres		Avg queue leng	30	metres		Avg queue lengtl	38	metres		Avg queue lengtl	#DIV/0!		metres
Average delay =	30.4	seconds		Average delay	29.2	seconds		Average delay =	31.2	seconds		Average delay =	#VALUE!		seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J11 - Nga Tsin Wai Road / Lung Kong Road	Ref. No.:			
Scheme:	Design	Design year:	2036		
		Designed by:	RC	Checked by:	PK
Arm A:	Nga Tsin Wai Road WB				
Arm B:	Nga Tsin Wai Road EB				
Arm C:	Lung Kong Road NB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Nga Tsin Wai Road WB	1	46	120	350	1690	1.2	41	115	355	1690	1.2
Nga Tsin Wai Road EB	1	46	120	310	1650	1.2	41	115	295	1645	1.2
Lung Kong Road NB	2	39	120	635	3610	1.2	39	115	735	3610	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	74	0.38	0.54	9.7	14		31	33	36	36	36
Nga Tsin Wai Road EB	74	0.38	0.49	8.6	13		30	29	32	32	32
Lung Kong Road NB	81	0.33	0.54	17.6	23		34	33	36	36	36
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	74	0.35	0.59	9.5	15		33	35	37	37	37
Nga Tsin Wai Road EB	74	0.35	0.51	7.9	12		32	28	30	30	30
Lung Kong Road NB	76	0.34	0.59	19.6	24		32	36	39	39	39
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Nga Tsin Wai Road WB	**36**	**37**
Arm B:	Nga Tsin Wai Road EB	**32**	**30**
Arm C:	Lung Kong Road NB	**36**	**39**
Arm D:	-		

Effective Red, $r = c-g$
Effective Green Ratio, $L = g/c$
Degree of Saturation, $X = q/(SL)$
Average Arrival Rate, $M = qc/3600p$
Maximum Queue Length $= 6 * \text{Maximum Queue}/n$
Estimated Delay, $d = c(1-L)^2/2(1-LX) + 3600pX^2/2q(1-X) - 0.65(c/(q/3600p)^2)^{(1/3)}*X^{(2+5L)}$ OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, $L1 = 6q(r/2+d)/3600pn$ OR $L2 = 6qr/3600pn$ whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks

^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

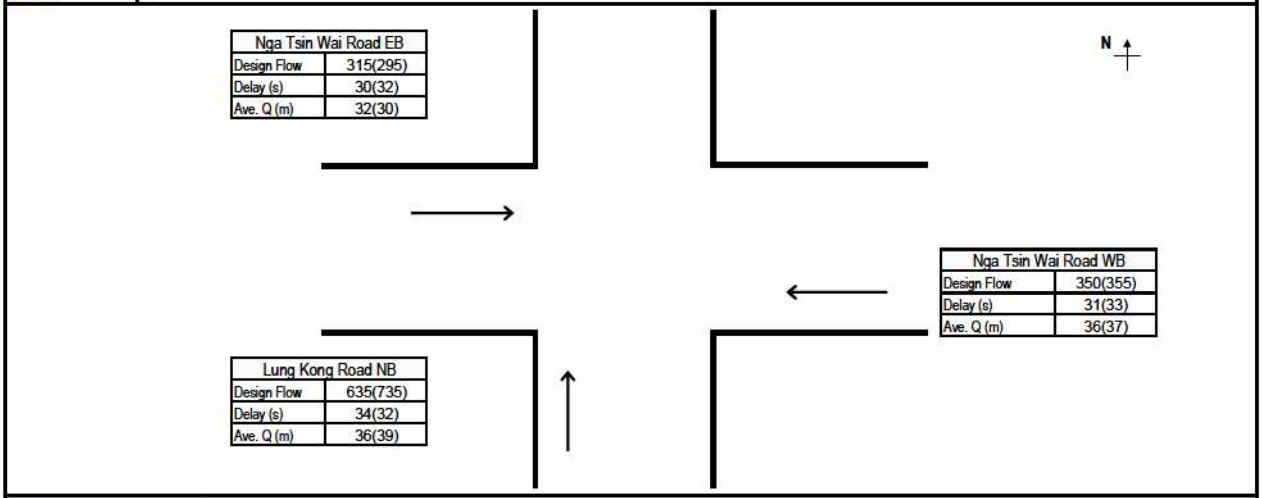
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	292	veh/hr		q '=	258	veh/hr		q '=	529	veh/hr		q '=	#DIV/0!		veh/hr
c=	120	sec		c=	120	sec		c=	120	sec		c=	0		sec
S '=	1408	veh/hr		S '=	1375	veh/hr		S '=	3008	veh/hr		S '=	#DIV/0!		veh/hr
t=	1	hr		t=	1	hr		t=	1	hr		t=	1		hr
X=	0.54			X=	0.49			X=	0.54			X=	#DIV/0!		
Q =	539	veh/hr		Q =	526	veh/hr		Q =	979	veh/hr		Q =	#VALUE!		veh/hr
y=	0.21			y=	0.19			y=	0.18			y=	#DIV/0!		
L =	0.38			L=	0.38			L=	0.33			L=			
n =	1	lane		n =	1	lane		n =	2	lane		n =	0	lane	
X ' =	0.70			X ' =	0.70			X ' =	0.72			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.46			Z =	-0.51			Z =	-0.46			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	6	vehs		N =	5	vehs		N =	12	vehs		N =	#DIV/0!		vehs
Avg queue length =	36	metres		Avg queue leng	32	metres		Avg queue length	36	metres		Avg queue length	#DIV/0!		metres
Average delay =	28.8	seconds		Average delay	28.1	seconds		Average delay =	33.1	seconds		Average delay =	#VALUE!		seconds

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	296	veh/hr		q=	246	veh/hr		q=	613	veh/hr		q=	#DIV/0!		veh/hr
c=	115	sec		c=	115	sec		c=	115	sec		c=	115		sec
S=	1408	veh/hr		S=	1371	veh/hr		S=	3008	veh/hr		S=	#DIV/0!		veh/hr
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5		hr
X=	0.59			X=	0.51			X=	0.59			X=	#DIV/0!		
Q =	497	veh/hr		Q =	484	veh/hr		Q =	1030	veh/hr		Q =	#VALUE!		veh/hr
y=	0.21			y=	0.18			y=	0.20			y=	#DIV/0!		
L =	0.35			L=	0.35			L=	0.34			L=			
n =	1	lane		n =	1	lane		n =	2	lane		n =	0	lane	
X ' =	0.70			X ' =	0.70			X ' =	0.72			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.41			Z =	-0.49			Z =	-0.41			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	6	vehs		N =	5	vehs		N =	13	vehs		N =	#DIV/0!		vehs
Avg queue length =	37	metres		Avg queue leng	30	metres		Avg queue length	39	metres		Avg queue length	#DIV/0!		metres
Average delay =	30.5	seconds		Average delay	29.3	seconds		Average delay =	31.2	seconds		Average delay =	#VALUE!		seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J11 - Nga Tsin Wai Road / Lung Kong Road	Ref. No.:			
Scheme:	Reference	Design year:	2037		
		Designed by:	RC	Checked by:	PK
Arm A:	Nga Tsin Wai Road WB				
Arm B:	Nga Tsin Wai Road EB				
Arm C:	Lung Kong Road NB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Nga Tsin Wai Road WB	1	46	120	350	1690	1.2	41	115	355	1690	1.2
Nga Tsin Wai Road EB	1	46	120	315	1655	1.2	41	115	295	1645	1.2
Lung Kong Road NB	2	39	120	635	3610	1.2	39	115	735	3610	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	74	0.38	0.54	9.7	14		31	33	36	36	36
Nga Tsin Wai Road EB	74	0.38	0.50	8.8	13		30	30	32	32	32
Lung Kong Road NB	81	0.33	0.54	17.6	23		34	33	36	36	36
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	74	0.35	0.59	9.5	15		33	35	37	37	37
Nga Tsin Wai Road EB	74	0.35	0.51	7.9	12		32	28	30	30	30
Lung Kong Road NB	76	0.34	0.59	19.6	24		32	36	39	39	39
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Nga Tsin Wai Road WB	**36**	**37**
Arm B:	Nga Tsin Wai Road EB	**32**	**30**
Arm C:	Lung Kong Road NB	**36**	**39**
Arm D:	-		

Effective Red, $r = c-g$
Effective Green Ratio, $L = g/c$
Degree of Saturation, $X = q/(SL)$
Average Arrival Rate, $M = qc/3600p$
Maximum Queue Length $= 6 * \text{Maximum Queue}/n$
Estimated Delay, $d = c(1-L)^2/2(1-LX) + 3600pX^2/2q(1-X) - 0.65(c/(q/3600p)^2)^{(1/3)}*X^{(2+5L)}$ OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, $L1 = 6q(r/2+d)/3600pn$ OR $L2 = 6qr/3600pn$ whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks

^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

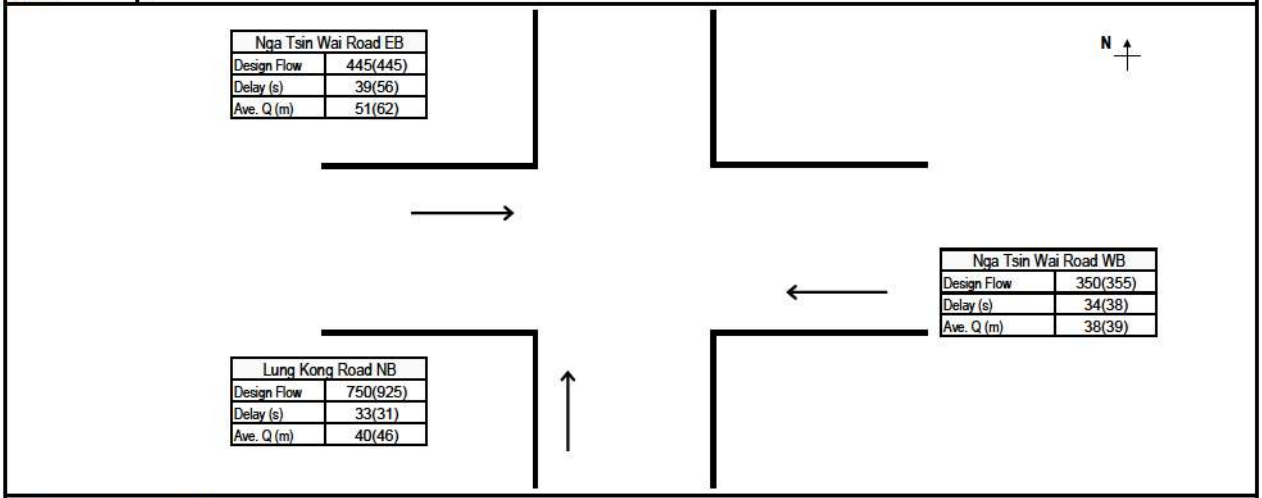
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	292	veh/hr		q '=	263	veh/hr		q '=	529	veh/hr		q '=	#DIV/0!		veh/hr
c=	120	sec		c=	120	sec		c=	120	sec		c=	0		sec
S '=	1408	veh/hr		S '=	1379	veh/hr		S '=	3008	veh/hr		S '=	#DIV/0!		veh/hr
t=	1	hr		t=	1	hr		t=	1	hr		t=	1		hr
X=	0.54			X=	0.50			X=	0.54			X=	#DIV/0!		
Q =	539	veh/hr		Q =	528	veh/hr		Q =	979	veh/hr		Q =	#VALUE!		veh/hr
y=	0.21			y=	0.19			y=	0.18			y=	#DIV/0!		
L =	0.38			L=	0.38			L=	0.33			L=			
n =	1	lane		n =	1	lane		n =	2	lane		n =	0	lane	
X ' =	0.70			X ' =	0.70			X ' =	0.72			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.46			Z =	-0.50			Z =	-0.46			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	6	vehs		N =	5	vehs		N =	12	vehs		N =	#DIV/0!		vehs
Avg queue length =	36	metres		Avg queue leng	32	metres		Avg queue length	36	metres		Avg queue length	#DIV/0!		metres
Average delay =	28.8	seconds		Average delay	28.2	seconds		Average delay =	33.1	seconds		Average delay =	#VALUE!		seconds

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	296	veh/hr		q=	246	veh/hr		q=	613	veh/hr		q=	#DIV/0!		veh/hr
c=	115	sec		c=	115	sec		c=	115	sec		c=	115		sec
S=	1408	veh/hr		S=	1371	veh/hr		S=	3008	veh/hr		S=	#DIV/0!		veh/hr
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5		hr
X=	0.59			X=	0.51			X=	0.59			X=	#DIV/0!		
Q =	497	veh/hr		Q =	484	veh/hr		Q =	1030	veh/hr		Q =	#VALUE!		veh/hr
y=	0.21			y=	0.18			y=	0.20			y=	#DIV/0!		
L =	0.35			L=	0.35			L=	0.34			L=			
n =	1	lane		n =	1	lane		n =	2	lane		n =	0	lane	
X ' =	0.70			X ' =	0.70			X ' =	0.72			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.41			Z =	-0.49			Z =	-0.41			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	6	vehs		N =	5	vehs		N =	13	vehs		N =	#DIV/0!		vehs
Avg queue length =	37	metres		Avg queue leng	30	metres		Avg queue length	39	metres		Avg queue length	#DIV/0!		metres
Average delay =	30.5	seconds		Average delay	29.3	seconds		Average delay =	31.2	seconds		Average delay =	#VALUE!		seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J11 - Nga Tsin Wai Road / Lung Kong Road	Ref. No.:			
Scheme:	Design	Design year:	2037		
		Designed by:	RC	Checked by:	PK
Arm A:	Nga Tsin Wai Road WB				
Arm B:	Nga Tsin Wai Road EB				
Arm C:	Lung Kong Road NB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Nga Tsin Wai Road WB	1	43	120	350	1690	1.2	36	115	355	1690	1.2
Nga Tsin Wai Road EB	1	43	120	445	1595	1.2	36	115	445	1585	1.2
Lung Kong Road NB	2	42	120	750	3665	1.2	44	115	925	3685	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	77	0.36	0.58	9.7	15		34	35	38	38	38
Nga Tsin Wai Road EB	77	0.36	0.78	12.4	19		39		48	51	51
Lung Kong Road NB	78	0.35	0.58	20.8	24		33	37	40	40	40
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	79	0.32	0.66	9.5	15		38	38	39	39	39
Nga Tsin Wai Road EB	79	0.32	0.89	11.8	28		56		49	62	62
Lung Kong Road NB	71	0.38	0.66	24.6	26		31	43	46	46	46
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Nga Tsin Wai Road WB	**38**	**39**
Arm B:	Nga Tsin Wai Road EB	**51**	**62**
Arm C:	Lung Kong Road NB	**40**	**46**
Arm D:	-		

Effective Red, $r = c-g$
Effective Green Ratio, $L = g/c$
Degree of Saturation, $X = q/(SL)$
Average Arrival Rate, $M = qc/3600p$
Maximum Queue Length $= 6 * \text{Maximum Queue}/n$
Estimated Delay, $d = c(1-L)^2/2(1-LX) + 3600pX^2/2q(1-X) - 0.65(c/(q/3600p)^2)^{(1/3)}*X^{(2+5L)}$ OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, $L1 = 6q(r/2+d)/3600pn$ OR $L2 = 6qr/3600pn$ whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

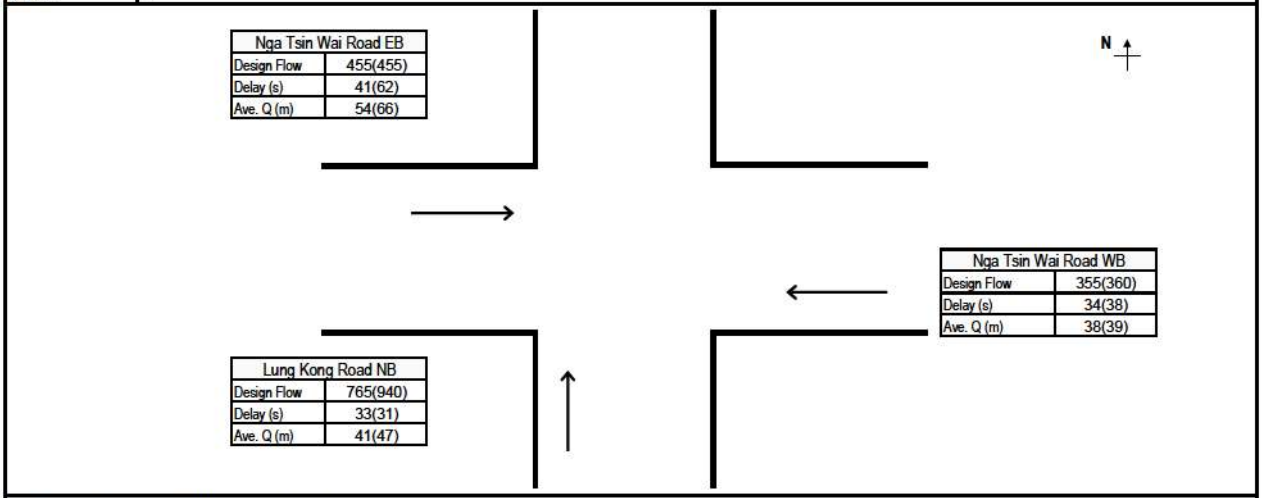
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	292	veh/hr		q '=	371	veh/hr		q '=	625	veh/hr		q '=	#DIV/0!		veh/hr
c=	120	sec		c=	120	sec		c=	120	sec		c=	0		sec
S '=	1408	veh/hr		S '=	1329	veh/hr		S '=	3054	veh/hr		S '=	#DIV/0!		veh/hr
t=	1	hr		t=	1	hr		t=	1	hr		t=	1		hr
X=	0.58			X=	0.78			X=	0.58			X=	#DIV/0!		
Q =	502	veh/hr		Q =	474	veh/hr		Q =	1075	veh/hr		Q =	#VALUE!		veh/hr
y=	0.21			y=	0.28			y=	0.20			y=	#DIV/0!		
L =	0.36			L=	0.36			L=	0.35			L=			
n =	1	lane		n =	1	lane		n =	2	lane		n =	0	lane	
X ' =	0.70			X ' =	0.70			X ' =	0.73			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	TRUE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.42			Z =	-0.22			Z =	-0.42			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.6	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	6	vehs		N =	9	vehs		N =	13	vehs		N =	#DIV/0!		vehs
Avg queue length =	38	metres		Avg queue leng	51	metres		Avg queue length	40	metres		Avg queue length	#DIV/0!		metres
Average delay =	31.4	seconds		Average delay	39.0	seconds		Average delay =	31.7	seconds		Average delay =	#VALUE!		seconds

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	296	veh/hr		q=	371	veh/hr		q=	771	veh/hr		q=	#DIV/0!		veh/hr
c=	115	sec		c=	115	sec		c=	115	sec		c=	115		sec
S=	1408	veh/hr		S=	1321	veh/hr		S=	3071	veh/hr		S=	#DIV/0!		veh/hr
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5		hr
X=	0.66			X=	0.89			X=	0.66			X=	#DIV/0!		
Q =	446	veh/hr		Q =	418	veh/hr		Q =	1163	veh/hr		Q =	#VALUE!		veh/hr
y=	0.21			y=	0.28			y=	0.25			y=	#DIV/0!		
L =	0.32			L=	0.32			L=	0.38			L=			
n =	1	lane		n =	1	lane		n =	2	lane		n =	0	lane	
X ' =	0.69			X ' =	0.69			X ' =	0.73			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	TRUE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.34			Z =	-0.11			Z =	-0.34			Z =	#DIV/0!		
No=	0.0	vehs		No=	2.2	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	6	vehs		N =	10	vehs		N =	15	vehs		N =	#DIV/0!		vehs
Avg queue length =	39	metres		Avg queue leng	62	metres		Avg queue length	46	metres		Avg queue length	#DIV/0!		metres
Average delay =	34.0	seconds		Average delay	55.9	seconds		Average delay =	29.6	seconds		Average delay =	#VALUE!		seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J11 - Nga Tsin Wai Road / Lung Kong Road	Ref. No.:			
Scheme:	Reference	Design year:	2040		
		Designed by:	RC	Checked by:	PK
Arm A:	Nga Tsin Wai Road WB				
Arm B:	Nga Tsin Wai Road EB				
Arm C:	Lung Kong Road NB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Nga Tsin Wai Road WB	1	43	120	355	1690	1.2	36	115	360	1690	1.2
Nga Tsin Wai Road EB	1	43	120	455	1595	1.2	36	115	455	1580	1.2
Lung Kong Road NB	2	42	120	765	3665	1.2	44	115	940	3685	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	77	0.35	0.59	9.9	15		34	36	38	38	38
Nga Tsin Wai Road EB	77	0.35	0.80	12.6	20		41		49	54	54
Lung Kong Road NB	78	0.35	0.59	21.3	24		33	38	41	41	41
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	79	0.32	0.67	9.6	15		38	39	39	39	39
Nga Tsin Wai Road EB	79	0.32	0.91	12.1	31		62		50	66	66
Lung Kong Road NB	71	0.38	0.67	25.0	26		31	44	47	47	47
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Nga Tsin Wai Road WB	38	39
Arm B:	Nga Tsin Wai Road EB	54	66
Arm C:	Lung Kong Road NB	41	47
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

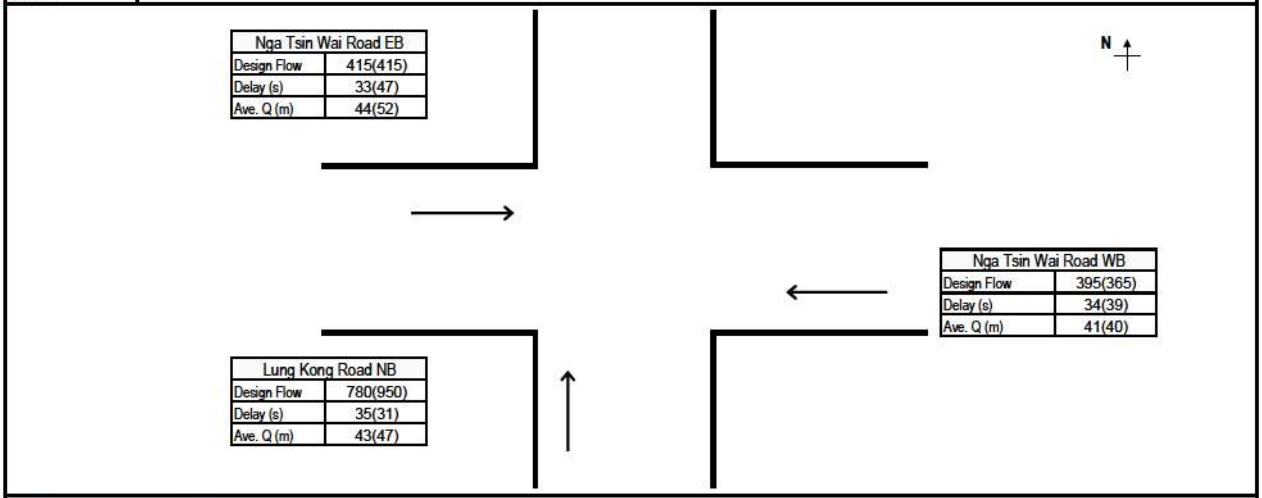
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	296	veh/hr		q '=	379	veh/hr		q '=	638	veh/hr		q '=	#DIV/0!		veh/hr
c=	120	sec		c=	120	sec		c=	120	sec		c=	0		sec
S '=	1408	veh/hr		S '=	1329	veh/hr		S '=	3054	veh/hr		S '=	#DIV/0!		veh/hr
t=	1	hr		t=	1	hr		t=	1	hr		t=	1		hr
X=	0.59			X=	0.80			X=	0.59			X=	#DIV/0!		
Q =	500	veh/hr		Q =	472	veh/hr		Q =	1079	veh/hr		Q =	#VALUE!		veh/hr
y=	0.21			y=	0.29			y=	0.21			y=	#DIV/0!		
L =	0.35			L=	0.35			L=	0.35			L=			
n =	1	lane		n =	1	lane		n =	2	lane		n =	0	lane	
X ' =	0.70			X ' =	0.70			X ' =	0.73			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	TRUE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.41			Z =	-0.20			Z =	-0.41			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.8	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	6	vehs		N =	9	vehs		N =	14	vehs		N =	#DIV/0!		vehs
Avg queue length =	38	metres		Avg queue leng	54	metres		Avg queue lengtl	41	metres		Avg queue lengtl	#DIV/0!		metres
Average delay =	31.6	seconds		Average delay	41.1	seconds		Average delay =	31.7	seconds		Average delay =	#VALUE!		seconds

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	300	veh/hr		q=	379	veh/hr		q=	783	veh/hr		q=	#DIV/0!		veh/hr
c=	115	sec		c=	115	sec		c=	115	sec		c=	115		sec
S=	1408	veh/hr		S=	1317	veh/hr		S=	3071	veh/hr		S=	#DIV/0!		veh/hr
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5		hr
X=	0.67			X=	0.91			X=	0.67			X=	#DIV/0!		
Q =	446	veh/hr		Q =	417	veh/hr		Q =	1164	veh/hr		Q =	#VALUE!		veh/hr
y=	0.21			y=	0.29			y=	0.26			y=	#DIV/0!		
L =	0.32			L=	0.32			L=	0.38			L=			
n =	1	lane		n =	1	lane		n =	2	lane		n =	0	lane	
X ' =	0.69			X ' =	0.69			X ' =	0.73			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	TRUE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.33			Z =	-0.09			Z =	-0.33			Z =	#DIV/0!		
No=	0.0	vehs		No=	2.8	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	7	vehs		N =	11	vehs		N =	16	vehs		N =	#DIV/0!		vehs
Avg queue length =	39	metres		Avg queue leng	66	metres		Avg queue lengtl	47	metres		Avg queue lengtl	#DIV/0!		metres
Average delay =	34.1	seconds		Average delay	61.8	seconds		Average delay =	29.8	seconds		Average delay =	#VALUE!		seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J11 - Nga Tsin Wai Road / Lung Kong Road	Ref. No.:			
Scheme:	Design	Design year:	2040		
		Designed by:	RC	Checked by:	PK
Arm A:	Nga Tsin Wai Road WB				
Arm B:	Nga Tsin Wai Road EB				
Arm C:	Lung Kong Road NB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Nga Tsin Wai Road WB	1	44	120	395	1690	1.2	36	115	365	1690	1.2
Nga Tsin Wai Road EB	1	44	120	415	1585	1.2	36	115	415	1575	1.2
Lung Kong Road NB	2	41	120	780	3655	1.2	44	115	950	3680	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	76	0.37	0.63	11.0	15		34	40	41	41	41
Nga Tsin Wai Road EB	76	0.37	0.71	11.5	17		33		44	44	44
Lung Kong Road NB	79	0.34	0.63	21.7	25		35	40	43	43	43
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Nga Tsin Wai Road WB	79	0.32	0.68	9.7	16		39	40	40	40	40
Nga Tsin Wai Road EB	79	0.32	0.83	11.0	22		47		45	52	52
Lung Kong Road NB	71	0.38	0.68	25.3	27		31	44	47	47	47
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Nga Tsin Wai Road WB	**41**	**40**
Arm B:	Nga Tsin Wai Road EB	**44**	**52**
Arm C:	Lung Kong Road NB	**43**	**47**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

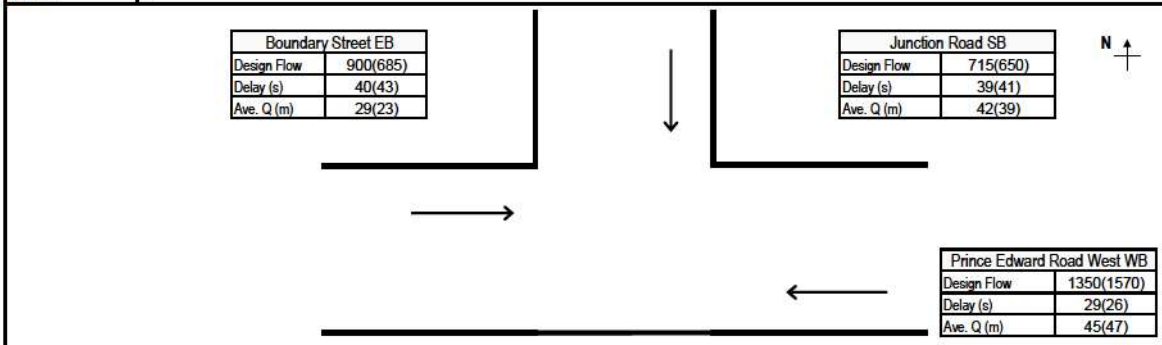
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	329	veh/hr		q '=	346	veh/hr		q '=	650	veh/hr		q '=	#DIV/0!	veh/hr	
c=	120	sec		c=	120	sec		c=	120	sec		c=	0	sec	
S '=	1408	veh/hr		S '=	1321	veh/hr		S '=	3046	veh/hr		S '=	#DIV/0!	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.63			X=	0.71			X=	0.63			X=	#DIV/0!		
Q =	521	veh/hr		Q =	489	veh/hr		Q =	1030	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.23			y=	0.26			y=	0.21			y=	#DIV/0!		
L =	0.37			L=	0.37			L=	0.34			L=			
n =	1	lane		n =	1	lane		n =	2	lane		n =	0	lane	
X ' =	0.70			X ' =	0.70			X ' =	0.73			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	TRUE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.37			Z =	-0.29			Z =	-0.37			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.1	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	7	vehs		N =	7	vehs		N =	14	vehs		N =	#DIV/0!	vehs	
Avg queue length =	41	metres		Avg queue leng	44	metres		Avg queue length	43	metres		Avg queue length	#DIV/0!	metres	
Average delay =	31.1	seconds		Average delay	32.6	seconds		Average delay =	33.4	seconds		Average delay =	#VALUE!	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	304	veh/hr		q=	346	veh/hr		q=	792	veh/hr		q=	#DIV/0!	veh/hr	
c=	115	sec		c=	115	sec		c=	115	sec		c=	115	sec	
S=	1408	veh/hr		S=	1313	veh/hr		S=	3067	veh/hr		S=	#DIV/0!	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.68			X=	0.83			X=	0.68			X=	#DIV/0!		
Q =	446	veh/hr		Q =	416	veh/hr		Q =	1162	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.22			y=	0.26			y=	0.26			y=	#DIV/0!		
L =	0.32			L=	0.32			L=	0.38			L=			
n =	1	lane		n =	1	lane		n =	2	lane		n =	0	lane	
X ' =	0.69			X ' =	0.69			X ' =	0.73			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	TRUE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.32			Z =	-0.17			Z =	-0.32			Z =	#DIV/0!		
No=	0.0	vehs		No=	1.2	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	7	vehs		N =	9	vehs		N =	16	vehs		N =	#DIV/0!	vehs	
Avg queue length =	40	metres		Avg queue leng	52	metres		Avg queue length	47	metres		Avg queue length	#DIV/0!	metres	
Average delay =	34.2	seconds		Average delay	46.5	seconds		Average delay =	29.9	seconds		Average delay =	#VALUE!	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J13 - Prince Edward Road West / Boundary Street / Grampian Road	Ref. No.:			
Scheme:	Existing	Design year:	2021		
		Designed by:	RC	Checked by:	PK
Arm A:	Prince Edward Road West WB				
Arm B:	Boundary Street EB				
Arm C:	Junction Road SB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Prince Edward Road W	3	48	120	1350	5950	1.2	50	115	1570	5950	1.2
Boundary Street EB	4	28	120	900	7495	1.2	20	115	685	7495	1.2
Junction Road SB	2	35	120	715	3720	1.2	29	115	650	3725	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Prince Edward Road W	72	0.40	0.57	37.5	38		29	41	45	45	45
Boundary Street EB	92	0.23	0.52	25.0	34		40	27	29	29	29
Junction Road SB	85	0.29	0.66	19.9	26		39	40	42	42	42
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Prince Edward Road W	65	0.43	0.61	41.8	37		26	42	47	47	47
Boundary Street EB	95	0.18	0.52	18.2	26		43	21	23	23	23
Junction Road SB	86	0.25	0.70	17.3	24		41	38	39	39	39
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Prince Edward Road West WB	**45**	**47**
Arm B:	Boundary Street EB	**29**	**23**
Arm C:	Junction Road SB	**42**	**39**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

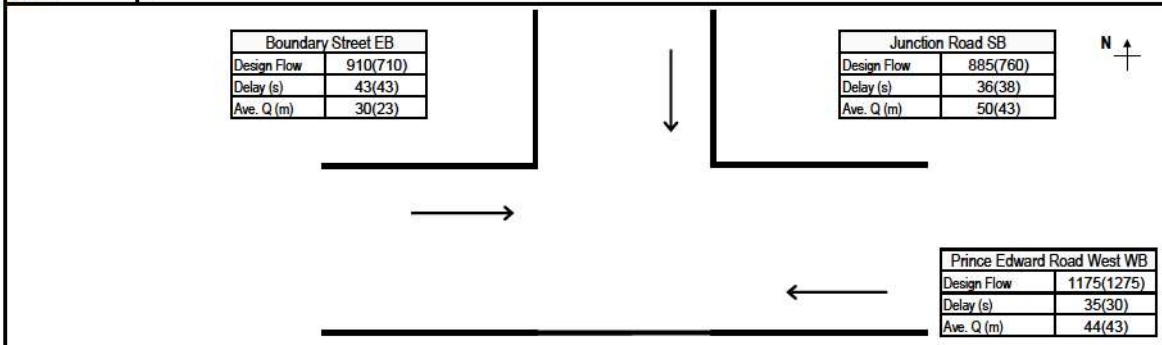
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	1125	veh/hr		q '=	750	veh/hr		q '=	596	veh/hr		q '=	#DIV/0!		veh/hr
c=	120	sec		c=	120	sec		c=	120	sec		c=	0		sec
S '=	4958	veh/hr		S '=	6246	veh/hr		S '=	3100	veh/hr		S '=	#DIV/0!		veh/hr
t=	1	hr		t=	1	hr		t=	1	hr		t=	1		hr
X=	0.57			X=	0.52			X=	0.66			X=	#DIV/0!		
Q =	1970	veh/hr		Q =	1445	veh/hr		Q =	906	veh/hr		Q =	#VALUE!		veh/hr
y=	0.23			y=	0.12			y=	0.19			y=	#DIV/0!		
L =	0.40			L=	0.23			L=	0.29			L=			
n =	3	lane		n =	4	lane		n =	2	lane		n =	0	lane	
X ' =	0.78			X ' =	0.75			X ' =	0.72			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.43			Z =	-0.48			Z =	-0.34			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	23	vehs		N =	19	vehs		N =	14	vehs		N =	#DIV/0!		vehs
Avg queue length =	45	metres		Avg queue leng	29	metres		Avg queue length	42	metres		Avg queue length	#DIV/0!		metres
Average delay =	28.2	seconds		Average delay	40.3	seconds		Average delay =	37.2	seconds		Average delay =	#VALUE!		seconds

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	1308	veh/hr		q=	571	veh/hr		q=	542	veh/hr		q=	#DIV/0!		veh/hr
c=	115	sec		c=	115	sec		c=	115	sec		c=	115		sec
S=	4958	veh/hr		S=	6246	veh/hr		S=	3104	veh/hr		S=	#DIV/0!		veh/hr
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5		hr
X=	0.61			X=	0.52			X=	0.70			X=	#DIV/0!		
Q =	2148	veh/hr		Q =	1104	veh/hr		Q =	777	veh/hr		Q =	#VALUE!		veh/hr
y=	0.26			y=	0.09			y=	0.17			y=	#DIV/0!		
L =	0.43			L=	0.18			L=	0.25			L=			
n =	3	lane		n =	4	lane		n =	2	lane		n =	0	lane	
X ' =	0.78			X ' =	0.73			X ' =	0.71			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.39			Z =	-0.48			Z =	-0.30			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	24	vehs		N =	15	vehs		N =	13	vehs		N =	#DIV/0!		vehs
Avg queue length =	47	metres		Avg queue leng	23	metres		Avg queue length	39	metres		Avg queue length	#DIV/0!		metres
Average delay =	25.1	seconds		Average delay	42.9	seconds		Average delay =	39.1	seconds		Average delay =	#VALUE!		seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J13 - Prince Edward Road West / Boundary Street / Grampian Road	Ref. No.:			
Scheme:	Reference	Design year:	2033		
		Designed by:	RC	Checked by:	PK
Arm A:	Prince Edward Road West WB				
Arm B:	Boundary Street EB				
Arm C:	Junction Road SB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Prince Edward Road W	3	38	120	1175	5950	1.2	42	115	1275	5950	1.2
Boundary Street EB	4	25	120	910	7495	1.2	21	115	710	7495	1.2
Junction Road SB	2	39	120	885	3735	1.2	33	115	760	3730	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Prince Edward Road W	82	0.32	0.62	32.6	37		35	41	44	44	44
Boundary Street EB	95	0.21	0.57	25.3	35		43	28	30	30	30
Junction Road SB	81	0.32	0.73	24.6	29		36		50	50	50
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Prince Edward Road W	73	0.37	0.59	33.9	36		30	39	43	43	43
Boundary Street EB	94	0.18	0.53	18.9	27		43	22	23	23	23
Junction Road SB	82	0.29	0.71	20.2	26		38	42	43	43	43
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Prince Edward Road West WB	**44**	**43**
Arm B:	Boundary Street EB	**30**	**23**
Arm C:	Junction Road SB	**50**	**43**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

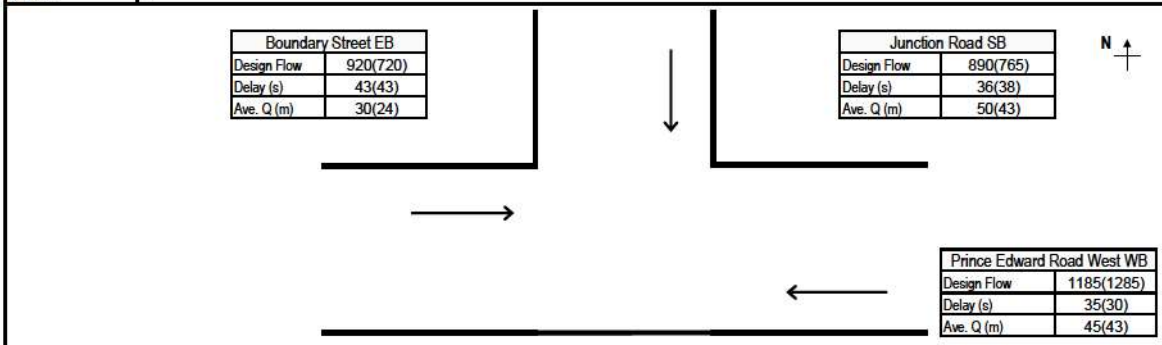
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	979	veh/hr		q '=	758	veh/hr		q '=	738	veh/hr		q '=	#DIV/0!	veh/hr	
c=	120	sec		c=	120	sec		c=	120	sec		c=	0	sec	
S '=	4958	veh/hr		S '=	6246	veh/hr		S '=	3113	veh/hr		S '=	#DIV/0!	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.62			X=	0.57			X=	0.73			X=	#DIV/0!		
Q =	1590	veh/hr		Q =	1320	veh/hr		Q =	1009	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.20			y=	0.12			y=	0.24			y=	#DIV/0!		
L =	0.32			L=	0.21			L=	0.32			L=			
n =	3	lane		n =	4	lane		n =	2	lane		n =	0	lane	
X ' =	0.76			X ' =	0.74			X ' =	0.73			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	TRUE			X > X '	#DIV/0!		
Z =	-0.38			Z =	-0.43			Z =	-0.27			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	22	vehs		N =	20	vehs		N =	17	vehs		N =	#DIV/0!	vehs	
Avg queue length =	44	metres		Avg queue leng	30	metres		Avg queue lengtl	50	metres		Avg queue lengtl	#DIV/0!	metres	
Average delay =	34.5	seconds		Average delay	42.5	seconds		Average delay =	36.0	seconds		Average delay =	#VALUE!	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	1063	veh/hr		q=	592	veh/hr		q=	633	veh/hr		q=	#DIV/0!	veh/hr	
c=	115	sec		c=	115	sec		c=	115	sec		c=	115	sec	
S=	4958	veh/hr		S=	6246	veh/hr		S=	3108	veh/hr		S=	#DIV/0!	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.59			X=	0.53			X=	0.71			X=	#DIV/0!		
Q =	1813	veh/hr		Q =	1126	veh/hr		Q =	898	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.21			y=	0.09			y=	0.20			y=	#DIV/0!		
L =	0.37			L=	0.18			L=	0.29			L=			
n =	3	lane		n =	4	lane		n =	2	lane		n =	0	lane	
X ' =	0.77			X ' =	0.73			X ' =	0.72			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.41			Z =	-0.47			Z =	-0.29			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	22	vehs		N =	15	vehs		N =	14	vehs		N =	#DIV/0!	vehs	
Avg queue length =	43	metres		Avg queue leng	23	metres		Avg queue lengtl	43	metres		Avg queue lengtl	#DIV/0!	metres	
Average delay =	29.5	seconds		Average delay	42.7	seconds		Average delay =	36.5	seconds		Average delay =	#VALUE!	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J13 - Prince Edward Road West / Boundary Street / Grampian Road	Ref. No.:			
Scheme:	Design	Design year:	2033		
		Designed by:	RC	Checked by:	PK
Arm A:	Prince Edward Road West WB				
Arm B:	Boundary Street EB				
Arm C:	Junction Road SB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Prince Edward Road W	3	39	120	1185	5950	1.2	42	115	1285	5950	1.2
Boundary Street EB	4	26	120	920	7495	1.2	21	115	720	7495	1.2
Junction Road SB	2	39	120	890	3735	1.2	33	115	765	3735	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Prince Edward Road W	81	0.32	0.62	32.9	37		35	41	45	45	45
Boundary Street EB	94	0.21	0.58	25.6	35		43	29	30	30	30
Junction Road SB	81	0.32	0.73	24.7	29		36		50	50	50
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Prince Edward Road W	73	0.37	0.59	34.2	36		30	39	43	43	43
Boundary Street EB	94	0.18	0.53	19.2	27		43	22	24	24	24
Junction Road SB	82	0.29	0.71	20.4	26		38	42	43	43	43
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Prince Edward Road West WB	**45**	**43**
Arm B:	Boundary Street EB	**30**	**24**
Arm C:	Junction Road SB	**50**	**43**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

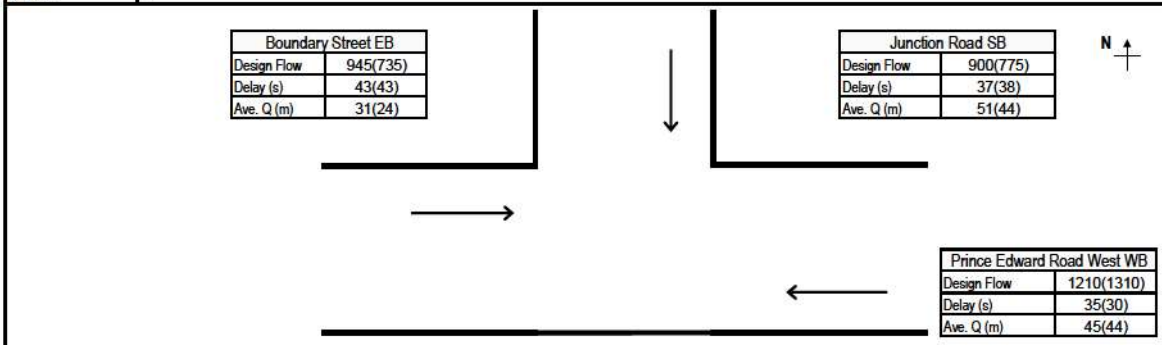
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	988	veh/hr		q '=	767	veh/hr		q '=	742	veh/hr		q '=	#DIV/0!		veh/hr
c=	120	sec		c=	120	sec		c=	120	sec		c=	0		sec
S '=	4958	veh/hr		S '=	6246	veh/hr		S '=	3113	veh/hr		S '=	#DIV/0!		veh/hr
t=	1	hr		t=	1	hr		t=	1	hr		t=	1		hr
X=	0.62			X=	0.58			X=	0.73			X=	#DIV/0!		
Q =	1596	veh/hr		Q =	1332	veh/hr		Q =	1011	veh/hr		Q =	#VALUE!		veh/hr
y=	0.20			y=	0.12			y=	0.24			y=	#DIV/0!		
L =	0.32			L=	0.21			L=	0.32			L=			
n =	3	lane		n =	4	lane		n =	2	lane		n =	0	lane	
X ' =	0.76			X ' =	0.74			X ' =	0.73			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	TRUE			X > X '	#DIV/0!		
Z =	-0.38			Z =	-0.42			Z =	-0.27			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	22	vehs		N =	20	vehs		N =	17	vehs		N =	#DIV/0!		vehs
Avg queue length =	45	metres		Avg queue leng	30	metres		Avg queue lengtl	50	metres		Avg queue lengtl	#DIV/0!		metres
Average delay =	34.4	seconds		Average delay	42.3	seconds		Average delay =	36.1	seconds		Average delay =	#VALUE!		seconds

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	1071	veh/hr		q=	600	veh/hr		q=	638	veh/hr		q=	#DIV/0!		veh/hr
c=	115	sec		c=	115	sec		c=	115	sec		c=	115		sec
S=	4958	veh/hr		S=	6246	veh/hr		S=	3113	veh/hr		S=	#DIV/0!		veh/hr
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5		hr
X=	0.59			X=	0.53			X=	0.71			X=	#DIV/0!		
Q =	1817	veh/hr		Q =	1136	veh/hr		Q =	902	veh/hr		Q =	#VALUE!		veh/hr
y=	0.22			y=	0.10			y=	0.20			y=	#DIV/0!		
L =	0.37			L=	0.18			L=	0.29			L=			
n =	3	lane		n =	4	lane		n =	2	lane		n =	0	lane	
X ' =	0.77			X ' =	0.73			X ' =	0.72			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.41			Z =	-0.47			Z =	-0.29			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	22	vehs		N =	16	vehs		N =	14	vehs		N =	#DIV/0!		vehs
Avg queue length =	43	metres		Avg queue leng	24	metres		Avg queue lengtl	43	metres		Avg queue lengtl	#DIV/0!		metres
Average delay =	29.4	seconds		Average delay	42.6	seconds		Average delay =	36.5	seconds		Average delay =	#VALUE!		seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J13 - Prince Edward Road West / Boundary Street / Grampian Road	Ref. No.:			
Scheme:	Reference	Design year:	2036		
		Designed by:	RC	Checked by:	PK
Arm A:	Prince Edward Road West WB				
Arm B:	Boundary Street EB				
Arm C:	Junction Road SB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Prince Edward Road W	3	39	120	1210	5950	1.2	42	115	1310	5950	1.2
Boundary Street EB	4	26	120	945	7495	1.2	21	115	735	7495	1.2
Junction Road SB	2	39	120	900	3735	1.2	33	115	775	3735	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Prince Edward Road W	81	0.32	0.63	33.6	37		35	42	45	45	45
Boundary Street EB	94	0.21	0.59	26.3	36		43	29	31	31	31
Junction Road SB	81	0.32	0.75	25.0	29		37		51	51	51
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Prince Edward Road W	73	0.37	0.60	34.9	37		30	40	44	44	44
Boundary Street EB	94	0.18	0.53	19.6	28		43	23	24	24	24
Junction Road SB	82	0.29	0.72	20.6	27		38	43	44	44	44
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Prince Edward Road West WB	**45**	**44**
Arm B:	Boundary Street EB	**31**	**24**
Arm C:	Junction Road SB	**51**	**44**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, $d = c(1-L)^2/2(1-LX) + 3600pX^2/2q(1-X) - 0.65(c/(q/3600p)^2)^{(1/3)}*X^{(2+5L)}$ OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

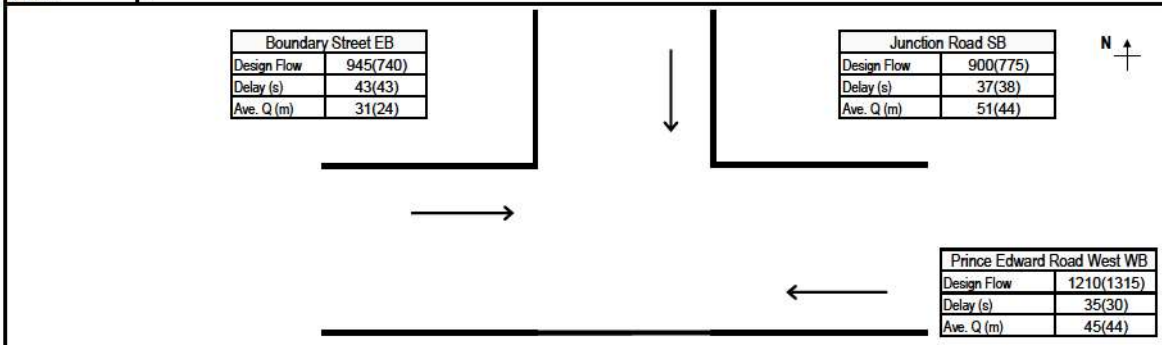
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	1008	veh/hr		q '=	788	veh/hr		q '=	750	veh/hr		q '=	#DIV/0!	veh/hr	
c=	120	sec		c=	120	sec		c=	120	sec		c=	0	sec	
S '=	4958	veh/hr		S '=	6246	veh/hr		S '=	3113	veh/hr		S '=	#DIV/0!	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.63			X=	0.59			X=	0.75			X=	#DIV/0!		
Q =	1608	veh/hr		Q =	1340	veh/hr		Q =	1004	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.20			y=	0.13			y=	0.24			y=	#DIV/0!		
L =	0.32			L=	0.21			L=	0.32			L=			
n =	3	lane		n =	4	lane		n =	2	lane		n =	0	lane	
X ' =	0.76			X ' =	0.74			X ' =	0.73			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	TRUE			X > X '	#DIV/0!		
Z =	-0.37			Z =	-0.41			Z =	-0.25			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.1	vehs		No=	#DIV/0!	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	23	vehs		N =	21	vehs		N =	17	vehs		N =	#DIV/0!	vehs	
Avg queue length =	45	metres		Avg queue leng	31	metres		Avg queue length	51	metres		Avg queue length	#DIV/0!	metres	
Average delay =	34.4	seconds		Average delay	42.4	seconds		Average delay =	36.7	seconds		Average delay =	#VALUE!	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	1092	veh/hr		q=	613	veh/hr		q=	646	veh/hr		q=	#DIV/0!	veh/hr	
c=	115	sec		c=	115	sec		c=	115	sec		c=	115	sec	
S=	4958	veh/hr		S=	6246	veh/hr		S=	3113	veh/hr		S=	#DIV/0!	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.60			X=	0.53			X=	0.72			X=	#DIV/0!		
Q =	1825	veh/hr		Q =	1146	veh/hr		Q =	903	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.22			y=	0.10			y=	0.21			y=	#DIV/0!		
L =	0.37			L=	0.18			L=	0.29			L=			
n =	3	lane		n =	4	lane		n =	2	lane		n =	0	lane	
X ' =	0.77			X ' =	0.73			X ' =	0.72			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.40			Z =	-0.47			Z =	-0.28			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	22	vehs		N =	16	vehs		N =	15	vehs		N =	#DIV/0!	vehs	
Avg queue length =	44	metres		Avg queue leng	24	metres		Avg queue length	44	metres		Avg queue length	#DIV/0!	metres	
Average delay =	29.4	seconds		Average delay	42.5	seconds		Average delay =	36.6	seconds		Average delay =	#VALUE!	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J13 - Prince Edward Road West / Boundary Street / Grampian Road	Ref. No.:			
Scheme:	Design	Design year:	2036		
		Designed by:	RC	Checked by:	PK
Arm A:	Prince Edward Road West WB				
Arm B:	Boundary Street EB				
Arm C:	Junction Road SB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Prince Edward Road W	3	39	120	1210	5950	1.2	42	115	1315	5950	1.2
Boundary Street EB	4	26	120	945	7495	1.2	21	115	740	7495	1.2
Junction Road SB	2	39	120	900	3735	1.2	33	115	775	3735	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Prince Edward Road W	81	0.32	0.63	33.6	37		35	42	45	45	45
Boundary Street EB	94	0.21	0.59	26.3	36		43	29	31	31	31
Junction Road SB	81	0.32	0.75	25.0	29		37		51	51	51
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Prince Edward Road W	73	0.37	0.60	35.0	37		30	40	44	44	44
Boundary Street EB	94	0.18	0.53	19.7	28		43	23	24	24	24
Junction Road SB	82	0.29	0.72	20.6	27		38	43	44	44	44
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Prince Edward Road West WB	**45**	**44**
Arm B:	Boundary Street EB	**31**	**24**
Arm C:	Junction Road SB	**51**	**44**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

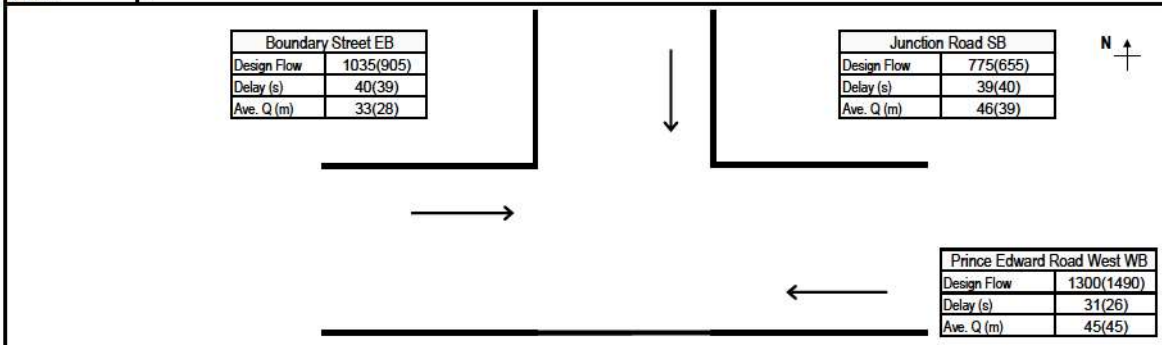
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	1008	veh/hr		q '=	788	veh/hr		q '=	750	veh/hr		q '=	#DIV/0!		veh/hr
c=	120	sec		c=	120	sec		c=	120	sec		c=	0	sec	
S '=	4958	veh/hr		S '=	6246	veh/hr		S '=	3113	veh/hr		S '=	#DIV/0!		veh/hr
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.63			X=	0.59			X=	0.75			X=	#DIV/0!		
Q =	1608	veh/hr		Q =	1340	veh/hr		Q =	1004	veh/hr		Q =	#VALUE!		veh/hr
y=	0.20			y=	0.13			y=	0.24			y=	#DIV/0!		
L =	0.32			L=	0.21			L=	0.32			L=			
n =	3	lane		n =	4	lane		n =	2	lane		n =	0	lane	
X ' =	0.76			X ' =	0.74			X ' =	0.73			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	TRUE			X > X '	#DIV/0!		
Z =	-0.37			Z =	-0.41			Z =	-0.25			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.1	vehs		No=	#DIV/0!		vehs
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	23	vehs		N =	21	vehs		N =	17	vehs		N =	#DIV/0!		vehs
Avg queue length =	45	metres		Avg queue leng	31	metres		Avg queue lengtl	51	metres		Avg queue lengtl	#DIV/0!		metres
Average delay =	34.4	seconds		Average delay	42.4	seconds		Average delay =	36.7	seconds		Average delay =	#VALUE!		seconds

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	1096	veh/hr		q=	617	veh/hr		q=	646	veh/hr		q=	#DIV/0!		veh/hr
c=	115	sec		c=	115	sec		c=	115	sec		c=	115	sec	
S=	4958	veh/hr		S=	6246	veh/hr		S=	3113	veh/hr		S=	#DIV/0!		veh/hr
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.60			X=	0.53			X=	0.72			X=	#DIV/0!		
Q =	1829	veh/hr		Q =	1154	veh/hr		Q =	903	veh/hr		Q =	#VALUE!		veh/hr
y=	0.22			y=	0.10			y=	0.21			y=	#DIV/0!		
L =	0.37			L=	0.18			L=	0.29			L=			
n =	3	lane		n =	4	lane		n =	2	lane		n =	0	lane	
X ' =	0.77			X ' =	0.73			X ' =	0.72			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.40			Z =	-0.47			Z =	-0.28			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	22	vehs		N =	16	vehs		N =	15	vehs		N =	#DIV/0!		vehs
Avg queue length =	44	metres		Avg queue leng	24	metres		Avg queue lengtl	44	metres		Avg queue lengtl	#DIV/0!		metres
Average delay =	29.4	seconds		Average delay	42.4	seconds		Average delay =	36.6	seconds		Average delay =	#VALUE!		seconds

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J13 - Prince Edward Road West / Boundary Street / Grampian Road	Ref. No.:			
Scheme:	Design (with improvement)	Design year:	2037		
		Designed by:	RC	Checked by:	PK
Arm A:	Prince Edward Road West WB				
Arm B:	Boundary Street EB				
Arm C:	Junction Road SB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Prince Edward Road W	3	45	120	1300	5950	1.2	49	115	1490	5950	1.2
Boundary Street EB	4	29	120	1035	7495	1.2	27	115	905	7495	1.2
Junction Road SB	2	35	120	775	3805	1.2	30	115	655	3805	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Prince Edward Road W	75	0.37	0.59	36.1	38		31	41	45	45	45
Boundary Street EB	91	0.25	0.56	28.8	37		40	31	33	33	33
Junction Road SB	85	0.29	0.70	21.5	27		39	44	46	46	46
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Prince Edward Road W	66	0.43	0.58	39.7	36		26	40	45	45	45
Boundary Street EB	88	0.23	0.51	24.1	33		39	26	28	28	28
Junction Road SB	85	0.26	0.67	17.4	24		40	37	39	39	39
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Prince Edward Road West WB	**45**	**45**
Arm B:	Boundary Street EB	**33**	**28**
Arm C:	Junction Road SB	**46**	**39**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

For conditions where the flow is near or even exceeds the capacity (X > X'):

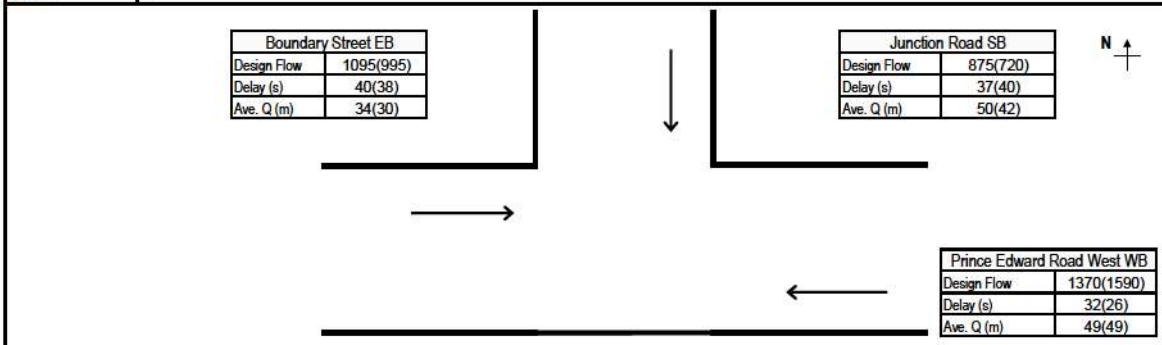
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	1083	veh/hr		q '=	863	veh/hr		q '=	646	veh/hr		q '=	#DIV/0!	veh/hr	
c=	120	sec		c=	120	sec		c=	120	sec		c=	0	sec	
S '=	4958	veh/hr		S '=	6246	veh/hr		S '=	3171	veh/hr		S '=	#DIV/0!	veh/hr	
t=	1	hr		t=	1	hr		t=	1	hr		t=	1	hr	
X=	0.59			X=	0.56			X=	0.70			X=	#DIV/0!		
Q =	1842	veh/hr		Q =	1532	veh/hr		Q =	928	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.22			y=	0.14			y=	0.20			y=	#DIV/0!		
L =	0.37			L=	0.25			L=	0.29			L=			
n =	3	lane		n =	4	lane		n =	2	lane		n =	0	lane	
X ' =	0.77			X ' =	0.76			X ' =	0.72			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.41			Z =	-0.44			Z =	-0.30			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs	
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	23	vehs		N =	22	vehs		N =	15	vehs		N =	#DIV/0!	vehs	
Avg queue length =	45	metres		Avg queue leng	33	metres		Avg queue lengtl	46	metres		Avg queue lengtl	#DIV/0!	metres	
Average delay =	30.3	seconds		Average delay	39.6	seconds		Average delay =	37.7	seconds		Average delay =	#VALUE!	seconds	

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	1242	veh/hr		q=	754	veh/hr		q=	546	veh/hr		q=	#DIV/0!	veh/hr	
c=	115	sec		c=	115	sec		c=	115	sec		c=	115	sec	
S=	4958	veh/hr		S=	6246	veh/hr		S=	3171	veh/hr		S=	#DIV/0!	veh/hr	
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5	hr	
X=	0.58			X=	0.51			X=	0.67			X=	#DIV/0!		
Q =	2125	veh/hr		Q =	1465	veh/hr		Q =	820	veh/hr		Q =	#VALUE!	veh/hr	
y=	0.25			y=	0.12			y=	0.17			y=	#DIV/0!		
L =	0.43			L=	0.23			L=	0.26			L=			
n =	3	lane		n =	4	lane		n =	2	lane		n =	0	lane	
X ' =	0.78			X ' =	0.75			X ' =	0.71			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.42			Z =	-0.49			Z =	-0.33			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!	vehs	
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	23	vehs		N =	18	vehs		N =	13	vehs		N =	#DIV/0!	vehs	
Avg queue length =	45	metres		Avg queue leng	28	metres		Avg queue lengtl	39	metres		Avg queue lengtl	#DIV/0!	metres	
Average delay =	25.0	seconds		Average delay	38.3	seconds		Average delay =	38.2	seconds		Average delay =	#VALUE!	seconds	

QUEUE LENGTH CALCULATION [SIGNALIZED JUNCTION]

ATKINS
Member of the SNC-Lavalin Group

Job Title:	KC-017	Job No.:	5205867		
Junction:	J13 - Prince Edward Road West / Boundary Street / Grampian Road	Ref. No.:			
Scheme:	Design (with improvement)	Design year:	2040		
		Designed by:	RC	Checked by:	PK
Arm A:	Prince Edward Road West WB				
Arm B:	Boundary Street EB				
Arm C:	Junction Road SB				
Arm D:	-				



GREEN TIME, CYCLE TIME AND FLOWS DATA

		AM					PM				
	Number of Lanes, n	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p	Effective Green, g (sec)	Cycle Time, c (sec)	Design Flow, q (pcu/hr)	Saturation Flow, S (pcu/hr)	PCU Factor, p
Prince Edward Road W	3	43	120	1370	5950	1.2	49	115	1590	5950	1.2
Boundary Street EB	4	29	120	1095	7495	1.2	28	115	995	7495	1.2
Junction Road SB	2	37	120	875	3805	1.2	31	115	720	3805	1.2
-											

AM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Prince Edward Road W	77	0.36	0.64	38.1	40		32	45	49	49	49
Boundary Street EB	91	0.24	0.60	30.4	38		40	33	34	34	34
Junction Road SB	83	0.31	0.74	24.3	29		37		50	50	50
-											

PM PEAK QUEUE LENGTH CALCULATION

	Effective Red, r (sec)	Effective Green Ratio, L	Degree of Saturation, X	Average Arrival Rate, M (veh/cycle)	Maximum Queue (vehs)*		Estimated Delay, d(sec)	Average Queue Length, L1 (m)	Average Queue Length, L2 (m)	Average Queue Length, L3 (m)	Average Queue Length (m)
Prince Edward Road W	66	0.43	0.63	42.3	37		26	44	49	49	49
Boundary Street EB	87	0.24	0.55	26.5	35		38	28	30	30	30
Junction Road SB	84	0.27	0.71	19.2	25		40	41	42	42	42
-											

RESULT SUMMARY

		AM Average Queue Length (m)	PM Average Queue Length (m)
Arm A:	Prince Edward Road West WB	**49**	**49**
Arm B:	Boundary Street EB	**34**	**30**
Arm C:	Junction Road SB	**50**	**42**
Arm D:	-		

Effective Red, r = c-g
Effective Green Ratio, L = g/c
Degree of Saturation, X = q/(SL)
Average Arrival Rate, M = qc/3600p
Maximum Queue Length = 6 * Maximum Queue/n
Estimated Delay, d = c(1-L)²/2(1-LX) + 3600pX²/2q(1-X) - 0.65(c/(q/3600p)²)^(1/3)*X^(2+5L) OR by Akcelik's time-dependent expression if X>X'
Average Queue Length, L1 = 6q(r/2+d)/3600pn OR L2 = 6qr/3600pn whichever the greater, OR L3 (Akcelik's time-dependent expression, if X>X')

Max. Queue (1 in 100) adopted.

In accordance with TPDM - Volume 4.2.5.2

** Note: The probability of maximum queue exceeding the critical value are 5% & 1% for 1 in 20 & 1 in 100 cases respectively (TPDM V.4.2. Table 2.5.2.4 & 2.5.2.5)*

Date: 5/13/2022

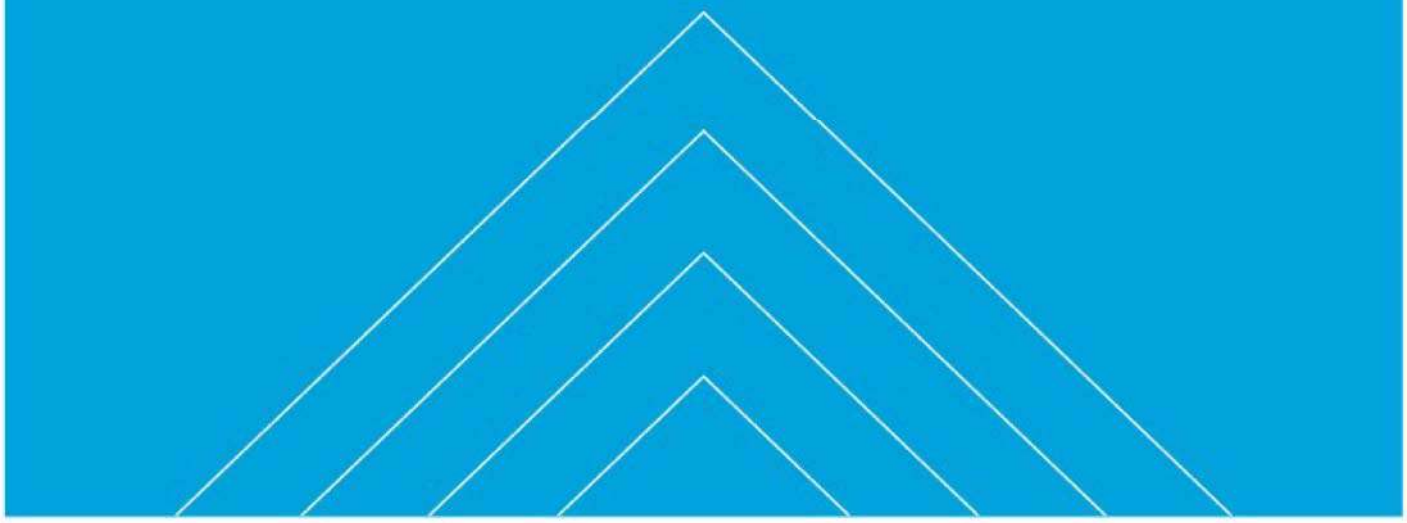
* Remarks ^ Flare lane effect has been considered
vehicle queued at the flare section have been deducted

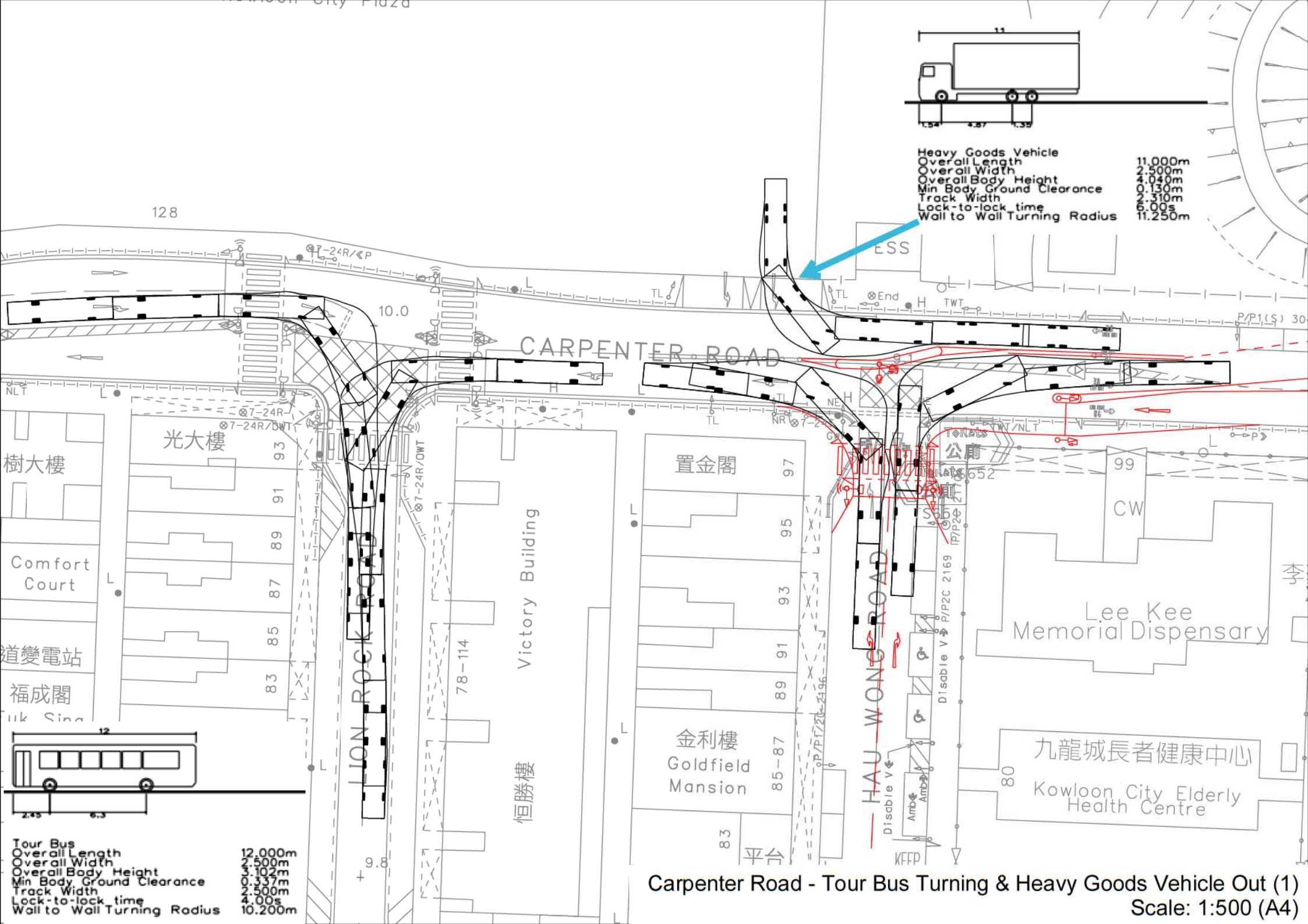
For conditions where the flow is near or even exceeds the capacity (X > X'):

Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
AM	ARM A			AM	ARM B			AM	ARM C			AM	ARM D		
q '=	1142	veh/hr		q '=	913	veh/hr		q '=	729	veh/hr		q '=	#DIV/0!		veh/hr
c=	120	sec		c=	120	sec		c=	120	sec		c=	0		sec
S '=	4958	veh/hr		S '=	6246	veh/hr		S '=	3171	veh/hr		S '=	#DIV/0!		veh/hr
t=	1	hr		t=	1	hr		t=	1	hr		t=	1		hr
X=	0.64			X=	0.60			X=	0.74			X=	#DIV/0!		
Q =	1796	veh/hr		Q =	1524	veh/hr		Q =	987	veh/hr		Q =	#VALUE!		veh/hr
y=	0.23			y=	0.15			y=	0.23			y=	#DIV/0!		
L =	0.36			L=	0.24			L=	0.31			L=			
n =	3	lane		n =	4	lane		n =	2	lane		n =	0	lane	
X ' =	0.77			X ' =	0.75			X ' =	0.72			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	TRUE			X > X '	#DIV/0!		
Z =	-0.36			Z =	-0.40			Z =	-0.26			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.1	vehs		No=	#DIV/0!		vehs
Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)				Avg stop-line queue at start of green (in vehs)			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	24	vehs		N =	23	vehs		N =	17	vehs		N =	#DIV/0!		vehs
Avg queue length =	49	metres		Avg queue leng	34	metres		Avg queue length	50	metres		Avg queue length	#DIV/0!		metres
Average delay =	31.7	seconds		Average delay	40.2	seconds		Average delay =	37.2	seconds		Average delay =	#VALUE!		seconds

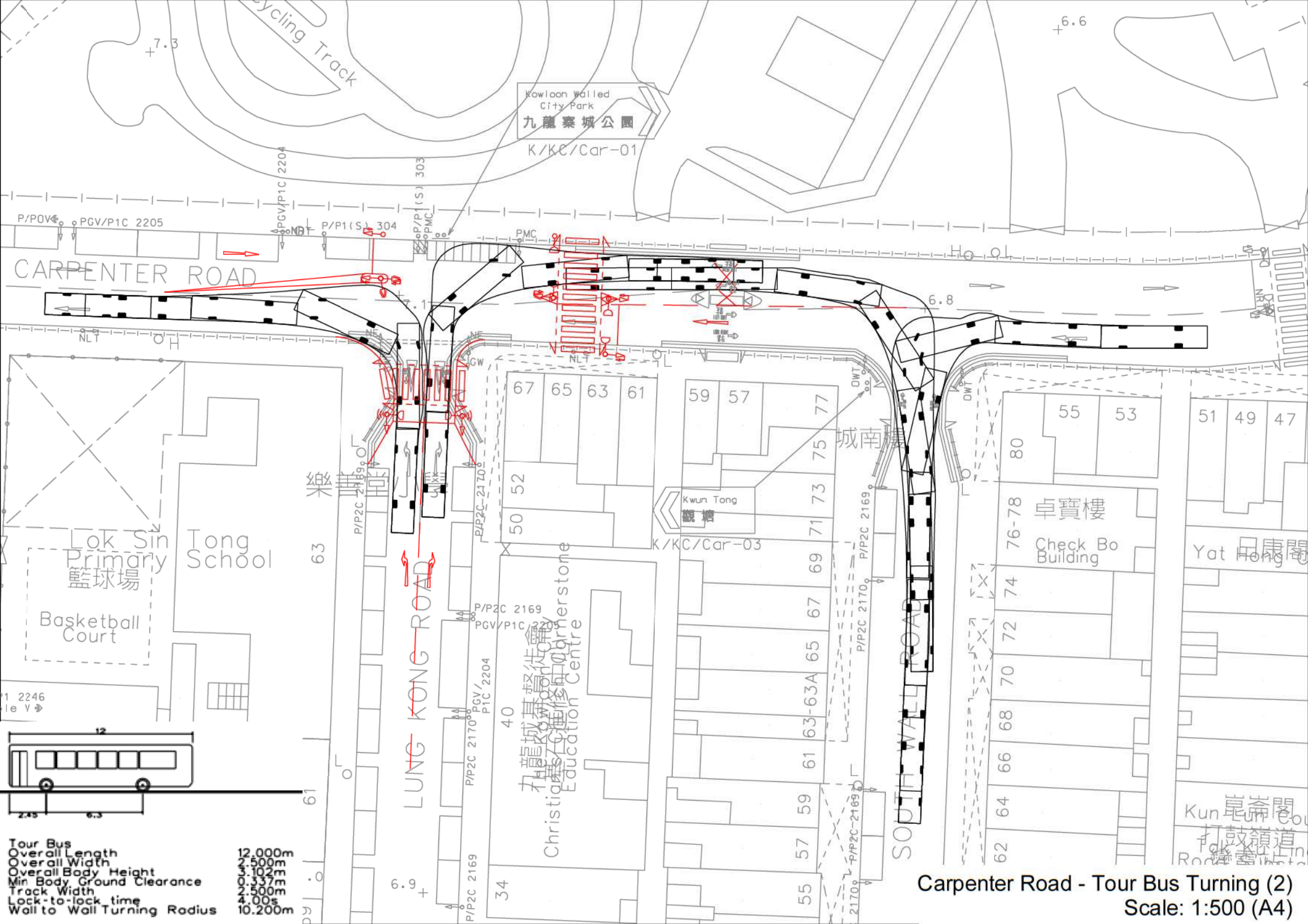
Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula				Akcelik's time -dependent formula			
PM	ARM A			PM	ARM B			PM	ARM C			PM	ARM D		
q=	1325	veh/hr		q=	829	veh/hr		q=	600	veh/hr		q=	#DIV/0!		veh/hr
c=	115	sec		c=	115	sec		c=	115	sec		c=	115		sec
S=	4958	veh/hr		S=	6246	veh/hr		S=	3171	veh/hr		S=	#DIV/0!		veh/hr
t=	0.5	hr		t=	0.5	hr		t=	0.5	hr		t=	0.5		hr
X=	0.63			X=	0.55			X=	0.71			X=	#DIV/0!		
Q =	2113	veh/hr		Q =	1508	veh/hr		Q =	850	veh/hr		Q =	#VALUE!		veh/hr
y=	0.27			y=	0.13			y=	0.19			y=	#DIV/0!		
L =	0.43			L=	0.24			L=	0.27			L=			
n =	3	lane		n =	4	lane		n =	2	lane		n =	0	lane	
X ' =	0.78			X ' =	0.75			X ' =	0.72			X ' =	#DIV/0!		
X > X '	FALSE			X > X '	FALSE			X > X '	FALSE			X > X '	#DIV/0!		
Z =	-0.37			Z =	-0.45			Z =	-0.29			Z =	#DIV/0!		
No=	0.0	vehs		No=	0.0	vehs		No=	0.0	vehs		No=	#DIV/0!		vehs
Average Queue				Average Queue				Average Queue				Average Queue			
N= qr + No				N= qr + No				N= qr + No				N= qr + No			
N =	24	vehs		N =	20	vehs		N =	14	vehs		N =	#DIV/0!		vehs
Avg queue length =	49	metres		Avg queue leng	30	metres		Avg queue length	42	metres		Avg queue length	#DIV/0!		metres
Average delay =	25.8	seconds		Average delay	38.1	seconds		Average delay =	38.0	seconds		Average delay =	#VALUE!		seconds

Appendix C – Swept Path Analysis

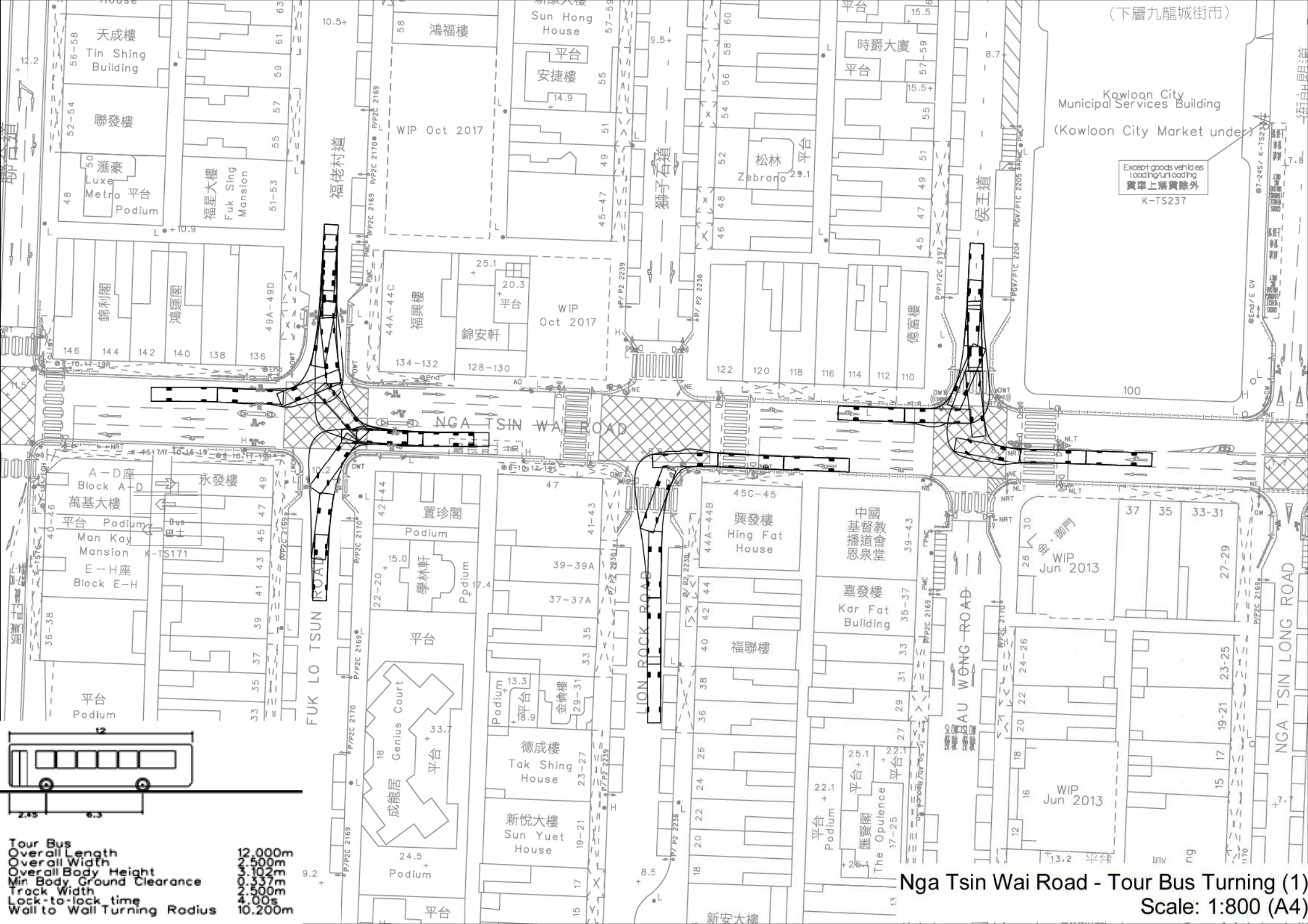




Carpenter Road - Tour Bus Turning & Heavy Goods Vehicle Out (1)
Scale: 1:500 (A4)

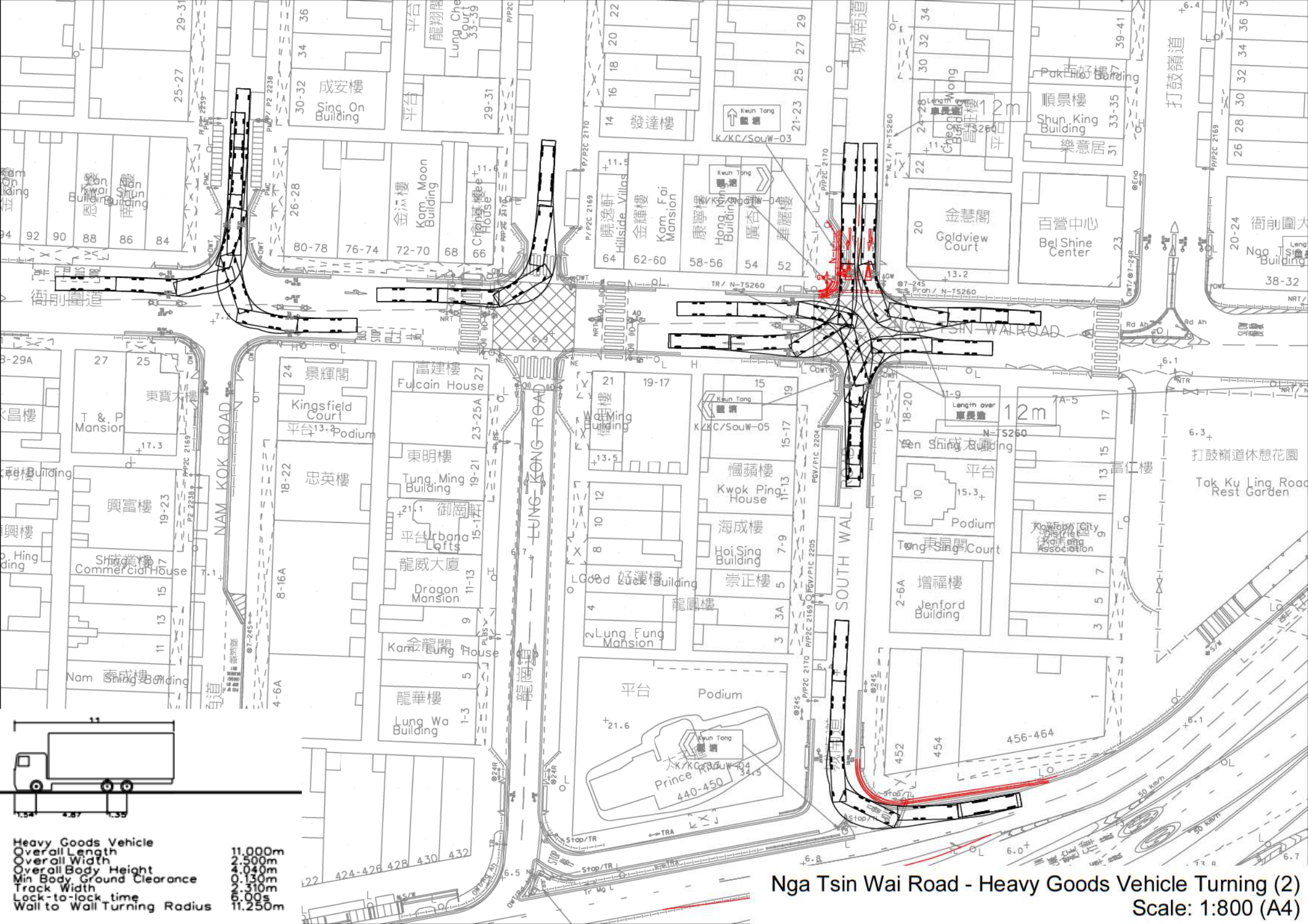


Carpenter Road - Tour Bus Turning (2)
Scale: 1:500 (A4)



Nga Tsin Wai Road - Tour Bus Turning (1)

Scale: 1:800 (A4)



Nga Tsin Wai Road - Heavy Goods Vehicle Turning (2)

Scale: 1:800 (A4)

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Appendix 7

Environmental Assessment (EA) Report

SNC·LAVALIN ATKINS Member of the SNC-Lavalin Group

Urban Renewal Authority

Nga Tsin Wai Road / Carpenter Road Development Scheme

(KC-017)

Environmental Assessment

May 2022

Notice

This document and its contents have been prepared and are intended solely for Urban Renewal Authority's information and use in relation to the Draft Development Scheme Plan in Kowloon City.

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Document history

Revision	Purpose description	Originated	Checked	Reviewed	Authorised	Date
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Rev 1	Final Submission for URA review	Various	Benjamin TANG	Funny WU	Wing WONG	May 2022

Client signoff

Client	Urban Renewal Authority
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1. Introduction

1.1. Background

1.1.1. The Nga Tsin Wai Road / Carpenter Road Development Scheme (KC-017) (the Scheme) is located in Nga Tsin Wai Road area, Lung Tong of the Kowloon City District. With a total gross site area of about 37,061m^2, the Scheme comprises three sites, main site, northern site and eastern site. The main site, comprising the connected Site A and Site C2, is broadly bounded by Carpenter Road, Hau Wong Road, Nga Tsin Wai Road and Lung Kong Road. The northern site (Site B) is located within Carpenter Road Park. The eastern site (Site C1) is broadly bounded by existing buildings to the north and the east, Prince Edward Road East, Tak Ku Ling Road Rest Garden and Tak Ku Ling Road. The location plan is presented in **Figure 1.1**.

1.1.2. Atkins China Limited (Atkins) has been commissioned by URA to conduct an Environmental Assessment (EA) in support of the submission of the Scheme under Section 25 of the Urban Renewal Authority Ordinance (URAO) to the Town Planning Board (TPB).

1.2. Existing Land Use

1.2.1. According to the Approved Ma Tau Kok Outline Zoning Plan (OZP) No. S/K10/28, the Scheme area is currently zoned as "Government, Institution or Community" (G/IC), "Residential (Group A)2" (R(A)2), "Open Space" (O) and "Road". The current zonings of the site from the relevant OZP is shown in **Figure 1.2** sourced from OZP S/K10/28, http://www.ozp.tpb.gov.hk.

1.3. Purpose of this EA

1.3.1. The purpose of this EA is to assess the potential environmental impacts associated with the implementation of the Scheme and support submission of the draft DSP for approval from the TPB. The EA Report has been undertaken with reference to Chapter 9 "Environment" of the Hong Kong Planning Standards and Guidelines (HKPSG).

1.4. Scope of this EA

1.4.1. The EA Report would be prepared to assess the potential environmental impacts associated with the proposed Scheme covering Noise Impact Assessment, Air Quality Impact Assessment, Waste Management Implications and Land Contamination Appraisal.

1.4.2. The potential environmental impacts would be assessed against HKPSG. Environmental mitigation measures would be proposed to reduce the environmental impact to an acceptable level.

1.5. Structure of this Report

1.5.1. This EA Report includes, in addition to this introduction, the following sections:

- Section 2 Proposed Development
- Section 3 Air Quality Impact Assessment
- Section 4 Noise Impact Assessment
- Section 5 Waste Management Implications
- Section 6 Land Contamination Appraisal
- Section 7 Conclusion

2. Proposed Development

2.1. Surrounding Environment

2.1.1. The Scheme area is currently occupied by clusters of tenement buildings, a number of GIC facilities including the Kowloon City Municipal Services Buildings (KCMSB), Kowloon City Lions Club Health Centre (KCLCHC) and the Lee Kee Memorial Dispensary (LKMD). Part of the existing Carpenter Road Park (CRP) is also included in the Scheme.

2.1.2. The Scheme area and its vicinity are predominately a residential neighbourhood, with mainly tenement buildings and commercial uses such as retail shops and eateries at ground floors. Scattered commercial buildings and high-rise redeveloped residential buildings are also found in the area. To the north of the Scheme Area is the Carpenter Road Park (CRP) and the Kowloon Walled City Park.

2.2. Proposed Development

2.2.1. The Scheme comprises main site[1] (Sites A and C2), northern site (Site B) and eastern site (Site C1). The main site and eastern site are proposed to be rezoned to "R(A)". Site B is proposed to be rezoned to "GIC". The net site area for Plot Ratio calculation in the R(A) zone of the Scheme is about 25,302sq.m., subject to site survey.

2.2.2. Under current notional design, the main site (Site A and Site C2) is proposed to be developed into 7 high-rise residential buildings with retail and GIC facilities at the podium. Nga Tsin Wai Road and Nam Kok Road within the Scheme are proposed to be pedestrianized to enhance the walkability and provide space for at-grade landscaped diversified space. About 4 storeys basement car park are also proposed at the main site for loading/unloading bays and private car parking spaces. At Site B, it is proposed to develop a new GIC complex for re-provisioning

[1] The net site area has excluded the three new road sections in the Scheme (the two new private streets proposed at the main site (Sites A and C2) and the new diverted road at the eastern site (Site C1), and the surrounding pavement of the Scheme. Should there be later departmental comments for a smaller net site area, the technical assessments conducted based on the development potential from this net site area (i.e. 25,302sq.m.) would be considered as the worst case scenario for the proposed development of the draft DSP.

of the KCMSB, LKMD and KCLCHC; and to accommodate new GIC facilities to meet community needs. At Site C1, diversion of the existing Kai Tak Road/ Nga Tsin Wai Road is proposed to provide new at-grade gateway square and retail facilities to serve as an enlarged gateway from Kai Tak Development Area (KTDA).

2.2.3. **Figures 2.1** and **2.2a to 2.2b** illustrate the notional design and section plans of the proposed scheme, subject to detailed design. The key development parameters are given in **Table 2.1**.

Table 2.1 Key Development Parameters

Site	Net Site Area (m^2)	Current Land Use	Proposed Development Parameters				Proposed Development		
			Proposed Zoning	Uses	Max. Building Height (mPD)	Approx. GFA	Estimated No. of Flats	Residential Tower No. (T)/Others	Basement carpark
A	13,353	R(A)2 + Road	R(A)	Residential cum retail	160mPD	Dom:106,824sq.m. Non-dom:13,353sq.m.	2,297	T5, T6, T7, T8	4 levels
B	6,600	Open Space	GIC	G/IC Complex	100mPD	-	-	1 GIC Block	3 levels
C1	8,582	R(A)2 + Road	R(A)	Retail + POS	40mPD or 3 storeys	Non-dom: 2,000sq.m.	-	1 Retail Block	-
C2	3,367	G/IC	R(A)	Residential cum retail	160mPD	Dom:95,592sq.m. Non-dom:11,949sq.m.	2,056	T1, T2, T3	4 levels

2.3. Tentative Completion Years/Operation Programme

2.3.1. The proposed development is proposed to be implemented by phases, subject to actual implementation progress. The tentative completion programme for each sub-sites of the Scheme is illustrated in **Table 2.2**. It will be subject to change at detailed design and implementation stages.

Table 2.2 Tentative Completion/Operation Programme

Site	Anticipated Completion Year
A	2034
B	2030
C1	2033
C2	2037

3. Air Quality Impact Assessment

3.1. Introduction

3.1.1. This section demonstrates air quality compliance of the proposed Scheme based on the notional scheme layout with HKPSG. The potential air quality impacts associated with the proposed development during construction and operational phases will be addressed. The potential air quality impacts associated with the construction works are identified and evaluated. During operation, any chimney emissions and vehicular emissions impact from nearby open roads on existing and planned air sensitive receivers (ASRs) within the development sites based on the Scheme layout will also be evaluated. Practical mitigation measures are proposed to minimise air quality impacts.

3.2. Baseline Conditions

3.2.1. It is anticipated that the future background air quality would be improving due to the air quality management system documented in the report "A Clean Air Plan for Hong Kong 2035" released by the Environmental Bureau in June 2021.

Predicted Background Air Quality

3.2.2. Pollutants in the Atmosphere and their Transport over Hong Kong version 2.1 (PATH v2.1) is the latest available model developed and updated by EPD to predict future air quality from 2022 to 2025 over the entire Pearl River Delta region including Hong Kong. For the purpose of this assessment, background air quality has been predicted based on hourly concentration data extracted from the PATH v2.1 model. The Study Area (i.e., within 500m from the boundary of the development sites) is covered by the PATH v2.1 Grids (41, 35), (41, 34), (42,35) and (42, 34).

3.2.3. Given that tentative completion years/operation programme of the Scheme is between 2030 and 2037 for the four sites, the predicted concentration data from all four future years in PATH v2.1 (i.e. 2022 to 2025) will be assessed. **Table 3.1** provides a summary of the maximum background levels amongst 2022 to 2025 compared against the prevailing Air Quality Objectives (AQOs), which have been implemented on 1 January 2022.

Table 3.1 Maximum Predicted Background Concentrations (from Year 2022-25)

Pollutants	Parameters	Maximum Background Air Concentration in PATH v2.1 for relevant grids (2022-2025)				Prevailing AOQs ($\mu g/m^3$)
		(41,35)	(41,34)	(42,35)	(42,34)	
RSP (PM_{10})	10th highest 24-hour	62	64	62	64	100 (9)
	Annual	27	28	27	27	50
FSP ($PM_{2.5}$)	36th highest 24-hour	24	24	23	24	50 (35)
	Annual	15	15	15	15	25
NO_2	19th highest 1-hour	114	126	110	120	200 (18)
	Annual	19	23	19	21	40

Note:
1. Data Source: EPD Website (https://path.epd.gov.hk/).
2. Concentration adjustments for RSP (daily, annual) and FSP (annual) are made in accordance with EPD's "Guidelines on Choice of Models and Model Parameters".

3.2.4. It can be seen that all the predicted maximum pollutant concentrations for RSP, FSP and NO_2 at all four grid cells comply with the AQOs.

3.3. Impact Evaluation and Mitigation Measures during Construction Phase

3.3.1. The potential sources of air quality impact associated with proposed construction activities have been identified and these include:

- Demolition of existing structures;
- Site clearance works;
- Excavation and foundation works;
- Material storage and handling; and
- Operation of on-site vehicle and diesel-powered plants.

3.3.2. Considering the nature and scale of the development, excavation works are anticipated to be localized and confined within the development sites. With the implementation of the dust reduction measures stipulated in the Air Pollution Control (Construction Dust) Regulation and good site practices, adverse fugitive dust impacts during the construction phase are not anticipated.

Mitigation Measures

3.3.3. The Contractor shall operate dust reduction measures in accordance with the requirements of the Air Pollution Control (Construction Dust) Regulation. The requirement of the regulation has been summarised as below:

- Water spraying on any dusty materials before loading and unloading; stockpile of dusty materials; area where demolition work is carried out; area where excavation or earth moving activities are carried out; and any unpaved main haul road;
- Provide hoarding of not less than 2.4 m high from ground level along the site boundary which is next to a road or other public area;
- Provide effective dust screens, sheeting or netting to enclose any scaffolding built around the perimeter of a building;
- Cover or shelter any stockpile of dusty materials;
- Dispose of any dusty materials collected by fabric filters or other pollution control system in totally enclosed containers;
- Properly treat any exposed earth, such as by compacting or hydro seeding, within 6 months after the last construction activity;
- Provide vehicle washing facilities at all site exits to wash away any dusty materials from vehicle body and wheels before they leave the site; and
- Cover any dusty load on vehicles before they leave the site.

3.3.4. The Contractor shall use Non-road Mobile Machinery approved under Air Pollution Control (Non-road Mobile Machinery) (Emission) Regulation. The Contractor should consider connecting construction plant and equipment to mains electricity supply and avoid use of diesel generators and diesel-powered equipment as far as practicable to minimize air quality impact arising from this equipment.

3.3.5. In addition to the dust reduction measures stipulated in the regulation, good site practices to minimise the dust generation shall be undertaken by the Contractor are listed as follows:

- Avoid storage of dusty materials, including stockpiles and bags of cement, within the project site as far as possible;
- Minimize the drop height during loading and unloading;

- Avoid the handling of dusty materials at open area; and
- Limit the speed of vehicles within the construction project site to below 8km/h.

3.3.6. With the implementation of the above proposed mitigation measures, it is anticipated that the fugitive dust emission from the construction works of the development would be readily minimised.

3.4. Impact Evaluation and Mitigation Measures during Operational Phase

Industrial Emission

3.4.1. Desktop study and site survey on 19 November 2021 were conducted to review whether there are any potential sources of industrial emissions within the Study Area. With reference to Table 3.1 of HKPSG, for industrial chimney emission, the minimum recommended buffer distance from active and passive recreational use should be greater than 200m, where the difference in height between industrial chimney exit and the site is less than 20m. Taking this into consideration as a worst-case scenario, no active chimneys were identified within 200m of the Development Site Boundary in the desktop study and during the site survey. As such, in accordance with HKPSG, adverse air quality impact from chimney emission sources on the development sites is not anticipated.

Vehicular Emission

3.4.2. The main site (Sites A and C2) is planned for residential development and Site B for GIC facilities, which they are surrounded by Carpenter Road, Hau Wong Road, Lung Kong Road and Nga Tsin Wai Road. Site C1, which is planned for retail development and at-grade gateway square is bounded by Prince Edward Road East, Tak Ku Ling Road, Kai Tak Road and future diversionary road crossing between the proposed retail area and gateway square. As confirmed by the traffic consultant, all roads are classified as “Local Distributor (LD)” except for Prince Edward Road East being classified as “Primary Distributor”.

3.4.3. With reference to Table 3.1 of Chapter 9 of HKPSG, there is a list of recommended minimum buffer distance required between roads and active open spaces. The minimum setback distance of active open space from road kerb of nearby roads are summarised in **Table 3.2**. Such buffer distance will be adopted as a basis for assessing the ASRs in the proposed development. Based on the proposed development layouts and air buffer zones shown in **Figure 3.1**, the horizontal separation distances comply with the HKPSG recommended buffer distance. To this end, adverse air quality impact due to the surrounding vehicular emissions is not expected to occur.

Table 3.2 Setback Distance from Road Kerbs to the Development Layouts

Site No.	Road Name	Type of Road	HKPSG Setback Distance	Meeting Setback Distance
A	Carpenter Road	Local Distributor	5m	Yes
	Lung Kong Road	Local Distributor	5m	
	Nga Tsin Wai Road	Local Distributor	5m	
B	Carpenter Road	Local Distributor	5m	Yes
C1	Prince Edward Road East	Primary Distributor	20m	Yes
	Tak Ku Ling Road	Local Distributor	5m	Yes
	Kai Tak Road	Local Distributor	5m	Yes
	Future diversionary road	Local Distributor	5m	Yes
C2	Carpenter Road	Local Distributor	5m	Yes
	Hau Wong Road	Local Distributor	5m	Yes
	Nga Tsin Wai Road	Local Distributor	5m	Yes

Other Sources

3.4.4. The Kowloon City Hau Wong Temple at Junction Road is located within the air quality study area which is located approximately 200m northwest of the development site B. There are occasional joss paper burning activities within the temple.

3.4.5. Considering the infrequent use of the joss paper burner, the installation of Best Available Technology (BAT) system and the implementation of the good operational practices and administrative measures, adverse air quality nuisance arising from joss paper burning is not expected.

Mitigation Measures

3.4.6. As detailed design of the development is not yet available, the positioning of the future fresh air intakes for the proposed retail shop at Site C1 and the GIC Complex at Site B (both assuming there will be installation of central air-conditioning system) shall follow the HKPSG buffer distance requirement to be provided at the locations meeting the minimum buffer distance as indicated in **Figure 3.1**.

3.4.7. For the design of future at-grade gateway square at Site C1, as indicated in **Figure 3.1** is designed as amenity space for leisure and recreation uses, there shall be sufficient buffer distance with Prince Edward Road East, which is a Primary Distributor, in accordance with the HKPSG requirements for "active and passive recreational uses" (>20m), "passive recreational uses" (3-20m) and "amenity areas" (<3m).

4. Noise Impact Assessment

4.1. Introduction

4.1.1. This section demonstrates noise compliance of the proposed development based on the notional scheme layout with HKPSG. The potential noise impacts associated with the proposed development during construction and operational phases will be addressed. The potential noise impacts associated with the construction works are identified and evaluated. During operation, any road traffic from nearby open roads and fixed plant noise impact on the planned noise sensitive receivers (NSRs) within the development sites based on the Scheme layout will also be evaluated. Practical mitigation measures are proposed to reduce noise impacts.

4.2. Existing Background Noise

4.2.1. The noise environment is predominately by road traffic from open roads including Carpenter Road, Hau Wong Road, Nga Tsin Wai Road, and Prince Edward Road East. Several fixed noise sources are identified in the vicinity of the development sites such as cooling towers and air-cooled chillers located at the podium of Regal Oriental Hotel.

4.3. Assessment Criteria

Road Traffic Noise

4.3.1. The HKPSG has stipulated the road traffic noise criteria of various types of noise sensitive uses which they are summarized in **Table 4.1**. HKPSG road traffic noise criteria of $L_{10(1\ hour)}$ 70 dB(A) is applicable to the proposed development at the main site (Sites A and C2) which are for residential use. Given that the proposed development at Site B is for G/IC complex and Site C1 for retail use, both will be installed with air conditioning system and do not rely on openable window for ventilation, the relevant noise standards under HKPSG would not be applicable to these noise sensitive uses at Site B and Site C1. Road traffic noise impact assessment will therefore be undertaken only for residential developments at the main site as NSRs.

Table 4.1 HKPSG Road Traffic Noise Criteria

Uses	Road Traffic Noise $L_{10(1\ hour)}$, dB(A)
Domestic premises	70
Hotels and hostels	70
Offices	70
Educational institutions	65
Places of public worship and courts of law	65
Hospitals & clinics	55
Note: The above standards apply the uses which rely on openable windows for ventilation	

Fixed Plant Noise

4.3.2. Fixed noise sources impacting on existing uses are regulated under the NCO, which requires that impacts shall comply with the ANL laid down in Table 2 of IND-TM.

4.3.3. In setting the ANL, reference has been made to the Area Sensitive Rating (ASR) in Table 1 of IND-TM (as reproduced in **Table 4.2**) corresponding to the nature of area where NSRs are located.

Table 4.2 Area Sensitivity Rating

Type of Area Containing NSR	Degree to which NSR is affected by Influencing Factor (IF)		
	Not Affected	Indirectly Affected	Directly Affected
Rural area, including country parks or village type developments	A	B	B
Low density residential area consisting of low-rise or isolated high-rise developments	A	B	C
Urban area	B	C	C
Area other than those above	B	B	C

4.3.4. The HKPSG also states that in order to plan for a better environment, all planned fixed noise sources should be located and designed that when assessed in accordance with IND-TM, the level of the intruding noise at the façade of the nearest existing sensitive use should be at least 5 dB(A) below the appropriate ANL shown in Table 2 of IND-TM or, in the case of the background being 5 dB(A) lower than the ANL, should not be higher than the background. The ANLs in IND-TM are provided in **Table 4.3**.

Table 4.3 Acceptable Noise Levels for Fixed Plant Noise

Time Period	Area Sensitivity Rating (ASR)		
	A	B	C
Daytime (0700-1900 hours)	60	65	70
Evening (1900-2300 hours)			
Night-time (2300-0700 hours)	50	55	60

4.3.5. Residential developments and education institutions are located in the vicinity of the Development, hence the type of area containing the NSRs is considered as "Urban Area". According to the Annual Traffic Census 2020, Prince Edward Road East and West located within 300m study area have an annual average daily traffic flow in excess of 30,000, which is considered as an influencing factor (IF). As these two major roads are blocked by the surrounding buildings and therefore not affected by IF, an Area Sensitivity Rating of B is adopted as the assessment criteria.

4.4. Impact Evaluation and Mitigation Measures during Construction Phase

4.4.1. The potential major noise sources associated with the construction activities include demolition of existing structures and the use of Powered Mechanical Equipment (PME) for foundation works.

4.4.2. It is anticipated that the construction works will be conducted during daytime, i.e., the non-restricted hours between 07:00 and 19:00 hours on any day except Sunday and general holiday. When any construction works involving PME is required to be carried out during the restricted hours (19:00 – 07:00 hours of the next day on any day and anytime during Sunday or general holiday), a Construction Noise Permit (CNP) shall be obtained under the Noise Control Ordinance.

4.4.3. During construction phase, construction activities may impose noise impacts on the NSRs if they are not properly controlled and scheduled. Considering that the proposed development is confined within the development sites and no extensive construction activities will be involved, no adverse construction noise impact is expected with the implementation of appropriate noise control measures as recommended below.

Mitigation Measures

4.4.4. The mitigation measures as per the requirements stated in Practice Note PN2/93 "Noise from Construction Activities – Non-statutory Controls" should be adopted to minimise the potential noise impacts. These include:

- Scheduling of work – This includes minimizing noise operations during examination periods; avoiding simultaneous operation of noise equipment; retaining existing features that can act as noise barrier until the last phase; and erecting, as early as possible, any new structures which will have the effect of screening noise sources. Such screens can reduce noise levels by 15 dB(A) or more.

- Siting of facilities – Noisy equipment, such as emergency generators and water pumps, should always be sited as far as possible from noise sensitive receivers. Consideration should also be given to using structures such as site offices and stored as noise barriers.

- Selection of Quiet PME – Quiet PME is defined as PME whose actual Sound Power Level (SWL) is less than the value purpose-built acoustic panels or enclosures around construction site boundaries can effectively protect nearby residential development, schools and other noise sensitive receivers. This has been the case for a number of tunnel and excavation Projects as well as for concrete batching activities. The use of re-usable metal acoustic panels has been made more attractive recently with the government's requirement to minimize the use of hardwood hoarding.

4.4.5. The Contractor will apply a CNP as per the requirements under Noise Control Ordinance if required.

4.4.6. With the implementation of mitigation measures discussed above, adverse noise impacts are not expected to result from the proposed development during construction phase.

4.4.7. Adoption of quiet PME is one of the most effective measures and is increasingly practicable because of the availability of quiet equipment. Reference can be made to EPD's QPME Label Database. For example, the use of hydraulic concrete cutters and crushers in demolition work, instead of excavator-mounted percussive breakers, can achieve a noise reduction of up to 20 dB(A) and totally remove the annoying impulsive nature of the latter. Other quiet construction equipment /method would be identified as far as practicable and as according to relevant Buildings Ordinance/Regulations.

4.5. Impact Evaluation and Mitigation Measures during Operational Phase

Road Traffic Noise Impacts on the Development

4.5.1. Road traffic noise impact assessment for the identified NSRs of the development at the main site (Sites A and C2) has been carried out using the NoiseMap model, which is a computerized model developed on the basis of the UK Department of Transport's Calculation of Road Traffic Noise (CRTN) procedures, which is a method accepted by EPD for use in Hong Kong.

4.5.2. Existing roads and future diversionary road at development site C1 crossing between the proposed retail area and at-grade gateway square within 300m from the development sites A and C2 have been included in the assessment.

4.5.3. All residential flats of the four building towers at Site A and three building towers at Site C2 where it will rely on openable windows for ventilation have been identified as representative NSRs. **Figures 4.1A** to **4.1G** illustrate the locations of road noise assessment points (NAPs) and **Table 4.4** summarizes them.

Table 4.4 Representative NSRs for Road Noise Impact Assessment

Unit No.	Site C2									Site A											
	Tower 1			Tower 2			Tower 3			Tower 5			Tower 6			Tower 7			Tower 8		
	Noise Assessment Point ID																				
1	T1_1_L	T1_1_B		T2_1_L	T2_1_B		T3_1_L	T3_1_B1	T3_1_B2	T5_1_L	T5_1_B1	T5_1_B2	T6_1_L	T6_1_B1	T6_1_B2	T7_1_L	T7_1_B		T8_1_L	T8_1_B1	T8_1_B2
2	T1_2_L	T1_2_B		T2_2_L	T2_2_B		T3_2_L	T3_2_B1	T3_2_B2	T5_2_L	T5_2_B		T6_2_L	T6_2_B1	T6_2_B2	T7_2_L	T7_2_B		T8_2_L	T8_2_B1	T8_2_B2
3	T1_3_L	T1_3_B		T2_3_L	T2_3_B		T3_3_L	T3_3_B		T5_3_L	T5_3_B		T6_3_L	T6_3_B1	T6_3_B2	T7_3_L	T7_3_B		T8_3_L	T8_3_B1	T8_3_B2
4	T1_4_L	T1_4_B		T2_4_L	T2_4_B		T3_4_L	T3_4_B1	T3_4_B2	T5_4_L	T5_4_B		T6_4_L	T6_4_B		T7_4_L	T7_4_B1	T7_4_B2	T8_4_L	T8_4_B1	T8_4_B2
5	T1_5_L	T1_5_B1	T1_5_B2	T2_5_L	T2_5_B		T3_5_L	T3_5_B1	T3_5_B2	T5_5_L	T5_5_B		T6_5_L	T6_5_B		T7_5_L	T7_5_B1	T7_5_B2	T8_5_L	T8_5_B1	T8_5_B2
6	T1_6_L	T1_6_B1	T1_6_B2	T2_6_L	T2_6_B1	T2_6_B2	T3_6_L	T3_6_B1	T3_6_B2	T5_6_L	T5_6_B1	T5_6_B2	T6_6_L	T6_6_B		T7_6_L	T7_6_B1	T7_6_B2	T8_6_L	T8_6_B1	T8_6_B2
7	T1_7_L	T1_7_B		T2_7_L	T2_7_B1	T2_7_B2	T3_7_L	T3_7_B1	T3_7_B2	T5_7_L	T5_7_B1	T5_7_B2	T6_7_L	T6_7_B		T7_7_L	T7_7_B		T8_7_L	T8_7_B	
8	T1_8_L	T1_8_B		T2_8_L	T2_8_B		T3_8_L	T3_8_B		T5_8_L	T5_8_B		T6_8_L	T6_8_B		T7_8_L	T7_8_B		T8_8_L	T8_8_B1	T8_8_B2
9	T1_9_L	T1_9_B1	T1_9_B2	T2_9_L	T2_9_B		T3_9_L	T3_9_B		T5_9_L	T5_9_B		T6_9_L	T6_9_B1	T6_9_B2	T7_9_L	T7_9_B1	T7_9_B2	T8_9_L	T8_9_B1	T8_9_B2
10	T1_10_L	T1_10_B1	T1_10_B2	T2_10_L	T2_10_B		T3_10_L	T3_10_B1	T3_10_B2	T5_10_L	T5_10_B		T6_10_L	T6_10_B1	T6_10_B2	T7_10_L	T7_10_B1	T7_10_B2	T8_10_L	T8_10_B1	T8_10_B2
11	T1_11_L	T1_11_B1	T1_11_B2	T2_11_L	T2_11_B		T3_11_L	T3_11_B1	T3_11_B2	T5_11_L	T5_11_B		T6_11_L	T6_11_B1	T6_11_B2	T7_11_L	T7_11_B1	T7_11_B2	T8_11_L	T8_11_B1	T8_11_B2
12	T1_12_L	T1_12_B1	T1_12_B2	T2_12_L	T2_12_B1	T2_12_B2	T3_12_L	T3_12_B1	T3_12_B2	T5_12_L	T5_12_B		T6_12_L	T6_12_B1	T6_12_B2	T7_12_L	T7_12_B1	T7_12_B2	T8_12_L	T8_12_B1	T8_12_B2
13	T1_13_L	T1_13_B		T2_13_L	T2_13_B1	T2_13_B2	T3_13_L	T3_13_B1	T3_13_B2	T5_13_L	T5_13_B					T7_13_L	T7_13_B		T8_13_L	T8_13_B1	T8_13_B2
14	T1_14_L	T1_14_B		T2_14_L	T2_14_B1	T2_14_B2	T3_14_L	T3_14_B1	T3_14_B2	T5_14_L	T5_14_B								T8_14_L	T8_14_B	
15	T1_15_L	T1_15_B		T2_15_L	T2_15_B		T3_15_L	T3_15_B1	T3_15_B2	T5_15_L	T5_15_B								T8_15_L	T8_15_B1	T8_15_B2
16	T1_16_L	T1_16_B1	T1_16_B2				T3_16_L	T3_16_B1	T3_16_B2	T5_16_L	T5_16_B1	T5_16_B2							T8_16_L	T8_16_B1	T8_16_B2
17	T1_17_L	T1_17_B1	T1_17_B2				T3_17_L	T3_17_B1	T3_17_B2	T5_17_L	T5_17_B										
18	T1_18_L	T1_18_B								T5_18_L	T5_18_B1	T5_18_B2									
19	T1_19_L	T1_19_B																			
20	T1_20_L	T1_20_B																			

4.5.4. **Table 4.5** shows the anticipated completion years/occupation years of the proposed development at different sites.

Table 4.5 Traffic Noise Assessment Year

Site	Anticipated Completion Year	15 Years upon Completion
A	2034	2049
C2	2037	2052

4.5.5. The assessment has been undertaken based on the projected peak hourly traffic flow in Year 2049 for Site A and 2052 for Site C2, which corresponds to the maximum projected traffic conditions within 15 years upon occupancy of the proposed development. The traffic flow forecast for Year 2049 and Year 2052 provided by the Traffic Consultant is presented in **Appendix 4.1 and was submitted to** Transport Department for endorsement.

Predicted Road Traffic Noise Impact (Base Scenario)

4.5.6. Careful building setback and building orientation together with podium design has been incorporated into the Scheme layout to protect the future NSRs from potential road traffic noise impact as far as possible. The building orientation has been designed, where practicable, with a view to reducing direct line of sight to major roads and providing self-screening to flats facing inside. With the current Scheme, building setback has been adopted to increase the separation between the road and residential development to minimise the road noise impact. The residential towers are designed to be sitting on top of the podium. This podium design would provide additional vertical separation distance between the road and residential units.

4.5.7. The predicted peak hourly road traffic noise levels at the selected representative NSRs based on the Scheme layout plan under base scenario (without mitigation measures in place at-receiver) are summarized in **Table 4.6**. Predicted road traffic noise results (base scenario) are presented in **Appendix 4.2**.

Table 4.6 Predicted Road Traffic Noise Levels (Base Scenario)

Tower	Total of NAPs	Max. Predicted, $L_{10(1\ hour)}$ dB(A)	Compliance with the Standard of $L_{10(1\ hour)}$ 70 dB(A) (Yes / No)
T1	1968	59.6	Yes
T2	1435	61.0	Yes
T3	1764	67.0	Yes
T5	1763	61.7	Yes
T6	1116	67.8	Yes
T7	1320	64.9	Yes
T8	1656	67.4	Yes

4.5.8. It can be seen from **Table 4.6**, all assessment points with openable windows for ventilation under base scenario are complied with the noise criteria for residential use (i.e. 70 dB(A)). With careful layout design, no adverse road traffic noise is anticipated.

Fixed Plant Noise Impacts on the Development

4.5.9. Desktop study and site survey have been conducted to identify fixed plant noise sources within 300m Study Area. The Site is mainly surrounded by low-rise residential buildings, small scale retail shops and open space such as Kowloon Walled City Park and Carpenter Road Park. No industrial area is situated adjacent to the proposed development. The surrounding major fixed plant noise sources within 300m study area that may affect the future NSRs of the development are summarized in **Table 4.7** and illustrated in **Figure 4.2**.

Table 4.7 Identified Major Fixed Noise Sources

Source ID	Location	Type of Fixed Plant	Quantity	Operation Time	Approximate Shortest Horizontal Separation Distance from the Nearest NSRs	Direct Line of Sight from Future Residential Use?
S1	Rooftop of Regal Oriental Hotel	Main Exhaust Fan	8	24 hours	260m	No
S2	Podium of Regal Oriental Hotel	Cooling Tower	2	24 hours	260m	No
S3	Podium pf Billionnaire Royale	VRV [1]	12	08:00 to 19:00	216m	No
S4	Podium of Le Billionnaire	VRV [1]	11	N/A [2]	281m	No
S5	Rooftop of Bel Shine Center	Cooling Tower	4	24 hours [3]	100m	No
S6	Rooftop of Tung Sing Court	Cooling Tower	4	24 hours [3]	123m	No
S7	Rooftop of Kowloon City Exchange	VRV [1]	16	24 hours [4]	24m	Yes
S8	Rooftop of E.F.C.C. Grace Church	VRV [1]	14	08:00 to 21:00 [5]	39m	Yes

Note:

1. VRV air-conditioning system (i.e. a multi-spilt type air conditioner that uses variable refrigerant flow control).
2. As confirmed with the management of Le Billionnaire, VRV units located at the podium of the building are for backup purpose and will not be operated under normal condition. Correspondences with the management of Le Billionnaire are provided in **Appendix 4.3**.
3. The cooling towers installed on the rooftop of residential buildings are assumed to be operated for 24 hours as a conservative approach.
4. Since no information on the operation time of VRVs installed on the rooftop of Kowloon City Exchange is available at the time of preparing this report, it is assumed that all VRVs are operated for 24 hours as a conservative approach. The fixed noise impact assessment will be updated once the details of fixed noise sources are available.
5. Since no information on the operation time of VRVs installed on the rooftop of E.F.C.C. Grace Church is available at the time of preparing this report, it is assumed that all VRVs are operated between 08:00 to 21:00 based on the operation hours of the Church (see **Appendix 4.4**). The fixed noise impact assessment will be updated once the details of fixed noise sources are available.

4.5.10. Considering the distant separation from the identified major fixed noise sources at S1 to S6 and there is no direct line of sight from the future NSR of the development, no adverse fixed noise impact generated from the fixed plants at the Regal Oriental Hotel, Billionnaire Royale, Le Billionnaire, Bel Shine Center and Tung Sing Court on the future residential use is expected to occur. Hence, S1 to S6 have been excluded from the assessment.

4.5.11. The assessment of the fixed noise sources was conducted in accordance with the following standard acoustic principle:

$$SPL_{NSR} = SPL_{mesarued} - DAC + FC + BC$$

Where SPL_{NSR} = Predicted façade noise level at NSR, dB(A)

$SPL_{measured}$ = Sound Pressure Level at measurement point, dB(A)

DAC = Distance attentuation correction, dB(A), $20 \log_{10} (D_0/D_{NSR})$, dB(A)

where

D_0 is the distance from noise source during site measurement

D_{NSR} is the source – receiver seperation distance in metres

FC = Façade correction of 3 dB(A)

BC = Barrier correction,
-10 dB(A) if the noise soruce is screened,
otherwise 0 dB(A)

4.5.12. The total predicted façade noise level (SPL) contributed from adjacent identified fixed noise sources at representative NSR is then calculated by the following formula:

$$\text{Total } SPL_{NSR} = 10 \log_{10} \Sigma\ 10\ \hat{}\ (SPL_i / 10)$$

Where Total SPL_{NSR} = Total predicted façade noise level from all noise sources in the calculations, dB(A)

SPL_i = Predicted façade noise level at receiver by individual noise source, dB(A)

4.5.13. Acceptable Noise Level (ANL) will be adopted for the cumulative noise from all the identified sources. The predicted noise levels at NSRs from the fixed noise sources by adopting standard acoustics principles were compared with the noise criteria to determine whether mitigation measures shall be adopted.

4.5.14. Since no information on the model of the VRVs installed on the rooftop of Kowloon City Exchange and E.F.C.C. Grace Church is available at the time of preparing this report, the sound power levels of the VRVs are assumed based on the catalogue available in the market (see **Appendix 4.5**).

4.5.15. Representative NSRs of the Development (i.e. T3_11_B1 and T7_4_L) have been selected for assessment as they are close to the noise sources. Locations of the representative NSRs are illustrated in **Figure 4.3**. The assessment results are summarised in **Table 4.8** below and detailed in **Appendix 4.6**.

Table 4.8 Fixed Plant Noise Impact Assessment Results

NSR ID	Description	Daytime and Evening (0700-2300 hours)			Night-time (2300-0700 hours)		
		Predicted Fixed Plant Noise Level at Façade, dB(A)	Criteria, dB(A)	Compliance	Predicted Fixed Plant Noise Level at Façade, dB(A)	Criteria, dB(A)	Compliance
T3_11_B1	Tower 3	53	65	Yes	N/A [1]	N/A [1]	N/A [1]
T7_4_L	Tower 7	53	65	Yes	53	55	Yes

Note:
1. It is assumed that all VRVs installed on the rooftop of E.F.C.C. Grace Church are not operated during night-time.

4.5.16. Based on the fixed plant noise impact assessment results, the predicted accumulative noise levels at the representative NSRs will comply with relevant noise criteria. As such, adverse fixed plant noise impacts on the Development are not anticipated.

Fixed Plant Noise Impacts from the Development

4.5.17. As central air ventilation will be provided for retail area and clubhouse, the associated cooling towers, chillers and ventilation system installed for the basement car park may cause noise impact to the surrounding NSRs. However, retail area will be closed outside operation hours and the associated cooling towers and chillers are expected to stop during night-time. To avoid the noise impact arising from these fixed plants, the location and orientation of the fixed noise sources will be well designed to avoid, as far as practicable, to have direct facing to the surrounding NSRs. With the appropriate noise barrier installed at the cooling towers and chillers within the Scheme, if necessary and practicable, the noise impact due to the fixed plant of the proposed development would not be anticipated.

5. Waste Management Implications

5.1. Introduction

5.1.1. This section demonstrates waste management of the proposed development. The potential waste management implications associated with the proposed development during construction and operational phases will be addressed. The types of wastes will be identified that are likely to be generated during the construction and operational phases of the development. Potential implications associated with these wastes will also be evaluated. Practical mitigation measures are proposed to reduce waste impacts.

5.2. Impact Evaluation and Mitigation Measures during Construction Phase

5.2.1. The construction activities of this development will involve demolition of existing structures, site clearance, and foundation works. These activities are expected to generate a variety of wastes which can be divided into categories based on their composition and ultimate method of disposal. The identified waste types include:

- Construction and demolition (C&D) materials;
- Potential asbestos containing materials;
- Chemical wastes; and
- General refuse.

5.2.2. The nature of each type of waste arising and an evaluation of the potential implications associated with these wastes are provided below.

Construction and Demolition Materials

5.2.3. C&D materials will be generated during construction phase. The inert portion of C&D materials will comprise rocks, soil, broken concrete, building debris while non-inert portion will comprise bamboo scaffolding, wooden formwork, paper packing of construction materials and other organic materials. It was estimated that the total quantity of inert C&D materials and non-inert C&D materials generated would be around 486,000 m^3 and 13,280 m^3 respectively during the whole construction phase. However, the exact quantities of C&D materials are still subject to design when more details are confirmed at later stage.

5.2.4. The inert C&D materials will be reused on-site as backfilling materials as far as practicable. It was estimated that part of inert C&D materials to be re-used (around 56,000 m^3). The reuse/recycling of all materials on site should be investigated by the Contractor in a later stage. Other possible reuse/recycle of inert C&D materials includes re-use as fill material in other concurrent construction project or recycle of hard material (e.g. broken concrete/rock) in recycling facility for aggregates production.

5.2.5. The surplus inert C&D materials which cannot be reused during the construction works of the Development will be transported at the appropriate public fill reception facilities available at the time of construction, and a license is required to be issued by the Civil Engineering & development Department (CEDD). The Public Fill Committee in consultation with relevant Project Department is responsible for identifying suitable site for public filling. The non-inert C&D materials will be reused and recycled as far as practicable, and the surplus will be disposed of at landfill site.

Chemical Waste

5.2.6. Chemicals are expected to be used during the construction activities for the development. These may include surplus adhesives, spent paints, petroleum products, spent lubrication oil, grease and mineral oil, spent acid and alkaline solutions/solvent and other chemicals. Accidental spillage of chemicals in the works areas may contaminate the surface and sub-surface soils.

5.2.7. The volume of chemical waste that will be generated will depend on the total number of plants and vehicles, and how much maintenance is actually required to be carried out on site by the Contractor. In the view of the scale of the development and the nature of construction activities, the estimated quantity of chemical waste generated during construction phase of the development would be small and is expected to approximate 200L per month. However, the final quantity is subject to the Contractors on-site maintenance practices and the number of mechanical plant and vehicles utilised on-site.

5.2.8. Provided the waste is properly handled, stored and disposed of, no adverse impacts will result from the handling, transportation and disposal of a minimal quantity of chemical waste arising from the development.

5.2.9. Building demolition may possibly generate asbestos waste as the existing building insulation materials likely contain asbestos. Asbestos waste is categorized as chemical waste under the Waste Disposal (Chemical Waste) Regulation. An asbestos investigation should be conducted by a registered asbestos consultant prior to demolition of existing building structure. The investigation should reveal the presence, quantity and location of Asbestos Containing Materials (ACM). Asbestos waste will be handled in accordance with the Code of Practice on the Handling, Transportation and Disposal of Asbestos Waste issued by EPD. No adverse impacts are expected with the implementation of proper waste management.

General Refuse

5.2.10. Small amount of refuse such as waste papers, packaging material and food wastes generated by the construction workforce is anticipated. The amount of general refuse that may be produced is dependent on size of workforce at site. The approximate number of construction workers for this development is estimated to be 40 people in average per day during construction phase. With reference to the Monitoring of Solid Waste in Hong Kong 2020, the domestic waste disposal rate is 0.91 kg per capita per day. Based on the above assumptions, the estimated quantity of general refuse generated during construction will be approximately 36 kg per day.

5.2.11. Such refuse will be collected on-site, separately from C&D materials by an appropriate waste collector employed by the Contractor to the landfills. There will be no canteen provided on-site.

5.2.12. Prior to disposal off-site, such wastes will have to be temporarily put in a suitably covered storage area where it will have to be regularly cleaned and maintained to avoid attracting vermin and pests. With proper on-site handling and storage as well as regular disposal of these wastes, no adverse impacts are anticipated.

5.2.13. To minimize the disposal quantities of general refuse, recycle bins for different types of recyclable waste should be provided together with general refuse bins. Arrangements should be made with the recycling Contractor to collect the recycled material regularly. The Contractor shall provide briefing for workers regarding avoiding, reducing, reusing and recycling of general refuse during induction training.

5.2.14. The estimation of the volume of C&D materials and other waste are shown in **Table 5.1**.

Table 5.1 Estimation Quantities of C&D Materials and Different Types of Waste Generated during the Construction Phase

Materials/Waste Type	Quantity to be Generated	Quantity to be Reused	Recommended Outlet
Inert C&D Materials (Total)	Approximate 486,000 m^3	Approximate 56,000 m^3	Reuse on-site as far as practicable. The surplus is proposed to be delivered to Public Fill Reception Facilities
Non-inert C&D Materials (Total)	Approximate 13,280 m^3	-	Sorted for re-used and recycling before disposal of at landfill
Chemical Waste	Approximate 200L per month	-	Licensed Chemical Waste Treatment Centre (CWTC) at Tsing Yi, or other licensed chemical waste treatment / disposal facilities
General Refuse	Approximate 36kg/day	-	Landfill

Note:
The estimated quantities of C&D materials/ chemical waste/ general refuse are based on the preliminary programme. The waste arising will largely depend on the Contractor works programme and activities.

Mitigation Measures

5.2.15. Adverse waste management impact is not anticipated as mentioned above, good site practices are still provided for future Contractor. In line with the Hong Kong Government's position on waste minimisation, the practice of avoiding and minimising waste generation and waste recycling should be adopted as far as practicable throughout the construction phase. C&D Material Management Plan (C&DMMP) would be required according to the "Project Administrative Handbook Chapter 4, Section 4.1.3". Recommended mitigation measures to be implemented includes:

- The Contractor will submit an Environmental Management Plan (EMP) prior to the commencement of construction works, in accordance with the ETWB TC(W) No.19/2005 which will provide an overall framework of waste management and reduction. The Contractor will submit the Environmental Management Plan to URA for endorsement prior to the commencement of the construction works. Such plan will incorporate site-specific factors, such as the designation of areas for the segregation and temporary storage or reusable and recyclable material;
- The Contractor's waste management practices and effectiveness should also be audited by the URA on a regular basis;

- The reuse/recycling of all materials on site should be investigated and exhausted prior to treatment/disposal off-site;
- Good site practices should be adopted from the commencement of works to avoid the generation of waste, reduce cross contamination of waste and to promote waste minimisation;
- All C&D materials should be sorted on-site into inert and non-inert C&D materials, and where the materials can be recycled or reused, they should be further segregated. Inert material, or public fill will comprise stone, rock, masonry, brick, concrete and soil which is suitable for land reclamation and site formation whilst non-inert materials include all other wastes generated from the construction process such as plastic packaging and vegetation (from site clearance);
- The Contractor should be responsible for identifying what materials can be recycled/reused, whether on-site or off-site. In the event of the latter, the Contractor should make arrangements for the collection of the recyclable materials. Any remaining non-inert waste after segregation of reusable and recyclable material should be collected and disposed of to the Landfill Areas whilst any inert C&D materials should be re-used on site as far as possible. Alternatively, if no use of the inert materials can be found on-site, the materials can be delivered to a public fill reception facility after obtaining the appropriate licence;
- In order to monitor the disposal of inert C&D materials and solid waste at public fill reception facilities and landfills, and to control fly-tipping, a trip ticket system shall be implemented by the Contractor, in accordance with the contract and the requirements of DEVB TCW No. 6/2010;
- Under the Waste Disposal (Chemical Waste) (General) Regulation, the Contractor shall register as a chemical waste producer if chemical wastes such as spent lubricants, paints, etc. are generated onsite. The chemical waste should be collected by licensed collectors for subsequent disposal at the Chemical Waste Treatment Centre (CWTC) at Tsing Yi or other licensed chemical waste treatment/ disposal facilities by licensed collectors. The handling, storage, transportation and disposal of chemical wastes shall be conducted in accordance with the Code of Practice on the Packaging, Labelling

and Storage of Chemical Wastes and A Guide to the Chemical Waste Control Scheme both published by the EPD.

- A sufficient number of covered bins should be provided onsite for the containment of general refuse to prevent visual impacts and nuisance to the sensitive surroundings. These bins should be cleared daily, and the collected waste disposed of to the nearest refuse transfer station. Further to the issue of DEVB TCW No. 8/2010, the Contractor is required to maintain a clean and hygienic site throughout the Project works;
- Sufficient recycling bins should be placed at prominent places at the construction site to encourage recycling. A 4-bin recycling system for paper, metals, plastics and glass should be adopted. All recyclable materials should be collected by recyclers;
- Open stockpiles of C&D material should be covered with tarpaulin or similar fabric during rainstorms.
- Toolbox talks should be provided to workers about the concepts of site cleanliness and appropriate waste management procedures, including waste reduction, reuse and recycling; and
- The Contractor shall comply with all relevant statutory requirements and guidelines and their updated versions that may be issued during the course of the construction.

5.3. Impact Evaluation and Mitigation Measures during Operational Phase

General Refuse

5.3.1. During operation phase, domestic waste is expected to be generated from the operation of the development as the major type of waste. General refuse, including food waste, paper waste and office waste, will be arise from daily activities of different user groups. The generated domestic waste will be collected and disposed of regularly.

5.3.2. With the implementation of good waste management practices at the Site, the environmental impacts caused by storage, handling, transport and disposal of general refuse are expected to be minimal.

Chemical Waste

5.3.3. Chemical waste is expected to be generated from the proposed development, such as spent acid and non-halogenated organic. The corresponding operators will be registered as a Chemical Waste Producer (CWP) and will inform EPD in writing of any changes to the particulars of the registration including any change of waste types, contact telephone number/person, etc.

5.3.4. The requirements in the Waste Disposal Ordinance (WDO) and Waste Disposal (Chemical Waste) (General) Regulation should be followed, where applicable, in handling of chemical waste. A trip-ticket system should be operated in accordance with the Waste Disposal (Chemical Waste) (General) Regulation to monitor all movements of chemical waste which would be collected by a licensed collector to a licensed facility for final treatment and disposal.

Clinical Wastes

5.3.5. Clinical wastes would be generated from medical and health facilities (i.e. KCLCHC and LKMD), which include sharps, dressing and other wastes dribbling and caked with blood, etc. It is potentially infectious and bio-hazardous and shall be segregated from ordinary refuse and collected separately for proper disposal.

5.3.6. Storage, handling, transport and disposal of clinical wastes should be arranged in accordance with the *Waste Disposal (Clinical Waste) (General) Regulation (Cap. 354O) and the Code of Practice for the Management of Clinical Waste - Major Clinical Waste Producers and Waste Collection*. Materials classified as clinical waste will require special handling and storage arrangement and to be collected by the Chemical Waste Treatment Centre (CWTC) or other licensed collectors for appropriate treatment at the Chemical Waste Treatment Centre (CWTC).

Mitigation Measures

5.3.7. Domestic waste should be collected on a daily basis and delivered to the refuse collection point accordingly. A reputable waste collector should be employed to remove general refuse regularly to avoid odour nuisance or pest/vermin problem. Sufficient recycling containers are recommended to be provided at suitable locations of the development to encourage recycling of waste such as aluminium cans, plastics and wastepaper.

5.3.8. For storage, handling, transport and disposal of clinical and chemical wastes, it should be arranged in accordance with the Code of Practice for the Management of Clinical Waste - Major Clinical Waste Producers and Waste Collection published by the EPD and the Waste Disposal (Chemical Waste) (General) Regulations respectively. The clinical wastes shall be collected by the Chemical Waste Treatment Centre (CWTC) or other licensed collectors.

6. Land Contamination Appraisal

6.1. Introduction

6.1.1. This section identifies and assesses any potential land contamination issues within the development sites based on historical and existing land use and to propose remediation measures if necessary.

6.1.2. The relevant legislation, standards and guidelines include the following:

- Guidance Note for Contaminated Land Assessment and Remediation (Guidance Note)
- Practice Guide for Investigation and Remediation of Contaminated Land (Practice Guide)
- Guidance Manual for Use of Risk-based Remediation Goals for Contaminated Land Management (Guidance Manual)

6.2. Land Contamination Appraisal

Review of Historical Aerial Photos

6.2.1. Historical aerial photos and topographic maps were reviewed to identify previous land uses at the development sites and any previous contaminative activities. Information obtained from the review of the historical aerial photos are summarized in **Table 6.1**. Extracted aerial photos from 1963 to 2019 are presented in **Appendix 6.1**.

Table 6.1 Review of Historical Aerial Photographs

Year	Description of Land Use*	Potential Land Contamination (Yes/No)
1963	Site A & Ste C1: residential tenement buildings Site B: squatter settlements – San Tau New Village Site C2: Clinics (Lee Kee Memorial Dispensary), Timber Yard & Sawmill, auto workshop, bazaar and market	Yes, for auto workshop
1973	Site A & Ste C1: similar to 1963 Site B: similar to 1963 Site C2: Clinics (Lee Kee Memorial Dispensary, Kowloon City Maternity & Child Health Centre), bazaar and market	No
1982	Site A & Ste C1: similar to 1973. South-eastern portion of Site C1 formed part of Nga Tsin Wai Road connecting to Kai Tak Road. Site B: similar to 1973 in the eastern portion. Portion of squatter village in the western portion were demolished.	No

Year	Description of Land Use*	Potential Land Contamination (Yes/No)
	Site C2: similar to 1973	
1993	Site A & Ste C1: similar to 1982 Site B: San Tau New Village was demolished and converted into Carpenter Road Park Site C2: Clinics (Lee Kee Memorial Dispensary & maternity homes). Bazaar was demolished and become Kowloon City Municipal Services Building	No
2001	Similar to 1993	No
2004	Similar to 2001	No
2010	Similar to 2004	No
2015	Site C2: Clinics (Lee Kee Memorial Dispensary, Kowloon City Lions Club Health Centre) and Kowloon City Municipal Services Building Site A, B and C1: Similar to 2010	No
2019	Similar to 2014	No

Note: * the land use has also made reference to historical topographic map sheet 11-NE-11A.

6.2.2. According to historical aerial photographs, Site A and Site C1 comprised of low-rise residential tenement buildings since 1960s. Site B formed part of squatters settlement of San Tau New Village between 1963 and 1982, which was later demolished in early 1990s for construction of the Carpenter Road Park. Site C2 occupied by Lee Kee Memorial Dispensary (LKMD) and a bazaar along Hau Wong Road since 1950s. A timber yard and sawmill, and an auto workshop were found at Site C2 in 1960s but was later converted into carpark and bazaar in early 1970s. The bazaar was then demolished and replaced by the Kowloon City Municipal Services Building (KCMSB) in 1988.

6.2.3. Land contamination is not anticipated from the previous occupations (i.e. mainly in residential buildings/ villages, park, bazaar/ KCMSB and GIC) within the proposed development sites, except for the land use of auto workshop identified at Site C2 in 1963. The location of auto workshop at Site C2 in 1963 was provided in **Figure 6.1** with reference to historical topography map. The auto workshop is identified as site LC1 for easy reference. Car maintenance/service workshop is anticipated at Site LC1 and detailed in **Table 6.5** below.

Site Inspection

6.2.4. A site inspection was undertaken on 6 January 2022 to identify potential sources and signs of contamination. The Scheme area, situated on urban area in Kowloon City, is predominately a mixed residential neighbourhood with tenement buildings and retail shops (i.e. convenient shops, supermarkets, massage, pet shops, optical shop, electronics stores, currency exchange store) at ground floors, restaurants and cafés, GIC uses including the Kowloon City Municipal Services Building, Lee Kee Memorial Dispensary and the Kowloon City Lions Club Health Centre, as well as the Carpenter Road Park. Land contamination is not anticipated from the current land uses abovementioned. Photos showing the existing site conditions of the Scheme area are presented in **Appendix 6.2**.

6.2.5. However, a few potential land contamination activities/businesses were identified during site inspection. These include electricity sub-stations, vehicle maintenance/servicing workshops, backup generator and fuel storages. The identified potentially contaminated sites are listed below and shown in **Figure 6.2**:

- Site LC2: Carpenter Road Park "B" Sub-station at Site B
- Site LC3: Dangerous Good Store in Kowloon City Lions Club Health Centre
- Site LC4: Transformer Room in Kowloon City Municipal Services Building
- Site LC5: Electricity Sub-Station at Kam Moon Building, 70-72 Nga Tsin Wai Road
- Site LC6: Emergency generator at Man Fat House, 39-41 Nam Kok Road
- Site LC7: Emergency generator at Luen King Mansion, 35-37 Nam Kok Road
- Site LC8: Car maintenance/service workshop at 49A Lung Kong Road
- Site LC9: Car maintenance/service workshop at 55 Lung Kong Road
- Site LC10: Car maintenance/service workshop at 37 Kai Tak Road

Review of Governmental Records

6.2.6. A visit to EPD Environmental Compliance Division, Territorial Control Office, Chemical Waste and WEEE (Licensing and Control Support) Section was conducted on 13 December 2021 to identify any records of Chemical Waste Producers (CWP) within the development sites. The registered CWP were provided in **Table 6.2** and the locations of CWP is shown in **Figure 6.2**.

Table 6.2 Detail on Registered CWPs

ID	Name	Address	Nature of Business	Active / Removed	Land contamination anticipated?
CWP01	Department of Health – Narcotics and Drug Administration Unit 衛生署毒品管理部	99 Carpenter Road, Ma Tau Kok, Kowloon City, Kowloon	Provide Methadone treatment to Opiate abusers	Active	No
CWP02	Hospital Authority – Lee Kee Memorial Dispensary 醫院管理局 李基紀念藥局	99 Carpenter Road, Ma Tau Kok, Kowloon City, Kowloon	General Out-patient Clinic	Active	No
CWP03	Department of Health 衛生署	G/F, Lions Clubs Health Centre, 80 Hau Wong Road, Kowloon City, Kowloon	Government clinic – Elderly health centre	Active	No
CWP04	Department of Health – Kowloon City Lions Clubs Student Health 衛生署 獅子會學生健康服務	1/F, 80 Hau Wong Road, Kowloon City, Kowloon	Clinic	Active	No
CWP05	Brighton Pharmacy Limited 寶萊大藥房有限公司	G/F, 75 Nga Tsin Wai Road, Kowloon City, Kowloon	General chemists and druggists	Active	No
CWP06	KC Station 淖鑾汽車美容	G/F, 53 Nam Kok Road, Kowloon City, Kowloon	Car repair	Active	Yes
CWP07	Fu Po Motor Service Co. 富寶汽車服務公司	Block B, 49B, Lung Kong Road, Kowloon City, Kowloon	Servicing and repairing of motor vehicles	Active	Yes
CWP08	Department of Health (Dental service)	99 Carpenter Road, Kowloon City, Kowloon	Dental service	Removed	No
CWP09	Director of Health	99 Carpenter Road, Kowloon City, Kowloon	Dispensary	Removed	No
CWP10	Chun Yu Motors Trading LTD.	Shop 2, G/F, Fook Chi Building, 59-61 Nam Kok Road, Kowloon City, Kowloon	Repairing and servicing of motor vehicles	Removed	Yes
CWP11	Yu Hing Car Trading Co.	G/F, 19A Lung Kong Road, Kowloon City, Kowloon	Motor vehicle repairing	Removed	Yes

6.2.7. CWP01, CWP02, CWP03, CWP04, CWP05, CWP 08 and CWP09 are not of land contamination concern as they are dispensary only. The chemical waste generated were expired drugs and in small quantity. CWP06, CWP07, CWP10 and CWP11 were car maintenance/servicing workshops. Potential land contamination may be resulted from car maintenance/servicing undertaken at the premises.

6.2.8. CWP07 and CWP11 had the same address as potentially contaminated site LC8. For CWP 06 and CWP 10, they are identified as additional potentially contaminated site LC11 and LC12 as shown in **Figure 6.3**, respectively.

6.2.9. EPD Environmental Compliance Division, Regional Office (East), Kowloon City was also consulted for any chemical spillage/leakage record. No record of spillage/leakage of chemical waste or chemicals was recorded by EPD. The correspondences from EPD are presented in **Appendix 6.3**.

6.2.10. Fire Services Department was consulted for any record of Dangerous Goods (DGs) or incidents records within development sites. Based on FSD's reply on 12 January 2022, there were 2 licensed DGs and 32 incident records. Upon further checking of these locations, 1 licensed DG and 6 incidents were found within the development sites. The licensed DGs and incident records are summarised in **Table 6.3** and **6.4** respectively. The correspondences from FSD are presented in **Appendix 6.4**.

Table 6.3 Licensed DGs from FSD's Reply

Types of DG	Description*	Location	Storage	Quantity	Potential land contamination anticipated?
Cat. 9A	Combustible goods exempted from Sections 6 to 11 of the Ordinance.	G/F, 53 Lung Kong Road	Rubber Tyres	300	No

*Reference to the classification of dangerous goods under *Dangerous Goods Ordinance*, *Cap. 295*

Table 6.4 Summary of Incident Records from FSD's Reply

Date of Incident	Type of Incident	Address
4/2/2019	No.1 Fire Alarm	41 Lung Kong Road
23/5/2019	No.1 Fire Alarm	54 Nam Kok Road
16/8/2019	Rubbish Fire	42 Nam Kok Road
22/9/2019	No.1 Fire Alarm	33-39 Lung Kong Road
3/10/2020	No.1 Fire Alarm	Nam Kok Road
15/5/2021	Rubbish Fire	Nga Tsin Long Road

Site Appraisal

6.2.11. The development sites were situated on urban area in Kowloon City. Site inspections were conducted on 6 January 2022 to identify potential land contaminating land uses within the Site. The identified potentially contaminated sites are detailed in **Figure 6.4**.

Table 6.5 Detail Site Findings on Potentially Contaminated Sites

ID of Potentially Contaminated Site	Site Appraisal and Identification of Potential Land Contaminating Land Use	Potential Contaminant*	Recommended for Further Investigation
LC1	The site was a part of the Kowloon City Municipal Services Building. Land contamination is not anticipated from the current land use as a wet market. With reference to the historical aerial photo review, the site was an auto workshop during early 1960s. Car maintenance/service workshop is anticipated to take place at site LC1. Potential land contamination may be resulted from vehicle maintenance/servicing works.	Potential Contaminants result from vehicle maintenance/servicing works: • Volatile Organic Compounds • Semi Volatile Organic Compounds • Metals • Petroleum Carbon Ranges	Yes
LC2	The site was Carpenter Road Park "B" Sub-station at Site B. However, the substation is not accessible during site inspection. (See Photo02 in **Appendix 6-1**). The substation has been operated since 1987. No other potential land contamination land use was identified in historical aerial photos review.	NIL	Recommend for a more detailed site inspection to determine if further site investigation is required.
LC3	The site was Dangerous Good Store in Kowloon City Lions Club Health Centre at Site C2. The storage was for Cat. 5 dangerous goods (i.e. Substances giving off inflammable vapour). However, the substation is not accessible during site inspection. (See Photo05 in **Appendix 6-1**). The content need to further confirmed with site occupant. The existing building has been established in early 1960s. No other potential land contamination land use was identified in historical aerial photos review.	NIL	Recommend for a more detailed site inspection to determine if further site investigation is required.
LC4	The site was Transformer Room in Kowloon City Municipal Services Building at Site C2. However, the substation is not accessible during site inspection. (See Photo09 in **Appendix 6-1**). The building was established since 1988. No other potential land contamination land use was identified in historical aerial photos review.	NIL	Recommend for a more detailed site inspection to determine if further site investigation is required.
LC5	The site was an electricity Sub-Station at Kam Moon Building, 70-72 Nga Tsin Wai Road at Site A. However, the substation is not accessible during site inspection. (See Photo22 in **Appendix 6-1**). The building was completed in 1985. No other potential land contamination land use was identified in historical aerial photos review.	NIL	Recommend for a more detailed site inspection to determine if further site investigation is required.
LC6	The site was an emergency generator at Man Fat House, 39-41 Nam Kok Road at Site A. However, the room is not accessible during site inspection. (See Photo16 in **Appendix 6-1**). The room may involve storage of diesel fuel that supply to the generator. Potential land contamination may be resulted from handling of diesel fuel. Man Fat House was completed in 1990. It was previously occupied by tenement building. No other potential land contamination land use was identified in historical aerial photos review	Potential Contaminants result from diesel storage tank: • Petroleum Carbon Ranges • PAHs • BTEX	Recommend for a more detailed site inspection to determine if further site investigation is required.

ID of Potentially Contaminated Site	Site Appraisal and Identification of Potential Land Contaminating Land Use	Potential Contaminant*	Recommended for Further Investigation
LC7	The site was an emergency generator at Luen King Mansion, 35-37 Nam Kok Road at Site A. However, the room is not accessible during site inspection. (See Photo17 in **Appendix 6-1**). The room may involve storage of diesel fuel that supply to the generator. Potential land contamination may be resulted from handling of diesel fuel. Luen King Mansion was completed in 1996. The area was previously occupied by is occupied tenement buildings. No other potential land contamination land use was identified in historical aerial photos review.	Potential Contaminants result from diesel storage tank: • Petroleum Carbon Ranges • PAHs • BTEX	Recommend for a more detailed site inspection to determine if further site investigation is required.
LC8	The site was a car maintenance/service workshop at 49A Lung Kong Road at Site A. However, the room is not accessible during site inspection. (See Photo23 in **Appendix 6-1**). The workshop was paved with concrete and situated within the buildings. The operator refused on a detail interview. Vehicle maintenance/servicing works was observed on site during site inspection. Potential land contamination may be resulted from vehicle maintenance/servicing works. The existing building at 49A Lung Kong Road was completed in 1975. No other potential land contamination land use was identified in historical aerial photos review	Potential Contaminants result from vehicle maintenance/servicing works: • Volatile Organic Compounds • Semi Volatile Organic Compounds • Metals • Petroleum Carbon Ranges	Yes
LC9	The site was a car maintenance/service workshop at 55 Lung Kong Road at Site A. However, the room is not accessible during site inspection. (See Photo24 in **Appendix 6-1**). The workshop was paved with concrete and situated within the buildings. The operator refused on a detail interview. Vehicle maintenance/servicing works was observed on site during site inspection. Potential land contamination may be resulted from vehicle maintenance/servicing works. The existing building at 55 Lung Kong Road was completed in 1949. No other potential land contamination land use was identified in historical aerial photos review	Potential Contaminants result from vehicle maintenance/servicing works: • Volatile Organic Compounds • Semi Volatile Organic Compounds • Metals • Petroleum Carbon Ranges	Yes
LC10	The site was a car maintenance/service workshop at 37 Kai Tak Road at Site A. However, the room is not accessible during site inspection. (See Photo30 in **Appendix 6-1**). The workshop was paved with concrete and situated within the buildings. The operator refused on a detail interview. Vehicle maintenance/servicing works was observed on site during site inspection. Potential land contamination may be resulted from vehicle maintenance/servicing works. The existing building at 37 Kai Tak Road was completed in 1967. The area has been high-rise residential buildings since 1963. No other potential land contamination land use was identified in historical aerial photos review	Potential Contaminants result from vehicle maintenance/servicing works: • Volatile Organic Compounds • Semi Volatile Organic Compounds • Metals • Petroleum Carbon Ranges	Yes
LC11	With reference to the CWP register of EPD, the site (53 Nam Kok Road) had been operated as a car maintenance/service workshop. Potential land contamination may be resulted from vehicle maintenance/servicing works. The existing building at 53 Nam Kok Road was completed in 1952. No other potential land contamination land use was identified in historical aerial photos review	Potential Contaminants result from vehicle maintenance/servicing works: • Volatile Organic Compounds • Semi Volatile Organic Compounds • Metals	Yes

ID of Potentially Contaminated Site	Site Appraisal and Identification of Potential Land Contaminating Land Use	Potential Contaminant*	Recommended for Further Investigation
		• Petroleum Carbon Ranges	
LC12	With reference to the CWP register of EPD, the site (59-61 Nam Kok Road) had been operated as a car maintenance/service workshop. Potential land contamination may be resulted from vehicle maintenance/servicing works. The existing building at 59-61 Nam Kok Road was completed in 1992. It was previously occupied by tenement buildings. No other potential land contamination land use was identified in historical aerial photos review	Potential Contaminants result from vehicle maintenance/servicing works: • Volatile Organic Compounds • Semi Volatile Organic Compounds • Metals • Petroleum Carbon Ranges	Yes

Note:

* The proposed chemicals of concern is subjected to review upon detailed site inspection.

Site Investigation and Mitigation Options

6.2.12. Potential contaminated sites have been identified above based upon a desktop study and site inspection of the areas. A few potentially contaminated sites LC1 – LC12 are identified and summarized in **Figure 6.3**.

6.2.13. Upon the Scheme to be approved by CE in C and the URA acquired the properties in the Scheme, site re-appraisal at potentially contaminated sites LC1- LC12 can be conducted, if necessary, to ascertain any contamination issues. If any potential land contamination is ascertained after site re-appraisal at later stage, Contamination Assessment Plan (CAP) will be conducted and submitted to EPD for approval. The related sampling works and laboratory testing shall be conducted in accordance with the sampling proposal detailed in the approved CAP. A Contamination Assessment Report (CAR) will be prepared and submitted to EPD for approval after completion of sampling works and laboratory testing. Should contamination be identified in the CAR, Remediation Action Plan (RAP)(s) (if required) shall also be prepared and submitted to EPD for approval. Remediation measures as recommended in the RAP(s) shall be fully implemented prior to commencement of works. With regard to the above, all the land contamination assessments, if necessary, shall be conducted/ supervised by the qualified Land Contamination Specialist who shall have adequate experience in land contamination assessment, investigation and remediation prior to the commencement of any development works within the sites.

7. Overall Conclusion

7.1.1. This Environmental Assessment has been undertaken to ascertain the environmental compliance of the proposed Scheme with reference to the HKPSG and serves as a supporting document for the draft development Scheme Plan (DSP) submission to the TPB under Section 25 of URAO. With the implementation of proposed mitigation measures, adverse impacts in terms of air quality, noise, waste management and land contamination are not anticipated.

Air Quality Impact

7.1.2. Through proper implementation of the dust control measures that are required under the Air Pollution Control (Construction Dust) Regulation and good sites practices by the works Contractor, construction dust could be controlled. No adverse construction dust impact is expected.

7.1.3. Potential air quality impact due to vehicular emissions, chimney emissions and other emission sources on the planned ASRs within the development sites based on the Scheme layout have been reviewed. No active chimneys have been identified within 200m of the Development Boundary. Given the horizontal separation distances of the development layouts comply with the HKPSG recommended buffer distance, no adverse air quality impact due to the surrounding vehicular emissions is anticipated.

Noise Impact

7.1.4. No adverse construction noise impact is expected with the implementation of recommended noise control measures considering that the proposed development is confined within the development sites and no extensive construction activities will be involved.

7.1.5. All assessment points with openable windows for ventilation under base scenario are complied with the noise criteria for residential use (i.e. 70 dB(A)). With careful layout design, no adverse road traffic noise is anticipated.

7.1.6. No adverse fixed noise impact generated from the major fixed noise sources on the residential use is expected to occur considering the distant separation between the identified major fixed noise sources and the future NSRs of the development.

7.1.7. With the appropriate noise barrier installed at the cooling towers and chillers within the Scheme, if necessary and practicable, the noise impact due to the fixed plant of the proposed development would not be anticipated.

Waste Management Implications

7.1.8. The construction activities associated with the proposed development will generate a variety of wastes including inert and non-inert C&D materials, chemical wastes and general refuse.

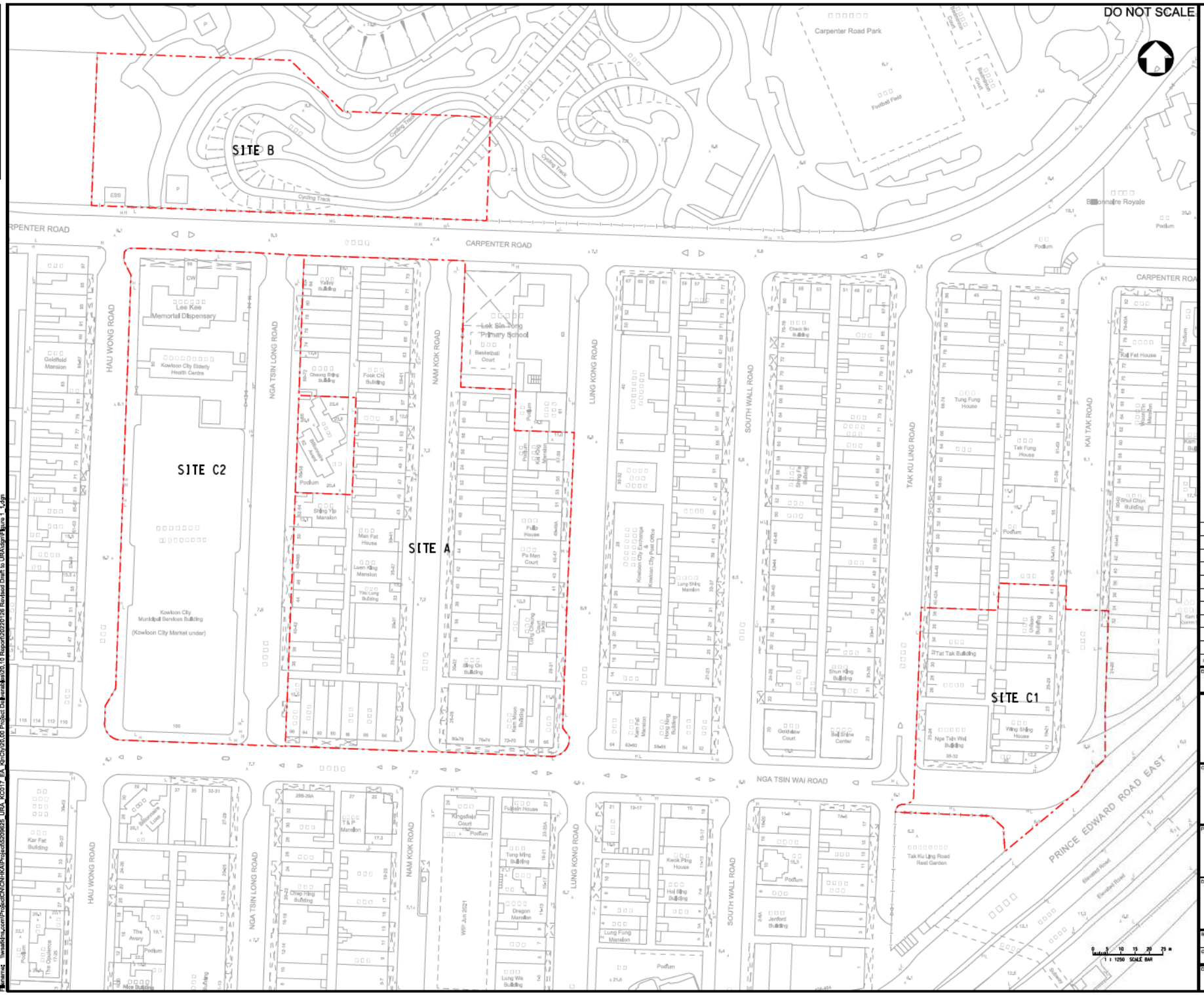
7.1.9. Mitigation measures and good waste management practices have been recommended to prevent and minimize potentials from the handling and disposal of construction and operation phase wastes. With the implementation of these mitigation measures, strict adherence to the guidelines and procedures for proper management of the generated waste types and arrangement for collection of the generated waste types by the relevant licensed waste collectors, no waste management implications during construction and operational phases of the development are anticipated.

Land Contamination

7.1.10. Potential contaminated sites have been identified above based upon a desktop study and site inspection of the areas. It is considered that site re-appraisal is required at potential contaminated sites LC1 - LC12 to confirm and quantify the presence, if any, of soil and groundwater contamination within the Scheme area.

7.1.11. Potential land contamination area in potential contaminated sites LC1 - LC12 are summarized in **Figure 6.3**. Given the sites are currently occupied by activities/businesses, upon the Scheme to be approved by CE in C and the URA acquired the properties in the Scheme, site re-appraisal at potential contaminated sites LC1 - LC12 can be conducted, if necessary, to ascertain any contamination issues. All the land contamination assessment and subsequent site investigation (SI) and remediation works, if necessary, should be completed prior to the commencement of any development works within the sites.

Figures



Rev.	Date	Description	By	Chkd	Appd

Drawing Status

Suitability

ATKINS
Member of the SNC-Lavalin Group

Client

URBAN RENEWAL AUTHORITY

Project Title

URBAN RENEWAL AUTHORITY
NGA TSIN WAI ROAD / CARPENTER ROAD
DEVELOPMENT SCHEME
(KC-017)

Drawing Title

SITE LAYOUT PLAN

Scale	Designed	Drawn	Checked	Authorised
1: 1250	VAR	CAD	VAR	VAR
Original Size	Date	Date	Date	Date
A3	JAN 2022	JAN 2022	JAN 2022	JAN 2022

Drawing Number

FIGURE 1.1

Revision

A

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LEGEND:

- SCHEME BOUNDARY
- OPEN SPACE
- GOVERNMENT, INSTITUTION OR COMMUNITY
- RESIDENTIAL (GROUP A)
- ROAD

Rev.	Date	Description	By	Chkd	Appd

Drawing Status: Submitted

ATKINS
Member of the SNC-Lavalin Group

Client: URBAN RENEWAL AUTHORITY 市區重建局

Project Title: URBAN RENEWAL AUTHORITY NGA TSIN WAI ROAD / CARPENTER ROAD DEVELOPMENT SCHEME (KC-017)

Drawing Title: APPROVED MA TAU KOK OUTLINE ZONING PLAN NO. S/K10/28

Scale	Designed	Drawn	Checked	Authorised
1: 1250	VAR	CAD	VAR	VAR
Original Size	Date	Date	Date	Date
A3	JAN 2022	JAN 2022	JAN 2022	JAN 2022

Drawing Number: FIGURE 1.2 Revision: A

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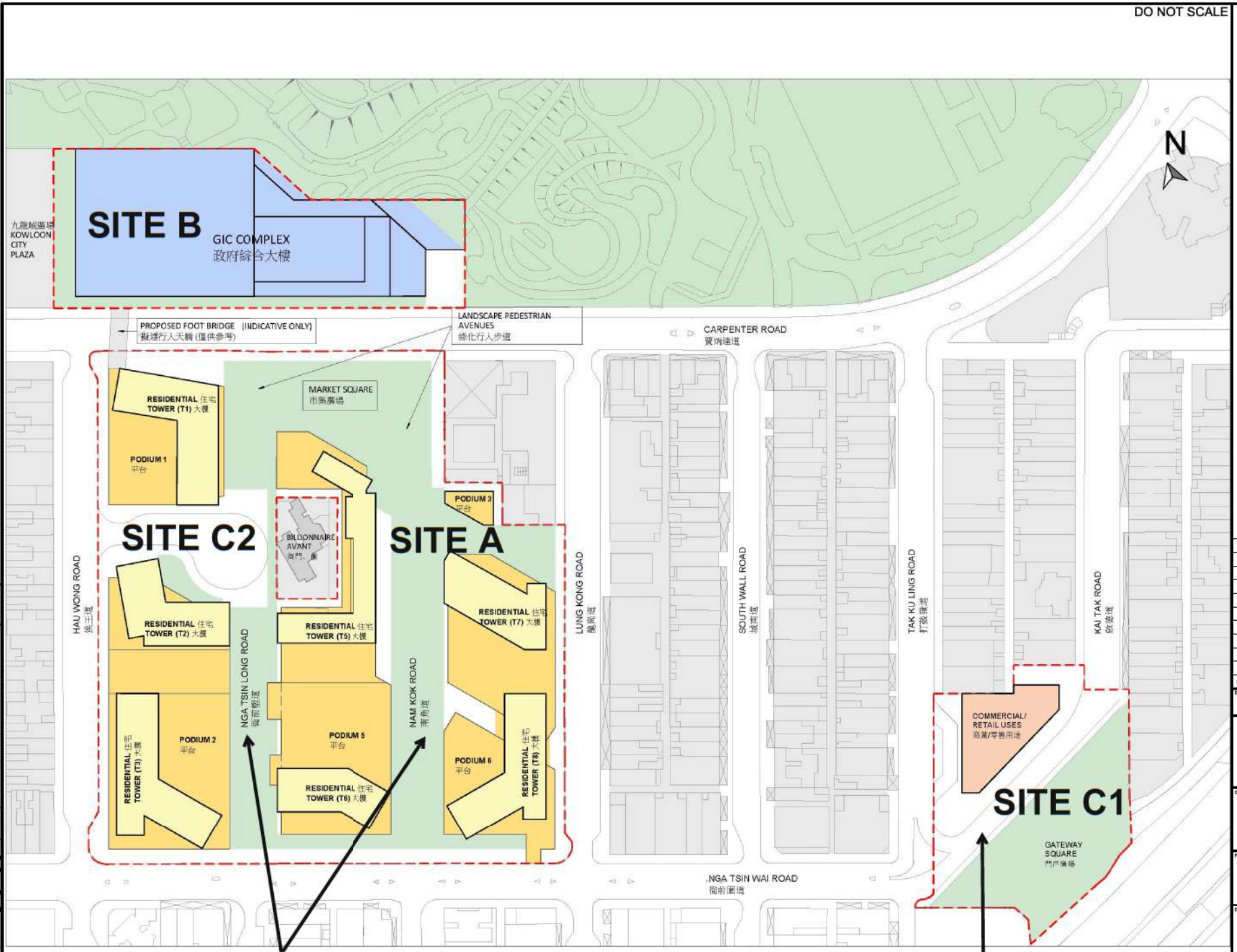

LEGEND

SCHEME BOUNDARY

Remarks: Notional design subject to change at detailed design stage.

Rev.	Date	Description	By	Chkd	Appd

Drawing Status

Suitability

ATKINS
Member of the SNC-Lavalin Group

Client: 市區重建局 URBAN RENEWAL AUTHORITY

Project Title: URBAN RENEWAL AUTHORITY NGA TSIN WAI ROAD / CARPENTER ROAD DEVELOPMENT SCHEME (KC-017)

Drawing Title: NOTIONAL DESIGN

Scale	Designed	Drawn	Checked	Authorised
NOT TO SCALE	RC	CAD	VAR	VAR
Original Size A3	Date JAN 2022	Date JAN 2022	Date JAN 2022	Date JAN 2022

Drawing Number: FIGURE 2.1

Revision

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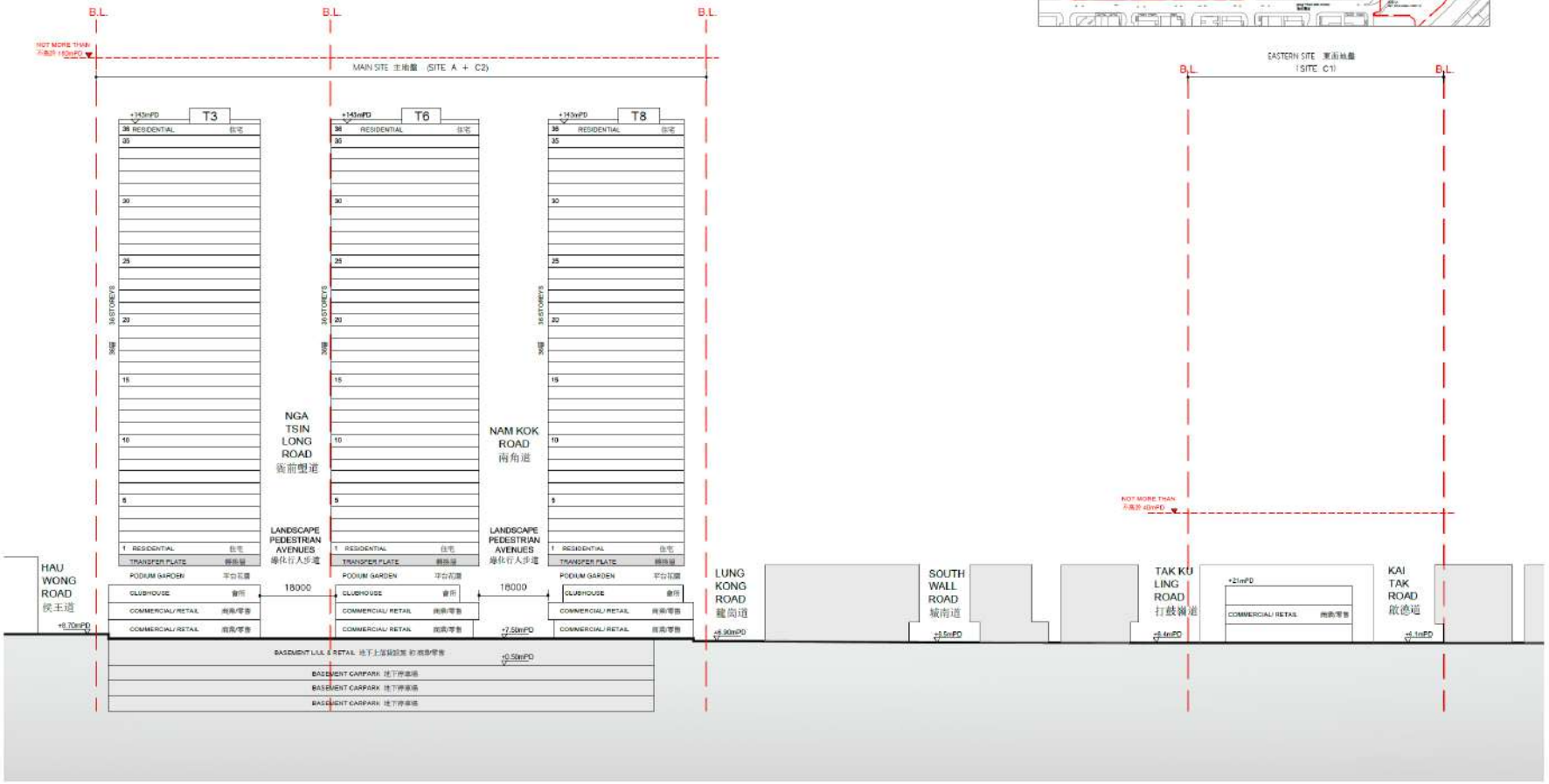
DO NOT SCALE

KEY PLAN





SECTION A-A'

GENERAL SITE LOCATION



Remarks: Notional design subject to change at detailed design stage.

Rev.	Date	Description	By	Chk'd	App'd

Drawing Status

Suitability

ATKINS
Member of the SNC-Lavalin Group

Client
市區重建局 URBAN RENEWAL AUTHORITY

Project Title
URBAN RENEWAL AUTHORITY
NGA TSIN WAI ROAD / CARPENTER ROAD
DEVELOPMENT SCHEME
(KC-017)

Drawing Title
SECTION A-A'

Scale	Designed	Drawn	Checked	Authorised
NOT TO SCALE	RC	CAD	VAR	VAR
Original Size	Date	Date	Date	Date
A3	JAN 2022	JAN 2022	JAN 2022	JAN 2022

Drawing Number
FIGURE 2.2a

Revision

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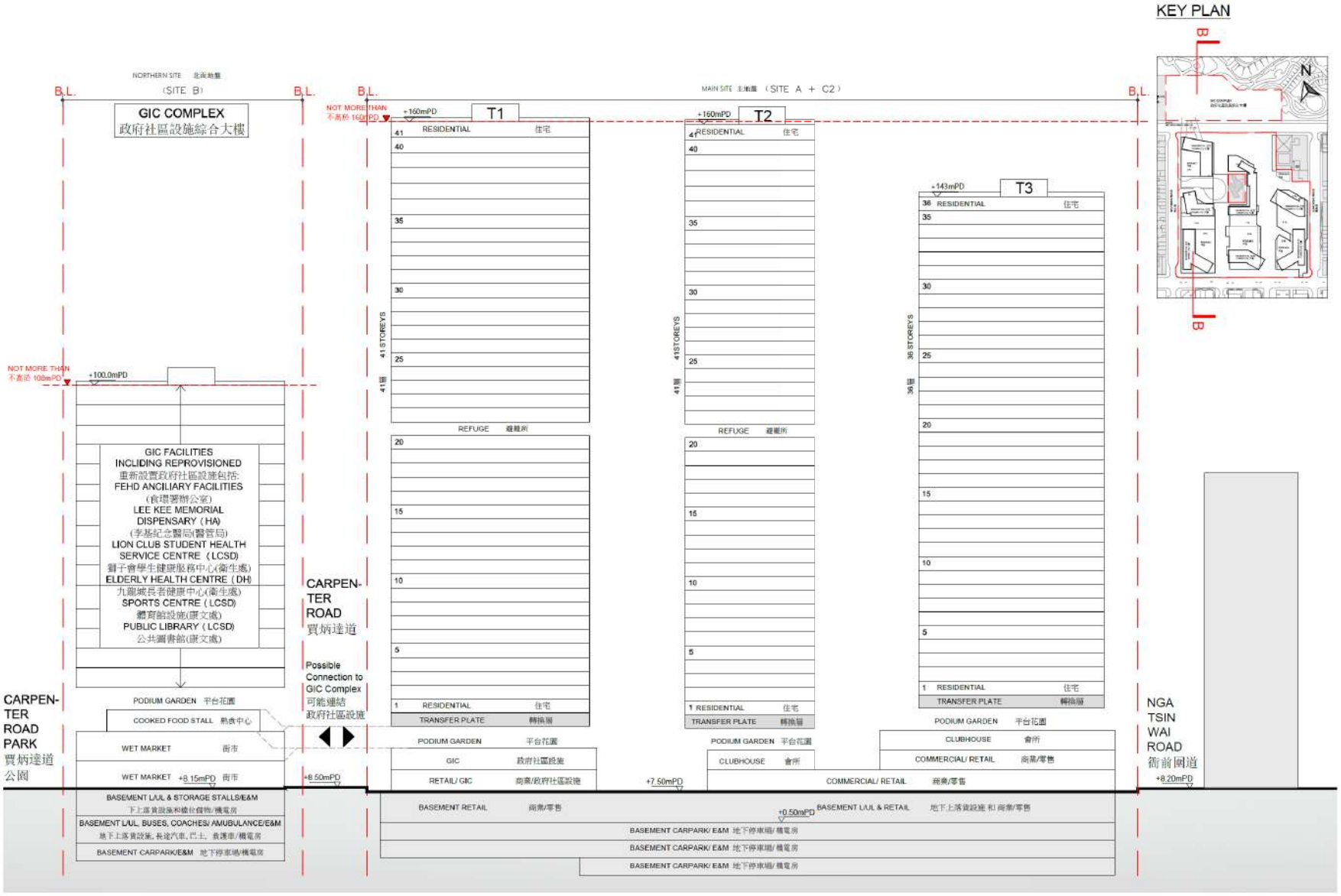
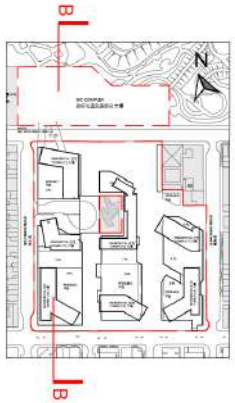
User name: G1GW1748 Date: 1/24/2022 Time: 10:10:23 AM
Filename: P:\CN\HK\Projects\5206625_URA_KC017_EA_\3C\Cy\20\00 Project Deliverables\20\10 Report\20220126 Revised Draft to URA\drg\ATK-A1P.dgn

DO NOT SCALE



KEY PLAN



SECTION B-B'

GENERAL SITE LOCATION



Remarks: Notional design subject to change at detailed design stage.

Rev.	Date	Description	By	Chk'd	App'd

Drawing Status

Suitability

ATKINS
Member of the SNC-Lavalin Group

Client
市區重建局
URBAN RENEWAL AUTHORITY

Project Title
URBAN RENEWAL AUTHORITY
NGA TSIN WAI ROAD / CARPENTER ROAD
DEVELOPMENT SCHEME
(KC-017)

Drawing Title
SECTION B-B'

Scale	Designed	Drawn	Checked	Authorised
NOT TO SCALE	RC	CAD	VAR	VAR
Original Size	Date	Date	Date	Date
A3	JAN 2022	JAN 2022	JAN 2022	JAN 2022

Drawing Number
FIGURE 2.2b

Revision

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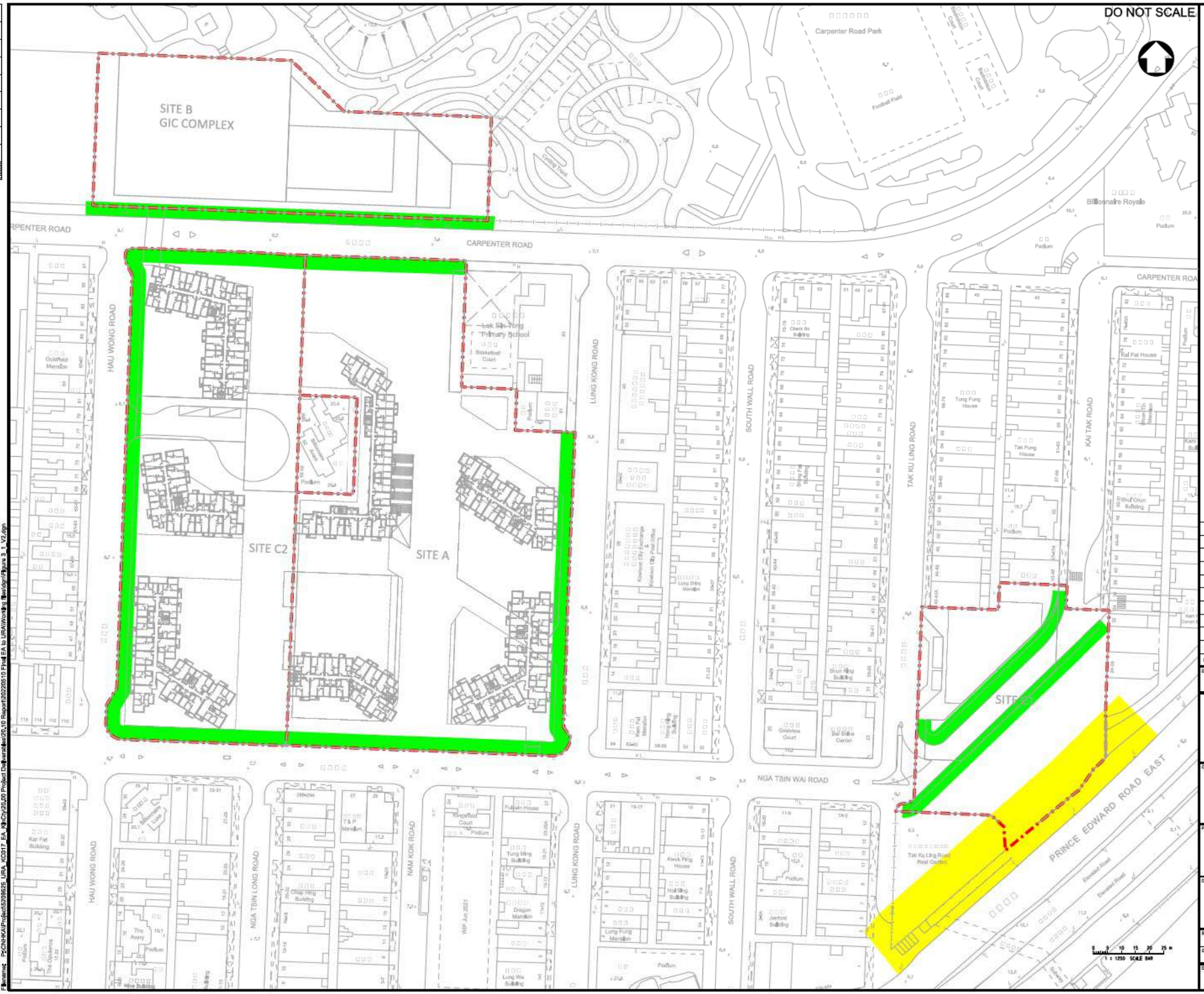
User name: CHOW1748 Date: 1/24/2022 Time: 10:10:23 AM
Filename: P:\CNHKA\Project\5209625_URA_KC017_EA_Ph2\Ch20.00 Project Deliverables\20.10 Report\20220126 Revised Draft to URA\dgn\ATK-A1P.dgn



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DO NOT SCALE
NOISE ASSESSMENT POINTS
HAU WONG ROAD
9.1
8.3
8.1
20.4
97
95
93
91
89
85-87
81
79
T1_16_B2
T1_16_B1
T1_16_L
T1_15_L
T1_15_B1
T1_14_B1
T1_14_L
T1_13_L
T1_13_B1
T1_12_L
T1_12_B2
T1_12_B1
T1_11_B1
T1_11_B2
T1_11_L
T1_17_B2
T1_17_B1
T1_17_L
T1_18_L
T1_18_B1
T1_19_B1
T1_19_L
T1_20_L
T1_20_B1
T1_1_B1
T1_1_L
T1_2_L
T1_2_B1
T1_3_B1
T1_3_L
T1_4_L
T1_4_B1
T1_5_L
T1_5_B1
T1_5_B2
T1_10_L
T1_10_B1
T1_10_B2
T1_9_B1
T1_9_B2
T1_9_L
T1_8_B1
T1_8_L
T1_7_L
T1_7_B1
T1_6_L
T1_6_B1
T1_6_B2
A 01/22 ENVIRONMENTAL ASSESSMENT SUBMISSION RW RC FW
Rev. Date Description By Chkd Appvd
Drawing Status
Submitted By
ATKINS
Member of the SNC-Lavalin Group
Client
URBAN RENEWAL AUTHORITY
市區重建局
Project Title
URBAN RENEWAL AUTHORITY
NGA TSIN WAI ROAD / CARPENTER ROAD
DEVELOPMENT SCHEME
(KC-017)
Drawing Title
LOCATIONS OF
ROAD NOISE ASSESSMENT POINTS
(TOWER 1)
Scale 1:256
Designed RW
Drawn RW
Checked RC
Authorised FW
Original Size A3
Date JAN 2022
Date JAN 2022
Date JAN 2022
Date JAN 2022
Drawing Number FIGURE 4.1A
Revision A
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DO NOT SCALE



NOISE ASSESSMENT POINTS

Rev.	Date	Description	By	Chkd	Appd
A	01/22	ENVIRONMENTAL ASSESSMENT SUBMISSION	RW	RC	FW

Drawing Status

Submitted by

ATKINS
Member of the SNC-Lavalin Group

Client
URBAN RENEWAL AUTHORITY

Project Title
URBAN RENEWAL AUTHORITY
NGA TSIN WAI ROAD / CARPENTER ROAD
DEVELOPMENT SCHEME
(KC-017)

Drawing Title
LOCATIONS OF
ROAD NOISE ASSESSMENT POINTS
(TOWER 2)

Scale	Designed	Drawn	Checked	Authorised
1:205	RW	RW	RC	FW
Original Size A3	Date JAN 2022	Date JAN 2022	Date JAN 2022	Date JAN 2022

Drawing Number
FIGURE 4.1B

Revision
A

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8.7 A


DO NOT SCALE
NOISE ASSESSMENT POINTS
T3_5_B2
T3_5_B1
T3_5_L
T3_6_L
T3_6_B2
T3_6_B1
T3_7_B2
T3_7_B1
T3_7_L
T3_8_B1
T3_8_L
T3_9_L
T3_9_B1
T3_10_B2
T3_10_B1
T3_10_L
T3_11_L
T3_11_B2
T3_11_B1
T3_4_B2
T3_4_B1
T3_4_L
T3_3_B2
T3_3_L
T3_3_B1
T3_2_B2
T3_2_L
T3_2_B1
T3_1_L
T3_1_B2
T3_1_B1
T3_17_B2
T3_17_L
T3_17_B1
T3_16_B2
T3_16_L
T3_16_B1
T3_15_L
T3_15_B2
T3_15_B1
T3_12_L
T3_12_B1
T3_12_B2
T3_13_B1
T3_13_B2
T3_13_L
T3_14_L
T3_14_B1
T3_14_B2
57-5
15.5
55
51
49
47
45
112
110
8.7
A 01/22 ENVIRONMENTAL ASSESSMENT SUBMISSION RW RC FW
ATKINS
Member of the SNC-Lavalin Group
URBAN RENEWAL AUTHORITY
URBAN RENEWAL AUTHORITY
NGA TSIN WAI ROAD / CARPENTER ROAD
DEVELOPMENT SCHEME
(KC-017)
LOCATIONS OF
ROAD NOISE ASSESSMENT POINTS
(TOWER 3)
1:256
A3
RW
JAN 2022
FIGURE 4.1C
A
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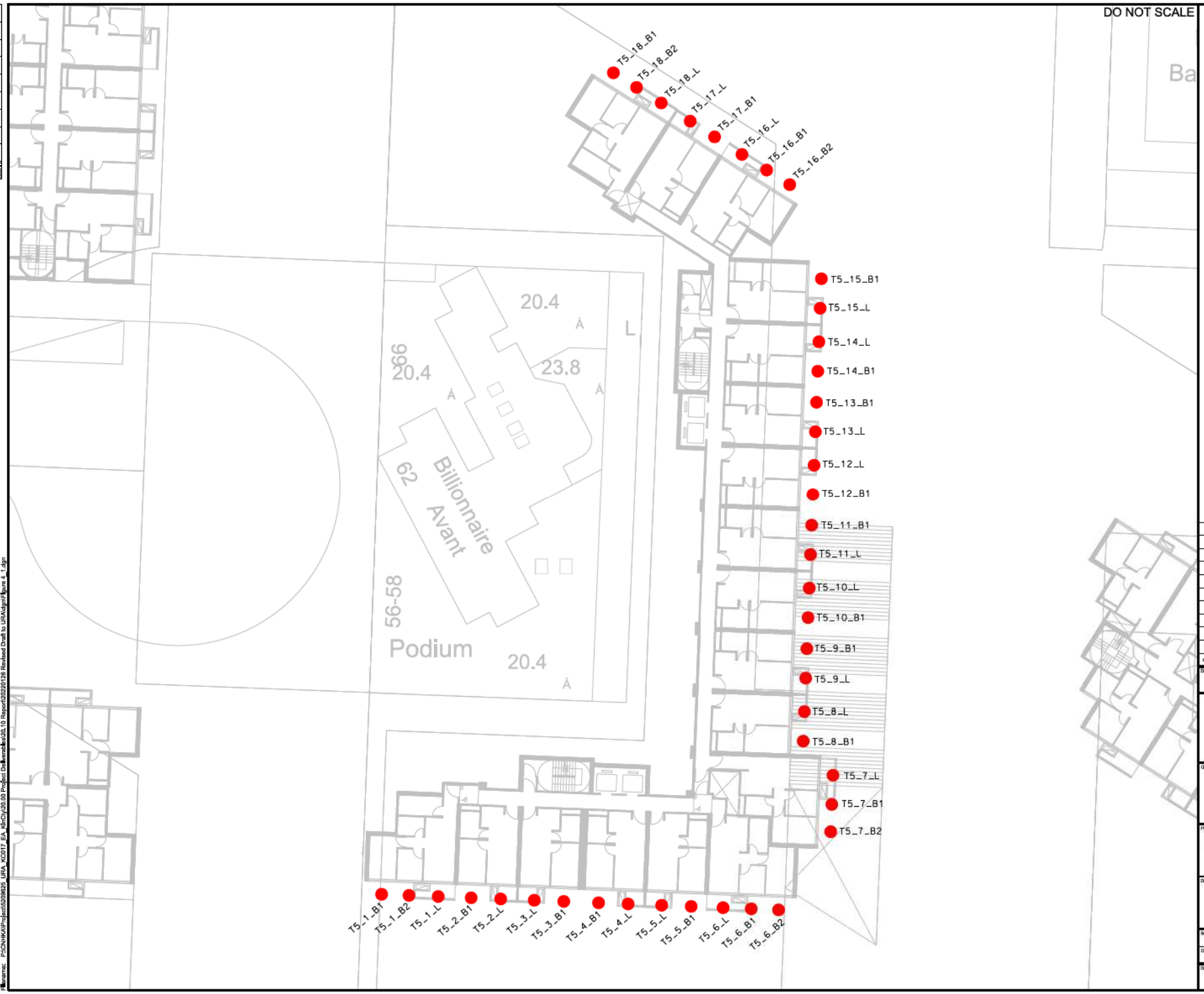

Rev.	Date	Description	By	Chkd	Appd
A	01/22	ENVIRONMENTAL ASSESSMENT SUBMISSION	RW	RC	FW

Drawing Status

Suitability

ATKINS
Member of the SNC-Lavalin Group

Client
URBAN RENEWAL AUTHORITY

Project Title
URBAN RENEWAL AUTHORITY
NGA TSIN WAI ROAD / CARPENTER ROAD
DEVELOPMENT SCHEME
(KC-017)

Drawing Title
LOCATIONS OF
ROAD NOISE ASSESSMENT POINTS
(TOWER 5)

Scale	Designed	Drawn	Checked	Authorised
1:282	RW	RW	RC	FW
Original Size A3	Date JAN 2022	Date JAN 2022	Date JAN 2022	Date JAN 2022

Drawing Number
FIGURE 4.1D

Revision
A

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DO NOT SCALE



NOISE ASSESSMENT POINTS

Rev.	Date	Description	By	Chk'd	App'd
A	01/22	ENVIRONMENTAL ASSESSMENT SUBMISSION	RW	RC	FW

Drawing Status

Suitability

ATKINS

Member of the SNC-Lavalin Group

Client

市區重建局 URBAN RENEWAL AUTHORITY

Project Title

URBAN RENEWAL AUTHORITY
NGA TSIN WAI ROAD / CARPENTER ROAD DEVELOPMENT SCHEME
(KC-017)

Drawing Title

LOCATIONS OF
ROAD NOISE ASSESSMENT POINTS
(TOWER 6)

Scale	Designed	Drawn	Checked	Authorised
1:205	RW	RW	RC	FW
Original Size	Date	Date	Date	Date
A3	JAN 2022	JAN 2022	JAN 2022	JAN 2022

Drawing Number: FIGURE 4.1E

Revision: A

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DO NOT SCALE

NOISE ASSESSMENT POINTS

Rev.	Date	Description	By	Chkd	Appd
A	01/22	ENVIRONMENTAL ASSESSMENT SUBMISSION	RW	RC	FW

Drawing Status

Submitted

ATKINS
Member of the SNC-Lavalin Group

Client
URBAN RENEWAL AUTHORITY

Project Title
URBAN RENEWAL AUTHORITY
NGA TSIN WAI ROAD / CARPENTER ROAD
DEVELOPMENT SCHEME
(KC-017)

Drawing Title
LOCATIONS OF
ROAD NOISE ASSESSMENT POINTS
(TOWER 7)

Scale	Designed	Drawn	Checked	Authorised
1:205	RW	RW	RC	FW
Original Size	Date	Date	Date	Date
A3	JAN 2022	JAN 2022	JAN 2022	JAN 2022

Drawing Number
FIGURE 4.1F

Revision
A

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DO NOT SCALE
NOISE ASSESSMENT POINTS
T8_10_B1
T8_10_B2
T8_10_L
T8_9_B1
T8_9_L
T8_9_B2
T8_8_B1
T8_8_L
T8_8_B2
T8_7_L
T8_7_B1
T8_6_B1
T8_6_L
T8_6_B2
T8_5_B1
T8_5_L
T8_5_B2
T8_4_L
T8_4_B1
T8_4_B2
T8_11_B1
T8_11_B2
T8_11_L
T8_12_L
T8_12_B1
T8_12_B2
T8_13_B1
T8_13_B2
T8_13_L
T8_14_B1
T8_14_L
T8_15_L
T8_15_B1
T8_15_B2
T8_16_L
T8_16_B1
T8_16_B2
T8_1_L
T8_1_B1
T8_1_B2
T8_2_B1
T8_2_B2
T8_2_L
T8_3_L
T8_3_B1
T8_3_B2
6.9
A
11.5
A
26
24
22
20
18
16
14
64
62-60
L
L
A | 01/22 | ENVIRONMENTAL ASSESSMENT SUBMISSION | RW | RC | FW
Rev. | Date | Description | By | Chkd | Appd
Drawing Status
Suitability
ATKINS
Member of the SNC-Lavalin Group
Client
URBAN RENEWAL AUTHORITY
市區重建局
Project Title
URBAN RENEWAL AUTHORITY
NGA TSIN WAI ROAD / CARPENTER ROAD
DEVELOPMENT SCHEME
(KC-017)
Drawing Title
LOCATIONS OF
ROAD NOISE ASSESSMENT POINTS
(TOWER 8)
Scale 1:256 | Designed RW | Drawn RW | Checked RC | Authorised FW
Original size A3 | Date JAN 2022 | Date JAN 2022 | Date JAN 2022 | Date JAN 2022
Drawing Number
FIGURE 4.1G
Revision
A
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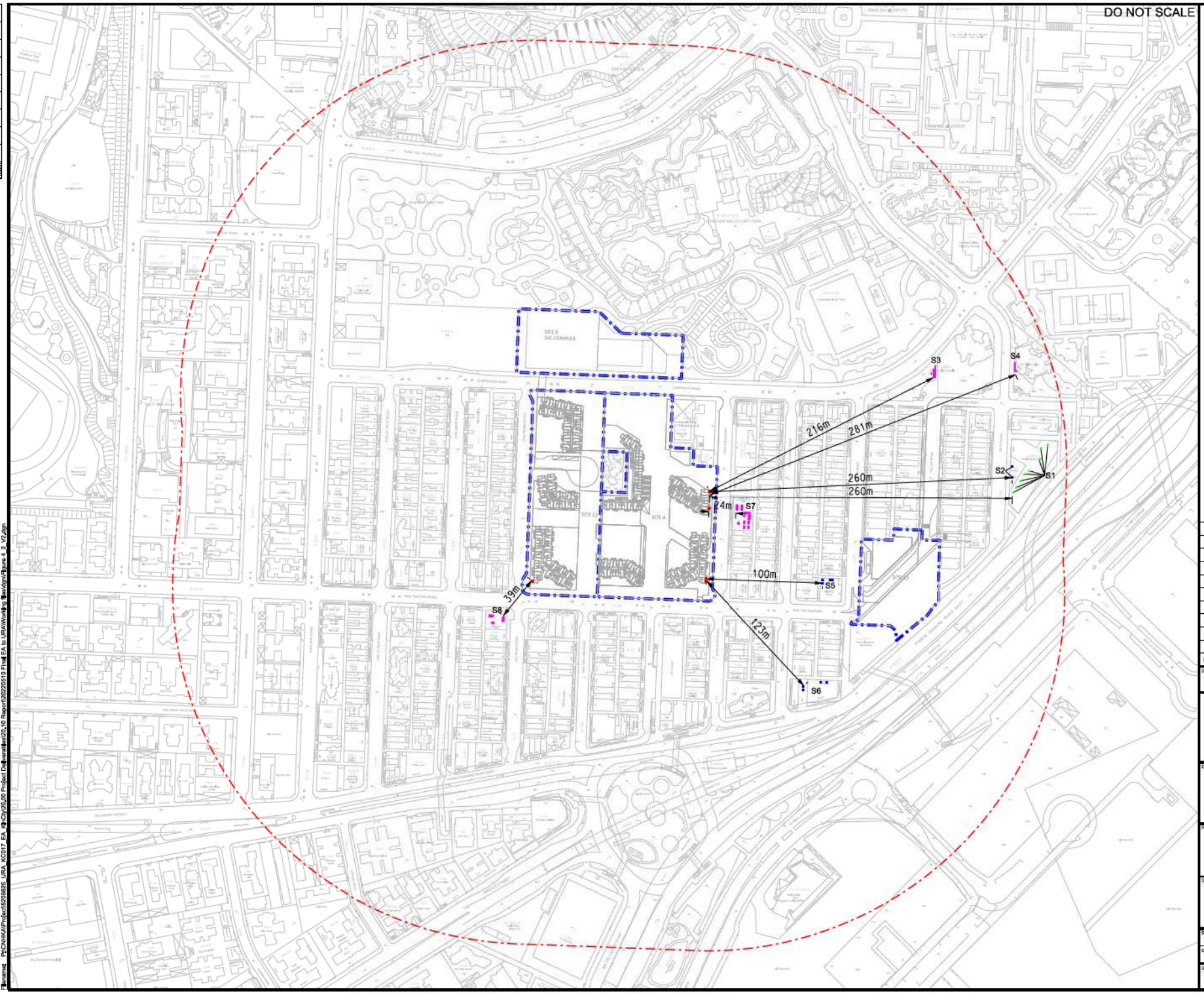

Rev.	Date	Description	By	Chkd	Appd
B	04/22	ENVIRONMENTAL ASSESSMENT SUBMISSION	RW	FW	WW
A	01/22	ENVIRONMENTAL ASSESSMENT SUBMISSION	RW	RC	FW

Drawing Status

Submitted by

ATKINS
Member of the SNC-Lavalin Group

Client

市區重建局
URBAN RENEWAL AUTHORITY

Project Title
URBAN RENEWAL AUTHORITY
NGA TSIN WAI ROAD / CARPENTER ROAD
DEVELOPMENT SCHEME
(KC-017)

Drawing Title
MAJOR FIXED PLANT NOISE SOURCES
WITHIN 300M STUDY AREA

Scale	Designed	Drawn	Checked	Authorised
1 : 3000	RW	RW	FW	WW
Original Size	Date	Date	Date	Date
A3	APR 2022	APR 2022	APR 2022	APR 2022

Drawing Number
FIGURE 4.2

Revision
B

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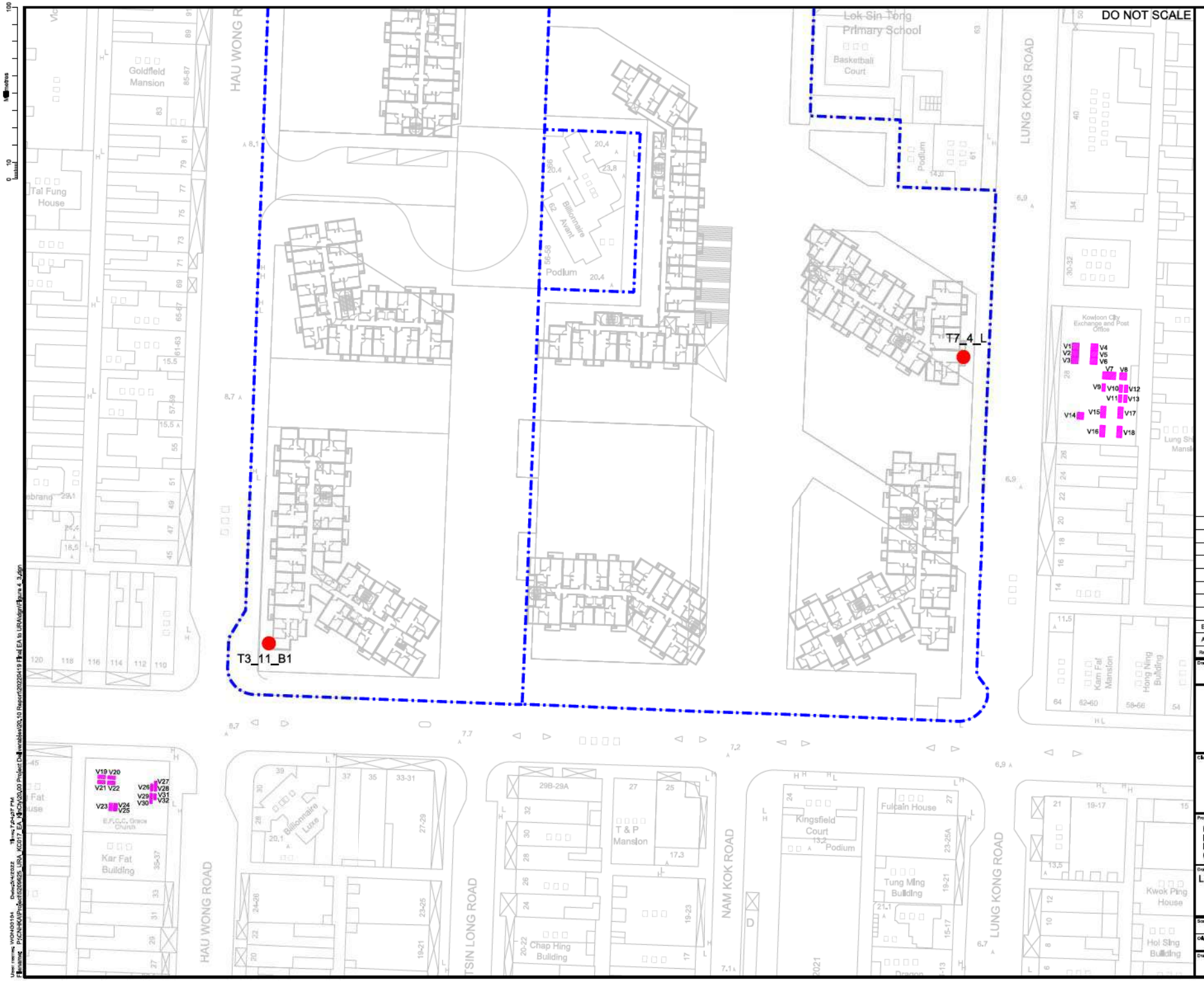

Rev.	Date	Description	By	Chkd	Appd
B	05/22	ENVIRONMENTAL ASSESSMENT SUBMISSION	RW	FW	WW
A	01/22	ENVIRONMENTAL ASSESSMENT SUBMISSION	RW	RC	WW

Drawing Status:

Suitability: -

ATKINS
Member of the SNC-Lavalin Group

Client: URBAN RENEWAL AUTHORITY 市區重建局

Project Title:
URBAN RENEWAL AUTHORITY
NGA TSIN WAI ROAD / CARPENTER ROAD
DEVELOPMENT SCHEME
(KC-017)

Drawing Title:
LOCATION OF MAJOR FIXED PLANT NOISE SOURCES AND REPRESENTATIVE NOISE SENSITIVE RECEIVERS

Scale	Designed	Drawn	Checked	Authorised
1 : 750	RW	RW	FW	WW
Original size: A3	Date: MAY 2022	Date: MAY 2022	Date: MAY 2022	Date: MAY 2022

Drawing Number: FIGURE 4.3

Revision: B

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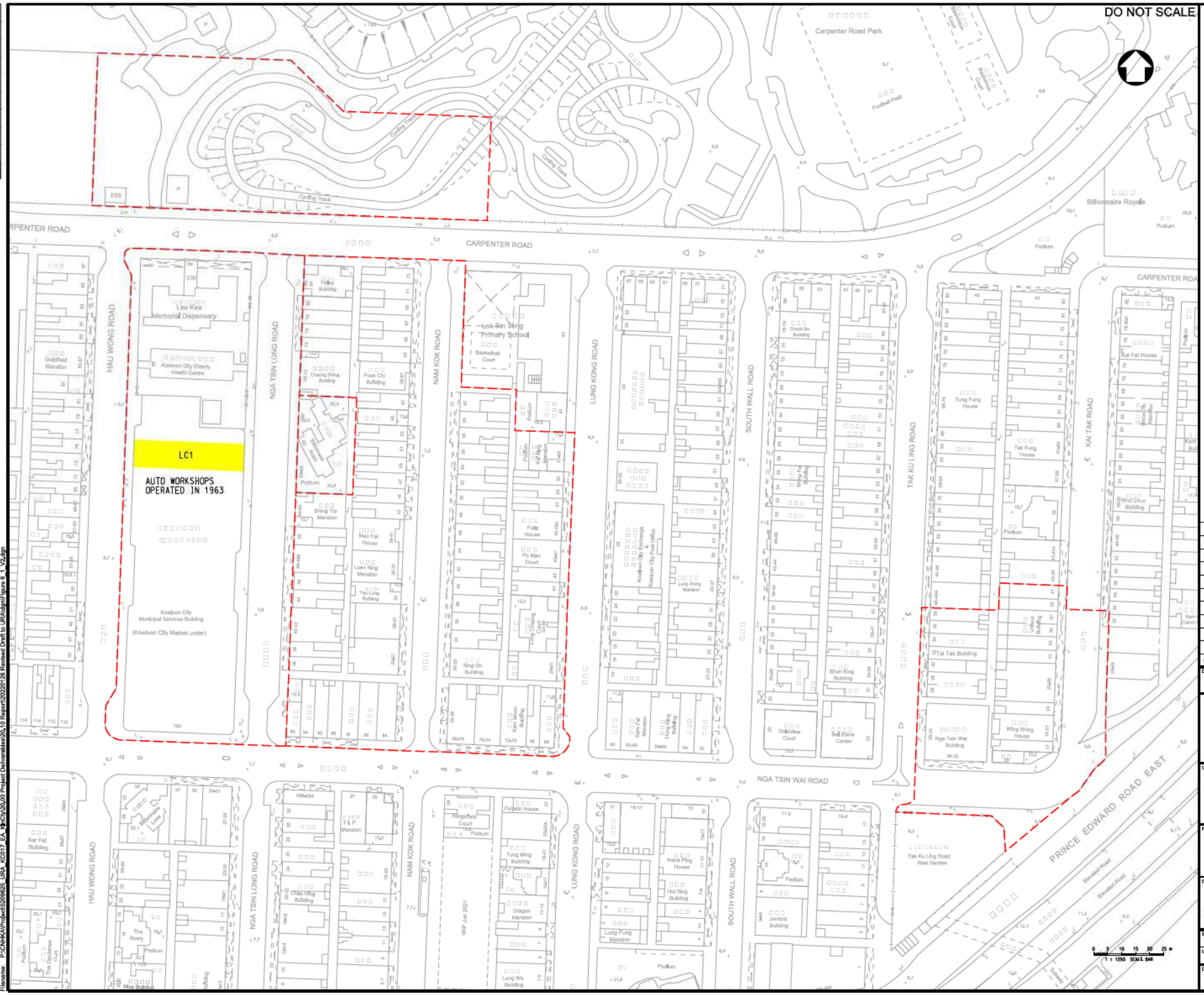

LEGEND:

SCHEME BOUNDARY

LC1 — POTENTIALLY CONTAMINATED SITES IDENTIFIED DURING HISTORIAL REVIEW

Rev.	Date	Description	By	Chk'd	App'd

Drawing Status

Suitability

ATKINS
Member of the SNC-Lavalin Group

Client

市區重建局
URBAN RENEWAL AUTHORITY

Project Title

URBAN RENEWAL AUTHORITY
NGA TSIN WAI ROAD / CARPENTER ROAD DEVELOPMENT SCHEME (KC-017)

Drawing Title

POTENTIAL LAND CONTAMINATED SITES IDENTIFIED DURING HISTORICAL REVIEW

Scale	Designed	Drawn	Checked	Authorised
1 : 1250	VAR	CAD	VAR	VAR
Original Size	Date	Date	Date	Date
A3	JAN 2022	JAN 2022	JAN 2022	JAN 2022

Drawing Number: FIGURE 6.1

Revision: A

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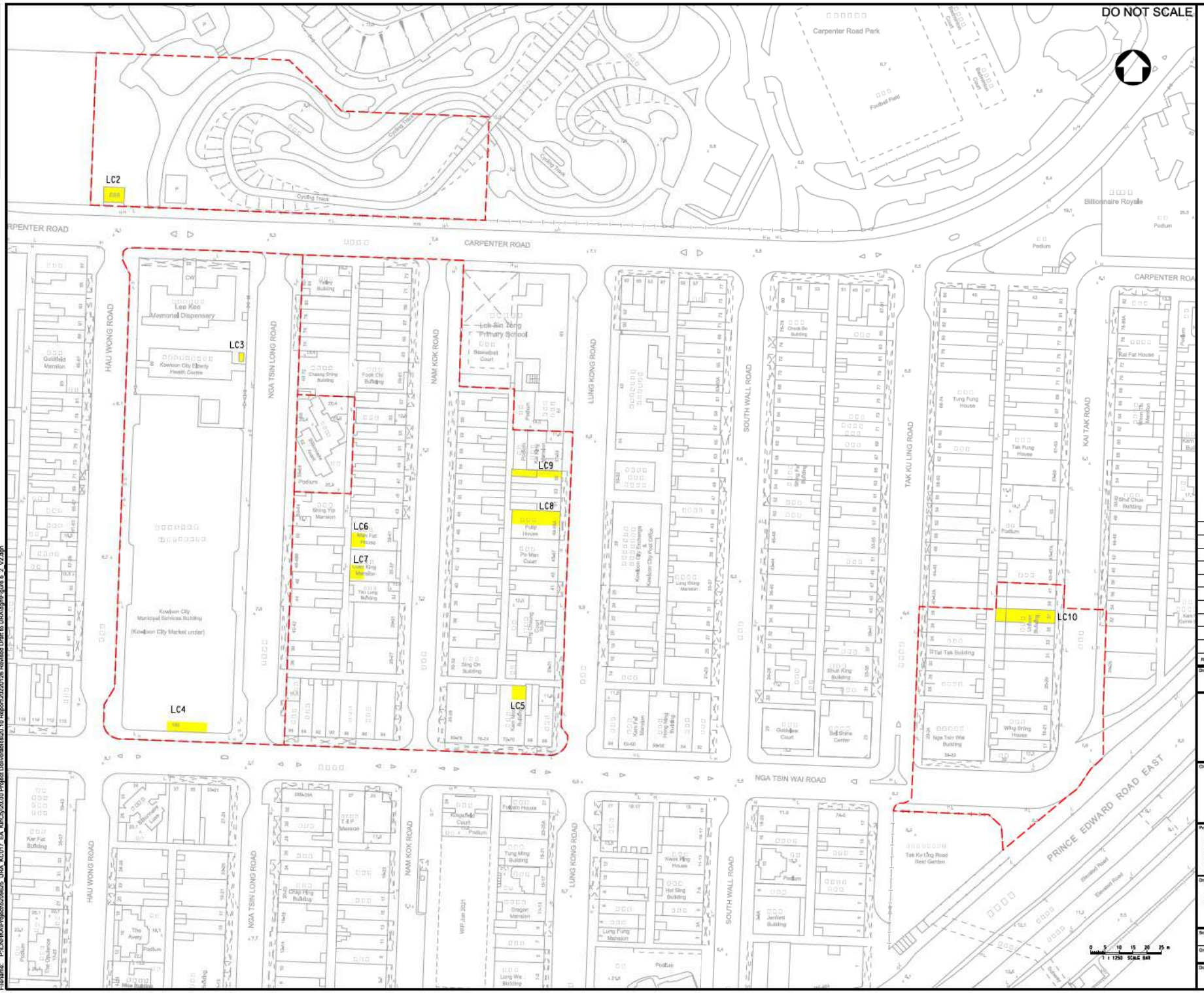
User name: CHOW1748 Date: 1/20/2022 Time: 6:35:16 PM
Filename: P:\CNHKA\Project\5209625_URA_KC017_EA_Kin\Cty\20.00 Project Deliverables\20.10 Report\20220126 Revised Draft to URA\dgn\Figure 6_1_V2.dgn



LEGEND:

PROJECT BOUNDARY

LC7 POTENTIALLY CONTAMINATED SITES IDENTIFIED DURING SITE INSPECTION

Rev.	Date	Description	By	Chk'd	App'd

Drawing Status

Suitability

ATKINS

Member of the SNC-Lavalin Group

Client

市區重建局 URBAN RENEWAL AUTHORITY

Project Title

URBAN RENEWAL AUTHORITY
NGA TSIN WAI ROAD / CARPENTER ROAD DEVELOPMENT SCHEME (KC-017)

Drawing Title

POTENTIAL LAND CONTAMINATED SITES IDENTIFIED DURING SITE INSPECTION

Scale	Designed	Drawn	Checked	Authorised
1 : 1250	VAR	CAD	VAR	VAR
Original Size	Date	Date	Date	Date
A3	JAN 2022	JAN 2022	JAN 2022	JAN 2022

Drawing Number: FIGURE 6.2

Revision: A

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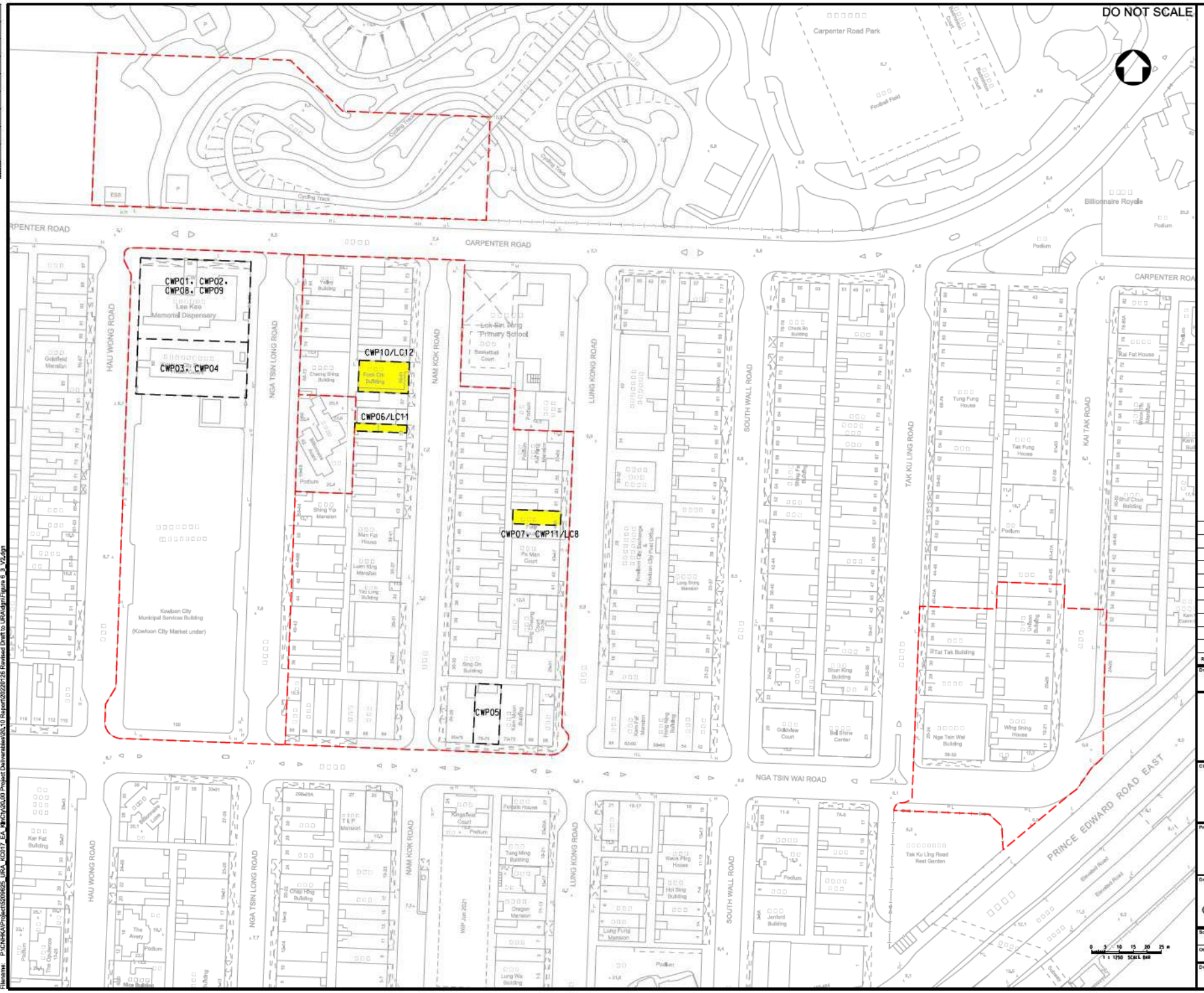
Millimetres 0 10 100

User name: CHOW1748 Date: 1/26/2022 Time: 7:10:14 PM
Filename: P:\CN\HKA\Project\5209625_URA_KC017_EA_KinCity\20.00 Project Deliverables\20.10 Report\20220126 Revised Draft to URA\dgn\Figure 6_2_V2.dgn



LEGEND:

- SCHEME BOUNDARY
- CHEMICAL WASTE PRODUCER
- POTENTIALLY CONTAMINATED SITE IDENTIFIED WITH CHEMICAL WASTE PRODUCER REGISTER (LC7)

Rev.	Date	Description	By	Chkd	Appd

Drawing Status: | Suitability: —

ATKINS
Member of the SNC-Lavalin Group

Client: URBAN RENEWAL AUTHORITY 市區重建局

Project Title:
URBAN RENEWAL AUTHORITY
NGA TSIN WAI ROAD / CARPENTER ROAD
DEVELOPMENT SCHEME
(KC-017)

Drawing Title:
POTENTIAL LAND CONTAMINATED SITES IDENTIFIED WITH CHEMICAL WASTE PRODUCER REGISTER

Scale	Designed	Drawn	Checked	Authorised
1 : 1250	VAR	CAD	VAR	VAR
Original Size: A3	Date: JAN 2022	Date: JAN 2022	Date: JAN 2022	Date: JAN 2022

Drawing Number: FIGURE 6.3 | Revision: A

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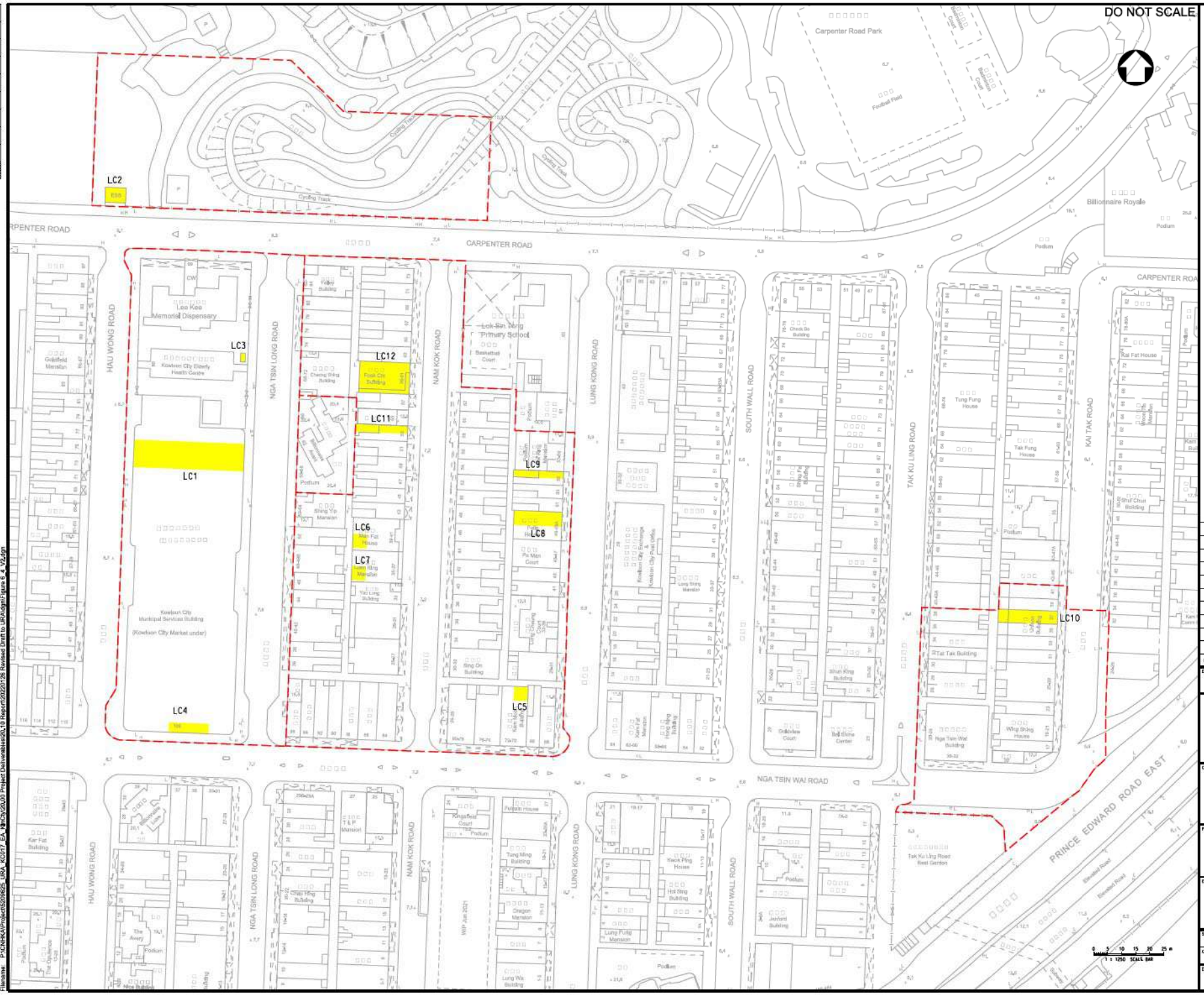
User name: G1GW1748 Date: 1/20/2022 Time: 6:30:09 PM
Filename: P:\CN\HK\Projects\5026625_ERA_KC017_EA_VAR\CAD\20_0\20.10 Project Deliverables\20.10 Report\20220126 Revised Draft to URA\dgn\Figure 6.3_VZ.dgn



LEGEND:

SCHEME BOUNDARY

LC7 POTENTIALLY CONTAMINATED SITE

Rev.	Date	Description	By	Chk'd	App'd

Drawing Status

Suitability

ATKINS

Member of the SNC-Lavalin Group

Client

市區重建局 URBAN RENEWAL AUTHORITY

Project Title

URBAN RENEWAL AUTHORITY
NGA TSIN WAI ROAD / CARPENTER ROAD
DEVELOPMENT SCHEME
(KC-017)

Drawing Title

POTENTIAL LAND CONTAMINATED SITES

Scale	Designed	Drawn	Checked	Authorised
1 : 1250	VAR	CAD	VAR	VAR
Original Size	Date	Date	Date	Date
A3	JAN 2022	JAN 2022	JAN 2022	JAN 2022

Drawing Number: FIGURE 6.4

Revision: A

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Appendix 4.1

Traffic Flow Forecast for Year 2049 for Site A and Year 2052 for Site C2


PRINCE EDWARD ROAD E
LOK SIN ROAD
SA PO ROAD
KAI TAK ROAD
TAK KU LING ROAD
S WALL ROAD
LUNG KONG ROAD
NAM KOK ROAD
NGA TSIN LONG ROAD
HAU WONG ROAD
LION ROCK ROAD
FUK LO TSUN ROAD
TUNG TSING ROAD
CARPENTER ROAD
OLYMPIC AVE
MA TAU CHUNG ROAD
ARGYLE STREET
STIRLING ROAD
PRINCE EDWARD ROAD W
BOUNDARY STREET
SAU CHUK YUEN ROAD
NGA TSIN WAI ROAD
GRAMPIAN ROAD
DUMBARTON ROAD
TUNG TAU TSUEN ROAD
JUNCTION ROAD
ROAD LINK INDEX PLAN

2049 Peak Hour Traffic Flows for NIA

Road ID	Road Name	Travel Direction	Speed Limit	08:00 ~ 09:00 AM PEAK FLOW (veh/hr)	18:00 ~ 19:00 PM PEAK FLOW (veh/hr)	AM HV%	PM HV%
5A	Junction Road	NB	50	700	700	21%	15%
5B	Junction Road	SB	50	700	450	26%	17%
6A	Junction Road	NB	50	600	700	20%	17%
6B	Junction Road	SB	50	750	450	26%	17%
7A	Tung Tau Tsuen Road	EB	50	350	300	28%	34%
7B	Tung Tau Tsuen Road	WB	50	450	300	27%	23%
9A	Tung Tsing Road	SB	50	450	450	31%	21%
9B	Tung Tsing Road	NB	50	300	200	29%	20%
19A	Dumbarton Road	EB	50	300	150	13%	22%
19B	Dumbarton Road	WB	50	50	50	15%	9%
20A	Dumbarton Road	EB	50	400	150	16%	12%
20B	Dumbarton Road	WB	50	100	50	40%	61%
22A	Grampian Road	NB	50	200	150	20%	19%
22B	Grampian Road	SB	50	100	50	26%	15%
23A	Junction Road	NB	50	350	500	26%	17%
23B	Junction Road	SB	50	750	400	26%	20%
24A	Carpenter Road	EB	50	150	100	19%	0%
24B	Carpenter Road	WB	50	350	450	27%	12%
25A	Carpenter Road	EB	50	300	300	20%	2%
25B	Carpenter Road	WB	50	250	400	26%	14%
26A	Carpenter Road	EB	50	100	150	21%	5%
26B	Carpenter Road	WB	50	400	550	27%	14%
27A	Carpenter Road	EB	50	250	250	26%	11%
27B	Carpenter Road	WB	50	500	450	32%	14%
29	Ta Ku Ling Road	2-way	50	5	7	0%	16%
30A	Carpenter Road	EB	50	450	550	30%	22%
30B	Carpenter Road	WB	50	200	250	36%	13%
31A	Carpenter Road	EB	50	300	450	28%	22%
31B	Carpenter Road	WB	50	200	300	36%	16%
32A	Carpenter Road	EB	50	650	800	30%	21%
32B	Carpenter Road	WB	50	100	100	28%	13%
33A	Lok Sin Road	EB	50	300	300	31%	23%
33B	Lok Sin Road	WB	50	450	350	30%	23%
34	Sa Po Road	SB	50	800	900	30%	20%
35A	Carpenter Road	EB	50	50	9	20%	23%
35B	Carpenter Road	WB	50	14	50	23%	19%
36	Kai Tak Road	SB	50	14	50	23%	19%
37	Sa Po Road	SB	50	450	500	31%	14%
38A	Junction Road	NB	50	250	300	28%	14%
38B	Junction Road	SB	50	850	650	28%	21%
39	Fuk Lo Tsun Road	NB	50	200	200	12%	4%
40	Lion Rock Road	SB	50	300	250	19%	5%
41	Hau Wong Road	NB	50	350	350	29%	16%
42A	Road L9	NB	50	400	300	31%	31%
42B	Road L9	SB	50	400	300	31%	32%
44	Lung Kong Road	NB	50	300	400	24%	21%
45	South Wall Road	SB	50	200	150	36%	19%
46	Tak Ku Ling Road	NB	50	400	500	37%	19%
49A	Nga Tsin Wai Road	EB	50	500	400	18%	10%

Road ID	Road Name	Travel Direction	Speed Limit	08:00 ~ 09:00 AM PEAK FLOW (veh/hr)	18:00 ~ 19:00 PM PEAK FLOW (veh/hr)	AM HV%	PM HV%
49B	Nga Tsin Wai Road	WB	50	450	450	25%	12%
50A	Nga Tsin Wai Road	EB	50	550	550	18%	9%
50B	Nga Tsin Wai Road	WB	50	350	450	21%	9%
51A	Nga Tsin Wai Road	EB	50	650	600	19%	9%
51B	Nga Tsin Wai Road	WB	50	450	600	23%	11%
52A	Nga Tsin Wai Road	EB	50	300	250	20%	11%
52B	Nga Tsin Wai Road	WB	50	650	750	23%	11%
53A	Nga Tsin Wai Road	EB	50	300	300	20%	10%
53B	Nga Tsin Wai Road	WB	50	650	750	24%	13%
54A	Nga Tsin Wai Road	EB	50	250	350	18%	6%
54B	Nga Tsin Wai Road	WB	50	550	800	30%	15%
55	Flyover K73	EB	50	300	150	13%	20%
56	Flyover K72	EB	50	400	400	18%	22%
57A	Nga Tsin Wai Road	EB	50	350	400	25%	13%
57B	Nga Tsin Wai Road	WB	50	400	400	30%	21%
58A	Nga Tsin Wai Road	EB	50	250	350	30%	15%
58B	Nga Tsin Wai Road	WB	50	650	550	28%	22%
59	Nga Tsin Wai Road	WB	50	450	550	19%	19%
61	Sau Chuk Yuen Road	EB	50	200	150	14%	21%
62	Grampian Road	NB	50	250	150	20%	18%
63	Grampian Road	NB	50	100	100	20%	18%
64A	Junction Road	NB	50	450	450	25%	14%
64B	Junction Road	SB	50	950	850	28%	22%
65	Fuk Lo Tsun Road	SB	50	300	250	12%	6%
66	Lion Rock Road	SB	50	300	200	24%	10%
67	Hau Wong Road	NB	50	350	300	19%	13%
68	Nga Tsin Long Road	NB	50	50	100	22%	19%
70	Lung Kong Road	NB	50	650	750	25%	14%
71	South Wall Road	SB	50	550	350	26%	17%
72	South Wall Road	WB	50	50	50	43%	21%
74	Prince Edward Road West	EB	50	800	850	25%	20%
75	Prince Edward Road West	EB	50	1000	900	25%	22%
76	Prince Edward Road West	EB	50	1300	1150	22%	17%
77	Prince Edward Road West	EB	50	1600	1350	22%	17%
78	Prince Edward Road West	EB	50	1250	1050	21%	17%
79	Prince Edward Road West	EB	50	2400	2450	26%	23%
80	Prince Edward Road West	EB	50	1450	1800	32%	27%
81	Prince Edward Road West	EB	50	850	1050	38%	38%
82	Prince Edward Road West	EB	50	1350	1350	33%	32%
83	Prince Edward Road East	EB	50	3500	3700	26%	23%
84	Prince Edward Road East	EB	50	3150	3300	26%	22%
92	Prince Edward Road West	WB	50	1250	1500	28%	27%
93	Prince Edward Road West	WB	50	900	1150	29%	27%
94	Prince Edward Road West	WB	50	950	1250	28%	25%
95	Prince Edward Road West	WB	50	650	900	36%	33%
96	Prince Edward Road West	WB	50	300	300	15%	21%
97	Kowloon City Roundabout	NB	50	1150	1450	31%	27%
98	Kowloon City Roundabout	NB	50	1750	2350	32%	13%
99	Kowloon City Roundabout	NB	50	1350	1900	34%	12%
100	Kowloon City Roundabout	NB	50	1650	2100	31%	29%

Road ID	Road Name	Travel Direction	Speed Limit	08:00 ~ 09:00 AM PEAK FLOW (veh/hr)	18:00 ~ 19:00 PM PEAK FLOW (veh/hr)	AM HV%	PM HV%
101	Kowloon City Roundabout	NB	50	800	1100	28%	11%
102	Kowloon City Roundabout	SB	50	1000	750	22%	19%
105	Stirling Road	SB	50	100	100	12%	4%
108	Argyle Street	EB	50	400	400	25%	27%
111	Argyle Street	WB	50	250	150	20%	54%
121	Ma Tau Chung Road	NB	50	800	1000	35%	18%
124	Ma Tau Chung Road	SB	50	1550	1350	34%	27%
125	Ma Tau Chung Road	SB	50	2400	2450	32%	26%
126	Ma Tau Chung Road	WB	50	1400	1700	42%	30%
127	Prince Edward Road East	WB	50	2850	3000	42%	12%
134	Olympic Avenue	SB	50	700	600	29%	27%
136	Road D1	EB	50	650	450	28%	26%
137	Road D1	WB	50	650	600	36%	30%
138	Road D1	EB	50	350	300	32%	28%
139	Olympic Avenue	NB	50	700	450	28%	27%
140	Boundary Street (Flyover)	EB	50	1500	1350	14%	21%
141	Prince Edward Road West (Flyover)	WB	50	1100	1100	13%	20%
142	Prince Edward Road West (Flyover)	WB	50	1800	2000	13%	20%
143	Ma Tau Chung Road / Prince Edward Road West	EB	50	1350	2000	14%	21%
144	Argyle Street (Flyover)	EB	50	1000	1150	13%	20%
145	Argyle Street (Flyover)	WB	50	450	500	13%	20%
146	Ma Tau Chung Road (Flyover)	SB	50	900	950	13%	20%
150A	Nga Tsin Wai Road	EB	50	250	400	22%	16%
150B	Nga Tsin Wai Road	WB	50	500	800	29%	14%
151A	Nga Tsin Wai Road	EB	50	250	350	24%	16%
151B	Nga Tsin Wai Road	WB	50	600	900	27%	11%

2052 Peak Hour Traffic Flows for NIA

Road ID	Road Name	Travel Direction	Speed Limit	08:00 ~ 09:00 AM PEAK FLOW (veh/hr)	18:00 ~ 19:00 PM PEAK FLOW (veh/hr)	AM HV%	PM HV%
5A	Junction Road	NB	50	700	700	21%	16%
5B	Junction Road	SB	50	700	450	26%	17%
6A	Junction Road	NB	50	600	700	20%	17%
6B	Junction Road	SB	50	750	450	26%	16%
7A	Tung Tau Tsuen Road	EB	50	350	300	28%	33%
7B	Tung Tau Tsuen Road	WB	50	450	300	27%	23%
9A	Tung Tsing Road	SB	50	500	450	31%	21%
9B	Tung Tsing Road	NB	50	300	200	29%	20%
19A	Dumbarton Road	EB	50	300	150	13%	22%
19B	Dumbarton Road	WB	50	50	50	15%	9%
20A	Dumbarton Road	EB	50	400	150	16%	12%
20B	Dumbarton Road	WB	50	100	50	40%	60%
22A	Grampian Road	NB	50	200	150	20%	19%
22B	Grampian Road	SB	50	100	50	26%	15%
23A	Junction Road	NB	50	350	500	26%	17%
23B	Junction Road	SB	50	750	400	26%	21%
24A	Carpenter Road	EB	50	150	100	19%	0%
24B	Carpenter Road	WB	50	350	450	27%	12%
25A	Carpenter Road	EB	50	300	300	20%	2%
25B	Carpenter Road	WB	50	250	400	26%	14%
26A	Carpenter Road	EB	50	100	150	21%	5%
26B	Carpenter Road	WB	50	400	550	27%	14%
27A	Carpenter Road	EB	50	250	250	26%	11%
27B	Carpenter Road	WB	50	500	450	32%	14%
29	Ta Ku Ling Road	2-way	50	5	7	0%	16%
30A	Carpenter Road	EB	50	450	550	30%	22%
30B	Carpenter Road	WB	50	200	250	36%	14%
31A	Carpenter Road	EB	50	300	450	28%	22%
31B	Carpenter Road	WB	50	200	300	36%	16%
32A	Carpenter Road	EB	50	650	800	30%	21%
32B	Carpenter Road	WB	50	100	100	28%	13%
33A	Lok Sin Road	EB	50	300	300	31%	23%
33B	Lok Sin Road	WB	50	450	350	29%	23%
34	Sa Po Road	SB	50	800	900	29%	20%
35A	Carpenter Road	EB	50	50	9	20%	23%
35B	Carpenter Road	WB	50	14	50	23%	19%
36	Kai Tak Road	SB	50	14	50	23%	19%
37	Sa Po Road	SB	50	450	500	31%	14%
38A	Junction Road	NB	50	250	300	28%	14%
38B	Junction Road	SB	50	850	650	28%	21%
39	Fuk Lo Tsun Road	NB	50	200	200	12%	4%
40	Lion Rock Road	SB	50	300	250	19%	5%
41	Hau Wong Road	NB	50	350	350	29%	15%
42A	Road L9	NB	50	400	300	31%	31%
42B	Road L9	SB	50	400	300	31%	32%
44	Lung Kong Road	NB	50	300	400	24%	21%
45	South Wall Road	SB	50	200	150	36%	19%
46	Tak Ku Ling Road	NB	50	400	500	37%	19%
49A	Nga Tsin Wai Road	EB	50	500	400	18%	10%

Road ID	Road Name	Travel Direction	Speed Limit	08:00 ~ 09:00 AM PEAK FLOW (veh/hr)	18:00 ~ 19:00 PM PEAK FLOW (veh/hr)	AM HV%	PM HV%
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50A	Nga Tsin Wai Road	EB	50	550	550	18%	9%
50B	Nga Tsin Wai Road	WB	50	350	450	21%	9%
51A	Nga Tsin Wai Road	EB	50	650	600	19%	9%
51B	Nga Tsin Wai Road	WB	50	450	600	23%	11%
52A	Nga Tsin Wai Road	EB	50	300	250	20%	11%
52B	Nga Tsin Wai Road	WB	50	650	750	23%	11%
53A	Nga Tsin Wai Road	EB	50	300	300	20%	10%
53B	Nga Tsin Wai Road	WB	50	650	750	24%	13%
54A	Nga Tsin Wai Road	EB	50	250	350	18%	6%
54B	Nga Tsin Wai Road	WB	50	550	800	30%	15%
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58A	Nga Tsin Wai Road	EB	50	250	350	29%	15%
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65	Fuk Lo Tsun Road	SB	50	300	250	12%	6%
66	Lion Rock Road	SB	50	300	200	24%	10%
67	Hau Wong Road	NB	50	350	300	20%	13%
68	Nga Tsin Long Road	NB	50	50	100	22%	19%
70	Lung Kong Road	NB	50	650	800	25%	14%
71	South Wall Road	SB	50	550	350	26%	17%
72	South Wall Road	WB	50	50	50	43%	21%
74	Prince Edward Road West	EB	50	800	850	25%	20%
75	Prince Edward Road West	EB	50	1000	900	25%	22%
76	Prince Edward Road West	EB	50	1300	1150	22%	17%
77	Prince Edward Road West	EB	50	1600	1350	22%	17%
78	Prince Edward Road West	EB	50	1300	1050	21%	17%
79	Prince Edward Road West	EB	50	2400	2500	26%	23%
80	Prince Edward Road West	EB	50	1450	1800	32%	27%
81	Prince Edward Road West	EB	50	850	1050	38%	38%
82	Prince Edward Road West	EB	50	1350	1350	33%	32%
83	Prince Edward Road East	EB	50	3500	3700	26%	23%
84	Prince Edward Road East	EB	50	3150	3300	26%	22%
92	Prince Edward Road West	WB	50	1250	1500	28%	27%
93	Prince Edward Road West	WB	50	900	1150	29%	27%
94	Prince Edward Road West	WB	50	950	1250	28%	25%
95	Prince Edward Road West	WB	50	650	900	36%	33%
96	Prince Edward Road West	WB	50	300	300	15%	21%
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Road ID	Road Name	Travel Direction	Speed Limit	08:00 ~ 09:00 AM PEAK FLOW (veh/hr)	18:00 ~ 19:00 PM PEAK FLOW (veh/hr)	AM HV%	PM HV%
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102	Kowloon City Roundabout	SB	50	1000	750	22%	19%
105	Stirling Road	SB	50	100	100	12%	4%
108	Argyle Street	EB	50	400	400	25%	27%
111	Argyle Street	WB	50	250	150	20%	54%
121	Ma Tau Chung Road	NB	50	800	1000	35%	18%
124	Ma Tau Chung Road	SB	50	1600	1400	34%	27%
125	Ma Tau Chung Road	SB	50	2400	2450	32%	26%
126	Ma Tau Chung Road	WB	50	1400	1700	42%	30%
127	Prince Edward Road East	WB	50	2850	3000	42%	12%
134	Olympic Avenue	SB	50	700	600	29%	27%
136	Road D1	EB	50	650	450	28%	25%
137	Road D1	WB	50	650	600	36%	30%
138	Road D1	EB	50	350	300	32%	28%
139	Olympic Avenue	NB	50	700	450	28%	27%
140	Boundary Street (Flyover)	EB	50	1500	1400	14%	21%
141	Prince Edward Road West (Flyover)	WB	50	1100	1100	13%	20%
142	Prince Edward Road West (Flyover)	WB	50	1800	2000	13%	20%
143	Ma Tau Chung Road / Prince Edward Road West	EB	50	1350	2000	14%	21%
144	Argyle Street (Flyover)	EB	50	1000	1150	13%	20%
145	Argyle Street (Flyover)	WB	50	450	500	13%	20%
146	Ma Tau Chung Road (Flyover)	SB	50	900	950	13%	20%
150A	Nga Tsin Wai Road	EB	50	250	400	22%	16%
150B	Nga Tsin Wai Road	WB	50	500	800	29%	14%
151A	Nga Tsin Wai Road	EB	50	250	350	24%	16%
151B	Nga Tsin Wai Road	WB	50	600	900	27%	11%

Appendix 4.2

Predicted Road Traffic Noise Levels at the Affected NSRs under Base Case Scenario

Tower 1 - Base Scenario

Tower 1	Unit No.	T1_1_L	T1_1_B1	T1_2_L	T1_2_B1	T1_3_L	T1_3_B1	T1_4_L	T1_4_B1	T1_5_L	T1_5_B1	T1_5_B2	T1_6_L	T1_6_B1	T1_6_B2	T1_7_L	T1_7_B1	T1_8_L	T1_8_B1
1/F	1	36.7	36.6	36.6	36.4	36.5	36.4	36.5	36.4	36.3	36.1	36.1	56.1	56.2	56.3	56.2	56.3	56.2	56.0
2/F	2	36.9	36.8	36.8	36.5	36.6	36.6	36.6	36.5	36.3	36.2	36.1	56.3	56.3	56.3	56.2	56.3	56.2	56.1
3/F	3	37.1	36.9	37.0	36.7	36.8	36.8	36.8	36.6	36.5	36.2	36.1	56.3	56.4	56.4	56.3	56.4	56.2	56.1
4/F	4	37.3	37.1	37.2	37.0	37.0	37.0	37.0	36.8	36.6	36.3	36.1	56.4	56.5	56.5	56.4	56.5	56.3	56.2
5/F	5	37.4	37.4	37.4	37.3	37.2	37.3	37.2	37.1	36.8	36.4	36.1	56.5	56.7	56.7	56.5	56.6	56.4	56.3
6/F	6	37.8	37.5	37.7	37.5	37.5	37.5	37.5	37.3	37.1	36.5	36.1	56.7	56.8	56.9	56.6	56.7	56.5	56.4
7/F	7	38.2	37.9	38.3	38.0	38.0	38.0	37.9	37.8	37.3	36.8	36.1	57.0	57.1	57.2	56.9	57.0	56.7	56.6
8/F	8	38.8	38.4	38.8	38.7	38.6	38.6	38.6	38.4	37.9	37.0	36.2	57.2	57.3	57.4	57.1	57.2	57.0	56.9
9/F	9	39.3	38.9	39.4	39.2	39.2	39.2	39.1	38.9	38.4	37.3	36.2	57.4	57.4	57.6	57.2	57.4	57.1	57.0
10/F	10	40.1	39.5	40.3	40.1	40.1	40.1	40.0	39.8	39.2	37.9	36.2	57.5	57.6	57.7	57.4	57.5	57.3	57.1
11/F	11	40.8	40.2	41.0	40.9	40.8	40.8	40.8	40.6	39.8	38.4	36.3	57.6	57.7	57.8	57.5	57.6	57.4	57.2
12/F	12	41.3	40.7	41.7	41.5	41.4	41.4	41.3	41.2	40.4	38.7	36.3	57.7	57.8	57.9	57.5	57.6	57.4	57.3
13/F	13	41.8	41.0	42.1	41.9	41.9	41.9	41.8	41.6	40.7	39.0	36.3	57.7	57.8	57.9	57.6	57.7	57.5	57.4
14/F	14	42.1	41.4	42.5	42.2	42.2	42.2	42.1	41.9	41.0	39.2	36.4	57.8	57.9	57.9	57.6	57.7	57.5	57.4
15/F	15	42.5	41.6	42.8	42.5	42.5	42.6	42.4	42.1	41.2	39.3	36.4	57.8	57.9	58.0	57.6	57.7	57.6	57.5
16/F	16	42.7	41.9	43.0	42.8	42.7	42.7	42.6	42.3	41.3	39.5	36.5	57.8	57.9	58.0	57.7	57.8	57.6	57.5
17/F	17	42.9	42.0	43.2	43.0	42.8	42.9	42.7	42.5	41.4	39.6	36.5	57.8	58.0	58.0	57.7	57.8	57.6	57.5
18/F	18	43.0	42.2	43.4	43.1	43.0	43.0	42.9	42.6	41.5	39.7	36.6	57.9	58.0	58.1	57.7	57.8	57.7	57.5
19/F	19	43.1	42.4	43.4	43.2	43.1	43.2	43.0	42.7	41.7	39.8	36.6	57.9	58.0	58.1	57.8	57.9	57.6	57.5
20/F	20	43.3	42.5	43.6	43.3	43.2	43.2	43.1	42.8	41.7	39.9	36.7	58.0	58.1	58.2	57.8	57.9	57.7	57.6
21/F	21	43.7	42.9	44.0	43.6	43.6	43.6	43.4	43.0	41.9	40.0	37.1	58.1	58.1	58.3	57.9	58.0	57.8	57.7
22/F	22	43.8	43.2	44.1	43.7	43.6	43.7	43.4	43.0	41.9	40.2	37.3	58.1	58.2	58.3	57.9	58.0	57.8	57.7
23/F	23	44.0	43.3	44.2	43.8	43.8	43.8	43.6	43.1	42.0	40.3	37.7	58.1	58.3	58.3	58.0	58.0	57.8	57.7
24/F	24	44.2	43.5	44.4	44.0	43.9	44.0	43.7	43.1	42.1	40.6	38.3	58.1	58.3	58.3	58.0	58.1	57.9	57.8
25/F	25	44.4	43.8	44.5	44.0	44.0	44.0	43.8	43.3	42.3	40.8	39.1	58.2	58.3	58.4	58.0	58.1	57.9	57.8
26/F	26	44.5	44.0	44.6	44.2	44.2	44.1	43.9	43.5	42.8	41.8	40.6	58.2	58.3	58.5	58.0	58.2	57.9	57.8
27/F	27	44.7	44.3	44.8	44.2	44.2	44.2	44.1	43.7	43.3	42.8	42.3	58.2	58.4	58.5	58.1	58.2	57.9	57.8
28/F	28	45.0	44.6	45.0	44.3	44.2	44.3	44.2	44.1	43.9	43.6	43.5	58.3	58.4	58.5	58.1	58.2	58.0	57.8
29/F	29	45.2	45.0	45.1	44.3	44.3	44.3	44.3	44.3	44.2	44.1	44.0	58.3	58.4	58.5	58.1	58.3	58.0	57.9
30/F	30	45.5	45.3	45.2	44.4	44.4	44.4	44.4	44.4	44.4	44.4	44.3	58.4	58.5	58.5	58.2	58.3	58.0	57.9
31/F	31	45.6	45.5	45.4	44.4	44.4	44.4	44.5	44.4	44.5	44.4	44.5	58.4	58.5	58.6	58.2	58.4	58.1	58.0
32/F	32	45.7	45.7	45.5	44.5	44.5	44.4	44.4	44.4	44.5	44.5	44.5	58.5	58.5	58.6	58.3	58.4	58.3	58.3
33/F	33	45.8	45.9	45.6	44.5	44.5	44.5	44.5	44.5	44.5	44.5	44.5	58.6	58.6	58.7	58.6	58.6	58.5	58.5
34/F	34	46.0	46.0	45.6	44.6	44.5	44.5	44.5	44.5	44.5	44.5	44.5	58.8	58.8	58.9	58.8	58.8	58.7	58.7
35/F	35	46.2	46.2	45.7	44.6	44.5	44.5	44.5	44.5	44.5	44.5	44.5	59.0	59.0	59.0	59.0	59.0	58.9	58.9
36/F	36	46.4	46.4	45.8	44.6	44.5	44.5	44.5	44.5	44.5	44.5	44.6	59.1	59.1	59.2	59.0	59.1	59.0	59.0
37/F	37	46.5	46.6	45.9	44.6	44.5	44.5	44.5	44.6	44.5	44.5	44.6	59.1	59.2	59.2	59.1	59.1	59.0	59.0
38/F	38	46.6	46.7	46.0	44.7	44.5	44.6	44.6	44.6	44.6	44.5	44.6	59.1	59.2	59.2	59.1	59.1	59.0	59.0
39/F	39	46.7	46.8	46.1	44.7	44.6	44.6	44.6	44.6	44.6	44.5	44.6	59.1	59.2	59.3	59.1	59.1	59.0	59.0
40/F	40	46.9	46.9	46.3	44.8	44.7	44.7	44.7	44.7	44.7	44.7	44.8	59.1	59.2	59.2	59.1	59.1	59.1	59.0
41/F	41	47.1	47.2	46.5	45.0	44.9	44.9	44.9	44.9	44.9	44.9	44.9	59.1	59.1	59.2	59.1	59.1	59.0	59.0

*** Note:**

XX Individual receiver with traffic noise level exceeding the standard of 70 dB(A) as stipulated in HKPSG are highlighed.

Tower 1 - Base Scenario

Tower 1	Unit No.	T1_9_L	T1_9_B1	T1_9_B2	T1_10_L	T1_10_B1	T1_10_B2	T1_11_L	T1_11_B1	T1_11_B2	T1_12_L	T1_12_B1	T1_12_B2	T1_13_L	T1_13_B1	T1_14_L	T1_14_B1	T1_15_L	T1_15_B1
1/F	1	55.9	55.8	55.9	55.4	55.5	55.6	55.1	54.8	54.9	50.5	51.3	50.9	49.7	50.1	49.3	48.8	47.9	48.4
2/F	2	55.9	55.8	55.9	55.4	55.5	55.7	55.1	54.8	54.9	50.5	51.3	50.9	49.7	50.1	49.3	48.8	47.9	48.4
3/F	3	56.0	55.8	56.0	55.5	55.6	55.7	55.1	54.8	55.0	50.5	51.3	50.9	49.7	50.1	49.3	48.8	47.9	48.4
4/F	4	56.1	55.9	56.0	55.5	55.6	55.7	55.2	54.9	55.0	50.5	51.3	50.9	49.7	50.1	49.3	48.8	47.9	48.4
5/F	5	56.2	56.0	56.0	55.5	55.7	55.8	55.2	54.9	55.1	50.5	51.3	50.9	49.7	50.1	49.3	48.8	47.9	48.4
6/F	6	56.2	56.1	56.2	55.6	55.8	55.9	55.3	55.0	55.2	50.5	51.3	50.9	49.7	50.1	49.2	48.8	47.9	48.4
7/F	7	56.4	56.3	56.4	55.7	55.9	56.1	55.4	55.1	55.3	50.5	51.3	50.9	49.7	50.1	49.2	48.8	47.9	48.4
8/F	8	56.7	56.5	56.6	55.9	56.1	56.4	55.6	55.2	55.4	50.5	51.3	50.9	49.7	50.1	49.2	48.8	47.9	48.4
9/F	9	56.8	56.6	56.7	56.0	56.2	56.5	55.7	55.4	55.5	50.5	51.3	50.9	49.7	50.1	49.2	48.8	47.9	48.4
10/F	10	57.0	56.8	56.9	56.1	56.3	56.6	55.8	55.5	55.6	50.5	51.3	50.9	49.7	50.1	49.2	48.8	47.9	48.3
11/F	11	57.1	56.9	57.0	56.2	56.4	56.7	55.9	55.6	55.7	50.5	51.2	50.9	49.7	50.0	49.2	48.8	47.9	48.3
12/F	12	57.1	56.9	57.1	56.3	56.5	56.8	56.0	55.7	55.8	50.5	51.3	50.9	49.7	50.0	49.2	48.8	47.9	48.3
13/F	13	57.2	57.0	57.1	56.4	56.6	56.8	56.1	55.7	55.9	50.5	51.3	50.9	49.7	50.0	49.2	48.7	47.9	48.3
14/F	14	57.2	57.0	57.2	56.4	56.6	56.9	56.1	55.8	56.0	50.4	51.3	50.9	49.7	50.0	49.2	48.7	47.8	48.3
15/F	15	57.3	57.1	57.2	56.5	56.7	56.9	56.2	55.8	56.0	50.4	51.3	50.8	49.6	50.0	49.2	48.7	47.8	48.3
16/F	16	57.3	57.1	57.2	56.5	56.7	56.9	56.2	55.9	56.0	50.4	51.3	50.8	49.6	50.0	49.2	48.8	47.8	48.3
17/F	17	57.3	57.1	57.2	56.6	56.7	57.0	56.2	55.9	56.1	50.4	51.3	50.8	49.6	50.0	49.2	48.8	47.8	48.3
18/F	18	57.3	57.1	57.3	56.6	56.8	57.0	56.3	56.0	56.1	50.4	51.3	50.8	49.6	50.0	49.2	48.7	47.9	48.3
19/F	19	57.4	57.1	57.3	56.6	56.8	57.0	56.3	56.1	56.2	50.4	51.4	50.8	49.6	50.0	49.2	48.8	47.8	48.3
20/F	20	57.4	57.2	57.3	56.7	56.8	57.0	56.4	56.1	56.2	50.4	51.4	50.8	49.6	50.0	49.2	48.8	47.8	48.3
21/F	21	57.5	57.3	57.4	56.9	57.0	57.1	56.7	56.4	56.5	50.4	51.6	50.8	49.6	50.0	49.2	48.8	47.9	48.3
22/F	22	57.5	57.3	57.4	57.1	57.1	57.2	56.8	56.5	56.6	50.4	51.6	50.8	49.7	50.0	49.2	48.8	47.9	48.4
23/F	23	57.5	57.3	57.4	57.2	57.2	57.2	56.9	56.7	56.7	50.5	51.7	50.8	49.7	50.1	49.3	48.8	48.0	48.4
24/F	24	57.6	57.4	57.5	57.3	57.3	57.2	57.0	56.8	56.9	50.5	51.8	50.9	49.7	50.1	49.3	48.9	48.1	48.5
25/F	25	57.6	57.4	57.5	57.4	57.3	57.3	57.1	57.0	57.0	50.6	52.0	51.0	49.8	50.2	49.4	49.0	48.2	48.6
26/F	26	57.6	57.4	57.5	57.6	57.4	57.3	57.3	57.1	57.1	50.7	52.2	51.1	49.9	50.3	49.5	49.1	48.3	48.8
27/F	27	57.6	57.4	57.6	57.6	57.5	57.3	57.3	57.3	57.2	50.8	52.3	51.2	50.1	50.5	49.7	49.4	48.5	48.9
28/F	28	57.7	57.5	57.6	57.7	57.6	57.4	57.5	57.5	57.4	51.1	52.6	51.5	50.4	50.8	50.1	49.7	48.9	49.3
29/F	29	57.7	57.6	57.6	57.8	57.6	57.4	57.7	57.7	57.6	51.7	53.1	52.1	51.0	51.3	50.6	50.2	49.5	49.9
30/F	30	57.8	57.6	57.7	58.0	57.8	57.6	57.9	58.1	57.8	52.6	53.9	53.0	51.9	52.3	51.6	51.2	50.5	50.9
31/F	31	57.9	57.8	57.9	58.3	58.0	57.7	58.2	58.5	58.2	53.7	54.7	53.9	53.2	53.5	52.9	52.6	51.9	52.3
32/F	32	58.1	58.1	58.1	58.6	58.4	58.1	58.6	58.8	58.6	54.6	55.5	54.8	54.1	54.3	53.9	53.7	53.3	53.5
33/F	33	58.4	58.4	58.4	58.9	58.7	58.4	58.9	59.2	59.0	55.3	56.1	55.5	54.9	55.1	54.7	54.6	54.2	54.4
34/F	34	58.7	58.6	58.7	59.2	59.0	58.7	59.2	59.5	59.2	55.9	56.7	56.1	55.6	55.7	55.4	55.2	54.9	55.1
35/F	35	58.9	58.9	58.8	59.4	59.1	58.8	59.3	59.6	59.3	56.3	56.9	56.5	56.1	56.2	55.9	55.8	55.5	55.7
36/F	36	58.9	58.9	59.0	59.4	59.1	58.9	59.3	59.6	59.3	56.6	57.0	56.6	56.4	56.5	56.3	56.2	55.9	56.1
37/F	37	59.0	58.9	59.0	59.4	59.1	58.9	59.4	59.6	59.4	56.6	57.0	56.7	56.5	56.6	56.5	56.4	56.2	56.3
38/F	38	59.0	59.0	59.0	59.4	59.1	58.9	59.3	59.6	59.3	56.7	57.1	56.7	56.6	56.6	56.5	56.5	56.4	56.4
39/F	39	59.0	58.9	59.0	59.4	59.1	58.9	59.4	59.6	59.3	56.7	57.0	56.7	56.6	56.6	56.5	56.5	56.4	56.5
40/F	40	58.9	58.9	59.0	59.4	59.2	58.9	59.3	59.6	59.3	56.6	57.0	56.7	56.6	56.6	56.5	56.5	56.4	56.5
41/F	41	58.9	58.9	59.0	59.4	59.1	58.8	59.4	59.6	59.3	56.6	57.0	56.7	56.6	56.6	56.5	56.5	56.4	56.5

* Note:

XX Individual receiver with traffic noise level exceeding the standard of 70 dB(A) as stipulated in HKPSG are highlighed.

Tower 1 - Base Scenario

Tower 1	Unit No.	T1_16_L	T1_16_B1	T1_16_B2	T1_17_L	T1_17_B1	T1_17_B2	T1_18_L	T1_18_B1	T1_19_L	T1_19_B1	T1_20_L	T1_20_B1
1/F	1	47.4	46.8	46.3	38.0	46.1	48.0	37.8	37.8	36.8	37.4	36.5	36.5
2/F	2	47.4	46.8	46.3	38.2	46.2	48.0	38.0	38.0	36.9	37.6	36.5	36.6
3/F	3	47.4	46.8	46.3	38.4	46.2	48.0	38.2	38.2	37.1	37.8	36.6	36.7
4/F	4	47.4	46.8	46.3	38.6	46.2	48.0	38.5	38.5	37.2	38.1	36.7	36.9
5/F	5	47.4	46.8	46.3	38.9	46.3	48.1	38.7	38.7	37.4	38.4	36.8	37.1
6/F	6	47.4	46.8	46.3	39.3	46.4	48.1	39.0	39.0	37.5	38.7	36.9	37.3
7/F	7	47.4	46.8	46.3	39.7	46.5	48.2	39.4	39.4	37.8	38.9	37.1	37.5
8/F	8	47.4	46.8	46.2	40.2	46.5	48.3	39.9	39.8	38.1	39.4	37.3	37.9
9/F	9	47.4	46.8	46.2	40.8	46.7	48.4	40.5	40.3	38.3	39.8	37.5	38.3
10/F	10	47.4	46.8	46.2	41.1	46.8	48.4	40.9	40.9	38.8	40.5	37.8	38.8
11/F	11	47.4	46.8	46.2	41.7	47.1	48.6	41.3	41.1	39.0	40.9	38.2	39.3
12/F	12	47.3	46.8	46.2	42.4	47.2	48.7	42.0	41.8	39.4	41.3	38.6	39.8
13/F	13	47.3	46.8	46.2	42.9	47.4	48.9	42.6	42.4	40.0	42.0	38.8	40.2
14/F	14	47.3	46.8	46.2	43.4	47.6	48.9	43.1	43.0	40.5	42.6	38.9	40.5
15/F	15	47.3	46.7	46.2	43.8	47.7	49.0	43.5	43.4	40.9	43.0	39.1	40.7
16/F	16	47.3	46.8	46.2	44.2	47.8	49.2	43.9	43.8	41.1	43.4	39.3	40.9
17/F	17	47.3	46.7	46.2	44.4	48.0	49.3	44.2	44.1	41.4	43.8	39.5	41.1
18/F	18	47.3	46.8	46.2	44.9	48.2	49.4	44.5	44.4	41.7	44.1	39.7	41.2
19/F	19	47.3	46.8	46.2	45.1	48.3	49.5	44.9	44.8	42.0	44.4	39.9	41.3
20/F	20	47.3	46.8	46.2	45.5	48.5	49.7	45.1	45.1	42.2	44.7	40.1	41.5
21/F	21	47.4	46.9	46.3	46.4	49.0	50.1	46.2	46.0	43.0	45.7	40.7	42.0
22/F	22	47.4	46.9	46.3	46.7	49.2	50.1	46.4	46.3	43.3	46.0	40.9	42.2
23/F	23	47.5	47.0	46.4	46.9	49.2	50.2	46.7	46.5	43.6	46.2	41.1	42.4
24/F	24	47.6	47.0	46.5	47.1	49.4	50.3	46.9	46.8	43.8	46.4	41.5	42.8
25/F	25	47.6	47.2	46.7	47.3	49.5	50.4	47.1	47.0	44.1	46.6	41.8	43.0
26/F	26	47.8	47.4	46.9	47.6	49.7	50.6	47.4	47.3	44.3	46.8	42.2	43.2
27/F	27	48.1	47.6	47.2	48.0	50.0	50.8	47.7	47.7	44.7	47.0	42.7	43.6
28/F	28	48.4	48.0	47.6	48.5	50.3	51.1	48.3	48.2	45.2	47.4	43.4	44.1
29/F	29	49.0	48.6	48.2	49.1	50.7	51.5	48.9	48.8	45.9	48.0	44.3	44.7
30/F	30	50.1	49.7	49.3	49.5	51.0	51.7	49.3	49.2	46.4	48.3	44.9	45.1
31/F	31	51.6	51.1	50.8	49.7	51.2	51.8	49.6	49.4	46.7	48.6	45.3	45.4
32/F	32	53.0	52.7	52.4	50.0	51.3	52.0	49.8	49.7	47.0	48.9	45.6	45.6
33/F	33	54.0	53.8	53.6	50.2	51.5	52.1	50.0	49.9	47.2	49.1	45.7	45.8
34/F	34	54.7	54.6	54.4	50.5	51.7	52.3	50.2	50.1	47.5	49.3	46.1	46.0
35/F	35	55.4	55.2	55.1	50.7	51.8	52.5	50.4	50.3	47.7	49.5	46.3	46.2
36/F	36	55.8	55.7	55.6	50.8	52.0	52.6	50.6	50.5	47.9	49.7	46.5	46.5
37/F	37	56.1	56.0	55.9	51.0	52.1	52.7	50.8	50.6	48.0	49.8	46.7	46.6
38/F	38	56.3	56.2	56.1	51.1	52.2	52.8	50.9	50.7	48.1	49.9	46.8	46.7
39/F	39	56.4	56.3	56.3	51.2	52.3	52.8	51.0	50.8	48.3	50.0	47.0	46.8
40/F	40	56.4	56.3	56.3	51.3	52.4	52.9	51.1	50.9	48.4	50.2	47.1	47.0
41/F	41	56.4	56.3	56.3	51.4	52.4	52.9	51.1	51.0	48.6	50.2	47.4	47.2

*** Note:**

XX Individual receiver with traffic noise level exceeding the standard of 70 dB(A) as stipulated in HKPSG are highlighed.

Tower 2 - Base Scenario

Tower 2	Unit No.	T2_1_L	T2_1_B1	T2_2_L	T2_2_B1	T2_3_L	T2_3_B1	T2_4_L	T2_4_B1	T2_5_L	T2_5_B1	T2_6_L	T2_6_B1	T2_6_B2	T2_7_L	T2_7_B1	T2_7_B2	T2_8_L	T2_8_B1
1/F	1	50.5	50.2	51.2	51.0	50.3	49.6	49.6	49.5	49.5	49.5	49.4	48.9	47.0	39.8	44.6	44.1	45.3	45.0
2/F	2	50.8	50.5	51.5	51.3	50.6	49.9	49.6	49.6	49.6	49.5	49.4	48.9	47.1	40.1	44.7	44.7	46.0	45.7
3/F	3	50.9	50.6	51.5	51.3	50.7	50.0	49.6	49.6	49.6	49.6	49.5	48.9	47.1	40.4	44.8	45.3	46.7	46.4
4/F	4	50.9	50.6	51.5	51.3	50.7	50.0	49.7	49.6	49.6	49.6	49.5	48.9	47.2	40.8	44.9	46.0	47.6	47.3
5/F	5	50.9	50.6	51.5	51.3	50.7	50.0	49.7	49.7	49.7	49.6	49.6	49.0	47.3	41.2	45.0	46.6	48.6	48.2
6/F	6	50.9	50.6	51.5	51.3	50.7	50.0	49.8	49.7	49.7	49.7	49.6	49.1	47.4	41.6	45.2	47.4	49.8	49.3
7/F	7	50.9	50.5	51.5	51.3	50.7	50.0	49.8	49.8	49.8	49.7	49.7	49.1	47.5	42.1	45.4	48.2	50.9	50.4
8/F	8	50.9	50.5	51.5	51.3	50.7	50.0	49.9	49.9	49.9	49.8	49.8	49.2	47.7	42.6	45.6	49.1	52.1	51.5
9/F	9	50.9	50.5	51.5	51.3	50.7	50.0	50.0	50.0	50.0	49.9	49.9	49.4	47.9	43.4	46.1	49.9	53.1	52.5
10/F	10	50.9	50.5	51.5	51.3	50.7	50.0	50.1	50.1	50.1	50.0	50.0	49.5	48.0	43.8	46.2	50.9	54.0	53.4
11/F	11	50.9	50.5	51.5	51.3	50.7	50.0	50.2	50.3	50.3	50.2	50.2	49.8	48.3	44.5	46.8	51.9	54.8	54.2
12/F	12	50.9	50.5	51.5	51.3	50.7	50.0	50.4	50.5	50.5	50.4	50.4	50.0	48.6	45.3	47.2	52.7	55.4	54.9
13/F	13	50.9	50.5	51.5	51.3	50.7	50.0	50.5	50.6	50.6	50.5	50.5	50.2	48.9	45.9	47.6	53.4	55.9	55.4
14/F	14	50.9	50.5	51.4	51.3	50.7	50.0	50.7	50.7	50.7	50.7	50.7	50.3	49.1	46.4	47.9	54.0	56.3	55.9
15/F	15	50.8	50.5	51.4	51.3	50.7	50.0	50.8	50.8	50.8	50.8	50.8	50.5	49.3	46.8	48.2	54.5	56.6	56.3
16/F	16	50.8	50.5	51.4	51.2	50.7	50.0	51.0	51.0	51.0	51.0	51.0	50.6	49.6	47.3	48.5	55.0	57.0	56.6
17/F	17	50.8	50.5	51.4	51.2	50.7	50.0	51.1	51.1	51.1	51.0	51.1	50.8	49.8	47.5	48.7	55.3	57.3	56.9
18/F	18	50.8	50.5	51.4	51.2	50.7	50.0	51.2	51.2	51.2	51.2	51.3	51.0	50.0	47.9	49.0	55.7	57.5	57.2
19/F	19	50.8	50.5	51.4	51.2	50.6	50.0	51.3	51.4	51.4	51.4	51.5	51.2	50.2	48.4	49.4	56.0	57.7	57.4
20/F	20	50.8	50.5	51.4	51.2	50.6	50.0	51.5	51.5	51.6	51.5	51.6	51.4	50.5	48.7	49.7	56.2	57.9	57.5
21/F	21	50.8	50.4	51.4	51.2	50.6	49.9	51.9	51.9	51.9	51.9	52.0	51.8	51.1	49.6	50.3	56.9	58.4	58.1
22/F	22	50.8	50.4	51.4	51.2	50.6	49.9	52.0	51.9	52.0	52.0	52.1	52.0	51.3	49.8	50.5	57.0	58.5	58.2
23/F	23	50.8	50.4	51.4	51.2	50.6	49.9	52.1	52.1	52.2	52.2	52.3	52.1	51.4	50.0	50.8	57.2	58.6	58.4
24/F	24	50.8	50.4	51.4	51.2	50.5	49.9	52.3	52.3	52.3	52.3	52.5	52.3	51.6	50.4	51.0	57.4	58.7	58.4
25/F	25	50.7	50.4	51.4	51.2	50.5	49.9	52.6	52.6	52.5	52.6	52.6	52.6	51.9	50.7	51.3	57.5	58.7	58.5
26/F	26	50.7	50.4	51.3	51.1	50.5	49.9	53.0	52.9	52.8	52.9	52.9	52.8	52.2	51.0	51.6	57.6	58.8	58.6
27/F	27	50.7	50.4	51.3	51.1	50.5	49.9	53.2	53.1	53.0	53.1	53.1	52.9	52.4	51.2	51.8	57.7	58.9	58.7
28/F	28	50.7	50.4	51.3	51.1	50.5	49.9	53.3	53.2	53.2	53.2	53.3	53.1	52.5	51.4	52.0	57.8	58.9	58.7
29/F	29	50.7	50.4	51.3	51.1	50.5	49.8	53.4	53.3	53.3	53.3	53.4	53.2	52.6	51.6	52.2	57.9	59.0	58.8
30/F	30	50.7	50.4	51.3	51.1	50.5	49.8	53.5	53.4	53.4	53.4	53.5	53.3	52.8	51.7	52.3	58.0	59.0	58.8
31/F	31	50.7	50.4	51.3	51.1	50.5	49.8	53.5	53.5	53.4	53.4	53.5	53.4	52.9	51.9	52.4	58.1	59.0	58.9
32/F	32	50.7	50.4	51.3	51.1	50.5	49.8	53.6	53.5	53.5	53.5	53.6	53.5	53.0	52.0	52.5	58.2	59.1	58.9
33/F	33	50.7	50.4	51.3	51.0	50.4	49.8	53.7	53.6	53.6	53.6	53.7	53.6	53.1	52.2	52.7	58.2	59.1	58.9
34/F	34	50.7	50.4	51.3	51.0	50.4	49.8	53.8	53.7	53.7	53.7	53.8	53.7	53.2	52.3	52.8	58.3	59.1	58.9
35/F	35	50.7	50.4	51.2	51.0	50.4	49.8	53.8	53.7	53.8	53.8	53.9	53.8	53.3	52.4	52.9	58.3	59.1	58.9
36/F	36	50.8	50.5	51.2	51.0	50.4	49.8	53.9	53.8	53.8	53.9	53.9	53.8	53.4	52.6	53.0	58.3	59.1	58.9
37/F	37	50.9	50.7	51.2	51.0	50.4	49.8	54.0	53.9	53.9	53.9	54.0	53.9	53.5	52.7	53.1	58.4	59.1	58.9
38/F	38	51.0	50.9	51.3	51.0	50.4	49.7	54.1	53.9	53.9	54.0	54.1	54.0	53.6	52.8	53.2	58.4	59.1	59.0
39/F	39	51.2	51.2	51.3	51.0	50.4	49.7	54.1	54.0	54.1	54.1	54.2	54.1	53.7	52.9	53.3	58.5	59.1	59.0
40/F	40	51.3	51.5	51.3	51.0	50.4	49.7	54.2	54.1	54.2	54.2	54.3	54.2	53.8	53.1	53.5	58.5	59.1	59.0
41/F	41	51.4	51.6	51.3	51.0	50.4	49.8	54.3	54.2	54.3	54.4	54.4	54.3	53.9	53.3	53.6	58.6	59.2	59.1

*** Note:**

XX Individual receiver with traffic noise level exceeding the standard of 70 dB(A) as stipulated in HKPSG are highlighed.

Tower 2 - Base Scenario

Tower 2	Unit No.	T2_9_L	T2_9_B1	T2_10_L	T2_10_B1	T2_11_L	T2_11_B1	T2_12_L	T2_12_B1	T2_12_B2	T2_13_L	T2_13_B1	T2_13_B2	T2_14_L	T2_14_B1	T2_14_B2	T2_15_L	T2_15_B1
1/F	1	45.6	45.9	46.6	46.2	47.0	47.5	51.6	54.1	55.3	49.1	48.5	48.3	49.5	49.8	49.6	50.0	49.9
2/F	2	46.3	46.7	47.5	47.0	47.9	48.6	52.1	54.4	55.5	49.3	48.8	48.5	49.7	50.0	49.8	50.3	50.2
3/F	3	47.1	47.6	48.5	48.0	49.0	49.7	52.7	54.7	55.8	49.4	48.8	48.5	49.7	50.1	49.8	50.4	50.3
4/F	4	48.1	48.6	49.7	49.1	50.3	51.2	53.6	55.3	56.2	49.4	48.7	48.5	49.7	50.1	49.8	50.4	50.3
5/F	5	49.1	49.7	51.1	50.3	51.8	52.7	54.6	55.9	56.7	49.4	48.7	48.5	49.7	50.1	49.8	50.4	50.2
6/F	6	50.4	51.1	52.7	51.8	53.5	54.3	55.8	56.8	57.4	49.4	48.7	48.5	49.7	50.0	49.8	50.4	50.2
7/F	7	51.6	52.3	54.0	53.1	54.8	55.5	56.7	57.5	58.0	49.4	48.7	48.5	49.7	50.0	49.8	50.4	50.2
8/F	8	52.9	53.6	55.0	54.2	55.8	56.5	57.4	58.0	58.4	49.4	48.7	48.5	49.7	50.0	49.8	50.4	50.2
9/F	9	53.8	54.5	55.9	55.1	56.6	57.1	57.9	58.4	58.8	49.4	48.7	48.5	49.7	50.0	49.8	50.4	50.2
10/F	10	54.7	55.3	56.5	55.9	57.2	57.6	58.3	58.8	59.0	49.3	48.7	48.5	49.7	50.0	49.8	50.4	50.2
11/F	11	55.4	55.9	57.0	56.4	57.6	58.0	58.6	59.0	59.2	49.3	48.7	48.5	49.7	50.0	49.8	50.4	50.2
12/F	12	55.9	56.4	57.4	56.8	58.0	58.3	58.9	59.2	59.3	49.3	48.7	48.5	49.7	50.0	49.8	50.4	50.2
13/F	13	56.4	56.8	57.7	57.2	58.2	58.6	59.1	59.4	59.5	49.3	48.7	48.5	49.6	50.0	49.8	50.4	50.2
14/F	14	56.8	57.2	58.0	57.5	58.4	58.8	59.3	59.5	59.6	49.3	48.7	48.5	49.6	50.0	49.7	50.4	50.2
15/F	15	57.1	57.5	58.2	57.8	58.7	59.0	59.4	59.7	59.7	49.3	48.7	48.5	49.6	50.0	49.7	50.3	50.2
16/F	16	57.4	57.8	58.5	58.1	58.9	59.2	59.6	59.8	59.9	49.3	48.7	48.5	49.6	50.0	49.7	50.3	50.2
17/F	17	57.7	58.0	58.7	58.3	59.1	59.4	59.8	60.0	60.0	49.3	48.7	48.5	49.6	50.0	49.7	50.3	50.2
18/F	18	57.9	58.2	58.9	58.5	59.3	59.6	60.0	60.1	60.2	49.3	48.7	48.4	49.6	50.0	49.7	50.3	50.2
19/F	19	58.1	58.4	59.1	58.7	59.4	59.7	60.1	60.2	60.3	49.3	48.7	48.4	49.6	50.0	49.7	50.3	50.2
20/F	20	58.2	58.5	59.2	58.8	59.6	59.9	60.2	60.4	60.4	49.3	48.6	48.4	49.6	50.0	49.7	50.3	50.1
21/F	21	58.7	58.9	59.6	59.2	59.9	60.3	60.5	60.7	60.7	49.2	48.7	48.4	49.6	49.9	49.7	50.3	50.1
22/F	22	58.8	59.1	59.7	59.3	60.0	60.4	60.6	60.8	60.8	49.2	48.6	48.4	49.6	49.9	49.7	50.3	50.1
23/F	23	58.9	59.2	59.8	59.4	60.1	60.4	60.7	60.8	60.9	49.2	48.6	48.4	49.6	49.9	49.7	50.3	50.1
24/F	24	59.0	59.2	59.8	59.4	60.2	60.5	60.8	60.9	60.9	49.2	48.6	48.4	49.6	49.9	49.6	50.3	50.1
25/F	25	59.0	59.3	59.8	59.5	60.2	60.5	60.8	60.9	61.0	49.2	48.6	48.4	49.6	49.9	49.6	50.3	50.1
26/F	26	59.1	59.3	59.9	59.6	60.3	60.6	60.8	60.9	61.0	49.2	48.6	48.4	49.5	49.9	49.6	50.2	50.1
27/F	27	59.2	59.4	59.9	59.6	60.3	60.6	60.8	61.0	61.0	49.2	48.6	48.4	49.5	49.9	49.7	50.2	50.1
28/F	28	59.2	59.4	60.0	59.6	60.3	60.6	60.9	61.0	61.0	49.2	48.6	48.4	49.5	49.9	49.6	50.2	50.1
29/F	29	59.2	59.4	60.0	59.7	60.3	60.6	60.9	61.0	61.0	49.2	48.6	48.4	49.6	49.9	49.7	50.2	50.1
30/F	30	59.3	59.5	60.0	59.7	60.3	60.6	60.9	61.0	61.0	49.2	48.7	48.4	49.6	49.9	49.6	50.2	50.1
31/F	31	59.3	59.5	60.0	59.7	60.4	60.6	60.8	61.0	61.0	49.3	48.7	48.4	49.6	49.9	49.7	50.2	50.1
32/F	32	59.3	59.5	60.0	59.7	60.4	60.6	60.8	61.0	61.0	49.3	48.7	48.5	49.6	50.0	49.7	50.2	50.1
33/F	33	59.3	59.5	60.0	59.7	60.4	60.6	60.9	61.0	61.0	49.3	48.8	48.5	49.7	50.0	49.8	50.3	50.2
34/F	34	59.3	59.5	60.0	59.7	60.3	60.6	60.8	61.0	61.0	49.4	48.9	48.7	49.8	50.1	49.8	50.3	50.2
35/F	35	59.3	59.5	60.0	59.7	60.3	60.6	60.8	60.9	61.0	49.7	49.1	48.9	49.9	50.2	50.0	50.4	50.3
36/F	36	59.3	59.5	60.0	59.7	60.3	60.6	60.8	60.9	60.9	50.0	49.5	49.3	50.2	50.5	50.3	50.5	50.6
37/F	37	59.3	59.5	60.0	59.7	60.3	60.6	60.8	60.9	60.9	50.4	50.0	49.7	50.7	50.9	50.7	50.7	50.9
38/F	38	59.3	59.5	60.0	59.7	60.3	60.6	60.8	60.9	60.9	50.9	50.4	50.2	51.2	51.4	51.2	51.0	51.3
39/F	39	59.3	59.5	60.0	59.6	60.3	60.6	60.7	60.9	60.9	51.2	50.7	50.5	51.5	51.8	51.6	51.3	51.8
40/F	40	59.3	59.5	60.0	59.7	60.3	60.6	60.7	60.9	60.9	51.4	50.9	50.6	51.7	52.1	51.9	51.6	52.1
41/F	41	59.4	59.5	60.0	59.7	60.3	60.6	60.7	60.9	60.9	51.5	51.0	50.7	51.9	52.2	52.0	51.8	52.2

*** Note:**

XX Individual receiver with traffic noise level exceeding the standard of 70 dB(A) as stipulated in HKPSG are highlighed.

Tower 3 - Base Scenario

Tower 3	Unit No.	T3_1_L	T3_1_B1	T3_1_B2	T3_2_L	T3_2_B1	T3_2_B2	T3_3_L	T3_3_B1	T3_3_B2	T3_4_L	T3_4_B1	T3_4_B2	T3_5_L	T3_5_B1	T3_5_B1	T3_6_L	T3_6_B1	T3_6_B2
1/F	1	39.6	39.9	39.7	43.6	42.5	44.3	45.7	45.1	46.0	46.3	46.8	46.8	51.2	51.1	51.1	51.2	51.3	51.3
2/F	2	40.1	40.3	40.0	44.3	43.3	45.2	46.5	46.0	46.9	47.2	47.7	47.7	51.2	51.1	51.1	51.3	51.4	51.3
3/F	3	40.6	40.6	40.4	45.3	44.1	46.1	47.4	46.8	47.7	48.1	48.6	48.7	51.3	51.2	51.2	51.3	51.4	51.4
4/F	4	41.2	41.1	40.8	46.2	45.1	47.0	48.3	47.8	48.7	49.0	49.6	49.7	51.3	51.2	51.2	51.4	51.5	51.4
5/F	5	41.8	41.4	41.2	47.3	46.2	48.1	49.4	48.9	49.8	50.2	50.8	50.9	51.4	51.3	51.3	51.5	51.5	51.5
6/F	6	42.7	41.9	41.6	48.5	47.4	49.2	50.4	49.9	50.8	51.2	51.9	51.9	51.5	51.3	51.3	51.5	51.6	51.6
7/F	7	43.4	42.4	42.0	49.8	48.7	50.5	51.6	51.2	51.9	52.4	53.0	53.0	51.6	51.5	51.5	51.7	51.8	51.8
8/F	8	44.1	42.8	42.5	50.9	49.8	51.6	52.8	52.3	53.1	53.5	54.1	54.1	51.7	51.6	51.6	51.8	51.9	51.8
9/F	9	44.8	43.3	42.9	52.0	50.9	52.7	53.9	53.4	54.2	54.6	55.1	55.1	51.9	51.8	51.8	52.0	52.1	52.0
10/F	10	45.5	43.7	43.5	52.9	51.7	53.6	54.8	54.3	55.1	55.4	55.9	55.9	52.1	52.0	52.0	52.2	52.3	52.2
11/F	11	45.9	44.2	43.9	53.6	52.4	54.4	55.5	55.1	55.8	56.1	56.6	56.5	52.2	52.2	52.2	52.4	52.5	52.4
12/F	12	46.5	44.9	44.6	54.3	53.0	55.0	56.2	55.7	56.4	56.8	57.2	57.1	52.4	52.4	52.4	52.5	52.6	52.6
13/F	13	47.0	45.4	45.1	54.8	53.5	55.6	56.7	56.3	56.9	57.2	57.6	57.6	52.6	52.5	52.5	52.7	52.8	52.7
14/F	14	47.4	45.9	45.6	55.2	53.9	56.0	57.1	56.7	57.4	57.7	58.0	58.0	52.7	52.6	52.6	52.7	52.9	52.8
15/F	15	47.8	46.6	46.3	55.5	54.2	56.4	57.5	57.1	57.7	58.0	58.4	58.4	52.8	52.7	52.7	52.9	53.1	53.0
16/F	16	48.3	47.4	47.1	55.8	54.4	56.6	57.8	57.3	58.0	58.2	58.6	58.6	53.0	52.9	52.9	53.1	53.3	53.2
17/F	17	48.7	48.0	47.7	56.0	54.6	56.9	58.0	57.6	58.2	58.5	58.8	58.8	53.1	53.1	53.1	53.3	53.4	53.3
18/F	18	49.0	48.6	48.2	56.1	54.7	57.0	58.2	57.8	58.4	58.6	59.0	59.0	53.3	53.3	53.3	53.4	53.5	53.5
19/F	19	49.3	49.2	48.7	56.2	54.8	57.1	58.3	57.9	58.6	58.8	59.2	59.2	53.4	53.4	53.4	53.5	53.6	53.6
20/F	20	49.7	49.7	49.3	56.2	54.9	57.2	58.5	58.0	58.7	59.0	59.4	59.3	53.6	53.4	53.4	53.6	53.8	53.7
21/F	21	50.1	50.5	49.9	56.3	55.0	57.3	58.6	58.1	58.8	59.1	59.5	59.5	53.7	53.6	53.6	53.8	53.9	53.8
22/F	22	50.5	50.8	50.3	56.3	55.0	57.3	58.6	58.2	58.9	59.2	59.6	59.6	53.8	53.7	53.7	54.0	54.1	54.0
23/F	23	50.7	51.3	50.7	56.4	55.1	57.4	58.7	58.2	59.0	59.3	59.6	59.7	54.0	53.9	53.9	54.1	54.2	54.2
24/F	24	50.9	51.7	51.1	56.4	55.1	57.4	58.8	58.3	59.1	59.3	59.7	59.8	54.1	54.0	54.0	54.2	54.4	54.4
25/F	25	51.2	52.1	51.5	56.4	55.2	57.5	58.8	58.3	59.1	59.4	59.8	59.9	54.3	54.2	54.2	54.4	54.5	54.5
26/F	26	51.4	52.5	51.8	56.4	55.2	57.5	58.9	58.4	59.2	59.5	59.9	60.0	54.4	54.3	54.3	54.5	54.7	54.6
27/F	27	51.6	52.8	52.1	56.4	55.3	57.5	58.9	58.4	59.2	59.5	59.9	60.0	54.5	54.4	54.4	54.6	54.8	54.7
28/F	28	51.9	53.1	52.4	56.4	55.3	57.5	58.9	58.4	59.2	59.6	60.0	60.0	54.7	54.5	54.5	54.8	55.0	54.9
29/F	29	52.0	53.3	52.6	56.4	55.3	57.5	58.9	58.4	59.3	59.6	60.0	60.1	54.8	54.7	54.7	54.9	55.1	55.0
30/F	30	52.1	53.5	52.8	56.4	55.3	57.5	58.9	58.4	59.3	59.6	60.0	60.1	54.9	54.8	54.8	55.1	55.3	55.2
31/F	31	52.3	53.7	53.0	56.4	55.3	57.5	58.9	58.4	59.3	59.6	60.0	60.1	55.1	55.0	55.0	55.2	55.4	55.3
32/F	32	52.4	53.8	53.1	56.4	55.3	57.4	58.9	58.4	59.3	59.6	60.1	60.1	55.2	55.0	55.0	55.3	55.6	55.5
33/F	33	52.5	53.9	53.2	56.4	55.3	57.4	58.9	58.4	59.3	59.6	60.1	60.1	55.3	55.2	55.2	55.5	55.7	55.6
34/F	34	52.5	54.1	53.3	56.3	55.3	57.4	58.9	58.4	59.2	59.6	60.1	60.1	55.4	55.3	55.3	55.6	55.8	55.7
35/F	35	52.6	54.2	53.4	56.3	55.3	57.4	58.9	58.4	59.2	59.6	60.0	60.1	55.5	55.4	55.4	55.7	55.9	55.8
36/F	36	52.6	54.3	53.5	56.3	55.3	57.4	58.9	58.3	59.2	59.6	60.0	60.1	55.7	55.5	55.5	55.8	56.1	56.0

*** Note:**

XX Individual receiver with traffic noise level exceeding the standard of 70 dB(A) as stipulated in HKPSG are highlighed.

Tower 3 - Base Scenario

Tower 3	Unit No.	T3_7_L	T3_7_B1	T3_7_B2	T3_8_L	T3_8_B1	T3_9_L	T3_9_B1	T3_10_L	T3_10_B1	T3_10_B2	T3_11_L	T3_11_B1	T3_11_B2	T3_12_L	T3_12_B1	T3_12_B2
1/F	1	51.5	51.5	51.4	51.7	51.6	51.8	51.8	51.9	51.9	51.8	51.9	51.8	51.9	53.5	53.7	53.9
2/F	2	51.6	51.5	51.4	51.7	51.6	51.8	51.8	52.0	51.9	51.9	51.9	51.9	52.0	55.4	55.7	55.9
3/F	3	51.6	51.6	51.5	51.7	51.7	51.9	51.9	52.0	52.0	51.9	52.0	52.0	52.0	57.4	57.8	58.1
4/F	4	51.7	51.6	51.5	51.8	51.8	51.9	51.9	52.1	52.1	52.0	52.0	52.0	52.0	59.1	59.4	59.7
5/F	5	51.7	51.7	51.6	51.9	51.8	52.0	52.0	52.2	52.1	52.0	52.1	52.1	52.1	60.4	60.7	60.9
6/F	6	51.8	51.7	51.7	52.0	51.9	52.1	52.1	52.3	52.2	52.1	52.2	52.3	52.3	61.3	61.6	61.8
7/F	7	52.0	51.9	51.9	52.1	52.0	52.2	52.3	52.4	52.4	52.3	52.4	52.4	52.4	62.1	62.3	62.5
8/F	8	52.1	52.0	51.9	52.3	52.2	52.4	52.4	52.6	52.6	52.4	52.6	52.7	52.6	62.6	62.8	63.0
9/F	9	52.4	52.3	52.2	52.5	52.4	52.6	52.6	52.9	52.8	52.7	52.8	52.9	52.9	63.1	63.3	63.4
10/F	10	52.5	52.5	52.3	52.7	52.6	52.9	52.9	53.1	53.0	52.9	53.1	53.2	53.1	63.6	63.7	63.9
11/F	11	52.7	52.6	52.5	52.8	52.8	53.0	53.0	53.3	53.2	53.1	53.2	53.4	53.4	63.9	64.1	64.2
12/F	12	52.9	52.8	52.7	53.0	53.0	53.2	53.2	53.4	53.4	53.3	53.5	53.6	53.5	64.3	64.4	64.5
13/F	13	53.0	52.9	52.9	53.2	53.1	53.4	53.4	53.6	53.6	53.4	53.7	53.8	53.7	64.5	64.7	64.8
14/F	14	53.2	53.1	53.0	53.3	53.3	53.5	53.6	53.8	53.8	53.6	53.9	54.1	54.0	64.7	64.9	65.0
15/F	15	53.4	53.3	53.2	53.6	53.5	53.7	53.7	54.0	53.9	53.8	54.0	54.3	54.1	64.9	65.0	65.2
16/F	16	53.5	53.5	53.3	53.7	53.7	53.9	53.9	54.2	54.1	54.0	54.2	54.5	54.3	65.1	65.2	65.3
17/F	17	53.7	53.6	53.5	53.9	53.8	54.0	54.1	54.4	54.3	54.1	54.4	54.7	54.5	65.2	65.3	65.4
18/F	18	53.8	53.7	53.7	54.0	53.9	54.1	54.2	54.5	54.4	54.3	54.5	54.9	54.6	65.3	65.4	65.5
19/F	19	53.9	53.9	53.8	54.1	54.0	54.3	54.3	54.7	54.5	54.4	54.7	55.3	54.8	65.3	65.4	65.5
20/F	20	54.1	54.0	53.9	54.3	54.2	54.5	54.5	54.9	54.7	54.6	54.9	55.8	55.0	65.4	65.5	65.6
21/F	21	54.2	54.1	54.0	54.4	54.4	54.6	54.7	55.0	54.9	54.8	55.0	56.9	55.1	65.4	65.5	65.6
22/F	22	54.4	54.3	54.2	54.6	54.5	54.8	54.9	55.2	55.1	54.9	55.3	58.6	55.3	65.5	65.5	65.6
23/F	23	54.6	54.5	54.4	54.8	54.7	54.9	55.0	55.4	55.3	55.1	55.5	59.8	55.6	65.5	65.6	65.6
24/F	24	54.7	54.6	54.5	54.9	54.9	55.1	55.2	55.6	55.5	55.3	55.7	60.7	55.8	65.5	65.6	65.7
25/F	25	54.9	54.8	54.6	55.2	55.0	55.3	55.4	55.8	55.7	55.6	55.9	61.2	56.1	65.5	65.6	65.7
26/F	26	55.1	55.0	54.8	55.3	55.2	55.5	55.6	56.0	55.9	55.7	56.1	61.7	56.3	65.5	65.6	65.7
27/F	27	55.2	55.1	55.0	55.5	55.3	55.7	55.7	56.3	56.1	55.9	56.4	62.0	56.6	65.6	65.6	65.7
28/F	28	55.3	55.2	55.1	55.6	55.5	55.8	56.0	56.5	56.3	56.2	56.6	62.3	56.9	65.6	65.7	65.7
29/F	29	55.5	55.4	55.2	55.9	55.7	56.0	56.2	56.7	56.6	56.4	56.8	62.4	57.0	65.6	65.7	65.8
30/F	30	55.7	55.5	55.4	56.1	55.9	56.2	56.4	56.9	56.7	56.6	57.0	62.5	57.2	65.6	65.7	65.8
31/F	31	55.9	55.7	55.6	56.2	56.0	56.4	56.6	57.0	56.9	56.8	57.2	62.5	57.4	65.7	65.7	65.8
32/F	32	56.0	55.9	55.7	56.4	56.2	56.6	56.7	57.2	57.1	56.9	57.3	62.6	57.6	65.7	65.7	65.8
33/F	33	56.2	56.0	55.9	56.5	56.3	56.7	56.9	57.3	57.2	57.1	57.4	62.6	57.8	65.7	65.7	65.8
34/F	34	56.3	56.1	56.0	56.6	56.5	56.9	57.0	57.5	57.3	57.2	57.6	62.7	58.0	65.7	65.8	65.8
35/F	35	56.4	56.3	56.1	56.7	56.6	57.0	57.1	57.7	57.5	57.3	57.8	62.8	58.2	65.7	65.8	65.9
36/F	36	56.6	56.4	56.2	56.9	56.7	57.1	57.3	57.8	57.7	57.5	58.0	62.8	58.5	65.8	65.8	65.9

*** Note:**

XX Individual receiver with traffic noise level exceeding the standard of 70 dB(A) as stipulated in HKPSG are highlighed.

Tower 3 - Base Scenario

Tower 3	Unit No.	T3_13_L	T3_13_B1	T3_13_B2	T3_14_L	T3_14_B1	T3_14_B2	T3_15_L	T3_15_B1	T3_15_B2	T3_16_L	T3_16_B1	T3_16_B2	T3_17_L	T3_17_B1	T3_17_B2
1/F	1	54.7	54.2	54.4	55.1	56.0	58.1	41.8	50.4	44.2	40.8	41.3	40.4	40.6	40.2	41.8
2/F	2	56.9	56.2	56.6	57.4	58.2	59.8	42.3	51.6	45.0	41.2	41.7	40.7	41.0	40.5	42.2
3/F	3	59.1	58.4	58.7	59.5	60.1	61.1	42.7	52.9	45.8	41.7	42.1	41.2	41.2	40.9	42.4
4/F	4	60.7	60.0	60.3	61.0	61.4	62.2	43.2	54.3	46.9	42.1	42.6	41.6	41.7	41.3	42.7
5/F	5	61.7	61.2	61.5	61.9	62.3	63.0	43.7	55.6	48.0	42.6	43.1	42.0	42.0	41.8	43.0
6/F	6	62.5	62.1	62.3	62.7	63.1	63.6	44.1	56.9	49.2	43.0	43.6	42.4	42.4	42.2	43.3
7/F	7	63.1	62.7	62.9	63.3	63.6	64.1	44.7	58.0	50.3	43.6	44.0	42.9	42.8	42.7	43.6
8/F	8	63.6	63.2	63.4	63.7	64.1	64.5	45.2	58.9	51.3	44.0	44.5	43.4	43.2	43.1	44.0
9/F	9	64.0	63.6	63.8	64.2	64.5	64.9	45.9	59.6	52.1	44.5	45.1	43.8	43.7	43.7	44.4
10/F	10	64.4	64.0	64.2	64.6	64.9	65.3	46.6	60.2	52.8	45.1	45.8	44.4	44.3	44.1	44.8
11/F	11	64.8	64.4	64.6	64.9	65.2	65.6	47.4	60.7	53.5	45.7	46.5	45.0	44.7	44.7	45.2
12/F	12	65.0	64.7	64.9	65.2	65.4	65.8	48.1	61.1	53.9	46.4	47.2	45.7	45.5	45.4	45.8
13/F	13	65.2	65.0	65.1	65.4	65.6	66.0	49.0	61.5	54.4	47.1	48.0	46.2	45.9	45.9	46.3
14/F	14	65.5	65.1	65.3	65.6	65.8	66.2	49.8	61.7	54.8	47.8	48.7	46.9	46.5	46.5	46.7
15/F	15	65.6	65.3	65.5	65.7	66.0	66.4	50.7	62.0	55.2	48.6	49.6	47.6	47.1	47.2	47.4
16/F	16	65.7	65.5	65.6	65.8	66.1	66.5	51.4	62.2	55.6	49.4	50.4	48.4	47.9	48.0	48.0
17/F	17	65.8	65.5	65.7	65.9	66.1	66.6	52.1	62.3	55.9	50.0	51.1	49.0	48.5	48.5	48.6
18/F	18	65.8	65.6	65.7	66.0	66.2	66.6	52.7	62.5	56.2	50.6	51.6	49.5	49.0	49.1	49.1
19/F	19	65.9	65.7	65.8	66.0	66.2	66.7	53.3	62.6	56.4	51.3	52.3	50.1	49.6	49.7	49.6
20/F	20	66.0	65.7	65.8	66.1	66.3	66.8	53.7	62.7	56.7	51.9	52.8	50.8	50.2	50.4	50.2
21/F	21	66.0	65.7	65.9	66.1	66.3	66.8	54.1	62.8	56.9	52.3	53.2	51.3	50.9	51.0	50.8
22/F	22	66.0	65.8	65.9	66.1	66.4	66.8	54.4	62.9	57.0	52.7	53.6	51.8	51.2	51.3	51.2
23/F	23	66.0	65.8	65.9	66.1	66.4	66.9	54.7	63.0	57.2	53.1	53.9	52.2	51.6	51.8	51.6
24/F	24	66.0	65.8	65.9	66.1	66.4	66.9	55.0	63.0	57.4	53.5	54.3	52.6	52.1	52.2	52.1
25/F	25	66.1	65.8	65.9	66.1	66.4	66.9	55.3	63.1	57.5	53.8	54.5	53.0	52.4	52.6	52.4
26/F	26	66.1	65.8	65.9	66.1	66.4	66.9	55.5	63.1	57.6	54.1	54.8	53.3	52.8	53.0	52.7
27/F	27	66.1	65.8	66.0	66.2	66.5	67.0	55.7	63.1	57.7	54.4	55.0	53.6	53.1	53.3	53.1
28/F	28	66.1	65.9	66.0	66.2	66.5	67.0	55.8	63.1	57.8	54.6	55.2	53.8	53.4	53.5	53.3
29/F	29	66.1	65.9	66.0	66.2	66.5	67.0	55.9	63.1	57.8	54.7	55.3	54.0	53.6	53.8	53.6
30/F	30	66.1	65.9	66.0	66.2	66.5	67.0	56.0	63.1	57.9	54.9	55.4	54.2	53.8	53.9	53.8
31/F	31	66.1	65.9	66.0	66.2	66.5	67.0	56.1	63.1	57.9	55.0	55.5	54.3	54.1	54.1	53.9
32/F	32	66.1	65.9	66.0	66.2	66.5	67.0	56.2	63.1	58.0	55.1	55.6	54.4	54.2	54.3	54.0
33/F	33	66.1	65.9	66.0	66.2	66.5	67.0	56.2	63.1	58.0	55.1	55.7	54.6	54.3	54.4	54.2
34/F	34	66.1	66.0	66.1	66.2	66.5	67.0	56.2	63.1	58.0	55.2	55.7	54.7	54.4	54.5	54.3
35/F	35	66.2	66.0	66.1	66.2	66.5	67.0	56.3	63.1	58.0	55.2	55.7	54.7	54.5	54.5	54.4
36/F	36	66.2	66.0	66.1	66.3	66.6	67.0	56.3	63.1	58.0	55.3	55.8	54.8	54.5	54.5	54.5

*** Note:**

XX Individual receiver with traffic noise level exceeding the standard of 70 dB(A) as stipulated in HKPSG are highlighed.

Tower 5 - Base Scenario

Tower 5	Unit No.	T5_1_L	T5_1_B1	T5_1_B2	T5_2_L	T5_2_B1	T5_3_L	T5_3_B1	T5_4_L	T5_4_B1	T5_5_L	T5_5_B1	T5_6_L	T5_6_B1	T5_6_B2	T5_7_L	T5_7_B1	T5_7_B2
1/F	1	39.5	45.6	42.7	39.5	39.5	39.8	40.4	42.0	41.2	42.5	43.0	43.6	44.3	46.3	54.9	54.7	54.4
2/F	2	39.7	49.8	45.6	39.7	39.6	40.0	40.7	42.4	41.6	43.1	43.6	44.2	44.9	49.0	56.7	56.6	56.6
3/F	3	39.9	52.0	47.8	39.8	39.8	40.2	41.1	42.9	42.0	43.6	44.2	44.9	45.5	50.5	57.6	57.6	57.7
4/F	4	40.0	52.6	48.4	40.0	40.0	40.5	41.6	43.5	42.5	44.2	44.8	45.5	46.3	51.0	58.0	57.9	58.0
5/F	5	40.1	52.7	48.6	40.1	40.2	40.8	42.1	44.1	43.1	44.9	45.4	46.2	47.1	51.4	58.2	58.1	58.2
6/F	6	40.3	52.7	48.6	40.3	40.3	41.3	42.7	44.8	43.7	45.6	46.3	47.1	48.1	51.8	58.3	58.3	58.3
7/F	7	40.5	52.7	48.7	40.6	40.5	41.7	43.4	45.5	44.5	46.4	47.2	48.2	49.3	52.4	58.4	58.4	58.4
8/F	8	40.8	52.8	48.8	40.8	40.7	42.4	44.2	46.5	45.3	47.5	48.5	49.5	50.6	53.2	58.5	58.6	58.6
9/F	9	41.0	52.8	48.8	41.1	41.0	43.0	44.9	47.3	46.1	48.5	49.6	50.7	51.9	54.0	58.8	58.8	58.9
10/F	10	41.3	52.8	48.8	41.4	41.3	43.7	45.8	48.4	47.1	49.7	50.8	52.0	53.1	54.8	59.1	59.1	59.1
11/F	11	41.6	52.8	48.9	41.7	41.6	44.5	46.8	49.5	48.2	50.8	51.9	53.0	54.0	55.5	59.3	59.3	59.3
12/F	12	42.0	52.8	48.9	42.1	42.0	45.1	47.6	50.4	49.0	51.7	52.7	53.7	54.7	56.0	59.5	59.5	59.5
13/F	13	42.4	52.9	49.0	42.6	42.4	45.7	48.3	51.1	49.7	52.4	53.3	54.3	55.3	56.4	59.8	59.7	59.7
14/F	14	42.9	52.9	49.1	43.2	42.9	46.5	49.0	51.7	50.4	52.9	53.9	54.8	55.7	56.7	59.8	59.9	59.8
15/F	15	43.4	52.9	49.2	43.7	43.4	47.1	49.6	52.2	50.9	53.4	54.4	55.2	56.1	57.0	60.0	60.0	60.0
16/F	16	44.0	53.0	49.4	44.5	44.1	47.7	50.2	52.7	51.4	53.8	54.7	55.6	56.4	57.3	60.1	60.1	60.0
17/F	17	44.6	53.1	49.6	45.1	44.8	48.3	50.8	53.2	51.9	54.3	55.1	55.9	56.6	57.5	60.2	60.1	60.1
18/F	18	45.4	53.2	49.9	45.9	45.6	48.9	51.3	53.6	52.3	54.6	55.4	56.1	56.9	57.6	60.2	60.2	60.2
19/F	19	46.2	53.3	50.2	46.8	46.4	49.6	51.8	54.0	52.8	54.9	55.6	56.4	57.1	57.9	60.3	60.3	60.2
20/F	20	47.1	53.5	50.6	47.7	47.3	50.1	52.3	54.3	53.1	55.2	55.9	56.6	57.3	58.0	60.4	60.3	60.3
21/F	21	49.4	54.1	51.8	49.6	49.4	51.4	53.2	55.1	54.0	55.9	56.5	57.2	57.9	58.5	60.7	60.6	60.6
22/F	22	49.9	54.3	52.1	50.0	49.8	51.7	53.3	55.3	54.2	56.0	56.6	57.3	58.0	58.7	60.8	60.8	60.8
23/F	23	50.2	54.4	52.3	50.3	50.1	51.9	53.4	55.4	54.3	56.2	56.8	57.5	58.2	58.9	60.9	60.9	60.9
24/F	24	50.5	54.6	52.6	50.6	50.4	52.0	53.5	55.5	54.4	56.2	56.9	57.6	58.3	58.9	61.2	61.1	61.0
25/F	25	50.8	54.7	52.8	50.8	50.6	52.2	53.6	55.6	54.5	56.3	56.9	57.6	58.4	59.0	61.2	61.2	61.2
26/F	26	51.0	54.8	52.9	51.0	50.8	52.3	53.6	55.7	54.6	56.4	57.0	57.7	58.5	59.1	61.4	61.3	61.2
27/F	27	51.2	54.8	53.0	51.2	51.0	52.4	53.6	55.7	54.6	56.5	57.1	57.8	58.6	59.2	61.5	61.4	61.2
28/F	28	51.3	54.9	53.1	51.3	51.1	52.5	53.6	55.8	54.7	56.5	57.2	57.9	58.7	59.2	61.6	61.5	61.3
29/F	29	51.4	55.0	53.2	51.4	51.3	52.5	53.6	55.8	54.7	56.6	57.2	58.0	58.7	59.3	61.6	61.5	61.4
30/F	30	51.6	55.0	53.3	51.5	51.4	52.5	53.7	55.9	54.7	56.6	57.3	58.0	58.8	59.3	61.6	61.6	61.4
31/F	31	51.7	55.0	53.3	51.6	51.5	52.6	53.6	55.9	54.7	56.6	57.3	58.0	58.8	59.4	61.6	61.5	61.4
32/F	32	51.8	55.1	53.4	51.8	51.6	52.6	53.6	55.9	54.7	56.7	57.3	58.1	58.8	59.4	61.7	61.5	61.4
33/F	33	51.9	55.1	53.5	51.9	51.7	52.7	53.6	55.9	54.7	56.7	57.3	58.1	58.8	59.4	61.7	61.5	61.5
34/F	34	52.1	55.2	53.7	52.0	51.9	52.7	53.6	55.9	54.7	56.7	57.4	58.1	58.8	59.4	61.7	61.5	61.4
35/F	35	52.2	55.3	53.8	52.1	52.0	52.7	53.6	55.9	54.8	56.7	57.4	58.1	58.9	59.4	61.7	61.5	61.4
36/F	36	52.3	55.3	53.8	52.2	52.1	52.8	53.6	55.9	54.8	56.7	57.4	58.1	58.9	59.4	61.7	61.5	61.4
37/F	37	52.4	55.4	53.9	52.3	52.2	52.8	53.7	56.0	54.8	56.7	57.4	58.1	58.9	59.4	61.7	61.5	61.4
38/F	38	52.5	55.5	54.1	52.5	52.4	52.8	53.7	56.0	54.8	56.8	57.4	58.1	58.8	59.4	61.7	61.5	61.4
39/F	39	52.7	55.6	54.2	52.6	52.5	52.9	53.7	56.0	54.9	56.8	57.4	58.1	58.8	59.4	61.6	61.5	61.4
40/F	40	52.9	55.6	54.3	52.8	52.7	53.0	53.8	56.0	54.9	56.8	57.5	58.1	58.9	59.4	61.6	61.5	61.4
41/F	41	53.0	55.7	54.4	52.9	52.8	53.1	53.8	56.1	55.0	56.8	57.5	58.1	58.8	59.4	61.6	61.4	61.4
42/F	42	53.2	55.8	54.6	53.1	53.0	53.2	53.9	56.1	55.0	56.9	57.5	58.1	58.8	59.4	61.6	61.4	61.4
43/F	43	53.4	55.9	54.7	53.3	53.3	53.4	54.1	56.2	55.1	57.0	57.5	58.1	58.8	59.4	61.6	61.4	61.4

*** Note:**

XX Individual receiver with traffic noise level exceeding the standard of 70 dB(A) as stipulated in HKPSG are highlighed.

Tower 5 - Base Scenario

Tower 5	Unit No.	T5_8_L	T5_8_B1	T5_9_L	T5_9_B1	T5_10_L	T5_10_B1	T5_11_L	T5_11_B1	T5_12_L	T5_12_B1	T5_13_L	T5_13_B1	T5_14_L	T5_14_B1	T5_15_L	T5_15_B1
1/F	1	52.4	52.2	52.7	53.0	53.6	53.2	53.9	54.3	55.3	54.8	55.6	55.9	56.3	56.1	56.6	56.8
2/F	2	53.1	52.9	53.4	53.7	54.2	53.9	54.5	55.1	56.0	55.4	56.2	56.4	56.9	56.7	57.1	57.3
3/F	3	54.1	53.9	54.4	54.6	55.0	54.8	55.3	55.9	56.8	56.3	57.0	57.2	57.7	57.4	57.9	58.0
4/F	4	54.6	54.5	54.9	55.1	55.5	55.3	55.8	56.3	57.2	56.7	57.4	57.5	58.0	57.8	58.2	58.3
5/F	5	54.9	54.7	55.2	55.4	55.8	55.6	56.0	56.6	57.4	56.9	57.6	57.7	58.1	57.9	58.3	58.4
6/F	6	55.0	54.9	55.2	55.6	56.0	55.7	56.2	56.6	57.6	57.0	57.7	57.8	58.3	57.9	58.4	58.5
7/F	7	55.1	54.9	55.3	55.6	56.1	55.8	56.3	56.8	57.7	57.0	57.8	57.8	58.3	58.1	58.4	58.5
8/F	8	55.1	54.9	55.4	55.8	56.3	56.0	56.6	57.0	57.7	57.2	57.8	57.9	58.4	58.1	58.5	58.6
9/F	9	55.1	55.0	55.5	56.0	56.5	56.3	56.8	57.2	57.9	57.4	58.0	58.1	58.5	58.2	58.7	58.7
10/F	10	55.2	55.1	55.7	56.3	56.9	56.6	57.1	57.5	58.1	57.7	58.3	58.3	58.7	58.5	58.8	58.9
11/F	11	55.4	55.2	55.9	56.6	57.3	57.0	57.6	57.9	58.5	58.1	58.5	58.6	58.9	58.8	59.0	59.0
12/F	12	55.6	55.4	56.2	56.9	57.6	57.3	57.9	58.2	58.7	58.3	58.7	58.8	59.1	58.9	59.2	59.2
13/F	13	55.7	55.5	56.4	57.2	57.9	57.6	58.1	58.4	58.9	58.5	59.0	59.0	59.2	59.1	59.3	59.3
14/F	14	55.9	55.6	56.6	57.4	58.1	57.9	58.4	58.6	59.0	58.7	59.0	59.1	59.3	59.2	59.4	59.4
15/F	15	56.0	55.8	56.8	57.7	58.3	58.1	58.6	58.8	59.2	58.8	59.2	59.2	59.4	59.3	59.5	59.5
16/F	16	56.1	55.8	57.0	57.9	58.6	58.3	58.8	59.0	59.3	59.0	59.3	59.3	59.5	59.4	59.5	59.6
17/F	17	56.2	55.9	57.2	58.0	58.7	58.5	59.0	59.1	59.3	59.1	59.3	59.4	59.5	59.5	59.6	59.6
18/F	18	56.3	55.9	57.3	58.2	58.9	58.7	59.1	59.3	59.4	59.1	59.4	59.5	59.6	59.5	59.6	59.7
19/F	19	56.5	56.0	57.4	58.3	59.0	58.8	59.3	59.4	59.4	59.2	59.5	59.6	59.7	59.6	59.7	59.7
20/F	20	56.5	56.1	57.5	58.5	59.2	59.0	59.4	59.5	59.5	59.2	59.7	59.7	59.8	59.7	59.8	59.8
21/F	21	57.0	56.6	58.0	58.8	59.5	59.3	59.7	59.7	59.6	59.4	60.0	59.9	60.1	60.0	60.1	60.1
22/F	22	57.2	56.9	58.2	59.0	59.6	59.4	59.8	59.8	59.6	59.5	60.0	60.0	60.1	60.1	60.2	60.2
23/F	23	57.5	57.1	58.4	59.1	59.7	59.6	59.9	59.8	59.6	59.5	60.1	60.1	60.2	60.1	60.2	60.2
24/F	24	57.9	57.4	58.6	59.3	59.8	59.7	60.0	59.9	59.7	59.6	60.1	60.1	60.3	60.1	60.3	60.3
25/F	25	58.1	57.7	58.8	59.5	59.9	59.7	60.1	59.9	59.7	59.6	60.2	60.2	60.3	60.2	60.3	60.3
26/F	26	58.4	58.0	59.1	59.6	60.1	59.9	60.2	59.9	59.7	59.6	60.2	60.2	60.3	60.2	60.3	60.4
27/F	27	58.5	58.1	59.2	59.7	60.1	60.0	60.2	60.0	59.7	59.7	60.3	60.2	60.3	60.3	60.4	60.4
28/F	28	58.7	58.2	59.3	59.9	60.2	60.1	60.3	60.0	59.8	59.7	60.3	60.3	60.4	60.3	60.4	60.4
29/F	29	58.7	58.3	59.4	59.9	60.2	60.1	60.3	60.1	59.8	59.7	60.4	60.3	60.4	60.3	60.4	60.4
30/F	30	58.8	58.3	59.4	59.9	60.3	60.2	60.3	60.1	59.8	59.7	60.4	60.3	60.4	60.3	60.4	60.4
31/F	31	58.8	58.3	59.5	60.0	60.4	60.3	60.4	60.1	59.8	59.8	60.3	60.4	60.5	60.3	60.5	60.4
32/F	32	58.8	58.4	59.5	60.0	60.4	60.3	60.4	60.1	59.8	59.8	60.4	60.4	60.5	60.4	60.5	60.5
33/F	33	58.8	58.4	59.4	60.0	60.4	60.3	60.4	60.1	59.9	59.8	60.4	60.3	60.4	60.4	60.5	60.5
34/F	34	58.8	58.4	59.4	60.0	60.4	60.3	60.4	60.1	59.8	59.8	60.4	60.4	60.5	60.4	60.5	60.5
35/F	35	58.8	58.4	59.4	60.0	60.4	60.3	60.5	60.1	59.9	59.8	60.4	60.4	60.5	60.4	60.5	60.5
36/F	36	58.8	58.3	59.4	60.0	60.4	60.3	60.4	60.1	59.9	59.8	60.4	60.4	60.5	60.4	60.5	60.5
37/F	37	58.8	58.3	59.4	60.0	60.4	60.3	60.4	60.2	59.9	59.8	60.4	60.4	60.5	60.4	60.5	60.5
38/F	38	58.8	58.3	59.4	60.0	60.4	60.3	60.4	60.2	59.9	59.8	60.4	60.4	60.5	60.4	60.5	60.5
39/F	39	58.7	58.3	59.4	60.0	60.3	60.3	60.4	60.1	59.9	59.8	60.4	60.4	60.4	60.4	60.5	60.5
40/F	40	58.7	58.3	59.4	60.0	60.4	60.2	60.4	60.1	59.8	59.8	60.4	60.3	60.4	60.4	60.5	60.5
41/F	41	58.7	58.3	59.4	60.0	60.4	60.3	60.4	60.1	59.8	59.8	60.4	60.4	60.4	60.4	60.5	60.5
42/F	42	58.7	58.3	59.4	60.0	60.3	60.3	60.4	60.1	59.8	59.8	60.4	60.4	60.4	60.3	60.4	60.5
43/F	43	58.7	58.2	59.3	60.0	60.3	60.2	60.4	60.1	59.9	59.8	60.3	60.3	60.4	60.3	60.4	60.5

*** Note:**

XX Individual receiver with traffic noise level exceeding the standard of 70 dB(A) as stipulated in HKPSG are highlighed.

Tower 5 - Base Scenario

Tower 5	Unit No.	T5_16_L	T5_16_B1	T5_16_B2	T5_17_L	T5_17_B1	T5_18_L	T5_18_B1	T5_18_B2
1/F	1	56.5	56.4	56.3	56.8	56.6	56.9	56.9	56.9
2/F	2	56.8	56.7	56.6	56.9	56.9	57.0	57.0	57.0
3/F	3	57.1	57.1	57.0	57.1	57.1	57.1	57.1	57.1
4/F	4	57.2	57.2	57.2	57.2	57.2	57.2	57.1	57.2
5/F	5	57.3	57.3	57.3	57.3	57.3	57.2	57.1	57.2
6/F	6	57.3	57.3	57.3	57.2	57.3	57.2	57.1	57.2
7/F	7	57.3	57.3	57.4	57.2	57.3	57.2	57.1	57.2
8/F	8	57.3	57.3	57.4	57.2	57.2	57.2	57.1	57.2
9/F	9	57.4	57.4	57.4	57.2	57.2	57.2	57.1	57.2
10/F	10	57.3	57.3	57.4	57.3	57.3	57.3	57.2	57.3
11/F	11	57.3	57.3	57.3	57.3	57.3	57.3	57.2	57.3
12/F	12	57.3	57.3	57.3	57.3	57.3	57.3	57.2	57.3
13/F	13	57.3	57.3	57.3	57.3	57.3	57.3	57.2	57.3
14/F	14	57.3	57.3	57.3	57.3	57.3	57.3	57.2	57.3
15/F	15	57.3	57.3	57.3	57.3	57.3	57.3	57.1	57.2
16/F	16	57.4	57.4	57.4	57.3	57.3	57.3	57.1	57.2
17/F	17	57.4	57.4	57.4	57.4	57.4	57.4	57.2	57.3
18/F	18	57.4	57.5	57.5	57.4	57.4	57.3	57.2	57.3
19/F	19	57.5	57.5	57.5	57.4	57.5	57.4	57.2	57.3
20/F	20	57.5	57.5	57.6	57.5	57.5	57.4	57.3	57.4
21/F	21	57.9	57.9	58.0	56.8	56.6	56.9	57.6	57.7
22/F	22	58.1	58.1	58.2	56.9	56.9	57.0	57.7	57.9
23/F	23	58.2	58.2	58.3	57.1	57.1	57.1	57.8	57.9
24/F	24	58.4	58.4	58.5	57.2	57.2	57.2	58.0	58.1
25/F	25	58.5	58.6	58.6	57.3	57.3	57.2	58.1	58.2
26/F	26	58.6	58.6	58.7	57.2	57.3	57.2	58.2	58.4
27/F	27	58.7	58.7	58.8	57.2	57.3	57.2	58.4	58.5
28/F	28	58.7	58.8	58.8	57.2	57.2	57.2	58.5	58.6
29/F	29	58.8	58.8	58.9	57.2	57.2	57.2	58.6	58.6
30/F	30	58.8	58.9	58.9	57.3	57.3	57.3	58.6	58.6
31/F	31	58.9	58.9	58.9	57.3	57.3	57.3	58.6	58.7
32/F	32	58.9	58.9	58.9	57.3	57.3	57.3	58.7	58.7
33/F	33	58.8	58.8	58.9	57.3	57.3	57.3	58.7	58.7
34/F	34	58.8	58.8	58.9	57.3	57.3	57.3	58.7	58.7
35/F	35	58.8	58.8	58.9	57.3	57.3	57.3	58.7	58.7
36/F	36	58.8	58.8	58.9	57.3	57.3	57.3	58.6	58.6
37/F	37	58.8	58.8	58.9	57.4	57.4	57.4	58.6	58.6
38/F	38	58.7	58.8	58.9	57.4	57.4	57.3	58.6	58.6
39/F	39	58.7	58.8	58.8	57.4	57.5	57.4	58.6	58.6
40/F	40	58.7	58.8	58.8	57.5	57.5	57.4	58.6	58.6
41/F	41	58.7	58.8	58.8	57.5	57.6	57.5	58.6	58.6
42/F	42	58.7	58.7	58.8	57.7	57.7	57.6	58.5	58.5
43/F	43	58.7	58.7	58.8	57.8	57.8	57.8	58.5	58.5

*** Note:**

XX Individual receiver with traffic noise level exceeding the standard of 70 dB(A) as stipulated in HKPSG are highlighed.

Tower 6 - Base Scenario

Tower 6	Unit No.	T6_1_L	T6_1_B1	T6_1_B2	T6_2_L	T6_2_B1	T6_2_B2	T6_3_L	T6_3_B1	T6_3_B2	T6_4_L	T6_4_B1	T6_5_L	T6_5_B1	T6_6_L	T6_6_B1	T6_7_L	T6_7_B1
1/F	1	55.8	55.7	55.7	56.2	58.1	59.4	47.2	46.1	50.1	47.2	47.0	48.2	48.6	47.6	47.9	45.1	46.0
2/F	2	58.4	58.2	58.3	58.9	60.4	61.0	47.4	46.5	51.0	47.3	47.1	48.3	48.8	48.1	48.2	46.1	46.8
3/F	3	60.7	60.4	60.6	61.1	62.2	62.4	47.7	47.0	52.3	47.3	47.1	48.3	48.9	48.4	48.4	46.6	47.2
4/F	4	62.1	61.9	62.0	62.5	63.3	63.4	48.3	47.6	53.6	47.3	47.2	48.4	48.9	48.5	48.5	46.9	47.4
5/F	5	63.1	62.9	63.0	63.4	64.1	64.2	48.9	48.4	55.1	47.4	47.3	48.4	48.9	48.6	48.5	47.0	47.5
6/F	6	63.9	63.7	63.8	64.2	64.8	64.8	49.6	49.2	56.3	47.4	47.4	48.4	48.9	48.6	48.5	47.0	47.6
7/F	7	64.5	64.2	64.4	64.7	65.3	65.2	50.4	50.2	57.4	47.5	47.5	48.4	48.9	48.6	48.5	47.0	47.6
8/F	8	64.9	64.7	64.8	65.1	65.7	65.6	51.1	50.9	58.1	47.5	47.6	48.4	48.9	48.6	48.5	47.0	47.6
9/F	9	65.3	65.1	65.2	65.5	66.0	66.0	51.7	51.5	58.8	47.6	47.8	48.5	48.9	48.6	48.5	47.0	47.6
10/F	10	65.6	65.4	65.5	65.8	66.3	66.3	52.2	52.0	59.3	47.6	48.0	48.5	48.9	48.6	48.5	47.0	47.5
11/F	11	65.8	65.6	65.7	66.0	66.6	66.5	52.7	52.5	59.7	47.8	48.3	48.5	48.9	48.6	48.5	47.0	47.5
12/F	12	66.0	65.8	65.9	66.2	66.8	66.8	53.1	53.0	60.0	47.8	48.5	48.5	48.9	48.5	48.5	47.0	47.5
13/F	13	66.2	66.0	66.1	66.4	67.0	66.9	53.5	53.4	60.3	48.0	48.8	48.5	48.9	48.5	48.5	47.0	47.5
14/F	14	66.3	66.2	66.3	66.6	67.2	67.1	53.8	53.8	60.5	48.1	49.1	48.5	48.9	48.5	48.5	47.0	47.5
15/F	15	66.4	66.3	66.4	66.7	67.3	67.2	54.2	54.1	60.7	48.3	49.4	48.4	48.9	48.5	48.4	47.0	47.5
16/F	16	66.5	66.4	66.5	66.8	67.4	67.4	54.4	54.4	60.9	48.4	49.6	48.5	48.8	48.5	48.4	46.9	47.5
17/F	17	66.6	66.5	66.5	66.9	67.5	67.5	54.7	54.6	61.1	48.5	49.9	48.5	48.8	48.5	48.4	46.9	47.5
18/F	18	66.7	66.5	66.6	67.0	67.6	67.5	55.0	54.9	61.2	48.7	50.2	48.5	48.8	48.5	48.4	46.9	47.5
19/F	19	66.7	66.6	66.7	67.0	67.6	67.6	55.2	55.0	61.3	48.9	50.5	48.5	48.8	48.5	48.4	46.9	47.4
20/F	20	66.8	66.6	66.7	67.1	67.7	67.7	55.3	55.1	61.5	48.9	50.6	48.5	48.8	48.5	48.4	46.9	47.4
21/F	21	66.8	66.7	66.7	67.1	67.7	67.7	55.3	55.2	61.5	49.1	50.8	48.6	48.8	48.4	48.4	46.9	47.4
22/F	22	66.8	66.7	66.7	67.1	67.8	67.7	55.4	55.3	61.6	49.2	50.9	48.6	48.8	48.4	48.4	46.9	47.4
23/F	23	66.8	66.7	66.8	67.1	67.8	67.7	55.4	55.3	61.6	49.3	51.0	48.6	48.8	48.4	48.4	46.9	47.4
24/F	24	66.8	66.7	66.8	67.2	67.8	67.8	55.5	55.3	61.7	49.4	51.2	48.6	48.8	48.4	48.4	46.8	47.4
25/F	25	66.8	66.7	66.8	67.2	67.8	67.8	55.5	55.4	61.7	49.5	51.2	48.7	48.8	48.4	48.4	46.8	47.4
26/F	26	66.8	66.7	66.8	67.2	67.8	67.8	55.5	55.4	61.7	49.5	51.2	48.7	48.7	48.4	48.3	46.8	47.4
27/F	27	66.8	66.7	66.8	67.2	67.8	67.7	55.5	55.4	61.7	49.6	51.3	48.6	48.7	48.4	48.3	46.8	47.3
28/F	28	66.8	66.7	66.8	67.2	67.8	67.7	55.5	55.4	61.7	49.6	51.3	48.6	48.7	48.4	48.3	46.8	47.3
29/F	29	66.8	66.7	66.7	67.2	67.8	67.7	55.5	55.4	61.7	49.6	51.3	48.6	48.7	48.3	48.3	46.8	47.3
30/F	30	66.8	66.7	66.7	67.1	67.8	67.7	55.5	55.4	61.7	49.7	51.3	48.6	48.7	48.3	48.3	46.8	47.3
31/F	31	66.8	66.7	66.7	67.1	67.7	67.7	55.5	55.4	61.7	49.7	51.4	48.6	48.7	48.3	48.3	46.8	47.3
32/F	32	66.8	66.7	66.7	67.1	67.7	67.7	55.5	55.4	61.6	49.7	51.3	48.7	48.7	48.3	48.2	46.7	47.3
33/F	33	66.8	66.7	66.7	67.1	67.7	67.7	55.5	55.4	61.6	49.7	51.4	48.7	48.7	48.3	48.2	46.7	47.3
34/F	34	66.7	66.7	66.7	67.1	67.7	67.7	55.5	55.3	61.6	49.6	51.4	48.7	48.7	48.3	48.2	46.7	47.2
35/F	35	66.7	66.6	66.7	67.1	67.7	67.7	55.5	55.4	61.6	49.7	51.3	48.7	48.7	48.2	48.2	46.7	47.2
36/F	36	66.7	66.6	66.7	67.1	67.7	67.7	55.5	55.4	61.6	49.7	51.3	48.7	48.6	48.2	48.2	46.7	47.2

*** Note:**

XX Individual receiver with traffic noise level exceeding the standard of 70 dB(A) as stipulated in HKPSG are highlighed.

Tower 6 - Base Scenario

Tower 6	Unit No.	T6_8_L	T6_8_B1	T6_9_L	T6_9_B1	T6_9_B2	T6_10_L	T6_10_B1	T6_10_B2	T6_11_L	T6_11_B1	T6_11_B2	T6_12_L	T6_12_B1	T6_12_B2
1/F	1	43.2	41.8	39.3	31.2	36.6	57.0	58.4	57.7	56.5	56.3	56.2	55.9	56.2	56.2
2/F	2	44.4	43.2	40.7	32.1	38.0	59.2	59.8	59.5	58.8	58.6	58.5	58.2	58.3	58.3
3/F	3	45.0	43.8	41.4	32.6	38.8	60.9	61.1	61.0	60.7	60.7	60.5	60.4	60.4	60.4
4/F	4	45.3	44.2	41.9	32.9	39.1	62.0	62.1	62.1	62.0	62.0	61.9	61.8	61.9	61.9
5/F	5	45.5	44.3	42.1	33.1	39.3	62.9	62.9	62.9	62.9	62.9	62.9	62.9	62.9	62.9
6/F	6	45.6	44.4	42.2	33.1	39.4	63.6	63.5	63.5	63.6	63.6	63.7	63.6	63.6	63.6
7/F	7	45.6	44.4	42.3	33.1	39.4	64.1	64.0	64.0	64.1	64.2	64.2	64.2	64.2	64.2
8/F	8	45.6	44.4	42.3	33.1	39.4	64.5	64.5	64.5	64.5	64.6	64.6	64.6	64.6	64.7
9/F	9	45.5	44.4	42.3	33.1	39.4	64.9	64.8	64.9	64.9	65.0	65.0	65.0	65.0	65.1
10/F	10	45.5	44.4	42.3	33.1	39.4	65.3	65.2	65.2	65.3	65.3	65.3	65.4	65.4	65.4
11/F	11	45.5	44.4	42.3	33.1	39.4	65.5	65.5	65.5	65.5	65.6	65.6	65.6	65.6	65.6
12/F	12	45.5	44.4	42.3	33.1	39.4	65.8	65.7	65.7	65.8	65.8	65.8	65.8	65.8	65.8
13/F	13	45.5	44.4	42.3	33.1	39.4	66.0	65.9	65.9	65.9	66.0	66.0	66.0	66.0	66.0
14/F	14	45.5	44.4	42.3	33.1	39.4	66.1	66.1	66.1	66.1	66.2	66.2	66.2	66.2	66.2
15/F	15	45.5	44.4	42.2	33.1	39.3	66.3	66.2	66.2	66.2	66.3	66.3	66.3	66.3	66.3
16/F	16	45.5	44.4	42.2	33.1	39.3	66.4	66.4	66.4	66.4	66.4	66.4	66.4	66.4	66.4
17/F	17	45.5	44.4	42.2	33.1	39.3	66.5	66.5	66.5	66.4	66.5	66.5	66.5	66.5	66.5
18/F	18	45.5	44.4	42.2	33.1	39.3	66.6	66.6	66.6	66.6	66.6	66.6	66.5	66.6	66.6
19/F	19	45.5	44.3	42.2	33.1	39.3	66.7	66.6	66.6	66.6	66.7	66.7	66.6	66.7	66.7
20/F	20	45.5	44.3	42.2	33.1	39.3	66.7	66.7	66.7	66.7	66.7	66.7	66.6	66.7	66.7
21/F	21	45.4	44.3	42.2	33.1	39.3	66.8	66.7	66.8	66.7	66.8	66.8	66.7	66.8	66.8
22/F	22	45.4	44.3	42.2	33.1	39.3	66.8	66.8	66.8	66.8	66.8	66.8	66.7	66.8	66.8
23/F	23	45.4	44.3	42.2	33.1	39.3	66.9	66.8	66.8	66.8	66.8	66.8	66.7	66.8	66.8
24/F	24	45.4	44.3	42.2	33.0	39.3	66.9	66.9	66.9	66.8	66.9	66.9	66.7	66.9	66.8
25/F	25	45.4	44.3	42.1	33.0	39.3	66.9	66.9	66.9	66.9	66.9	66.9	66.7	66.9	66.9
26/F	26	45.4	44.3	42.1	33.0	39.3	66.9	66.9	66.9	66.9	66.9	66.9	66.7	66.9	66.9
27/F	27	45.4	44.3	42.1	33.0	39.3	66.9	66.9	66.9	66.9	66.9	66.9	66.7	66.9	66.9
28/F	28	45.4	44.2	42.1	33.0	39.2	66.9	66.9	66.9	66.9	66.9	66.9	66.7	66.9	66.9
29/F	29	45.4	44.2	42.1	33.0	39.2	67.0	66.9	66.9	66.9	66.9	66.9	66.7	66.9	66.9
30/F	30	45.3	44.2	42.1	33.0	39.2	66.9	66.9	66.9	66.9	66.9	66.9	66.7	66.9	66.9
31/F	31	45.3	44.2	42.1	33.0	39.2	66.9	66.9	66.9	66.9	66.9	66.9	66.7	66.9	66.9
32/F	32	45.3	44.2	42.1	33.0	39.2	66.9	66.9	66.9	66.9	66.9	66.9	66.7	66.9	66.9
33/F	33	45.3	44.2	42.1	33.0	39.2	66.9	66.9	66.9	66.9	66.9	66.9	66.7	66.9	66.9
34/F	34	45.3	44.2	42.0	32.9	39.2	66.9	66.9	66.9	66.9	66.9	66.9	66.7	66.9	66.8
35/F	35	45.3	44.3	42.0	32.9	39.2	66.9	66.9	66.9	66.9	66.9	66.9	66.7	66.9	66.8
36/F	36	45.3	44.2	42.0	33.1	39.3	66.9	66.9	66.9	66.9	66.9	66.9	66.7	66.9	66.8

*** Note:**

XX Individual receiver with traffic noise level exceeding the standard of 70 dB(A) as stipulated in HKPSG are highlighed.

Tower 7 - Base Scenario

Tower 7	Unit No.	T7_1_L	T7_1_B1	T7_2_L	T7_2_B1	T7_3_L	T7_3_B1	T7_4_L	T7_4_B1	T7_4_B2	T7_5_L	T7_5_B1	T7_5_B2	T7_6_L	T7_6_B1	T7_6_B2	T7_7_L	T7_7_B1
1/F	1	57.4	57.4	57.5	57.5	57.6	57.5	57.6	57.7	57.8	43.0	42.9	43.4	43.3	43.6	43.0	43.9	43.9
2/F	2	57.5	57.5	57.6	57.5	57.6	57.5	57.7	57.8	57.9	43.7	43.5	44.2	44.0	44.3	43.6	44.6	44.5
3/F	3	57.6	57.5	57.6	57.6	57.7	57.6	57.7	57.8	57.9	44.4	44.1	44.9	44.7	45.0	44.3	45.3	45.2
4/F	4	57.7	57.6	57.7	57.7	57.8	57.7	57.8	57.9	58.0	45.1	44.8	45.6	45.4	45.7	44.9	45.9	45.9
5/F	5	57.8	57.8	57.8	57.8	57.9	57.8	57.9	58.0	58.2	45.7	45.5	46.2	46.1	46.4	45.6	46.7	46.6
6/F	6	58.0	58.0	58.0	58.0	58.1	58.1	58.2	58.2	58.3	46.4	46.1	46.9	46.9	47.2	46.3	47.6	47.5
7/F	7	58.2	58.2	58.2	58.3	58.4	58.3	58.4	58.5	58.5	47.1	46.9	47.6	47.8	48.2	47.1	48.5	48.5
8/F	8	58.6	58.6	58.6	58.6	58.7	58.7	58.8	58.8	58.9	47.9	47.7	48.4	48.9	49.4	48.0	49.7	49.7
9/F	9	59.1	59.1	59.1	59.1	59.1	59.1	59.2	59.3	59.3	48.8	48.6	49.2	50.0	50.5	49.1	50.7	50.8
10/F	10	59.4	59.4	59.5	59.5	59.5	59.5	59.7	59.7	59.7	49.7	49.5	50.2	51.1	51.6	50.1	52.0	52.0
11/F	11	59.9	59.8	59.9	59.8	59.9	59.9	60.0	60.1	60.2	50.7	50.5	51.1	52.1	52.6	51.1	52.9	53.0
12/F	12	60.3	60.3	60.2	60.3	60.4	60.3	60.4	60.5	60.6	51.8	51.6	52.2	53.0	53.5	52.2	53.7	53.8
13/F	13	60.8	60.7	60.7	60.8	60.8	60.8	60.9	61.0	61.1	53.0	52.7	53.3	53.8	54.2	53.2	54.4	54.5
14/F	14	61.2	61.2	61.3	61.2	61.4	61.4	61.5	61.5	61.6	54.2	53.9	54.5	54.6	55.0	54.1	55.1	55.2
15/F	15	61.6	61.6	61.7	61.7	61.8	61.8	61.9	62.1	62.2	55.1	54.9	55.5	55.5	55.8	55.1	55.8	56.0
16/F	16	62.0	61.9	62.1	62.2	62.3	62.2	62.5	62.5	62.6	56.2	55.9	56.5	56.3	56.5	56.0	56.5	56.6
17/F	17	62.4	62.3	62.5	62.6	62.7	62.6	62.8	62.9	63.1	57.0	56.8	57.4	57.1	57.3	56.8	57.2	57.4
18/F	18	62.7	62.7	62.8	62.9	63.1	63.0	63.2	63.3	63.4	57.6	57.5	58.1	57.7	57.9	57.5	57.9	58.0
19/F	19	63.0	63.0	63.1	63.2	63.4	63.3	63.5	63.6	63.8	58.2	58.0	58.8	58.2	58.4	58.0	58.4	58.5
20/F	20	63.3	63.3	63.5	63.5	63.7	63.7	63.9	63.9	64.0	58.7	58.4	59.4	58.6	58.7	58.4	58.8	58.9
21/F	21	64.1	64.0	64.2	64.2	64.4	64.3	64.5	64.5	64.6	60.1	59.7	60.9	59.6	59.7	59.5	59.7	59.7
22/F	22	64.3	64.2	64.3	64.4	64.5	64.5	64.6	64.6	64.8	60.4	60.0	61.1	59.9	59.9	59.8	59.9	60.0
23/F	23	64.3	64.3	64.4	64.5	64.5	64.6	64.7	64.7	64.8	60.6	60.2	61.3	60.1	60.1	60.0	60.1	60.2
24/F	24	64.4	64.4	64.5	64.6	64.6	64.5	64.7	64.8	64.9	60.7	60.3	61.5	60.3	60.3	60.1	60.3	60.4
25/F	25	64.4	64.4	64.5	64.6	64.6	64.6	64.7	64.8	64.9	60.8	60.4	61.5	60.3	60.4	60.2	60.4	60.5
26/F	26	64.5	64.4	64.5	64.6	64.7	64.6	64.8	64.8	64.9	60.9	60.4	61.6	60.4	60.4	60.3	60.5	60.5
27/F	27	64.5	64.4	64.6	64.5	64.7	64.6	64.8	64.8	64.9	60.9	60.5	61.6	60.4	60.5	60.3	60.5	60.6
28/F	28	64.5	64.4	64.6	64.5	64.7	64.6	64.8	64.8	64.9	60.9	60.5	61.6	60.5	60.5	60.3	60.6	60.6
29/F	29	64.5	64.4	64.6	64.5	64.7	64.6	64.7	64.8	64.8	60.9	60.5	61.6	60.5	60.5	60.3	60.6	60.6
30/F	30	64.5	64.4	64.6	64.5	64.7	64.6	64.7	64.8	64.8	60.9	60.5	61.7	60.5	60.5	60.3	60.6	60.6
31/F	31	64.5	64.4	64.5	64.5	64.6	64.6	64.7	64.8	64.8	60.9	60.5	61.6	60.5	60.5	60.3	60.6	60.6
32/F	32	64.5	64.4	64.5	64.5	64.6	64.6	64.7	64.8	64.8	60.9	60.5	61.6	60.5	60.5	60.3	60.6	60.6
33/F	33	64.4	64.4	64.5	64.5	64.6	64.5	64.7	64.8	64.8	60.9	60.5	61.6	60.5	60.5	60.3	60.6	60.6
34/F	34	64.4	64.4	64.5	64.5	64.6	64.5	64.7	64.7	64.8	60.9	60.5	61.6	60.4	60.5	60.3	60.6	60.6
35/F	35	64.4	64.4	64.5	64.5	64.6	64.5	64.7	64.7	64.7	60.9	60.5	61.6	60.4	60.5	60.3	60.6	60.6
36/F	36	64.4	64.3	64.5	64.4	64.6	64.5	64.6	64.7	64.7	60.9	60.5	61.6	60.4	60.5	60.2	60.5	60.6
37/F	37	64.4	64.3	64.5	64.4	64.5	64.5	64.6	64.7	64.7	60.9	60.4	61.6	60.4	60.5	60.2	60.5	60.6
38/F	38	64.4	64.3	64.4	64.4	64.5	64.4	64.6	64.7	64.7	60.9	60.4	61.6	60.4	60.5	60.2	60.5	60.6
39/F	39	64.3	64.3	64.4	64.4	64.5	64.4	64.6	64.6	64.7	60.9	60.4	61.6	60.4	60.4	60.2	60.5	60.6
40/F	40	64.3	64.3	64.4	64.4	64.5	64.4	64.5	64.6	64.6	60.9	60.4	61.6	60.4	60.5	60.2	60.5	60.6

*** Note:**

XX Individual receiver with traffic noise level exceeding the standard of 70 dB(A) as stipulated in HKPSG are highlighed.

Tower 7 - Base Scenario

Tower 7	Unit No.	T7_8_L	T7_8_B1	T7_9_L	T7_9_B1	T7_9_B2	T7_10_L	T7_10_B1	T7_10_B2	T7_11_L	T7_11_B1	T7_11_B2	T7_12_L	T7_12_B1	T7_12_B2	T7_13_L	T7_13_B1
1/F	1	44.6	49.5	52.6	48.4	54.9	50.6	51.5	51.0	50.1	49.6	49.1	46.0	48.2	47.4	44.3	42.3
2/F	2	45.1	49.7	52.7	48.5	54.9	53.5	53.9	53.6	53.2	52.7	52.3	49.8	51.3	50.7	48.7	47.5
3/F	3	45.8	49.9	52.8	48.6	55.0	54.5	54.9	54.7	54.2	53.9	53.7	52.8	53.3	53.0	52.4	51.7
4/F	4	46.4	50.2	52.9	48.8	55.0	54.8	55.3	55.0	54.6	54.4	54.2	53.3	53.8	53.6	53.1	52.5
5/F	5	47.1	50.5	53.1	49.0	55.1	54.9	55.3	55.1	54.6	54.4	54.3	53.4	53.9	53.7	53.1	52.6
6/F	6	48.0	50.9	53.3	49.3	55.2	55.0	55.4	55.1	54.8	54.6	54.4	53.5	54.0	53.7	53.2	52.7
7/F	7	48.9	51.3	53.5	49.7	55.4	55.1	55.5	55.2	54.8	54.6	54.4	53.6	54.1	53.8	53.3	52.8
8/F	8	50.1	52.0	53.9	50.2	55.6	55.2	55.6	55.3	55.0	54.8	54.6	53.9	54.3	54.0	53.6	53.2
9/F	9	51.0	52.6	54.2	50.7	55.8	55.4	55.8	55.6	55.2	55.1	55.0	54.3	54.7	54.5	54.2	53.8
10/F	10	52.2	53.4	54.8	51.4	56.1	55.8	56.1	55.9	55.7	55.6	55.5	54.9	55.3	55.0	54.8	54.5
11/F	11	53.1	54.1	55.3	52.1	56.4	56.1	56.4	56.2	56.0	55.9	55.8	55.3	55.7	55.5	55.2	55.0
12/F	12	53.8	54.6	55.7	52.5	56.7	56.4	56.6	56.4	56.2	56.2	56.1	55.7	56.0	55.8	55.6	55.4
13/F	13	54.4	55.1	56.0	52.9	56.9	56.6	56.7	56.6	56.6	56.6	56.6	56.1	56.3	56.2	56.1	55.9
14/F	14	55.1	55.6	56.4	53.2	57.2	56.9	57.0	57.0	56.9	56.9	56.9	56.5	56.7	56.6	56.5	56.4
15/F	15	55.8	56.1	56.8	53.4	57.4	57.1	57.2	57.1	57.1	57.1	57.1	56.7	56.9	56.8	56.7	56.6
16/F	16	56.4	56.6	57.2	53.6	57.7	57.2	57.3	57.2	57.3	57.3	57.3	56.8	57.1	56.8	56.8	56.8
17/F	17	57.0	57.2	57.6	53.9	58.1	57.5	57.4	57.4	57.4	57.4	57.5	56.9	57.2	56.9	56.9	56.8
18/F	18	57.7	57.8	58.1	54.2	58.5	57.6	57.6	57.6	57.6	57.6	57.7	56.9	57.3	56.9	56.9	56.8
19/F	19	58.2	58.3	58.5	54.4	58.8	57.7	57.7	57.8	57.8	57.8	57.9	56.9	57.4	56.9	56.9	56.8
20/F	20	58.6	58.7	58.8	54.7	59.1	57.9	57.9	57.9	58.0	58.0	58.1	56.9	57.5	56.9	56.9	56.8
21/F	21	59.5	59.4	59.6	55.2	59.7	58.3	58.3	58.3	58.4	58.4	58.4	56.8	57.6	56.9	56.8	56.8
22/F	22	59.8	59.7	59.8	55.4	59.9	58.4	58.4	58.4	58.4	58.3	58.4	56.8	57.7	56.9	56.8	56.7
23/F	23	60.0	59.9	60.0	55.5	60.1	58.4	58.4	58.4	58.4	58.4	58.4	56.8	57.7	56.9	56.8	56.7
24/F	24	60.2	60.1	60.1	55.6	60.2	58.4	58.4	58.4	58.4	58.4	58.4	56.8	57.7	56.9	56.8	56.7
25/F	25	60.3	60.2	60.2	55.8	60.3	58.4	58.4	58.4	58.4	58.4	58.5	56.8	57.7	56.9	56.8	56.7
26/F	26	60.4	60.2	60.3	55.8	60.4	58.4	58.4	58.4	58.4	58.4	58.5	56.8	57.7	56.8	56.8	56.7
27/F	27	60.4	60.3	60.3	55.9	60.4	58.4	58.4	58.4	58.5	58.5	58.5	56.7	57.6	56.8	56.7	56.7
28/F	28	60.4	60.3	60.4	55.9	60.4	58.4	58.5	58.4	58.5	58.5	58.5	56.7	57.6	56.8	56.7	56.7
29/F	29	60.5	60.4	60.4	56.0	60.5	58.4	58.4	58.4	58.4	58.4	58.4	56.7	57.6	56.8	56.7	56.6
30/F	30	60.5	60.4	60.4	56.0	60.5	58.4	58.4	58.4	58.4	58.4	58.4	56.7	57.6	56.8	56.7	56.6
31/F	31	60.5	60.4	60.4	56.0	60.5	58.4	58.4	58.4	58.4	58.4	58.4	56.7	57.6	56.8	56.7	56.6
32/F	32	60.5	60.4	60.4	56.0	60.4	58.3	58.4	58.3	58.4	58.4	58.4	56.7	57.6	56.8	56.7	56.6
33/F	33	60.5	60.4	60.4	56.0	60.4	58.3	58.4	58.3	58.4	58.4	58.4	56.6	57.6	56.7	56.6	56.6
34/F	34	60.4	60.3	60.4	56.0	60.4	58.3	58.4	58.3	58.4	58.4	58.4	56.6	57.5	56.7	56.6	56.5
35/F	35	60.4	60.3	60.3	56.0	60.4	58.3	58.3	58.3	58.3	58.3	58.3	56.6	57.5	56.7	56.6	56.5
36/F	36	60.4	60.3	60.3	56.0	60.4	58.3	58.3	58.3	58.3	58.3	58.3	56.6	57.5	56.7	56.6	56.5
37/F	37	60.4	60.3	60.3	56.0	60.4	58.3	58.3	58.3	58.3	58.3	58.3	56.6	57.5	56.7	56.6	56.5
38/F	38	60.4	60.3	60.3	55.9	60.4	58.2	58.3	58.2	58.3	58.3	58.3	56.5	57.5	56.6	56.6	56.5
39/F	39	60.4	60.3	60.3	56.0	60.3	58.2	58.3	58.2	58.3	58.3	58.2	56.5	57.4	56.6	56.5	56.4
40/F	40	60.4	60.3	60.3	56.0	60.3	58.2	58.2	58.2	58.2	58.2	58.2	56.5	57.4	56.6	56.5	56.4

*** Note:**

XX Individual receiver with traffic noise level exceeding the standard of 70 dB(A) as stipulated in HKPSG are highlighed.

Tower 8 - Base Scenario

Tower 8	Unit No.	T8_1_L	T8_1_B1	T8_1_B2	T8_2_L	T8_2_B1	T8_2_B2	T8_3_L	T8_3_B1	T8_3_B2	T8_4_L	T8_4_B1	T8_4_B2	T8_5_L	T8_5_B1	T8_5_B2	T8_6_L	T8_6_B1	T8_6_B2	T8_7_L	T8_7_B1
1/F	1	56.8	56.6	56.7	55.8	56.3	56.1	56.8	57.3	58.1	39.5	39.6	41.9	39.5	39.5	39.5	39.4	39.4	39.5	39.4	39.4
2/F	2	58.7	58.6	59.0	58.3	58.8	58.6	59.2	59.6	60.2	39.5	39.6	42.1	39.5	39.5	39.5	39.4	39.4	39.5	39.4	39.4
3/F	3	60.1	60.2	61.0	60.6	60.8	60.7	61.2	61.5	61.8	39.5	39.6	42.4	39.5	39.5	39.5	39.4	39.4	39.5	39.4	39.4
4/F	4	61.0	61.2	62.0	61.8	62.0	61.9	62.4	62.6	62.8	39.5	39.5	42.8	39.5	39.5	39.5	39.4	39.4	39.5	39.4	39.4
5/F	5	61.8	61.9	62.8	62.7	62.7	62.7	63.2	63.4	63.5	39.5	39.5	43.1	39.5	39.5	39.5	39.4	39.4	39.4	39.3	39.4
6/F	6	62.3	62.6	63.3	63.3	63.3	63.3	63.7	63.9	64.0	39.5	39.5	43.5	39.5	39.5	39.5	39.4	39.4	39.4	39.3	39.4
7/F	7	62.8	63.1	63.8	63.8	63.8	63.8	64.2	64.3	64.5	39.5	39.5	44.0	39.5	39.5	39.5	39.4	39.4	39.4	39.3	39.4
8/F	8	63.3	63.7	64.3	64.3	64.3	64.3	64.7	64.7	64.9	39.5	39.5	44.5	39.4	39.4	39.5	39.4	39.4	39.4	39.3	39.4
9/F	9	63.7	64.2	64.8	64.8	64.8	64.8	65.1	65.1	65.3	39.4	39.5	45.2	39.4	39.4	39.4	39.4	39.3	39.4	39.3	39.3
10/F	10	64.0	64.6	65.2	65.1	65.2	65.2	65.4	65.5	65.6	39.4	39.5	45.9	39.4	39.4	39.4	39.4	39.3	39.4	39.3	39.3
11/F	11	64.3	64.9	65.5	65.5	65.5	65.5	65.7	65.8	65.9	39.4	39.5	46.6	39.4	39.4	39.4	39.3	39.3	39.4	39.3	39.3
12/F	12	64.6	65.2	65.8	65.8	65.8	65.8	66.0	66.0	66.2	39.4	39.4	47.4	39.4	39.4	39.4	39.3	39.3	39.3	39.2	39.3
13/F	13	64.8	65.5	66.0	66.1	66.1	66.1	66.3	66.3	66.4	39.4	39.4	48.0	39.3	39.4	39.4	39.3	39.3	39.3	39.2	39.3
14/F	14	65.0	65.7	66.2	66.3	66.3	66.3	66.5	66.5	66.6	39.4	39.4	48.5	39.3	39.3	39.4	39.3	39.3	39.3	39.2	39.3
15/F	15	65.1	65.8	66.4	66.5	66.5	66.5	66.7	66.6	66.8	39.3	39.4	49.3	39.3	39.3	39.3	39.3	39.2	39.3	39.2	39.2
16/F	16	65.2	65.9	66.5	66.6	66.7	66.7	66.8	66.7	67.0	39.3	39.4	49.9	39.3	39.3	39.3	39.2	39.2	39.3	39.2	39.2
17/F	17	65.3	66.0	66.6	66.8	66.8	66.8	67.0	66.9	67.1	39.3	39.4	50.4	39.3	39.3	39.3	39.2	39.2	39.2	39.1	39.2
18/F	18	65.4	66.1	66.7	66.9	66.9	66.9	67.1	66.9	67.2	39.3	39.4	50.7	39.3	39.3	39.3	39.2	39.2	39.2	39.1	39.2
19/F	19	65.4	66.2	66.8	67.0	67.0	67.0	67.2	67.0	67.3	39.3	39.4	51.1	39.2	39.2	39.3	39.2	39.2	39.2	39.1	39.2
20/F	20	65.5	66.2	66.8	67.0	67.0	67.0	67.2	67.1	67.4	39.3	39.4	51.4	39.2	39.2	39.2	39.2	39.1	39.2	39.1	39.1
21/F	21	65.5	66.2	66.8	67.0	67.1	67.1	67.2	67.1	67.4	39.3	39.5	51.8	39.2	39.2	39.2	39.1	39.1	39.2	39.1	39.1
22/F	22	65.5	66.2	66.8	67.1	67.1	67.1	67.2	67.1	67.4	39.3	39.5	52.0	39.2	39.2	39.2	39.1	39.1	39.2	39.1	39.1
23/F	23	65.5	66.3	66.9	67.1	67.1	67.1	67.3	67.1	67.4	39.3	39.5	52.3	39.2	39.2	39.2	39.1	39.1	39.2	39.1	39.1
24/F	24	65.5	66.3	66.9	67.1	67.1	67.1	67.3	67.1	67.4	39.3	39.6	52.6	39.2	39.2	39.2	39.1	39.1	39.1	39.0	39.1
25/F	25	65.5	66.3	66.8	67.1	67.1	67.1	67.3	67.1	67.4	39.3	39.7	52.9	39.1	39.1	39.2	39.1	39.1	39.1	39.0	39.1
26/F	26	65.6	66.3	66.9	67.1	67.1	67.1	67.2	67.1	67.4	39.4	39.9	53.2	39.1	39.1	39.1	39.1	39.0	39.1	39.0	39.0
27/F	27	65.5	66.3	66.8	67.1	67.1	67.1	67.2	67.1	67.4	39.4	40.0	53.5	39.1	39.1	39.1	39.0	39.0	39.1	39.0	39.0
28/F	28	65.6	66.3	66.8	67.1	67.1	67.1	67.2	67.1	67.4	39.4	40.2	53.7	39.1	39.1	39.1	39.0	39.0	39.0	39.0	39.0
29/F	29	65.6	66.3	66.8	67.1	67.1	67.1	67.2	67.1	67.4	39.4	40.5	53.9	39.1	39.1	39.1	39.0	39.0	39.0	38.9	39.0
30/F	30	65.6	66.3	66.8	67.1	67.0	67.1	67.2	67.1	67.4	39.5	40.8	54.2	39.0	39.0	39.1	39.0	38.9	39.0	38.9	39.0
31/F	31	65.6	66.3	66.8	67.0	67.0	67.1	67.2	67.1	67.4	39.6	41.2	54.4	39.0	39.0	39.0	38.9	38.9	39.0	38.9	38.9
32/F	32	65.6	66.3	66.8	67.0	67.0	67.1	67.2	67.1	67.4	39.8	41.6	54.7	39.0	39.0	39.0	38.9	38.9	38.9	38.9	38.9
33/F	33	65.7	66.3	66.9	67.0	67.1	67.1	67.2	67.1	67.3	40.0	42.2	54.9	38.9	38.9	39.0	38.9	38.9	38.9	38.8	38.9
34/F	34	65.7	66.4	66.9	67.1	67.1	67.1	67.2	67.1	67.4	40.5	42.9	55.1	38.9	38.9	38.9	38.8	38.8	38.8	38.8	38.8
35/F	35	65.8	66.4	67.0	67.1	67.1	67.2	67.3	67.1	67.4	41.1	43.8	55.3	39.0	39.0	39.0	38.9	38.9	39.0	39.1	38.9
36/F	36	65.9	66.5	67.0	67.2	67.2	67.2	67.3	67.1	67.4	43.0	45.5	55.5	41.1	41.2	41.0	41.2	41.1	41.2	41.2	41.0

*** Note:**

XX Individual receiver with traffic noise level exceeding the standard of 70 dB(A) as stipulated in HKPSG are highlighed.

Tower 8 - Base Scenario

Tower 8	Unit No.	T8_8_L	T8_8_B1	T8_8_B2	T8_9_L	T8_9_B1	T8_9_B2	T8_10_L	T8_10_B1	T8_10_B2	T8_11_L	T8_11_B1	T8_11_B2	T8_12_L	T8_12_B1	T8_12_B2	T8_13_L	T8_13_B1	T8_13_B2	T8_14_L	T8_14_B1
1/F	1	39.2	39.4	39.3	40.1	40.6	39.7	40.7	40.5	40.6	58.8	58.6	58.7	58.9	59.0	59.1	59.4	59.1	59.2	59.7	59.6
2/F	2	39.2	39.4	39.3	40.2	40.8	39.8	41.0	40.6	40.8	59.0	58.7	58.9	59.1	59.2	59.3	59.7	59.4	59.5	60.0	59.9
3/F	3	39.2	39.4	39.3	40.3	41.0	39.8	41.2	40.8	41.0	59.2	59.0	59.1	59.3	59.4	59.5	60.0	59.6	59.8	60.4	60.2
4/F	4	39.2	39.5	39.3	40.4	41.2	39.9	41.4	41.1	41.2	59.4	59.3	59.3	59.6	59.6	59.8	60.3	59.9	60.1	60.7	60.6
5/F	5	39.2	39.5	39.3	40.5	41.5	40.0	41.7	41.3	41.5	59.8	59.5	59.7	59.8	59.9	60.1	60.7	60.3	60.4	61.1	60.9
6/F	6	39.2	39.5	39.3	40.7	41.7	40.0	42.0	41.6	41.8	60.1	59.9	60.1	60.3	60.4	60.4	61.1	60.7	60.9	61.5	61.3
7/F	7	39.2	39.5	39.2	40.9	42.1	40.1	42.3	41.9	42.1	60.6	60.4	60.4	60.8	60.8	61.0	61.5	61.2	61.3	61.9	61.8
8/F	8	39.2	39.6	39.2	41.1	42.4	40.2	42.6	42.2	42.4	61.0	60.8	61.0	61.2	61.3	61.4	62.0	61.6	61.8	62.4	62.2
9/F	9	39.2	39.6	39.2	41.4	42.9	40.2	43.1	42.6	42.8	61.5	61.3	61.4	61.7	61.9	61.9	62.5	62.1	62.3	62.8	62.7
10/F	10	39.1	39.6	39.2	41.7	43.4	40.3	43.6	43.1	43.3	62.1	61.8	62.0	62.2	62.4	62.5	63.0	62.7	62.9	63.3	63.2
11/F	11	39.1	39.7	39.2	42.1	43.9	40.4	44.1	43.6	43.8	62.7	62.4	62.5	62.8	62.9	63.1	63.5	63.1	63.3	63.7	63.6
12/F	12	39.1	39.7	39.2	42.5	44.5	40.5	44.7	44.2	44.4	63.2	62.9	63.1	63.3	63.3	63.5	63.9	63.7	63.7	64.1	64.0
13/F	13	39.1	39.8	39.1	43.0	45.0	40.6	45.2	44.8	45.1	63.6	63.4	63.5	63.7	63.8	63.9	64.2	64.0	64.1	64.5	64.4
14/F	14	39.1	39.9	39.1	43.3	45.7	40.8	45.8	45.3	45.5	63.9	63.8	63.9	64.1	64.1	64.2	64.5	64.4	64.5	64.8	64.7
15/F	15	39.1	40.0	39.1	43.7	46.4	40.9	46.5	46.0	46.2	64.3	64.1	64.2	64.4	64.4	64.5	64.8	64.7	64.8	65.0	65.0
16/F	16	39.1	40.1	39.1	44.0	46.8	41.1	46.9	46.5	46.7	64.6	64.4	64.5	64.6	64.7	64.8	65.1	64.9	65.0	65.3	65.2
17/F	17	39.1	40.1	39.1	44.3	47.4	41.3	47.5	47.0	47.2	64.8	64.7	64.8	64.9	65.0	65.1	65.3	65.2	65.2	65.5	65.4
18/F	18	39.1	40.2	39.1	44.5	48.0	41.5	48.1	47.6	47.8	65.0	64.9	65.0	65.1	65.2	65.3	65.4	65.3	65.3	65.6	65.5
19/F	19	39.1	40.4	39.0	44.8	48.4	41.8	48.6	48.1	48.3	65.1	65.1	65.1	65.2	65.3	65.3	65.5	65.4	65.4	65.6	65.6
20/F	20	39.1	40.6	39.0	44.9	48.9	42.0	49.0	48.5	48.7	65.2	65.1	65.1	65.3	65.3	65.4	65.5	65.5	65.5	65.7	65.6
21/F	21	39.1	40.8	39.0	45.1	49.1	42.3	49.3	48.9	49.1	65.3	65.1	65.2	65.3	65.4	65.5	65.5	65.5	65.5	65.7	65.6
22/F	22	39.1	41.1	39.0	45.3	49.4	42.6	49.6	49.1	49.4	65.3	65.2	65.2	65.4	65.4	65.5	65.6	65.5	65.5	65.7	65.6
23/F	23	39.1	41.4	39.0	45.5	49.6	42.9	49.9	49.4	49.7	65.3	65.2	65.2	65.4	65.4	65.5	65.6	65.5	65.5	65.7	65.6
24/F	24	39.2	41.7	39.0	45.8	49.8	43.3	50.2	49.6	49.9	65.3	65.2	65.2	65.4	65.4	65.5	65.5	65.5	65.5	65.7	65.6
25/F	25	39.2	42.0	39.0	46.0	50.1	43.6	50.4	49.9	50.1	65.3	65.2	65.2	65.3	65.4	65.5	65.5	65.5	65.5	65.6	65.6
26/F	26	39.3	42.5	39.0	46.3	50.2	44.1	50.6	50.1	50.3	65.3	65.2	65.2	65.3	65.4	65.4	65.5	65.5	65.5	65.6	65.6
27/F	27	39.3	42.8	39.0	46.6	50.3	44.5	50.9	50.3	50.5	65.3	65.1	65.2	65.3	65.4	65.4	65.5	65.5	65.5	65.6	65.6
28/F	28	39.4	43.3	39.0	46.9	50.5	44.9	51.1	50.5	50.7	65.2	65.1	65.2	65.3	65.3	65.4	65.5	65.5	65.5	65.6	65.5
29/F	29	39.5	43.7	38.9	47.3	50.7	45.4	51.3	50.7	51.0	65.2	65.1	65.2	65.3	65.3	65.4	65.5	65.4	65.5	65.6	65.5
30/F	30	39.7	44.1	38.9	47.9	50.9	46.0	51.5	50.8	51.1	65.2	65.1	65.2	65.3	65.3	65.4	65.4	65.4	65.5	65.5	65.5
31/F	31	39.8	44.4	38.9	48.2	51.1	46.3	51.8	51.1	51.4	65.2	65.1	65.1	65.2	65.3	65.3	65.4	65.4	65.5	65.5	65.5
32/F	32	39.9	44.7	38.9	48.5	51.2	46.7	52.0	51.2	51.6	65.2	65.0	65.1	65.2	65.3	65.3	65.4	65.4	65.4	65.5	65.4
33/F	33	40.2	45.0	38.9	48.9	51.4	47.3	52.1	51.4	51.7	65.1	65.0	65.1	65.2	65.2	65.3	65.4	65.4	65.4	65.5	65.4
34/F	34	40.5	45.3	38.9	49.4	51.6	47.6	52.3	51.6	51.9	65.1	65.0	65.1	65.2	65.2	65.3	65.4	65.3	65.4	65.5	65.4
35/F	35	41.2	45.6	39.4	49.8	51.8	48.1	52.5	51.7	52.1	65.1	65.0	65.1	65.2	65.2	65.3	65.4	65.3	65.4	65.5	65.4
36/F	36	42.8	46.5	41.3	50.4	52.2	48.8	52.8	51.9	52.3	65.1	65.0	65.0	65.1	65.2	65.2	65.3	65.3	65.4	65.5	65.4

*** Note:**

XX Individual receiver with traffic noise level exceeding the standard of 70 dB(A) as stipulated in HKPSG are highlighed.

Tower 8 - Base Scenario

Tower 8	Unit No.	T8_15_L	T8_15_B1	T8_15_B2	T8_16_L	T8_16_B1	T8_16_B2
1/F	1	59.8	60.0	60.1	60.2	60.4	60.8
2/F	2	60.2	60.4	60.4	60.7	61.0	61.5
3/F	3	60.7	60.8	60.9	61.3	61.5	62.3
4/F	4	61.0	61.1	61.3	61.7	62.0	62.9
5/F	5	61.4	61.6	61.7	62.1	62.3	63.4
6/F	6	61.8	61.9	62.1	62.4	62.7	63.9
7/F	7	62.1	62.3	62.5	62.9	63.2	64.3
8/F	8	62.7	62.7	62.9	63.3	63.6	64.8
9/F	9	63.1	63.2	63.4	63.7	64.0	65.2
10/F	10	63.6	63.7	63.8	64.1	64.3	65.6
11/F	11	63.9	64.1	64.2	64.4	64.7	65.8
12/F	12	64.3	64.4	64.5	64.7	64.9	66.2
13/F	13	64.5	64.6	64.8	65.0	65.2	66.4
14/F	14	64.9	64.9	65.0	65.3	65.5	66.6
15/F	15	65.2	65.2	65.3	65.5	65.7	66.8
16/F	16	65.4	65.5	65.5	65.7	65.9	67.0
17/F	17	65.6	65.6	65.6	65.8	66.0	67.0
18/F	18	65.7	65.7	65.7	65.9	66.1	67.1
19/F	19	65.7	65.8	65.9	65.9	66.1	67.1
20/F	20	65.7	65.8	65.9	65.9	66.1	67.1
21/F	21	65.8	65.8	65.9	65.9	66.1	67.1
22/F	22	65.8	65.8	65.9	65.9	66.1	67.2
23/F	23	65.8	65.8	65.9	66.0	66.1	67.2
24/F	24	65.7	65.8	65.9	66.0	66.1	67.2
25/F	25	65.7	65.8	65.9	66.0	66.1	67.2
26/F	26	65.7	65.8	65.8	66.0	66.0	67.1
27/F	27	65.7	65.8	65.8	66.0	66.0	67.1
28/F	28	65.7	65.7	65.8	65.9	66.0	67.1
29/F	29	65.7	65.7	65.8	65.9	66.0	67.1
30/F	30	65.6	65.7	65.7	65.9	66.0	67.1
31/F	31	65.6	65.7	65.7	65.9	66.0	67.1
32/F	32	65.6	65.6	65.7	65.9	66.1	67.2
33/F	33	65.6	65.6	65.7	65.9	66.1	67.2
34/F	34	65.6	65.6	65.7	65.9	66.2	67.2
35/F	35	65.6	65.6	65.7	65.9	66.3	67.2
36/F	36	65.6	65.7	65.7	66.0	66.3	67.2

*** Note:**

XX Individual receiver with traffic noise level exceeding the standard of 70 dB(A) as stipulated in HKPSG are highlighed.

Appendix 4.3

Correspondences with Le Billionnaire

Wong, Rachel

From: Rice Chan <rice_cwl@ccg-realestatemgt.com.hk>
Sent: Thursday, January 6, 2022 5:21 PM
To: Wong, Rachel
Cc: Samuel Dong; Gary Li; Erik Chau; CS
Subject: 回覆: CONFIDENTIAL : Request for Fixed Plant Technical Information at Le Billionnaire
Attachments: Reply - Fixed Plant Enquiry Form_Le Billionnaire.pdf

Dear Rachel,

The mentioned A/C units are for stock usage, please find the attached file for your information. Thanks.

Best Regards
Rice Chan
Customer Service Office
Billionnaire Royale

九龍九龍城沙浦道83號御·豪門6樓客戶服務部
6/F Customer Service Office, Billionnaire Royale,
83 Sa Po Road, Kowloon City, Kowloon.
電話 Tel：(852) 2382 1878 傳真 Fax：(852) 2382 2078
電郵 Mail：rice_cwl@ccg-realestatemgt.com.hk

CHINACHEM GROUP
華懋集團

寄件者: CS <cs@chinachemgroup.com>
寄件日期: 2021年12月20日 12:23
收件者: Gary Li <garyli@chinachemgroup.com>; Rice Chan <rice_cwl@ccg-realestatemgt.com.hk>
主旨: FW: CONFIDENTIAL : Request for Fixed Plant Technical Information at Le Billionnaire

Samuel Dong
Director of Property Services

T 2739 8811 | D 2500 7630

CHINACHEM GROUP
華懋集團

35 - 38/F, Nina Tower, 8 Yeung Uk Road,
Tsuen Wan, N.T., Hong Kong
Places with Heart | chinachemgroup.com

From: Wong, Rachel <Rachel.Wong@atkinsglobal.com>
Sent: Thursday, December 16, 2021 4:02 PM
To: CS <cs@chinachemgroup.com>
Cc: ytli@ura.org.hk; Wu, Funny <Funny.Wu@atkinsglobal.com>; Tang, Benjamin <Benjamin.Tang@atkinsglobal.com>
Subject: CONFIDENTIAL : Request for Fixed Plant Technical Information at Le Billionnaire

Dear Sir/Madam,

Urban Renewal Authority
Term Environmental Consultancy Services (Service Order No. 004)
Environmental Assessment for a Development Scheme in Kowloon City

CONFIDENTIAL : Request for Fixed Plant Technical Information at Le Billionnaire

We are the Environmental Consultant commissioned by the Urban Renewal Authority (URA) to undertake the captioned consultancy service in Kowloon City. A copy of the appointment letter and a broad location plan showing the indicative location of the technical study area are enclosed with this email for your information.

The **Le Billionnaire** is located within the noise assessment study area. Based on our desktop findings, a number of fixed plant have been identified on the podium of the building. As part of our study, we would like to enquire some technical information regarding the fixed plant. Therefore, we would like to seek your assistance to complete the attached **Fixed Plant Enquiry Form**.

We shall be grateful if you could provide us the above information via email to rachel.wong@atkinsglobal.com on or before **24 December 2021 (Friday)**. Should you have any queries, please feel free to contact the undersigned at 2972 1349.

Thank you for your kind assistance. Note that the password for the attached documents shall be provided in a separate email.

Kind Regards,

Rachel Wong
Environmental Consultant, Environment
Hong Kong Asia Pacific
Engineering, Design and Project Management

+852 2972 1349

13/F Wharf T&T Centre, Harbour City, Tsim Sha Tsui, Kowloon, Hong Kong

Atkins China Limited was commissioned by Urban Renewal Authority (URA) to carry out technical study in the Kowloon City Area. According to our observations, air-cooled/water-cooled chiller plants and other machines are observed on the podium of the building (photos of the fixed plant are attached for your reference). In order to have an effective and accuracy assessment, would you please provide the information related to the fixed plant on the podium of the building. Please fill in the enclosed Form and return to us by email to rachel.wong@atkinsglobal.com . If you have any enquiries, please contact Ms. Rachel Wong at 2972 1349. Thank you for your cooperation.

阿特金斯顧問有限公司獲市區重建局委聘為九龍城區附近進行一項技術研究。根據我們的觀察，在上述建築物的平台上發現了水冷/風冷式冷風機及其他機器（隨附有關機器的相片，以供您參考）。為更有效及精確作出評估，現希望貴公司能提供有關機器類型及運作的資料。煩請填完此份表格後，電郵至 rachel.wong@atkinsglobal.com)。如有查詢，請與王小姐聯絡(電話：2972 1349）。謝謝您的合作。

Fixed Plant Enquiry Form 機器查詢表格

Name of Property 物業名稱: 豪門 (Le Billionnaie)

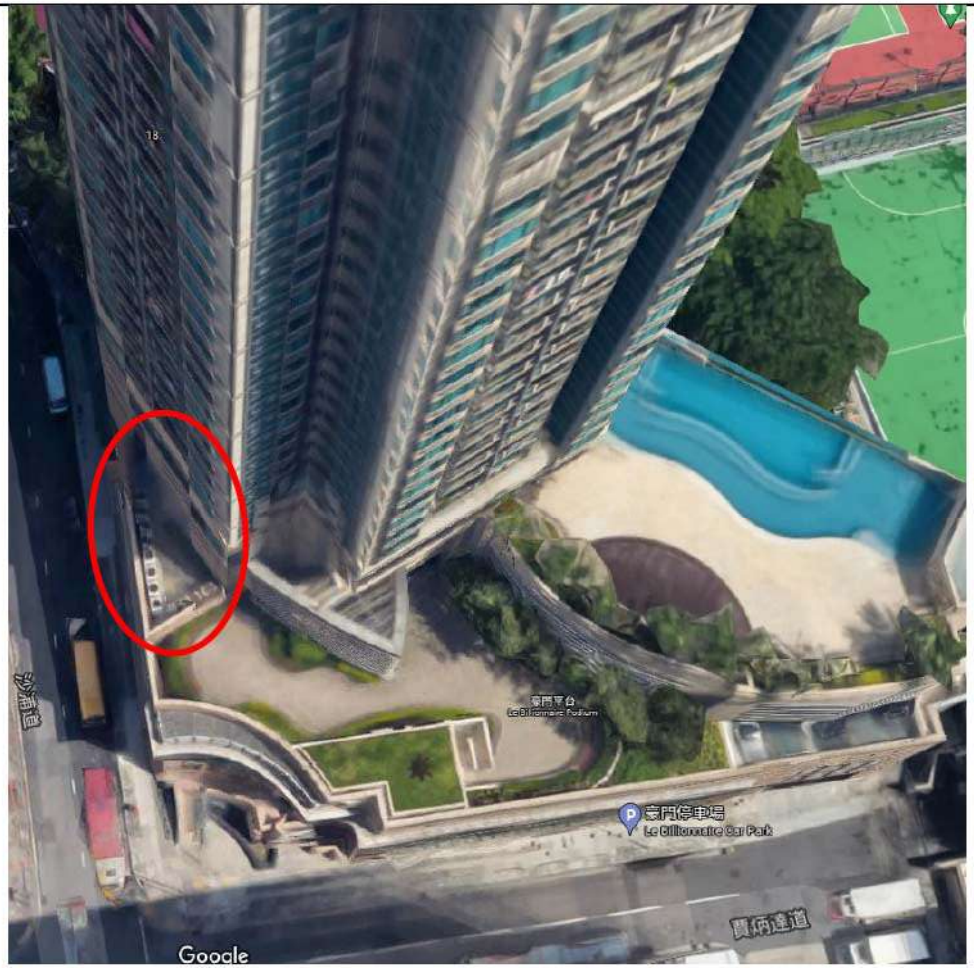
Address of Property 物業地址: 九龍城沙浦道46號

Name of Property Management Company 物業管理公司名稱: 合安管理有限公司

Type of the fixed plant (e.g. air-cooled/water-cooled chiller? Water cooling tower? Other machine on the podium / rooftop?) 機器類型 (例如,風冷式/水冷式製冷機? 淡水冷卻塔? 或其他在平台/天台的機器?)	Number of the fixed plant 機器數目	Model of the fixed Plant 機器型號	Cooling capacity (in terms of ton) 製冷量（噸）	Sound Power Level (SWL) / Sound Pressure Level (SPL) in dB(A) 聲功率級/聲壓級	Operation schedule of the fixed plant 機器運作時段 (e.g. 8:00 to 18:00?)	Machine in use / no longer in use? 機器使用中/不再使用?
風冷式VRV冷氣機	11	HITACHI RAS-280FS3Q	24,300 kcal/h	35	不使用 只作存倉備用	不使用 只作存倉備用

Photo of Fixed Plant on the Podium of Le Billionnaire

豪門平台機器相片



Source: https://goo.gl/maps/C5gdu9bNzs6QDNVcA

Appendix 4.4

Operation Hours of E.F.C.C. Grace Church

Appendix 4.4 Operation Hours of E.F.C.C. Grace Church



Appendix 4.5

VRV Catalogue

Free Match-Outdoor Units

Specification ▸

DC Inverter



16,000/18000 Btu/h



21,000/26,000 Btu/h

Model NO.			M2OD-16HFN1-Q	M2OD-18HFN1-Q	M3OD-21HFN1-Q	M3OD-26HFN1-Q
System Format			1 Drive 2	1 Drive 2	1 Drive 3	1 Drive 3
Performance						
Power Supply		V~,Hz,Ph	220-240,50,1	220-240,50,1	220-240,50,1	220-240,50,1
Air Flow Volume		m³/h	2100	2100	2700	2700
Sound Power Noise Level		dB(A)	65	65	64	68
Sound Pressure Noise Level		dB(A)	56	56	58	58
Dimension & Weight & Piping Size						
Net Dimension	W×D×H	mm	810×310×558	810×310×558	845×320×700	845×320×700
Packing Dimension	W×D×H	mm	930×400×615	930×400×615	965×395×755	965×395×755
Net / Gross Weight		kg	34.5/37.5	36.5/39.5	50 / 54	50/54
Liquid / Gas Side		Φmm	2×(6.35/9.52)	2×(6.35/9.52)	3×(6.35/9.52)	3×(6.35/9.52)
Max. Pipe Length	Each Indoor	m	15	15	15	15
Max. Heigh Difference	Each Indoor	m	10	10	10	10
Stuffing Quantity						
20'/40'/40'HQ		set	102/216/288	102/216/288	102/216/216	102/216/216

Specification ▸

DC Inverter



28,000 Btu/h



36,000/42,000 Btu/h

Model NO.			M4OD-28HFN1-Q	M4OA-36HFN1-Q	M5OC-36HFN1-Q	M5OD-42HFN1-Q
System Format			1 Drive 4	1 Drive 4	1 Drive 5	1 Drive 5
Performance						
Power Supply		V~,Hz,Ph	220-240,50,1	220-240,50,1	220-240,50,1	220-240,50,1
Air Flow Volume		m³/h	3800	5500	5500	5500
Sound Power Noise Level		dB(A)	70	67	68	72
Sound Pressure Noise Level		dB(A)	59	64	64	66
Dimension & Weight & Piping Size						
Net Dimension	W×D×H	mm	900×315×860	990×345×965	990×345×965	990×345×965
Packing Dimension	W×D×H	mm	1043×395×915	1120×435×1100	1120×435×1100	1120×435×1100
Net / Gross Weight		kg	65/69	78/88	80/91	83.5/93
Liquid / Gas Side		Φmm	4×(6.35/9.52)	4×(6.35/9.52)	5×(6.35/9.52)	5×(6.35/9.52)
Max. Pipe Length	Each Indoor	m	15	15	15	15
Max. Heigh Difference	Each Indoor	m	10	10	10	10
Stuffing Quantity						
20'/40'/40'HQ		set	60/128/128	52/108/108	52/108/108	52/108/108

Free Match-Indoor Units

Premier Split ▸

3D DC Inverter



Combination Performance		MS11PU-09HRFN1-QRD0W		
Combination		9+9	9+9+9	9+9+9+9
Cooling Capacity	Btu/h	18000	27600	36000
	kW	5.3	8.1	10.6
Heating Capacity	Btu/h	19500	28000	44000
	kW	5.7	8.2	12.9
SEER	W/W	7.0	7.0	5.8
Energy Rate	Cooling	A++	A++	A+
SCOP(Average)	W/W	4.1	3.9	3.9
Energy Rate	Heating	A+	A	A
Tbiv	C	-7	-7	-7
Tol	C	-15	-15	-15

Unit Performance		MS11PU-09HRFN1-QRD0W	MS11PU-12HRFN1-QRC8W
Performance			
Power Supply	V~, Hz, Ph	220-240, 50, 1	220-240, 50, 1
Rated Cooling Capacity	Btu/h	9000	12000
	kW	2.64	3.52
Rated Heating Capacity	Btu/h	10000	13000
	kW	2.93	3.81
Air Flow Volume	m3h(H/M/L)	620/480/370	620/520/420
Sound Pressure Noise Level	dB(A)(H/M/L)	40/33/30	39/34/29
Sound Power Noise Level	dB(A)(H)	51	51
Net Dimension	mm(WxDxH)	808x148x298	808x148x298
Packing Dimension	mm(WxDxH)	965x260x375	965x260x375
Net / Gross Weight	kg	10 / 13	10 / 13
Liquid Side	Φmm(inch)	6.35(1/4)	6.35(1/4)
Gas Side	Φmm(inch)	9.53(3/8)	9.53(3/8)
Applicable Area	m2	16-24	20-30

Oasis Split ▸

3D DC Inverter



Combination Performance		MS11MI-07HRFN1-QW				MS11MU-09HRFN1-QRD0GW(A)		
Combination		7+7	7+7+7	7+7+7+7	7+7+7+7+7	9+9	9+9+9	9+9+9+9
Cooling Capacity	Btu/h	16500	22800	30000	38000	19000	27000	36000
	kW	4.8	6.7	8.8	11.2	5.6	7.9	10.6
Heating Capacity	Btu/h	17000	25000	32000	40000	20000	27400	42000
	kW	5	7.3	9.4	11.7	5.9	8	12.3
SEER	W/W	7.0	6.7	6.8	5.8	7.2	7.2	5.8
Energy Rate	Cooling	A++	A++	A++	A+	A++	A++	A+
SCOP(Average)	W/W	4.2	4.2	4	3.8	4.2	4.5	3.8
Energy Rate	Heating	A+	A+	A+	A	A+	A+	A
Tbiv	C	-7	-7	-7	-7	-7	-7	-7
Tol	C	-15	-15	-15	-15	-15	-15	-15

Unit Performance		MS11MI-07HRFN1-QW	MS11MU-09HRFN1-QRD0GW(A)	MS11MU-12HRFN1-QRD0GW(B)	MS11MU-18HRFN1-QRD0GW(B)
Performance					
Power Supply	V~, Hz, Ph	220-240, 50, 1	220-240, 50, 1	220-240, 50, 1	220-240, 50, 1
Rated Cooling Capacity	Btu/h	7000	9500	12000	18000
	kW	2.05	2.78	3.52	5.28
Rated Heating Capacity	Btu/h	8000	10000	13000	19000
	kW	2.34	2.93	3.81	5.57
Air Flow Volume	m3h(H/M/L)	530/460/350	530/460/350	630/540/430	1000/780/650
Sound Pressure Noise Level	dB(A)(H/M/L)	40/37/28	40/37/28	42/38/31	47/40/34
Sound Power Noise Level	dB(A)(H)	52	52	54	56
Net Dimension	mm(WxDxH)	750x198x280	750x198x280	835x198x280	990x218x315
Packing Dimension	mm(WxDxH)	830x270x355	830x270x355	910x270x355	1065x300x400
Net / Gross Weight	kg	7 / 9	8 / 10	8.7 / 11.2	11.8 / 15
Liquid Side	Φmm(inch)	6.35(1/4)	6.35(1/4)	6.35(1/4)	6.35(1/4)
Gas Side	Φmm(inch)	9.53(3/8)	9.53(3/8)	9.53(3/8)	12.7(1/2)
Applicable Area	m2	11-17	16-24	20-30	28-40

For VRV V7, V15 - V23, V26, V28 - V29

OUTDOOR UNIT

YKD-series - Cooling-only

PUCY-P YSKD (-BS)



Specifications

Model			PUCY-P850YSKD (-BS)	PUCY-P900YSKD (-BS)
Power source			3-phase 4-wire 380-400-415 V 50/60 Hz	3-phase 4-wire 380-400-415 V 50/60 Hz
Cooling capacity (Nominal) *1		kW	92.0	96.0
		kcal/h	79,100	82,600
		BTU/h	313,900	327,600
	Power input	kW	26.97	29.00
	Current input	A	45.5-43.2-41.6	48.9-46.5-44.8
	EER	kW/kW	3.41	3.31
Temp. range of cooling	Indoor	W.B.	15.0~24.0 °C (59~75 °F)	15.0~24.0 °C (59~75 °F)
	Outdoor	D.B.	10.0~52.0 °C (50~126 °F)	10.0~52.0 °C (50~126 °F)
Indoor unit connectable	Total capacity		50~130% of outdoor unit capacity	50~130% of outdoor unit capacity
	Model/Quantity		P15~P500/1~50	P15~P500/1~50
Sound pressure level (measured in anechoic room)		dB <A>	66	66
Refrigerant piping diameter	Liquid pipe	mm (in.)	19.05 (3/4) Brazed	19.05 (3/4) Brazed
	Gas pipe	mm (in.)	41.28 (1-5/8) Brazed	41.28 (1-5/8) Brazed

Set Model

Model			PUCY-P400YKD (-BS)	PUCY-P450YKD (-BS)	PUCY-P450YKD (-BS)	PUCY-P450YKD (-BS)
Fan	Type x Quantity		Propeller fan x 1	Propeller fan x 1	Propeller fan x 1	Propeller fan x 1
	Air flow rate	m^3/min	210	210	210	210
		L/s	3,500	3,500	3,500	3,500
		cfm	7,415	7,415	7,415	7,415
	Control, Driving mechanism		Inverter-control, Direct-driven by motor		Inverter-control, Direct-driven by motor	
	Motor output	kW	0.92 x 1	0.92 x 1	0.92 x 1	0.92 x 1
*2	External static press.		0 Pa (0 mmH$_2$O)	0 Pa (0 mmH$_2$O)	0 Pa (0 mmH$_2$O)	0 Pa (0 mmH$_2$O)
Compressor	Type		Inverter scroll hermetic compressor		Inverter scroll hermetic compressor	
	Starting method		Inverter	Inverter	Inverter	Inverter
	Motor output	kW	10.8	12.4	12.4	12.4
	Case heater	kW	–	–	–	–
External finish			Pre-coated galvanized steel sheets (+powder coating for -BS type) <MUNSELL 3Y 7.8/1.1 or similar>		Pre-coated galvanized steel sheets (+powder coating for -BS type) <MUNSELL 3Y 7.8/1.1 or similar>	
External dimension H x W x D		mm	1,650 x 1,220 x 740	1,650 x 1,220 x 740	1,650 x 1,220 x 740	1,650 x 1,220 x 740
		in.	65 x 48-1/16 x 29-3/16	65 x 48-1/16 x 29-3/16	65 x 48-1/16 x 29-3/16	65 x 48-1/16 x 29-3/16
Protection devices	High pressure protection		High pressure sensor, High pressure switch at 4.15 MPa (601 psi)		High pressure sensor, High pressure switch at 4.15 MPa (601 psi)	
	Inverter circuit (COMP./FAN)		Over-heat protection, Over-current protection		Over-heat protection, Over-current protection	
Refrigerant	Type x original charge		R410A x 11.5 kg (26 lbs)	R410A x 11.5 kg (26 lbs)	R410A x 11.5 kg (26 lbs)	R410A x 11.5 kg (26 lbs)
Net weight		kg (lbs)	236 (521)	236 (521)	236 (521)	236 (521)
Heat exchanger			Salt-resistant cross fin & copper tube		Salt-resistant cross fin & copper tube	
Pipe between unit and distributor	Liquid pipe	mm (in.)	15.88 (5/8) Brazed	15.88 (5/8) Brazed	15.88 (5/8) Brazed	15.88 (5/8) Brazed
	Gas pipe	mm (in.)	28.58 (1-1/8) Brazed	28.58 (1-1/8) Brazed	28.58 (1-1/8) Brazed	28.58 (1-1/8) Brazed
Optional parts			Outdoor Twinning kit: CMY-Y200VBK2 Joint: CMY-Y102SS/LS-G2, CMY-Y202/302S-G2 Header: CMY-Y104/108/1010-G		Outdoor Twinning kit: CMY-Y200VBK2 Joint: CMY-Y102SS/LS-G2, CMY-Y202/302S-G2 Header: CMY-Y104/108/1010-G	

Notes:

*1 Nominal cooling conditions (subject to JIS B8615-2)

	Indoor	Outdoor	Pipe length	Level difference
Cooling	27 °CD.B./19 °CW.B. (81 °FD.B./66 °FW.B.)	35 °CD.B. (95 °FD.B.)	7.5 m (24-9/16 ft.)	0 m (0 ft.)

*2 External static pressure option is available (30Pa, 60Pa / 3.1mmH$_2$O, 6.1mmH$_2$O).

*Due to continuing improvement, above specifications may be subject to change without notice.

For VRV V8, V24 - V25, V27, V30 - V32

30RB

Nominal cooling capacity 16-40 kW



AQUASNAP.

Easy and fast installation

Hydronic module available

Economical operation

Superior reliability

The AquaSnap liquid chiller range was designed for commercial applications such as the air conditioning of offices and hotels, etc.

The new AquaSnap units integrate the latest technological innovations:

- Non-ozone depleting refrigerant R410A
- Scroll compressors
- Low-noise fans
- Auto-adaptive microprocessor control

The AquaSnap units are equipped with a hydronic module integrated into the unit chassis, limiting the installation to straightforward operations like connection of the power supply and the water supply and return piping.

Physical data

30RB				017	021	026	033	040
Cooling								
Full load performances*	C1	Nominal capacity	kW	16.4	21.4	27.3	33.3	41.4
	C1	EER	kW/kW	3.04	3.11	3.08	3.28	2.96
	C1	Eurovent Energy Class		B	A	B	A	B
	C2	Nominal capacity	kW	22.7	29.5	38.6	45.8	56.9
	C2	EER	kW/kW	3.80	3.86	4.01	4.11	3.52
Seasonal Efficiency*		ESEER	kW/kW	3.46	3.47	3.44	3.62	3.29
Sound Power Level Standard Unit			dB(A)	72	74	78	78	80
Operating weight†								
Standard unit (with hydronic module)			kg	189	208	255	280	291
Standard unit (without hydronic module)			kg	173	193	237	262	273
Refrigerant				R-410A				
Compressor				One hermetic scroll compressor				
Control				Pro-Dialog+				
Fans			%	Two twin-speed axial fans, 3 blades		One twin-speed axial fan, 7 blades		
Air flow				2212	2212	3530	3530	3530
Evaporator				Plate heat exchanger				
Condenser				Copper tubes and aluminium fins				
Unit with hydronic module Pump				One single-speed pump, screen filter, expansion tank, flow switch, pressure gauge, automatic air purge valve, safety valve				
Entering water connection			in	1-1/41	1-1/41	1-1/4	1-1/4	1-1/4
Leaving water connection			in	1	1	1-1/4	1-1/4	1-1/4
Nominal operating current			A	1.30	1,4	2,4	2,6	2,8
Dimensions								
Length			mm	1136	1136	1002	1002	1002
Depth			mm	584	584	824	824	824
Height			mm	1579	1579	1790	1790	1790

C1 Cooling mode conditions: Evaporator Water heat exchanger, entering/leaving temperature 12°C/7°C, fouling factor 0 m² K/W. Condenser Water heat exchanger, entering/leaving temperature 30°C/35°C, fouling factor 0 m² K/W.
C2 Cooling mode conditions: Evaporator Water heat exchanger, entering/leaving temperature 23°C/18°C, fouling factor 0 m² K/W. Condenser Water heat exchanger, entering/leaving temperature 30°C/35°C, fouling factor 0 m² K/W.
* In accordance with standard EN14511-3:2013
† Weight shown is a guideline only. The dimensions shown are for the standard unit.

Eurovent certified data

Electrical data

30RB			580	630	810	880	1150
Power circuit							
Nominal power supply ± 6%	V-ph-Hz	400-3-50 ± 10%					
Control circuit supply		24 V via internal transformer					
Maximum start-up current (Un)*	A	75	95	118	118	176
Maximum operating power input**	kW	7.8	9.1	11	13.8	17.5
Nominal unit operating current draw***	A	8	12	16	17	25

* Maximum instantaneous start-up current (locked rotor current of the compressor).
** Power input, compressors and fans, at the unit operating limits (saturated suction temperature 10°C, saturated condensing temperature 65°C) and nominal voltage of 400 V (data given on the unit nameplate).
*** Standardised Eurovent conditions: water heat exchanger entering/leaving water temperature 12°C/7°C, outside air temperature 35°C.

Type key

30R B - 021 C H E - B - - -

Product Range

B - Cooling only AquaSnap

Standard version

Nominal capacity

C - Power supply with neutral cable (not available for size 40)
D - Power supply without neutral cable

0 - Without hydronic module
H - With hydronic module with expansion tank
F - With hydronic module with expansion tank and water filling system
R - With hydronic module, without expansion tank
Z - With hydronic module, w/o exp. tank, with water filling system

- - Without coil protection
E - Epoxy coil-protection (Gold-fin)

Standard

- - Without gateway
B - CCN Jbus gateway
C - CCN Bacnet gateway
D - CCN LONtalk gateway

- - Standard
A - Remote User Interface HMI

New option (not used)

Revision status

Features and advantages

Quiet operation

- Compressors
  - Low-noise scroll or rotary compressors with low vibration levels
  - The compressor assembly is supported by anti-vibration mountings.
- Air heat exchanger section
  - Vertical air heat exchanger coils
  - The latest-generation low-noise fans are now even quieter and do not generate intrusive low-frequency noise
  - Rigid fan installation for reduced start-up noise.

Easy and fast installation

- Integrated hydronic module
  - High-pressure centrifugal water pump
  - Water filter protecting the water pump against circulating debris
  - High-capacity membrane expansion tank ensures pressurisation of the water circuit
  - Overpressure valve, set to 4 bar
  - Pressure gauge to measure the system pressure.
  - Automatic purge valve positioned at the highest point of the hydronic module to remove air from the system.
  - Thermal insulation and frost protection down to -10°C, using an electric resistance heater and pump cycling.
  - Integrated water fill system to ensure correct water pressure (option)
- Physical features
  - With its small footprint the unit blends in with any architectural styles.
  - The unit is enclosed by easily removable panels, covering all components (except air heat exchanger and fans).
- Simplified electrical connections
  - A single power supply point (power supply without neutral available as an option and in standard for units size 40kW)
  - Main disconnect switch with high trip capacity
  - Transformer for safe 24 V control circuit supply included
- Fast commissioning
  - Systematic factory operation test before shipment
  - Quick-test function for step-by-step verification of the instruments, electrical components and motors.

Economical operation

- Increased energy efficiency at part load
  - Eurovent energy efficiency class A and B (in accordance with EN14511-3:2013) in cooling and heating mode. The exceptionally high energy efficiency of the AquaSnap unit is the result of a long qualification and optimisation process.
- Reduced maintenance costs
  - Maintenance-free scroll compressors
  - Fast diagnosis of possible incidents and their history via the Pro-Dialog+ control
  - R410A refrigerant is easier to use than other refrigerant blends

Environmentally balanced

- Non-ozone depleting R410A refrigerant
  - Chlorine-free refrigerant of the HFC group with zero ozone depletion potential
  - Very efficient - gives an increased energy efficiency ratio (EER)
- Leak-tight refrigerant circuit
  - Brazed refrigerant connections for increased leak-tightness
  - Verification of pressure transducers and temperature sensors without transferring refrigerant charge

Superior reliability

- State-of-the-art concept
  - Cooperation with specialist laboratories and use of limit simulation tools (finite element calculations) for the design of the critical components, e.g. motor supports, suction/discharge piping etc.
- Auto-adaptive control
  - Control algorithm prevents excessive compressor cycling and permits reduction of the water quantity in the hydronic circuit (Carrier patent)
- Exceptional endurance tests
  - Corrosion resistance tests in salt mist in the laboratory
  - Accelerated ageing test on components that are submitted to continuous operation: compressor piping, fan supports
  - Transport simulation test in the laboratory on a vibrating table.

Controls

Pro-Dialog+ control

Pro-Dialog+ combines intelligence with operating simplicity. The control constantly monitors all machine parameters and precisely manages the operation of compressors, expansion devices, fans and of the water heat exchanger water pump for optimum energy efficiency.

Pro-Dialog+ interface



- Energy management
  - Seven-day internal time schedule clock: Permits unit on/off control and operation at a second set point
  - Set point reset based on the outside air temperature or the return water temperature or on the water heat exchanger delta T
  - Master/slave control of two units operating in parallel with operating time equalisation and automatic change-over in case of a unit fault.
  - Change-over based on the outside air temperature
- Integrated features
  - Night mode: Capacity and fan speed limitation for reduced noise level
- Ease-of-use
  - The new backlighted LCD interface includes a manual control potentiometer to ensure legibility under any lighting conditions.
  - The information is displayed clearly in English, French, German, Italian and Spanish (for other languages please consult Carrier)
  - The Pro-Dialog+ navigation uses intuitive tree-structure menus, similar to the Internet navigators. They are user-friendly and permit quick access to the principal operat-ing parameters: number of compressors operating, suction/discharge pressure, compressor operating hours, set point, air temperature, entering/leaving water temperature.

Remote operating mode with volt-free contacts (standard)

A simple two-wire communication bus between the RS485 port of the AquaSnap and the Carrier Comfort Network offers multiple remote control, monitoring and diagnostic possibilities. Carrier offers a vast choice of control products, specially designed to control, manage and supervise the operation of an air conditioning system. Please consult your Carrier representative for more information on these products.

- Start/stop: Opening of this contact will shut down the unit
- Dual set point: Closing of this contact activates a second set point (example: Unoccupied mode)
- Alert indication: This volt-free contact indicates the presence of a minor fault
- Alarm indication: This volt-free contact indicates the presence of a major fault that has led to the shut-down of the unit
- User safety: This contact can be used for any customer safety loop, closing of the contact generates a specific alarm
- Out of service: This signal indicates that the unit is completely out of service
- Unit capacity: This analogue output (0-10 V) gives an immediate indication of the unit capacity
- Compressor operation: This contact signals that the compressor is in operation

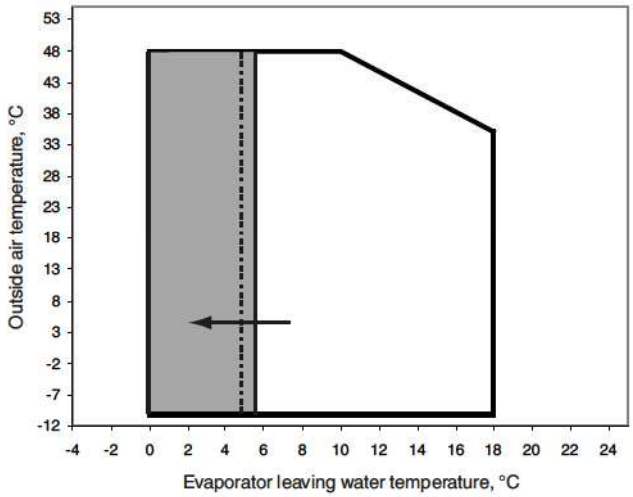
Operating limits

Water heat exchanger water flow rate

30RB	Flow rate, l/s Minimum	Maximum*	Maximum**
017	0.45	1.39	1.26
021	0.57	1.52	1.42
026	0.67	1.96	1.43
033	0.87	2.18	1.72
040	1.05	2.60	2.70

* Maximum flow rate at an available pressure of 50 kPa (unit with hydronic module)
** Maximum flow rate at pressure drop of 100 kPa in the plate heat exchanger (unit without hydronic module).

30RB (cooling mode)



Operating range with anti-freeze solution and Pro-Dialog configuration.

Hydronic module

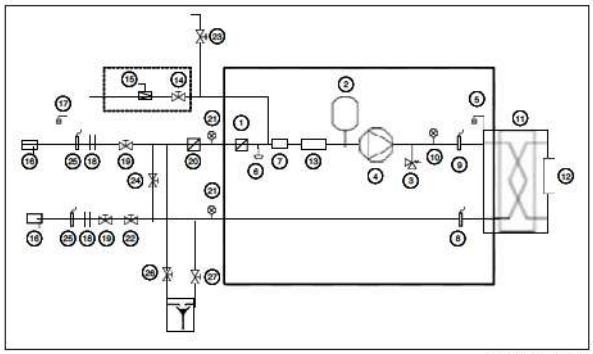
The hydronic module reduces the installation time. The unit is factory-equipped with the main hydronic components required for the installation: screen filter, water pump, expansion tank, safety valve and pressure gauge.

The water heat exchanger and the hydronic module are protected against frost down to -10°C, using an electric resistance heater (standard) and pump cycling.

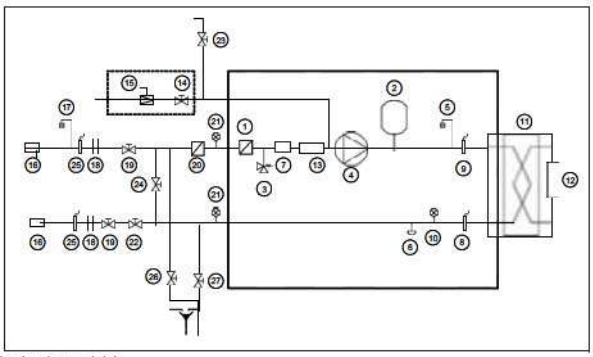
The hydronic module is integrated into the unit without increasing its dimensions and saves the space normally used for the water pump.

Typical hydronic circuit diagram

17-21 kW



26-40 kW



Hydronic module (unit with hydronic module)
Automatic water fill system option

Legend

Components of the unit and hydronic module

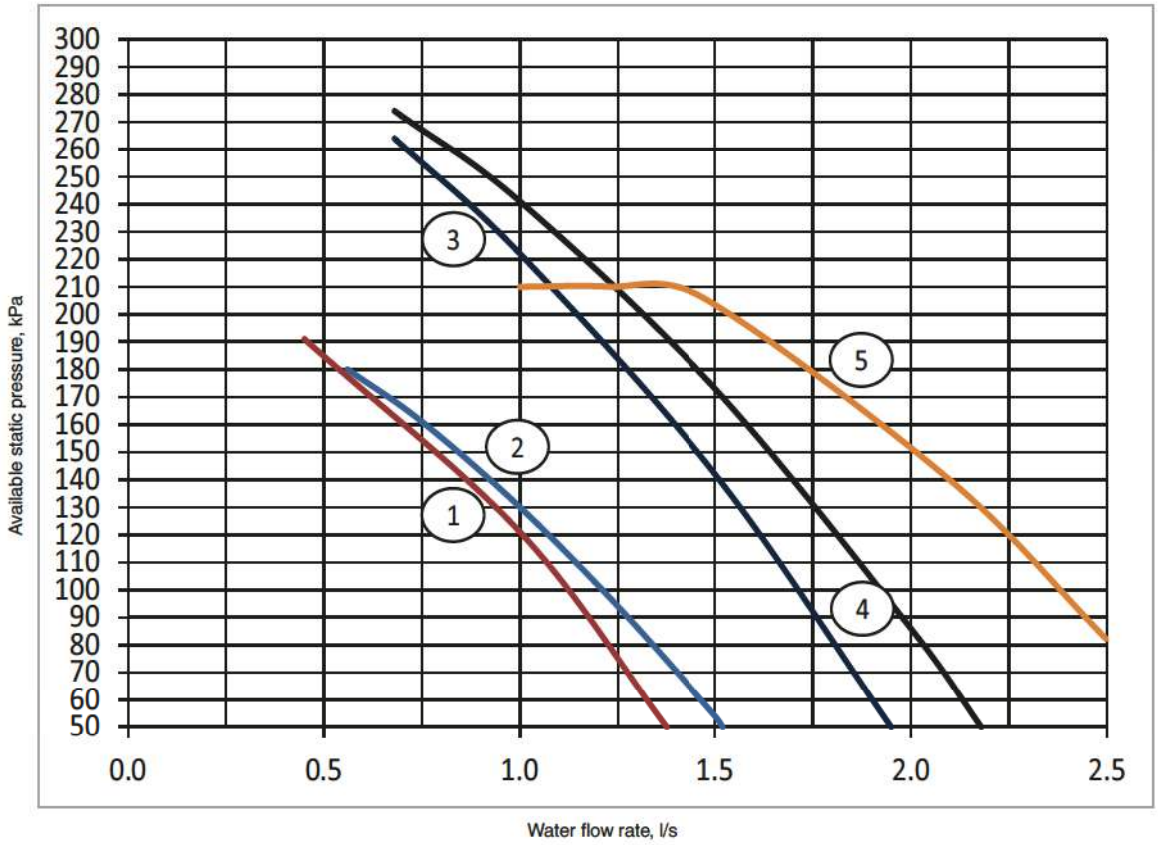
1. Screen filter
2. Expansion tank
3. Safety valve
4. High-pressure pump
5. Air purge
6. Water drain valve
7. Flow sensor
8. Plate heat exchanger leaving temperature sensor
9. Plate heat exchanger entering temperature sensor
10. Pressure gauge
11. Plate heat exchanger
12. Heat exchanger frost protection heater
13. Pipe frost protection heater
14. Shut-off valve (automatic water fill option)
15. Pressure reducer (automatic water fill option)

System components

16. Temperature sensor well
17. Air purge
18. Flexible connections
19. Shut-off valve
20. Screen filter (obligatory for a unit without hydronic module)
21. Pressure gauge
22. Flow control valve (factory-supplied for field installation)
23. Charge valve
24. Frost protection bypass (when shut-off valves are closed in winter)
25. Pressure sensor
26. System drain valves
27. Plate heat exchanger drain valve

Available static system pressure

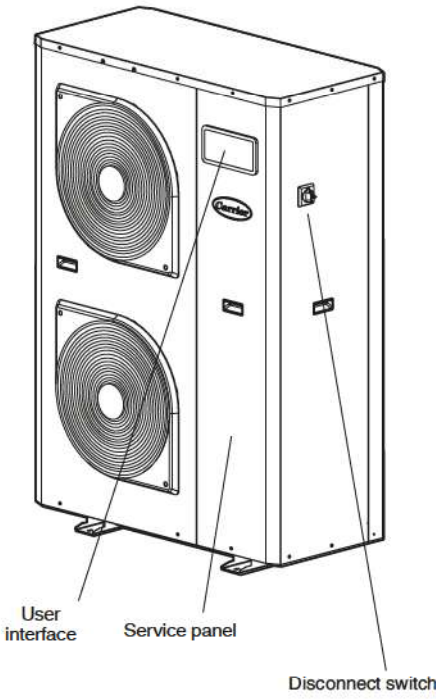
30RB 017-040

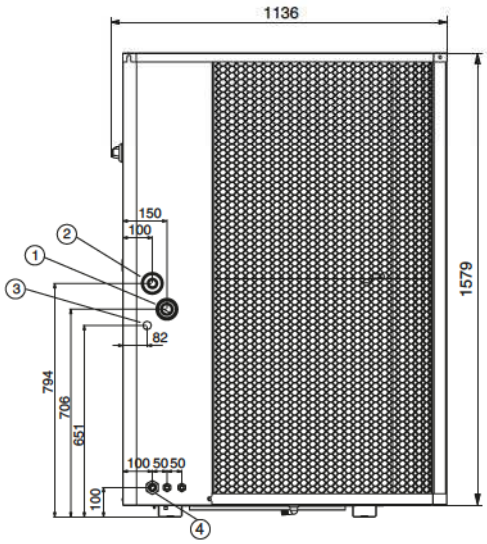


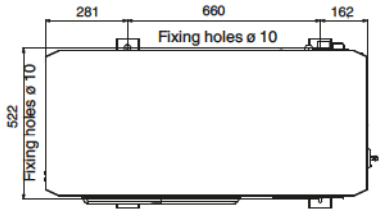
Legend
1. 30RB 017
2. 30RB 021
3. 30RB 026
4. 30RB 033
5. 30RB 040

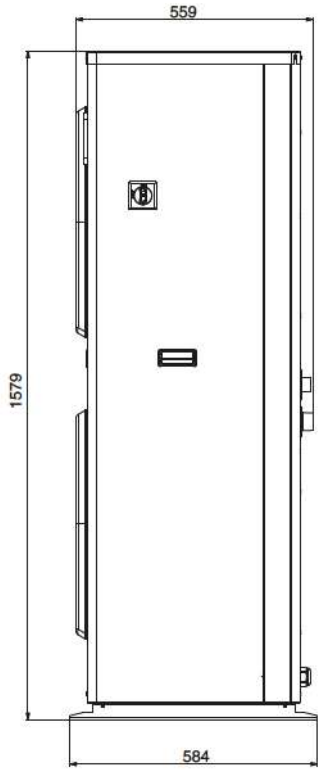
Dimensions/clearances

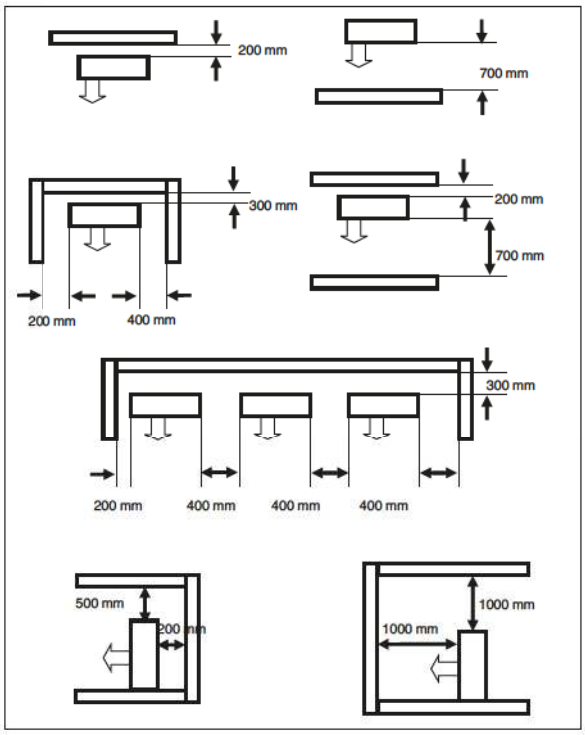
30RB 017-021







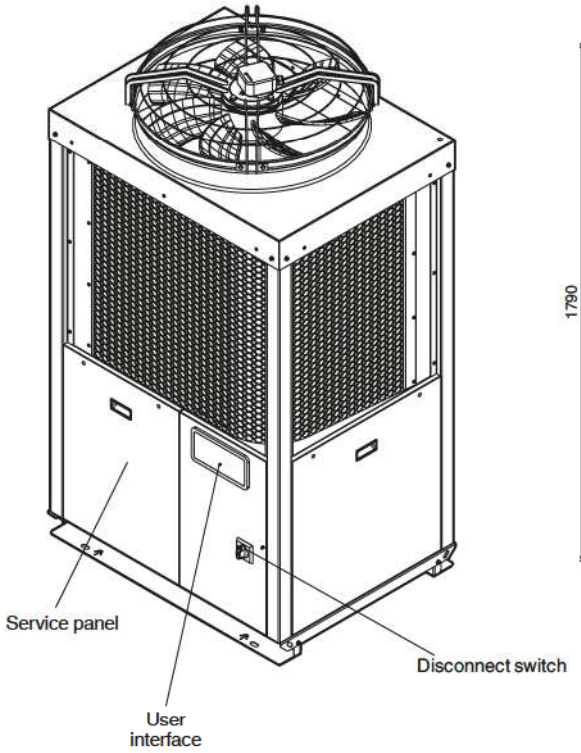


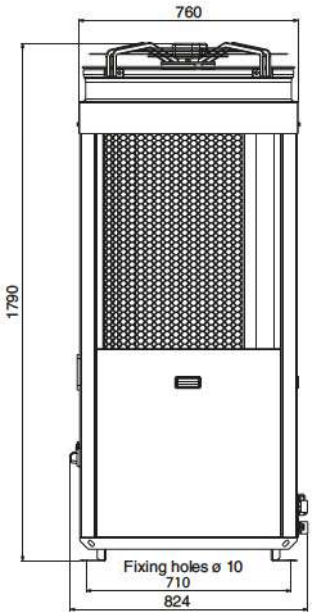


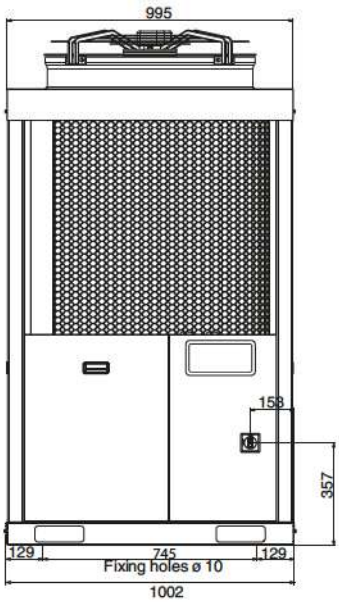
Legend
All dimensions are in mm
1. Water inlet
2. Water outlet
3. Water fill kit connection (option)
4. Power connections

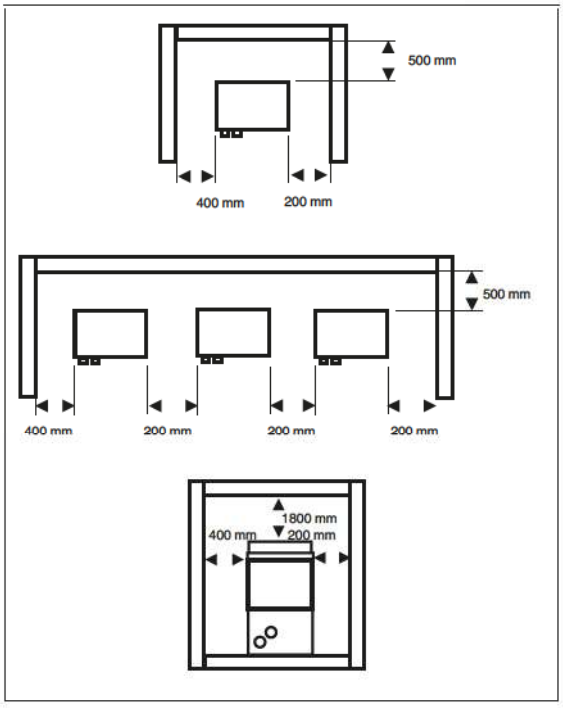
Dimensions/clearances

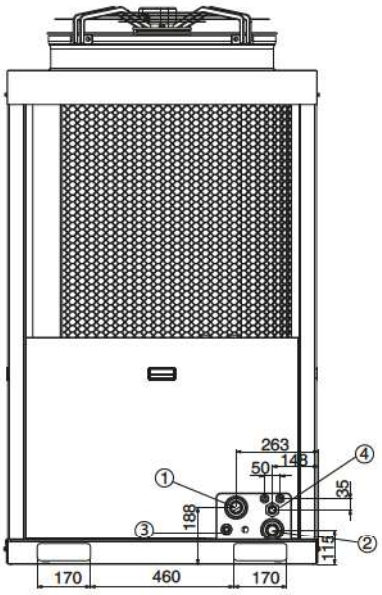
30RB 026-040











Legend
All dimensions are in mm
1. Water inlet
2. Water outlet
3. Water fill kit connection (option)
4. Power connections

Seasonal Classic

For VRV V9 - V12

Pair, Twin, Triple, double twin

Technology and comfort combined for commercial applications

- Top efficiency:
- Energy labels up to A++ (cooling) /A+ (heating) for RZQG71/100L9V1 + FCQG71/100F
- compressor that offers substantial efficiency improvements
- control logic that optimises efficiency at the most frequently encountered operating conditions and that optimises the auxiliary modes (when the unit is not active)
- heat exchangers that optimise the refrigerant flow at the most frequent operating conditions (temperature and load)
- via improved nominal performances
- Re-use of existing R-22 or R-407C technology



RZQSG100-125L3/9V1/L(8)Y1

- Guarantees operation in both heating and cooling mode down to -15°C
- With a gas cooled PCB reliable cooling is guaranteed as it is not influenced by ambient temperature
- Maximum piping length up to 50m, minimum piping length is 5m.
- Outdoor units for pair, twin, triple, double twin application
- Daikin outdoor units are neat, sturdy and can easily be mounted on a roof or terrace or simply placed against an outside wall
- Compatibility with D-BACS
- Units optimized for seasonal efficiency give an indication on how efficient an air conditioner operates over an entire heating or cooling season.

Twin, triple and double twin application

		FCQHG-F	FCQG-F				FFQ-C			FDXS-F(9)			FBQ-D				FHQ-C				FAQ-C	FNQ-A		
capacity class		71	35	50	60	71	35	50	60	35	50	60	35	50	60	71	35	50	60	71	71	35	50	60
RZQSG71L3V1			2				2			2			2				2					2		
RZQSG100L9V1	RZQSG100L8Y1		3	2			3	2		3	2		3	2			3	2				3	2	
RZQSG125L9V1	RZQSG125L8Y1		4	3	2		4	3	2	4	3	2	4	3	2		4	3	2			4	3	2
RZQSG140L9V1	RZQSG140LY1	2	4	3		2	4	3		4	3		4	3		2	4	3		2	2	4	3	

Outdoor unit				RZQSG	71L3V1	100L9V1	125L9V1	140L9V1	100L8Y1	125L8Y1	140LY1
Dimensions	Unit	HeightxWidthxDepth		mm	770x900x320	990x940x320		1,430x940x320	990x940x320		1,430x940x320
Weight	Unit			kg	67	72	74	95	82		101
Sound power level	Cooling			dBA	65	70		69		70	69
Sound pressure level	Cooling	Nom./Silent operation		dBA	49/47	53/-	54/-	53/-		54/-	53/-
	Heating	Nom.		dBA	51	57	58	54	57	58	54
	Night quiet mode	Level 1		dBA	-	49					
Operation range	Cooling	Ambient	Min.~Max.	°CDB	-15~46						
	Heating	Ambient	Min.~Max.	°CWB	-15~15.5						
Refrigerant	Type/Charge kg-TCO^{2}Eq/GWP				R-410A/2.75/5.7/2,087.5	R-410A/2.9/6.1/2,087.5		R-410A/4.0/8.4/2,087.5	R-410A/2.9/6.1/2,087.5		R-410A/4.0/8.4/2,087.5
Piping connections	Liquid	OD		mm	9.52						
	Gas	OD		mm	15.9						
	Piping length	OU - IU	Max.	m	50						
		System	Equivalent	m	70						
			Chargeless	m	30						
	Additional refrigerant charge			kg/m	See installation manual						
	Level difference	IU - OU	Max.	m	15	30.0					
		IU - IU	Max.	m	0.5						
Power supply	Phase / Frequency / Voltage			Hz / V	1~ / 50 / 220-240				3N~ / 50 / 380-415		
Current - 50Hz	Maximum fuse amps (MFA)			A	20	32			16		20

(1) MFA is used to select the circuit breaker and the ground fault circuit interrupter (earth leakage circuit breaker). For more detailed information on each combination, please refer to the electrical data drawing.

Seasonal Smart

For VRV V13

Pair, Twin, Triple, double twin

Industry leading technology for commercial applications and even for technical rooms

› Top efficiency:
› energy labels up to A++ in both cooling and heating
› compressor that offers substantial efficiency improvements
› control logic that optimises efficiency at the most frequently encountered operating conditions and that optimises the auxiliary modes (when the unit is not active)
› heat exchangers that optimise the refrigerant flow at the most frequent operating conditions (temperature and load)
› via improved nominal performances
› The perfect balance in efficiency and comfort thanks to Variable Refrigerant Temperature: top seasonal efficiency throughout most of the year and quick reaction speed on the hottest days.

Variable Refrigerant Temperature

› Suits high sensible, infrastructure cooling applications
› Re-use of existing R-22 or R-407C technology

› Extended operation range down to -20°C in heating and down to -15°C in cooling
› With a gas cooled PCB reliable cooling is guaranteed as it is not influenced by ambient temperature



RZQG140L9V1//(L(8)Y1

› Maximum piping length up to 75m, minimum piping length is 5m.
› Outdoor units for pair, twin, triple, double twin application
› Daikin outdoor units are neat, sturdy and can easily be mounted on a roof or terrace or simply placed against an outside wall
› Compatibility with D-BACS
› Units optimized for seasonal efficiency give an indication on how efficient an air conditioner operates over an entire heating or cooling season.

RELIABLE, CONTINUOUS OPERATION 24/7 365

Outdoor Unit

Twin, triple and double twin application

		FCQHG-F	FCQG-F				FFQ-C			FDXS-F (9)			FBQ-D				FHQ-C				FAQ-C	FUQ-C	FNQ-A		
capacity class		71	35	50	60	71	35	50	60	35	50	60	35	50	60	71	35	50	60	71	71	71	35	50	60
RZQG71L9V1	RZQG71L8Y1		2				2			2			2				2						2		
RZQG100L9V1	RZQG100L8Y1		3	2			3	2		3	2		3	2			3	2					3	2	
RZQG125L9V1	RZQG125L8Y1		4	3	2		4	3	2	4	3	2	4	3	2		4	3	2				4	3	2
RZQG140L9V1	RZQG140LY1	2	4	3		2	4	3		4	3		4	3		2	4	3		2	2	2	4	3	

Outdoor unit				RZQG	71L9V1	100L9V1	125L9V1	140L9V1	71L8Y1	100L8Y1	125L8Y1	140LY1
Dimensions	Unit	HeightxWidthxDepth		mm	990x940x320	1,430x940x320			990x940x320	1,430x940x320		
Weight	Unit			kg	69	95			80	101		
Sound power level	Cooling			dBA	64	66	67	69	64	66	67	69
Sound pressure level	Cooling	Nom.		dBA	48	50	51	52	48	50	51	52
	Heating	Nom.		dBA	50	52	53		50	52	53	
	Night quiet mode	Level 1		dBA	43	45			43	45		
Operation range	Cooling	Ambient	Min.~Max.	°CDB	-15~50							
	Heating	Ambient	Min.~Max.	°CWB	-20~15.5							
Refrigerant	Type/Charge kg-TCO^2Eq/GWP				R-410A/2.9/6.1/2,087.5	R-410A/4.0/8.4/2,087.5			R-410A/2.9/6.1/2,087.5	R-410A/4.0/8.4/2,087.5		
Piping connections	Liquid	OD		mm	9.52							
	Gas	OD		mm	15.9							
	Piping length	OU - IU	Max.	m	50	75			50	75		
		System	Equivalent	m	70	90			70	90		
			Chargeless	m	30							
	Additional refrigerant charge			kg/m	See installation manual							
	Level difference	IU - OU	Max.	m	30.0							
		IU - IU	Max.	m	0.5							
Power supply	Phase / Frequency / Voltage			Hz / V	1~ / 50 / 220-240				3N~ / 50 / 380-415			
Current - 50Hz	Maximum fuse amps (MFA)			A	20	32			20	32		

(1) MFA is used to select the circuit breaker and the ground fault circuit interrupter (earth leakage circuit breaker). For more detailed information on each combination, please refer to the electrical data drawing.

For VRV V14

Multi model application

- Outdoor units for multi model application.
- Outdoor units are fitted with a swing compressor, renowned for its low noise and high energy efficiency
- Up to 5 indoor units can be connected to 1 multi outdoor unit; all indoor units are individually controllable and do not need to be installed in the same room or at the same time; they operate simultaneously within the same cooling or heating mode
- Different types of indoor units can be connected: e.g. wall mounted, ceiling mounted cassette corner, concealed ceiling unit



3MXS52E/4MXS68E



5MXS90E



2MXS40-50H

CONNECTABLE INDOOR UNITS	Wall mounted																		Floor standing						Flexi type				Round flow cassette			Fully flat cassette				Concealed ceiling										Ceiling suspended			Concealed floor standing			
	FTXG-L				CTXS-K		FTXS-K						FTXS-G		FTX-J3			FTX-KV				FVXG-K			FVXS-F			FLXS-B(9)				FCQG-F			FFQ-C				FDXS-F(9)				FDBQ-B/ FBQ-D				FHQ-C			FNQ-A			
	20	25	35	50	15	35	20	25	35	42	50	60	71	20	25	35	20	25	35	25	35	50	25	35	50	25	35	50	60	35	50	60	25	35	50	60	25	35	50	60	25	35	50	60	35	50	60	25	35	50	60
2MXS40H	●	●	●		●	●	●	●	●					●	●	●	●	●	●	●	●	●	●	●		●	●										●	●														
2MXS50H	●	●	●	●	●	●	●	●	●	●	●			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●					●	●	●		●	●	●												
3MXS40K	●	●	●		●	●	●	●	●											●	●		●	●		●	●			●			●	●			●	●					●	●			●			●	●		
3MXS52E	●	●	●	●	●	●	●	●	●	●	●									●	●	●	●	●	●	●	●	●			●	●		●	●	●		●	●	●			●	●	●		●	●	●	●	●	●	
3MXS68G	●	●	●	●	●	●	●	●	●	●	●	●								●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
4MXS68F	●	●	●	●	●	●	●	●	●	●	●	●								●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
4MXS80E	●	●	●	●	●	●	●	●	●	●	●	●	●							●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
5MXS90E	●	●	●	●	●	●	●	●	●	●	●	●	●							●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Note : blue cells contain preliminary data

Outdoor unit					2MXS40H	2MXS50H	3MXS40K	3MXS52E	3MXS68G	4MXS68F	4MXS80E	5MXS90E
Dimensions	Unit	HeightxWidthxDepth		mm	550x765x285		735x936x300				770x900x320	
Weight	Unit			kg	38	42	49		58		72	73
Sound power level	Cooling			dBA	62	63	59		61		62	66
	Heating			dBA	-		60		-			
Sound pressure level	Cooling	Nom.		dBA	47	48	46		48			52
	Heating	Nom.		dBA	48	50	47		49			52
Operation range	Cooling	Ambient	Min.~Max.	°CDB	10~46		-10~46					
	Heating	Ambient	Min.~Max.	°CWB	-15~18							
Refrigerant	Type/Charge kg-TCO^2Eq/GWP				R-410A/1.20/ 2.5/2,087.5	R-410A/1.60/ 3.3/2,087.5	R-410A/2.0/ 4.2/2,087.5		R-410A/2.59/ 5.4/2,087.5	R-410A/2.6/ 5.4/2,087.5	R-410A/2.99/6.2/2,087.5	
Piping connections	Liquid	OD		mm	6.35x2		6.35x3			6.35x4		6.35x5
	Gas	OD		mm	9.52x1	12.7x1	9.52x3	9.52x2 12.7x1	9.52x1 12.7x2	9.52x2 12.7x2	9.52x1 12.7x1 15.9x2	9.52x2 12.7x1 15.9x2
	Piping length	OU - IU	Max.	m	20		25					
	Additional refrigerant charge			kg/m	0.02 (for piping length exceeding 20m)		0.02 (for piping length exceeding 30m)					
	Level difference	IU - OU	Max.	m	15							
		IU - IU	Max.	m	7.5							
Power supply	Phase / Frequency / Voltage			Hz / V	1~ / 50 / 220-240		1~ / 50 / 230					
Current - 50Hz	Maximum fuse amps (MFA)			A	16		20					

Appendix 4.6

Fixed Plant Noise Impact Assessment Results

Summary for Fixed Plant Noise Calculation: Daytime and Evening

NSR ID	Scenario	Predicted Fixed Plant Noise Level, dB(A)	Criteria, dB(A)	Compliance
T3_11_B1	Daytime and Evening	53	65	Y
T7_4_L		53	65	Y

Detail Fixed Plant Noise Calculation - T3_11_B1

Period	Daytime and evening
NSR ID	T3_11_B1
NSR Name	Tower 3
Coor - x	837500
Coor - y	821117
Criteria	65
Fixed Noise Level at Receiver, dB(A)	53
Compliance	Y

Source ID	Description	Source coor-x	Source coor-y	SWL, dB(A)	Distance between Source and NSR, m	Distance Attenuation, dB(A)	Noise Source in Operation (Y/N)	Direct Line-of-sight to Noise Source (Y: Yes; N: Screened by Building Structure)	Screening Correction, dB(A)	Tonality Correction, dB(A)	Façade Correction, dB(A)	Predicted Noise Level, $L_{eq(30mins)}$ dB(A)
V19	VRV	837465	821088	66	46	-41.2	Y	Y	0	3	3	31
V20	VRV	837467	821088	66	44	-40.9	Y	Y	0	3	3	31
V21	VRV	837465	821087	66	47	-41.4	Y	Y	0	3	3	31
V22	VRV	837467	821087	66	45	-41.1	Y	Y	0	3	3	31
V23	VRV	837466	821082	66	49	-41.8	Y	Y	0	3	3	30
V24	VRV	837467	821082	80	48	-41.6	Y	Y	0	3	3	44
V25	VRV	837467	821081	80	49	-41.7	Y	Y	0	3	3	44
V26	VRV	837475	821086	66	40	-40.0	Y	Y	0	3	3	32
V27	VRV	837476	821087	80	39	-39.7	Y	Y	0	3	3	46
V28	VRV	837476	821086	66	39	-39.9	Y	Y	0	3	3	32
V29	VRV	837475	821084	66	41	-40.3	Y	Y	0	3	3	32
V30	VRV	837475	821083	80	43	-40.6	Y	Y	0	3	3	45
V31	VRV	837476	821084	80	41	-40.2	Y	Y	0	3	3	46
V32	VRV	837476	821083	80	42	-40.4	Y	Y	0	3	3	46
											Total	**53**

Detail Fixed Plant Noise Calculation - T7_4_L

Period	Daytime and evening
NSR ID	T7_4_L
NSR Name	Tower 7
Coor - x	837652
Coor - y	821179
Criteria	65
Fixed Noise Level at Receiver, dB(A)	53
Compliance	Y

Source ID	Description	Source coor-x	Source coor-y	SWL, dB(A)	Distance between Source and NSR, m	Distance Attenuation, dB(A)	Noise Source in Operation (Y/N)	Direct Line-of-sight to Noise Source (Y: Yes; N: Screened by Building Structure)	Screening Correction, dB(A)	Tonality Correction, dB(A)	Façade Correction, dB(A)	Predicted Noise Level, $L_{eq(30mins)}$ dB(A)
V1	VRV	837676	821181	72	24	-35.5	Y	Y	0	3	3	43
V2	VRV	837676	821180	72	24	-35.4	Y	Y	0	3	3	43
V3	VRV	837676	821178	72	24	-35.4	Y	Y	0	3	3	43
V4	VRV	837680	821181	72	28	-36.9	Y	Y	0	3	3	41
V5	VRV	837680	821179	72	28	-36.9	Y	Y	0	3	3	41
V6	VRV	837680	821178	72	28	-36.9	Y	Y	0	3	3	41
V7	VRV	837683	821176	66	31	-37.7	Y	Y	0	3	3	34
V8	VRV	837686	821176	80	34	-38.7	Y	Y	0	3	3	47
V9	VRV	837682	821174	70	31	-37.8	Y	Y	0	3	3	38
V10	VRV	837686	821173	70	35	-38.8	Y	Y	0	3	3	37
V11	VRV	837686	821171	70	35	-38.9	Y	Y	0	3	3	37
V12	VRV	837687	821173	70	36	-39.1	Y	Y	0	3	3	37
V13	VRV	837687	821171	69	36	-39.1	Y	Y	0	3	3	36
V14	VRV	837677	821167	66	28	-36.8	Y	Y	0	3	3	35
V15	VRV	837682	821169	66	32	-38.1	Y	Y	0	3	3	34
V16	VRV	837682	821165	66	33	-38.5	Y	Y	0	3	3	34
V17	VRV	837686	821169	66	36	-39.0	Y	Y	0	3	3	33
V18	VRV	837686	821164	66	37	-39.3	Y	Y	0	3	3	33
											Total	**53**

Summary for Fixed Plant Noise Calculation: Night-time

NSR ID	Scenario	Predicted Fixed Plant Noise Level, dB(A)	Criteria, dB(A)	Compliance
T7_4_L	Night-time	53	55	Y

Detail Fixed Plant Noise Calculation - T7_4_L

Period	Nighttime
NSR ID	T7_4_L
NSR Name	Tower 7
Coor - x	837652
Coor - y	821179
Criteria	55
Fixed Noise Level at Receiver, dB(A)	53
Compliance	Y

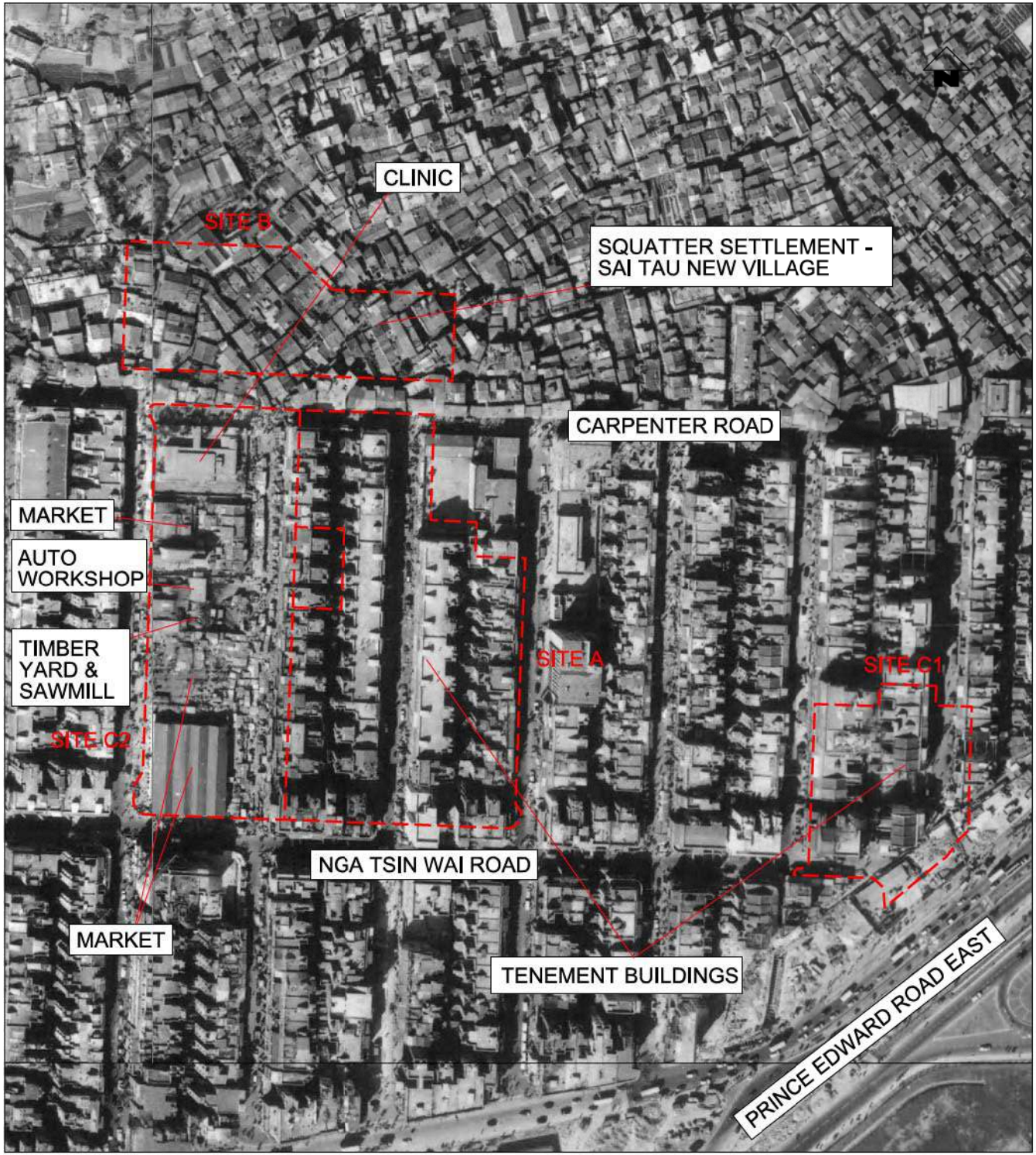
Source ID	Description	Source coor-x	Source coor-y	SWL, dB(A)	Distance between Source and NSR, m	Distance Attenuation, dB(A)	Noise Source in Operation (Y/N)	Direct Line-of-sight to Noise Source (Y: Yes; N: Screened by Building Structure)	Screening Correction, dB(A)	Tonality Correction, dB(A)	Façade Correction, dB(A)	Predicted Noise Level, $L_{eq(30mins)}$ dB(A)
V1	VRV	837676	821181	72	24	-35.5	Y	Y	0	3	3	43
V2	VRV	837676	821180	72	24	-35.4	Y	Y	0	3	3	43
V3	VRV	837676	821178	72	24	-35.4	Y	Y	0	3	3	43
V4	VRV	837680	821181	72	28	-36.9	Y	Y	0	3	3	41
V5	VRV	837680	821179	72	28	-36.9	Y	Y	0	3	3	41
V6	VRV	837680	821178	72	28	-36.9	Y	Y	0	3	3	41
V7	VRV	837683	821176	66	31	-37.7	Y	Y	0	3	3	34
V8	VRV	837686	821176	80	34	-38.7	Y	Y	0	3	3	47
V9	VRV	837682	821174	70	31	-37.8	Y	Y	0	3	3	38
V10	VRV	837686	821173	70	35	-38.8	Y	Y	0	3	3	37
V11	VRV	837686	821171	70	35	-38.9	Y	Y	0	3	3	37
V12	VRV	837687	821173	70	36	-39.1	Y	Y	0	3	3	37
V13	VRV	837687	821171	69	36	-39.1	Y	Y	0	3	3	36
V14	VRV	837677	821167	66	28	-36.8	Y	Y	0	3	3	35
V15	VRV	837682	821169	66	32	-38.1	Y	Y	0	3	3	34
V16	VRV	837682	821165	66	33	-38.5	Y	Y	0	3	3	34
V17	VRV	837686	821169	66	36	-39.0	Y	Y	0	3	3	33
V18	VRV	837686	821164	66	37	-39.3	Y	Y	0	3	3	33
											Total	**53**

Appendix 6.1

Historic Aerial Photos of Proposed Development Sites

URBAN RENEWAL AUTHORITY
NGA TSIN WAI ROAD/CARPENTER ROAD
DEVELOPMENT SCHEME (KC-017)
ENVIRONMENTAL ASSESSMENT

AERIAL PHOTO IN 1963



LEGEND

SCHEME BOUNDARY

METRES

1 : 2500 (A4)

MODEL: 1963



URBAN RENEWAL AUTHORITY
NGA TSIN WAI ROAD/CARPENTER ROAD
DEVELOPMENT SCHEME (KC-017)
ENVIRONMENTAL ASSESSMENT

AERIAL PHOTO IN 1973

LEGEND

SCHEME BOUNDARY

METRES

1 : 2500 (A4)

MODEL: 1973



URBAN RENEWAL AUTHORITY
NGA TSIN WAI ROAD/CARPENTER ROAD
DEVELOPMENT SCHEME (KC-017)
ENVIRONMENTAL ASSESSMENT

AERIAL PHOTO IN 1982

LEGEND

SCHEME BOUNDARY

METRES

1 : 2500 (A4)

URBAN RENEWAL AUTHORITY
NGA TSIN WAI ROAD/CARPENTER ROAD
DEVELOPMENT SCHEME (KC-017)
ENVIRONMENTAL ASSESSMENT

AERIAL PHOTO IN 1993



LEGEND

SCHEME BOUNDARY

METRES

1 : 2500 (A4)

URBAN RENEWAL AUTHORITY
NGA TSIN WAI ROAD/CARPENTER ROAD
DEVELOPMENT SCHEME (KC-017)
ENVIRONMENTAL ASSESSMENT

AERIAL PHOTO IN 2001



LEGEND

SCHEME BOUNDARY

MODEL: 2001



URBAN RENEWAL AUTHORITY
NGA TSIN WAI ROAD/CARPENTER ROAD
DEVELOPMENT SCHEME (KC-017)
ENVIRONMENTAL ASSESSMENT

AERIAL PHOTO IN 2004

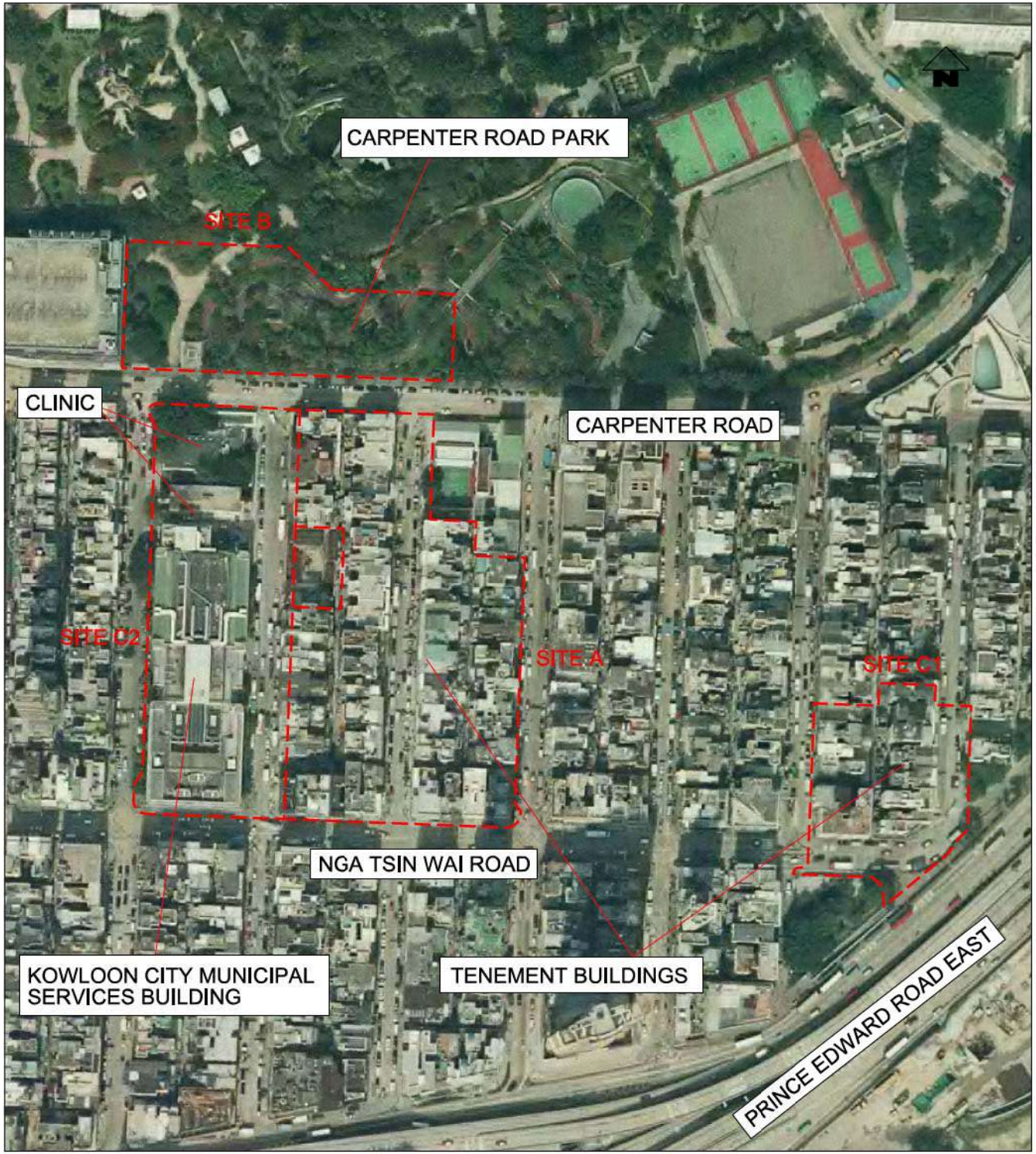
LEGEND

SCHEME BOUNDARY

METRES

1 : 2500 (A4)

MODEL: 2004



URBAN RENEWAL AUTHORITY
NGA TSIN WAI ROAD/CARPENTER ROAD DEVELOPMENT SCHEME (KC-017)
ENVIRONMENTAL ASSESSMENT

AERIAL PHOTO IN 2010

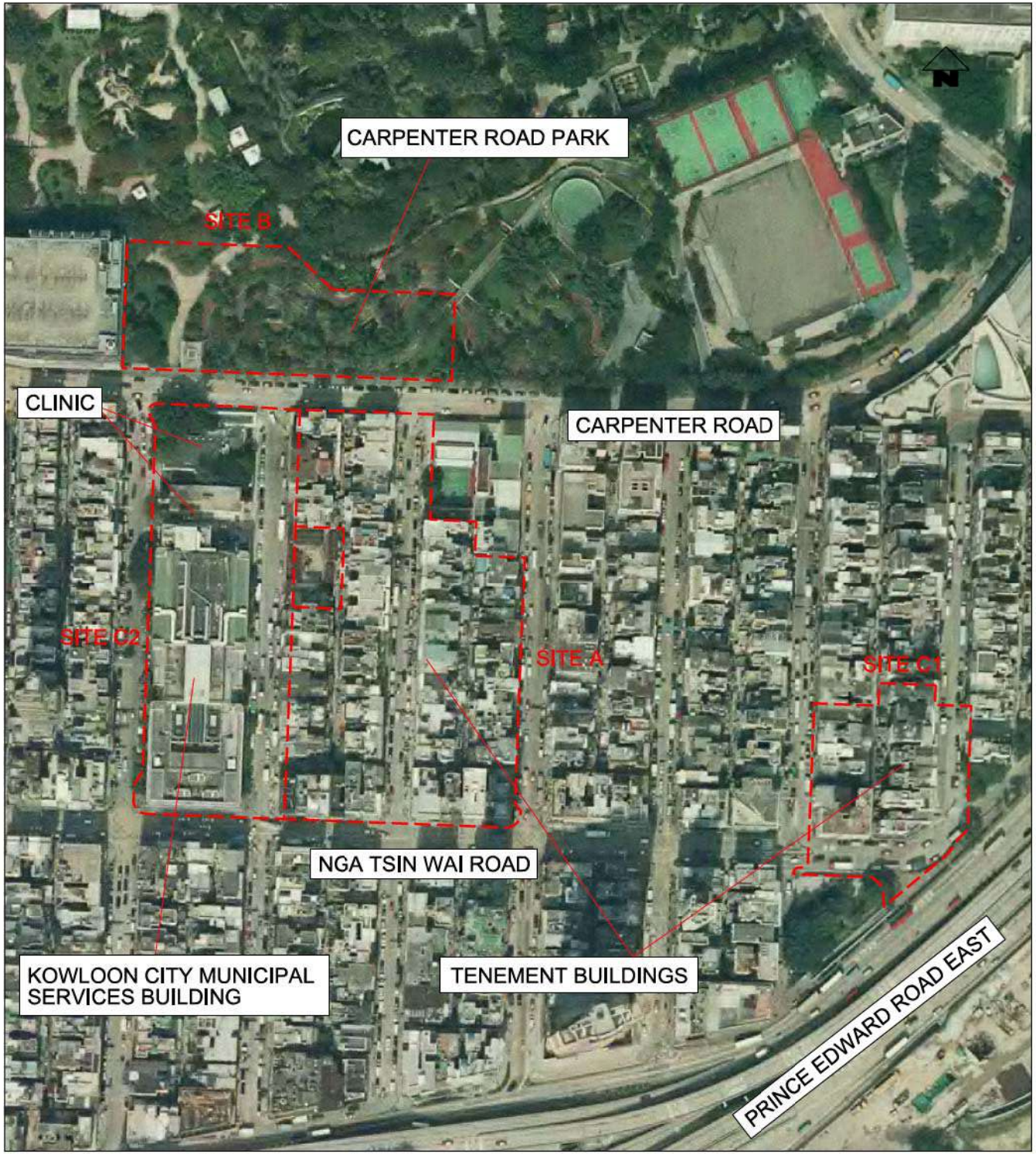
LEGEND

SCHEME BOUNDARY

METRES

1 : 2500 (A4)

MODEL: 2010



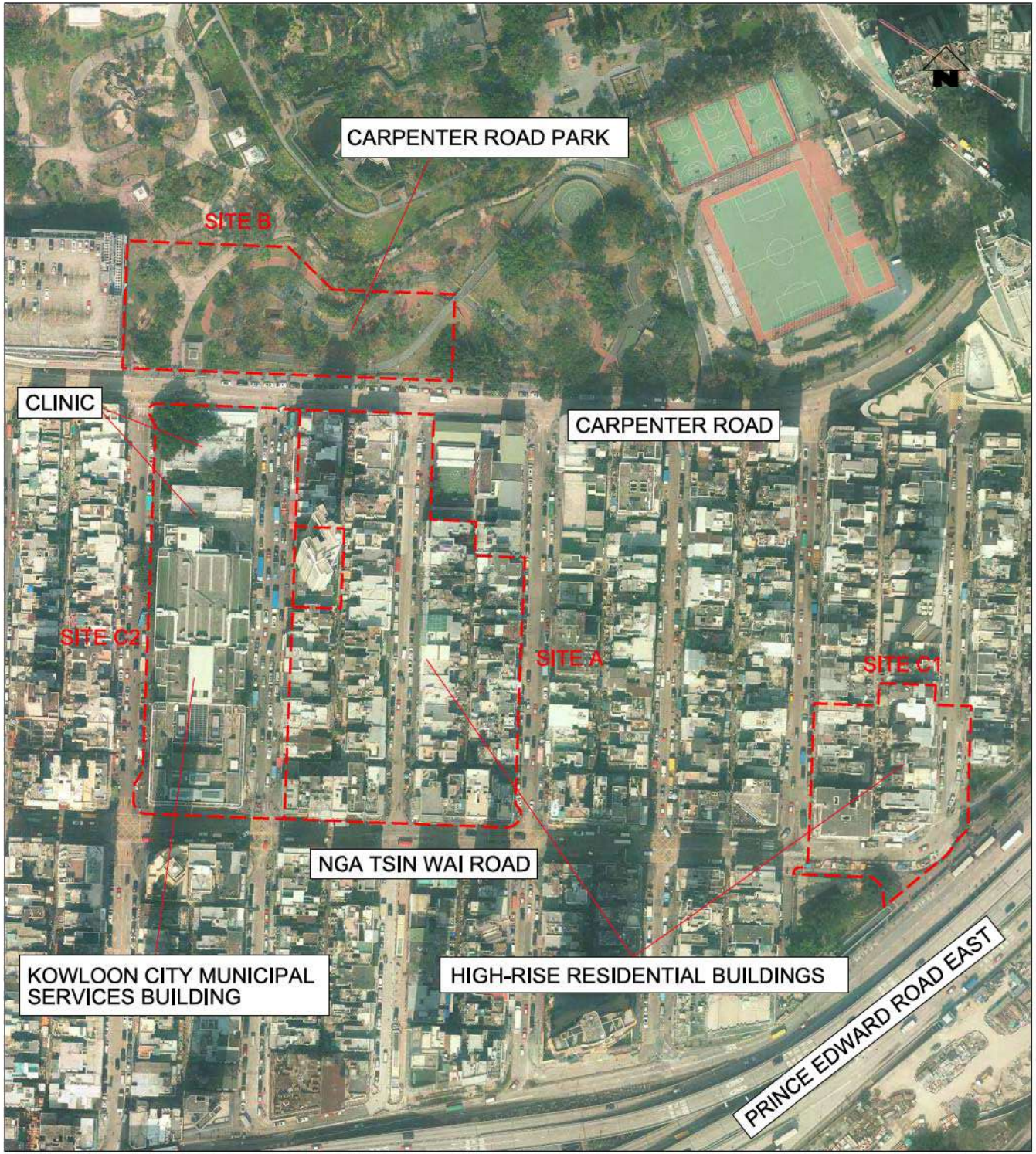
URBAN RENEWAL AUTHORITY
NGA TSIN WAI ROAD/CARPENTER ROAD
DEVELOPMENT SCHEME (KC-017)
ENVIRONMENTAL ASSESSMENT

AERIAL PHOTO IN 2015

LEGEND

SCHEME BOUNDARY

MODEL: 2015



URBAN RENEWAL AUTHORITY
NGA TSIN WAI ROAD/CARPENTER ROAD
DEVELOPMENT SCHEME (KC-017)
ENVIRONMENTAL ASSESSMENT

AERIAL PHOTO IN 2019

LEGEND

SCHEME BOUNDARY

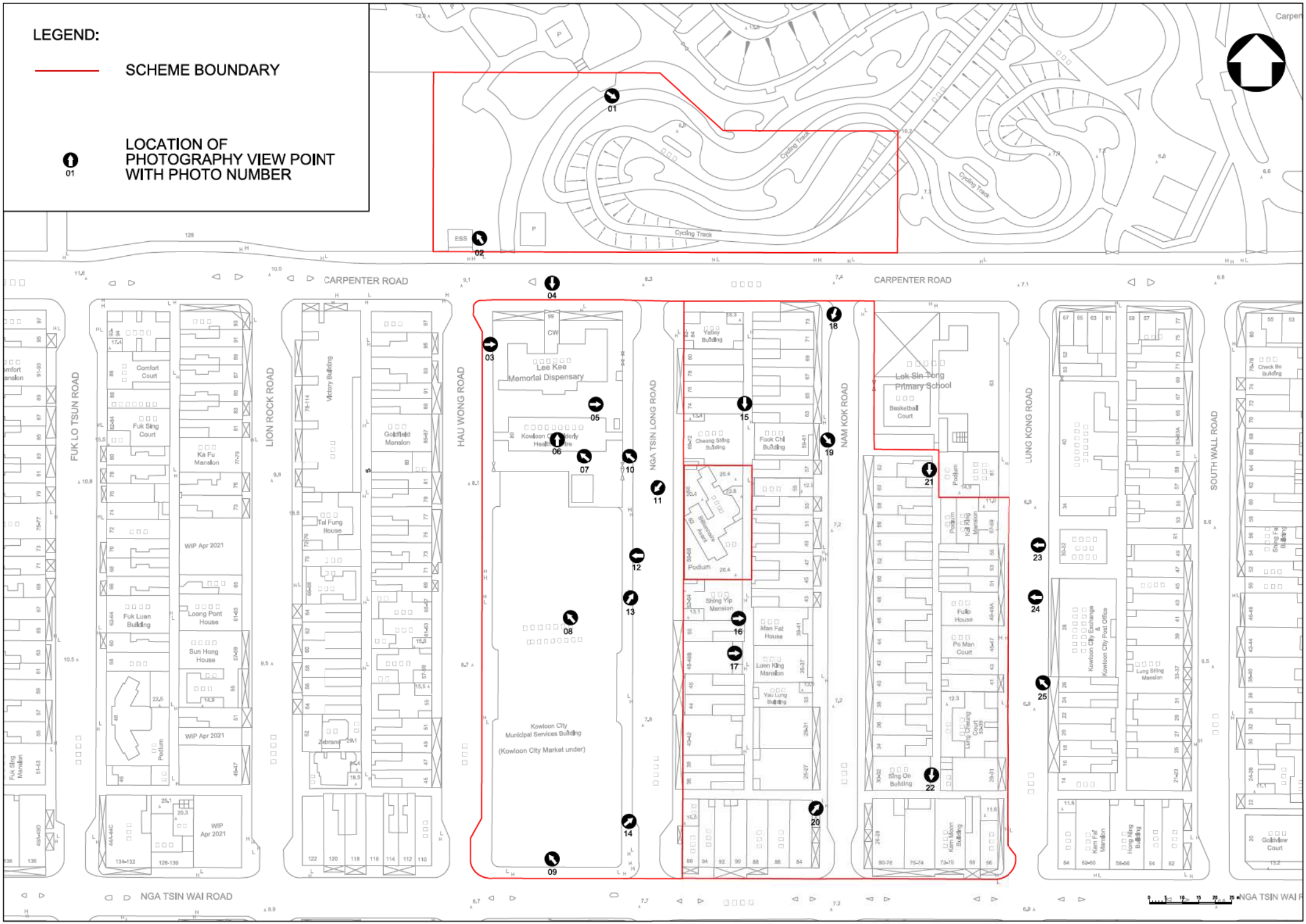
METRES

1 : 2500 (A4)

MODEL: 2019

Appendix 6.2

Photos of Existing Site Conditions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SCHEME BOUNDARY
LOCATION OF PHOTOGRAPHY VIEW POINT WITH PHOTO NUMBER
01
CARPENTER ROAD
FUK LO TSUN ROAD
LION ROCK ROAD
HAU WONG ROAD
NGA TSIN LONG ROAD
NAM KOK ROAD
LUNG KONG ROAD
SOUTH WALL ROAD
NGA TSIN WAI ROAD
Cycling Track
Lee Kee Memorial Dispensary
Kowloon City Municipal Services Building
(Kowloon City Market under)
Lok Sin Tong Primary School
Basketball Court
Comfort Court
Fuk Sing Court
Ka Fu Mansion
Fuk Luen Building
Loong Pont House
Sun Hong House
Victory Building
Goldfield Mansion
Tai Fung House
Zebrano
Yatley Building
Cheong Shing Building
Fook Chi Building
Shing Yip Mansion
Man Fat House
Luen King Mansion
Yau Lung Building
Fullo House
Po Man Court
Sing On Building
Kam Moon Building
Kowloon City Exchange & Kowloon City Post Office
Lung Shing Mansion
Kam Fai Mansion
Hong Ning Building
Check Bo Building
Goldview Court
Podium
WIP Apr 2021
ESS
P

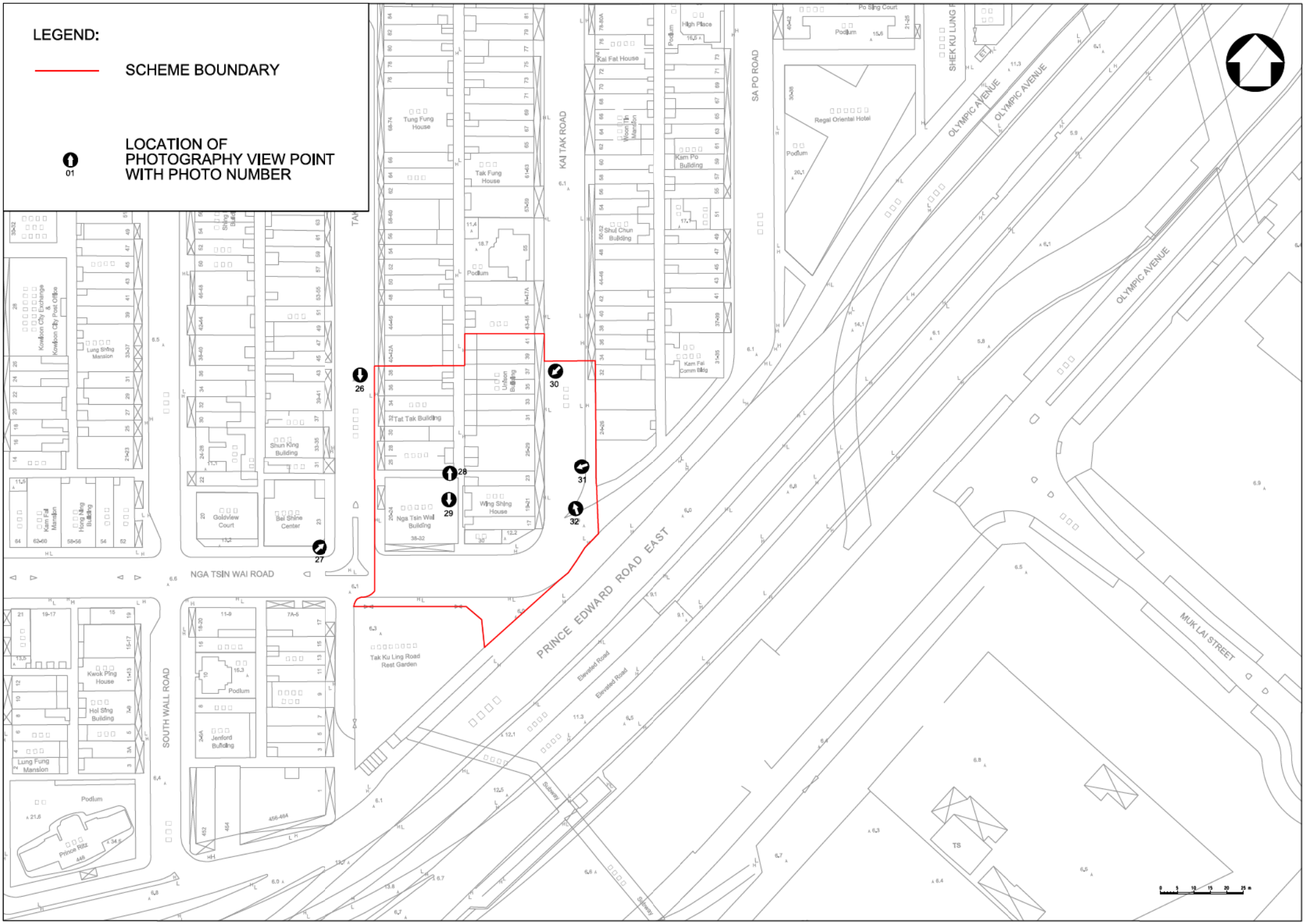
LEGEND:
SCHEME BOUNDARY
LOCATION OF PHOTOGRAPHY VIEW POINT WITH PHOTO NUMBER
01
26
27
28
29
30
31
32
NGA TSIN WAI ROAD
KAI TAK ROAD
SA PO ROAD
PRINCE EDWARD ROAD EAST
SOUTH WALL ROAD
OLYMPIC AVENUE
MUK LAI STREET
Tung Fung House
Tak Fung House
Kai Fat House
Shui Chun Building
Kam Po Building
Kam Fai Comm Bldg
Regal Oriental Hotel
Po Sing Court
High Place
Tat Tak Building
Nga Tsin Wai Building
Wing Shing House
Shun King Building
Goldview Court
Bel Shine Center
Kowloon City Exchange & Kowloon City Post Office
Lung Shing Mansion
Kam Fai Mansion
Hong Ning Building
Kwok Ping House
Hoi Sing Building
Lung Fung Mansion
Jenford Building
Tak Ku Ling Road Rest Garden
Elevated Road
Subway
TS
Podium



Photo A1: Overview of Site A	Date: 6 Jan 2022



Photo A2: Overview of Site B	Date: 6 Jan 2022



Photo A3: Overview of Site C1	Date: 6 Jan 2022



Photo A4: Overview of Site C2	Date: 6 Jan 2022

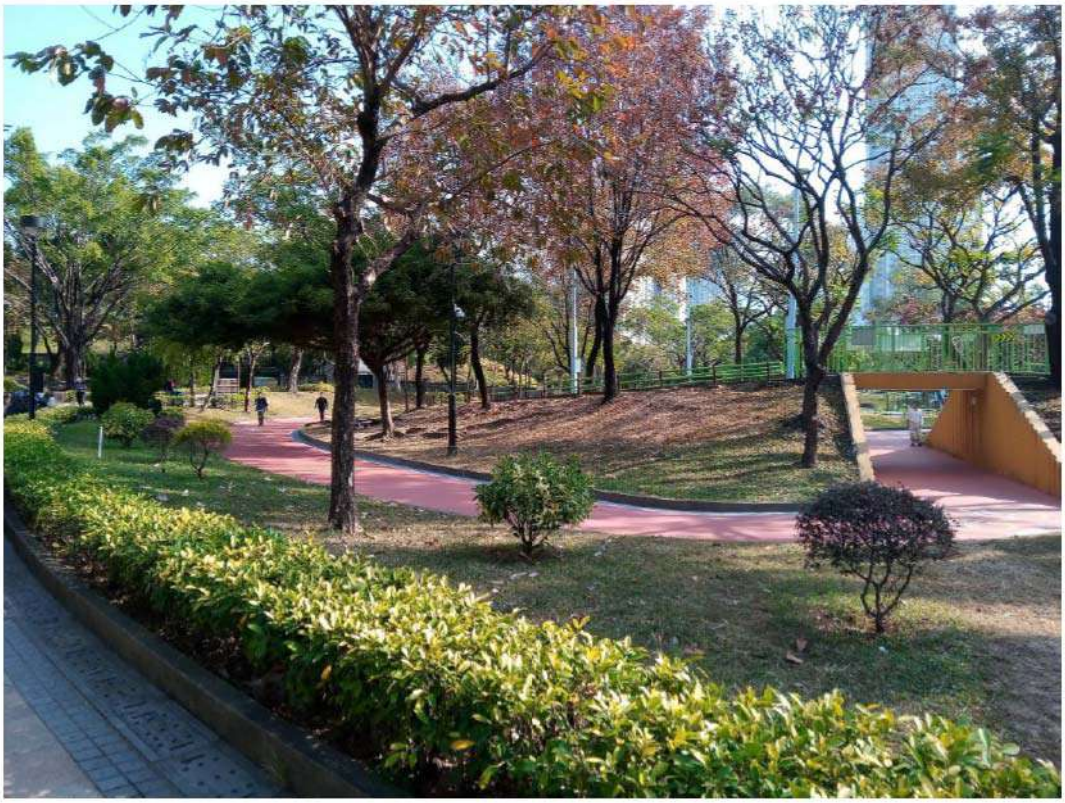

Photo 01: Carpenter Road Park at Site B	Date: 6 Jan 2022



Photo 02: Electricity Sub-station at Site B	Date: 6 Jan 2022



Photo 03: Lee Kee Memorial Dispensary	Date: 6 Jan 2022



Photo 04: Entrance of Lee Kee Memorial Dispensary	Date: 6 Jan 2022



Photo 05: Dangerous Good Store in Kowloon City Elderly Health Centre	Date: 6 Jan 2022



Photo 06: Clinical Waste Store in Kowloon City Elderly Health Centre	Date: 6 Jan 2022



Photo 07: Entrance of Kowloon City Elderly Health Centre	Date: 6 Jan 2022



Photo 08: Wet Market in Kowloon City Municipal Services Building	Date: 6 Jan 2022



Photo 09: Transformer Room in Kowloon City Municipal Services Building	Date: 6 Jan 2022



Photo 10: Kowloon City Elderly Health Centre	Date: 6 Jan 2022

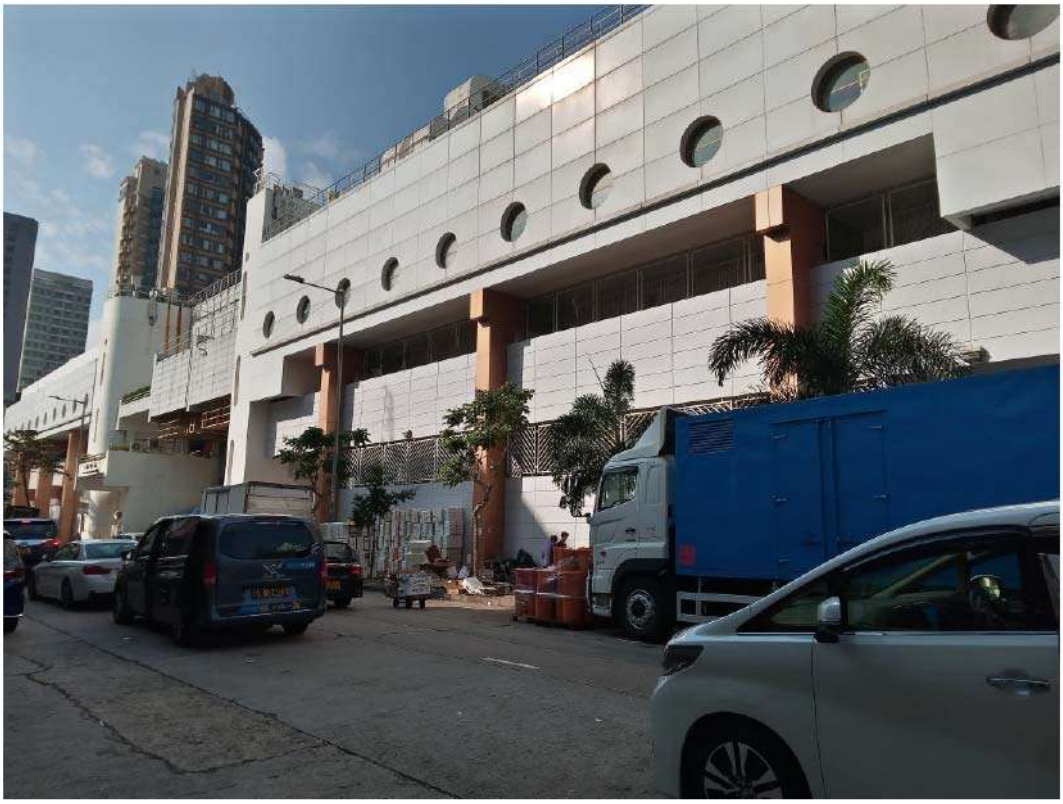

Photo 11: Kowloon City Municipal Services Building	Date: 6 Jan 2022



Photo 12: Entrance of Wet Market in Kowloon City Municipal Services Building	Date: 6 Jan 2022



Photo 13: Shops in Nga Tsin Long Road	Date: 6 Jan 2022



Photo 14: Shops in Nga Tsin Long Road	Date: 6 Jan 2022



Photo 15: Back alley between Nga Tsin Long Road and Nam Kok Road	Date: 6 Jan 2022



Photo 16: Emergency generator at Man Fat House, 39-41 Nam Kok Road	Date: 6 Jan 2022



Photo 17: Emergency generator at Luen King Mansion, 35-37 Nam Kok Road	Date: 6 Jan 2022

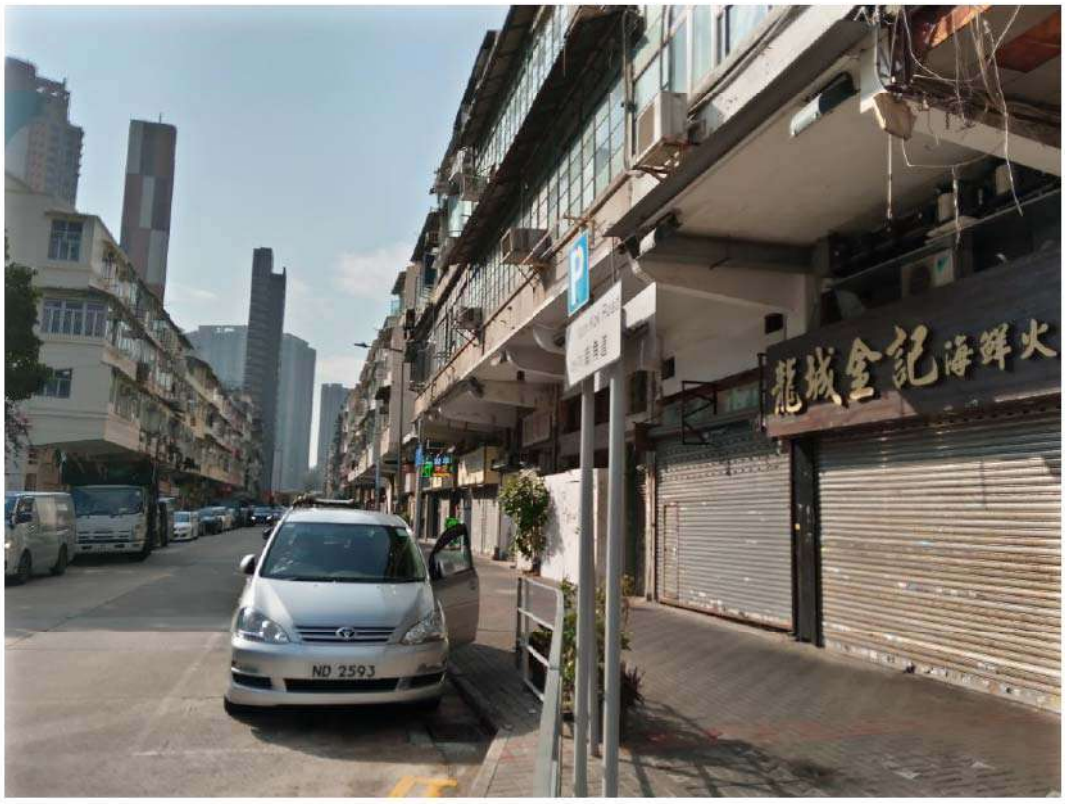

Photo 18: Shops in Nam Kok Road	Date: 6 Jan 2022



Photo 19: Shops in Nam Kok Road	Date: 6 Jan 2022

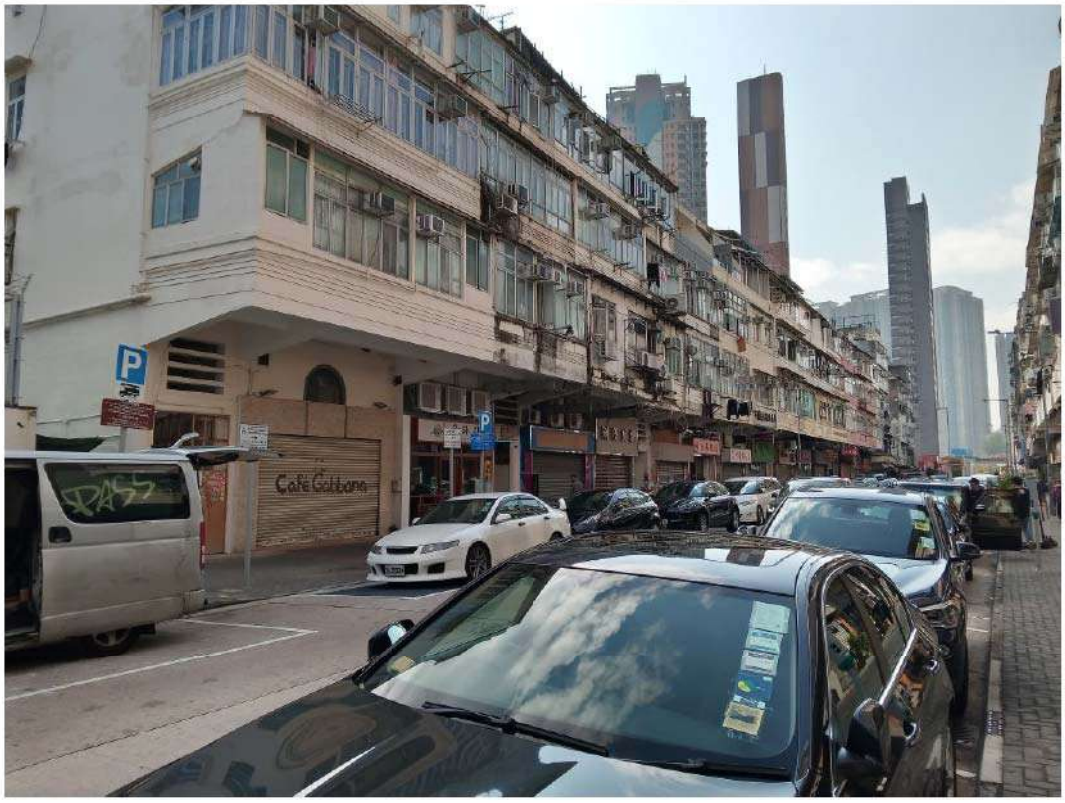

Photo 20: Shops in Nam Kok Road	Date: 6 Jan 2022



Photo 21: Back alley between Nam Kok Road and Lung Kong Road	Date: 6 Jan 2022



Photo 22: Electricity Sub0Station at Kam Moon Building, 70-72 Nga Tsin Wai Road	Date: 6 Jan 2022



Photo 23: Car maintenance/service workshop at 49A Lung Kong Road	Date: 6 Jan 2022



Photo 24: Car maintenance/service workshop at 55 Lung Kong Road	Date: 6 Jan 2022



Photo 25: Shops in Lung Kong Road	Date: 6 Jan 2022

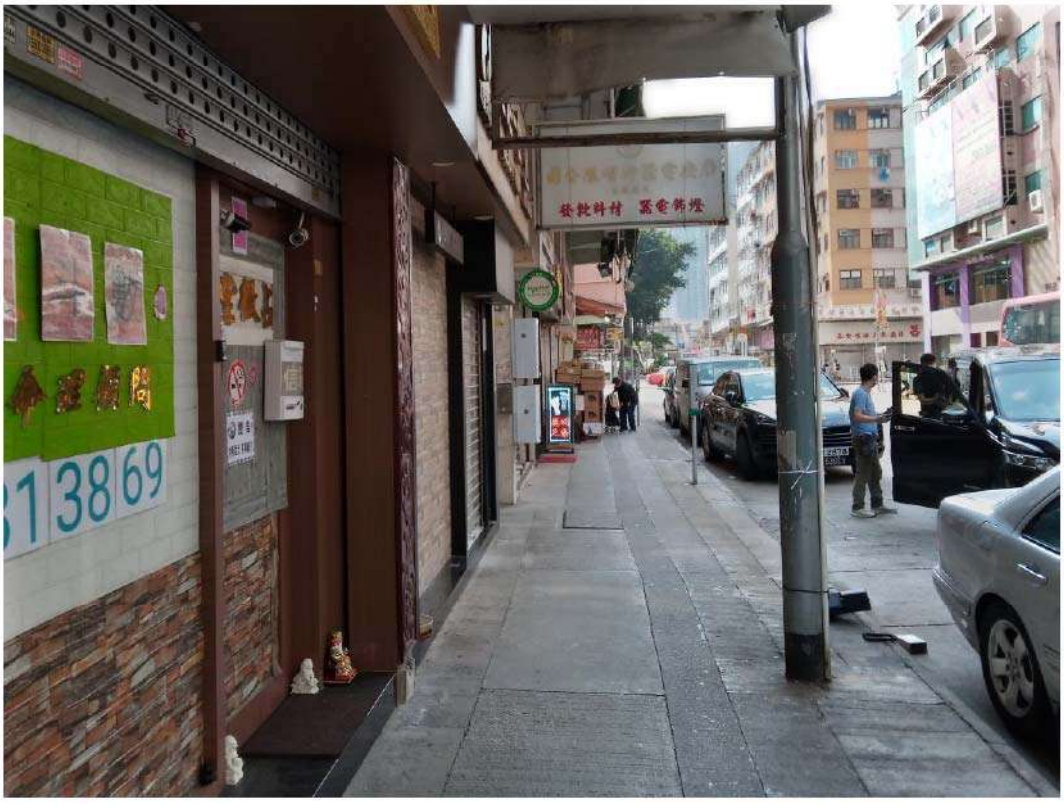

Photo 26: Shops in Tak Ku Ling Road	Date: 6 Jan 2022



Photo 27: Tak Ku Ling Road	Date: 6 Jan 2022

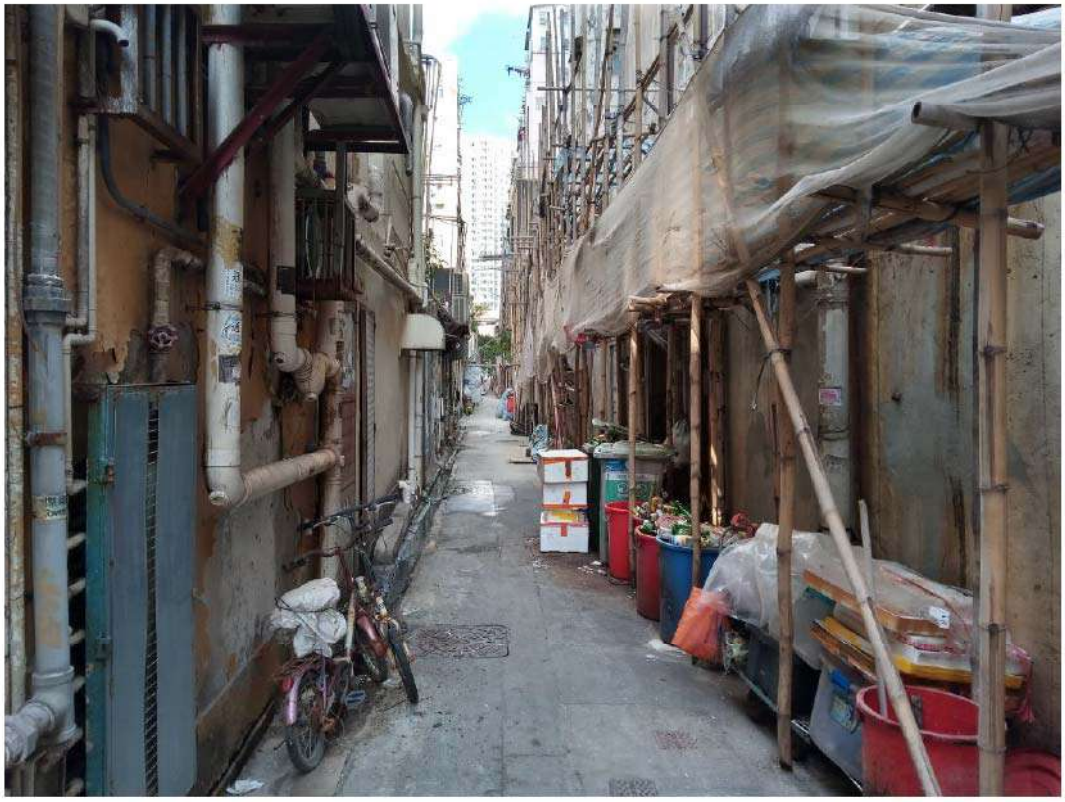

Photo 28: Back alley between Nam Kok Road and Lung Kong Road	Date: 6 Jan 2022

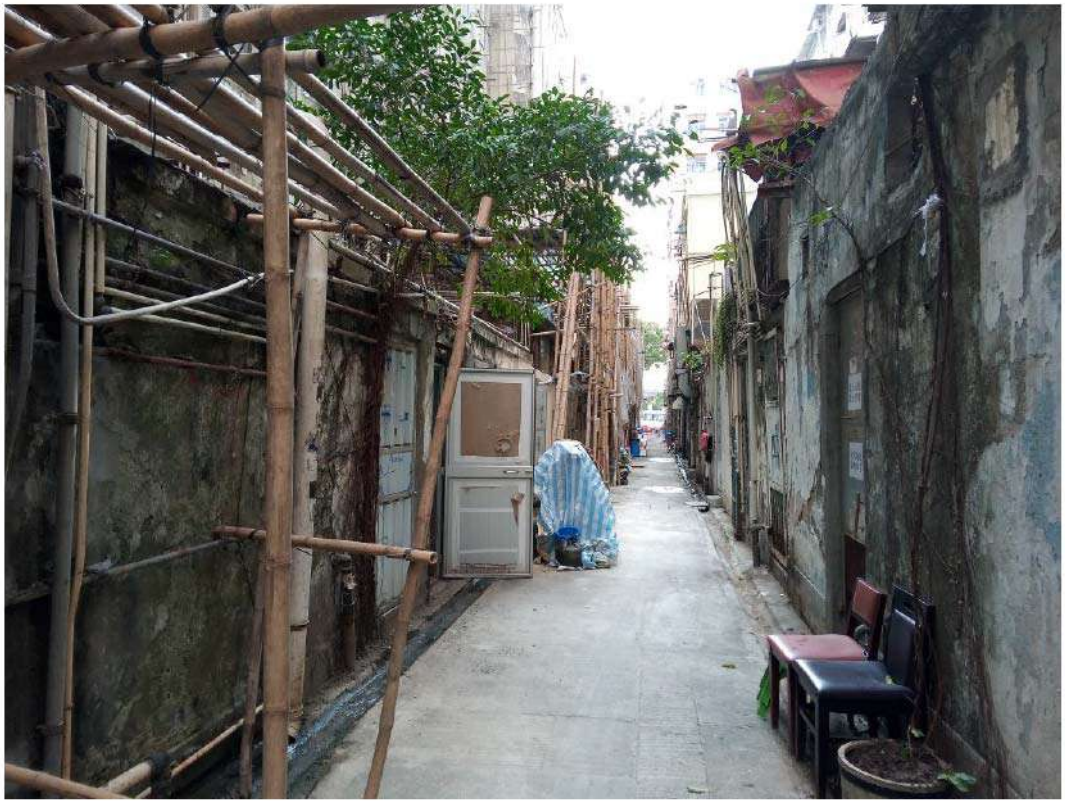

Photo 29: Back alley between Nam Kok Road and Lung Kong Road	Date: 6 Jan 2022



Photo 30: Car maintenance/service workshop at 37 Kai Tak Road	Date: 6 Jan 2022

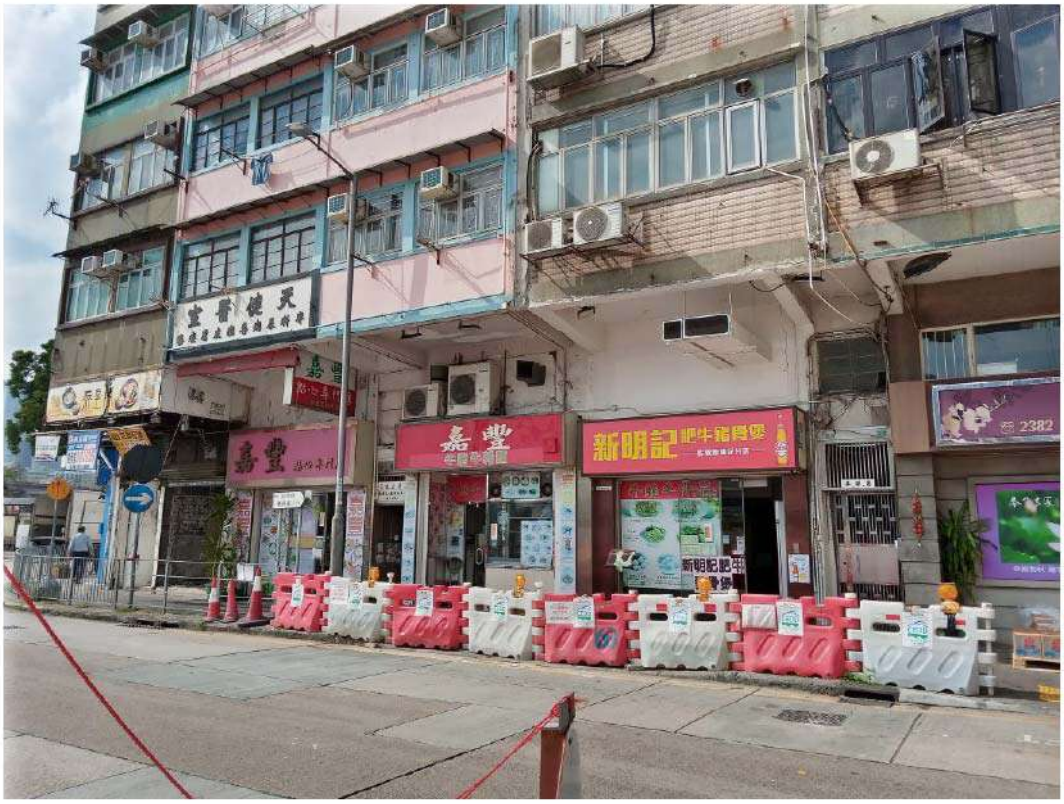

Photo 31: Shops in Kai Tak Road	Date: 6 Jan 2022



Photo 32: Shops in Kai Tak Road	Date: 6 Jan 2022

Appendix 6.3

Correspondences with EPD

Chow, Ray

From: tevyctkwok@epd.gov.hk
Sent: Thursday, December 23, 2021 3:56 PM
To: Chow, Ray
Cc: jimmychan@epd.gov.hk
Subject: [Not Virus Scanned] Fw: Urban Renewal Authority Term Environmental Consultancy Services in Kowloon City: Request for Information - Chemical spillage/incident record
Attachments: Letter of Service Order_URA.pdf

Dear Mr. CHOW,

I refer to your email below 21 Dec 2021 regarding the subject issue.

Please be informed that the EPD has nil record of chemical spillage / leakage incidents at the areas listed in your email below. You may wish to check with other relevant parties or departments for the record as appropriate.

While we have made a reasonable effort to ensure the completeness and accuracy of the information provided, you should comprehend that the information is provided as is and the EPD is not responsible or liable for any claim, loss or damage resulting from the use of this information.

If you have any queries, please feel free to contact our Senior Environmental Protection Inspector, Mr. CHAN, on 2117 7579.

Tevy KWOK
E(RE)53, EPD
Tel: 2117 7537

----- Forwarded by TS CHOW/EPD/HKSARG on 22/12/2021 09:29 -----

From: "Chow, Ray" <Ray.Chow@atkinsglobal.com>
To: "tschow@epd.gov.hk" <tschow@epd.gov.hk>
Cc: "Tsang, Irene" <Irene.Tsang@atkinsglobal.com>, "Wu, Funny" <Funny.Wu@atkinsglobal.com>, "Li, Yee Ting" <YTLi@ura.org.hk>, "Kwan, Mable" <MMPKwan@ura.org.hk>
Date: 21/12/2021 14:24
Subject: Urban Renewal Authority Term Environmental Consultancy Services in Kowloon City: Request for Information - Chemical spillage/incident record

---

Dear Ms. Chow,

We are the Consultant undertaking the above consultancy Agreement for Urban Renewal Authority. Please find attached a copy of the self-explanatory URA's letter ref.: URA211012841 dated 19 October 2021 for your information.

To enable us to conduct the Environmental Review for the Developments and Infrastructure Works in Kowloon City appropriately, we would be grateful if you would furnish us with the detail records (locations,

chemical, estimate volume, etc) of reported chemical spillage/leakage incident (if any) within the project area.

The location plan of the project area under the captioned Assignment is enclosed for your reference. Detail address is provided in the following table:

Lee Kee Memorial Dispensary, 99 Carpenter Road
Kowloon City Elderly Health Centre, 80 Hau Wong Road
Kowloon City Municipal Services Building, 100 Nga Tsin Wai Road
84-96 Nga Tsin Wai Road
66-80 Nga Tsin Wai Road
32-38 Nga Tsin Wai Road
30 Ngo Tsin Wai Road
36-54 Nga Tsin Long Road
68-84 Nga Tsin Long Road
25-73 Nam Kok Road
26-62 Nam Kok Road
29-59 Lung Kong Road
20-38 Tai Ku Ling Road
17-41 Kai Tak Road

Consents from the government buildings were also attached.
The password for the attachment will be provided in a separate email.

Due to the tight project programme, your reply by **31 December 2021** will be highly appreciated. Nil return is also required.

Should you have any queries regarding the above, please contact me at **2972 1461** or Mr Irene Tsang at **2972 1343** for further liaison.

Regards,

Ray CHOW
Senior Environmental Consultant
Hong Kong
Asia Pacific
Engineering, Design and Project Management

+852 2972 1461 +852 6992 3374

13/F Wharf T&T Centre, Harbour City, Tsim Sha Tsui, Kowloon, Hong Kong

Company

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市區重建局
URBAN RENEWAL AUTHORITY

Our Ref.: URA211012841

By Email and By Post
(Email: Jacky.Yeung@atkinsglobal.com)

19 October 2021

Atkins China Limited
13/F., Wharf T&T Centre,
Habour City, Tsim Sha Tsui,
Kowloon, Hong Kong

Attn: Mr. Jacky Yeung

Dear Mr. Yeung,

Term Environmental Consultancy Services
Service Order No. 004
Environmental Assessment for a Development Scheme in Kowloon City

Pursuant to the Clause 2.2.3 of the conditions of the captioned term environmental consultancy contract, we issue herewith a Service Order No. 004 for your retention. You are hereby instructed to commence your consultancy work in accordance with the attached scope of services accordingly.

Your attention is drawn to that payment of the fee shall only be made upon completion of actual work done and by stages as in accordance with the payment schedule under the Fee Enquiry Form as attached.

Please return the duly signed confidentiality undertaking (**Appendix A**) to us by **22 October 2021**.

Should you have any queries, please do not hesitate to contact the undersigned at 2588 2897. Thank you for your kind attention.

Yours faithfully,
For and on behalf of
URBAN RENEWAL AUTHORITY

Adam

Adam Chung
Manager, Planning and Design

Encl.

10 years+ 關心機構 caringorganisation

Appendix 1 - Broad Location of Project Area



Consent by Hospital Authority
on
Lee Kee Memorial Dispensary at 99 Carpenter Road

Chow, Ray

From: Joey YAN <joey.yan@ha.org.hk>
Sent: Wednesday, December 8, 2021 12:54 PM
To: Wu, Funny
Cc: Chow, Ray; Tsang, Irene; Li, Yee Ting; Kwan, Mable; David CHAK; Charlene LAU; HA King-hang; Tony TSUI; Joanne WONG
Subject: [Not Virus Scanned] RE: Urban Renewal Authority Term Environmental Consultancy Services: Request for Information – Chemical Spillage Record/Building Plan
Attachments: Letter of Service Order_URA.pdf

Dear Funny (ATKINS, consultant to URA),

Consent is given for URA/its consultant to access the following information from various government departments on Lee Kee Memorial Dispensary at 99 Carpenter Road:

1) Building Plan (e.g. diesel storage/backup generator/chemical waste storage) from Architectural Services Department (ArchSD);
2) Chemical spillage record/Chemical Waste Producer Register from Environmental Protection Department (EPD); and
3) Chemical spillage record/ Dangerous Goods Store record from Fire Services Department (FSD).

Thank you.

Warmest regards,
Joey YAN
Manager (Primary Health Care)
Hospital Authority Head Office
Tel: 2300 6658

From: Wu, Funny <Funny.Wu@atkinsglobal.com>
Sent: Monday, December 6, 2021 3:03 PM
To: Joey YAN, HOS&P M(PHC)2 <joey.yan@ha.org.hk>
Cc: Chow, Ray <Ray.Chow@atkinsglobal.com>; Tsang, Irene <Irene.Tsang@atkinsglobal.com>; Li, Yee Ting <YTLi@ura.org.hk>; Kwan, Mable <MMPKwan@ura.org.hk>
Subject: Urban Renewal Authority Term Environmental Consultancy Services: Request for Information – Chemical Spillage Record/Building Plan

----
EXTERNAL EMAIL: This email originated from outside of HA. Do not click any links, open any attachments, or reply unless you trust the sender and

know the content is safe. Use the "Report Phishing Email" function to report suspicious emails.

Dear Ms. Joey Yan,

Urban Renewal Authority Term Environmental Consultancy Services - Service Order No. 004 Environmental Assessment For A Development Scheme In Kowloon City
Request for Information – Chemical Spillage Record/Building Plan

We are the Environmental Consultant commissioned by Urban Renewal Authority to undertake the captioned consultancy services. A copy of the appointment letter and a location plan showing the indicative location of the site are enclosed with this email for your information. In order to accomplish the land contamination assessment, a desktop environmental study is required. We are writing to request your consent to access the following information from various government department on your building named Lee Kee Memorial Dispensary at 99 Carpenter Road:

1) Building Plan (e.g. diesel storage/backup generator/chemical waste storage) from Architectural Services Department (ArchSD);
2) Chemical spillage record/Chemical Waste Producer Register from Environmental Protection Department (EPD); and
3) Chemical spillage record/ Dangerous Goods Store record from Fire Services Department (FSD).

We shall be grateful if you would advise your consent on or before **9 December 2021**. Should you have any queries, please feel free to contact our Irene Tsang at **2972 1343** or Mr Ray Chow at **2972 1461**.

Please note that the password for the attached document shall be provided in a separate email.

Best regards,
Funny Wu
Associate Technical Director
Hong Kong Asia Pacific
Engineering, Design and Project Management
+852 2972 1167
Funny.Wu@atkinsglobal.com
ATKINS, a member of the SNC-Lavalin Group
14/F Wharf T&T Centre, Harbour City, Tsim Sha Tsui, Kowloon, Hong Kong

www.atkinsglobal.com | www.snclavalin.com

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All views or opinions expressed in this Email and its attachments are those of the sender and do not necessarily reflect the views and opinions of the Hospital Authority.
****

Consent by Department of Health,
on
Kowloon City Elderly Health Centre,
100 Nga Tsin Wai Road

Chow, Ray

From: Wu, Funny
Sent: Friday, December 10, 2021 11:16 AM
To: Chow, Ray; Tsang, Irene
Subject: FW: Urban Renewal Authority Term Environmental Consultancy Services: Request for Information – Chemical Spillage Record/Building Plan

FYI

From: seo_sdp2@dh.gov.hk <seo_sdp2@dh.gov.hk>
Sent: Friday, December 10, 2021 11:14 AM
To: Wu, Funny <Funny.Wu@atkinsglobal.com>
Cc: "&DH/PMO[SMP]"@Remark.Internal_Address_Not_For_Reply_From_Internet; "&DH/CHA[P]"@Remark.Internal_Address_Not_For_Reply_From_Internet; "&DH/CHA[CA]"@Remark.Internal_Address_Not_For_Reply_From_Internet; "&DH/AM[SD&P]"@Remark.Internal_Address_Not_For_Reply_From_Internet
Subject: RE: Urban Renewal Authority Term Environmental Consultancy Services: Request for Information – Chemical Spillage Record/Building Plan

Dear Ms Wu,

I refer to your email of 6.12.2021.

Please be confirmed that the Department of Health (DH) has **no objection** to your proposed access of the following information from relevant government departments for your desktop environmental study –

1) Building Plan (e.g. diesel storage/backup generator/chemical waste storage) from Architectural Services Department (ArchSD);
2) Chemical spillage record/Chemical Waste Producer Register from Environmental Protection Department (EPD); and
3) Chemical spillage record/ Dangerous Goods Store record from Fire Services Department (FSD).

Thank you.

Best Regards,
Alex LAI
SEO(SD&P)2/DH
Tel: 2961 8479

From: "Wu, Funny" <Funny.Wu@atkinsglobal.com>
To: "seo_sdp2@dh.gov.hk" <seo_sdp2@dh.gov.hk>
Date: 06/12/2021 15:05
Subject: RE: Urban Renewal Authority Term Environmental Consultancy Services: Request for Information – Chemical Spillage Record/Building Plan

---

From: Wu, Funny
Sent: Monday, December 6, 2021 3:03 PM
To: seo_sdp2@dh.gov.hk
Cc: Chow, Ray <Ray.Chow@atkinsglobal.com>; Tsang, Irene <Irene.Tsang@atkinsglobal.com>; Li, Yee Ting <YTLi@ura.org.hk>; Kwan, Mable <MMPKwan@ura.org.hk>
Subject: Urban Renewal Authority Term Environmental Consultancy Services: Request for Information – Chemical Spillage Record/Building Plan

Dear Mr Alex Lai,

Urban Renewal Authority Term Environmental Consultancy Services - Service Order No. 004 Environmental Assessment For A Development Scheme In Kowloon City
Request for Information – Chemical Spillage Record/Building Plan

We are the Environmental Consultant commissioned by Urban Renewal Authority to undertake the captioned consultancy services. A copy of the appointment letter and a location plan showing the indicative location of the site are enclosed with this email for your information. In order to accomplish the land contamination assessment, a desktop environmental study is required. We are writing to request your consent to access the following information from various government department on your building named Kowloon City Elderly Health Centre at 100 Nga Tsin Wai Road, Kowloon City:

1) Building Plan (e.g. diesel storage/backup generator/chemical waste storage) from Architectural Services Department (ArchSD);

2) Chemical spillage record/Chemical Waste Producer Register from Environmental Protection Department (EPD); and

3) Chemical spillage record/ Dangerous Goods Store record from Fire Services Department (FSD).

We shall be grateful if you would advise your consent on or before **9 December 2021**. Should you have any queries, please feel free to contact our Irene Tsang at **2972 1343** or Mr Ray Chow at **2972 1461**.

Please note that the password for the attached document shall be provided in a separate email.

Best regards,

Funny Wu
Associate Technical Director
Hong Kong Asia Pacific
Engineering, Design and Project Management
+852 2972 1167

Funny.Wu@atkinsglobal.com
ATKINS, a member of the SNC-Lavalin Group
14/F Wharf T&T Centre, Harbour City, Tsim Sha Tsui, Kowloon, Hong Kong

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Consent by District Environmental Hygiene Office
(Kowloon City),
Food and Environmental Hygiene Department
on
Municipal Services Building – Market,
100 Nga Tsin Wai Road, Kowloon City

Chow, Ray

From: winghlam@fehd.gov.hk
Sent: Thursday, December 9, 2021 4:44 PM
To: Wu, Funny
Cc: Tsang, Irene; Kwan, Mable; Chow, Ray; Li, Yee Ting; nkhattak@fehd.gov.hk; ysleung@fehd.gov.hk; mwlam@fehd.gov.hk; acwkwok@fehd.gov.hk
Subject: *Restricted: Re: Urban Renewal Authority Term Environmental Consultancy Services: Request for Information – Chemical Spillage Record/Building Plan

Dear Ms Wu,

Thank you for your email below.

Please be informed that consent from District Environmental Hygiene Office (Kowloon City) of Food and Environmental Hygiene Department has been obtained in respect of the request for access to the required information. I refers to my telephone conversation with Mr Ray Chow earlier who informed that you would also obtain consent from Leisure and Cultural Services Department separately.

Best Regards,
LAM Wing-hong
Coordinator (Market Special Duties)2, FEHD
Tel: 2752 1080
Email: winghlam@fehd.gov.hk

From: "Wu, Funny" <Funny.Wu@atkinsglobal.com>

To: "winghlam@fehd.gov.hk" <winghlam@fehd.gov.hk>
Cc: "Chow, Ray" <Ray.Chow@atkinsglobal.com>, "Tsang, Irene" <Irene.Tsang@atkinsglobal.com>, "Li, Yee Ting" <YTLi@ura.org.hk>, "Kwan, Mable" <MMPKwan@ura.org.hk>
Date: 6/12/2021 15:03
Subject: Urban Renewal Authority Term Environmental Consultancy Services: Request for Information – Chemical Spillage Record/Building Plan

Dear Mr. Lam Wing Hong,

Urban Renewal Authority Term Environmental Consultancy Services - Service Order No. 004 Environmental Assessment For A Development Scheme In Kowloon City
Request for Information – Chemical Spillage Record/Building Plan

We are the Environmental Consultant commissioned by Urban Renewal Authority to undertake the captioned consultancy services. A copy of the appointment letter and a location plan showing the indicative location of the site are enclosed with this email for your information. In order to accomplish the land contamination assessment, a desktop environmental study is required. We are writing to request your consent to access the following information from various government department on your building named Kowloon City Municipal Services Building – Market at 100 Nga Tsin Wai Road, Kowloon City:

1) Building Plan (e.g. diesel storage/backup generator/chemical waste storage) from Architectural Services Department (ArchSD);

2) Chemical spillage record/Chemical Waste Producer Register from Environmental Protection Department (EPD); and

3) Chemical spillage record/ Dangerous Goods Store record from Fire Services Department (FSD).

We shall be grateful if you would advise your consent on or before **9 December 2021**. Should you have any queries, please feel free to contact our Irene Tsang at **2972 1343** or Mr Ray Chow at **2972 1461**.

Please note that the password for the attached document shall be provided in a separate email.

Best regards,

Funny Wu
Associated Technical Director
Hong Kong Asia Pacific
Engineering, Design and Project Management
+852 2972 1167

Funny.Wu@atkinsglobal.com
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Consent by Leisure and Cultural Services Department
on
Kowloon City Municipal Services Building – Public Library
and
Kowloon City Municipal Services Building – Sport Centre
100 Nga Tsin Wai Road, Kowloon City

Chow, Ray

From: Maggie YY TAM <myytam@lcsd.gov.hk>
Sent: Tuesday, December 14, 2021 4:34 PM
To: Wu, Funny
Cc: Tsang, Irene; Kwan, Mable; Chow, Ray; Li, Yee Ting; Celine WC LAU; Kat PY LAI; Tracy MS WONG; Tsz Fung CHAN; May ML CHOW; Gary HK LO; Annie CO LAU
Subject: Re: Urban Renewal Authority Term Environmental Consultancy Services: Request for Information – Chemical Spillage Record/Building Plan

Dear Funny,

Re. your email below. We have no objection on allowing Atkins to access the following information (Item 1 to 3, as listed below) from various government department on Kowloon City Public Library (KCPL). However, according to Clause 2.1.1 in Appendix I of the Confidential Finance & Supplies Circular No. 1/2018 Security of Government Collection and Payment Offices, any drawings or layout that shown the strong room, collection and payment offices are regarded as confidential and are strictly confined to need-to-know basis. As such, for Building Plan of KCPL where strong room and collection and payment offices (such as shroff office, box office etc) are located should only passed to Atkins, consultant of URA, as confidential information and are strictly confined to need-to-known basis for conducting the required desktop environmental study.

1) Building Plan (e.g. diesel storage/backup generator/chemical waste storage) from Architectural Services Department (ArchSD);
2) Chemical spillage record/Chemical Waste Producer Register from Environmental Protection Department (EPD); and
3) Chemical spillage record/ Dangerous Goods Store record from Fire Services Department (FSD).

Thanks.

Best regards,
Maggie TAM
EO(P)12B
T: 2601 8051

From: "Wu, Funny" <Funny.Wu@atkinsglobal.com>
To: "myytam@lcsd.gov.hk" <myytam@lcsd.gov.hk>
Cc: "Chow, Ray" <Ray.Chow@atkinsglobal.com>, "Tsang, Irene" <Irene.Tsang@atkinsglobal.com>, "Li, Yee Ting" <YTLi@ura.org.hk>, "Kwan, Mable" <MMPKwan@ura.org.hk>
Date: 06/12/2021 15:03
Subject: Urban Renewal Authority Term Environmental Consultancy Services: Request for Information – Chemical Spillage Record/Building Plan

Dear Ms. Maggie Tam,

Urban Renewal Authority Term Environmental Consultancy Services - Service Order No. 004 Environmental Assessment For A Development Scheme In Kowloon City
Request for Information – Chemical Spillage Record/Building Plan

We are the Environmental Consultant commissioned by Urban Renewal Authority to undertake the captioned consultancy services. A copy of the appointment letter and a location plan showing the indicative location of the site are enclosed with this email for your information. In order to accomplish the land contamination assessment, a desktop environmental study is required. We are writing to request your consent to access the following information from various government department on your building named Kowloon City Municipal Services Building – Public Library 100 Nga Tsin Wai Road, Kowloon City:

1) Building Plan (e.g. diesel storage/backup generator/chemical waste storage) from Architectural Services Department (ArchSD);

2) Chemical spillage record/Chemical Waste Producer Register from Environmental Protection Department (EPD); and

3) Chemical spillage record/ Dangerous Goods Store record from Fire Services Department (FSD).

We shall be grateful if you would advise your consent on or before **9 December 2021**. Should you have any queries, please feel free to contact our Irene Tsang at **2972 1343** or Mr Ray Chow at **2972 1461**.

Please note that the password for the attached document shall be provided in a separate email.

Best regards,

Funny Wu
Associate Technical Director
Hong Kong Asia Pacific
Engineering, Design and Project Management
+852 2972 1167

Funny.Wu@atkinsglobal.com
ATKINS, a member of the SNC-Lavalin Group
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Chow, Ray

From: Maggie YY TAM <myytam@lcsd.gov.hk>
Sent: Tuesday, December 14, 2021 4:36 PM
To: Wu, Funny
Cc: Tsang, Irene; Kwan, Mable; Chow, Ray; Li, Yee Ting; Edmund CN WONG; Amy TY TONG; Tsz Fung CHAN; Annie CO LAU
Subject: Re: Urban Renewal Authority Term Environmental Consultancy Services: Request for Information – Chemical Spillage Record/Building Plan

Dear Funny,

Re. your email below, we have no objection to the applicant for assessing the Building Plan in order to carry out a desktop environmental study that requested by the Urban Renewal Authority. Thanks.

Best regards,
Maggie TAM
EO(P)12B
T: 2601 8051

From: "Wu, Funny" <Funny.Wu@atkinsglobal.com>
To: "myytam@lcsd.gov.hk" <myytam@lcsd.gov.hk>
Cc: "Chow, Ray" <Ray.Chow@atkinsglobal.com>, "Tsang, Irene" <Irene.Tsang@atkinsglobal.com>, "Li, Yee Ting" <YTLi@ura.org.hk>, "Kwan, Mable" <MMPKwan@ura.org.hk>
Date: 06/12/2021 15:03
Subject: Urban Renewal Authority Term Environmental Consultancy Services: Request for Information – Chemical Spillage Record/Building Plan

---

Dear Ms. Maggie Tam,

Urban Renewal Authority Term Environmental Consultancy Services - Service Order No. 004 Environmental Assessment For A Development Scheme In Kowloon City
Request for Information – Chemical Spillage Record/Building Plan

We are the Environmental Consultant commissioned by Urban Renewal Authority to undertake the captioned consultancy services. A copy of the appointment letter and a location plan showing the indicative location of the site are enclosed with this email for your information. In order to accomplish the land contamination assessment, a desktop environmental study is required. We are writing to request your consent to access the

following information from various government department on your building named Kowloon City Municipal Services Building – Sport Centre at 100 Nga Tsin Wai Road, Kowloon City:

1) Building Plan (e.g. diesel storage/backup generator/chemical waste storage) from Architectural Services Department (ArchSD);

2) Chemical spillage record/Chemical Waste Producer Register from Environmental Protection Department (EPD); and

3) Chemical spillage record/ Dangerous Goods Store record from Fire Services Department (FSD).

We shall be grateful if you would advise your consent on or before **9 December 2021**. Should you have any queries, please feel free to contact our Irene Tsang at **2972 1343** or Mr Ray Chow at **2972 1461**.

Please note that the password for the attached document shall be provided in a separate email.

Best regards,

Funny Wu
Associate Technical Director
Hong Kong Asia Pacific
Engineering, Design and Project Management
+852 2972 1167

Funny.Wu@atkinsglobal.com
ATKINS, a member of the SNC-Lavalin Group
14/F Wharf T&T Centre, Harbour City, Tsim Sha Tsui, Kowloon, Hong Kong

www.atkinsglobal.com | www.snclavalin.com

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Appendix 6.4

Correspondences with FSD

(73)

消 防 處
香港九龍尖沙咀東部康莊道 1 號
消防處總部大廈

FIRE SERVICES DEPARTMENT
FIRE SERVICES HEADQUARTERS BUILDING,
No.1 Hong Chong Road,
Tsim Sha Tsui East, Kowloon,
Hong Kong

本處檔號 **OUR REF.** : (73) in FSD GR 6-5/4 R Pt. 38
來函檔號 **YOUR REF.** :
電子郵件 **E-mail** : hkfsdenq@hkfsd.gov.hk
圖文傳真 **FAX NO.** : 2739 5879
電 話 **TEL NO.** : 2733 7741

12 January 2022

ATKINS
13/F Wharf T&T Centre,
Harbour City, Tsim Sha Tsui,
Kowloon, Hong Kong.
(Attn: Mr. Ray CHOW, Senior Environmental Consultant)

Dear Mr. CHOW,

Urban Renewal Authority Term Environmental Consultancy Services at Kowloon City
Request for Information of Dangerous Goods & Incident Records

I refer to your email of 21.12.2021 regarding the captioned subject and reply below in response to your questions.

1. Licensed dangerous goods are stored at the captioned address. Please refer to **Appendix A** for details.

2. A total number of 32 incident records were found at the subject location. Please refer to **Appendix B** for details.

If you have further questions, please feel free to contact the undersigned.

Yours sincerely,

(NG Wing-chit)
for Director of Fire Services

Appendix A

Urban Renewal Authority Term Environmental Consultancy Services at Kowloon City

Request for Information of Dangerous Goods & Incident Records

Item	Cat.	Quantity	Storage	Storage Location
1.	9A	300	Rubber Tyres	G/F, 53 Lung Kong Road
2.	9A	100	Rubber Tyres	G/F, 53A Shop 2, Nga Tsin Wai Road

Appendix B

Urban Renewal Authority Term Environmental Consultancy Services at Kowloon City

Request for Information of Dangerous Goods & Incident Records

No.	Date	Type of Incident	Address
1.	4/2/2019	No.1 Fire Alarm	41 LUNG KONG ROAD
2.	18/2/2019	Rubbish Fire	73 LION ROCK ROAD
3.	27/2/2019	Vehicle Fire	LION ROCK ROAD; NO102
4.	25/4/2019	Rubbish Fire	84 TAK KU LING ROAD
5.	23/5/2019	No.1 Fire Alarm	54 NAM KOK ROAD
6.	18/6/2019	Rubbish Fire	SOUTH WALL ROAD/ NGA TSIN WAI ROAD
7.	15/8/2019	No.1 Fire Alarm	63 FUK LO TSUN ROAD
8.	16/8/2019	Rubbish Fire	42 NAM KOK ROAD
9.	22/9/2019	No.1 Fire Alarm	33-39 LUNH KONG ROAD
10.	17/10/2019	No.1 Fire Alarm	42-44 SOUTH WALL ROAD
11.	11/11/2019	Rubbish Fire	LAMPPOST AB1822, PRINCE EDWARD ROAD WEST
12.	21/12/2019	No.1 Fire Alarm	128 CARPENTER ROAD
13.	27/12/2019	Rubbish Fire	17 TAK KU LING ROAD
14.	20/3/2020	No.1 Fire Alarm	132-134 NGA TSIN WAI ROAD
15.	2/5/2020	Vehicle Fire	CARPENTER ROAD
16.	26/6/2020	Rubbish Fire	86 FUK LO TSUN ROAD
17.	28/6/2020	No.1 Fire Alarm	42-44 SOUTH WALL ROAD

18.	28/6/2020	No.1 Fire Alarm	43 CARPENTER ROAD
19.	1/9/2020	Rubbish Fire	24 NAM KOK ROAD
20.	3/10/2020	No.1 Fire Alarm	NAM KOK ROAD
21.	28/10/2020	Rubbish Fire	FUK LO TSUN ROAD
22.	18/12/2020	No.1 Fire Alarm	25 SOUTH WALL ROAD
23.	11/1/2021	No.1 Fire Alarm	12-14 NGA TSIN LONG ROAD
24.	4/3/2021	Rubbish Fire	2-2B NGA TSIN LONG ROAD
25.	17/4/2021	Rubbish Fire	FUK LO TSUN ROAD
26.	17/4/2021	No.1 Fire Alarm	456-464 PRINCE EDWARD ROAD WEST
27.	15/5/2021	Rubbish Fire	NGA TSIN LONG ROAD
28.	25/8/2021	No.1 Fire Alarm	38-40 SOUTH WALL ROAD
29.	2/9/2021	Rubbish Fire	40-42A NGA TSIN WAI ROAD
30.	1/10/2021	Rubbish Fire	TAK KU LING ROAD
31.	24/10/2021	No.1 Fire Alarm	49A-49B FUK LO TSUN ROAD
32.	16/11/2021	No.1 Fire Alarm	114 NGA TSIN WAI ROAD

Chow, Ray

From: Chow, Ray
Sent: Tuesday, December 21, 2021 2:34 PM
To: hkfsdeng@hkfsd.gov.hk
Cc: Tsang, Irene; Wu, Funny; Li, Yee Ting; Kwan, Mable
Subject: Urban Renewal Authority Term Environmental Consultancy Services at Kowloon City: Request for Information - Dangerous good record / Chemical spillage/incident record
Attachments: Letter of Service Order_URA.pdf

Dear Mr. Wong,

We are the Consultant undertaking the above consultancy Agreement for Urban Renewal Authority. Please find attached a copy of the self-explanatory URA's letter ref.: URA211012841 dated 19 October 2021 for your information.

To enable us to conduct the Environmental Review for the Developments and Infrastructure Works appropriately, we would be most grateful if you would provide us with the following information:

(1) Records of current and past (as early as the records are available) registration of storage of dangerous goods (with type of dangerous goods, storage method, quantity, licence No., date of issue and location of storage) within the Project area; and
(2) Any records of accidents of spillage/leakage of dangerous goods stored within the Project areas.
(3) Any records of fire incidents within the Project areas.

The location plan of the project areas under the captioned Assignment is enclosed for your reference. Detail address is provided in the following table:

Lee Kee Memorial Dispensary, 99 Carpenter Road
Kowloon City Elderly Health Centre, 80 Hau Wong Road
Kowloon City Municipal Services Building, 100 Nga Tsin Wai Road
84-96 Nga Tsin Wai Road
66-80 Nga Tsin Wai Road
32-38 Nga Tsin Wai Road
30 Ngo Tsin Wai Road
36-54 Nga Tsin Long Road
68-84 Nga Tsin Long Road
25-73 Nam Kok Road
26-62 Nam Kok Road
29-59 Lung Kong Road
20-38 Tai Ku Ling Road
17-41 Kai Tak Road

Consents from the government buildings were also attached.
The password for the attachment will be provided in a separate email.

Due to the tight project programme, your reply by **7 January 2022** will be highly appreciated. Nil return is also required.

Should you have any queries regarding the above, please kindly contact me at **2972 1461** or Ms Irene Tsang at **2972 1343** further liaison.

Regards,

Ray CHOW
Senior Environmental Consultant
Hong Kong
Asia Pacific

Engineering, Design and Project Management

+852 2972 1461 +852 6992 3374

Atkins, member of the SNC-Lavalin Group
13/F Wharf T&T Centre, Harbour City, Tsim Sha Tsui, Kowloon, Hong Kong



ATKINS
Member of the SNC-Lavalin Group

Company

市區重建局
URBAN RENEWAL AUTHORITY

Our Ref.: URA211012841

By Email and By Post
(Email: Jacky.Yeung@atkinsglobal.com)

19 October 2021

Atkins China Limited
13/F., Wharf T&T Centre,
Habour City, Tsim Sha Tsui,
Kowloon, Hong Kong

Attn: Mr. Jacky Yeung

Dear Mr. Yeung,

Term Environmental Consultancy Services
Service Order No. 004
Environmental Assessment for a Development Scheme in Kowloon City

Pursuant to the Clause 2.2.3 of the conditions of the captioned term environmental consultancy contract, we issue herewith a Service Order No. 004 for your retention. You are hereby instructed to commence your consultancy work in accordance with the attached scope of services accordingly.

Your attention is drawn to that payment of the fee shall only be made upon completion of actual work done and by stages as in accordance with the payment schedule under the Fee Enquiry Form as attached.

Please return the duly signed confidentiality undertaking (**Appendix A**) to us by **22 October 2021**.

Should you have any queries, please do not hesitate to contact the undersigned at 2588 2897. Thank you for your kind attention.

Yours faithfully,
For and on behalf of
URBAN RENEWAL AUTHORITY

Adam

Adam Chung
Manager, Planning and Design

Encl.

10 years+ 關心機構 caringorganisation

Appendix 1 - Broad Location of Project Area



Consent by Hospital Authority
on
Lee Kee Memorial Dispensary at 99 Carpenter Road

Chow, Ray

From: Joey YAN <joey.yan@ha.org.hk>
Sent: Wednesday, December 8, 2021 12:54 PM
To: Wu, Funny
Cc: Chow, Ray; Tsang, Irene; Li, Yee Ting; Kwan, Mable; David CHAK; Charlene LAU; HA King-hang; Tony TSUI; Joanne WONG
Subject: [Not Virus Scanned] RE: Urban Renewal Authority Term Environmental Consultancy Services: Request for Information – Chemical Spillage Record/Building Plan
Attachments: Letter of Service Order_URA.pdf

Dear Funny (ATKINS, consultant to URA),

Consent is given for URA/its consultant to access the following information from various government departments on Lee Kee Memorial Dispensary at 99 Carpenter Road:

1) Building Plan (e.g. diesel storage/backup generator/chemical waste storage) from Architectural Services Department (ArchSD);
2) Chemical spillage record/Chemical Waste Producer Register from Environmental Protection Department (EPD); and
3) Chemical spillage record/ Dangerous Goods Store record from Fire Services Department (FSD).

Thank you.

Warmest regards,
Joey YAN
Manager (Primary Health Care)
Hospital Authority Head Office
Tel: 2300 6658

From: Wu, Funny <Funny.Wu@atkinsglobal.com>
Sent: Monday, December 6, 2021 3:03 PM
To: Joey YAN, HOS&P M(PHC)2 <joey.yan@ha.org.hk>
Cc: Chow, Ray <Ray.Chow@atkinsglobal.com>; Tsang, Irene <Irene.Tsang@atkinsglobal.com>; Li, Yee Ting <YTLi@ura.org.hk>; Kwan, Mable <MMPKwan@ura.org.hk>
Subject: Urban Renewal Authority Term Environmental Consultancy Services: Request for Information – Chemical Spillage Record/Building Plan

----
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Dear Ms. Joey Yan,

Urban Renewal Authority Term Environmental Consultancy Services - Service Order No. 004 Environmental Assessment For A Development Scheme In Kowloon City
Request for Information – Chemical Spillage Record/Building Plan

We are the Environmental Consultant commissioned by Urban Renewal Authority to undertake the captioned consultancy services. A copy of the appointment letter and a location plan showing the indicative location of the site are enclosed with this email for your information. In order to accomplish the land contamination assessment, a desktop environmental study is required. We are writing to request your consent to access the following information from various government department on your building named Lee Kee Memorial Dispensary at 99 Carpenter Road:

1) Building Plan (e.g. diesel storage/backup generator/chemical waste storage) from Architectural Services Department (ArchSD);
2) Chemical spillage record/Chemical Waste Producer Register from Environmental Protection Department (EPD); and
3) Chemical spillage record/ Dangerous Goods Store record from Fire Services Department (FSD).

We shall be grateful if you would advise your consent on or before **9 December 2021**. Should you have any queries, please feel free to contact our Irene Tsang at **2972 1343** or Mr Ray Chow at **2972 1461**.

Please note that the password for the attached document shall be provided in a separate email.

Best regards,
Funny Wu
Associate Technical Director
Hong Kong Asia Pacific
Engineering, Design and Project Management
+852 2972 1167
Funny.Wu@atkinsglobal.com
ATKINS, a member of the SNC-Lavalin Group
14/F Wharf T&T Centre, Harbour City, Tsim Sha Tsui, Kowloon, Hong Kong

www.atkinsglobal.com | www.snclavalin.com

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All views or opinions expressed in this Email and its attachments are those of the sender and do not necessarily reflect the views and opinions of the Hospital Authority.
****

Consent by Department of Health,
on
Kowloon City Elderly Health Centre,
100 Nga Tsin Wai Road

Chow, Ray

From: Wu, Funny
Sent: Friday, December 10, 2021 11:16 AM
To: Chow, Ray; Tsang, Irene
Subject: FW: Urban Renewal Authority Term Environmental Consultancy Services: Request for Information – Chemical Spillage Record/Building Plan

FYI

From: seo_sdp2@dh.gov.hk <seo_sdp2@dh.gov.hk>
Sent: Friday, December 10, 2021 11:14 AM
To: Wu, Funny <Funny.Wu@atkinsglobal.com>
Cc: "&DH/PMO[SMP]"@Remark.Internal_Address_Not_For_Reply_From_Internet; "&DH/CHA[P]"@Remark.Internal_Address_Not_For_Reply_From_Internet; "&DH/CHA[CA]"@Remark.Internal_Address_Not_For_Reply_From_Internet; "&DH/AM[SD&P]"@Remark.Internal_Address_Not_For_Reply_From_Internet
Subject: RE: Urban Renewal Authority Term Environmental Consultancy Services: Request for Information – Chemical Spillage Record/Building Plan

Dear Ms Wu,

I refer to your email of 6.12.2021.

Please be confirmed that the Department of Health (DH) has **no objection** to your proposed access of the following information from relevant government departments for your desktop environmental study –

1) Building Plan (e.g. diesel storage/backup generator/chemical waste storage) from Architectural Services Department (ArchSD);
2) Chemical spillage record/Chemical Waste Producer Register from Environmental Protection Department (EPD); and
3) Chemical spillage record/ Dangerous Goods Store record from Fire Services Department (FSD).

Thank you.

Best Regards,
Alex LAI
SEO(SD&P)2/DH
Tel: 2961 8479

From: "Wu, Funny" <Funny.Wu@atkinsglobal.com>
To: "seo_sdp2@dh.gov.hk" <seo_sdp2@dh.gov.hk>
Date: 06/12/2021 15:05
Subject: RE: Urban Renewal Authority Term Environmental Consultancy Services: Request for Information – Chemical Spillage Record/Building Plan

---

From: Wu, Funny
Sent: Monday, December 6, 2021 3:03 PM
To: seo_sdp2@dh.gov.hk
Cc: Chow, Ray <Ray.Chow@atkinsglobal.com>; Tsang, Irene <Irene.Tsang@atkinsglobal.com>; Li, Yee Ting <YTLi@ura.org.hk>; Kwan, Mable <MMPKwan@ura.org.hk>
Subject: Urban Renewal Authority Term Environmental Consultancy Services: Request for Information – Chemical Spillage Record/Building Plan

Dear Mr Alex Lai,

Urban Renewal Authority Term Environmental Consultancy Services - Service Order No. 004 Environmental Assessment For A Development Scheme In Kowloon City
Request for Information – Chemical Spillage Record/Building Plan

We are the Environmental Consultant commissioned by Urban Renewal Authority to undertake the captioned consultancy services. A copy of the appointment letter and a location plan showing the indicative location of the site are enclosed with this email for your information. In order to accomplish the land contamination assessment, a desktop environmental study is required. We are writing to request your consent to access the following information from various government department on your building named Kowloon City Elderly Health Centre at 100 Nga Tsin Wai Road, Kowloon City:

1) Building Plan (e.g. diesel storage/backup generator/chemical waste storage) from Architectural Services Department (ArchSD);

2) Chemical spillage record/Chemical Waste Producer Register from Environmental Protection Department (EPD); and

3) Chemical spillage record/ Dangerous Goods Store record from Fire Services Department (FSD).

We shall be grateful if you would advise your consent on or before **9 December 2021**. Should you have any queries, please feel free to contact our Irene Tsang at **2972 1343** or Mr Ray Chow at **2972 1461**.

Please note that the password for the attached document shall be provided in a separate email.

Best regards,

Funny Wu
Associate Technical Director
Hong Kong Asia Pacific
Engineering, Design and Project Management
+852 2972 1167

Funny.Wu@atkinsglobal.com
ATKINS, a member of the SNC-Lavalin Group
14/F Wharf T&T Centre, Harbour City, Tsim Sha Tsui, Kowloon, Hong Kong

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Consent by District Environmental Hygiene Office
(Kowloon City),
Food and Environmental Hygiene Department
on
Municipal Services Building – Market,
100 Nga Tsin Wai Road, Kowloon City

Chow, Ray

From: winghlam@fehd.gov.hk
Sent: Thursday, December 9, 2021 4:44 PM
To: Wu, Funny
Cc: Tsang, Irene; Kwan, Mable; Chow, Ray; Li, Yee Ting; nkhattak@fehd.gov.hk; ysleung@fehd.gov.hk; mwlam@fehd.gov.hk; acwkwok@fehd.gov.hk
Subject: *Restricted: Re: Urban Renewal Authority Term Environmental Consultancy Services: Request for Information – Chemical Spillage Record/Building Plan

Dear Ms Wu,

Thank you for your email below.

Please be informed that consent from District Environmental Hygiene Office (Kowloon City) of Food and Environmental Hygiene Department has been obtained in respect of the request for access to the required information. I refers to my telephone conversation with Mr Ray Chow earlier who informed that you would also obtain consent from Leisure and Cultural Services Department separately.

Best Regards,
LAM Wing-hong
Coordinator (Market Special Duties)2, FEHD
Tel: 2752 1080
Email: winghlam@fehd.gov.hk

From: "Wu, Funny" <Funny.Wu@atkinsglobal.com>

To: "winghlam@fehd.gov.hk" <winghlam@fehd.gov.hk>
Cc: "Chow, Ray" <Ray.Chow@atkinsglobal.com>, "Tsang, Irene" <Irene.Tsang@atkinsglobal.com>, "Li, Yee Ting" <YTLi@ura.org.hk>, "Kwan, Mable" <MMPKwan@ura.org.hk>
Date: 6/12/2021 15:03
Subject: Urban Renewal Authority Term Environmental Consultancy Services: Request for Information – Chemical Spillage Record/Building Plan

Dear Mr. Lam Wing Hong,

Urban Renewal Authority Term Environmental Consultancy Services - Service Order No. 004 Environmental Assessment For A Development Scheme In Kowloon City
Request for Information – Chemical Spillage Record/Building Plan

We are the Environmental Consultant commissioned by Urban Renewal Authority to undertake the captioned consultancy services. A copy of the appointment letter and a location plan showing the indicative location of the site are enclosed with this email for your information. In order to accomplish the land contamination assessment, a desktop environmental study is required. We are writing to request your consent to access the following information from various government department on your building named Kowloon City Municipal Services Building – Market at 100 Nga Tsin Wai Road, Kowloon City:

1) Building Plan (e.g. diesel storage/backup generator/chemical waste storage) from Architectural Services Department (ArchSD);

2) Chemical spillage record/Chemical Waste Producer Register from Environmental Protection Department (EPD); and

3) Chemical spillage record/ Dangerous Goods Store record from Fire Services Department (FSD).

We shall be grateful if you would advise your consent on or before **9 December 2021**. Should you have any queries, please feel free to contact our Irene Tsang at **2972 1343** or Mr Ray Chow at **2972 1461**.

Please note that the password for the attached document shall be provided in a separate email.

Best regards,

Funny Wu
Associated Technical Director
Hong Kong Asia Pacific
Engineering, Design and Project Management
+852 2972 1167

Funny.Wu@atkinsglobal.com
ATKINS, a member of the SNC-Lavalin Group
14/F Wharf T&T Centre, Harbour City, Tsim Sha Tsui, Kowloon, Hong Kong

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Consent by Leisure and Cultural Services Department
on
Kowloon City Municipal Services Building – Public Library
and
Kowloon City Municipal Services Building – Sport Centre
100 Nga Tsin Wai Road, Kowloon City

Chow, Ray

From: Maggie YY TAM <myytam@lcsd.gov.hk>
Sent: Tuesday, December 14, 2021 4:34 PM
To: Wu, Funny
Cc: Tsang, Irene; Kwan, Mable; Chow, Ray; Li, Yee Ting; Celine WC LAU; Kat PY LAI; Tracy MS WONG; Tsz Fung CHAN; May ML CHOW; Gary HK LO; Annie CO LAU
Subject: Re: Urban Renewal Authority Term Environmental Consultancy Services: Request for Information – Chemical Spillage Record/Building Plan

Dear Funny,

Re. your email below. We have no objection on allowing Atkins to access the following information (Item 1 to 3, as listed below) from various government department on Kowloon City Public Library (KCPL). However, according to Clause 2.1.1 in Appendix I of the Confidential Finance & Supplies Circular No. 1/2018 Security of Government Collection and Payment Offices, any drawings or layout that shown the strong room, collection and payment offices are regarded as confidential and are strictly confined to need-to-know basis. As such, for Building Plan of KCPL where strong room and collection and payment offices (such as shroff office, box office etc) are located should only passed to Atkins, consultant of URA, as confidential information and are strictly confined to need-to-known basis for conducting the required desktop environmental study.

1) Building Plan (e.g. diesel storage/backup generator/chemical waste storage) from Architectural Services Department (ArchSD);
2) Chemical spillage record/Chemical Waste Producer Register from Environmental Protection Department (EPD); and
3) Chemical spillage record/ Dangerous Goods Store record from Fire Services Department (FSD).

Thanks.

Best regards,
Maggie TAM
EO(P)12B
T: 2601 8051

From: "Wu, Funny" <Funny.Wu@atkinsglobal.com>
To: "myytam@lcsd.gov.hk" <myytam@lcsd.gov.hk>
Cc: "Chow, Ray" <Ray.Chow@atkinsglobal.com>, "Tsang, Irene" <Irene.Tsang@atkinsglobal.com>, "Li, Yee Ting" <YTLi@ura.org.hk>, "Kwan, Mable" <MMPKwan@ura.org.hk>
Date: 06/12/2021 15:03
Subject: Urban Renewal Authority Term Environmental Consultancy Services: Request for Information – Chemical Spillage Record/Building Plan

Dear Ms. Maggie Tam,

Urban Renewal Authority Term Environmental Consultancy Services - Service Order No. 004 Environmental Assessment For A Development Scheme In Kowloon City
Request for Information – Chemical Spillage Record/Building Plan

We are the Environmental Consultant commissioned by Urban Renewal Authority to undertake the captioned consultancy services. A copy of the appointment letter and a location plan showing the indicative location of the site are enclosed with this email for your information. In order to accomplish the land contamination assessment, a desktop environmental study is required. We are writing to request your consent to access the following information from various government department on your building named Kowloon City Municipal Services Building – Public Library 100 Nga Tsin Wai Road, Kowloon City:

1) Building Plan (e.g. diesel storage/backup generator/chemical waste storage) from Architectural Services Department (ArchSD);

2) Chemical spillage record/Chemical Waste Producer Register from Environmental Protection Department (EPD); and

3) Chemical spillage record/ Dangerous Goods Store record from Fire Services Department (FSD).

We shall be grateful if you would advise your consent on or before **9 December 2021**. Should you have any queries, please feel free to contact our Irene Tsang at **2972 1343** or Mr Ray Chow at **2972 1461**.

Please note that the password for the attached document shall be provided in a separate email.

Best regards,

Funny Wu
Associate Technical Director
Hong Kong Asia Pacific
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Chow, Ray

From: Maggie YY TAM <myytam@lcsd.gov.hk>
Sent: Tuesday, December 14, 2021 4:36 PM
To: Wu, Funny
Cc: Tsang, Irene; Kwan, Mable; Chow, Ray; Li, Yee Ting; Edmund CN WONG; Amy TY TONG; Tsz Fung CHAN; Annie CO LAU
Subject: Re: Urban Renewal Authority Term Environmental Consultancy Services: Request for Information – Chemical Spillage Record/Building Plan

Dear Funny,

Re. your email below, we have no objection to the applicant for assessing the Building Plan in order to carry out a desktop environmental study that requested by the Urban Renewal Authority. Thanks.

Best regards,
Maggie TAM
EO(P)12B
T: 2601 8051

From: "Wu, Funny" <Funny.Wu@atkinsglobal.com>
To: "myytam@lcsd.gov.hk" <myytam@lcsd.gov.hk>
Cc: "Chow, Ray" <Ray.Chow@atkinsglobal.com>, "Tsang, Irene" <Irene.Tsang@atkinsglobal.com>, "Li, Yee Ting" <YTLi@ura.org.hk>, "Kwan, Mable" <MMPKwan@ura.org.hk>
Date: 06/12/2021 15:03
Subject: Urban Renewal Authority Term Environmental Consultancy Services: Request for Information – Chemical Spillage Record/Building Plan

---

Dear Ms. Maggie Tam,

Urban Renewal Authority Term Environmental Consultancy Services - Service Order No. 004 Environmental Assessment For A Development Scheme In Kowloon City
Request for Information – Chemical Spillage Record/Building Plan

We are the Environmental Consultant commissioned by Urban Renewal Authority to undertake the captioned consultancy services. A copy of the appointment letter and a location plan showing the indicative location of the site are enclosed with this email for your information. In order to accomplish the land contamination assessment, a desktop environmental study is required. We are writing to request your consent to access the

following information from various government department on your building named Kowloon City Municipal Services Building – Sport Centre at 100 Nga Tsin Wai Road, Kowloon City:

1) Building Plan (e.g. diesel storage/backup generator/chemical waste storage) from Architectural Services Department (ArchSD);

2) Chemical spillage record/Chemical Waste Producer Register from Environmental Protection Department (EPD); and

3) Chemical spillage record/ Dangerous Goods Store record from Fire Services Department (FSD).

We shall be grateful if you would advise your consent on or before **9 December 2021**. Should you have any queries, please feel free to contact our Irene Tsang at **2972 1343** or Mr Ray Chow at **2972 1461**.

Please note that the password for the attached document shall be provided in a separate email.

Best regards,

Funny Wu
Associate Technical Director
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Appendix 8

Air Ventilation Assessment (AVA) – Expert Evaluation Report (EE)

Nga Tsin Wai Road / Carpenter Road Development Scheme (KC-017)

Air Ventilation Assessment - Expert Evaluation

Issue | 13 May 2022

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number --

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ARUP

Document Verification

ARUP

Job title		Nga Tsin Wai Road / Carpenter Road Development Scheme (KC-017)			**Job number** --
Document title		Air Ventilation Assessment - Expert Evaluation			**File reference**
Document ref					
Revision	**Date**	**Filename**			
		Description			
			Prepared by	Checked by	Approved by
		Name			
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1 Introduction

Ove Arup & Partners Hong Kong Ltd (Arup) has been commissioned to conduct the Air Ventilation Assessment (AVA) – Expert Evaluation (EE) for the draft development scheme plan for the Nga Tsin Wai Road / Carpenter Road Development Scheme (KC-017), hereafter "the Scheme". This qualitative air ventilation assessment is carried out to support the draft development scheme plan (DSP) submission to the Town Planning Board under Section 25 of the Urban Renewal Authority Ordinance.

1.1 Site Information

Figure 1 shows the location of the Scheme. The Site is divided into three sites, the Main Site (i.e. Site C2 and A), Northern Site (Site B) and Eastern Site (Site C1). The Scheme are currently zoned as "Government, Institution or Community (G/IC)", "Residential (Group A) 2 (R(A)2)", "Open Space" and "Road" on the Approved Ma Tau Kok Outline Zoning Plan (OZP) No. S/K10/28[1] .

The Main Site and the Eastern Site of the Scheme are proposed to be rezoned as "R(A)", while the Northern Site of the Scheme proposed to be rezoned as "G/IC" in the draft DSP.



Figure 1 Site Plan

[1] https://www.legco.gov.hk/yr2022/english/brief/sk1028_20220325-e.pdf

1.2 Objective

The objective of the Study is to investigate the wind performance of the Proposed Development Scheme in the form of AVA – EE. The AVA-EE will be conducted in accordance with the "Technical Circular No. 1/06 – Air Ventilation Assessments" (*Technical Circular*) and its Annex A "Technical Guide for Air Ventilation Assessment for Developments in Hong Kong" (*Technical Guide*), which is jointly issued by Housing, Planning and Lands Bureau and Environmental, Transport and Works Bureau on 19th July 2006.

1.3 Study Tasks

The major task of this study is to carry out an expert evaluation on the characteristics of the site wind availability data of the Scheme area and assessment of the wind performance of the proposed development in a qualitative way. The expert evaluation will cover the following tasks:

- Identify the wind condition
- Evaluate wind performance of the Proposed Scheme
- Identify any problem areas and good design features that can mitigate problem areas.

2 Site Characteristics

Figure 1 presents the site boundary of the Scheme, Study Area and the surrounding environment. The Study Area broadly covers the Ngai Tsin Wai Road area in the Kowloon City District. The Scheme is predominantly a residential neighbourhood, which comprises of clusters of low-rise existing buildings with scattered high-rise redeveloped buildings. Table 1 summarizes the details of site characteristics including location, maximum building height, and corresponding index in Figure 2 and Figure 3.

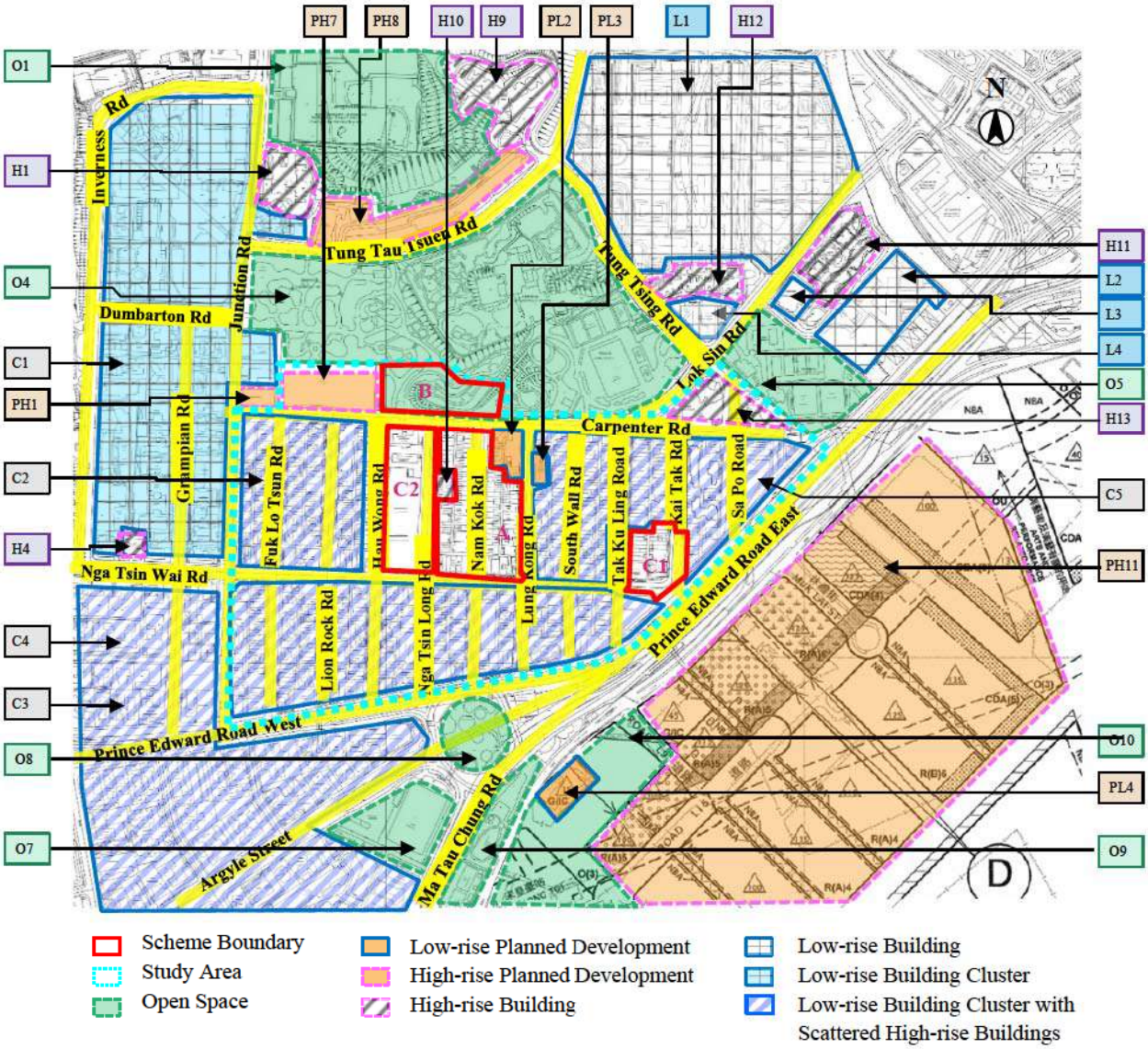

Figure 2 Overview of Study Area and Surrounding Area (Source: Lands Department)

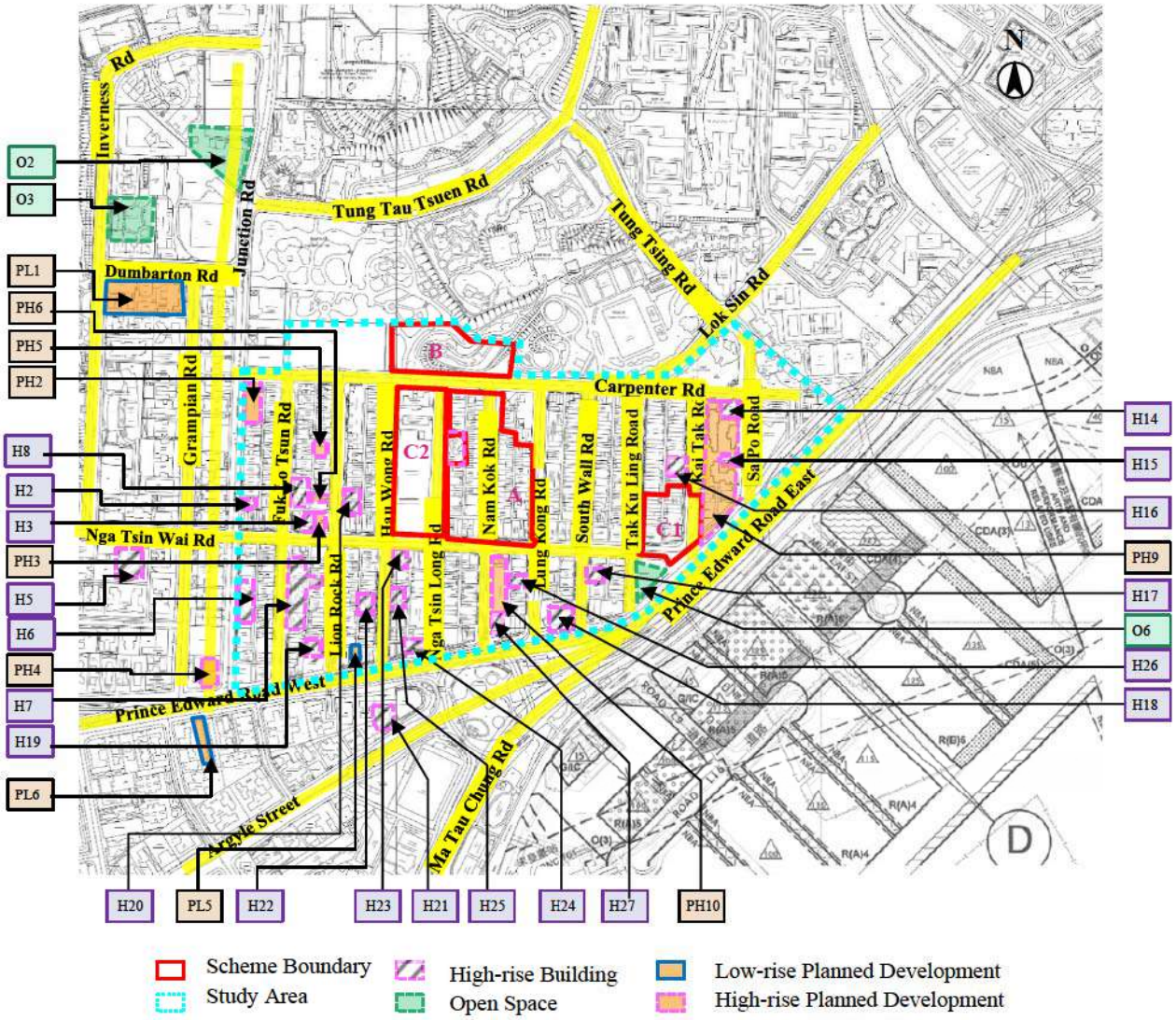

Figure 3 Scattered Open Space, Planned and High-Rise Building Details in Low-Rise Clusters (Source: Lands Department)

Table 1 Summary of Location of Surrounding Area of the Study Area.

	No.	Location	Maximum Building / Terrain Height (mPD)
Low-rise Building	L1	Tung Tau (I) Estate, Tung Tau (II) Estate	47
	L2	Lee Kau Yan Memorial School	31.2
	L3	Tung Tau Community Centre	26.1
	L4	Po Yan Oblate Primary School	26.1
High-rise Building	H1	Mei Yan House	138
	H4	Wellgan Villa	73.9
	H9	Mei Tak House	120
	H10	Billionnaire Avant	100.2
	H11	Tung Wui Estate	101-112
	H12	Wui Chi House (Tung Wui Estate)	99
	H13	Billionnaire Royale and Le Billionnaire	144.4-170
Planned Development	PL2	Proposed Lok Sin Tong Welfare Complex at 61 & 63 Lung Kong Road [2]	58.3
	PL3	40 Lung Kong Road [3]	44.21
	PL4	Planned Low-Rise GIC [4]	15
	PH1	NKIL 6561 [5]	100
	PH7	128 Carpenter Road [6]	100
	PH8	Redevelopment of Mei Tung Estate [7]	140
	PH11	Planned High-Rise Cluster [8] [9]	100-125
Open Space	O1	Pak Hok Shan	77
	O4	Carpenter Road Park and Kowloon Walled City Park	
	O5	Shek Ku Lung Road Playground	
	O7	Argyle Street Playground	
	O8	Olympic Garden	
	O9	Sung Wong Toi Playground	
	O10	Planned Open Space in Kai Tak Development	
C1		Low-Rise Building Cluster 1 (Low-rise building nature)	27.8-57.2
Open Space	O2	Stone Houses Family Garden	
	O3	Inverness Road Garden	

[2] https://www.info.gov.hk/tpb/en/papers/MPC/598-mpc_1-18.pdf
[3] https://www.info.gov.hk/tpb/tc/plan_application/Attachment/20201204/s12a_Y_K10_4_0_gist.pdf
[4] https://www1.ozp.tpb.gov.hk/plan/ozp_plan_notes/en/S_K22_7_e.pdf
[5] https://www1.ozp.tpb.gov.hk/plan/ozp_plan_notes/en/S_K10_27_e.pdf
[6] https://www.info.gov.hk/tpb/tc/plan_application/Attachment/20200515/s12a_Y_K10_3_0_gist.pdf
[7] https://www.info.gov.hk/tpb/en/whats_new/S_K8_22/R_S_K8_22_Attachments.pdf
[8] https://www1.ozp.tpb.gov.hk/plan/ozp_plan_notes/en/S_K22_7_e.pdf
[9] https://www.info.gov.hk/tpb//tc/plan_application/Attachment/20210223/s16_A_K22_30_0_gist.pdf

Planned Development	PL1	NKIL 1382 [10]	48
C2		Low-Rise Building Cluster 2 (Low-rise building nature with scattered high-rise buildings)	24.4-33.3
High-rise Buildings	H2	Luxe Metro	80.2
	H3	Kum On Hin	79.9
	H8	48 Fuk Lo Tsun Road (NKIL 3529 S.D.)	100.1
	H20	Zebrano and NKIL 5119	70.2-93.8
Planned Development	PL5	380 Prince Edward Road West, Kowloon [11]	50.1
	PH2	84-98 Junction Road [12]	100
	PH3	124-126 Nga Tsin Wai Road (NKIL 2725) [13]	80
	PH5	67-71 Lion Rock Road [14]	80
	PH6	NKIL 3778 [15]	80
C3		Low-Rise Building Cluster 3 (Low-rise building nature with scattered high-rise buildings)	27.5-45.6
High-rise Buildings	H5	The Bloomsville	115.6
	H21	Padek Palace	90.9
Planned Development	PL6	349 Prince Edward Road West, Kowloon [16]	39.1
	PH4	NKIL 1903 S.A. RP [17]	80
C4		Low-Rise Building Cluster 4 (Low-rise building nature with scattered high-rise buildings)	18.3-31.6
Open Space	O6	Tak Ku Ling Road Rest Garden	
High-rise Buildings	H6	Patina Wellness	99.9
	H7	Cambridge Heights, Genius Court, Oxford Heights and Cameron Mansion	67.5-106.4
	H17	10 South Wall Road (NKIL 5475 RP)	74.2
	H18	Prince Ritz	126.1
	H19	1 Lion Rock Road	73.8
	H22	The Opulence	89.1
	H23	Billionnaire Luxe	80.3
	H24	The Prince Place	87
	H25	The Avery	80.1
	H26	Urbana Lofts	93.8

[10] https://www2.ozp.tpb.gov.hk/gist/amend/en_tc/Y_K18_6_TC.pdf
[11] https://www2.ozp.tpb.gov.hk/gist/apply/en_tc/A_K10_249-1_TC.pdf
[12] Google Map / Site Visit
[13] https://www1.ozp.tpb.gov.hk/plan/ozp_plan_notes/en/S_K10_27_e.pdf
[14] https://www1.ozp.tpb.gov.hk/plan/ozp_plan_notes/en/S_K10_27_e.pdf
[15] https://www1.ozp.tpb.gov.hk/plan/ozp_plan_notes/en/S_K10_27_e.pdf
[16] https://www.info.gov.hk/tpb/tc/plan_application/Attachment/20190409/s16_A_K10_261_0_gist.pdf
[17] Google Map / Site Visit

	H27	420-422 Prince Edward Road East	80.2
Planned Development	PH10	4-24 Nam Kok Road [18]	100
C5		Low-Rise Building Cluster 5 (Low-rise building nature with scattered high-rise buildings)	14.8-38.1
High-rise Buildings	H14	High Place	*87.4*
	H15	Carlson Court	75.8
	H16	55 Kai Tak Road (NKIL 499 S.B. ss2)	91.7
Planned Development	PH9	KC-015 Kai Tak Road/ Sa Po Road [19]	120

To the north of Study Area, there are mainly large open spaces, including Carpenter Road Park and Kowloon Walled City Park (O4). At a further distance to the north direction, there is the Mei Tung Estate redevelopment (PH8) surrounded by high-rise residential buildings Mei Yan House (H1) and Mei Tak House (H9), and Pak Hok Shan (O1).

To the northeast, there are mainly low-rise buildings, including low-rise Tung Tau (I) Estate, Tung Tau (II) Estate (L1), Lee Kau Yan Memorial School (L2), Tung Tau Community Centre (L3), and Po Yan Oblate Primary School (L4), and high-rise building and open space situated within, such as Tung Wui Estate (H11 & H12) and Shek Ku Lung Road Playground (O5).

Kai Tak Development (PH11), an ongoing development comprising G/IC, CDA, OU, Commercial and Residential developments with building height ranging between 15mPD to 135mPD is situated to the east and southeast side of Study Area.

An extensive open space system is located at the south of Study Area, including Argyle Street Playground (O7), Olympic Garden (O8), Sung Wong Toi Playground (O9), and Planned Open Space in Kai Tak Development (O10) as well as a Planned Low-Rise GIC (PL4). To the southwest of the Study Area, high-density and Low-Rise Building Cluster 3 (C3) situated with few scattered high-rise buildings (H5, H21, and PH4) and planned low-rise 349 Prince Edward Road West, Kowloon (PL6). Meanwhile, a similar high-density and Low-Rise Building Cluster 4 (C4) with some high-rise buildings (H6, H7, H17-H19, H22-H26, and PH10) scattered within is located at the immediate south to the Scheme within Study Area.

A planned high-rise NKIL 6561 (PH1) is situated at the immediate northwest of Study Area. To the west and northwest, there is Low-Rise Building Cluster 1 (C1) with open spaces such as Stone Houses Family Garden (O2) and Inverness Road Garden (O3), and low-rise planned development at NKIL 1382 (PL1); as well as the high-rise Wellgan Villa (H4) in the area. Also, high-density and Low-Rise Building Cluster 2 (C2) with similar morphology as C4 is located at the west and northwest of the Study Area to the west of Site A, B and C2, which includes existing and proposed high-rise development, such as Luxe Metro (H2), Kum On Hin (H3),

[18] https://www1.ozp.tpb.gov.hk/plan/ozp_plan_notes/en/S_K10_27_e.pdf
[19] https://www1.ozp.tpb.gov.hk/plan/dev_plan_notes/tc/S_K10_URA1_2_c.pdf
https://www.info.gov.hk/tpb/en/papers/TPB/1202-tpb_10542.pdf

planned high-rise 84-98 Junction Road (PH2), 124-126 Nga Tsin Wai Road (NKIL 2725) (PH3), 67-71 Lion Rock Road (PH5), and NKIL 3778 (PH6).

The Low-Rise Building Cluster 5 (C5) indicates the area between Site A and Site C1, and the northeast of the Site C1, where scattered with high-rise residential buildings, including High Place (H14), Carlson Court (H15), and 55 Kai Tak Road (H16), planned high-rise buildings at KC-015 Kai Tak Road/ Sa Po Road (PH9). To the immediate northeast of Site A, there are planned low-rise Proposed Lok Sin Tong Welfare Complex at 61 & 63 Lung Kong Road (PL2) and 40 Lung Kong Road (PL3). Also, an existing high-rise Billionnaire Avant (H10) is located between Site A and C2 along Nga Tsin Long Road.

3 Site Wind Availability Data

To investigate the wind performance of the Scheme, the characteristic of the natural wind availability of the site is essential. Site wind availability data presented in the wind rose could be used to assess the wind characteristics in terms of the magnitude and frequency of approaching wind from different wind directions. According to the *AVA Technical Circular* [1] for Developments in Hong Kong, the site wind availability data will be referred to the simulated RAMS data from Planning Department.

Planning Department (PlanD) has set up a set of simulated meso-scale data of Regional Atmospheric Modelling System (RAMS) of the territory for AVA Study, which can be downloaded from Planning Department Website [1] . Among the wind data at three levels (200m, 300m and 500m), wind data at 200m would be suitable to represent the wind data with consideration of surrounding morphology. The location of the Scheme falls within the location grids (x: 083, y: 045), (x: 084, y: 045), (x: 083, y: 044) and (x: 084, y: 044) in the RAMS database [1], as indicated in Figure 4. The annual and summer wind roses at 200m are shown in Figure 5.

From these wind roses, the annual and summer prevailing wind directions are E/NNE/ENE and SW/E/SSW, respectively.

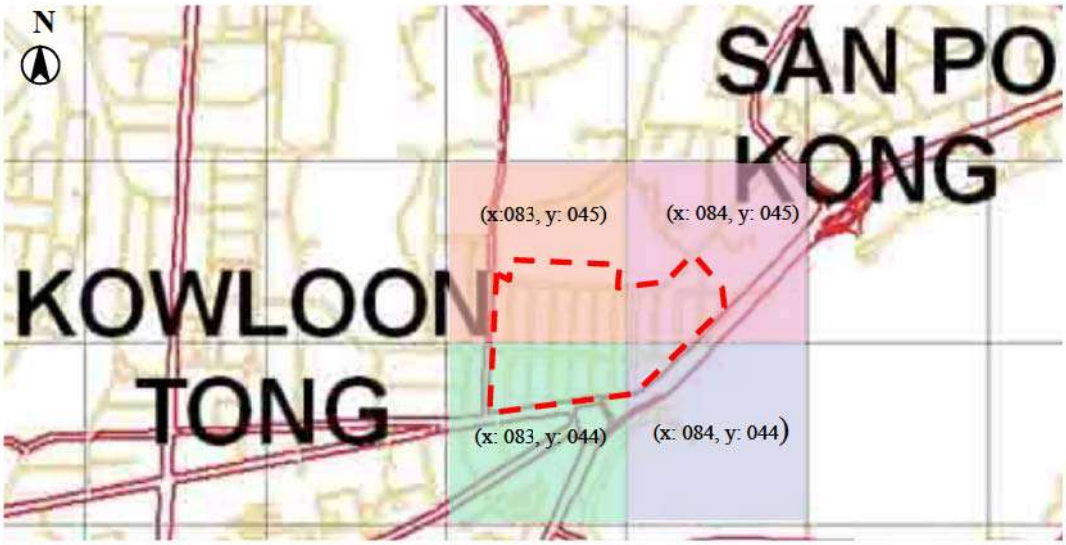

Figure 4 RAMS Grid and the Study Area Location

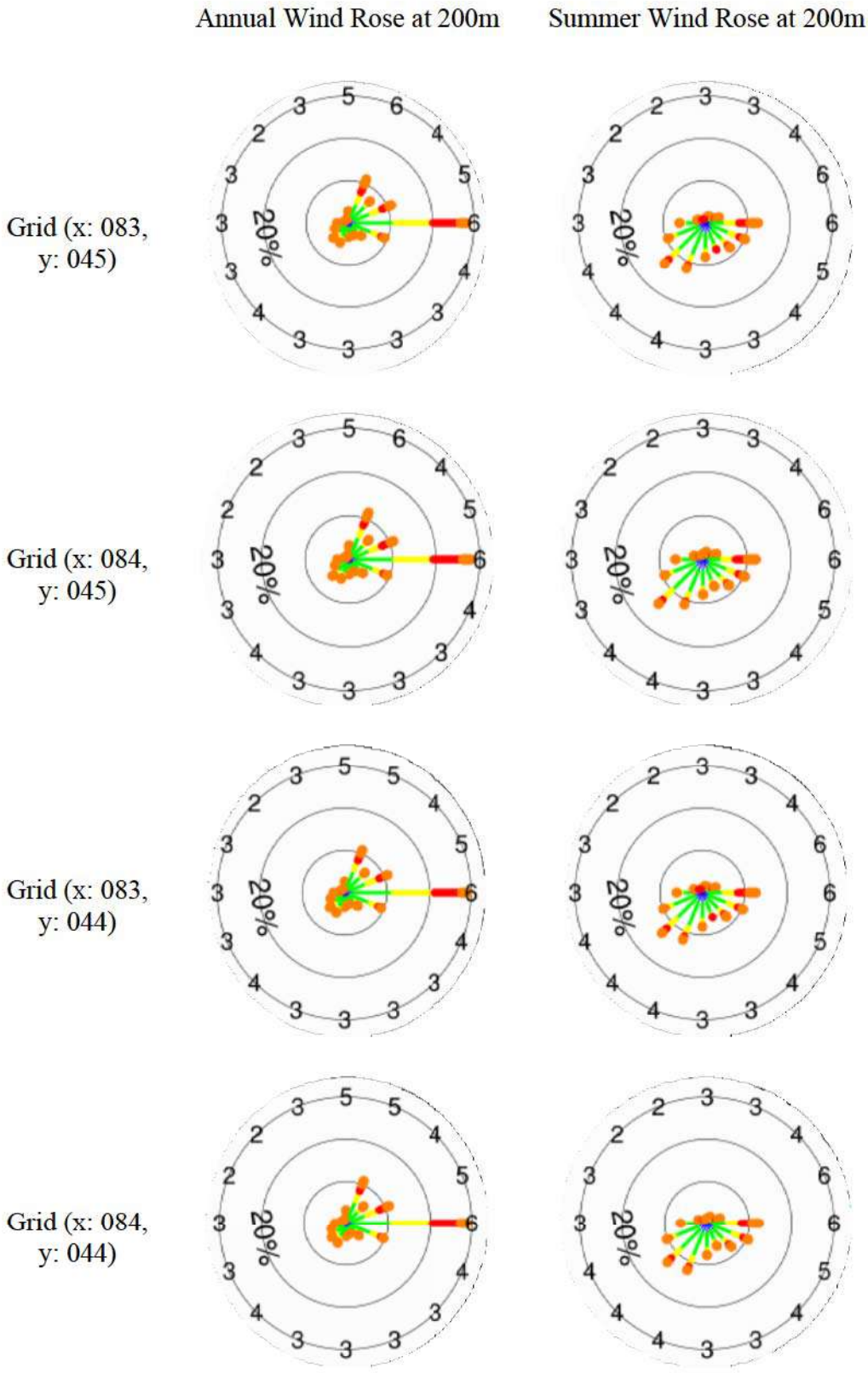

Figure 5 Annual and Summer Wind Roses at 200m at Grids (x: 083, y: 045), (x: 084, y: 045), (x: 083, y: 044) and (x: 084, y: 044) [1]

4 Studied Scenarios

To evaluate the potential ventilation impact of the proposed changes of the Study Site, two schemes have been studied in this Air Ventilation Assessment – Expert Evaluation, namely, Baseline Scheme and Proposed Scheme.

4.1 Baseline Scheme

The Baseline Scenario is formulated based on the assumption that the land parcels within the identified scheme boundary are developed individually with all existing road and service lane remain (no road closure). The Baseline Scheme reflects possible redevelopment by market practitioners which are in various size of land parcels, and in compliance with the development restrictions as stipulated under the approved OZP and requirements under the Buildings Ordinance. The Baseline Scheme and the key development parameters of the Baseline Scheme are shown in Figure 6 and Table 2.

Apart from the planned development, all other buildings in the district are considered with existing condition.

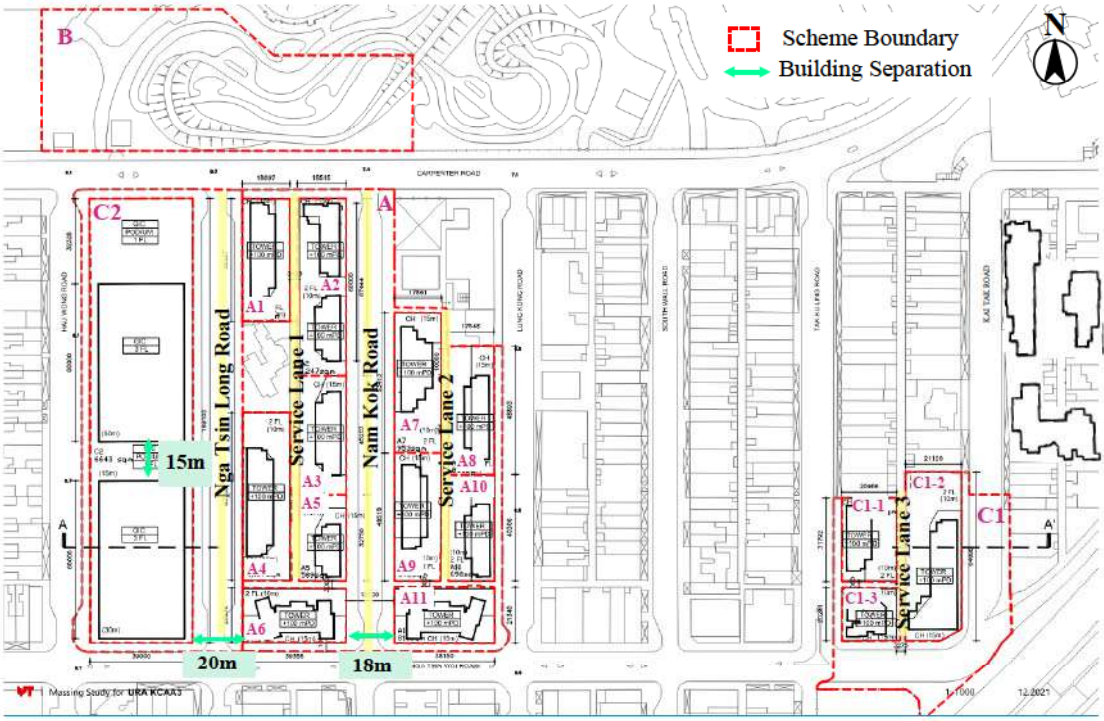

Figure 6 Layout Plan of Baseline Scheme

Table 2 Development Parameters of Baseline Scheme

Development Parameter	A	B	C1	C2
Net Site Area (sqm)	13,353	6,600	3,367	8,582
Plot Ratio	7.5 / 1.5 (or PR 7.5/ 0.9375 if it is a class A site)	/	7.5 / 1.5 (or PR 7.5/ 0.9375 if it is a class A site)	/
Maximum Building Height (mPD)	12 residential blocks of 100 mPD 11 two-storey podium and one-storey clubhouse	Existing Condition Open Space	3 residential blocks of 100 mPD 3 two-storey podium and one-storey clubhouse	2 GIC towers of 30-50 mPD (in-situ redevelopment)

PR: Plot Ratio; GIC: Government, Institution and Community

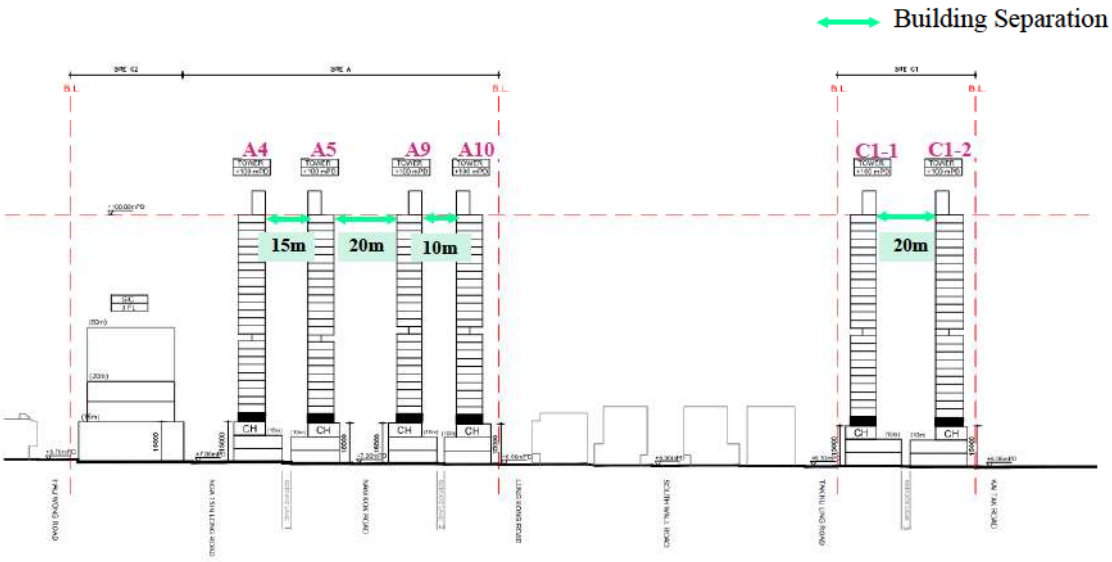

Figure 7 Section View of Baseline Scheme

4.2 Proposed Scheme

The Proposed Scheme and the key development parameters of the Proposed Scheme are shown in Table 3 and Figure 8. The Scheme has a net site area of about 25,302sq.m. for PR calculation in R(A) zone[20]. A new GIC complex of maximum 100mPD is proposed at the Northern Site (Site B). The Main Site (Site A and Site C2) are proposed for high-rise residential developments with a range of proposed building heights from 143mPD to 160mPD. The Eastern Site (Site C1) is proposed to develop a low-rise commercial complex of about 21mPD. The design is notional and subject to change at detailed design stage.

Nga Tsin Long Road and Nam Kok Road are proposed to be pedestrianized to enhance the walkability of the area. Diversion of Kai Tak Road/ Nga Tsin Wai Road is also proposed at the Eastern site (Site C1) to create a gateway square for public enjoyment.

Table 3 Development Parameters of Proposed Scheme

Development Parameter	**A**	**B**	**C1**	**C2**
Net Site Area (sq.m)	13,353	6,600	3,367	8,582
Gross Floor Area (sq.m) (Plot Ratio)	Dom: 106,824 (8.0) Non-Dom: 13,353 (1.0)	NA	Non-Dom: 2,000 (0.59)	Dom: 95,592 (11.1) Non-Dom: 9,949 (1.2)
Building Height (mPD)	Max. BHR: 160mPD Current Notional Design: 4 residential blocks ranging from +143mPD to +160mPD; Podia Design: 1 - 3 storeys of clubhouse/GIC/retail facilities.	Max. BHR: 100mPD Current Notional Design: +100mPD GIC Complex with stepped height profile	Max. BHR: 40mPD Current Notional Design: Commercial/retail low-rise block with about +21.1mPD	Max. BHR: 160mPD Current Notional Design: 3 residential blocks ranging from +143mPD to +160mPD; Podia Design: 1 - 3 storeys of clubhouse/GIC/retail facilities.

Dom: Domestic; Non-Dom: Non-Domestic; BHR: Building Height Restriction; GIC: Government, Institution and Community. Notional Design of Proposed Scheme for demonstration purpose and subject to change.

[20] The net site area has excluded the three new road sections in the Scheme (the two new private streets proposed at the Main Site (Site C2 &A) and the new diverted road at the Eastern Site (Site C1), and the surrounding pavement of the Scheme. Should there be later departmental comments for a smaller net site area, the technical assessments conducted based on the development potential from this net site area (i.e. 25,302sq.m.) would be considered as the worst-case scenario for the proposed development of the draft DSP.

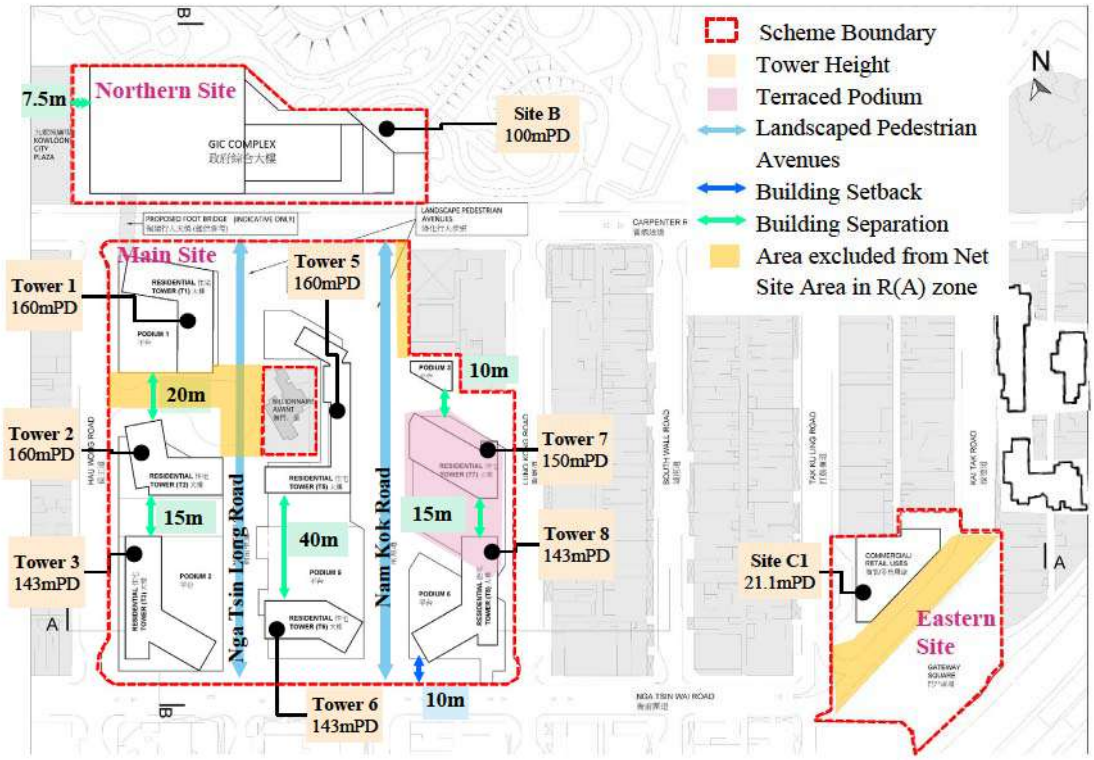

Figure 8 Notional Design of Proposed Scheme

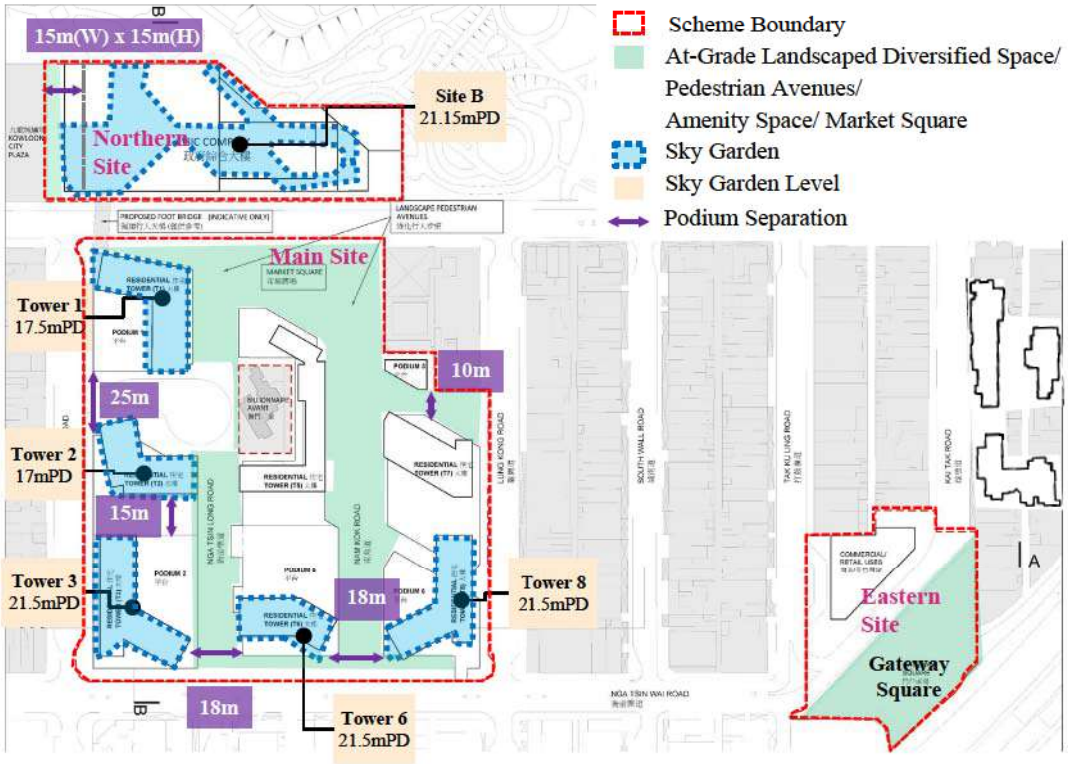

Figure 9 Landscaped Diversified Space of Proposed Scheme



Figure 10 Section A-A of Proposed Scheme

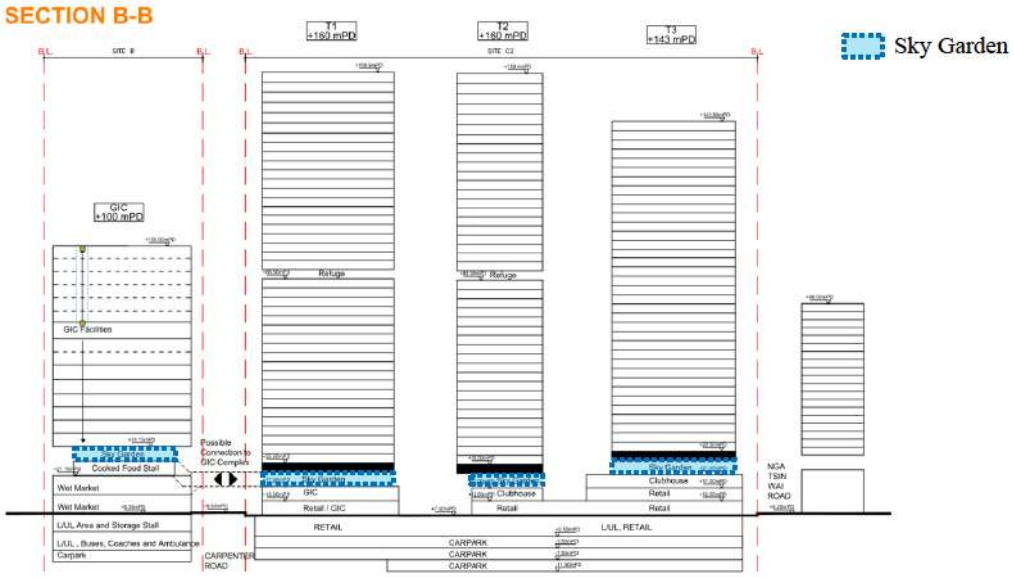

Figure 11 Section B-B of Proposed Scheme

Compared to Baseline Scheme, the following wind enhancement features have been adopted in the Proposed Scheme:

- Building Setback
- Building Separation
- Reduced Podium Coverage
- Provision of At-grade Landscaped Diversified Space (Landscaped Pedestrian Avenues, Market Square, Gateway Square, etc)
- Terraced Podium
- Stepped Building Height
- Sky Gardens, Landscaped terrace, Viewing Deck

5 Expert Evaluation of Directional Analysis

5.1 NNE Wind

NNE wind is one of the major prevailing wind directions under annual condition. With reference to AVA-Initial Study (AVA-IS) conducted for the planned high-rise buildings at KC-015 Kai Tak Road/ Sa Po Road, the NNE prevailing wind would penetrate through the low-rise developments including Tung Tau (I) Estate, Tung Tau (II) Estate, Lee Kau Yan Memorial School, Tung Tau Community Centre, and Po Yan Oblate Primary School before reaching the Study Area.

The existing high-rise buildings, such as Tung Wui Estate, Mei Yan House and Mei Tak House, as well as planned high-rise Mei Tung Estate redevelopment located at the upwind direction of the Study Area would partly shield the incoming NNE prevailing wind.

Nevertheless, the large open space Carpenter Road Park and Kowloon Walled City Park would act as a wind pocket to allow the wind coming from NNE to further distribute towards area to the south of Carpenter Road along north-south aligned roads. A majority of the incoming NNE wind would reach the Site A, B and C2 from Carpenter Road Park and Kowloon Walled City Park by travelling along the Hau Wong Road, Nga Tsin Long Road, and Nam Kok Road (**Magenta** arrows in Figure 12). However, the west portion of the Study Area would be shield by the planned 128 Carpenter Road. The wind availability in the west of the Study Area would be relatively limited.

The existing high-rise Billionnaire Royale and Le Billionnaire, 55 Kai Tak Road (NKIL 499 S.B. ss2) and planned high-rise buildings at KC-015 Kai Tak Road/ Sa Po Road would cast a wind shadow to Site C1 and block some incoming NNE wind from Tak Ku Ling Road and Kai Tak Road. Another stream of incoming wind would reach Site C1 from the scheme boundary through the planned split-level sunken plaza in the KC-015 Kai Tak Road/ Sa Po Road from Prince Edward Road East (**Blue** arrows in Figure 12).

As the building clusters within Study Area are generally aligned in the north-south direction, with the length and width being around 185m and 20m respectively, this will facilitate the NNE prevailing wind to penetrate towards the downwind directions.

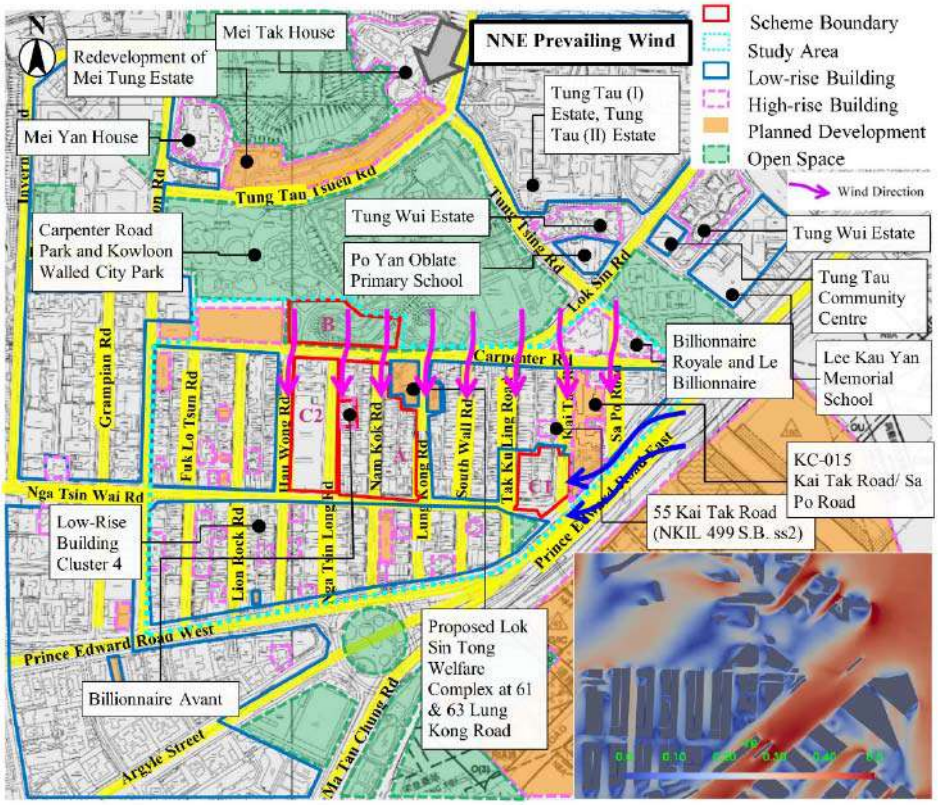

Figure 12 Wind Environment under NNE winds

5.1.1 Baseline Scheme (NNE Wind)

Since Site B would retain the existing open space condition under baseline scenario, the NNE prevailing wind would be able to reach a portion of Site A and C2 from the Carpenter Road Park and Kowloon Walled City Park (**Magenta** arrow in Figure 13). The NNE prevailing wind at high level would be able to skim over the Proposed Lok Sin Tong Welfare Complex at 61 & 63 Lung Kong Road to reach Site A, and then be downwashed by the high-rise buildings under Baseline Scenario to pedestrian level of Carpenter Road. Hence, the wind environment of Carpenter Road and Proposed Lok Sin Tong Welfare Complex at 61 & 63 Lung Kong Road would be enhanced (**Magenta** circle in Figure 13).

On the other hand, the first tier of buildings in Site A would cast a wind shadow to the leeward side, such as Billionnaire Avant in between Site A and Site C2. However, the wind captured by the first tier of buildings along Carpenter Road would be able to penetrate through the streets running in the north-south direction, i.e. Nga Tsin Long Road and Nam Kok Road (**Black** arrows in Figure 13). Localized enhancement would be expected at the north portion of Study Area.

The compact integrated podium structure in baseline scenario would impede the downwashed incoming NNE winds at low level. For the high-level NNE wind penetrated through the north-south aligned building separations within Site A, the two towers along Nga Tsin Wai Road (i.e. Site A6 and A11) would capture and downwash the incoming wind to low level, which would slightly enhance the wind environment onsite (**Green** circles in Figure 13).

Apart from the low-rise GIC portion in Site C2 would enable the NNE prevailing wind from Carpenter Road Park and Kowloon Walled City Park to skim over (**Brown** arrow in Figure 13), wind shadow would be induced by the high-rise buildings in Site A and reduce the wind availability at the south portion of Study Area, such as Low-Rise Building Cluster 4 to the south of Nga Tsin Wai Road.

A portion of incoming wind would reach to Site C1 skimming over the planned split-level sunken plaza at southern portion of the KC-015 Kai Tak Road/ Sa Po Road and Prince Edward Road East. The high-rise buildings in Site C1 would shield the incoming wind from reaching the leeward side along Nga Tsin Wai Road (**Blue** arrow and **Light Blue** circle highlighted in Figure 13). As the wind environment at Site C1 and its leeward side is dominant by wind shadow casted by the existing high-rise Billionnaire Royale and Le Billionnaire, 55 Kai Tak Road (NKIL 499 S.B. ss2) and KC-015 Kai Tak Road/ Sa Po Road to the north. Generally, relatively calm wind environment is expected.

5.1.2 Proposed Scheme (NNE Wind)

Similar to Baseline Scenario, the high-rise developments at the main site (Site A and C2) would be able to downwash the incoming high-level wind towards pedestrian level while wind shadow would be casted to the south of Nga Tsin Wai Road. Although the building height has been increased as compared with Baseline Case, the permeability under Proposed Scheme, such as provision of at grade amenity space, reduced podium coverage and building separation, has enhanced to allow air movement within the Study Area.

The stepping building height profile between Tower 7 at Site A and the planned redevelopment, Proposed Lok Sin Tong Welfare Complex at 61 & 63 Lung Kong Road, together with the 10m building setback provided between the two sites, would facilitate the incoming wind to be downwashed and further distributed at pedestrian level along Lung Kong Road and Nam Kok Road (**Green** circle and arrows in Figure 14).

The new GIC complex in Site B located at the north side of Carpenter Road would inevitably shield some of the incoming wind from Carpenter Road Park and Kowloon Walled City Park (**Magenta** arrow in Figure 14). However, the cascading profile of the GIC Complex allows a lower building height at its eastern part for more wind penetration towards the main site.

The stepping design of the new GIC building block including open-air viewing deck, sky garden, and landscaped terrace provided at the lower portion of the new GIC complex in Site B would increase the wind permeability to leeward sites by allowing some of the prevailing wind to skim over and reach to the downstream Sites A and C2 (**Purple** arrows in Figure 14).

In addition, the 15m(W) x 15m(H) podium separation from the planned 128 Carpenter Road (future Kowloon City Plaza) at the west of the new GIC complex in Site B improves the air permeability at low level. It would allow incoming NNE wind to penetrate through and reach the adjoining Carpenter Road. (**Red** arrow in Figure 14).

Besides, the stepping building height difference between high-rise residential towers in sites A & C2 and the new GIC complex in site B would enable high-level wind to skim over and facilitate a downwash effect at Carpenter Road. The building setback of Tower 5 would also allow the incoming NNE wind to be downwashed at the location further into the Study Area and improve the wind environment locally and its leeward side along the 18m- and 20m-width pedestrian avenues (**Magenta** circles in Figure 14).

Under Proposed Scheme, Sites A and C2 incorporate reduced podium coverage designs to allow more amenity space at grade. The landscape pedestrian avenue and the at-grade landscaped diversified space provided at Nga Tsin Long Road would act as a wind entrance for more NNE wind, together with on-site air paths retained, to travel further into the hinterland of the Study Area, such as Low-Rise Building Cluster 4, along Hau Wong Road and Nga Tsin Long Road. (**Brown** arrows in Figure 14).

Site C1 would be approached by the incoming wind from planned split-level sunken plaza at KC-015 Kai Tak Road/ Sa Po Road and along the Prince Edward Road East. Comparing to the Baseline Scheme, the low-rise commercial podium in Site C1 would allow more wind to flow atop it reaching the downstream portion of Low-Rise Building Cluster 4 and Low-Rise Building Cluster 5 (**Black** arrow in Figure 14). Apart from that, the building setback of commercial podium would also allow incoming wind to reach the downstream area along Nga Tsin Wai Road (**Blue** arrows in Figure 14).

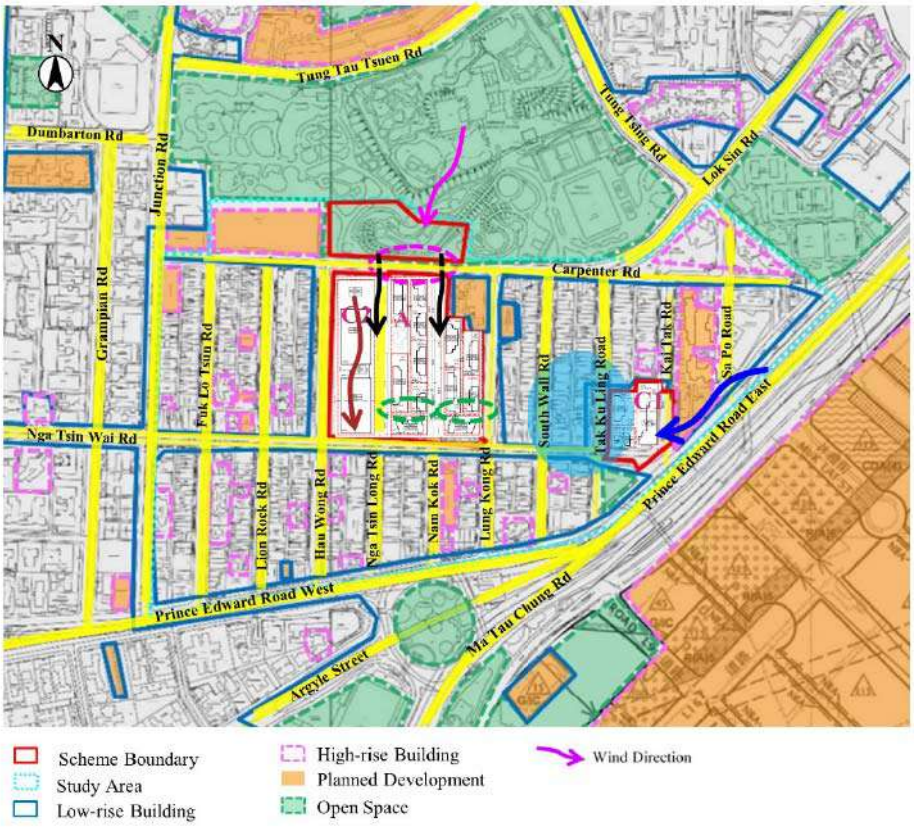

Figure 13 Wind Environment of Baseline Scheme under NNE winds

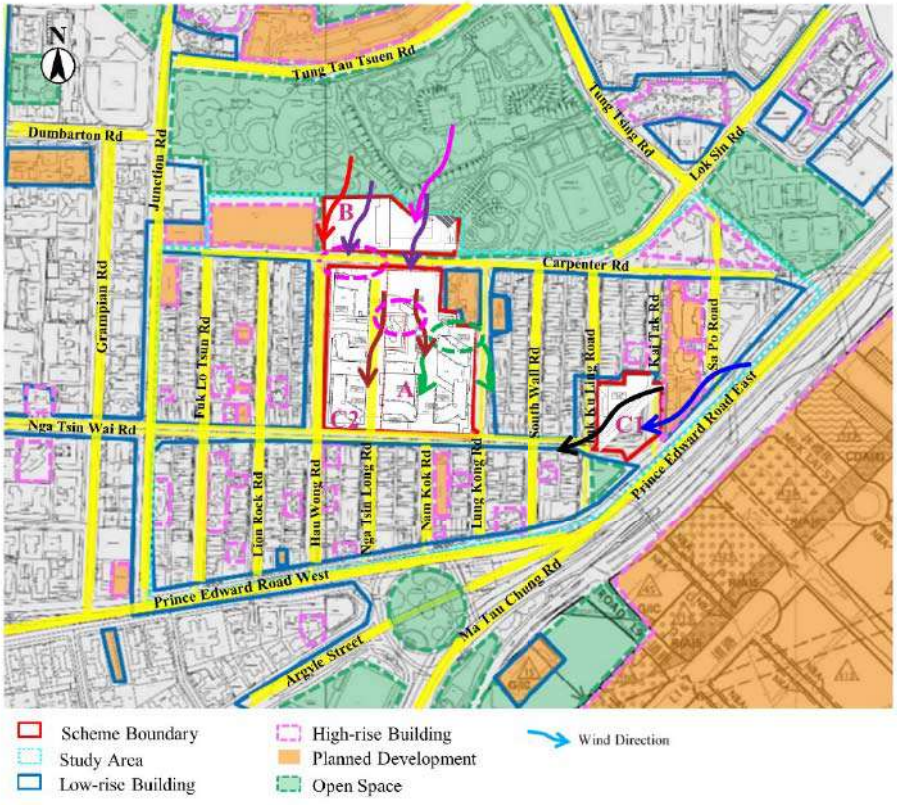

Figure 14 Wind Environment of Proposed Scheme under NNE winds

5.2 ENE/E Winds

ENE wind is one of the major annual prevailing wind directions and E wind is one of the major prevailing winds under both annual and summer conditions.

As indicated in AVA-Initial Study (AVA-IS) conducted for KC-015 Kai Tak Road/ Sa Po Road, the Site A, C1 and C2 are located downwind of the predominant annual and summer winds come from E / ENE directions, which shielded by the planned high-rise buildings at KC-015 Kai Tak Road/ Sa Po Road, existing high-rise residential buildings High Place and Carlson Court, and Low-Rise Building Cluster 5 in the east of Study Area. In addition, owing to the lack of building gaps or open spaces in east-west direction, the hinterland of Study Area would be relatively calm.

As for Site B, it is relatively open in the east. which is surrounded by large open space. The connection of open spaces, including Carpenter Road Park and Kowloon Walled City Park and Shek Ku Lung Road Playground, and local air paths, i.e. Lok Sin Road and Carpenter Road, allows incoming ENE/E wind to flow around the high rise Billionnaire Royale and Le Billionnaire and reach the new G/IC complex in Site B (**Red** arrows in Figure 15).

The existing low-rise Regal Oriental Hotel at the eastern edge of Study Area would shield a portion of the incoming wind at low and mid-level. But the incoming wind at high level would still be able to flow atop of the existing Regal Oriental Hotel and reach the planned KC-015 Kai Tak Road/ Sa Po Road. The planned KC-015 Kai Tak Road/ Sa Po Road is designed with a building separation of approximately 11m-wide at the middle of the project site and planned split-level sunken plaza would be provided at the southern portion of the site, which facilitate wind penetration into Study Area (**Blue** arrows in Figure 15).

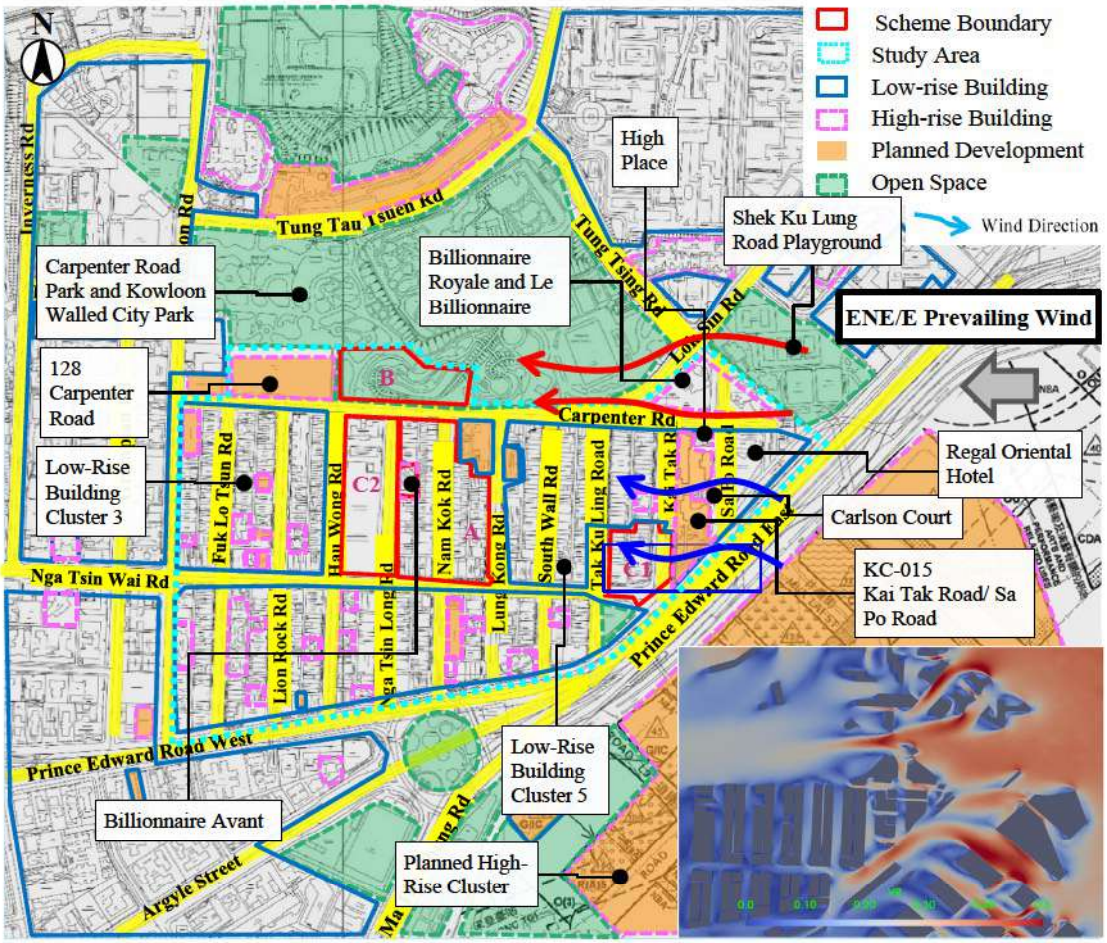

Figure 15 Wind Environment under ENE/E winds

5.2.1 Baseline Scheme (ENE/E Wind)

The prevailing ENE/E wind would reach Site C1 by passing through the planned split-level sunken plaza provided at the southern portion of the planned KC-015 Kai Tak Road/ Sa Po Road and Prince Edward Road West (**Blue** arrow in Figure 16). The OZP compliance high-rise building in Site C1 would shield the leeward developments in the Study Area. Downwash effects would then be induced by the large eastern façade of the high-rise building in Site C1 to divert wind to pedestrian level at Prince Edward Road West and the open space in southern part of the planned KC-015 Kai Tak Road/ Sa Po Road (**Blue** circle in Figure 16).

The wind environment in the leeward portion of Site C1 and the planned KC-015 Kai Tak Road/ Sa Po Road would be calmer due the wind shadow casted. The wind would recover slightly over the Low-Rise Building Cluster 5 between Tak Ku Ling Road and Lung Kong Road before reaching the high-rise development at Sites A and C2. Together with the wind penetrated through the building separation of the planned KC-015 Kai Tak Road/ Sa Po Road (**Green** arrow in Figure 16), the incoming wind would be downwashed to pedestrian level of Lung Kong Road to enhance the wind environment locally (**Magenta** circle in Figure 16).

However, the large podium coverage of Site A would hinder the wind penetration of the downwashed wind to travel through Site A. The wind environment of Site

C2 where is located at downstream of Site A is adversely affected. Meanwhile, the high-rise residential towers with similar building height and non-aligned building separations in East-West direction in Site A would cast a wind shadow over the leeward of Site A, including Site C2, Billionnaire Avant, and Low-Rise Building Cluster 3 with scattered high-rise buildings.

Since Site B would remain the existing condition in open space under the baseline scenario, the prevailing wind would skim over and be downwashed and diverted by the planned 128 Carpenter Road reaching Carpenter Road Park and Kowloon Walled City Park (**Red** arrows and **Black** circle in Figure 16).

5.2.2 Proposed Scheme (ENE/E Wind)

Similar to Baseline Scheme, the ENE/E wind would reach Site C1 through planned split-level sunken plaza provided by the planned KC-015 Kai Tak Road/ Sa Po Road and Prince Edward Road West. With the proposed low-rise commercial provided in Site C1 (**Blue** arrow in Figure 17) and building separation in the planned KC-015 Kai Tak Road/ Sa Po Road (**Green** arrow in Figure 17), wind entrance would be much enhanced to allow more wind to skim over the Low-Rise Building Cluster 5 and reach Site A. The road diversion and the gateway square provided in Site C1, together with the Tak Ku Ling Road Rest Garden at the junction of Kai Tak Road and Nga Tsin Wai Road and the split-level sunken plaza provided by the planned KC-015 (i.e. enlarged scalable gateway), would create a widened wind entrance to facilitate the entry of annual ENE/ E winds into the Study Area (**Brown** arrows in Figure 17).

Downwash effect would be induced at Lung Kong Road towards pedestrian level due to the height difference between existing buildings and Tower 7 & 8 of the Proposed Scheme (**Black** circle in Figure 17). The building separation between Tower 7 & 8 would also allow the incoming wind to penetrate through to leeward area.

Apart from the stepping building height profile between the Proposed Scheme and the existing building, the step height profile among Site A, +160mPD for Tower 5 at west and +150mPD at east, also creates height variation to promote air movement. More incoming winds would be captured and downwashed at high level to ventilate the podium and pedestrian level (**Magenta** circle in Figure 17).

The east-west aligned 10-m building setbacks along Nga Tsin Wai Road and building separations from the Scheme boundary at Site A would enhance wind permeability. This would facilitate the incoming ENE/E winds to penetrate through Sites A and C2, and ventilate the district, Low-Rise Building Cluster 2, at the leeward side (**Black** arrows in Figure 17). Also, the sky garden, podium separation, and at-grade landscaped diversified space provided in Sites A and C2 also would promote air movements by enhancing wind permeability of the developments.

The new GIC complex in Site B would shield some wind at the eastern façade of the planned 128 Carpenter Road. However, a downwash effect would be induced by the complex to direct airflow to the pedestrian level by creating a stepping building height profile with the adjacent Carpenter Road and Carpenter Road Park and Kowloon Walled City Park. This would help to capture the annual prevailing

winds coming from the ENE/E direction to the pedestrian level (**Red** arrows and **Red** circle in Figure 17).

To the leeward of the GIC complex in site B, the sky garden design at 3/F would alleviate the shielding effect imposed by allowing the prevailing wind to ventilate the at low level. Also, owing to the building setback and the lower building height of the GIC complex compared to the planned 128 Carpenter Road, high-level prevailing winds would be captured and travel along Carpenter Road to ventilate the downwind surroundings.

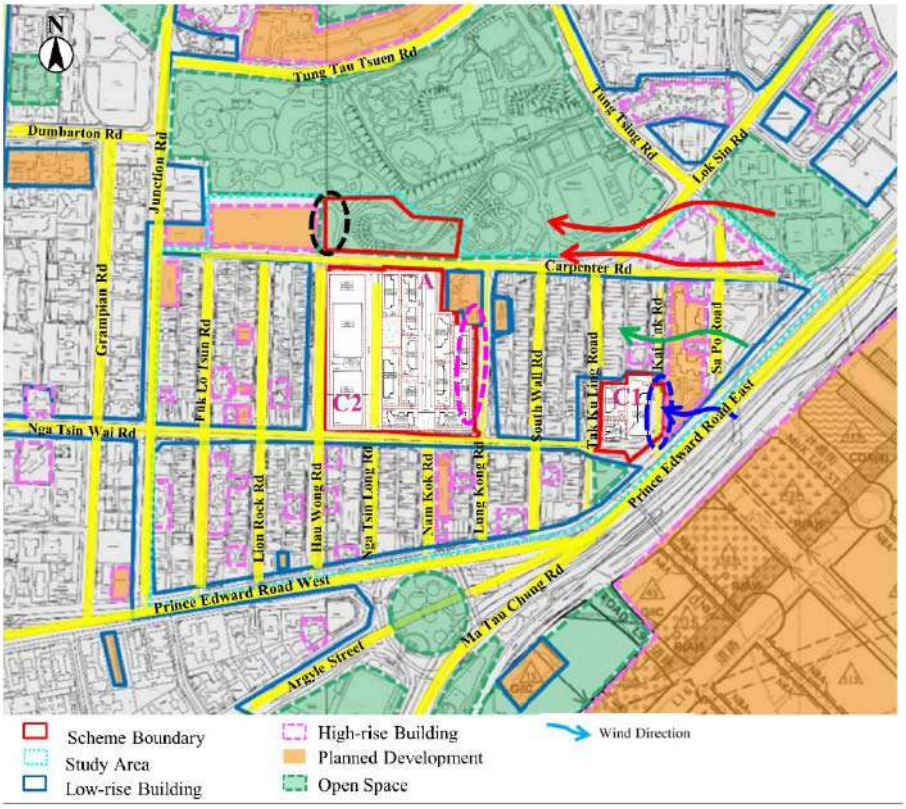

Figure 16 Wind Environment of Baseline Scheme under ENE/ E winds

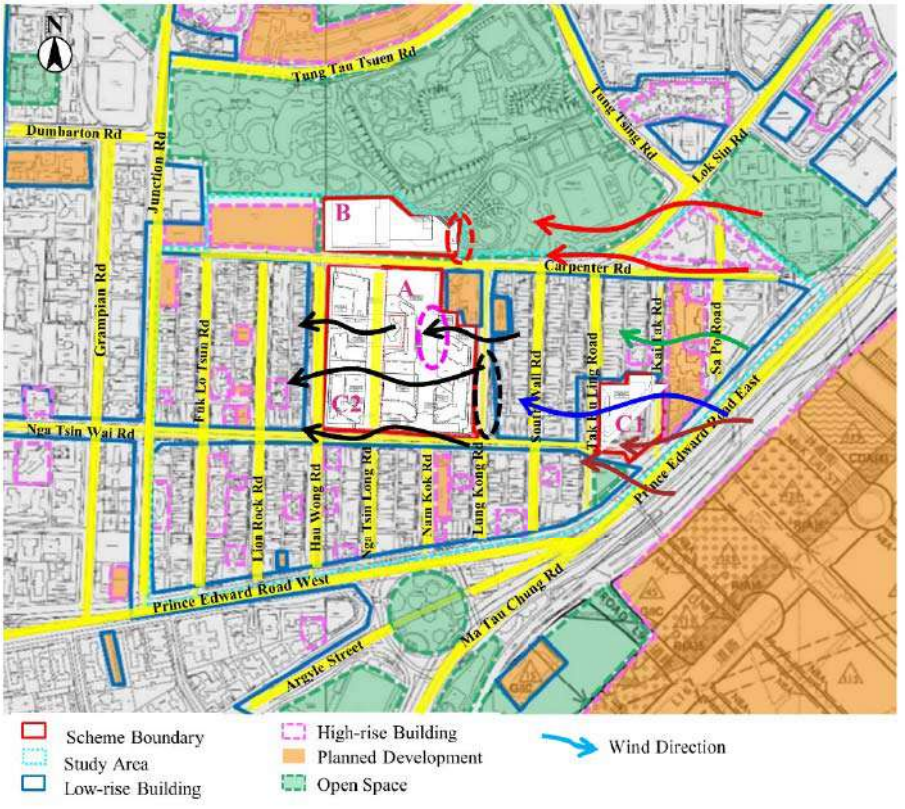

Figure 17 Wind Environment of Proposed Scheme under ENE/ E winds

5.3 SW/SSW Wind

SW and SSW wind directions are the major prevailing wind directions in summer. With reference to the previous AVA-IS of planned KC-015 Kai Tak Road/ Sa Po Road, the summer SSW/SW prevailing winds would travel along the north-south aligned roads, the wind performance in Study Area would be generally windier under summer wind condition.

As the area further to the south of Study Area is relatively open, open spaces including Argyle Street Playground, Olympic Garden, Sung Wong Toi Playground, and Planned Open Space in Kai Tak Development, it allows SW/SSW wind to penetrate through and reach the Study Area along Ma Tau Chung Road, Argyle Street, and Prince Edward Road West (**Purple** arrows in Figure 18).

Then, the incoming wind from Prince Edward Road West would flow along Hau Wong Road, Nga Tsin Long Road, Nam Kok Road and Lung Kong Road in Study Area to reach to Site A, B, and C2 (**Black** arrows in Figure 18).

The mid-to-high level incoming wind would skim over the Low-Rise Building Cluster 3 with generally low-rise building nature to reach the Study Area. Then, the incoming wind the penetrate through building gaps between the scattered high-rise buildings in the Low-Rise Building Cluster 4.

Meanwhile, another stream of the incoming wind from the Prince Edward Road West would travel along the road to the junction with Prince Edward Road East and enter the Site C1 from southwest boundary through Tak Ku Ling Road Rest Garden. (**Blue** arrow in Figure 18).

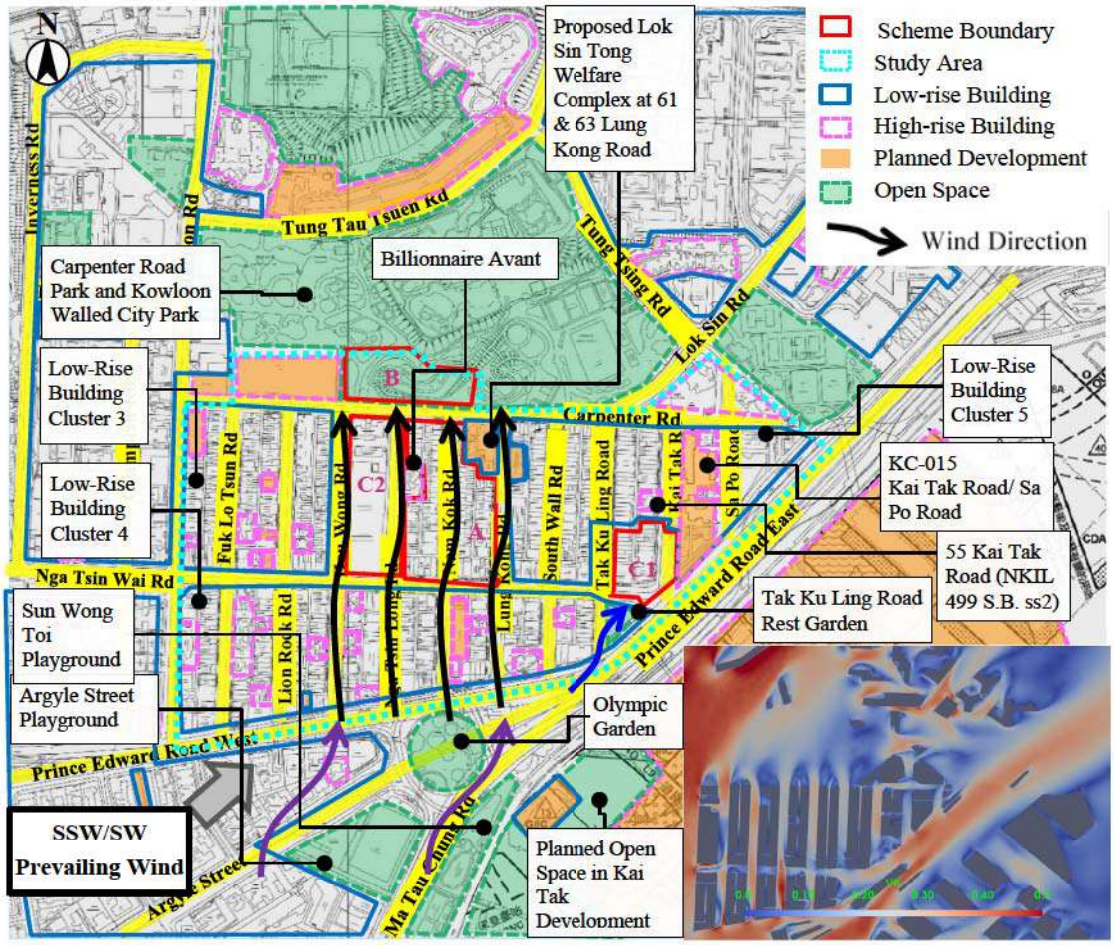

Figure 18 Wind Environment under SW/SSW winds

5.3.1 Baseline Scheme (SW/SSW Wind)

The high-rise development at Site A as well as the planned high-rise 128 Carpenter Road would downwash the incoming mid-to-high level SW/SSW wind to pedestrian level at Carpenter Road and Nga Tsin Wai Road, respectively (**Purple** arrows and **Purple** circles in Figure 19). The downwashed wind by the high-rise residential towers in Site A would be further delivered to the leeward side along Nga Tsin Long Road, Nam Kok Road, and Lung Kong Road.

The stepped building height difference between GIC towers in Site C2 and high-rise residential tower in Site A enables the SSW/SW prevailing wind to skim over GIC podium and be downwashed by the high-rise towers along the Nga Tsin Long Road enhancing the wind environment locally (**Magenta** circle in Figure 19). Owing to the packed podium coverage of the Scheme under Baseline Scheme in Site A, the wind enhancement effect would be localized. Wind shadow would be casted to the leeward area of Site A, Low-Rise Building Cluster 5, and the planned Proposed Lok Sin Tong Welfare Complex at 61 & 63 Lung Kong Road.

A portion of the summer SSW/SW wind would be direct to the Site B and planned low-rise Proposed Lok Sin Tong Welfare Complex at 61 & 63 Lung Kong Road along local air path, such as Hau Wong Road, Nga Tsin Long Road, and Nam Kok Road (**Black** arrows in Figure 19). Nevertheless, wind shadow effect would be

induced to Carpenter Road and Carpenter Road Park and Kowloon Walled City Park, including Site B, at leeward side of high-rise development in Site A resulting a relatively calmer wind condition.

Stepped building height profile with 20-m height difference between the GIC towers in Site C2 is adopted, downwash effect would be induced to divert mid-level wind to the podium (**Green** circle in Figure 19).

The high-rise towers in Site C1 would induce a downwash effect to enhance the wind environment at Tak Ku Ling Road Rest Garden and Nga Tsin Wai Road (**Blue** circle in Figure 19). The leeward area of the compact and integrated high-rise building and podium development in Site C1, such as the developments in Low-Rise Building Cluster 5 and high-rise 55 Kai Tak Road (NKIL 499 S.B. ss2), is hence relatively calm.

5.3.2 Proposed Scheme (SW/SSW Wind)

Similar to the Baseline scenario, the overall wind performance in Study Area is satisfactory under the dominant SSW/SW wind penetration along north-south aligned roads in summer (**Purple** arrows in Figure 20). The efficient block layout, building design and building separation under Proposed Scheme would further enhance overall air ventilation in Study Area.

Similarly, the high-rise development at Site A and C2 as well as the planned high-rise 128 Carpenter Road would induce downwash effect to divert high-level wind to pedestrian level of Carpenter Road and Nga Tsin Wai Road (**Purple** circles in Figure 20). Unlike Baseline Scheme, a portion of incoming wind would penetrate through building separations of high-rise residential towers further into the Scheme, and to the leeward side (**Brown** arrows in Figure 20).

Benefit from the stepped height profile and building separations in Sites A and C2, the second-tier high-rise residential towers, i.e. Tower 2 (+160mPD), Tower 5 (+160mPD) and Tower 7 (+150mPD), would be able to capture the prevailing wind penetrated through the building separations and flow atop Tower 3, Tower 6, and Tower 8 (+143mPD). The captured wind would be further downwashed to podium level. With the terraced podium design of Tower 7 and tower abutting podium of Tower 2, the downwashed wind would be able to reach pedestrian level and enhance wind environment onsite (**Black** circle in Figure 20).

The reduced podium coverage creates at-grade large open-air landscaped diversified space within Sites A and C2, together with sky garden design and 10m podium setback along Nga Tsin Wai Road at Sites A and C2, would further enhance the wind permeability and facilitate wind penetration at the pedestrian level, especially for the summer prevailing winds coming from the SW quadrant.

However, the new GIC complex in Site B would hinder portion of the incoming wind from entering the Carpenter Road Park and Kowloon Walled City Park. Nevertheless, the building design of the GIC complex with cascading profile of lower building height on east part of the building, and 15m(W) x 15m(H) podium separation at grade at the west side of the GIC Complex would enhance the wind to penetrate towards northern part of Carpenter Road Park. The elevated design at the

podium portion, i.e. podium separation from the planned 128 Carpenter Road, sky garden at 3/F, and open-air viewing deck, and terraced podium at different levels of the GIC complex, would also alleviate the potential impact by allowing some wind penetration from Nga Tsin Long Road, Nam Kok Road, and the market square provided in Site A next to the Carpenter Road (**Green** arrows in Figure 20). Meanwhile, the prevailing wind at mid-level would be downwashed by the GIC complex and enhance wind availability to Carpenter Road (**Blue** circle in Figure 20).

The road diversion and the gateway square provided in Site C1, together with the Tak Ku Ling Road Rest Garden and the split-level sunken plaza at the planned KC-015 (i.e. enlarged scalable gateway) connects with Price Edward Road East and forms an air path aligned with SW/SSW prevailing wind direction (**Black** arrow in Figure 20). This facilitates wind penetration across the Site C1 and ventilates the leeward area. Enhanced wind environment would be expected at planned KC-015 Kai Tak Road/ Sa Po Road as compared to Baseline Scenario.

Apart from that, the low-rise commercial podium in Site C1 enables prevailing wind to flow atop of it and reach the Low-Rise Building Cluster 5. Downwash effect would be induced by planned high-rise KC-015 Kai Tak Road/ Sa Po Road and existing high-rise 55 Kai Tak Road (NKIL 499 S.B. ss2). This would further enhance the wind environment at Kai Tak Road (**Black** circle in Figure 20).

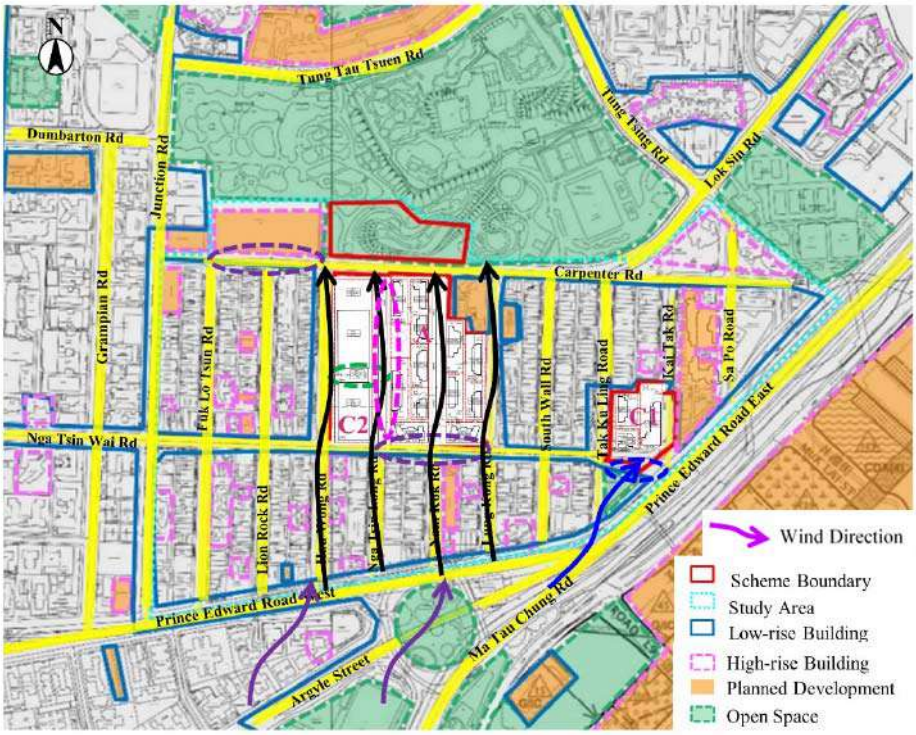

Figure 19 Wind Environment of Baseline Scheme under SW/SSW winds

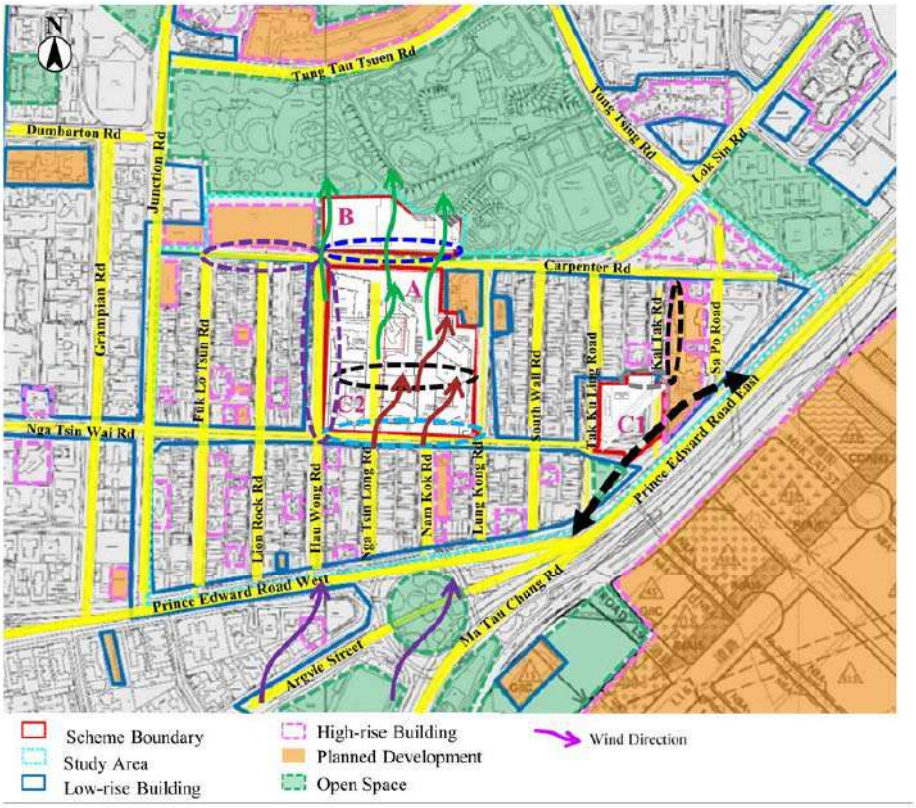

Figure 20 Wind Environment of Proposed Scheme under SW/SSW winds

6 Conclusion

Qualitative assessment of the wind environment of the Study Site was conducted. According to the wind availability data from PlanD, the annual prevailing wind comes from ENE, E and NNE directions while the summer prevailing wind is from E, SSW and SW directions.

6.1 Under annual wind condition (E/NNE/ENE Wind)

Under annual condition, the Scheme is mainly located downwind area of Low-Rise Building Cluster 5 with scattered high-rise buildings, such as KC-015 Kai Tak Road/ Sa Po Road and 55 Kai Tak Road (NKIL 499 S.B. ss2) under ENE/E wind condition; and the Scheme is surrounded by large open space Carpenter Road Park and Kowloon Walled City Park, where acts as a wind pocket to allow annual wind to reach the Scheme.

The overall annual wind condition under Proposed Scheme is similar with the Baseline Scheme. With wind enhancement features of Proposed Scheme, the adverse impacts to wind environment of downwind areas would be compensated.

Under Baseline Scenario, the compact high-rise building, large podium coverage and similar height profile of Sites A and Site C1 would result a relatively clam wind environment in downwind areas under ENE/E wind directions, while the incoming wind would be downwashed and penetrate through the streets running in the north-south direction under NNE wind direction.

Under Proposed Scenario, the creation of at-grade landscaped diversified space including two landscaped pedestrian avenues and market square, reduced podium coverage, east-west aligned building setbacks, stepped height profile and sky gardens in Site A and C2 would enhance wind permeability of the Scheme and divert more winds to leeward areas. Although the development in Site B would hinder a portion of prevailing winds, the downstream environment would be improved by the cascading building profile, the sky garden, open-air viewing deck, and landscaped terrace as well as the 15m(W) x 15m(H) podium separation at the western edge in Site B. Apart from that, the proposed Site C1 with lower building height (maximum BHR 40mPD) would allow more prevailing wind to skim over and the enlarged scalable gateway would act as wind entrance to ventilate affected leeward areas, comparing to the Baseline Scheme.

6.2 Under summer wind condition (SW/E/SSW Wind)

Under summer condition, the Study Site is located at leeward area of Low-Rise Building Cluster 4 and 5 with scattered high-rise buildings. As for the downwind area of Study Site, there are mainly Low-Rise Building Cluster 3, and a large open space Carpenter Road Park and Kowloon Walled City Park, where wind shadows would be casted.

The overall summer wind condition under Proposed Scheme is also similar with Baseline Scheme. With wind enhancement features of Proposed Scheme, the adverse impacts to wind environment of downwind areas would be compensated.

Under Baseline Scenario, the downwind environment is relatively clam owing to the compact high-rise building, large podium coverage and similar height profile of Sites A and Site C1. The prevailing wind from SSW/SW direction would reach to Site C2 through local air paths, while prevailing wind from ENE/E directions would be mostly hindered by high-rise buildings in Site A.

Under Proposed Scenario, the low-level wind would penetrate the at-grade landscaped diversified space, and sky gardens to the leeward areas onsite, such as the central part of the main site and the area in front of Billionnaire Avant, and further reach to Carpenter Road Park and Kowloon Walled City Park, and Low-Rise Building Cluster 3 with scattered high-rise buildings. The low-rise building in Site C1 with enlarged scalable gateway creating an air path connecting to Price Edward Road East would enhance the wind availability of its downstream areas, such as Low-Rise Building Cluster 5, and Site A and C2. In addition, the high-level wind would travel along the building separation among the north-south and east-west aligned towers in Sites A and C2 to the mentioned downstream areas.

6.3 Summary

In summary, it is expected that the Proposed Scheme would not lead to "insurmountable impact" in terms of air ventilation as compared with Baseline Scheme.

The building parameters under the Proposed Scheme is generally higher at the Northern Site (Site B) and the Main Site (Sites A and C2) than that of the Baseline Scheme. Nevertheless, higher permeability at both high and low levels provided under Proposed Scheme through tower alignment with north-south and west-east directions, building setback aligned with the prevailing wind directions, larger building and podium separation, reduced podium coverage, provision of at-grade landscaped diversified space, stepped building height, sky gardens, and terraced podium design, would facilitate more wind penetration through the site. Besides, for the Eastern Site (Site C1), a much lower building height and a creation of gateway square and road diversion at Proposed Scheme provides better condition for wind penetration and circulation than the Baseline Scheme.

As a whole, the Proposed Scheme would not lead to insurmountable impact in terms of air ventilation and the identified localized ventilation impact imposed by the Proposed Scheme at some locations would be alleviated through these wind enhancement features of the Proposed Scheme.

7 Reference

[1] Housing, Planning and Lands Bureau and Environment, Transport a& Works Bureau, Technical Circular No.1/06 Air Ventilation Assessment and its Annex A – Technical Guide for Air Ventilation Assessment for Developments in Hong Kong, dated 19th July 2006.

[2] Simulated RAMS wind data from Planning Department, available at: http://www.pland.gov.hk/pland_en/info_serv/site_wind/site_wind/index.html

Appendix 9

Drainage & Sewerage Impact Assessment (DSIA) Report

Urban Renewal Authority

Nga Tsin Wai Road/ Carpenter Road Development Scheme (KC-017)

Drainage and Sewerage Impact Assessment

Final | May 2022

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This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

ARUP

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1 Introduction

1.1 Overview

1.1.1.1 The Nga Tsin Wai Road/ Carpenter Road Development Scheme (KC-017) (the Proposed Scheme) is proposed by the Urban Renewal Authority (URA) under Section 25 of the Urban Renewal Authority Ordinance (URAO). The Drainage and Sewerage Impact Assessment is prepared in support of the submission of a draft Development Scheme Plan (DSP) with its Planning Report by the URA to the Town Planning Board (TPB) for consideration.

1.1.1.2 Taking into account the proposed urban renewal works under the draft DSP, the development impact on drainage and sewerage are reviewed and discussed in this Report. For drainage impact, it is anticipated that there will be some diversions but no insurmountable issues to the existing drainage system under the draft DSP. For sewerage impact, it is anticipated that there will be no insurmountable issues under the draft DSP. The key impact and recommendation for future urban renewal works in relation to infrastructure are identified and discussed in the following sections.

1.2 Project Outline and Description

1.2.1 Site Description

1.2.1.1 The Proposed Scheme is located in Kowloon City District, comprising the Main Site (i.e. Site C2 and A), the Northern Site (Site B) and the Eastern Site (Site C1), with a total gross site area of 37,061m^2 (the location plan at **Appendix A** refers). Main Site covers three street blocks bounded by Carpenter Road, Hau Wong Road, Lung Kong Road and Nga Tsin Wai Road. Site A and Site C1 are occupied by low-rise residential buildings with retail shops on the ground floor. Site C2 consists of a number of G/IC facilities, including the Kowloon City Municipal Services Building, Kowloon City Lions Clubs Health Centre and Lee Kee Memorial Dispensary. Northern Site, situated to the north of Main Site across Carpenter Road, is currently a part of the existing Carpenter Road Park.

1.2.1.2 The Main Site and the Eastern Site currently fall within areas mainly zoned 'R(A)2', 'G/IC' and pavement and sections of Nga Tsin Long Road, Nam Kok Road and Kai Tak Road shown as 'Road', whereas Northern Site falls within an area zoned 'O' on the approved Ma Tau Kok OZP No. S/K10/28 gazetted on 15 March 2022.

1.2.2 Proposed Scheme

1.2.2.1 The proposed scheme at Main Site consists of 7 residential towers over retail and GIC podia, as well as 1 standalone single-storey podium, with a maximum building height of 160mPD and residential population of 10,012[1].

[1] For the proposed domestic GFA of 202,416m^2, an average unit size of 46.5m^2 is adopted to come up with an estimated residential flat number of 4,353. The anticipated residential population of 10,012 is assumed based on the assumption of population per flat (PPF) of 2.3, which is in reference to HKPSG Ch.2. Sensitivity test is also carried out for +5% variation of population increase, which is about 2.4 as the same as the average domestic

1.2.2.2 The Eastern Site (Site C1) is proposed to develop 1 three-storey commercial complex and to provide an at-grade gateway square of approx. 2,130m^2 with the realignment of Kai Tak Road/ Nga Tsin Wai Road.

1.2.2.3 The Northern Site (Site B) will be developed into a G/IC Complex not exceeding a building height of 100mPD.

1.2.2.4 The Scheme has adopted a net site area of about 25,302m^2 for PR calculation in R(A) zone. The net site area has excluded the three new road sections in the Scheme (the two new private streets proposed at the Main Site and the new diverted road at the Eastern Site), and the surrounding pavement of the Scheme[2].

1.2.2.5 Here are the key parameters for the Proposed Scheme:

Table 1.2.1 Key Parameters for Proposed Scheme

	Number of Blocks	Domestic GFA (m^2)	Non-domestic GFA (1) (m^2)	
			Retail	GIC
Main Site (Site A and C2)	7 residential towers and 1 single-storey commercial podium	202,416	23,302	3,000
Eastern Site (Site C1)	1 three-storey commercial complex	-	2,000	-
Northern Site (Site B)	1 GIC Complex	-	-	44,000
Total	-	**202,416**	**25,302**	**47,000** (2)

Notes:
Notional Design subject to change at detailed design stage.
(1) The proposed exemption of clubhouse GFA (5,059m^2) from non-domestic GFA calculation is subject to the approval of the general building plan under the Building (Planning) Regulations.
(2) The proposed 47,000m^2 of non-domestic GFA for GIC uses are proposed to be exempted from GFA calculation under draft DSP.

household size of Lung Shing Constituency Area, The results demonstrated that it will not incur major deviation from the current assessment.
[2] Should there be later departmental comments for a smaller net site area, the following technical assessments conducted based on the development potential from this net site area (i.e. 25,302m2) would be considered as the worst case scenario for the proposed scheme of the draft DSP.

2 Drainage Impact Assessment

2.1 Existing Drainage Condition

2.1.1.1 There are many drainage pipes of various sizes within the Scheme Area. There are two large stormwater drains of dia.1350mm and a box culvert of 2500mm x 1500mm along Carpenter Road, and an 825mm dia. drainage pipe along Nga Tsin Wai Road. Stormwater is conveyed to the main storm drain running eastward along Nga Tsin Wai Road, and is then discharged into a two-cell box culvert further downstream. The storm flow from the existing gravity drainage network ultimately discharges to the Kai Tak River. **Appendix B** shows key stormwater drains within and around the Scheme Area.

2.1.1.2 Based on information from Drainage Services Department (DSD), there is currently no flooding issue within the Kowloon City area. DSD is also undertaking a project named "Drainage Improvement Works in Kowloon City" which is at the investigation stage. The layout plans of the project are attached for easy reference in **Appendix C**. The construction works are tentatively scheduled to commence in Q3 2023 and complete in Q1 2028, including Drainage Upgrading Works at Ma Tau Kok Road, Drainage Upgrading Works at Gillies Avenue South and Stormwater Pumping Scheme at Argyle Street Playground.

2.2 Estimated Future Runoff and Drainage Impact

2.2.1.1 The existing land uses of the Scheme Area comprise residential, G/IC uses and open space. Major area of the existing land uses within Scheme Area are paved.

2.2.1.2 Under the Proposed Scheme, there will be two main changes on land use. Firstly, at the Eastern Site, a portion of existing paved land will be turned into unpaved land as illustrated in the below figures. It is expected that no adverse impact on the existing drainage system will be caused by the development at the Eastern Site.



Figure A: Existing condition



Figure B: Proposed Scheme

2.2.1.3 Secondly, the proposed GIC Complex at the Northern Site located to the east of Kowloon City Plaza Redevelopment, contributing to additional paved area of around 6,600m^2. Therefore, the drainage impact on the existing drainage pipe/ box culvert at downstream is assessed below which contributes to 3-4% increase in flow rate. **Appendix D** shows the detailed calculation.

Table 2.2.1 Drainage Impact on the Existing Drainage Pipe/ Box Culvert at Downstream

Upstream Manhole	Downstream Manhole	Pipe/Box culvert	Pipe/Box culvert size (mm)	Sub catchment	Sub catchment area (m^2)	Increase in utilization (%)
SSH4001220	SSH4001221	Pipe	1800	Proposed GIC Complex	6,600	3.0%
SSH4001221	SSH4001240	Box culvert	2500x1500	Proposed GIC Complex	6,600	3.6%

2.2.1.4 Upon completion of the redevelopment, it is anticipated that there is no significant change on the catchment area and the overland flow path of the Scheme Area. The only increase in surface runoff is caused by the proposed GIC Complex. The redevelopment will increase greenery areas and amenity space in the Scheme. The total amount of amenity space will be about 1.5 times of the existing provision in the Scheme. Therefore, it is expected to have no adverse impact on the existing drainage system due to the redevelopment during different terms.

2.2.1.5 In detailed design stage, any new drainage provision should consider climate change effects.

2.3 Recommendations on Future Implementation

2.3.1.1 Parts of the existing local drainage network should be demolished due to the clashing with the Proposed Scheme (**Figure 1** of **Appendix E** refers).

2.3.1.2 There will be a new road alignment proposed at the Eastern Site, near the at-grade gateway square, proposed sunken plaza of KC-015 and Tak Ku Ling Road Rest Garden.

2.3.1.3 In view of the reconfiguration of land uses in the Scheme, it is proposed to divert the affected drainage and sewerage pipes to follow the new road alignment/pavement within the Eastern Site. The indicative location of the diversions is shown in **Figure 2** of **Appendix E**.

2.3.1.4 It is proposed that detailed utility survey and site investigation shall be conducted at the detailed design stage to ascertain the feasibility and the actual alignment with the relevant government departments for implementation at later stage.

2.4 Conclusion

2.4.1.1 Based on the above assessment, there is no insurmountable impact from the drainage aspect. Some diversions of underground utilities are required due to the new road alignment. It is proposed to carry out detailed site survey and investigation to develop the diversion alignment.

3 Sewerage Impact Assessment

3.1 Existing Sewerage System

3.1.1.1 Based on DSD records, on the western side of the Kowloon City area, there is an existing 225mm – 1050mm gravity sewer network receiving sewerage flow from existing residential, commercials and GIC developments and is collected into a 1200mm dia. gravity sewer located at the intersection of South Wall Road and Prince Edward Road West, which passes through a series of gravity sewers and ultimately discharges into the To Kwa Wan Preliminary Treatment Works (TKW PTW). **Appendix F** shows key foul sewers within the Kowloon City area.

3.2 Sewerage Flow and Sewerage Impact

3.2.1.1 Based on broad review within the Kowloon City Area, the estimated sewerage flow under existing condition and future condition with the Proposed Scheme under draft DSP are summarised in **Table 3.2.1** below. In the future condition, upstream sewerage generation of about 14,161.1 m^3/day will be resulted, which contributes to about 19.53% increase in sewerage generation as compared to the existing condition. Detailed calculation is attached in **Appendix G**.

Table 3.2.1 Summary of Sewerage Flow for Existing Condition and Future Condition with the Proposed Scheme under DSP

Kowloon City Area	Existing	Future Condition with Proposed Scheme under DSP
Population[1]	21,830	28,370*
Clubhouse GFA[2]	19,830 m^2	24,890 m^2
Retail GFA	140,170 m^2	150,170 m^2
Office GFA	15,430 m^2	14,610 m^2
Hotel GFA	17,190 m^2	17,190 m^2
G/IC GFA	41,350 m^2	73,310 m^2
Upstream Sewerage Generation	11,847.4 m^3/day	14,161.1 m^3/day
% Change compared to existing: Upstream Sewerage Generation	-	+19.53%

Notes:

(1) Assumption of population per flat (PPF) of 2.3 is adopted from HKPSG Chapter 2. The anticipated residential population of 10,012 is assumed based on the assumption of population per flat (PPF) of 2.3, which is in reference to HKPSG Ch.2. Sensitivity test is also carried out for +5% variation of population increase, which is about 2.4 as the same as the average domestic household size of Lung Shing Constituency Area, The results demonstrated that it will not incur major deviation from the current assessment.

(2) The clubhouse GFA of existing high-rise residential buildings (established after the relocation of Kai Tak Airport) and planned residential development (namely the KCP and KC-015) is assumed to be the maximum area permitted for GFA concession with reference to PNAP APP-104.

* Refer to subtracting the existing population of the scheme area (i.e. 3,475) from the existing population of Kowloon City Area (i.e. 21,830) and adding the anticipated population of the Proposed Scheme (i.e. 10,012).

3.2.1.2 **Table 3.2.2** shows the summary of sewerage treatment facilities. Taking into account the sewerage generation in the Proposed Scheme, the impact to the downstream sewerage treatment facilities is summarised in **Table 3.2.3**. Based on the assessment, there is no insurmountable impact to the existing sewerage treatment facilities due to the increased flow generated by the Proposed Scheme under DSP.

Table 3.2.2 Summary of Sewerage Treatment Facilities

Sewerage Treatment Facilities	Design Capacity[(1)] (m^3/day)	ADWF (m3/day)[(1)] (baseline scenario)	PWWF (m3/day)[(1)] (baseline scenario)	Estimated utilization of PTW at ADWF[(1)] (%) (baseline scenario)	Estimated utilization of PTW at ADWF[(1)] (%) (baseline scenario)
TKW PTW	805,248	238,220	597,888	29.6%	74.2%

Notes:

(1) Figure 16.12, Capacity Assessment of Existing Sewerage Treatment and Disposal Facilities for Year 2016 Scenario, Kai Tai Development Environmental Impact Assessment Report

Table 3.2.3 Summary of Impact of Proposed Urban Renewal Works to TKW PTW in Future Condition with Proposed Scheme under DSP

	Future Condition with Proposed Scheme under DSP
Total Increase ADWF	2,314 m^3/day
Total Increase PWWF	6,976 m^3/day
Estimated utilization of PTW at ADWF	29.9%
Estimated utilization of PTW at PWWF	75.1%
Increase of Utilization at ADWF	0.29%
Increase of Utilization at PWWF	0.87%

3.2.1.3 The following methodology has been adopted in carrying out the sewerage impact assessment:

- Determine the sewerage flow with the additional density up to OZP level based on Environmental Protection Department (EPD)'s Guidelines for Estimating Sewerage Flows for Sewerage Infrastructure Planning (EPD's Guideline)
- Identify the existing sewerage system within the Kowloon City area

- Examine the impact arising from additional density up to OZP level on the existing sewerage system

All detailed calculations are attached in **Appendix G**.

3.2.1.4 The downstream of existing sewers for the developments at the Main Site and the Northern Site are examined. The capacity checking of the existing public sewer along Carpenter Road and Nga Tsin Wai Road are shown in **Appendix H and Appendix I** respectively.

3.2.1.5 The proposed connection points, pipe improvement works, and demolishment required due to the Proposed Scheme under DSP are summarized in **Appendix J**.

3.2.1.6 The cumulative impact from development to further downstream of existing sewerage network will be required to be assessed during detailed design stage.

3.2.2 Recommendations on Future Implementation

3.2.2.1 Parts of the existing local sewerage network should be demolished due to the clashing with the Proposed Scheme (**Figure 1** of **Appendix J** refers).

3.2.2.2 The details of the proposed connection points are shown in **Figures 2-4** of **Appendix J**. It is recommended that the new terminal manholes should be provided at the same location of existing discharge points together with upgrading the existing sewerage pipes to 400mm – 500mm along Nga Tsin Wai Road (**Figures 5-6** of **Appendix J** refers) and to 600mm along Carpenter Road (**Figure 7** of **Appendix J** refers).

3.2.2.3 There will be a new road alignment at the Eastern Site, near the proposed sunken plaza of KC-015 and Tak Ku Ling Road Rest Garden. In view of the reconfiguration of land uses in the Scheme, it is proposed to divert the affected drainage and sewerage pipes to follow the new road alignment/pavement within the Eastern Site. The indicative location of the diversions is shown in **Figure 8** of **Appendix J**.

3.2.2.4 Detailed design on the demolishment/ diversion/ connection of the existing discharge points for the Proposed Scheme will be carried out at detailed design/ GBP submission stage upon DSP approval.

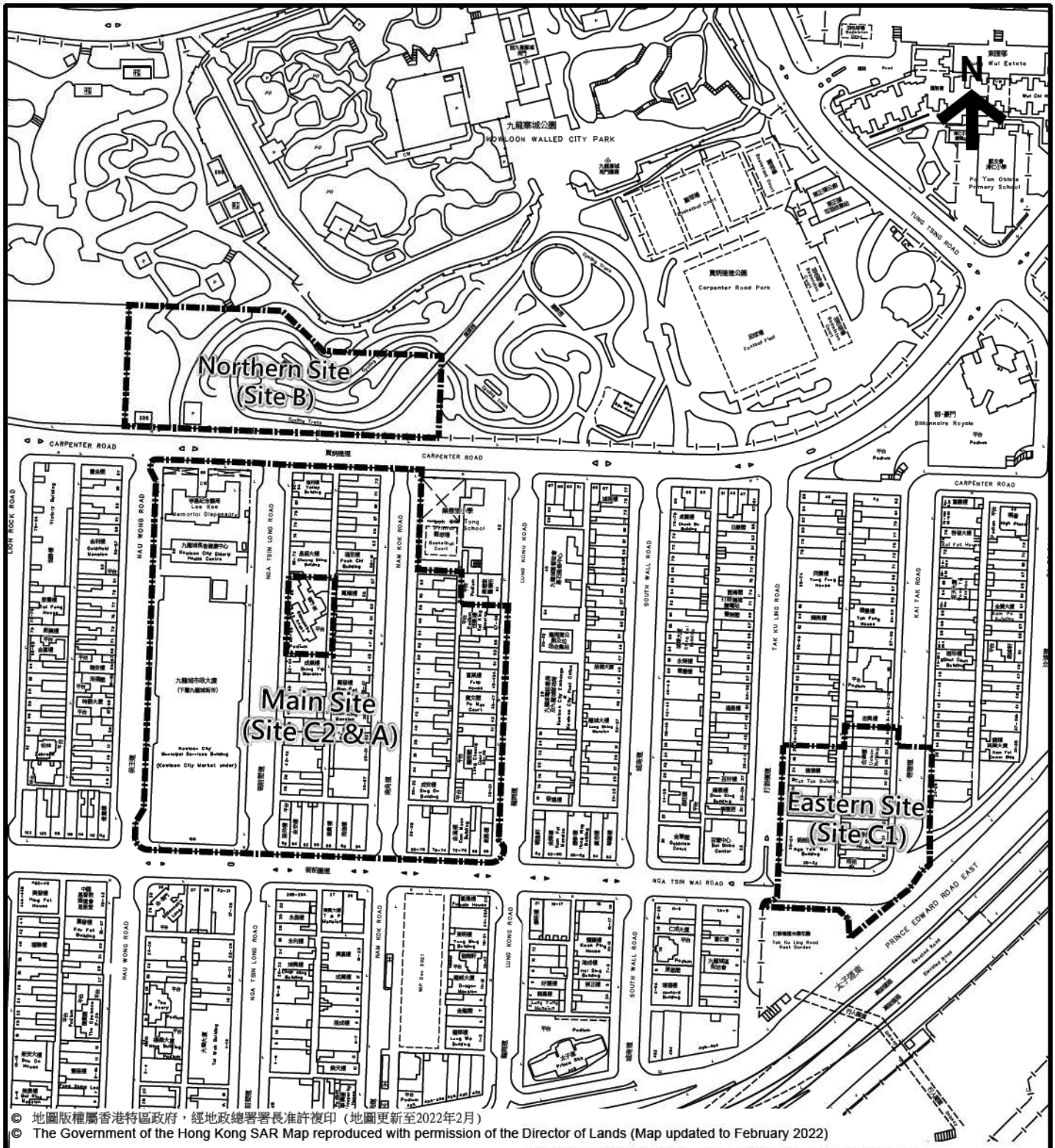
3.2.2.5 It is proposed that detailed utility survey and site investigation shall be conducted by project proponent/ future developer at the detailed design stage if necessary to ascertain the feasibility and the actual alignment with the relevant government departments for implementation at later stage.

3.2.2.6 The project proponent/ future developer will be responsible for the proposed sewer upgrading works to eliminate the surcharged condition caused by the proposed development at their own cost and subsequently handed over to DSD for future maintenance.

3.3 Conclusion

3.3.1.1 Based on the preliminary review, there is no insurmountable impact from the sewerage aspect. Some diversions of underground utilities are required due to the new road alignment. It is proposed to carry out detailed site survey and investigation to develop the diversion alignment.

Appendix A
Location Plan



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Legend 圖例：
Project Boundary
項目界線

市區重建局
URBAN RENEWAL AUTHORITY

KC-017
Nga Tsin Wai Road / Carpenter Road
衙前圍道 / 賈炳達道

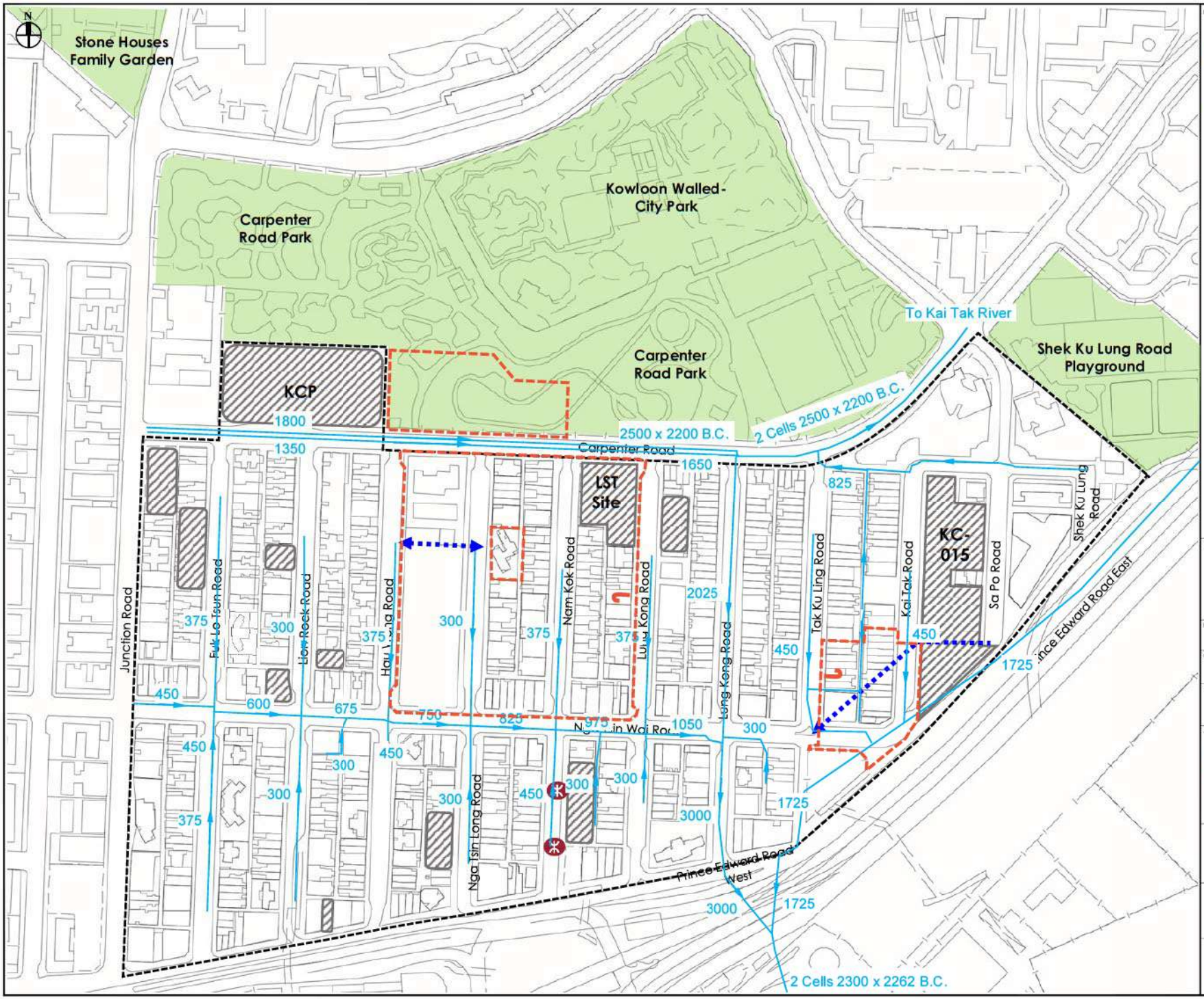
Site Plan
地盤平面圖

Scale 1:2,500

Date:3 May 2022

Appendix B

Key Stormwater Drains within Kowloon City Area



Legend

- Kowloon City Area
- Scheme Boundary
- Planned Redevelopment in the Vicinity
- New Road Alignment under the Proposed Scheme
- Existing Stormwater Drains

Drawing Title

KC-017 – Existing Drainage System

Drawn	Date
Checked	Approved
Figure No.	Scale and Orientation

Job Title

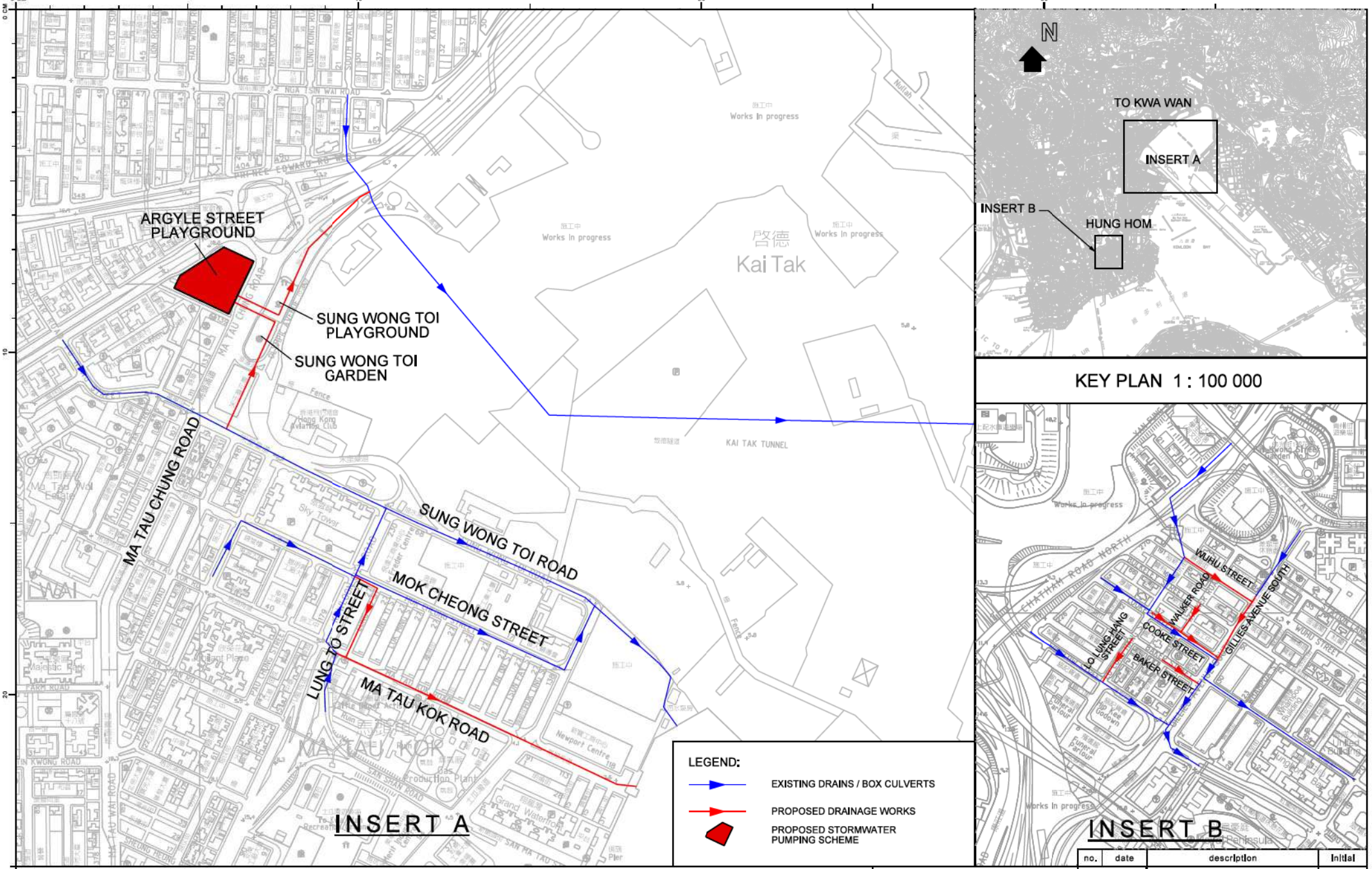
Nga Tsin Wai Road/ Carpenter Road Development Scheme (KC-017)

市區重建局 URBAN RENEWAL AUTHORITY

ARUP

Appendix C

Information of Drainage Improvement Works in Kowloon City, DSD



KEY PLAN 1 : 100 000

no.	date	description	Initial

drawing title

DRAINAGE IMPROVEMENT WORKS IN KOWLOON CITY - LAYOUT PLAN

drawn	SIGNED H. Y. LEE	date 17 AUG 2018
checked	SIGNED Y. T. HO	date 17 AUG 2018
approved	SIGNED S. S. POON	date 17 AUG 2018
office	PROJECT MANAGEMENT DIVISION	

drawing no. DPM/179CD/11015

scale 1 : 5000

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SPECIAL ADMINISTRATIVE REGION

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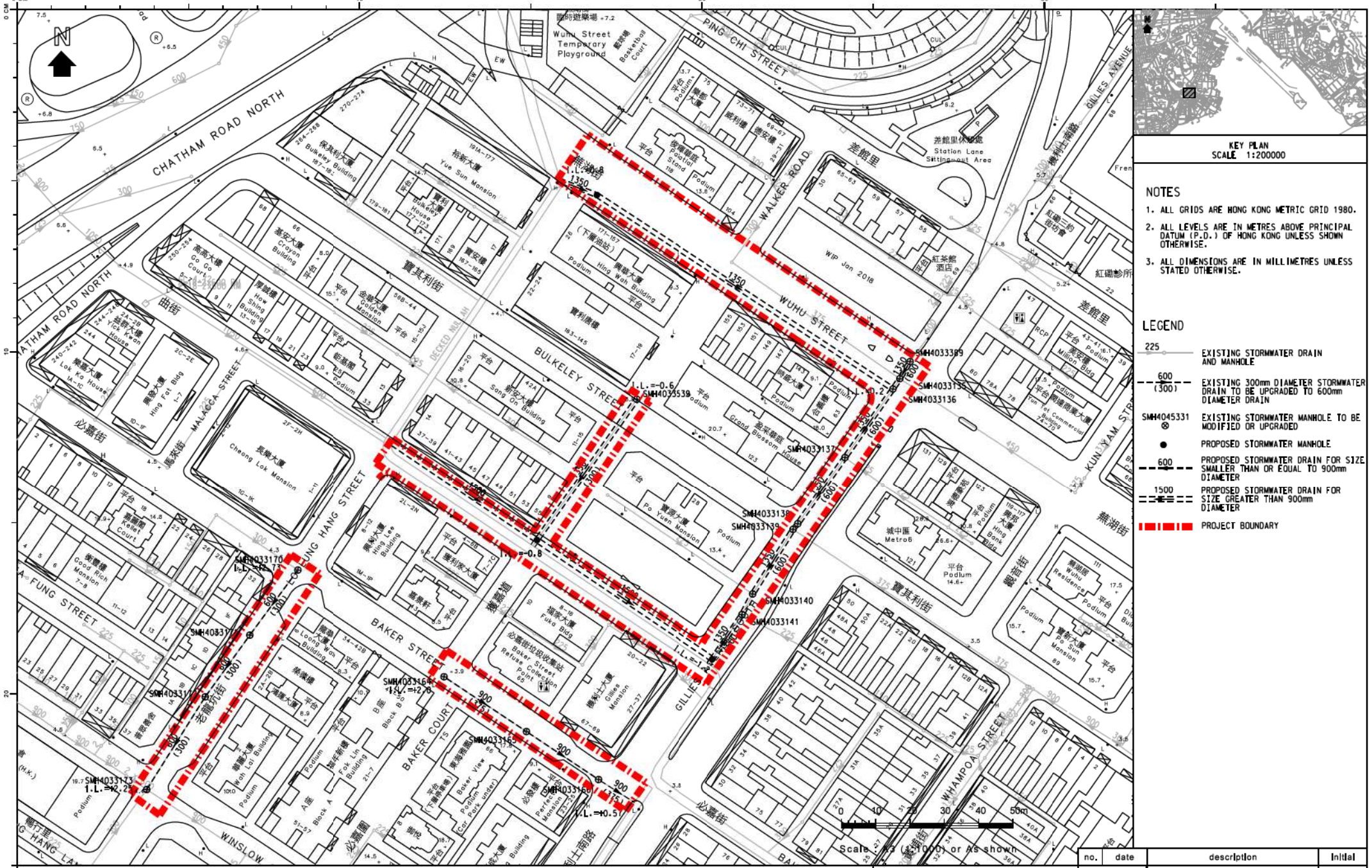

KEY PLAN
SCALE 1:200000

NOTES

1. ALL GRIDS ARE HONG KONG METRIC GRID 1980.
2. ALL LEVELS ARE IN METRES ABOVE PRINCIPAL DATUM (P.D.) OF HONG KONG UNLESS SHOWN OTHERWISE.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.

LEGEND

225	EXISTING STORMWATER DRAIN AND MANHOLE
600 (300)	EXISTING 300mm DIAMETER STORMWATER DRAIN TO BE UPGRADED TO 600mm DIAMETER DRAIN
SMH4045331 ⊗	EXISTING STORMWATER MANHOLE TO BE MODIFIED OR UPGRADED
●	PROPOSED STORMWATER MANHOLE
600	PROPOSED STORMWATER DRAIN FOR SIZE SMALLER THAN OR EQUAL TO 900mm DIAMETER
1500	PROPOSED STORMWATER DRAIN FOR SIZE GREATER THAN 900mm DIAMETER
	PROJECT BOUNDARY

drawing title

DRAINAGE IMPROVEMENT WORKS IN KOWLOON CITY
- DRAINAGE UPGRADING WORKS AT GILLIES AVENUE SOUTH

no.	date	description	initial
drawn	SIGNED H. Y. LEE	date 17 AUG 2018	
checked	SIGNED Y. T. HO	date 17 AUG 2018	
approved	SIGNED S. S. POON	date 17 AUG 2018	
office	PROJECT MANAGEMENT DIVISION		

drawing no. DPM/179CD/11018 | scale 1 : 1000

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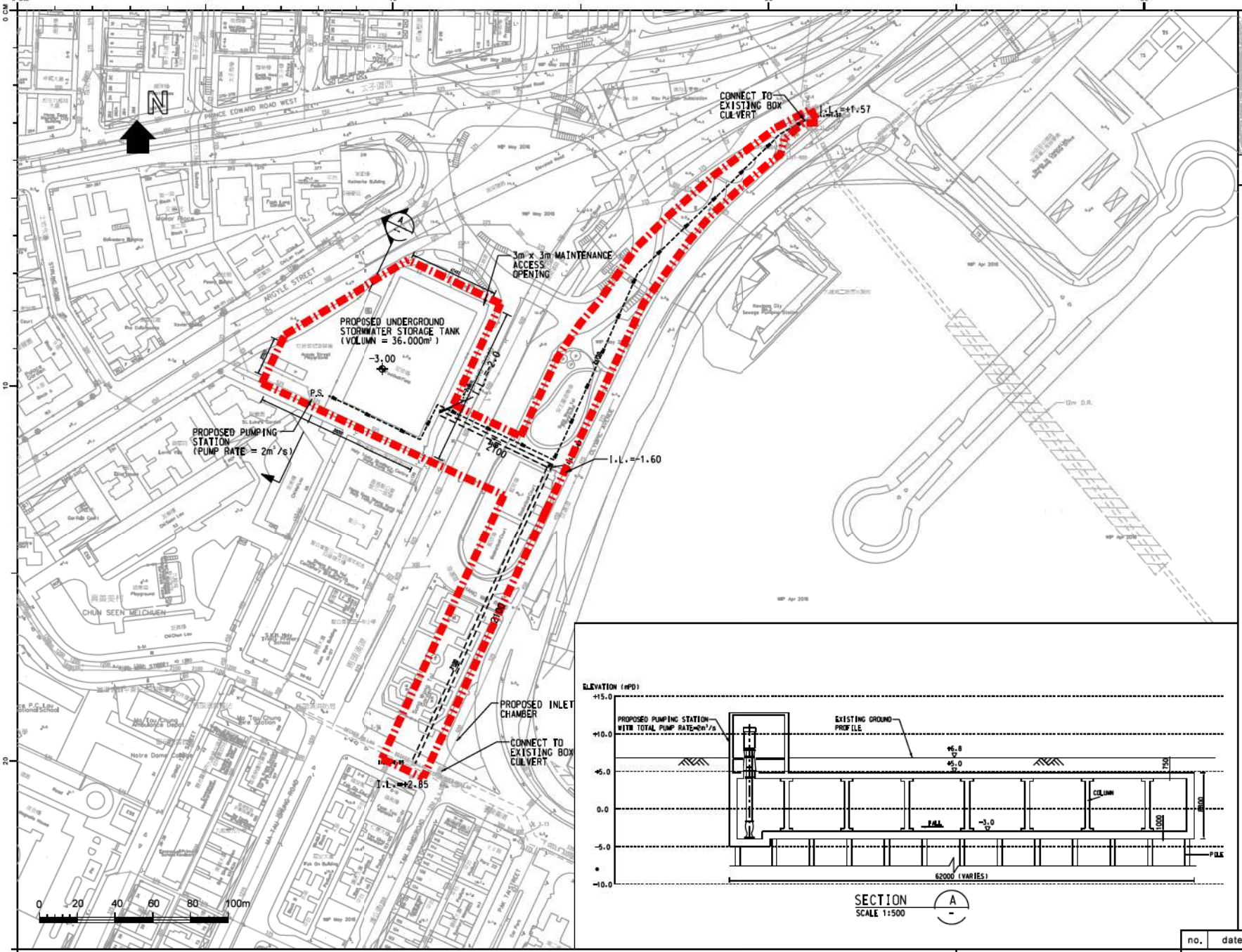

SECTION A
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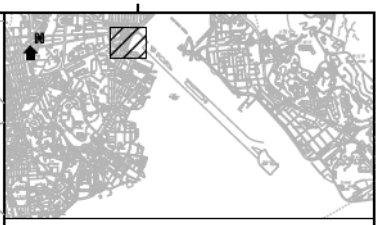

KEY PLAN
SCALE 1:200000

NOTES

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3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.

LEGEND

- -3.0mPD — TANK INVERT LEVEL
- 225 — EXISTING STORMWATER DRAIN AND MANHOLE
- PROPOSED STORMWATER MANHOLE
- 1500 — PROPOSED STORMWATER DRAIN FOR SIZE GREATER THAN 900mm DIAMETER
- RM — PROPOSED RISING MAIN
- PROJECT BOUNDARY

drawing title

DRAINAGE IMPROVEMENT WORKS IN KOWLOON CITY - STORMWATER PUMPING SCHEME AT ARGYLE STREET PLAYGROUND

no.	date	description	initial

drawn	SIGNED H. Y. LEE	date	17 AUG 2018
checked	SIGNED Y. T. HO	date	17 AUG 2018
approved	SIGNED S. S. POON	date	17 AUG 2018
office	PROJECT MANAGEMENT DIVISION		

drawing no. DPM/179CD/11016

scale 1 : 2000

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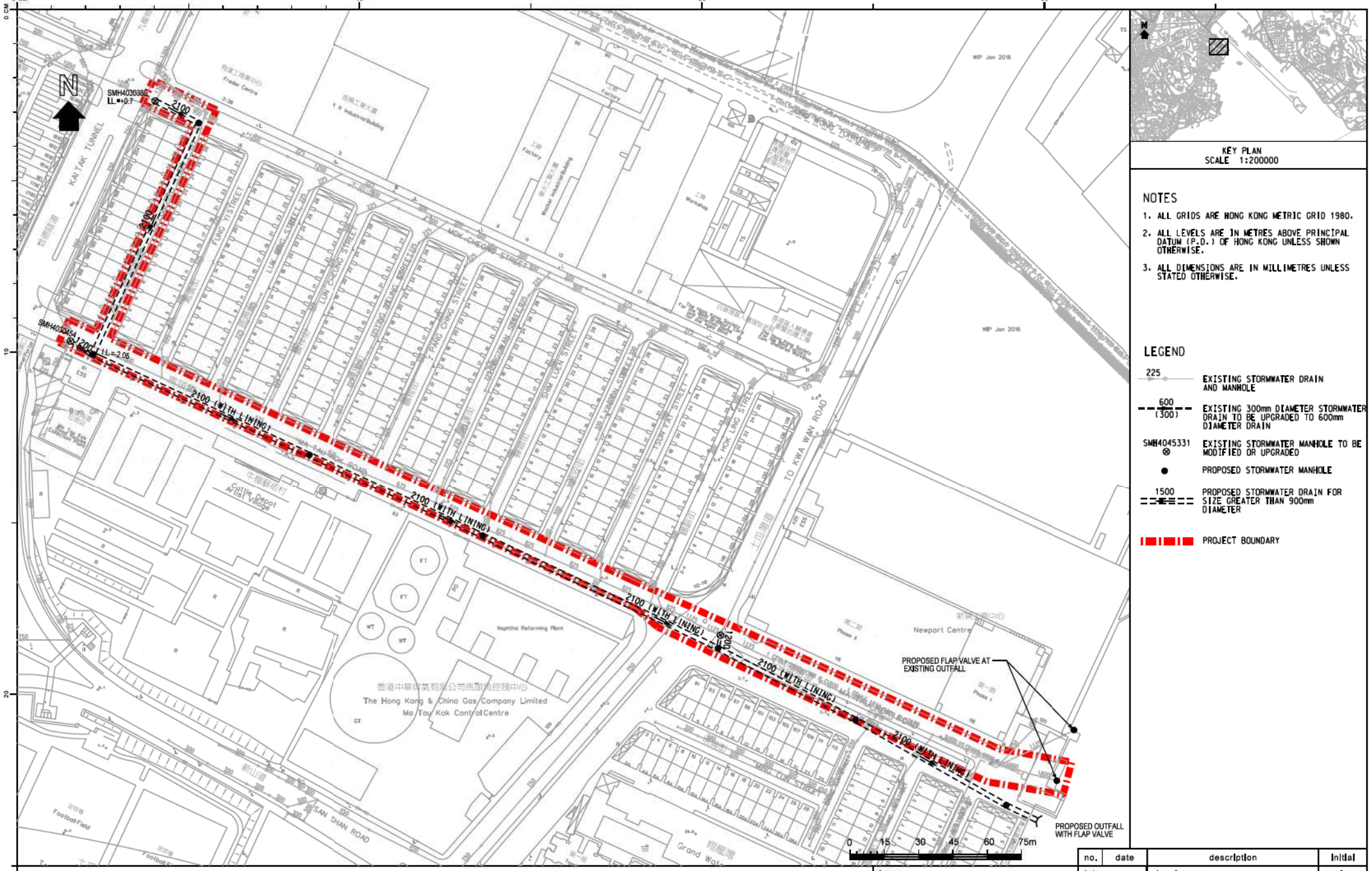
DRAINAGE SERVICES DEPARTMENT
GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION



KEY PLAN
SCALE 1:200000

NOTES

1. ALL GRIDS ARE HONG KONG METRIC GRID 1980.
2. ALL LEVELS ARE IN METRES ABOVE PRINCIPAL DATUM (P.D.) OF HONG KONG UNLESS SHOWN OTHERWISE.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.

LEGEND

- 225 — EXISTING STORMWATER DRAIN AND MANHOLE
- 600 (300) — EXISTING 300mm DIAMETER STORMWATER DRAIN TO BE UPGRADED TO 600mm DIAMETER DRAIN
- SMH4045331 ⊗ — EXISTING STORMWATER MANHOLE TO BE MODIFIED OR UPGRADED
- ● — PROPOSED STORMWATER MANHOLE
- 1500 — PROPOSED STORMWATER DRAIN FOR SIZE GREATER THAN 900mm DIAMETER
- PROJECT BOUNDARY

drawing title

DRAINAGE IMPROVEMENT WORKS IN KOWLOON CITY
- DRAINAGE UPGRADING WORKS AT MA TAU KOK ROAD

no.	date	description	initial

drawn	SIGNED H. Y. LEE	date 17 AUG 2018
checked	SIGNED Y. T. HO	date 17 AUG 2018
approved	SIGNED S. S. POON	date 17 AUG 2018

office
PROJECT MANAGEMENT DIVISION

drawing no. DPM/179CD/11017

scale 1 : 1500

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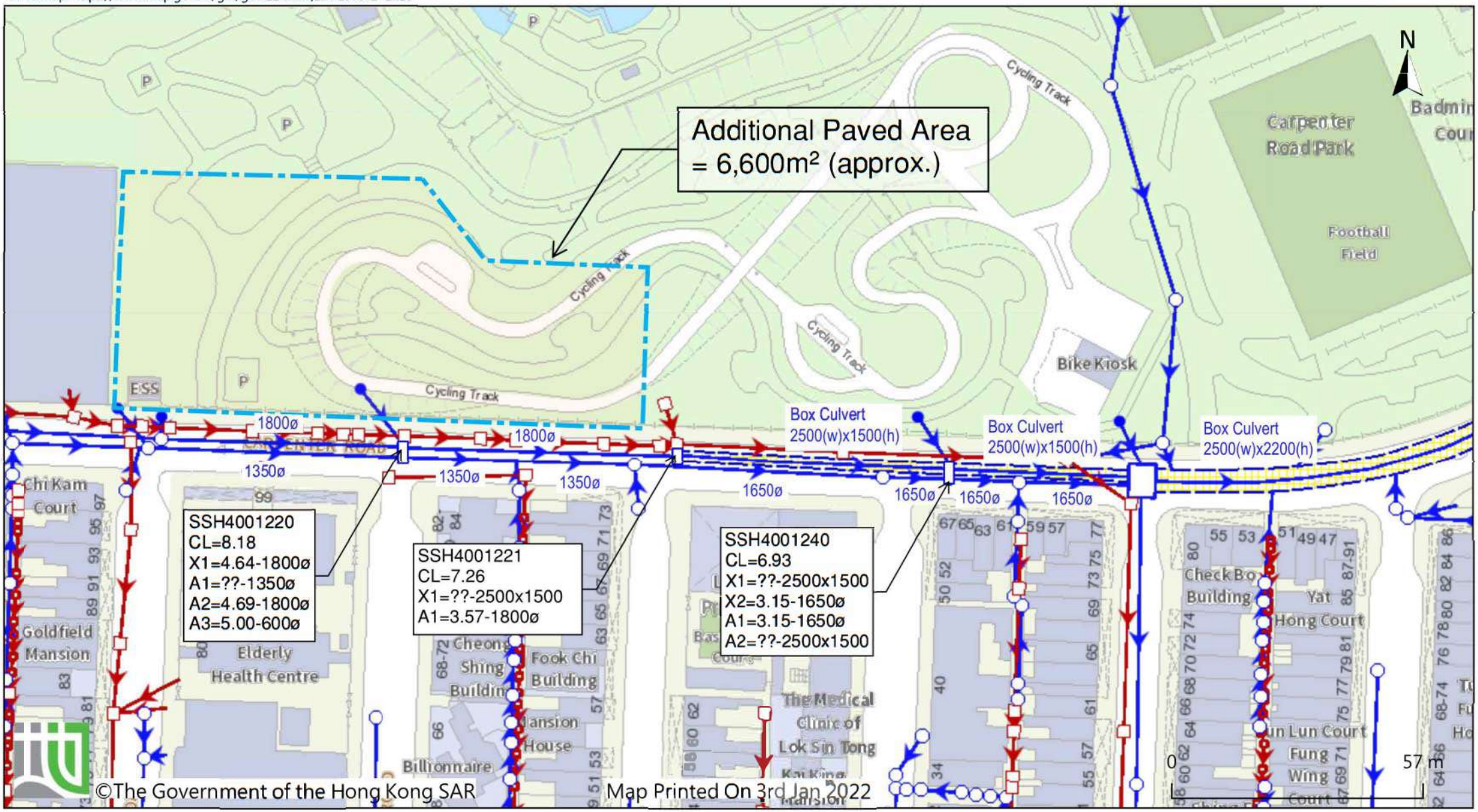
DRAINAGE SERVICES DEPARTMENT
GOVERNMENT OF THE
HONG KONG
SPECIAL ADMINISTRATIVE REGION

Appendix D
Drainage Calculation

GEOINFO MAP
地理資訊地圖

Go to map: https://www.map.gov.hk/gm/geo:22.3306,114.1895?z=1128



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Map Printed On 3rd Jan 2022

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Drainage Layout Plan for Northern Site

ARUP	Job No.	Sheet No.	Rev.
		1	1
	Member/Location		
Job Title: Nga Tsin Wai Road/ Carpenter Road Development Scheme (KC-017)	Drg. Ref.		
Calculation: Surface Runoff Generation from the Redevelopment and Drainage Network Capacity Check	Made by: IP	Date: 12/5/22	Chd.: YL

Notes

1 Runoff Coeff., C = 0.90 (Paved)
0.35 (Steep natural slope)
0.35 (unpaved)

Return Period = 50 years (Main Rural Catchment Drainage Channels)
10 years (Village (rural) drainage system)
(Table 10, Stormwater Drainage Manual)

Rainfall Intensity, $I = a / (T_c + b)^c$ (Gumbel solution)

where :

a =	451.3
b =	2.46
c =	0.337

Return Period = 50 years **(Table 3a, Stormwater Drainage Manual)**

2 Calculate by Colebrook-White Equation $\bar{V} = -\sqrt{32gRS_f}\log\left[\frac{k_s}{14.8R} + \frac{1.255v}{R\sqrt{32gRS_f}}\right]$

v is kinematic viscosity of fluid = 1.14 x 10-6 m^2/s and g is the gravity = 9.81m/s^2
V is the velocity, R is the hydraulic radius and S is the gradient of the stormwater drain.

3 A 10% reduction in flow area is adopted to take into account the effects on flow capacity due to deposition of sediment in pipes.

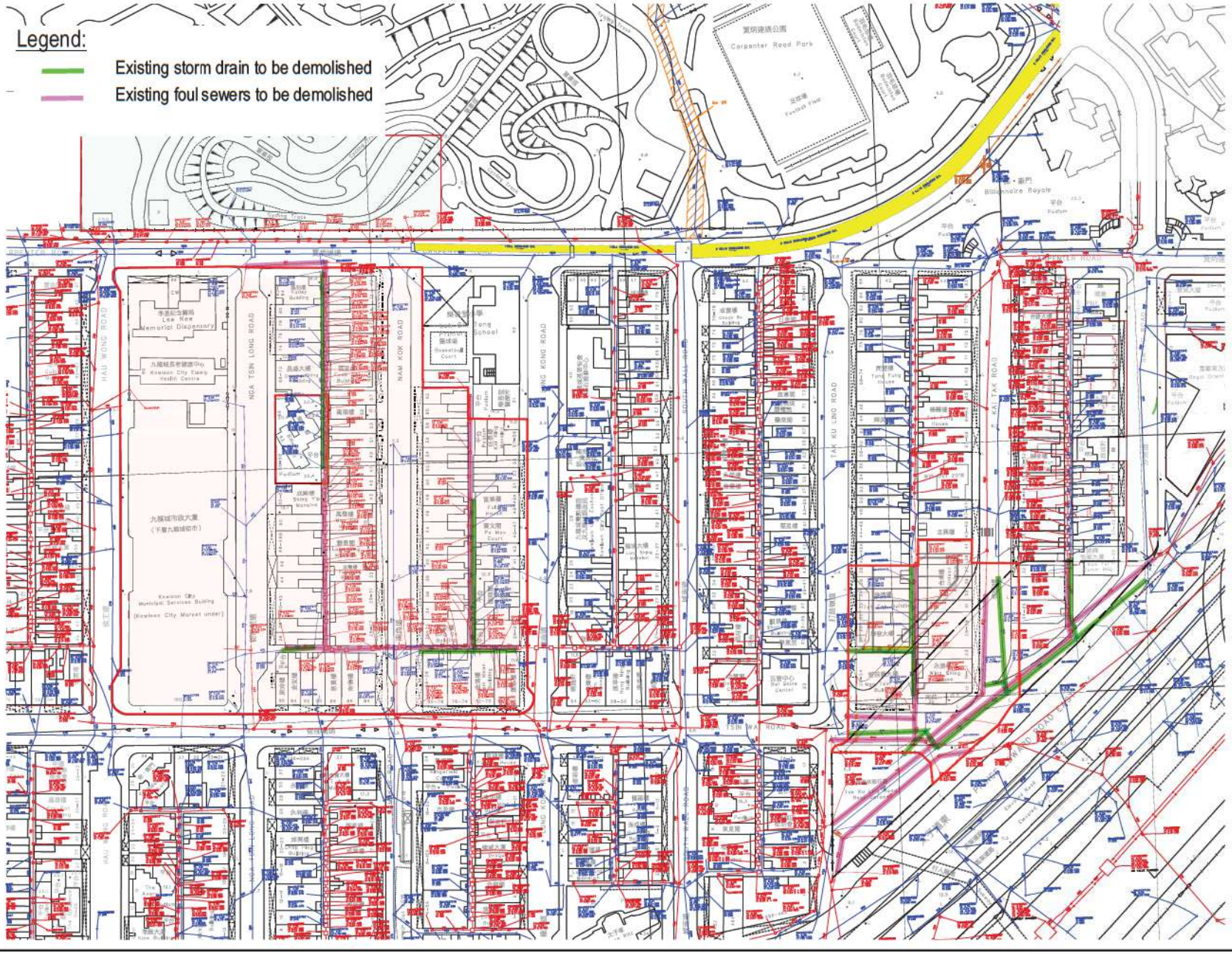
4 Climate Change Factor (%) = 10.40%
(Table 28, Stormwater Drainage Manual, for rainfall increase at Mid 21st Century 2041 – 2060)

Runoff Calculation

Return period = 50 years

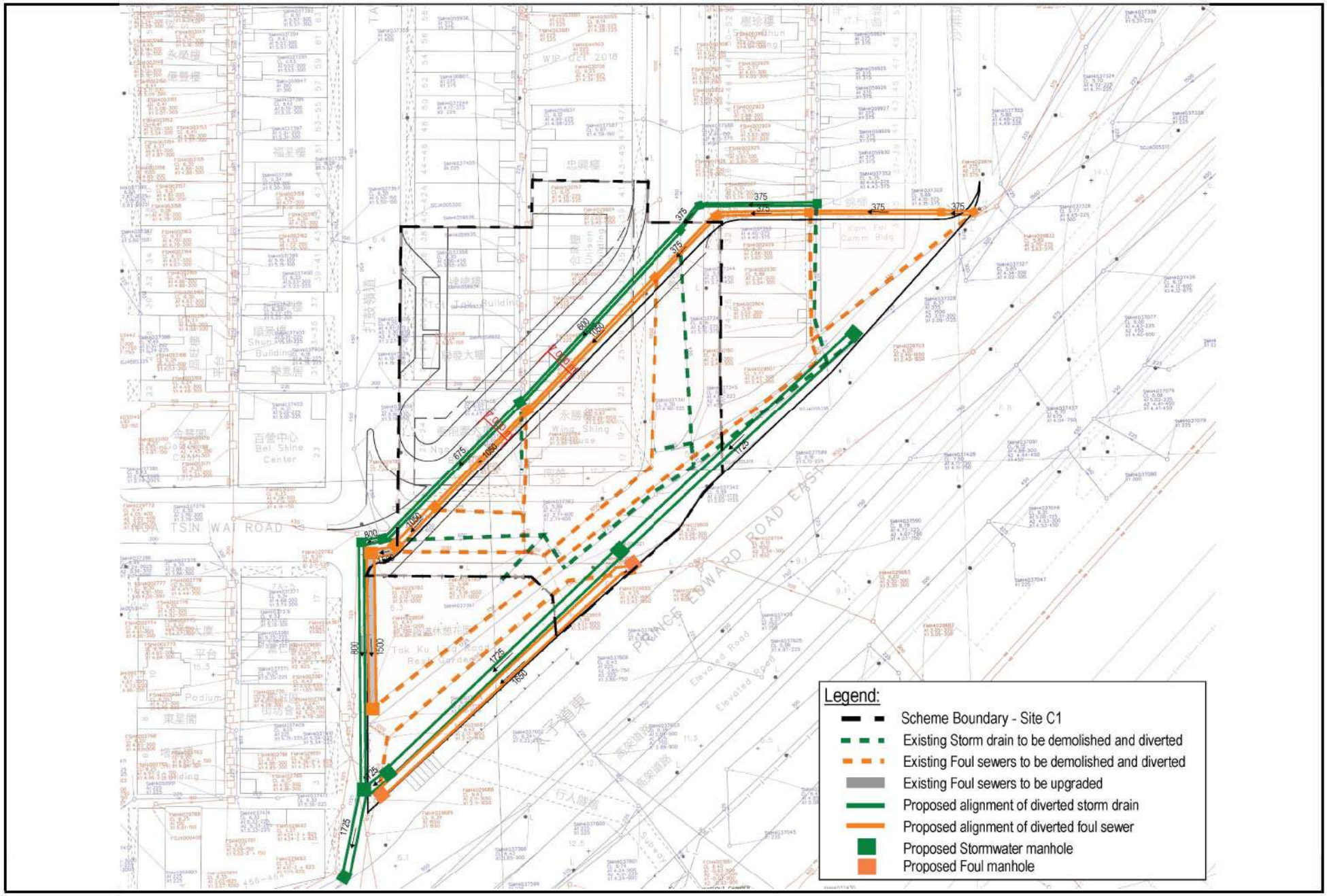
Location		Sub-Catchment Reference	Catchment Area of the development						Drainage Character					Hydraulic parameter		Time of the development			(i) Extreme	Peak	Full bore	% increase	Full bore
			Paved		Steep Natural Slope		Unpaved		Drainage Shape	Drainage size			Slope										
US	DS		Sub-Catchment (m^2)	Accumulative Area (m^2)	Sub-Catchment (m^2)	Accumulative Area (m^2)	Sub-Catchment (m^2)	Accumulative Area (m^2)		width/dia (mm)	height (mm)	length (m)	(S_f)	cross area (m^2)	Hydraulic Diameter, D (m)	t_e (min)	t_f (min)	t_c (min)	mean intensity (1 in 50) with climate change (mm/h)	Runoff (m^3/s)	Capacity (m^3/s)		Velocity (m/s)
SSH4001220	SSH4001221	N.D.N.	6,600	5,940	0	0	0	0	Circular Concrete Pipe	1800	-	61.8	0.02	2.29	1.67	5.00	0.19	5.19	251.0	0.373	12.44	3.00	5.43
SSH4001221	SSH4001240	N.D.N.	6,600	5,940	0	0	0	0	Circular Concrete Pipe	2500	1500	61.8	0.01	3.38	1.75	5.19	0.34	5.53	247.3	0.367	10.16	3.62	3.01

Appendix E
Proposed Drainage Works



PROPOSED DEMOLISH PLAN

Figure 1

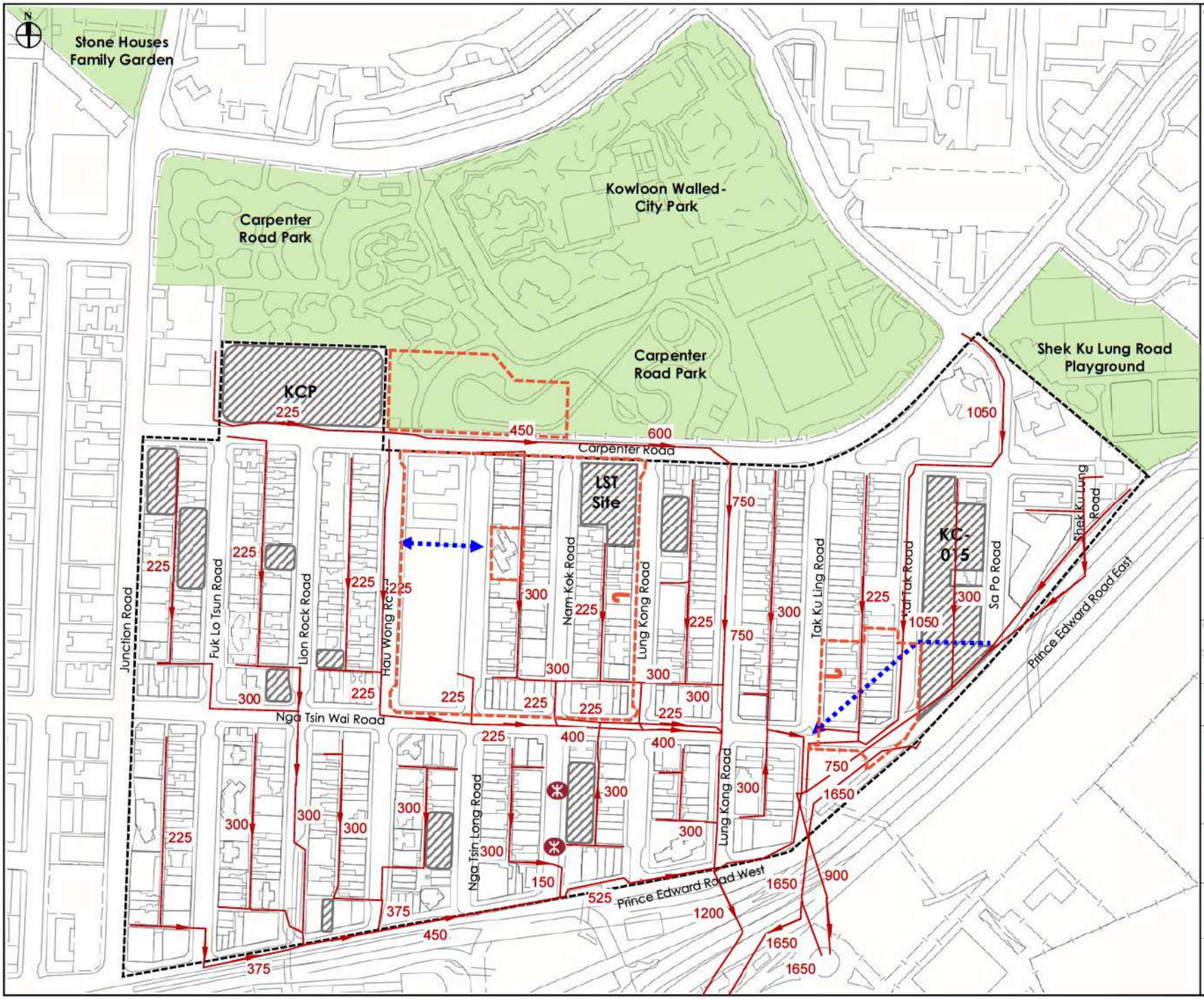


PROPOSED DIVERSION SCHEME

Figure 2

Appendix F

Key Foul Sewers within Kowloon City Area



Legend

- Kowloon City Area
- Scheme Boundary
- Planned Redevelopment in the Vicinity
- New Road Alignment under the Proposed Scheme
- Existing Foul Sewer

Drawing Title

KC-017 – Existing Sewerage System

Drawn	Date
Checked	Approved
Figure No.	Scale and Orientation

Job Title

Nga Tsin Wai Road/ Carpenter Road Development Scheme (KC-017)

市區重建局
URBAN RENEWAL AUTHORITY

ARUP

Appendix G
Sewage Estimation

ARUP	Job No.	Sheet No.	Rev.
		1	2
	Member/Location		
Job Title: Nga Tsin Wai Road/ Carpenter Road Development Scheme (KC-017)	Drg. Ref.		
Calculation: Sewage Generation from the Redevelopment and Sewerage Network Capacity Check	Made by	Date: 19/05/22	Chd.

Calculation for Sewage Generation

Upstream Sewage Generations:

Before Proposed Scheme

1.) Existing Development of Hotel					
Total GFA (assumed same as existing)	17,190	m^2			
Area/ Employee(1)	31.25	m^2			
Employee Population	550				
Unit Flow Factor (2)	1.58	m^3/day			
Estimated Dry Weather Flow		**869.13** m^3/day		**Catchment factor =**	1
2.) Existing Development of Office					
Total GFA	15,430	m^2			
Area/ Employee(3)	18.18	m^2			
Employee Population	849				
Unit Flow Factor (4)	0.08	m^3/day			
Estimated Dry Weather Flow		**67.89** m^3/day		**Catchment factor =**	1
3.) Existing Development of Residential					
Assume Residential					
Per Capita Flow (5)	0.27	m^3/day			
Total Population	21,830				
Estimated Dry Weather Flow		**5,894.10** m^3/day		**Catchment factor =**	1
Estimate for Clubhouse					
4.) Existing Development of Retail					
Total Retail GFA	140,170				
70% GFA	98,119	m^2			
Area/ Employee(6)	28.57	m^2			
Employee Population	3,434				
Unit Flow Factor (7)	0.28	m^3/day			
Estimated Dry Weather Flow		**961.57** m^3/day		**Catchment factor =**	1
5.) Existing Development of F&B					
Total GFA (assumed 30% of total retail GFA are F&B)	42,051	m^2			
Area/ Employee(8)	19.61	m^2			
Employee Population	2,145				
Unit Flow Factor (9)	1.58	m^3/day			
Estimated Dry Weather Flow		**3,388.47** m^3/day		**Catchment factor =**	1
6.) Existing Development of GIC					
Total GFA	41,350	m^2			
Area/ Employee(10)	30.30	m^2			
Employee Population	1,365				
Unit Flow Factor (11)	0.33	m^3/day			
Estimated Dry Weather Flow		**450.30** m^3/day		**Catchment factor =**	1
7.) Existing Development of Clubhouse					
Total GFA	19,830	m^2			
Area/ Employee(10)	30.30	m^2			
Employee Population	654				
Unit Flow Factor (11)	0.33	m^3/day			
Estimated Dry Weather Flow		**215.95** m^3/day		**Catchment factor =**	1
	Total	**11,847.40** m^3/day			
Contributing Population		**43,879**			
Peaking Factor		**4.00**			
Peak Flow		**47,389.62** m^3/day			

Remarks:

(1) Worker density 3.2 per 100m2 GFA has been assumed based on Commercial and Industrial Floor Space Utilization Survey (published by Planning Department) Figure 9 Hotels and Boarding Houses

(2) Unit flow factor = 0.08m3/day (commerical employee) +1.5m3/day (J10 Restaurants & Hotels) =1.58 m3/day based on EPD's GESF Table T-2;

(3)Worker density 5.5 per 100m2 GFA has been assumed based on Commercial and Industrial Floor Space Utilization Survey (published by Planning Department) Figure 9 Business services

(4) Unit flow factor per commercial employee = 0.08m3/day for commercial based on EPD's GESF Table T-2

(5) Unit flow factor per person = 0.27m3/day for Domestic houseing type Private R2 based on EPD's GESF Table T-1

(6) Worker density 3.5 per 100m2 GFA has been assumed based on Commercial and Industrial Floor Space Utilization Survey (published by Planning Department) Figure 9 Retail Trade

(7) Unit flow factor = 0.08m3/day (commerical employee) + 0.20m3/day (J4 Wholesale & Retail) =0.28 m3/day based on EPD's GESF Table T-2;

(8) Worker density5.1 per 100m2 GFA has been assumed based on Commercial and Industrial Floor Space Utilization Survey (published by Planning Department) Figure 9 Restaurants

(9) Unit flow factor = 0.08m3/day (commerical employee) +1.5m3/day (J10 Restaurants & Hotels) =1.58 m3/day based on EPD's GESF Table T-2;

(10) Worker density 3.3 per 100m2 GFA has been assumed based on Commercial and Industrial Floor Space Utilization Survey (published by Planning Department) Figure 9 community, social services& personal services

(11) Unit flow factor = 0.08m3/day (commerical employee) +0.25 m3/day (J2 electricity gas & Water) = 0.33m3/day based on EPD's GESF Table T-2;

(12) Unit flow factor = 0.08m3/day (commerical employee) +0.20 m3/day (J11 Community, Social & Personal Services) = 0.28m3/day based on EPD's GESF Table T-2;

ARUP		Job No.	Sheet No.	Rev.
			2	2
		Member/Location		
Job Title	Nga Tsin Wai Road/ Carpenter Road Development Scheme (KC-017)	Drg. Ref.		
Calculation	Sewage Generation from the Redevelopment and Sewerage Network Capacity Check	Made by	Date 19/05/22	Chd.

Calculation for Sewage Generation

Upstream Sewage Generations:

With Proposed Scheme

1.) After Development of Hotel				
Total GFA (assumed same as existing)	17,190	m^2		
Area/ Employee(1)	31.25	m^2		
Employee Population	550			
Unit Flow Factor (2)	1.58	m^3/day		
Estimated Dry Weather Flow		**869.13** m^3/day		**Catchment factor =1**
2.) After Development of Office				
Total GFA	14,610	m^2		
Area/ Employee(3)	18.18	m^2		
Employee Population	804			
Unit Flow Factor (4)	0.08	m^3/day		
Estimated Dry Weather Flow		**64.28** m^3/day		**Catchment factor =1**
3.) After Development of Residential				
Assume Residential				
Per Capita Flow (5)	0.27	m^3/day		
Total Population	28,370			
Estimated Dry Weather Flow		**7,659.90** m^3/day		**Catchment factor =1**
4.) After Development of Retail				
Total Retail GFA	150,170			
70% GFA	105,119	m^2		
Area/ Employee(6)	28.57	m^2		
Employee Population	3,679			
Unit Flow Factor (7)	0.28	m^3/day		
Estimated Dry Weather Flow		**1,030.17** m^3/day		**Catchment factor =1**
5.) After Development of F&B				
Total GFA (assumed 30% are F&B)	45,051.00			
Area/ Employee(8)	19.61	m^2		
Employee Population	2,298			
Unit Flow Factor (9)	1.58	m^3/day		
Estimated Dry Weather Flow		**3,630.21** m^3/day		**Catchment factor =1**
6.) After Development of GIC				
Total GFA	73,310.00	m^2		
Area/ Employee(10)	30.30	m^2		
Employee Population	2,419			
Unit Flow Factor (12)	0.28	m^3/day		
Estimated Dry Weather Flow		**677.38** m^3/day		**Catchment factor =1**
7.) After Development of Clubhouse				
Total GFA	24,890.00	m^2		
Area/ Employee(10)	30.30	m^2		
Employee Population	821			
Unit Flow Factor (12)	0.28	m^3/day		
Estimated Dry Weather Flow		**229.98** m^3/day		**Catchment factor =1**
	Total	**14,161.05** m^3/day		
	incerase compare with existing	**2,313.65** m^3/day		
		19.53% (increase)		
Contributing Population		**52,448**		
Peaking Factor		**4.03**		
Peak Flow		**57,076.68** m^3/day		

Remarks:

(1)Worker density 3.2 per 100m2 GFA has been assumed based on Commercial and Industrial Floor Space Utilization Survey (published by Planning Department) Figure 9 Hotels and Boarding Houses

(2) Unit flow factor = 0.08m3/day (commerical employee) +1.5m3/day (J10 Restaurants & Hotels) =1.58 m3/day based on EPD's GESF Table T-2;

(3)Worker density 5.5 per 100m2 GFA has been assumed based on Commercial and Industrial Floor Space Utilization Survey (published by Planning Department) Figure 9 Business services

(4) Unit flow factor per commercial employee = 0.08m3/day for commercial based on EPD's GESF Table T-2

(5) Unit flow factor per person = 0.27m3/day for Domestic houseing type Private R2 based on EPD's GESF Table T-1

(6)Worker density 3.5 per 100m2 GFA has been assumed based on Commercial and Industrial Floor Space Utilization Survey (published by Planning Department) Figure 9 Retail Trade

(7) Unit flow factor = 0.08m3/day (commerical employee) + 0.20m3/day (J4 Wholesale & Retail) =0.28 m3/day based on EPD's GESF Table T-2;

(8)Worker density5.1 per 100m2 GFA has been assumed based on Commercial and Industrial Floor Space Utilization Survey (published by Planning Department) Figure 9 Restaurants

(9) Unit flow factor = 0.08m3/day (commerical employee) +1.5m3/day (J10 Restaurants & Hotels) =1.58 m3/day based on EPD's GESF Table T-2;

(10)Worker density 3.3 per 100m2 GFA has been assumed based on Commercial and Industrial Floor Space Utilization Survey (published by Planning Department) Figure 9 community, social services& personal services

(11) Unit flow factor = 0.08m3/day (commerical employee) +0.25 m3/day (J2 electricity gas & Water) = 0.33m3/day based on EPD's GESF Table T-2;

(12) Unit flow factor = 0.08m3/day (commerical employee) +0.20 m3/day (J11 Community, Social & Personal Services) = 0.28m3/day based on EPD's GESF Table T-2;

ESTIMATION OF SEWAGE FLOW FROM APPLICATION SITE
(Based on EPD Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning)

Impact to TKW PTW		Proposed
Sewage Flow Estimates		
Total ADWF (m^3/day)		14,161.05
Increase of ADWF (m^3/day)		2,314
Peaking Factor (see Note 3)		3.01
Estimated PWWF (m^3/day)		42,695
Total increased PWWF (m^3/day)		6,976
To Kwa Wan PTW		
Design capacity (m^3/day) (see Note 4)		805,248
ADWF (m^3/day) (see Note 4)	(baseline scenario)	238,220
PWWF (m^3/day) (see Note 4)	(baseline scenario)	597,888
Estimated utilisation of PTW at ADWF, %	(baseline scenario)	29.6%
Estimated utilisation of PTW at PWWF, %	(baseline scenario)	74.2%
with additional flow at ADWF (m^3/day)		240,534
with additional flow at PWWF (m^3/day)		604,864
Estimated utilisation of PTW with additional flow at ADWF, %		29.9%
Estimated utilisation of PTW with additional flow at PWWF, %		75.1%
Increase in ADWF, %		0.29%
Increase in PWWF, %		0.87%

Note:
(1) Information on unit flow factor follows Section 12 of EPD's Guidelines for Estimating Sewage Flows (GESF)
(2) Based on HKPSG Table 2 Guidelines for Worker Densities, assume 20m^2/employee for office, 25m^2/employee for industrial, retail and F&B
(3) Peaking Factor based on EPD's GESF Table T-5
(4) Figure 16.12, Capacity Assessment of Existing Sewage Treatment and Disposal Facilities for Year 2016 Scenario, Kai Tai Development Environmental Impact Assessment Report

Appendix H

Capacity Check for sewers along Carpenter Road

GEOINFO MAP
地理資訊地圖

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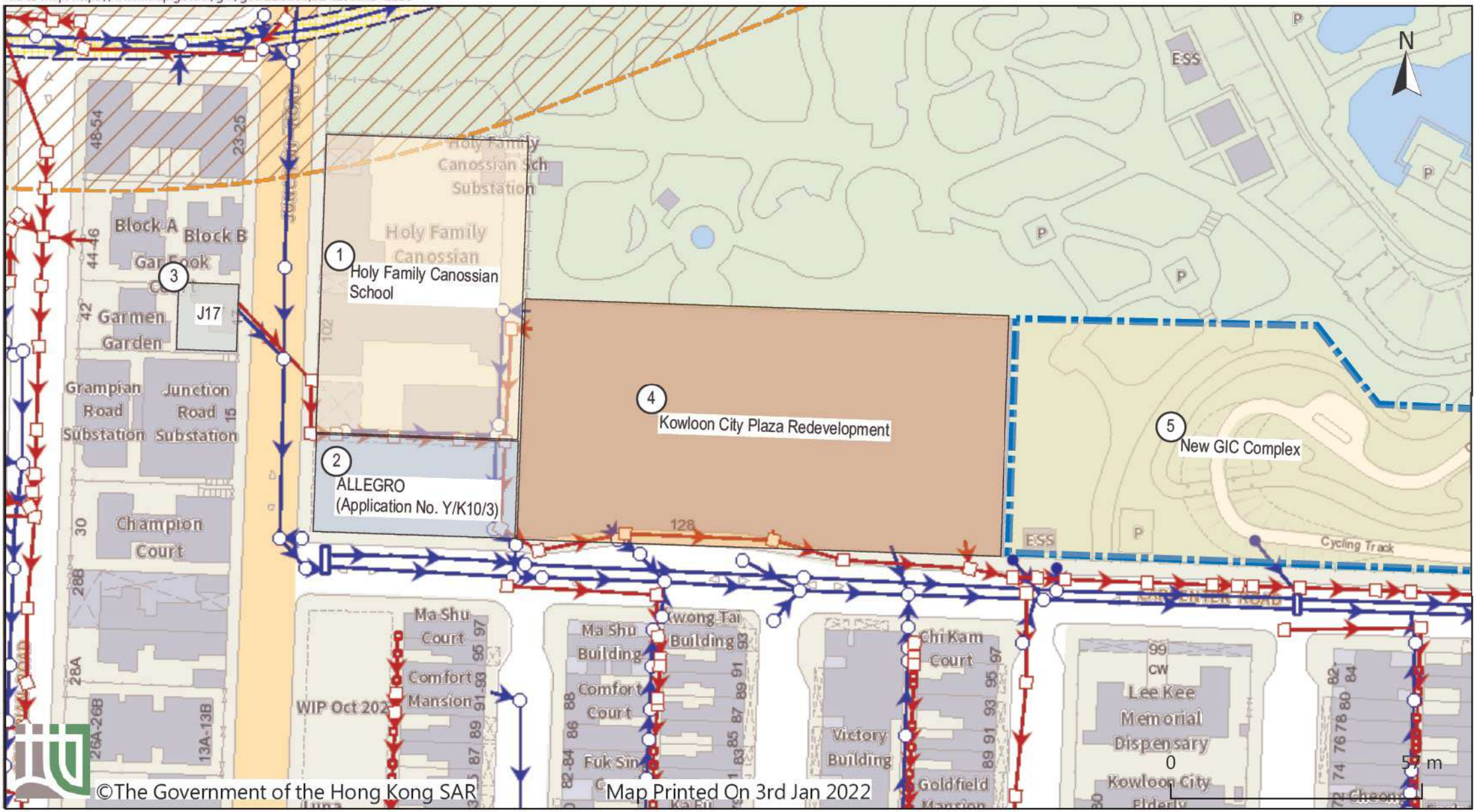

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Sewerage Catchment Plan along Carpenter Road

ARUP	Job No.	Sheet No.	Rev.
		1	2
	Member/Location		
Job Title: Nga Tsin Wai Road/ Carpenter Road Development Scheme (KC-017)	Drg. Ref.		
Calculation: Sewage Generation from the Redevelopment and Sewerage Network Capacity Check	Made by: IP	Date: 11/5/22	Chd.: YL

Calculation for Sewage Generation

Upstream Sewage Generations

1.)	**Holy Family Canossian School**			
	Student	576		
	Unit Flow Factor	0.04	m^3/day	
	Staff	38		
	Unit Flow Factor	0.08	m^3/day	
	Estimated Dry Weather Flow		**26.08** m^3/day	**Catchment factor =** **1**
2.)	**ALLEGRO (Application No. Y/K10/3)**			
	Estimated Dry Weather Flow (Provided by DSD)		**196.00** m^3/day	
3.)	**J17**			
	Assume Residential			
	Per Capita Flow	0.19	m^3/day	
	Total Population	30		
	Estimated Dry Weather Flow		**5.64** m^3/day	**Catchment factor =** **1**
4.)	**Kowloon City Plaza Redevelopment**			
	Estimated Dry Weather Flow (Provided by DSD)		**1,383.00** m^3/day	
5.)	**Reprovisioned GIC Complex**			
	Total GFA	44,000.00	m^2	
	Area/ Employee	30.30	m^2	
	Employee Population	1,452		
	Unit Flow Factor	0.28	m^3/day	
	Estimated Dry Weather Flow		**406.56** m^3/day	**Catchment factor =** **1**
		Total	**2,017.28** m^3/day	
	Contributing Population		**7,471**	
	Peaking Factor		**5.00**	
	Peak Flow		**10,086.42** m^3/day	

Remarks:

(1) Resident density 2.3 per 46.5m2 GFA has been assumed (provided by URA).

(2) Unit flow factor per person = 0.19m3/day for Domestic housing type Private R1 based on EPD's GESF Table T-1.

(3) Unit flow factor per commercial employee = 0.08m3/day for commercial based on EPD's GESF Table T-2.

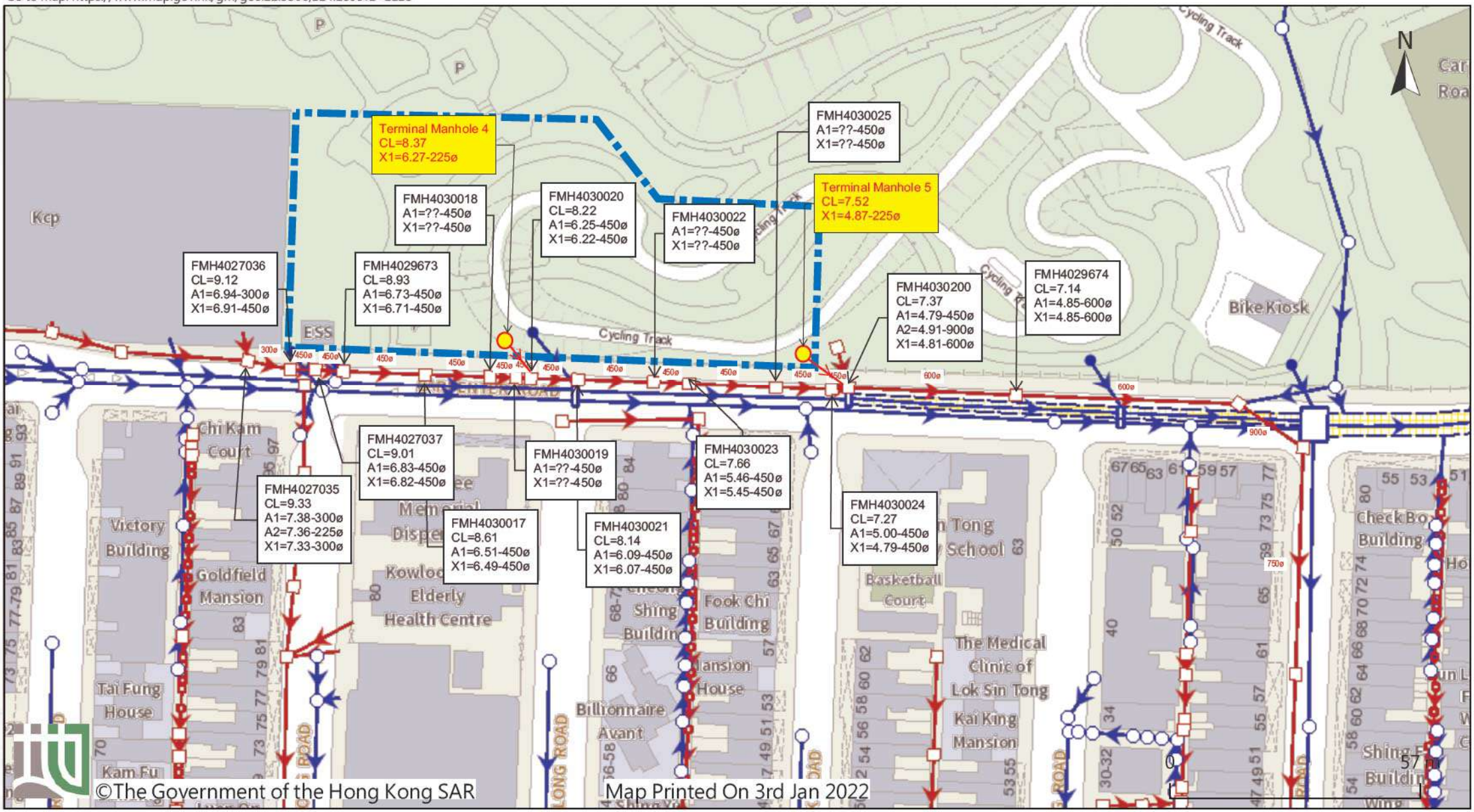
(4) Unit flow factor per school student = 0.04m3/day for commercial based on EPD's GESF Table T-2.

(5) Worker density 3.3 per 100m2 GFA has been assumed based on Commercial and Industrial Floor Space Utilization Survey (published by Planning Department) Figure 9 community, social services& personal services.

(6) Unit flow factor = 0.08m3/day (commerical employee) +0.20 m3/day (J11 Community, Social & Personal Services) = 0.28m3/day based on EPD's GESF Table T-2.

GEOINFO MAP
地理資訊地圖

Go to map: https://www.map.gov.hk/gm/geo:22.3306,114.1895?z=1128



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OPTION A -Sewerage Layout Plan along Carpenter Road

ARUP	Job No.	Sheet No.	Rev.
		2	2
	Member/Location		
Job Title: Nga Tsin Wai Road/ Carpenter Road Development Scheme (KC-017)	Drg. Ref.		
Calculation: Hydraulic Performance Review Of Existing Sewerage System (Along Along Carpenter Road) Capacity Check	Made by: IP	Date: 21/4/22	Chd: YL

HYDRAULIC PERFORMANCE REVIEW OF EXISTING SEWERAGE SYSTEM (Along Carpenter Road) - OPTION A

Notes:
Calculate by Colebrook-White Equation

$$\overline{V} = -\sqrt{32gRS_f}\log\left[\frac{k_s}{14.8R} + \frac{1.255\nu}{R\sqrt{32gRS_f}}\right]$$

where ks is roughness value equals 1.5mm for existing sewers.
ν is kinematic viscosity of fluid = 1.14 x 10-6 m^2/s and g is the gravity = 9.81m/s^2.

US Manhole Ref	DS Manhole Ref	Conduit Size		Invert Level		Slope	A_p	P	R	32gRSf	Velocity	Capacity	ADWF	Peak Flow		Utilised	Catchment Reference
		Diameter	Length	US	DS								Proposed Scheme	Peaking Factor	Proposed Scheme	Proposed Scheme	
		(m)	(m)	(mPD)	(mPD)	(S_f)	(m^2)	(m)	(m)	m^2/s^2	(m/s)	(L/s)	(m^3/day)		(L/s)	(%)	
Existing Sewerage System																	
FMH4027035	FMH4027036	0.300	10.0	7.33	6.94	0.0390	0.071	0.942	0.075	0.918	**2.74**	193.97	1610.72	5	93.21	48.1%	1,2,3,4
FMH4027036	FMH4027037	0.450	5.7	6.91	6.83	0.0140	0.159	1.414	0.113	0.496	**2.14**	340.14	1610.72	5	93.21	27.4%	
FMH4027037	FMH4029673	0.450	6.4	6.82	6.73	0.0141	0.159	1.414	0.113	0.497	**2.14**	340.47	1610.72	5	93.21	27.4%	
FMH4029673	FMH4030017	0.450	18.8	6.71	6.51	0.0106	0.159	1.414	0.113	0.376	**1.86**	296.03	1610.72	5	93.21	31.5%	
FMH4030017	FMH4030018	0.450	14.9	6.49	6.27	0.0150	0.159	1.414	0.113	0.529	**2.21**	351.27	1610.72	5	93.21	26.5%	
FMH4030018	FMH4030019	0.450	5.8	6.27	6.26	0.0019	0.159	1.414	0.113	0.067	**0.78**	124.51	1610.72	5	93.21	74.9%	
FMH4030019	FMH4030020	0.450	3.5	6.26	6.25	0.0017	0.159	1.414	0.113	0.061	**0.74**	118.34	1610.72	5	93.21	78.8%	
FMH4030020	FMH4030021	0.450	10.8	6.22	6.09	0.0120	0.159	1.414	0.113	0.425	**1.98**	314.94	1814.00	5	104.98	33.3%	50%_5
FMH4030021	FMH4030022	0.450	17.3	6.07	5.48	0.0343	0.159	1.414	0.113	1.213	**3.35**	532.49	1814.00	5	104.98	19.7%	
FMH4030022	FMH4030023	0.450	8.1	5.48	5.46	0.0020	0.159	1.414	0.113	0.070	**0.80**	127.09	1814.00	5	104.98	82.6%	
FMH4030023	FMH4030025	0.450	20.0	5.45	5.03	0.0212	0.159	1.414	0.113	0.747	**2.63**	417.74	1814.00	5	104.98	25.1%	
FMH4030025	FMH4030024	0.450	12.8	5.03	5.00	0.0021	0.159	1.414	0.113	0.074	**0.83**	131.36	1814.00	5	104.98	79.9%	
FMH4030024	FMH4030200	0.450	3.9	4.79	4.79	0.0000	0.159	1.414	0.113	0.035	**0.57**	90.19	1814.00	5	104.98	116.4%	
FMH4030200	FMH4029674	0.600	38.4	4.81	4.85	-0.0010	0.283	1.885	0.150	0.047	**0.68**	193.03	2017.28	5	116.74	60.5%	50%_5
FMH4029674	FMH4029675	0.600	51.0	4.85	4.63	0.0043	0.283	1.885	0.150	0.203	**1.42**	402.49	2017.28	5	116.74	29.0%	
Terminal Manhole 4	**FMH4030020**	0.300	5.0	6.27	6.22	0.0100	0.071	0.942	0.075	0.235	**1.39**	98.03	203.28	8	18.82	19.2%	50%_5
Terminal Manhole 5	**FMH4030200**	0.300	6.0	4.87	4.81	0.0100	0.071	0.942	0.075	0.235	**1.39**	98.03	203.28	8	18.82	19.2%	50%_5

ARUP	Job No.	Sheet No.	Rev.
		3	2
	Member/Location		
Job Title: Nga Tsin Wai Road/ Carpenter Road Development Scheme (KC-017)	Drg. Ref.		
Calculation: Hydraulic Performance Review Of Existing Sewerage System (Along Along Carpenter Road) Capacity Check	Made by: IP	Date: 21/4/22	Chd. YL

PROPOSED UPGRADE OF EXISTING SEWERAGE SYSTEM (Along Carpenter Road) - OPTION A

Notes:
Calculate by Colebrook-White Equation

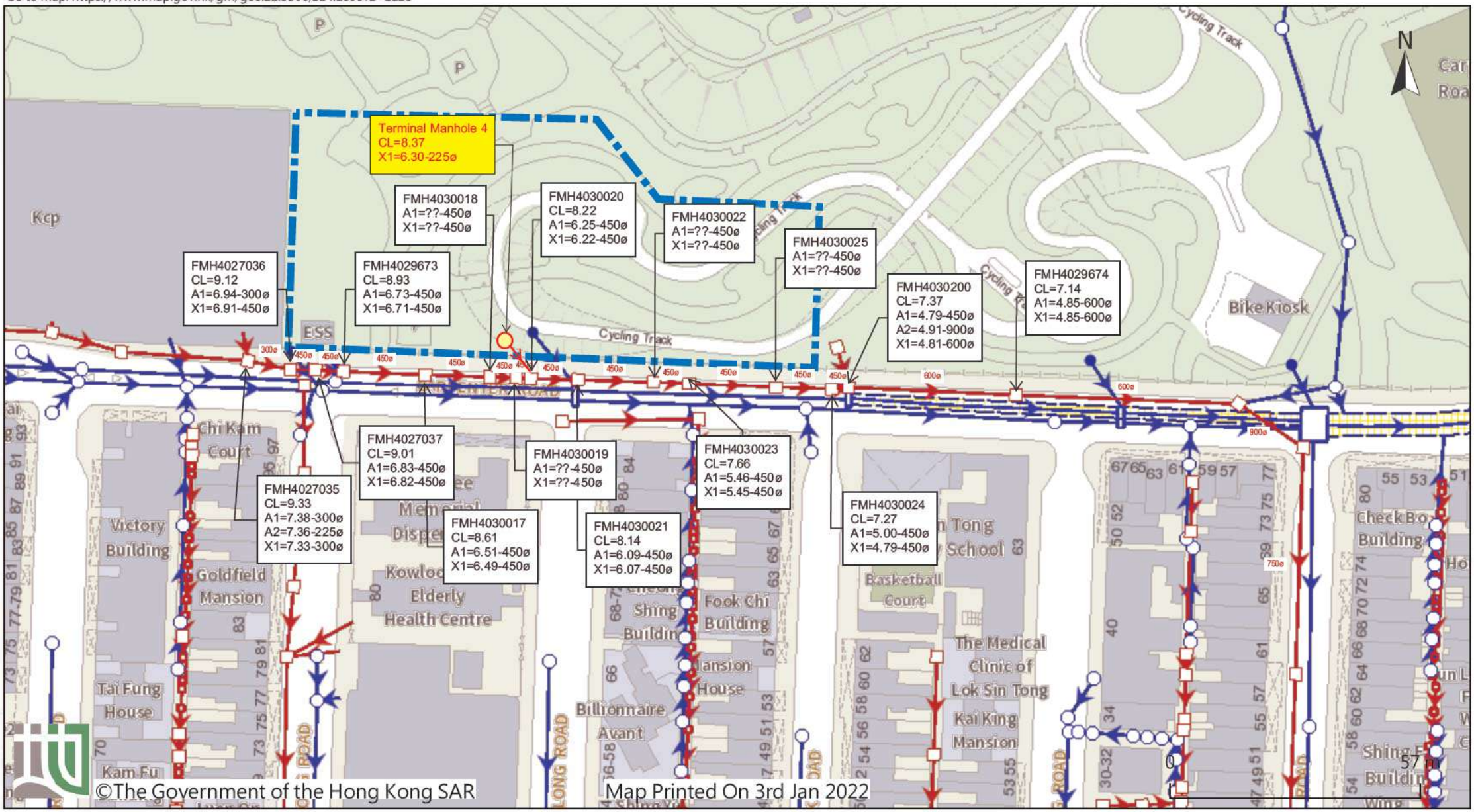
where ks is roughness value equals 1.5mm for existing sewers and 0.6mm for proposed sewers.
v is kinematic viscosity of fluid = 1.14 x 10-6 m^2/s and g is the gravity = 9.81m/s^2.

$$\overline{V} = -\sqrt{32gRS_f}\log\left[\frac{k_s}{14.8R} + \frac{1.255v}{R\sqrt{32gRS_f}}\right]$$

US Manhole Ref	DS Manhole Ref	Conduit Size		Invert Level		Slope	A_p	P	R	32gRSf	Velocity	Capacity	ADWF	Peak Flow		Utilised	Upgrade	Catchment Reference
		Diameter	Length	US	DS								Proposed Scheme	Peaking Factor	Proposed Scheme	Proposed Scheme		
		(m)	(m)	(mPD)	(mPD)	(S_f)	(m^2)	(m)	(m)	m^2/s^2	(m/s)	(L/s)	(m^3/day)		(L/s)	(%)		
Existing Sewerage System																		
FMH4027035	FMH4027036	0.300	10.0	7.33	6.94	0.0390	0.071	0.942	0.075	0.918	**2.74**	193.97	1610.72	5	93.21	48.1%		1,2,3,4
FMH4027036	FMH4027037	0.450	5.7	6.91	6.83	0.0140	0.159	1.414	0.113	0.496	**2.14**	340.14	1610.72	5	93.21	27.4%		
FMH4027037	FMH4029673	0.450	6.4	6.82	6.73	0.0141	0.159	1.414	0.113	0.497	**2.14**	340.47	1610.72	5	93.21	27.4%		
FMH4029673	FMH4030017	0.450	18.8	6.71	6.51	0.0106	0.159	1.414	0.113	0.376	**1.86**	296.03	1610.72	5	93.21	31.5%		
FMH4030017	FMH4030018	0.450	14.9	6.49	6.27	0.0150	0.159	1.414	0.113	0.529	**2.21**	351.27	1610.72	5	93.21	26.5%		
FMH4030018	FMH4030019	0.450	5.8	6.27	6.26	0.0019	0.159	1.414	0.113	0.067	**0.78**	124.51	1610.72	5	93.21	74.9%		
FMH4030019	FMH4030020	0.450	3.5	6.26	6.25	0.0017	0.159	1.414	0.113	0.061	**0.74**	118.34	1610.72	5	93.21	78.8%		
FMH4030020	FMH4030021	0.450	10.8	6.22	6.09	0.0120	0.159	1.414	0.113	0.425	**1.98**	314.94	1814.00	5	104.98	33.3%		50%_5
FMH4030021	FMH4030022	0.450	17.3	6.07	5.48	0.0343	0.159	1.414	0.113	1.213	**3.35**	532.49	1814.00	5	104.98	19.7%		
FMH4030022	FMH4030023	0.450	8.1	5.48	5.46	0.0020	0.159	1.414	0.113	0.070	**0.80**	127.09	1814.00	5	104.98	82.6%		
FMH4030023	FMH4030025	0.450	20.0	5.45	5.03	0.0212	0.159	1.414	0.113	0.747	**2.63**	417.74	1814.00	5	104.98	25.1%		
FMH4030025	FMH4030024	0.450	12.8	5.03	5.00	0.0021	0.159	1.414	0.113	0.074	**0.83**	131.36	1814.00	5	104.98	79.9%		
FMH4030024	FMH4030200	**0.600**	3.9	4.79	4.79	0.0000	0.283	1.885	0.150	0.047	**0.68**	193.03	1814.00	5	104.98	54.4%	Yes	
FMH4030200	FMH4029674	0.600	38.4	4.81	4.85	-0.0010	0.283	1.885	0.150	0.047	**0.68**	193.03	2017.28	5	116.74	60.5%		50%_5
FMH4029674	FMH4029675	0.600	51.0	4.85	4.63	0.0043	0.283	1.885	0.150	0.203	**1.42**	402.49	2017.28	5	116.74	29.0%		
Terminal Manhole 4	**FMH4030020**	0.300	5.0	6.27	6.22	0.0100	0.071	0.942	0.075	0.235	**1.39**	98.03	203.28	8	18.82	19.2%		50%_5
Terminal Manhole 5	**FMH4030200**	0.300	6.0	4.87	4.81	0.0100	0.071	0.942	0.075	0.235	**1.39**	98.03	203.28	8	18.82	19.2%		50%_5

GEOINFO MAP
地理資訊地圖

Go to map: https://www.map.gov.hk/gm/geo:22.3306,114.1895?z=1128



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Map Printed On 3rd Jan 2022

OPTION B -Sewerage Layout Plan along Carpenter Road

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ARUP	Job No.	Sheet No.	Rev.
		4	2
	Member/Location		
Job Title: Nga Tsin Wai Road/ Carpenter Road Development Scheme (KC-017)	Drg. Ref.		
Calculation: Hydraulic Performance Review Of Existing Sewerage System (Along Carpenter Road) Capacity Check	Made by: IP	Date: 21/4/22	Chd.: YL

HYDRAULIC PERFORMANCE REVIEW OF EXISTING SEWERAGE SYSTEM (Along Carpenter Road) - OPTION B

Notes:
Calculate by Colebrook-White Equation

where ks is roughness value equals 1.5mm for existing sewers.
v is kinematic viscosity of fluid = 1.14 x 10-6 m^2/s and g is the gravity = 9.81m/s^2.

$$\overline{V} = -\sqrt{32gRS_f}\log\left[\frac{k_s}{14.8R} + \frac{1.255\nu}{R\sqrt{32gRS_f}}\right]$$

US Manhole Ref	DS Manhole Ref	Conduit Size		Invert Level		Slope	A_p	P	R	32gRSf	Velocity	Capacity	ADWF	Peak Flow		Utilised	Catchment Reference
		Diameter	Length	US	DS								Proposed Scheme	Peaking Factor	Proposed Scheme	Proposed Scheme	
		(m)	(m)	(mPD)	(mPD)	(S_f)	(m^2)	(m)	(m)	m^2/s^2	(m/s)	(L/s)	(m^3/day)		(L/s)	(%)	
Existing Sewerage System																	
FMH4027035	FMH4027036	0.300	10.0	7.33	6.94	0.0390	0.071	0.942	0.075	0.918	**2.74**	193.97	1610.72	5	93.21	48.1%	1,2,3,4
FMH4027036	FMH4027037	0.450	5.7	6.91	6.83	0.0140	0.159	1.414	0.113	0.496	**2.14**	340.14	1610.72	5	93.21	27.4%	
FMH4027037	FMH4029673	0.450	6.4	6.82	6.73	0.0141	0.159	1.414	0.113	0.497	**2.14**	340.47	1610.72	5	93.21	27.4%	
FMH4029673	FMH4030017	0.450	18.8	6.71	6.51	0.0106	0.159	1.414	0.113	0.376	**1.86**	296.03	1610.72	5	93.21	31.5%	
FMH4030017	FMH4030018	0.450	14.9	6.49	6.27	0.0150	0.159	1.414	0.113	0.529	**2.21**	351.27	1610.72	5	93.21	26.5%	
FMH4030018	FMH4030019	0.450	5.8	6.27	6.26	0.0019	0.159	1.414	0.113	0.067	**0.78**	124.51	1610.72	5	93.21	74.9%	
FMH4030019	FMH4030020	0.450	3.5	6.26	6.25	0.0017	0.159	1.414	0.113	0.061	**0.74**	118.34	1610.72	5	93.21	78.8%	
FMH4030020	FMH4030021	0.450	10.8	6.22	6.09	0.0120	0.159	1.414	0.113	0.425	**1.98**	314.94	2017.28	5	116.74	37.1%	5
FMH4030021	FMH4030022	0.450	17.3	6.07	5.48	0.0343	0.159	1.414	0.113	1.213	**3.35**	532.49	2017.28	5	116.74	21.9%	
FMH4030022	FMH4030023	0.450	8.1	5.48	5.46	0.0020	0.159	1.414	0.113	0.070	**0.80**	127.09	2017.28	5	116.74	91.9%	
FMH4030023	FMH4030025	0.450	20.0	5.45	5.03	0.0212	0.159	1.414	0.113	0.747	**2.63**	417.74	2017.28	5	116.74	27.9%	
FMH4030025	FMH4030024	0.450	12.8	5.03	5.00	0.0021	0.159	1.414	0.113	0.074	**0.83**	131.36	2017.28	5	116.74	88.9%	
FMH4030024	FMH4030200	0.450	3.9	4.79	4.79	0.0000	0.159	1.414	0.113	0.035	**0.57**	90.19	2017.28	5	116.74	129.4%	
FMH4030200	FMH4029674	0.600	38.4	4.81	4.85	-0.0010	0.283	1.885	0.150	0.047	**0.68**	193.03	2017.28	5	116.74	60.5%	
FMH4029674	FMH4029675	0.600	51.0	4.85	4.63	0.0043	0.283	1.885	0.150	0.203	**1.42**	402.49	2017.28	5	116.74	29.0%	
Terminal Manhole 4	**FMH4030020**	0.300	5.0	6.27	6.22	0.0100	0.071	0.942	0.075	0.235	**1.39**	98.03	406.56	6	28.23	28.8%	5

ARUP

Job No.	Sheet No.	Rev.
	5	2

Member/Location:

Job Title: Nga Tsin Wai Road/ Carpenter Road Development Scheme (KC-017)

Drg. Ref.:

Calculation: Hydraulic Performance Review Of Existing Sewerage System (Along Carpenter Road) Capacity Check

Made by: IP Date: 21/4/22 Chd. YL

PROPOSED UPGRADE OF EXISTING SEWERAGE SYSTEM (Along Carpenter Road) - OPTION B

Notes:
Calculate by Colebrook-White Equation

where ks is roughness value equals 1.5mm for existing sewers and 0.6mm for proposed sewers.
v is kinematic viscosity of fluid = 1.14 x 10-6 m^2/s and g is the gravity = 9.81m/s^2.

$$\bar{V} = -\sqrt{32gRS_f}\log\left[\frac{k_s}{14.8R} + \frac{1.255v}{R\sqrt{32gRS_f}}\right]$$

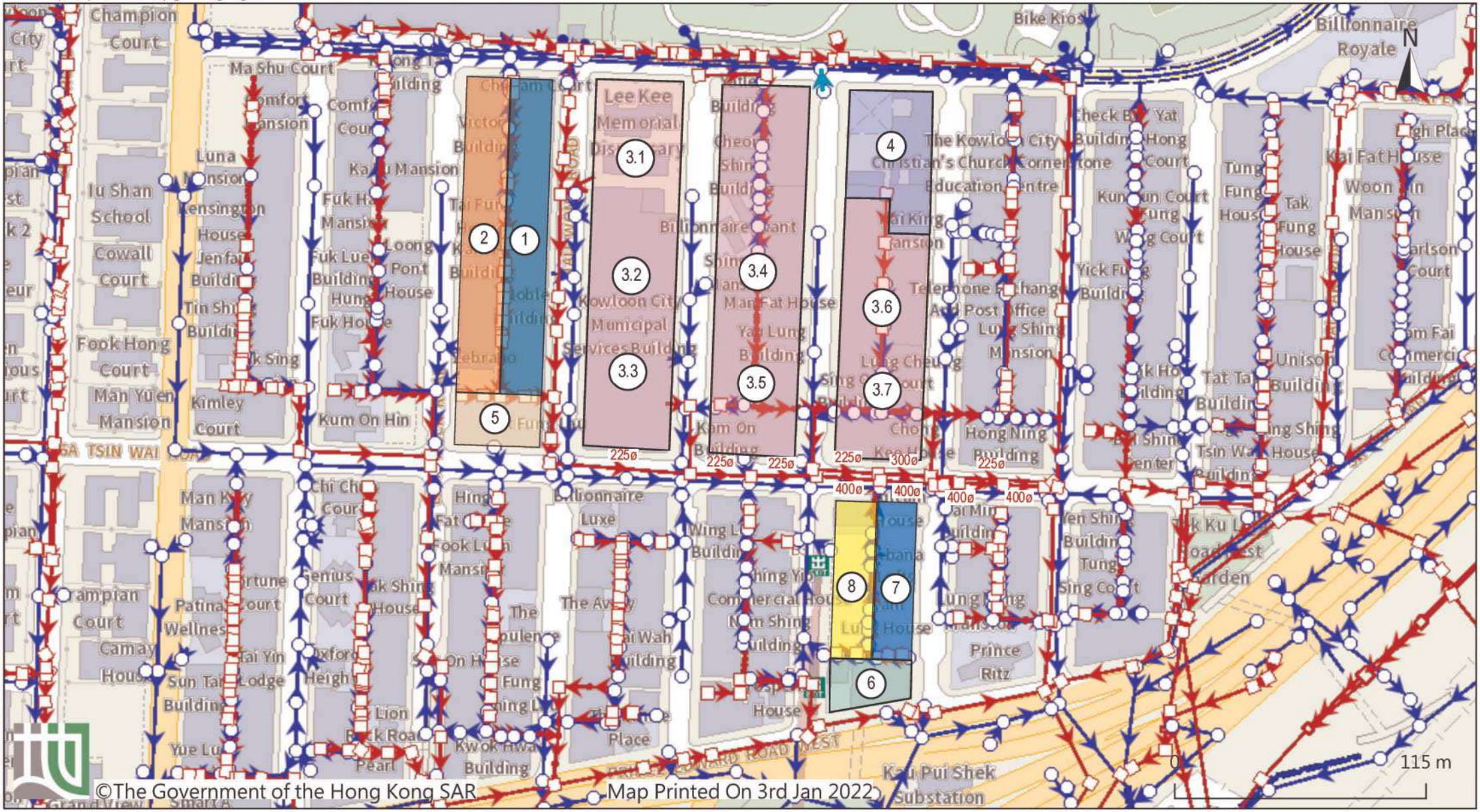
US Manhole Ref	DS Manhole Ref	Conduit Size		Invert Level		Slope	A_p	P	R	32gRSf	Velocity	Capacity	ADWF	Peak Flow		Utilised	Upgrade	Catchment Reference
		Diameter	Length	US	DS								Proposed Scheme	Peaking Factor	Proposed Scheme	Proposed Scheme		
		(m)	(m)	(mPD)	(mPD)	(S_f)	(m^2)	(m)	(m)	m^2/s^2	(m/s)	(L/s)	(m^3/day)		(L/s)	(%)		
Existing Sewerage System																		
FMH4027035	FMH4027036	0.300	10.0	7.33	6.94	0.039	0.071	0.942	0.075	0.918	**2.74**	193.97	1610.72	5	93.21	48.1%		1,2,3,4
FMH4027036	FMH4027037	0.450	5.7	6.91	6.83	0.014	0.159	1.414	0.113	0.496	**2.14**	340.14	1610.72	5	93.21	27.4%		
FMH4027037	FMH4029673	0.450	6.4	6.82	6.73	0.014	0.159	1.414	0.113	0.497	**2.14**	340.47	1610.72	5	93.21	27.4%		
FMH4029673	FMH4030017	0.450	18.8	6.71	6.51	0.011	0.159	1.414	0.113	0.376	**1.86**	296.03	1610.72	5	93.21	31.5%		
FMH4030017	FMH4030018	0.450	14.9	6.49	6.27	0.015	0.159	1.414	0.113	0.529	**2.21**	351.27	1610.72	5	93.21	26.5%		
FMH4030018	FMH4030019	0.450	5.8	6.27	6.26	0.002	0.159	1.414	0.113	0.067	**0.78**	124.51	1610.72	5	93.21	74.9%		
FMH4030019	FMH4030020	0.450	3.5	6.26	6.25	0.002	0.159	1.414	0.113	0.061	**0.74**	118.34	1610.72	5	93.21	78.8%		
FMH4030020	FMH4030021	0.450	10.8	6.22	6.09	0.012	0.159	1.414	0.113	0.425	**1.98**	314.94	2017.28	5	116.74	37.1%		5
FMH4030021	FMH4030022	0.450	17.3	6.07	5.48	0.034	0.159	1.414	0.113	1.213	**3.35**	532.49	2017.28	5	116.74	21.9%		
FMH4030022	FMH4030023	0.450	8.1	5.48	5.46	0.002	0.159	1.414	0.113	0.070	**0.80**	127.09	2017.28	5	116.74	91.9%		
FMH4030023	FMH4030025	0.450	20.0	5.45	5.03	0.021	0.159	1.414	0.113	0.747	**2.63**	417.74	2017.28	5	116.74	27.9%		
FMH4030025	FMH4030024	0.450	12.8	5.03	5.00	0.002	0.159	1.414	0.113	0.074	**0.83**	131.36	2017.28	5	116.74	88.9%		
FMH4030024	FMH4030200	**0.600**	3.9	4.79	4.79	0.0000	0.283	1.885	0.150	0.047	**0.68**	193.03	2017.28	5	116.74	60.5%	Yes	
FMH4030200	FMH4029674	0.600	38.4	4.81	4.85	-0.001	0.283	1.885	0.150	0.047	**0.68**	193.03	2017.28	5	116.74	60.5%		
FMH4029674	FMH4029675	0.600	51.0	4.85	4.63	0.004	0.283	1.885	0.150	0.203	**1.42**	402.49	2017.28	5	116.74	29.0%		
Terminal Manhole 4	**FMH4030020**	0.300	5.0	6.27	6.22	0.010	0.071	0.942	0.075	0.235	**1.39**	98.03	406.56	6	28.23	28.8%		5

Appendix I

Capacity Check for sewers along Nga Tsin Wai Road

GEOINFO MAP
地理資訊地圖

Go to map: https://www.map.gov.hk/gm/geo:22.3306,114.1895?z=1128



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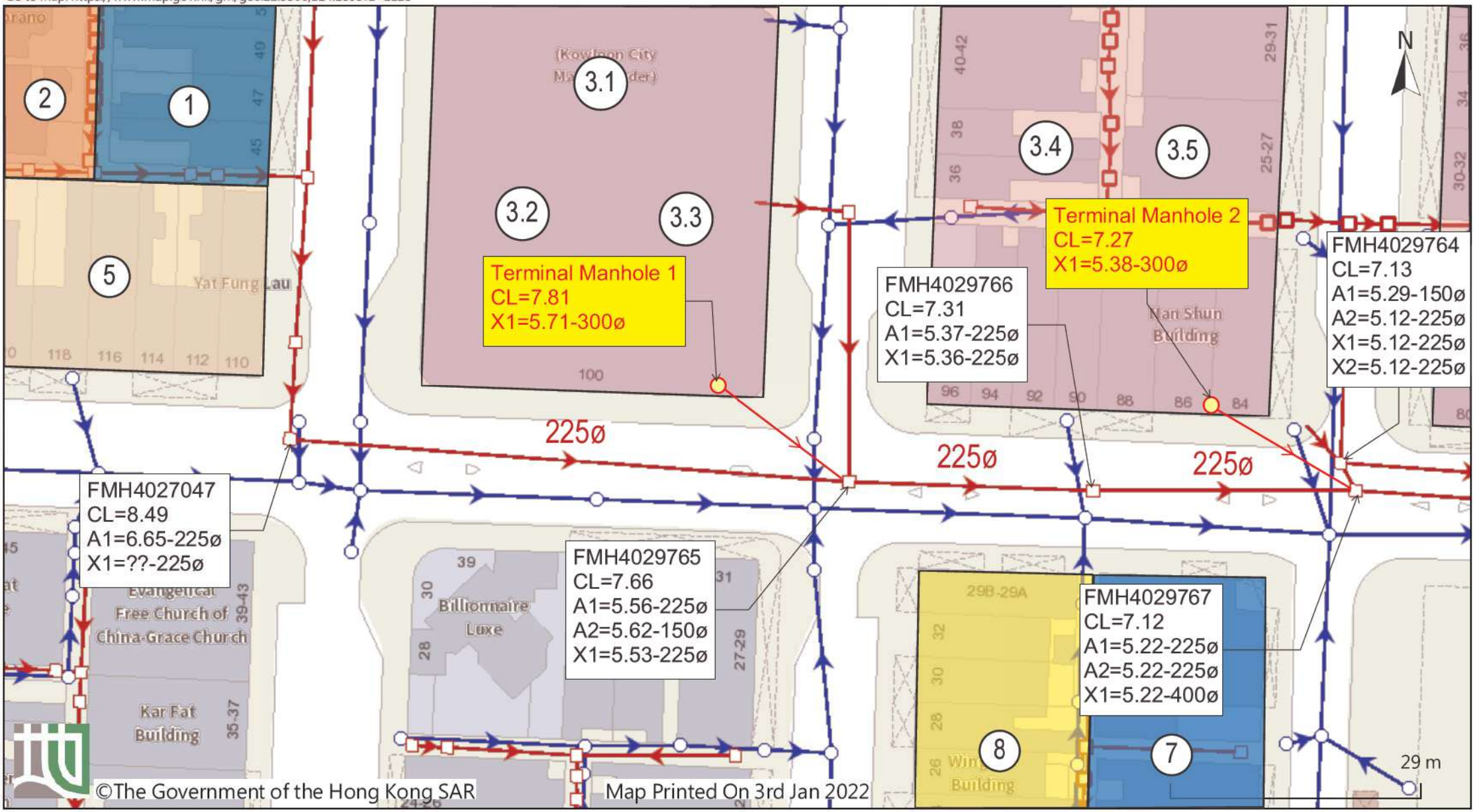
Sewerage Catchment Plan along Nga Tsin Wai Road

GEOINFO MAP
地理資訊地圖

Go to map: https://www.map.gov.hk/gm/geo:22.3306,114.1895?z=1128



Sewerage Layout Plan along Nga Tsin Wai Road

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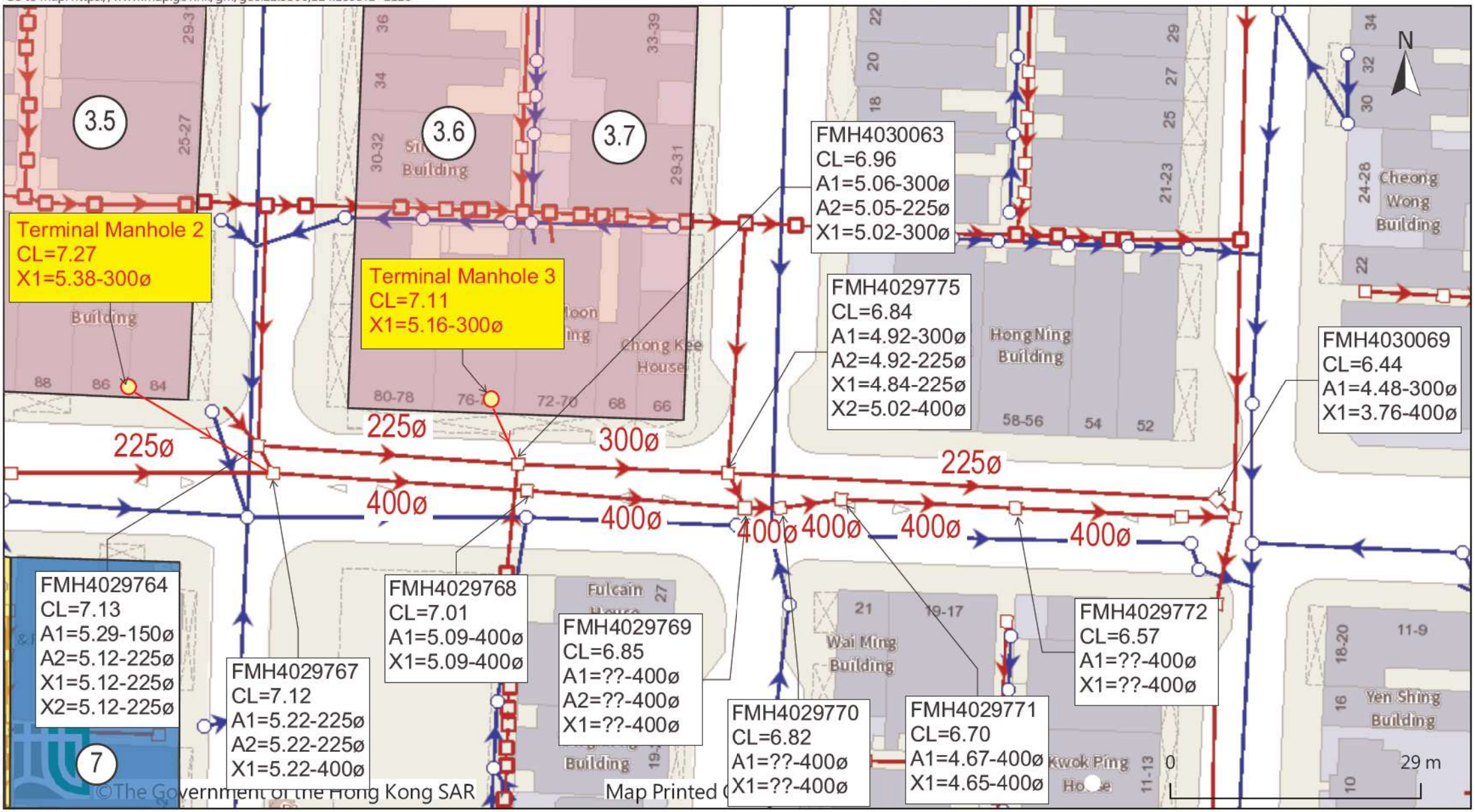
GEOINFO MAP
地理資訊地圖

Go to map: https://www.map.gov.hk/gm/geo:22.3306,114.1895?z=1128



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Sewerage Layout Plan along Nga Tsin Wai Road

ARUP	Job No.	Sheet No.	Rev.
		1	2
	Member/Location		
Job Title: Nga Tsin Wai Road/ Carpenter Road Development Scheme (KC-017)	Drg. Ref.		
Calculation: Sewage Generation from the Redevelopment and Sewerage Network Capacity Check	Made by: IP	Date: 11/5/22	Chd.: YL

Calculation for Sewage Generation

Upstream Sewage Generation (Along Nga Tsin Wai Rd)

1.1)	**45-51 HAU WONG RD**				
	Residential GFA	1,203	m^2		
	Population	59			
	Unit Flow Factor	0.19	m^3/day		
	Retail GFA	132	m^2		
	Employee Population	5			
	Unit Flow Factor	0.28	m^3/day		
	Estimated Dry Weather Flow		**12.60** m^3/day	**Catchment factor =**	1
1.2)	**55 HAU WONG RD**				
	Residential GFA	540	m^2		
	Population	27			
	Unit Flow Factor	0.19	m^3/day		
	Retail GFA	365	m^2		
	Employee Population	13			
	Unit Flow Factor	0.28	m^3/day		
	Estimated Dry Weather Flow		**8.65** m^3/day	**Catchment factor =**	1
1.3)	**Noble Building**				
	Residential GFA	531	m^2		
	Population	26			
	Unit Flow Factor	0.19	m^3/day		
	Retail GFA	358	m^2		
	Employee Population	13			
	Unit Flow Factor	0.28	m^3/day		
	Estimated Dry Weather Flow		**8.49** m^3/day	**Catchment factor =**	1
1.4)	**61-63 HAU WONG RD**				
	Residential GFA	445	m^2		
	Population	22			
	Unit Flow Factor	0.19	m^3/day		
	Retail GFA	296	m^2		
	Employee Population	10			
	Unit Flow Factor	0.28	m^3/day		
	Estimated Dry Weather Flow		**7.08** m^3/day	**Catchment factor =**	1
1.5)	**LUEN ON BUILDING**				
	Residential GFA	437	m^2		
	Population	22			
	Unit Flow Factor	0.19	m^3/day		
	Retail GFA	290	m^2		
	Employee Population	10			
	Unit Flow Factor	0.28	m^3/day		
	Estimated Dry Weather Flow		**6.94** m^3/day	**Catchment factor =**	1
1.6)	**69-71 HAU WONG RD**				
	Residential GFA	384	m^2		
	Population	19			
	Unit Flow Factor	0.19	m^3/day		
	Retail GFA	149	m^2		
	Employee Population	5			
	Unit Flow Factor	0.28	m^3/day		
	Estimated Dry Weather Flow		**5.07** m^3/day	**Catchment factor =**	1
1.7)	**73 HAU WONG RD**				
	Residential GFA	415	m^2		
	Population	21			
	Unit Flow Factor	0.19	m^3/day		
	Retail GFA	0	m^2		
	Employee Population	0			
	Unit Flow Factor	0.28	m^3/day		
	Estimated Dry Weather Flow		**3.90** m^3/day	**Catchment factor =**	1
1.8)	**75 HAU WONG RD**				
	Residential GFA	288	m^2		
	Population	14			
	Unit Flow Factor	0.19	m^3/day		
	Retail GFA	0	m^2		
	Employee Population	0			
	Unit Flow Factor	0.28	m^3/day		
	Estimated Dry Weather Flow		**2.71** m^3/day	**Catchment factor =**	1
1.9)	**77-79 HAU WONG RD**				
	Residential GFA	685	m^2		
	Population	34			
	Unit Flow Factor	0.19	m^3/day		
	Estimated Dry Weather Flow		**6.44** m^3/day	**Catchment factor =**	1
1.10)	**81 HAU WONG RD**				
	Residential GFA	223	m^2		
	Population	11			
	Unit Flow Factor	0.19	m^3/day		
	Retail GFA	75	m^2		
	Employee Population	3			
	Unit Flow Factor	0.28	m^3/day		
	Estimated Dry Weather Flow		**2.83** m^3/day	**Catchment factor =**	1
1.11)	**83 HAU WONG RD**				
	Residential GFA	339	m^2		
	Population	17			
	Unit Flow Factor	0.19	m^3/day		
	Retail GFA	229	m^2		
	Employee Population	8			
	Unit Flow Factor	0.28	m^3/day		
	Estimated Dry Weather Flow		**5.44** m^3/day	**Catchment factor =**	1

ARUP	Job No.	Sheet No.	Rev.
		2	2
	Member/Location		
Job Title: Nga Tsin Wai Road/ Carpenter Road Development Scheme (KC-017)	Drg. Ref.		
Calculation: Sewage Generation from the Redevelopment and Sewerage Network Capacity Check	Made by: IP	Date: 11/5/22	Chd.: YL

Calculation for Sewage Generation

Upstream Sewage Generation (Along Nga Tsin Wai Rd)

1.12)	**GOLDFIELD MANSION**					
	Residential GFA	621	m^2			
	Population	31				
	Unit Flow Factor	0.19	m^3/day			
	Retail GFA	203	m^2			
	Employee Population	7				
	Unit Flow Factor	0.28	m^3/day			
	Estimated Dry Weather Flow			**7.82**	m^3/day	**Catchment factor =** 1
1.13)	**89-91 HAU WONG RD**					
	Residential GFA	405	m^2			
	Population	20				
	Unit Flow Factor	0.19	m^3/day			
	Retail GFA	165	m^2			
	Employee Population	6				
	Unit Flow Factor	0.28	m^3/day			
	Estimated Dry Weather Flow			**5.43**	m^3/day	**Catchment factor =** 1
1.14)	**93-95 HAU WONG RD**					
	Residential GFA	601	m^2			
	Population	30				
	Unit Flow Factor	0.19	m^3/day			
	Retail GFA	199	m^2			
	Employee Population	7				
	Unit Flow Factor	0.28	m^3/day			
	Estimated Dry Weather Flow			**7.60**	m^3/day	**Catchment factor =** 1
1.15)	**CHI KAM COURT**					
	Residential GFA	380	m^2			
	Population	19				
	Unit Flow Factor	0.19	m^3/day			
	Retail GFA	228	m^2			
	Employee Population	8				
	Unit Flow Factor	0.28	m^3/day			
	Estimated Dry Weather Flow			**5.80**	m^3/day	**Catchment factor =** 1
Sewage generation by catchment 1 (to FMH4027047)				**96.80**		
2.1)	**54-56 LION ROCK RD**					
	Residential GFA	683	m^2			
	Population	34				
	Unit Flow Factor	0.19	m^3/day			
	Estimated Dry Weather Flow			**6.42**	m^3/day	**Catchment factor =** 1
2.2)	**58-64 LION ROCK RD**					
	Residential GFA	1,232	m^2			
	Population	61				
	Unit Flow Factor	0.19	m^3/day			
	Estimated Dry Weather Flow			**11.58**	m^3/day	**Catchment factor =** 1
2.3)	**Fuk Luen Building**					
	Residential GFA	404	m^2			
	Population	20				
	Unit Flow Factor	0.19	m^3/day			
	Estimated Dry Weather Flow			**3.80**	m^3/day	**Catchment factor =** 1
2.4)	**Kam Fu Building**					
	Residential GFA	580	m^2			
	Population	29				
	Unit Flow Factor	0.19	m^3/day			
	Retail GFA	392	m^2			
	Employee Population	14				
	Unit Flow Factor	0.28	m^3/day			
	Estimated Dry Weather Flow			**9.29**	m^3/day	**Catchment factor =** 1
2.5)	**70 LION ROCK RD**					
	Residential GFA	267	m^2			
	Population	13				
	Unit Flow Factor	0.19	m^3/day			
	Retail GFA	182	m^2			
	Employee Population	6				
	Unit Flow Factor	0.28	m^3/day			
	Estimated Dry Weather Flow			**4.29**	m^3/day	**Catchment factor =** 1
2.6)	**TAI FUNG HOUSE**					
	Residential GFA	891	m^2			
	Population	44				
	Unit Flow Factor	0.19	m^3/day			
	Retail GFA	596	m^2			
	Employee Population	21				
	Unit Flow Factor	0.28	m^3/day			
	Estimated Dry Weather Flow			**14.21**	m^3/day	**Catchment factor =** 1
2.7)	**Zebrano**					
	Residential GFA	1,468	m^2			
	Population	73				
	Unit Flow Factor	0.19	m^3/day			
	Retail GFA	299	m^2			
	Employee Population	10				
	Unit Flow Factor	0.28	m^3/day			
	Estimated Dry Weather Flow			**16.73**	m^3/day	**Catchment factor =** 1

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			3	2
		Member/Location		
Job Title	Nga Tsin Wai Road/ Carpenter Road Development Scheme (KC-017)	Drg. Ref.		
Calculation	Sewage Generation from the Redevelopment and Sewerage Network Capacity Check	Made by IP	Date 11/5/22	Chd. YL

Calculation for Sewage Generation

Upstream Sewage Generation (Along Nga Tsin Wai Rd)

2.8)	**VICTORY BUILDING**					
	Residential GFA	3,610	m^2			
	Population	179				
	Unit Flow Factor	0.19	m^3/day			
	Retail GFA	1,187	m^2			
	Employee Population	42				
	Unit Flow Factor	0.28	m^3/day			
	Estimated Dry Weather Flow			**45.56** m^3/day	**Catchment factor =**	1
Sewage generation by catchment 2 (to FMH4027047)				**111.87**		
3.1)	**NDN Tower 1**					
	Assume Residential					
	Per Capita Flow (5)	0.19	m^3/day			
	Total Population	1,779				
	Estimated Dry Weather Flow			**337.92** m^3/day	**Catchment factor =**	1
3.1A)	**Podium 1**					
	Podium GFA	2,934	m^2			
	Employee Population	97				
	Unit Flow Factor	0.28	m^3/day			
	Estimated Dry Weather Flow			**27.11** m^3/day	**Catchment factor =**	1
3.2)	**NDN Tower 2**					
	Assume Residential					
	Per Capita Flow (5)	0.19	m^3/day			
	Total Population	1,298				
	Estimated Dry Weather Flow			**246.60** m^3/day	**Catchment factor =**	1
3.3)	**NDN Tower 3**					
	Assume Residential					
	Per Capita Flow (5)	0.19	m^3/day			
	Total Population	1,651				
	Estimated Dry Weather Flow			**313.63** m^3/day	**Catchment factor =**	1
3.3A)	**Podium 2**					
	Podium GFA	7,246	m^2			
	Employee Population	239				
	Unit Flow Factor	0.28	m^3/day			
	Estimated Dry Weather Flow			**66.95** m^3/day	**Catchment factor =**	1
3.4)	**NDN Tower 5**					
	Assume Residential					
	Per Capita Flow (5)	0.19	m^3/day			
	Total Population	1,633				
	Estimated Dry Weather Flow			**310.35** m^3/day	**Catchment factor =**	1
3.5)	**NDN Tower 6**					
	Assume Residential					
	Per Capita Flow (5)	0.19	m^3/day			
	Total Population	1,175				
	Estimated Dry Weather Flow			**223.29** m^3/day	**Catchment factor =**	1
3.5A)	**Podium 5**					
	Podium GFA	7,429	m^2			
	Employee Population	245				
	Unit Flow Factor	0.28	m^3/day			
	Estimated Dry Weather Flow			**68.64** m^3/day	**Catchment factor =**	1
3.6)	**NDN Tower 7**					
	Assume Residential					
	Per Capita Flow (5)	0.19	m^3/day			
	Total Population	1,347				
	Estimated Dry Weather Flow			**255.97** m^3/day	**Catchment factor =**	1
3.6A)	**Podium 3**					
	Podium GFA	122	m^2			
	Employee Population	4				
	Unit Flow Factor	0.28	m^3/day			
	Estimated Dry Weather Flow			**1.13** m^3/day	**Catchment factor =**	1
3.7)	**NDN Tower 8**					
	Assume Residential					
	Per Capita Flow (5)	0.19	m^3/day			
	Total Population	1,441				
	Estimated Dry Weather Flow			**273.70** m^3/day	**Catchment factor =**	1
3.7A)	**Podium 6**					
	Podium GFA	5,786	m^2			
	Employee Population	191				
	Unit Flow Factor	0.28	m^3/day			
	Estimated Dry Weather Flow			**53.46** m^3/day	**Catchment factor =**	1
3.8)	**Billionaire Avant**					
	Residential GFA	4,591	m^2			
	Population	227				
	Unit Flow Factor	0.19	m^3/day			
	Retail GFA	888	m^2			
	Employee Population	31				
	Unit Flow Factor	0.28	m^3/day			
	Estimated Dry Weather Flow			**51.85** m^3/day	**Catchment factor =**	1
Sewage generation by catchment 3 (to FMH4029765, FMH4029767 and FMH4029764)				**2,230.61**		
4.)	**LST Site**					
	GFA	16,078	m^2			
	Employee Population	531				
	Unit Flow Factor	0.28	m^3/day			
	Estimated Dry Weather Flow			**148.56** m^3/day	**Catchment factor =**	1
Sewage generation by catchment 4 (to FMH4027047)				**148.56**		

ARUP		Job No.	Sheet No.	Rev.
			4	2
		Member/Location		
Job Title	Nga Tsin Wai Road/ Carpenter Road Development Scheme (KC-017)	Drg. Ref.		
Calculation	Sewage Generation from the Redevelopment and Sewerage Network Capacity Check	Made by IP	Date 11/5/22	Chd. YL

Calculation for Sewage Generation

Upstream Sewage Generation (Along Nga Tsin Wai Rd)

5.1)	**112-114 NGA TSIN WAI RD**					
	Residential GFA	717	m²			
	Population	35				
	Unit Flow Factor	0.19	m³/day			
	Retail GFA	190	m²			
	Employee Population	7				
	Unit Flow Factor	0.28	m³/day			
	Estimated Dry Weather Flow			**8.59**	m³/day	**Catchment factor =** 1
5.2)	**116 NGA TSIN WAI RD**					
	Office GFA	511	m²			
	Population	28				
	Unit Flow Factor	0.08	m³/day			
	Estimated Dry Weather Flow			**2.25**	m³/day	**Catchment factor =** 1
5.3)	**118 NGA TSIN WAI RD**					
	Residential GFA	475	m²			
	Population	24				
	Unit Flow Factor	0.19	m³/day			
	Retail GFA	126	m²			
	Employee Population	4				
	Unit Flow Factor	0.28	m³/day			
	Estimated Dry Weather Flow			**5.70**	m³/day	**Catchment factor =** 1
5.4)	**120 NGA TSIN WAI RD**					
	Residential GFA	502	m²			
	Population	25				
	Unit Flow Factor	0.19	m³/day			
	Retail GFA	133	m²			
	Employee Population	5				
	Unit Flow Factor	0.28	m³/day			
	Estimated Dry Weather Flow			**6.01**	m³/day	**Catchment factor =** 1
5.5)	**122 NGA TSIN WAI RD**					
	Residential GFA	444	m²			
	Population	22				
	Unit Flow Factor	0.19	m³/day			
	Retail GFA	248	m²			
	Employee Population	9				
	Unit Flow Factor	0.28	m³/day			
	Estimated Dry Weather Flow			**6.60**	m³/day	**Catchment factor =** 1
5.6)	**YAT FUNG LAU**					
	Residential GFA	204	m²			
	Population	10				
	Unit Flow Factor	0.19	m³/day			
	Retail GFA	422	m²			
	Employee Population	15				
	Unit Flow Factor	0.28	m³/day			
	Estimated Dry Weather Flow			**6.05**	m³/day	**Catchment factor =** 1
Sewage generation by catchment 5 (to FMH4027047)				**35.21**		
6.1)	**420-422 PRINCE EDWARD RD WEST**					
	Residential GFA	1,886	m²			
	Population	93				
	Unit Flow Factor	0.19	m³/day			
	Retail GFA	640	m²			
	Employee Population	22				
	Unit Flow Factor	0.28	m³/day			
	Estimated Dry Weather Flow			**24.00**	m³/day	**Catchment factor =** 1
6.2)	**424-426 PRINCE EDWARD RD WEST**					
	Residential GFA	522	m²			
	Population	26				
	Unit Flow Factor	0.19	m³/day			
	Retail GFA	432	m²			
	Employee Population	15				
	Unit Flow Factor	0.28	m³/day			
	Estimated Dry Weather Flow			**9.14**	m³/day	**Catchment factor =** 1
6.3)	**428-430 PRINCE EDWARD RD WEST**					
	Residential GFA	642	m²			
	Population	32				
	Unit Flow Factor	0.19	m³/day			
	Retail GFA	215	m²			
	Employee Population	8				
	Unit Flow Factor	0.28	m³/day			
	Estimated Dry Weather Flow			**8.15**	m³/day	**Catchment factor =** 1
6.4)	**432 PRINCE EDWARD RD WEST**					
	Residential GFA	294	m²			
	Population	15				
	Unit Flow Factor	0.19	m³/day			
	Retail GFA	181	m²			
	Employee Population	6				
	Unit Flow Factor	0.28	m³/day			
	Estimated Dry Weather Flow			**4.53**	m³/day	**Catchment factor =** 1
Sewage generation by catchment 6 (to FMH4030063)				**45.81**		
7.1)	**11-13 LUNG KONG RD**					
	Residential GFA	496	m²			
	Population	25				
	Unit Flow Factor	0.19	m³/day			
	Retail GFA	171	m²			
	Employee Population	6				
	Unit Flow Factor	0.28	m³/day			
	Estimated Dry Weather Flow			**6.33**	m³/day	**Catchment factor =** 1

ARUP	Job No.	Sheet No.	Rev.
		5	2
	Member/Location		
Job Title: Nga Tsin Wai Road/ Carpenter Road Development Scheme (KC-017)	Drg. Ref.		
Calculation: Sewage Generation from the Redevelopment and Sewerage Network Capacity Check	Made by: IP	Date: 11/5/22	Chd.: YL

Calculation for Sewage Generation

Upstream Sewage Generation (Along Nga Tsin Wai Rd)

7.2)	**1-3 LUNG KONG RD**					
	Residential GFA	473	m^2			
	Population	23				
	Unit Flow Factor	0.19	m^3/day			
	Retail GFA	243	m^2			
	Employee Population	9				
	Unit Flow Factor	0.28	m^3/day			
	Estimated Dry Weather Flow			**6.83**	m^3/day	**Catchment factor =** 1
7.3)	**17 LUNG KONG RD**					
	Residential GFA	1,219	m^2			
	Population	60				
	Unit Flow Factor	0.19	m^3/day			
	Retail GFA	280	m^2			
	Employee Population	10				
	Unit Flow Factor	0.28	m^3/day			
	Estimated Dry Weather Flow			**14.20**	m^3/day	**Catchment factor =** 1
7.4)	**19-21 LUNG KONG RD**					
	Residential GFA	509	m^2			
	Population	25				
	Unit Flow Factor	0.19	m^3/day			
	Retail GFA	163	m^2			
	Employee Population	6				
	Unit Flow Factor	0.28	m^3/day			
	Estimated Dry Weather Flow			**6.39**	m^3/day	**Catchment factor =** 1
7.5)	**23-25A LUNG KONG RD**					
	Residential GFA	512	m^2			
	Population	25				
	Unit Flow Factor	0.19	m^3/day			
	Retail GFA	165	m^2			
	Employee Population	6				
	Unit Flow Factor	0.28	m^3/day			
	Estimated Dry Weather Flow			**6.43**	m^3/day	**Catchment factor =** 1
7.6)	**27 LUNG KONG RD**					
	Residential GFA	277	m^2			
	Population	14				
	Unit Flow Factor	0.19	m^3/day			
	Retail GFA	142	m^2			
	Employee Population	5				
	Unit Flow Factor	0.28	m^3/day			
	Estimated Dry Weather Flow			**3.99**	m^3/day	**Catchment factor =** 1
7.7)	**5 LUNG KONG RD**					
	Residential GFA	183	m^2			
	Population	9				
	Unit Flow Factor	0.19	m^3/day			
	Retail GFA	208	m^2			
	Employee Population	7				
	Unit Flow Factor	0.28	m^3/day			
	Estimated Dry Weather Flow			**3.76**	m^3/day	**Catchment factor =** 1
7.8)	**7 LUNG KONG RD**					
	Residential GFA	205	m^2			
	Population	10				
	Unit Flow Factor	0.19	m^3/day			
	Retail GFA	143	m^2			
	Employee Population	5				
	Unit Flow Factor	0.28	m^3/day			
	Estimated Dry Weather Flow			**3.33**	m^3/day	**Catchment factor =** 1
7.9)	**9 LUNG KONG RD**					
	Residential GFA	145	m^2			
	Population	7				
	Unit Flow Factor	0.19	m^3/day			
	Retail GFA	77	m^2			
	Employee Population	3				
	Unit Flow Factor	0.28	m^3/day			
	Estimated Dry Weather Flow			**2.12**	m^3/day	**Catchment factor =** 1
Sewage generation by catchment 7 (to FMH4030063)				**53.38**		
8.)	**4-24 Nam Kok Road**					
	Residential GFA	9,137	m^2			
	Population	452				
	Unit Flow Factor	0.19	m^3/day			
	F&B GFA	1,827	m^2			
	Employee Population	93				
	Unit Flow Factor	1.58	m^3/day			
	Estimated Dry Weather Flow			**233.09**	m^3/day	**Catchment factor =** 1
Sewage generation by catchment 8 (to FMH4030063)				**233.09**		
		Total		**2,955.33**	**m^3/day**	
	Contributing Population			**10,946**		
	Peaking Factor			**4.00**		
	Peak Flow			**11,821.32**	**m^3/day**	

Remarks:

(1) Resident density 2.3 per 46.5m2 GFA has been assumed (provided by URA).

(2) Unit flow factor per person = 0.19m3/day for Domestic houseing type Private R1 based on EPD's GESF Table T-1.

(3) Worker density 5.5 per 100m2 GFA has been assumed based on Commercial and Industrial Floor Space Utilization Survey (published by Planning Department) Figure 9 Financial, Insurance, Real Estate & Business Services.

(4) Unit flow factor per commercial employee = 0.08m3/day for commercial based on EPD's GESF Table T-2.

(5) Worker density 3.3 per 100m2 GFA has been assumed based on Commercial and Industrial Floor Space Utilization Survey (published by Planning Department) Figure 9 community, social services& personal services.

(6) Unit flow factor = 0.08m3/day (commerical employee) +0.20 m3/day (J11 Community, Social & Personal Services) = 0.28m3/day based on EPD's GESF Table T-2.

(7) Worker density 3.5 per 100m2 GFA has been assumed based on Commercial and Industrial Floor Space Utilization Survey (published by Planning Department) Figure 9 Retail Trade.

(8) Unit flow factor = 0.08m3/day (commerical employee) + 0.20m3/day (J4 Wholesale & Retail) =0.28 m3/day based on EPD's GESF Table T-2.

(9) Worker density 5.1 per 100m2 GFA has been assumed based on Commercial and Industrial Floor Space Utilization Survey (published by Planning Department) Figure 9 Restaurants.

(10) Unit flow factor = 0.08m3/day (commerical employee) + 1.50m3/day (J10 Restaurants & Hotels) =1.58 m3/day based on EPD's GESF Table T-2.

ARUP	Job No.	Sheet No.	Rev.
		6	2
	Member/Location		
Job Title: Nga Tsin Wai Road / Carpenter Road Development Scheme (KC-017)	Org. Ref.		
Calculation: Hydraulic Performance Review Of Existing Sewerage System (Along Nga Tsin Wai Rd) Capacity Check	Made by: JP	Date: 11/5/22	Chd: YL

HYDRAULIC PERFORMANCE REVIEW OF EXISTING SEWERAGE SYSTEM (Along Nga Tsin Wai Rd)

Notes:
Calculate by Colebrook-White Equation

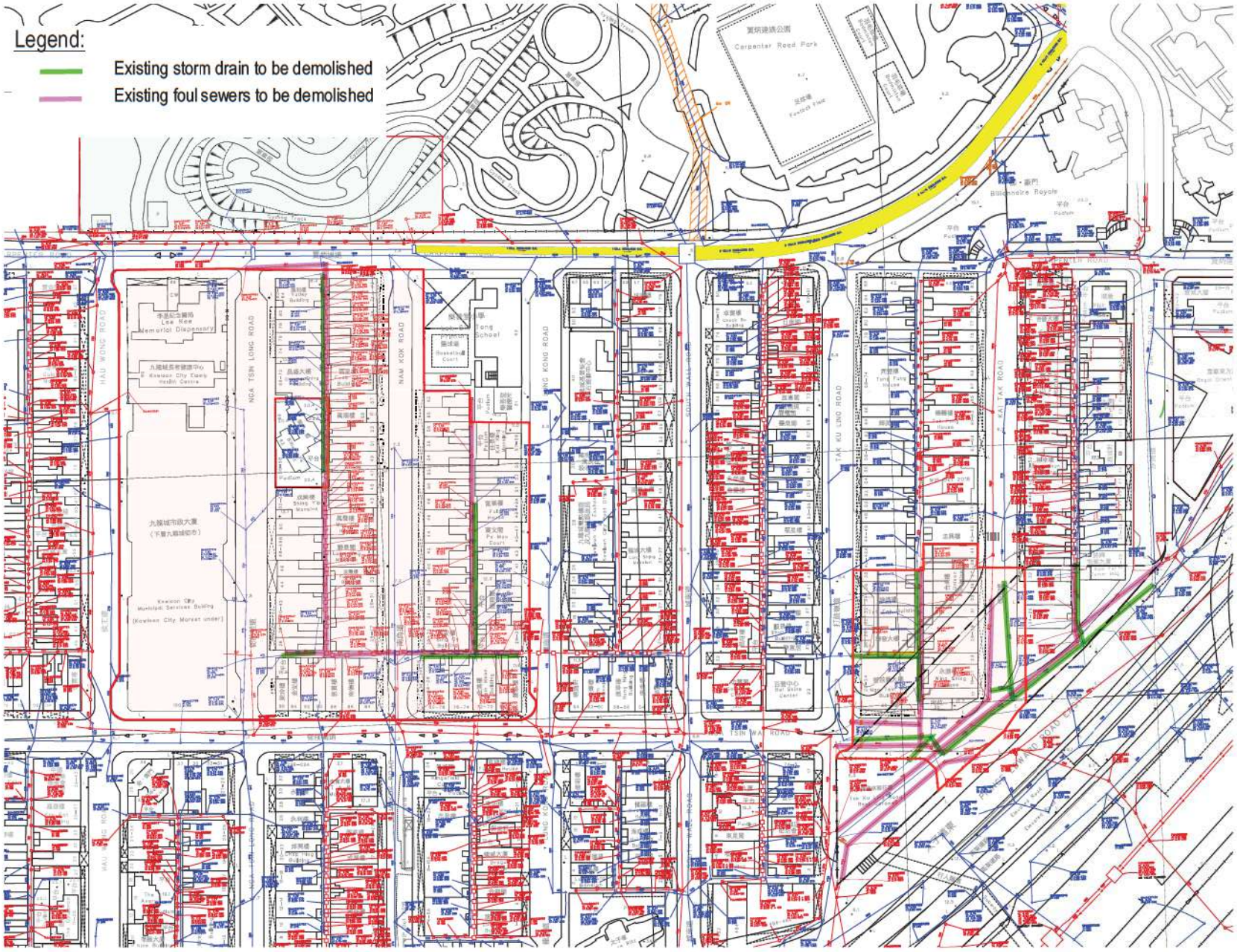
$$\overline{V} = -\sqrt{32gRS_f}\log\left[\frac{k_s}{14.8R} + \frac{1.255\nu}{R\sqrt{32gRS_f}}\right]$$

where ks is roughness value equals 1.5mm for existing sewers.
ν is kinematic viscosity of fluid = 1.14 x 10-6 m^2/s and g is the gravity = 9.81m/s^2.

US Manhole Ref	DS Manhole Ref	Conduit Size		Invert Level		Slope	A_p	P	R	32gRSf	Velocity	Capacity	ADWF	Peak Flow		Utilised	Catchment Ref.
		Diameter	Length	US	DS								Proposed Scheme	Peaking Factor	Proposed Scheme	Proposed Scheme	
		(m)	(m)	(mPD)	(mPD)	(S_f)	(m^2)	(m)	(m)	m^2/s^2	(m/s)	(L/s)	(m^3/day)		(L/s)	(%)	
Existing Sewerage System																	
FMH4027047	FMH4029765	0.225	64.2	5.84	5.56	0.0044	0.040	0.707	0.056	0.078	**0.76**	30.18	243.88	8	22.58	74.8%	1,2,5
FMH4029765	FMH4029766	0.225	28.0	5.53	5.37	0.0057	0.040	0.707	0.056	0.101	**0.87**	34.45	1236.09	6	85.84	249.2%	3.1-3.3
FMH4029766	FMH4029767	0.225	30.0	5.36	5.22	0.0047	0.040	0.707	0.056	0.082	**0.78**	31.11	1236.09	6	85.84	275.9%	
FMH4029767	FMH4029768	0.400	29.1	5.22	5.09	0.0045	0.126	1.257	0.100	0.140	**1.12**	140.24	1890.23	5	109.39	78.0%	3.4-3.5,3.8
FMH4029768	FMH4029769	0.400	25.1	5.09	4.69	0.0158	0.126	1.257	0.100	0.495	**2.10**	264.12	1890.23	5	109.39	41.4%	
FMH4029769	FMH4029770	0.400	4.0	4.69	4.69	0.0020	0.126	1.257	0.100	0.063	**0.74**	93.62	2635.80	5	152.53	162.9%	70% flow from **FMH4029769**
FMH4029770	FMH4029771	0.400	7.1	4.69	4.67	0.0023	0.126	1.257	0.100	0.071	**0.79**	99.41	2635.80	5	152.53	153.4%	
FMH4029771	FMH4029772	0.400	20.0	4.65	4.11	0.0271	0.126	1.257	0.100	0.849	**2.75**	346.05	2635.80	5	152.53	44.1%	
FMH4029772	FMH4029774	0.400	19.0	4.11	4.06	0.0024	0.126	1.257	0.100	0.076	**0.82**	103.07	2635.80	5	152.53	148.0%	
Terminal Manhole 1	**FMH4029765**	0.300	17.5	5.71	5.53	0.0100	0.071	0.942	0.075	0.235	**1.39**	98.03	992.21	6	68.90	70.3%	3.1-3.3
Terminal Manhole 2	**FMH4029767**	0.300	14.0	5.36	5.22	0.0100	0.071	0.942	0.075	0.235	**1.39**	98.03	602.29	6	41.83	42.7%	3.4-3.5
Terminal Manhole 3	FMH4030063	0.300	15.5	5.18	5.02	0.0100	0.071	0.942	0.075	0.235	**1.39**	98.03	732.82	6	50.89	51.9%	3.6-3.7, 4
FMH4030063	FMH4029775	0.300	24.0	5.02	4.92	0.0042	0.071	0.942	0.075	0.098	**0.89**	63.15	1065.10	6	73.97	117.1%	3.6-3.7, 4, 6,7,8
FMH4029775	**FMH4029769**	0.400	4.2	5.02	4.69	0.0776	0.126	1.257	0.100	2.437	**4.67**	586.65	1065.10	6	73.97	12.6%	3.6-3.7, 4, 6,7,8
FMH4029775	FMH4030069	0.225	55.1	4.84	4.48	0.0064	0.040	0.707	0.056	0.113	**0.92**	36.52	319.53	6	22.19	60.8%	30% flow from **FMH4029769**

Appendix J
Proposed Sewerage Works

A3

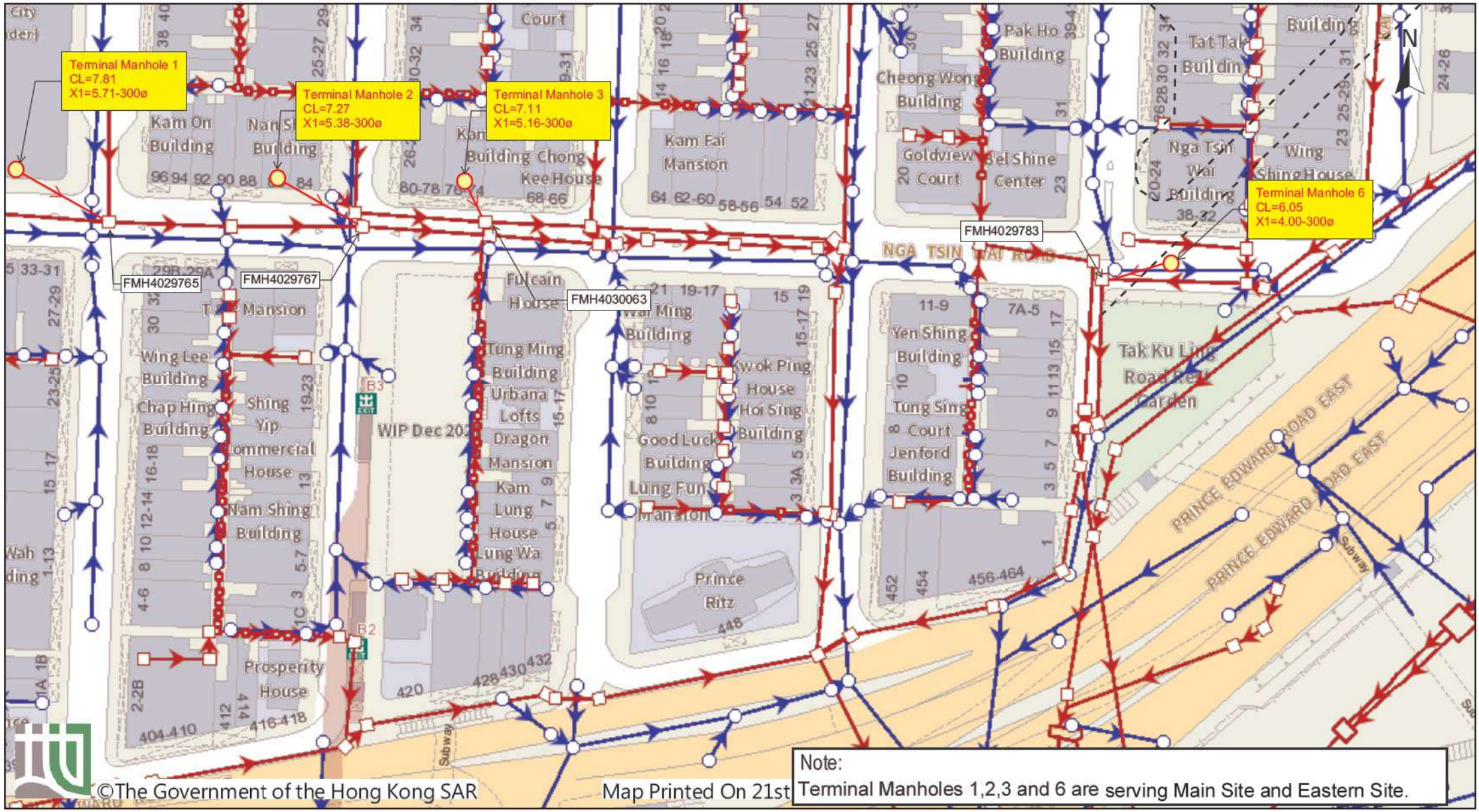


PROPOSED DEMOLISH PLAN

Figure 1

GEOINFO MAP
地理資訊地圖

Go to map: https://www.map.gov.hk/gm/geo:22.3285,114.1901?z=1128



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Map Printed On 21st

Note:
Terminal Manholes 1,2,3 and 6 are serving Main Site and Eastern Site.

Figure 2

Proposed Sewerage Connection Points

Powered by GeoInfo Map: https://www.map.gov.hk
Note: The use of this map is subject to the Terms and Conditions and the IP Rights Notice of GeoInfo Map.

GEOINFO MAP
地理資訊地圖

Go to map: https://www.map.gov.hk/gm/geo:22.3304,114.1893?z=1128

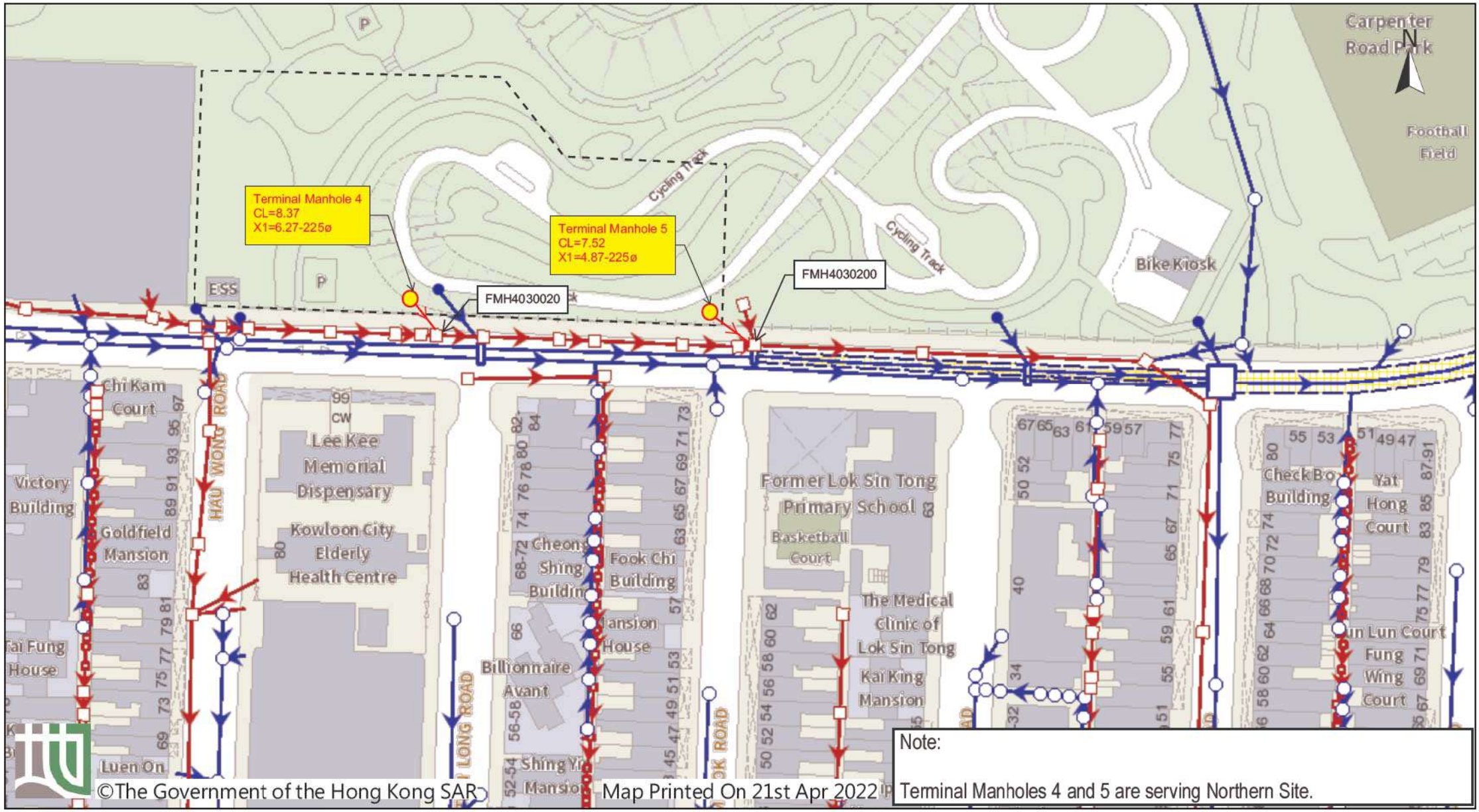

Figure 3

OPTION A - Proposed Sewerage Connection Points

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GEOINFO MAP
地理資訊地圖

Go to map: https://www.map.gov.hk/gm/geo:22.3304,114.1893?z=1128

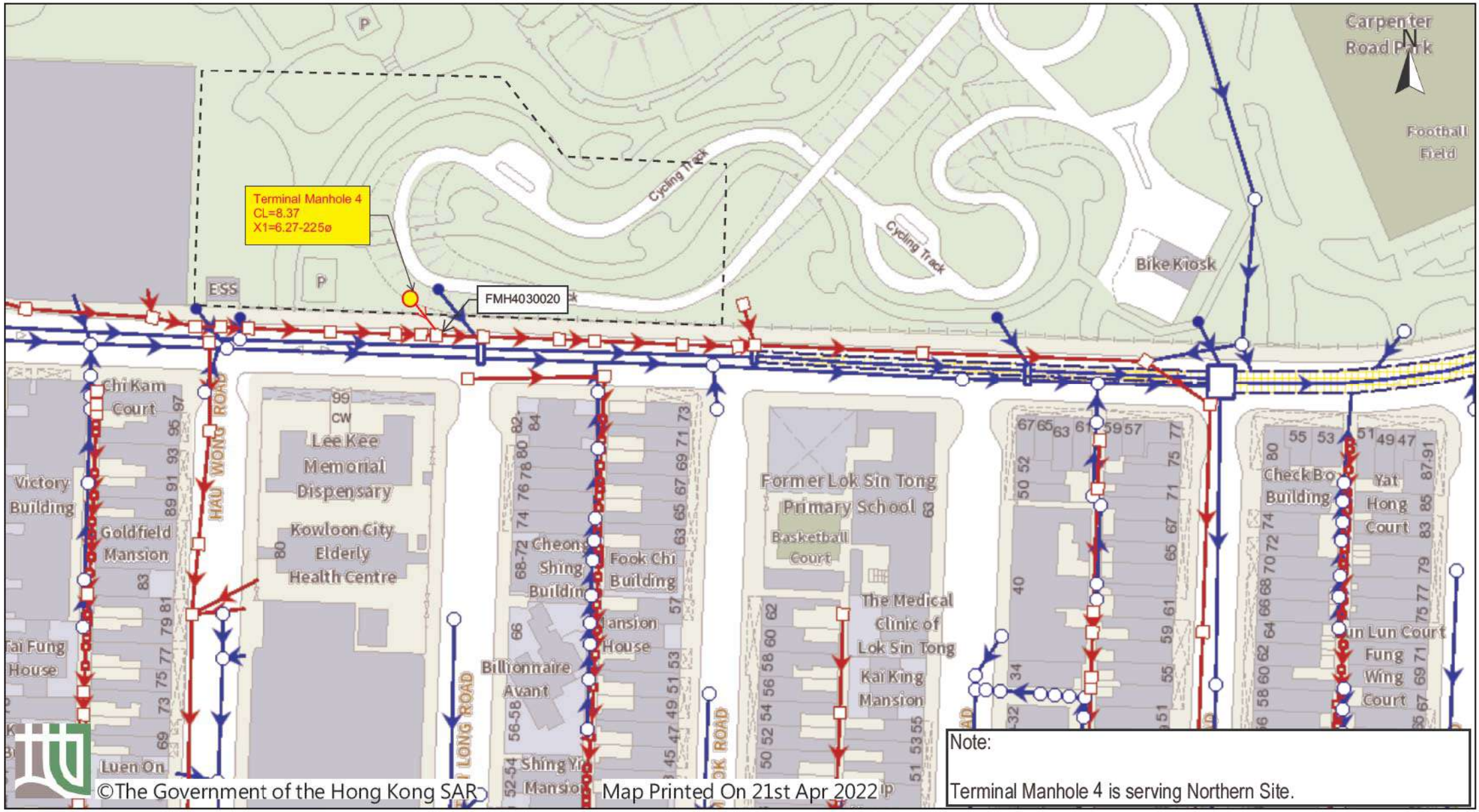

Figure 4

OPTION B - Proposed Sewerage Connection Points

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GEOINFO MAP
地理資訊地圖

Go to map: https://www.map.gov.hk/gm/geo:22.3306,114.1895?z=1128

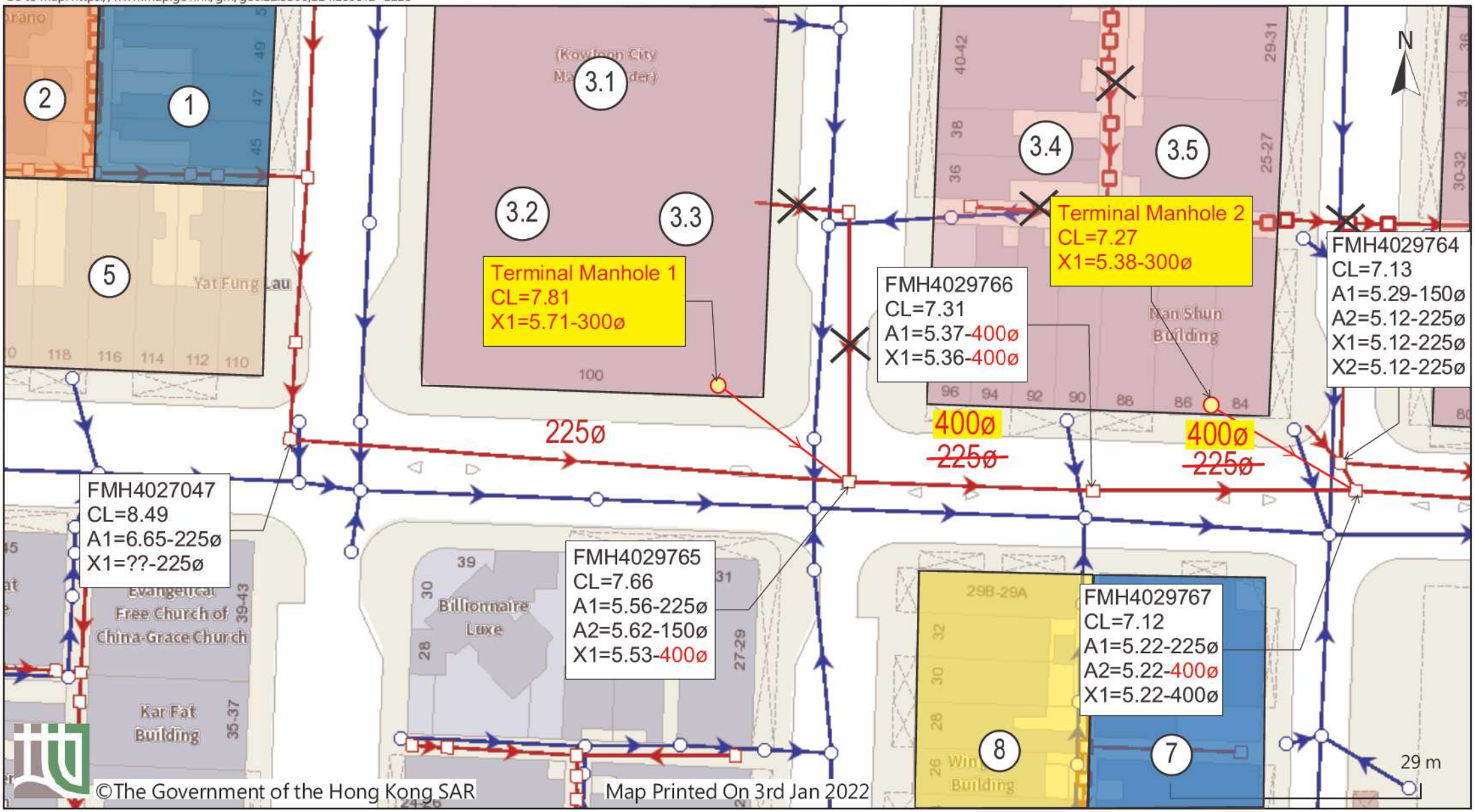

Figure 5

Proposed Upgrade Scheme along Nga Tsin Wai Road

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GEOINFO MAP
地理資訊地圖

Go to map: https://www.map.gov.hk/gm/geo:22.3306,114.1895?z=1128

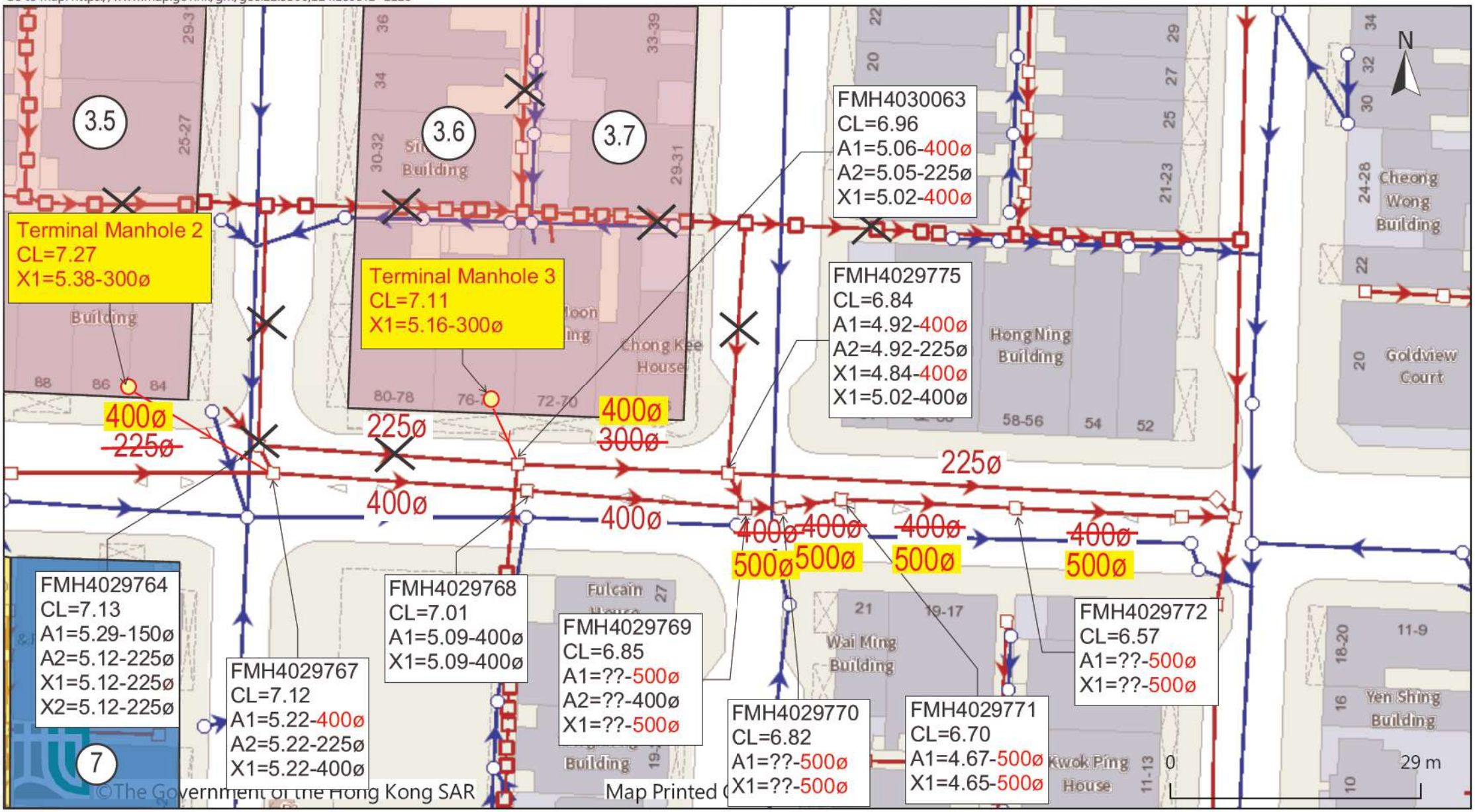

Figure 6

Proposed Upgrade Scheme along Nga Tsin Wai Road

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GEOINFO MAP
地理資訊地圖

Go to map: https://www.map.gov.hk/gm/geo:22.3306,114.1895?z=1128

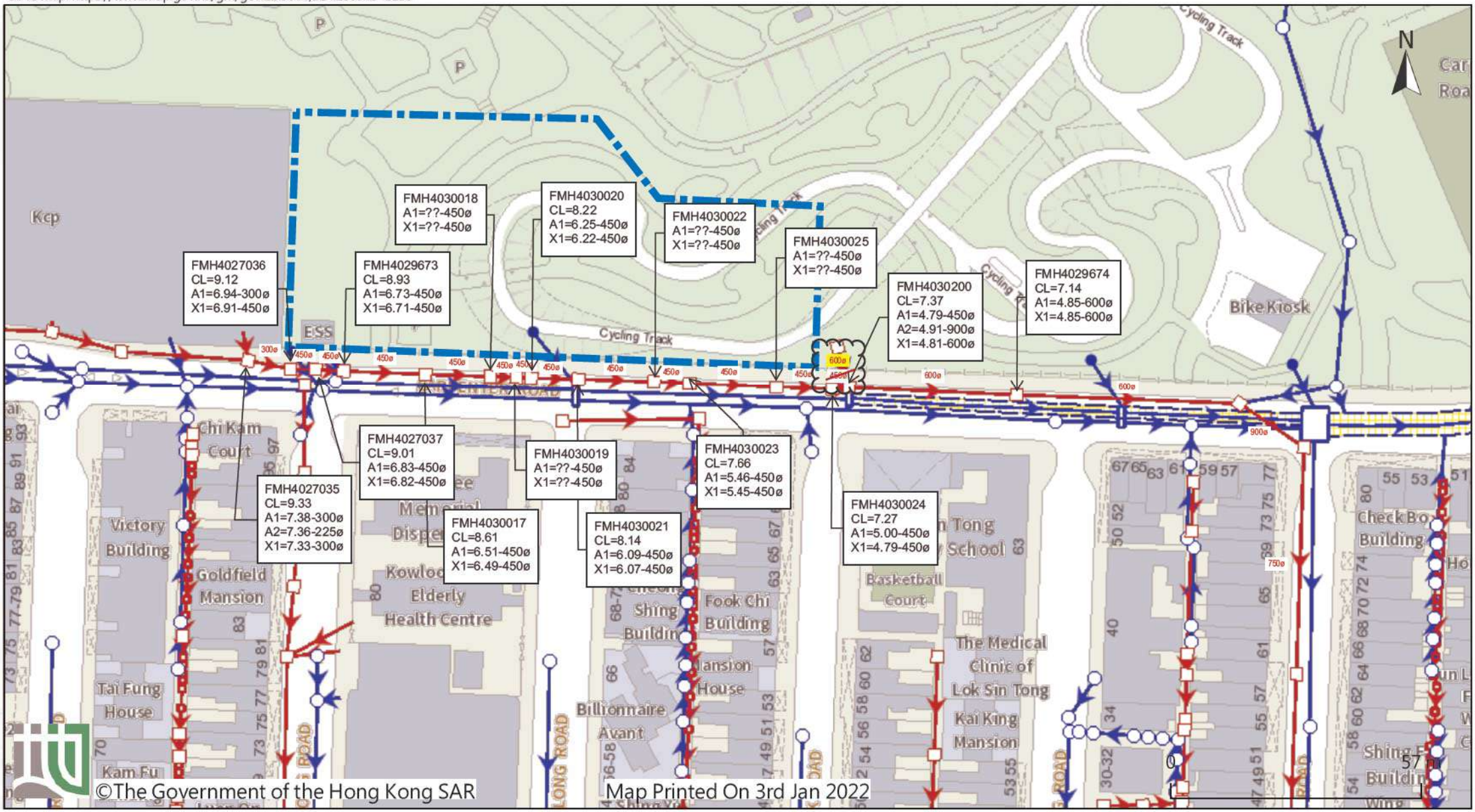

Figure 7

Proposed Upgrade scheme along Carpenter Road

Powered by GeoInfo Map: https://www.map.gov.hk
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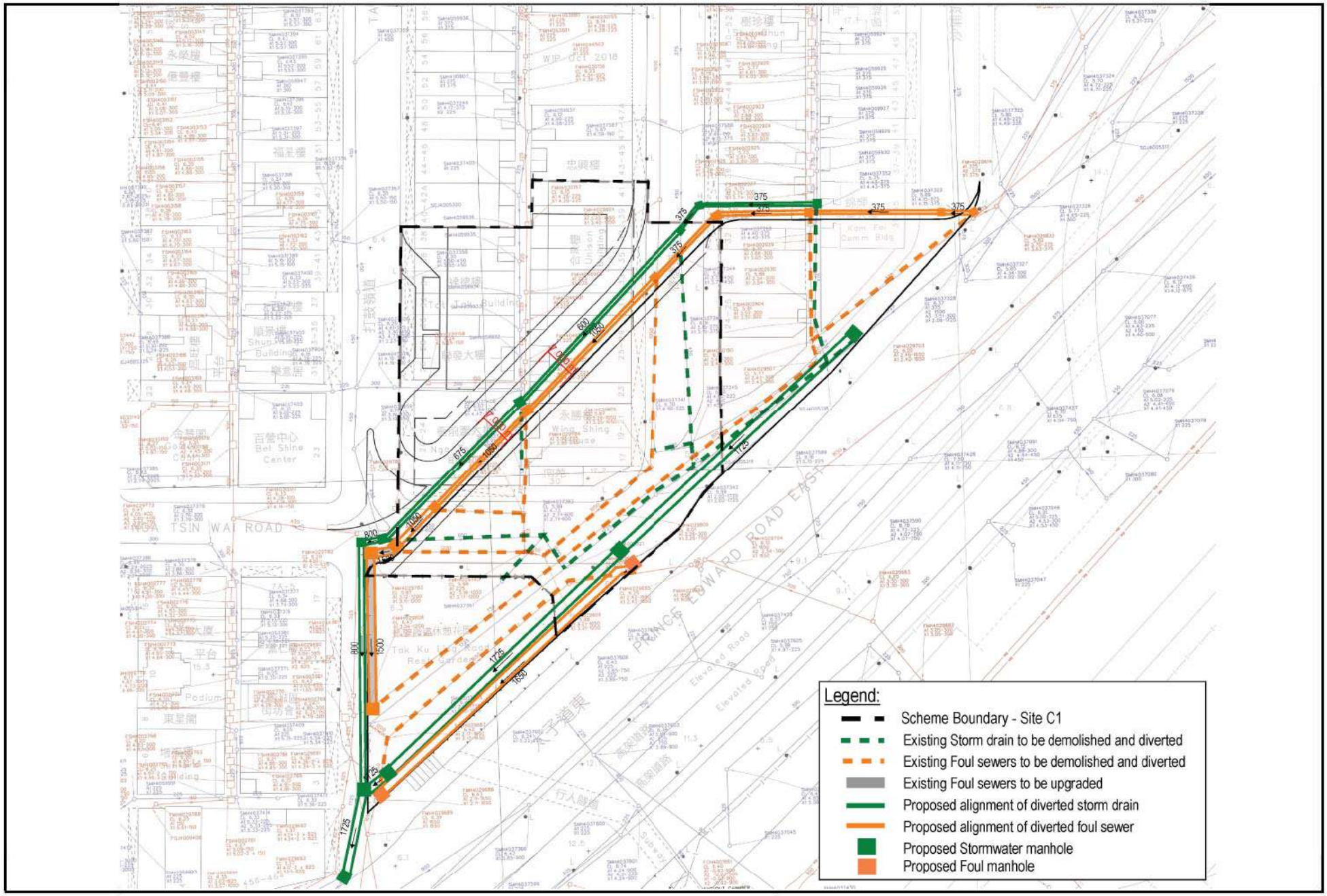
A3



PROPOSED DIVERSION SCHEME

Figure 8

Appendix 10

Water Supply Impact Assessment (WSIA) Report

Urban Renewal Authority

Nga Tsin Wai Road/ Carpenter Road Development Scheme (KC-017)

Water Supply Impact Assessment

Final | May 2022

Ove Arup & Partners Hong Kong Ltd
Level 5 Festival Walk
80 Tat Chee Avenue
Kowloon Tong
Kowloon
Hong Kong
www.arup.com

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

ARUP

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Table 2.2.1 Unit Water Demands
Table 2.2.2 Summary of Impact of Proposed Scheme on Water Supply and Treatment Facilities

Appendices

Appendix A Location Plan
Appendix B Information of Water Mains in Kowloon City, WSD
Appendix C Key Water Mains within Kowloon City Area
Appendix D Water Demand Estimation
Appendix E Proposed Tentative Connection Points and Hydraulic Calculation of Water Main

1 Introduction

1.1 Introduction

1.1.1.1 The Nga Tsin Wai Road/ Carpenter Road Development Scheme (KC-017) (the Scheme) is proposed by the Urban Renewal Authority (URA) under Section 25 of the Urban Renewal Authority Ordinance (URAO). Water Supply Impact Assessment (WSIA) is prepared in support of the submission of a draft Development Scheme Plan (DSP) with its Planning Report by the URA to the Town Planning Board (TPB) for consideration.

1.1.1.2 Taking into account the proposed urban renewal works under the draft DSP, the development impact on water supply is reviewed and discussed in this Report. Any water supply impact resulting from the draft DSP and any recommendation for mitigation works in relation to infrastructure are identified and discussed in the following sections.

1.2 Project Outline and Description

1.2.1 Site Description

1.2.1.1 The Scheme, which is located in Kowloon City District, is divided into three sites – the Main Site (i.e. Site C2 and Site A), the Northern Site (Site B), and the Eastern Site (Site C1), with a total gross site area of 37,061m^2 (the location plan at **Appendix A** refers). Main Site covers three street blocks bounded by Carpenter Road, Hau Wong Road, Lung Kong Road and Nga Tsin Wai Road. Site A and Site C1 are occupied by low-rise residential buildings with retail shops on the ground floor, Site C2 consists of a number of G/IC facilities, including the Kowloon City Municipal Services Building, Kowloon City Lions Clubs Health Centre and Lee Kee Memorial Dispensary. Northern Site, situated to the north of Main Site across Carpenter Road, is currently a part of the existing Carpenter Road Park.

1.2.1.2 Main Site and Eastern Site currently fall within areas mainly zoned 'R(A)2', 'G/IC' and pavement and sections of Nga Tsin Long Road, Nam Kok Road and Kai Tak Road shown as 'Road', whereas Northern Site falls within an area zoned 'O' on the approved Ma Tau Kok OZP No. S/K10/28 gazetted on 15 March 2022.

1.2.2 Proposed Scheme

1.2.2.1 The proposed scheme at Main Site (Site C2 and Site A) consists of 7 residential towers over retail and G/IC podia, as well as 1 standalone single-storey podium, with a maximum building height of 160mPD and residential population of 10,012[1].

[1] For the proposed domestic GFA of 202,416m^2, an average unit size of 46.5m^2 is adopted to come up with an estimated residential flat number of 4,353. The anticipated residential population of 10,012 is assumed based on the assumption of population per flat (PPF) of 2.3, which is in reference to HKPSG Ch.2. Sensitivity test is also carried out for +5% variation of population increase, which is about 2.4 as the same as the average domestic household size of Lung Shing Constituency Area. The results demonstrated that it will not incur major deviation from the current assessment.

1.2.2.2 Eastern Site (Site C1) is proposed to develop 1 three-storey commercial complex and to provide an at-grade gateway plaza of approx. 2,130m^2 with the realignment of Kai Tak Road/ Nga Tsin Wai Road.

1.2.2.3 Northern Site (Site B) will be developed into a G/IC Complex not exceeding a building height of 100mPD.

1.2.2.4 The Scheme has adopted a net site area of about 25,302m^2 for Plot Ratio (PR) calculation in R(A) zone. The net site area has excluded the three new road sections in the Scheme (the two new private streets proposed at Main Site and the new diverted road at Eastern Site), and the surrounding pavement of the Scheme. Should there be later departmental comments for a smaller net site area, the following technical assessments conducted based on the development potential from this net site area (i.e. 25,302m^2) would be considered as the worst case scenario for the proposed scheme of the draft DSP.

1.2.2.5 Here are the key parameters for the Proposed Scheme:

Table 1.2.1 Key Parameters for the Proposed Scheme

	Number of Blocks	Domestic GFA (m^2)	Non-domestic GFA [1] (m^2)	
			Retail	G/IC
Main Site (Site A and C2)	7 residential towers and 1 single-storey commercial podium	202,416	23,302	3,000
Eastern Site (Site C1)	1 three-storey commercial complex	-	2,000	-
Northern Site (Site B)	1 G/IC Complex	-	-	44,000
Total	-	**202,416**	**25,302**	**47,000** [2]

Notes:
Notional design subject to change at detailed design stage.
[1] The proposed exemption of clubhouse GFA (5,059m^2) from non-domestic GFA calculation is subject to the approval of the general building plan under the Building (Planning) Regulations.
[2] The proposed 47,000m^2 of non-domestic GFA for G/IC uses are proposed to be exempted from GFA calculation under draft DSP.

2 Water Supply Impact Assessment

2.1 Existing Water Supply System

2.1.1.1 The Kowloon City area is covered by Sha Tin Water Treatment Works. The Scheme is located within the supply zones served by Tsz Wan Shan Fresh Water Service Reservoir and Diamond Hill Salt Water Service Reservoir.

2.1.1.2 Water Supplies Department ("WSD") has been consulted to identify the existing water mains and the WSD record plan is presented in drawings attached in **Appendix B**. With reference to WSD record plans, the key existing fresh water and salt water supply mains within Kowloon City area are shown in **Appendix C.**

2.1.1.3 The saltwater within the Scheme is supplied by Tai Wan Saltwater Pumping Station.

2.2 Estimated Future Water Demand and Water Supply Impact

2.2.1.1 The unit water demands extracted from WSD's DI No. 1309 shown in **Table 2.2.1** have been adopted for estimating water demand.

Table 2.2.1 Unit Water Demands

Development Type	Fresh Water	Non-Potable	Unit
Residential			
Private Housing (R(A)2)	0.23	0.07	m^3/person/day
Commercial			
Commercial Uses – Retail and Office	0.03	0.05	m^3/employee/day
Restaurant and Hotel	1.20	0.14	m^3/employee/day
Government Use			
G/IC	0.03	0.05	m^3/employee/day

Note:
Reference is made to WSD DI 1309 and EPD's Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning (EPD's GESF)

2.2.1.2 The existing water consumption for the whole Kowloon City area is estimated. The water demand estimated based on the proposed population and GFA under the future condition with Proposed Scheme under the DSP is summarised in **Table 2.2.2**. The water demand for the Proposed Scheme is within the design capacity. Therefore, it is expected there is minimal impact on the existing water supply system capacity. Subject to detailed design, there is no insurmountable impact to existing fresh water supply and treatment facilities, and no insurmountable impact to the existing salt water supply and treatment facilities. Detailed calculation of water consumption is attached in **Appendix D.**

Table 2.2.2 Summary of Impact of Proposed Scheme on Water Supply and Treatment Facilities

Water Supply and Treatment Facilities	Capacity	Increase of Water Demand by the DSP	Increase of Utilization
Tsz Wan Shan Fresh Water Service Reservoir	76,302 m^3	6,383 m^3/day	8.37%
Sha Tin Water Treatment Works	600,000 m^3/day		1.06%
Diamond Hill Salt Water Service Reservoir	21,836 m^3	1,114 m^3/day	5.10%

2.3 Recommendations on Future Implementation

2.3.1.1 Based on the information collected from WSD, there is no large water main within the site boundary. For smaller scale water mains, there are several saltwater pipes and freshwater pipes within Kowloon City area. In particular, there is one DN400 saltwater pipe of 400mm diameter running along Nga Tsin Long Road that may be in conflict with the proposed basement carparks at Main Site (Site C2 and Site A). However, there is no elevation information for the freshwater and saltwater mains and there is no typical elevation range as the water main normally are pressurized main. Subject to the approval of the draft DSP, further consultation with WSD regarding the information on the saltwater and freshwater pipes at GBP stage would be required to consider if any diversion works necessary at the detailed design stage.

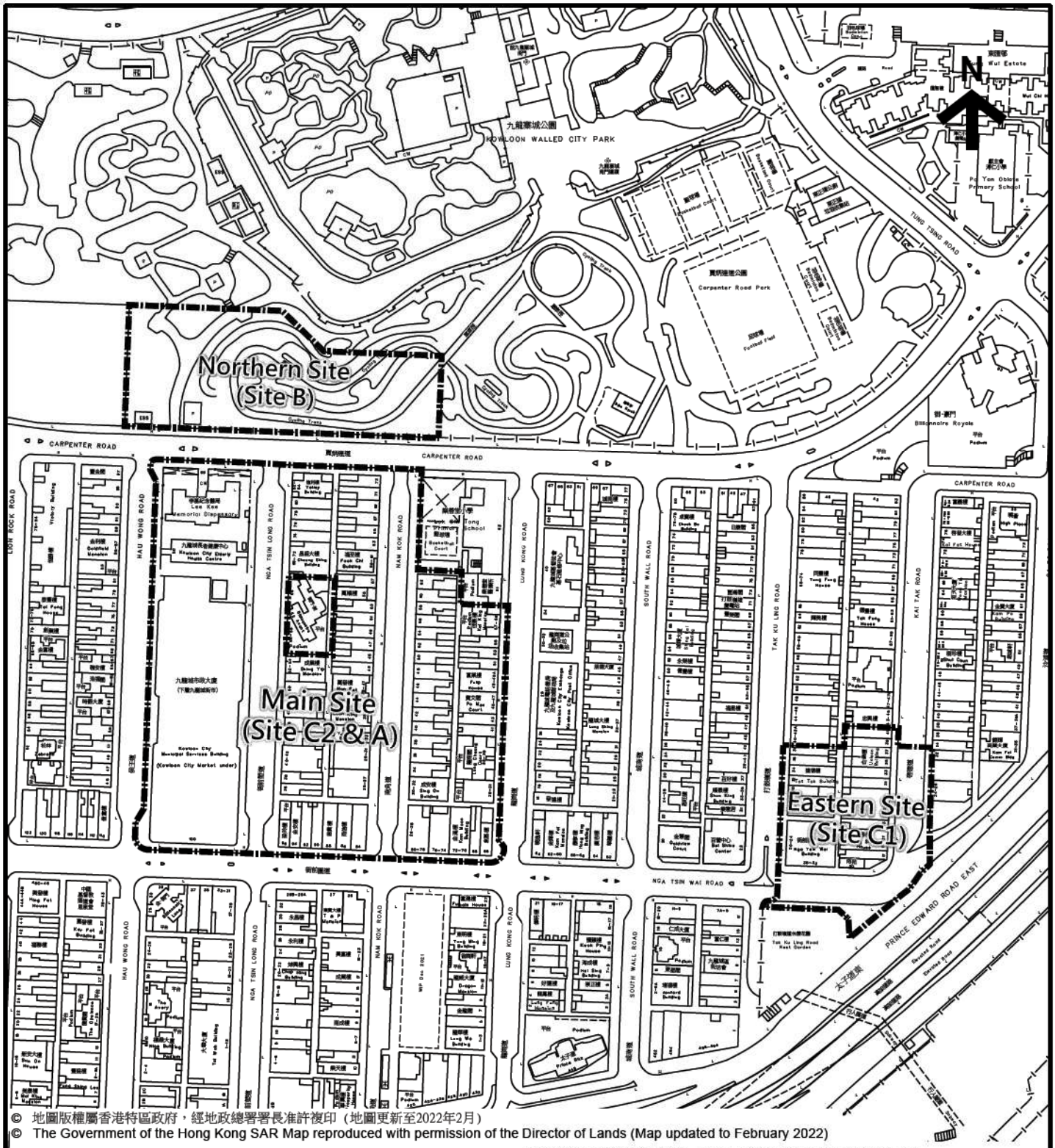
2.3.1.2 Detailed design on the diversion/ connection of the water mains for the Proposed Scheme will be carried out at detailed design/ GBP submission stage upon DSP approval.

2.3.1.3 The tentative connection points are proposed in **Appendix E.** The existing water main within the Scheme Area shall be abandoned. The connection of water supply for the Billionnaire Avant will be provided, if affected, and put into place through liaison with the concerned developer/ owners in later stage. The size and proposed modification works will be subject to the site survey and detailed design upon the approval of DSP.

2.4 Conclusion

2.4.1.1 Based on the above assessment, no adverse impact on the water supply is anticipated due to the Proposed Scheme of the DSP.

Appendix A
Location Plan



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Legend 圖例：
Project Boundary
項目界線

市區重建局
URBAN RENEWAL AUTHORITY

KC-017
Nga Tsin Wai Road / Carpenter Road
衙前圍道 / 賈炳達道

Site Plan
地盤平面圖

Scale 1:2,500

Date:3 May 2022

Appendix B

Information of Water Mains
in Kowloon City, WSD



NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.
2. ALL LEVELS ARE IN METRES ABOVE HANDRAIL DATUM.
3. INFORMATION ON ALIGNMENT OF MAINS IS OF INDICATIVE VALUE ONLY. WHERE POSITIONAL ACCURACY MAY BE OF IMPORTANCE, DETAILS SHOULD BE SITE CHECKED.
4. FOR MAINS RECORDS SIGN CONVENTIONS AND DESIGNATIONS SEE SKETCH NO. 3898.
5. NO PROPOSED WATER MAINS IN THE VICINITY OF THE SITE.
6. NO EXISTING WSD CABLE IN THE VICINITY OF THE SITE.
7. NO PROPOSED WSD CABLE IN THE VICINITY OF THE SITE.
8. THE SITE IS NOT WITHIN WSD GAY MAINS SPECIFIED.
9. NO WSD LAND ALLOCATION / WAVE WITHIN THE SITE AREA.
10. NO WSD SLOPES ARE AFFECTED IN THE VICINITY OF THE SITE.

SUBJECT SITE

PAR COPY OF SALT WATER MAINS RECORD PLAN(S)

WS/N0101 A8-B2, B2, 1B, 1B2, 1B3, 1F-1M/1B3, 1B5 & 1B3

FILE REF: (1) in WSD/K1801/103/1/2021 T/J133

REF. CODE: 48W01M	SHEET 1 OF 1	SCALE 1:1500

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Water Supplies Department

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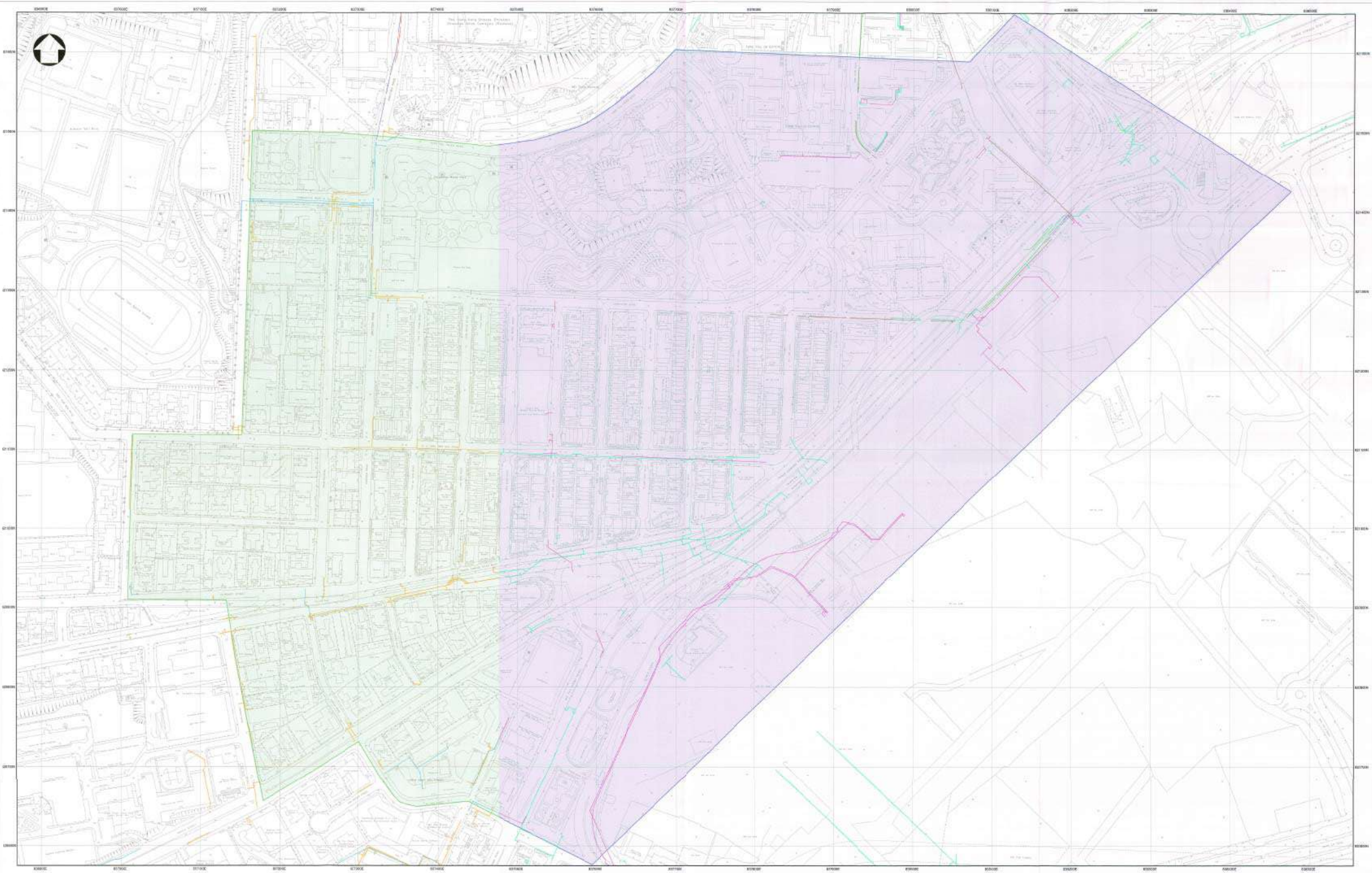

LEGEND:

1. FRESH WATER MAINS WITH AC MATERIAL
2. FRESH WATER MAINS WITH UNKNOWN MATERIAL
3. SALT WATER MAINS WITH AC MATERIAL
4. SALT WATER MAINS WITH UNKNOWN MATERIAL

SUPPLEMENTARY INFORMATION OF
ASBESTOS CEMENT (AC) OR UNKNOWN WATER MAINS

IMPORTANT: Please note that existing asbestos cement (AC) or unknown water pipes are identified in the activity of your project/works area. It is very likely that the unknown water pipes are AC water pipes. You are strongly advised to make special provisions including monitoring measures as necessary to protect these water pipes that are vulnerable to damage. Should abandon/replacement of AC or unknown water pipes be found necessary to be carried out in conjunction with your proposed works after detailed investigations or studies, you should instruct your consultants and/or contractors (as the case may be) to take all necessary measures during design and/or construction stage/use the water may fail to comply with all prevailing statutory requirements for the safe handling, removal, transportation and disposal of AC pipes.

SUBJECT SITE

PART COPY OF SURVEY SHEET NO(S).

11-SE-4C, 4D, 11B, 5D, 11C, 11-NW-6D, 10B & 10D

FILE REF: (1) in WSD/K1601/105/1/2021 TJ133

SHEET 1 OF 1 | SCALE 1:1500

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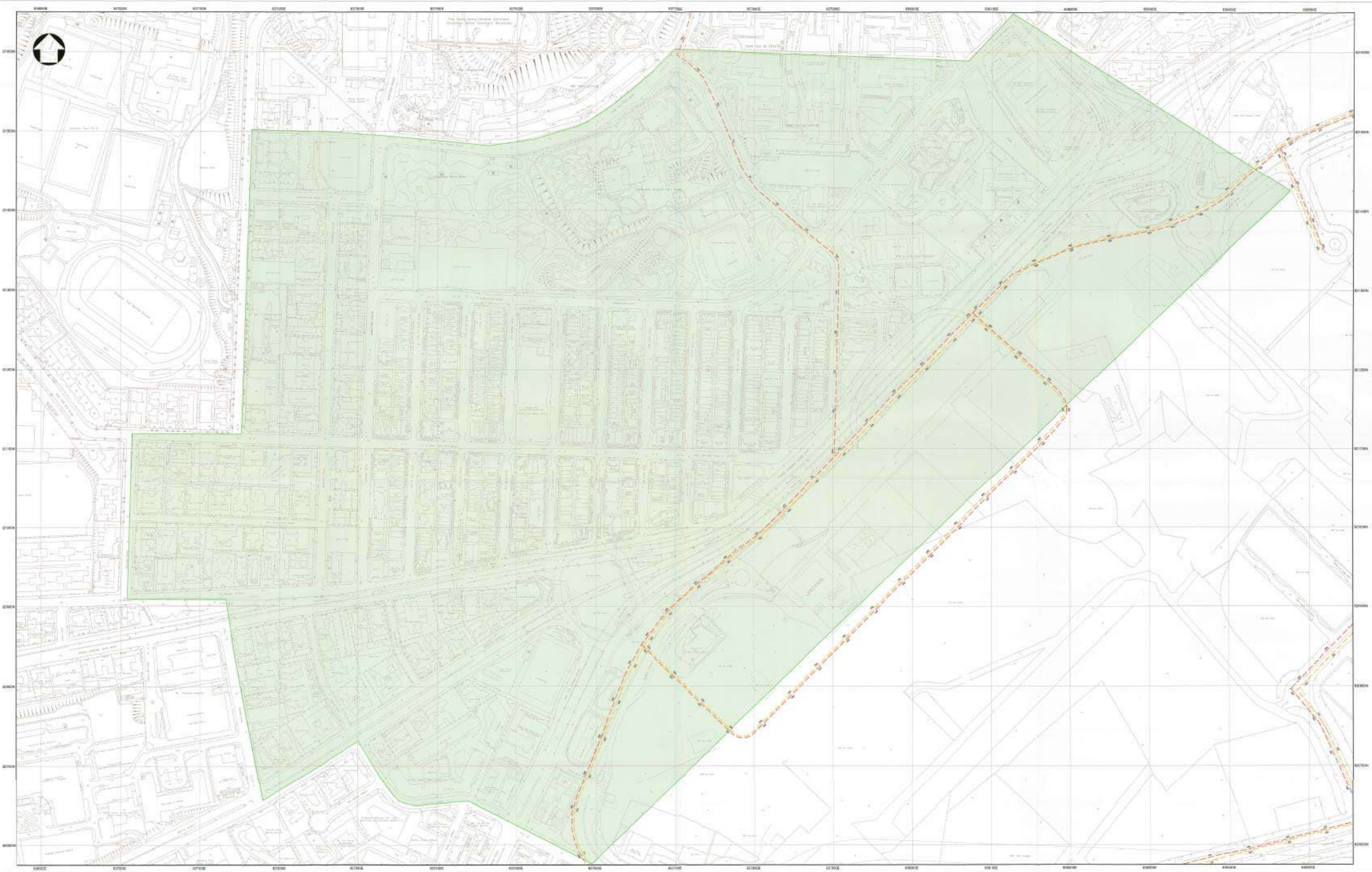

NOTES:
1. PROPOSED FRESH WATER MAINS SHOWN THUS
2. PROPOSED SALT WATER MAINS SHOWN THUS
3. FOR PROPOSED WATER MAINS, PLEASE REFER TO PLANNING REPORT NO(S). 2/2011, 2/2013.

SUBJECT SITE

SUPPLEMENTARY INFORMATION OF PROPOSED WATER MAINS
PART COPY OF SURVEY SHEET NO(S).

11 NE-SD, SD, 11B, 1C, 11D, 11-NW-CD, 10B & 10D

FILE REF: (1) in WSD/K1601/10/5/1/2021 TJ133

REF.CODE: 12W16P	SHEET 1 OF 1	SCALE 1:1500

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4. FOR MAINS RECORDS SIGN CONVENTIONS AND DESIGNATIONS SEE SKETCH NO. 3998.
5. NO EXISTING WSD CABLE IN THE VICINITY OF THE SITE.
6. NO PROPOSED WSD CABLE IN THE VICINITY OF THE SITE.
7. THE SITE IS NOT WITHIN WSD GATHERING GROUNDS.
8. NO WSD SLOPES ARE AFFECTED IN THE VICINITY OF THE SITE.

SUBJECT SITE

PART COPY OF FRESH WATER MAINS RECORD PLAN(S)

[illegible]

FILE REF: (1) in WSD/K1601/10/6/1/2021 TJ133

REF. CODE: 49W21M	SHEET 1 OF 1	SCALE 1:1500

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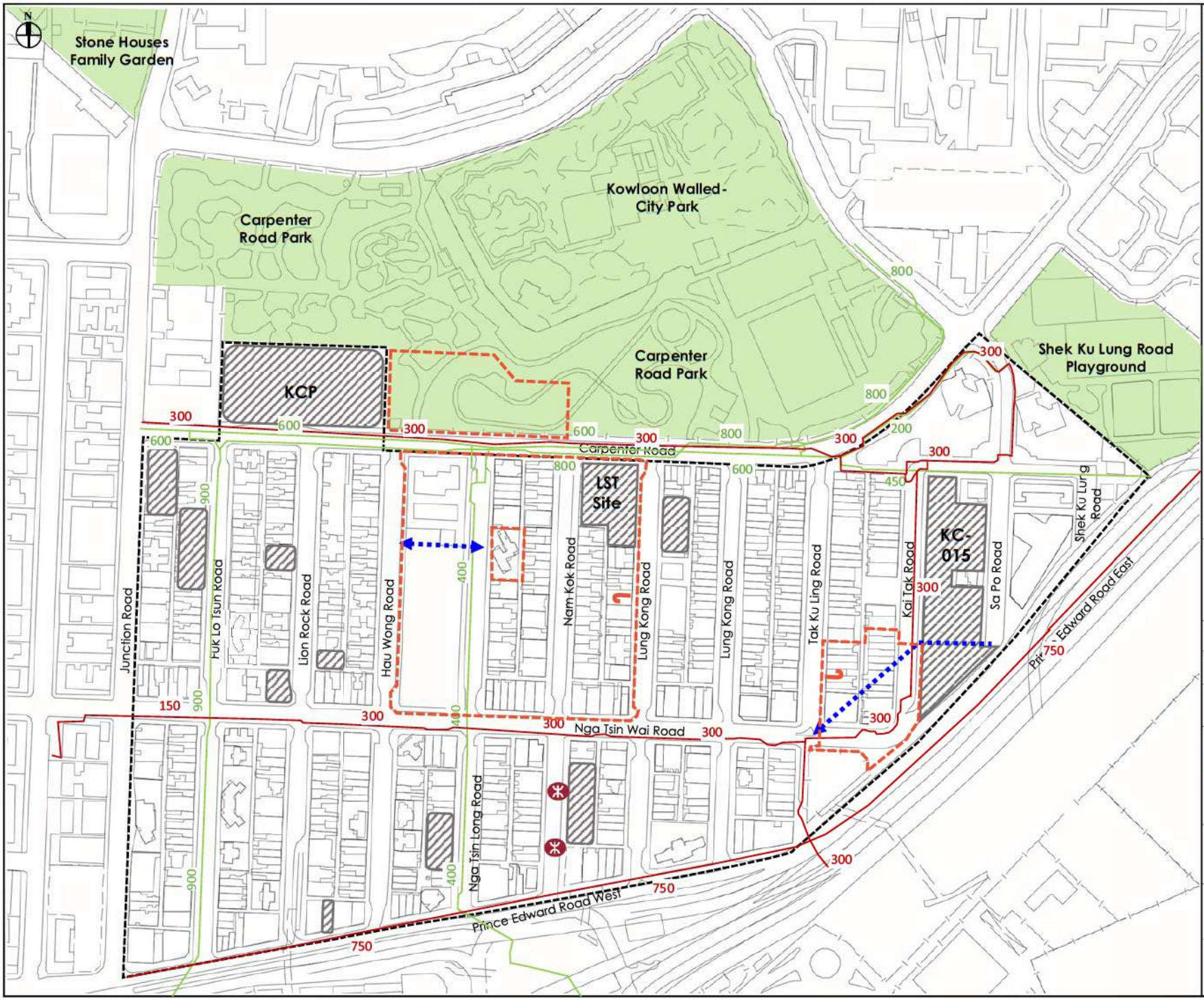
Appendix C

Key Water Mains within Kowloon City Area



Legend

- Kowloon City Area
- Scheme Boundary
- Planned Redevelopment in the Vicinity
- New Road Alignment under the Proposed Scheme
- Salt Water Main
- Fresh Water Main

Drawing Title

KC-017 – Key Water Main

Drawn	Date
Checked	Approved
Figure No.	Scale and Orientation

Job Title

Nga Tsin Wai Road/ Carpenter Road Development Scheme (KC-017)

市區重建局
URBAN RENEWAL AUTHORITY

ARUP

Appendix D

Water Demand Estimation

ARUP		Job No.	Sheet No.	Rev.
			06	02
		Member/Location		
Job Title	Nga Tsin Wai Road/ Carpenter Road Development Scheme (KC-017)	Drg. Ref.		
Calculation	Water Consumption Estimation	Made by IP	Date 18 May 22	Chd. YL

Calculation for Water Consumption Estimation
Before Development (Existing)

	Fresh Water	Flushing Water
Office		
Total GFA, m2	15,430	15,430
Area/Employee	18.18	18.18
Population	849	849
Unit flow factor (m3/person/day)	0.03	0.05
Daily Flow (m3/day)	25.47	42.45
Peak Flow Factor	3	2
Peak Flow (m3/day)	76.41	84.90
Retail		
Total GFA, m2	98,119	98,119
Area/Employee	28.57	28.6
Population	3,435	3,435
Unit flow factor (m3/person/day)	0.03	0.05
Daily Flow (m3/day)	103.05	171.75
Peak Flow Factor	3	2
Peak Flow (m3/day)	309.15	343.50
Restaurant		
Total GFA, m2 (assumed 30% of total retail GFA are F&B)	42,051	42,051
Area/Employee	19.61	19.6
Population	2,145	2,145
Unit flow factor (m3/person/day)	1.20	0.14
Daily Flow (m3/day)	2,574.00	300.30
Peak Flow Factor	3	2
Peak Flow (m3/day)	7,722.00	600.60
Hotel		
Total GFA, m2	17,190	17,190
Area/Employee	31.25	31.25
Population	551	551
Unit flow factor (m3/person/day)	1.20	0.14
Daily Flow (m3/day)	661.20	77.14
Peak Flow Factor	3	2
Peak Flow (m3/day)	1,983.60	154.28
GIC		
Total GFA, m2	41,350	41,350
Area/Employee	30.30	30.30
Population	1,365	1,365
Unit flow factor (m3/person/day)	0.03	0.05
Daily Flow (m3/day)	40.95	68.25
Peak Flow Factor	3	2
Peak Flow (m3/day)	122.85	136.50
Residential		
Population	21,830	21,830
Unit flow factor (m3/person/day)	0.23	0.07
Service Trade (m3/person/day)	0.055	0
Daily Flow (m3/day)	6,221.55	1,528.10
Peak Flow Factor	3	2
Peak Flow (m3/day)	18,664.65	3,056.20
Clubhouse		
Total GFA, m2	19,830	19,830
Area/Employee	30.30	30.30
Population	655	655
Unit flow factor (m3/person/day)	0.23	0.05
Daily Flow (m3/day)	150.65	32.75
Peak Flow Factor	3	2
Peak Flow (m3/day)	451.95	65.50
Total Daily Flow (m3/day)	9,777	2,221
Total Peak Flow (m3/day)	29,331	4,441

Remarks:
1) Based on WSD DI no.1309, peak flow rates in distribution mains for:
   Fresh water = 3 x mean daily demand
   Salt water = 2 x mean daily demand
2) Mean daily unit demand given in Table 1 of WSD DI no.1309.

	Fresh Water (l/h/d)	Flushing Water (l/h/d)
Residential - R1	230	70
Service Trade - Kowloon City	55	0

ARUP		Job No.	Sheet No.	Rev.
			07	02
		Member/Location		
Job Title	Nga Tsin Wai Road/ Carpenter Road Development Scheme (KC-017)	Drg. Ref.		
Calculation	Water Consumption Estimation	Made by IP	Date 18 May 22	Chd. YL

Calculation for Water Consumption Estimation
After Development (KC-017)

	Fresh Water	Flushing Water
Office		
Total GFA, m2	14,610	14,610
Area/Employee	18.18	18.18
Population	804	804
Unit flow factor (m3/person/day)	0.03	0.05
Daily Flow (m3/day)	24.12	40.20
Peak Flow Factor	3	2
Peak Flow (m3/day)	72.36	80.40
Retail		
Total GFA, m2	105,119	105,119
Area/Employee	28.57	28.57
Population	3,680	3,680
Unit flow factor (m3/person/day)	0.03	0.05
Daily Flow (m3/day)	110.40	184.00
Peak Flow Factor	3	2
Peak Flow (m3/day)	331.20	368.00
Restaurant		
Total GFA, m2 (assumed 30% of total retail GFA are F&B)	45,051	45,051
Area/Employee	19.61	19.61
Population	2,298	2,298
Unit flow factor (m3/person/day)	1.20	0.14
Daily Flow (m3/day)	2,757.60	321.72
Peak Flow Factor	3	2
Peak Flow (m3/day)	8,272.80	643.44
Hotel		
Total GFA, m2	17,190	17,190
Area/Employee	31.25	31.25
Population	551	551
Unit flow factor (m3/person/day)	1.20	0.14
Daily Flow (m3/day)	661.20	77.14
Peak Flow Factor	3	2
Peak Flow (m3/day)	1,983.60	154.28
GIC		
Total GFA, m2	77,510	77,510
Area/Employee	30.30	30.30
Population	2,558	2,558
Unit flow factor (m3/person/day)	0.03	0.05
Daily Flow (m3/day)	76.74	127.90
Peak Flow Factor	3	2
Peak Flow (m3/day)	230.22	255.80
Residential		
Population	28,370	28,370
Unit flow factor (m3/person/day)	0.23	0.07
Service Trade (m3/person/day)	0.055	0
Daily Flow (m3/day)	8,085.45	1,985.90
Peak Flow Factor	3	2
Peak Flow (m3/day)	24,256.35	3,971.80
Clubhouse		
Total GFA, m2	24,890	24,890
Area/Employee	30.30	30.30
Population	822	822
Unit flow factor (m3/person/day)	0.23	0.05
Daily Flow (m3/day)	189.06	41.10
Peak Flow Factor	3	2
Peak Flow (m3/day)	567.18	82.20
Total Daily Flow (m3/day)	11,905	2,778
Total Peak Flow (m3/day)	35,714	5,556
Increase (compared to existing) (m3/day)	6,383	1,114
%	21.8%	25.1%

Remarks:

1) Based on WSD DI no.1309, peak flow rates in distribution mains for:

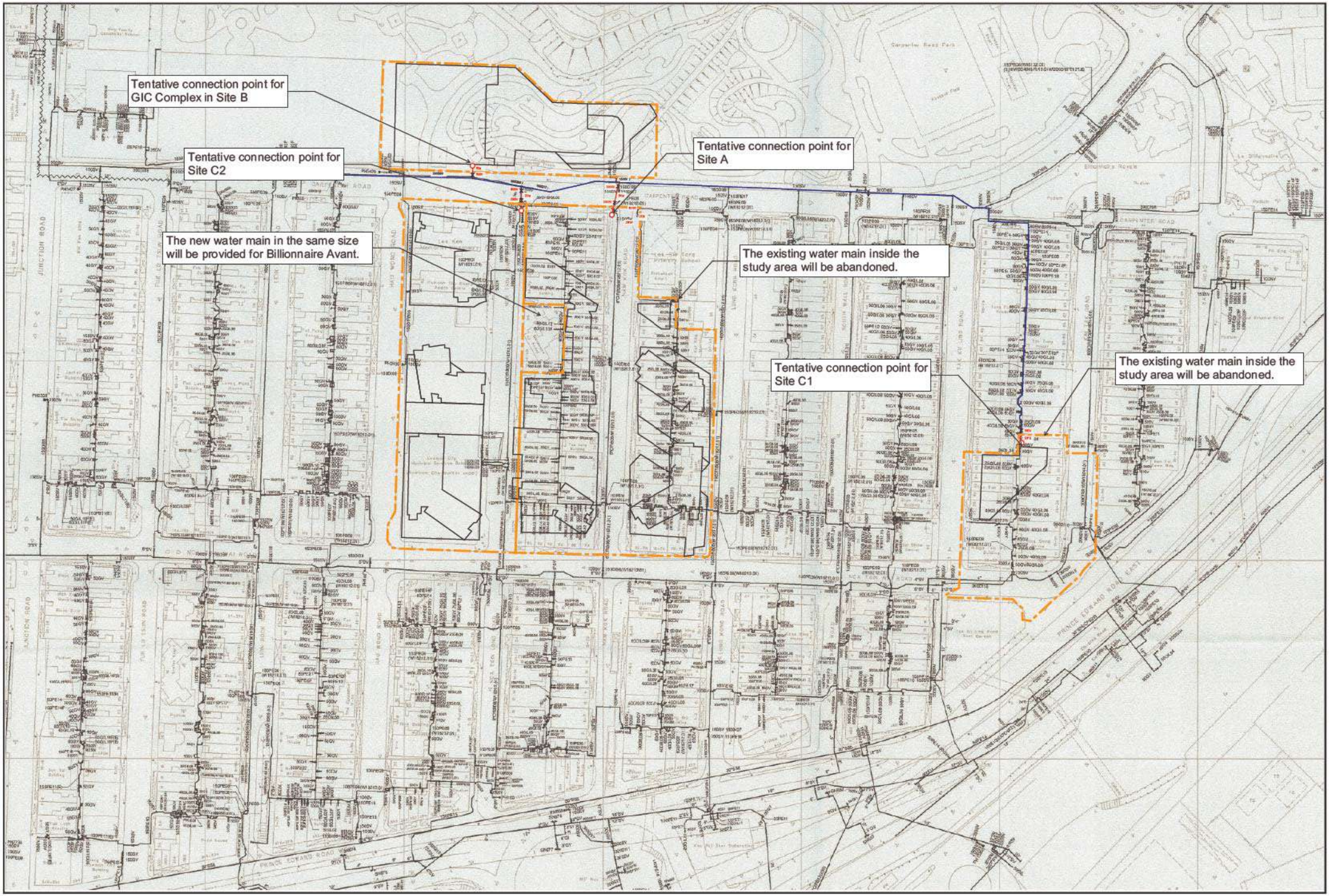
Fresh water =	3 x mean daily demand
Salt water =	2 x mean daily demand

2) Mean daily unit demand given in Table 1 of WSD DI no.1309.

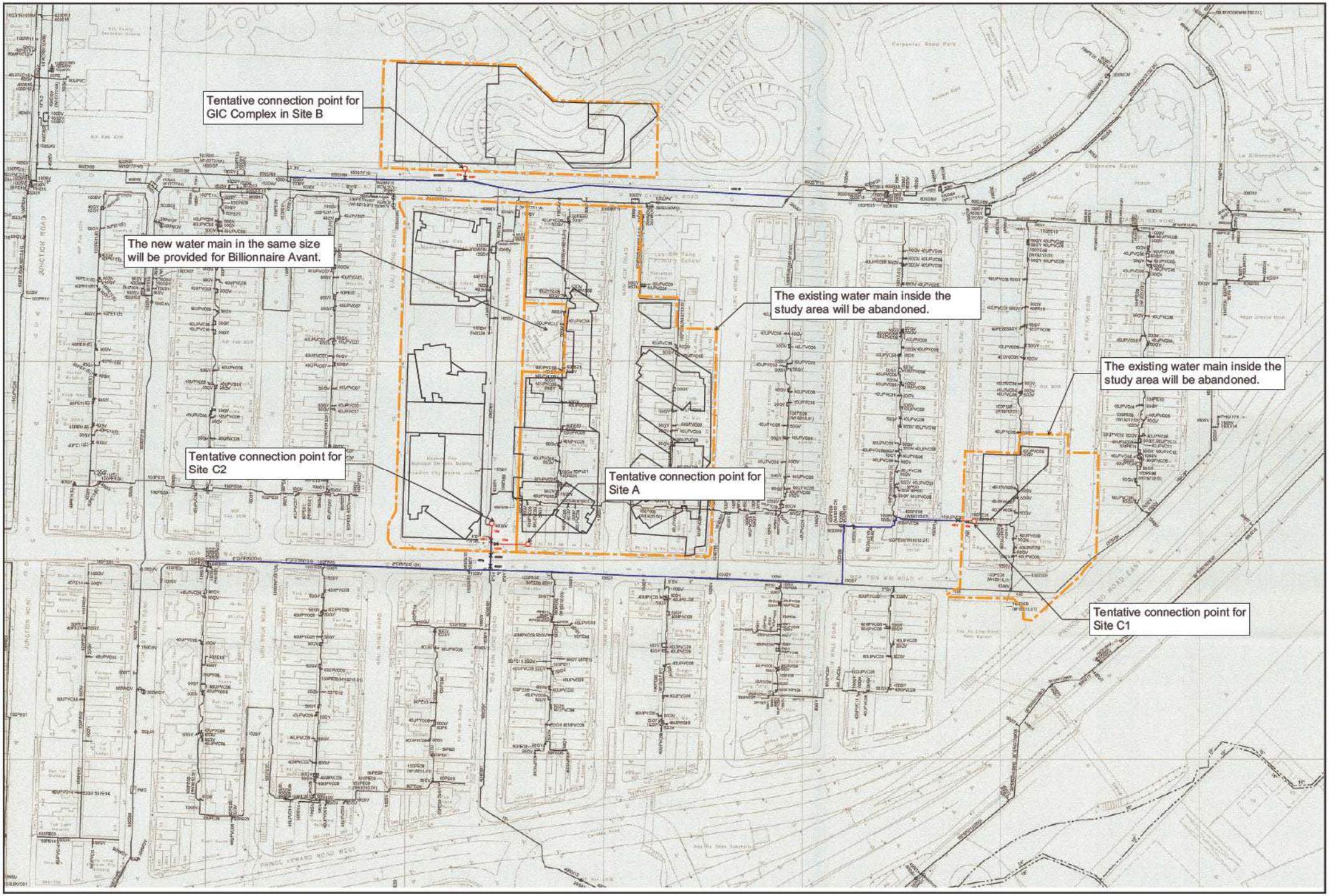
	Fresh Water (l/h/d)	Flushing Water (l/h/d)
Residential - R1	230	70
Service Trade - Kowloon City	55	0

Appendix E

Proposed Tentative Connection Points and Hydraulic Performance Review of Existing Freshwater Main



PROPOSED MODIFICATION PLAN ON FRESH WATER MAIN



PROPOSED MODIFICATION PLAN ON SALT WATER MAIN

ARUP		Job No.	Sheet No.	Rev.
			01	01
		Member/Location		
Job Title	Nga Tsin Wai Road/ Carpenter Road Development Scheme (KC-017)	Drg. Ref.		
Calculation	Water Consumption Estimation	Made by: IP	Date: 18 May 22	Chd.: YL

Calculation for Water Consumption Estimation

Site C2

Retail		
Total GFA, m2	10,035	10,035
Area/Employee	28.57	28.57
Population	352	352
Unit flow factor (m3/person/day)	0.03	0.05
Daily Flow (m3/day)	10.56	17.60
Peak Flow Factor	3	2
Peak Flow (m3/day)	31.68	35.20
Restaurant		
Total GFA, m2 (assumed 30% of total retail GFA are F&B)	4,301	4,301
Area/Employee	19.61	19.61
Population	220	220
Unit flow factor (m3/person/day)	1.20	0.14
Daily Flow (m3/day)	264.00	30.80
Peak Flow Factor	3	2
Peak Flow (m3/day)	792.00	61.60
Residential		
Population	4,727	4,727
Unit flow factor (m3/person/day)	0.23	0.07
Service Trade (m3/person/day)	0.055	0
Daily Flow (m3/day)	1,347.21	330.89
Peak Flow Factor	3	2
Peak Flow (m3/day)	4,041.64	661.79
Total Daily Flow (m3/day)	1,622	379
Total Peak Flow (m3/day)	4,865	759

Remarks:

1) Based on WSD DI no.1309, peak flow rates in distribution mains for:
   - Fresh water = 3 x mean daily demand
   - Salt water = 2 x mean daily demand
2) Mean daily unit demand given in Table 1 of WSD DI no.1309.

	Fresh Water (l/h/d)	Flushing Water (l/h/d)
Residential - R1	230	70
Service Trade - Kowloon City	55	0

ARUP		Job No.	Sheet No.	Rev.
			02	01
		Member/Location		
Job Title	Nga Tsin Wai Road/ Carpenter Road Development Scheme (KC-017)	Drg. Ref.		
Calculation	Water Consumption Estimation	Made by: IP	Date: 18 May 22	Chd.: YL

Calculation for Water Consumption Estimation

Site A and Billionnaire Avant

Retail		
Total GFA, m2	12,537	12,537
Area/Employee	28.57	28.57
Population	439	439
Unit flow factor (m3/person/day)	0.03	0.05
Daily Flow (m3/day)	13.17	21.95
Peak Flow Factor	3	2
Peak Flow (m3/day)	39.51	43.90
Restaurant		
Total GFA, m2 (assumed 30% of total retail GFA are F&B)	5,373	5,373
Area/Employee	19.61	19.61
Population	275	275
Unit flow factor (m3/person/day)	1.20	0.14
Daily Flow (m3/day)	330.00	38.50
Peak Flow Factor	3	2
Peak Flow (m3/day)	990.00	77.00
Residential		
Population	5,511	5,511
Unit flow factor (m3/person/day)	0.23	0.07
Service Trade (m3/person/day)	0.055	0
Daily Flow (m3/day)	1,570.60	385.76
Peak Flow Factor	3	2
Peak Flow (m3/day)	4,711.79	771.52
Total Daily Flow (m3/day)	1,914	446
Total Peak Flow (m3/day)	5,741	892

Remarks:

1) Based on WSD DI no.1309, peak flow rates in distribution mains for:
   - Fresh water = 3 x mean daily demand
   - Salt water = 2 x mean daily demand
2) Mean daily unit demand given in Table 1 of WSD DI no.1309.

	Fresh Water (l/h/d)	Flushing Water (l/h/d)
Residential - R1	230	70
Service Trade - Kowloon City	55	0

ARUP		Job No.	Sheet No.	Rev.
			03	01
		Member/Location		
Job Title	Nga Tsin Wai Road/ Carpenter Road Development Scheme (KC-017)	Drg. Ref.		
Calculation	Water Consumption Estimation	Made by IP	Date 18 May 22	Chd. YL

Calculation for Water Consumption Estimation

Northern Site (Site B) - GIC Complex

GIC		
Total GFA, m2	44,000	44,000
Area/Employee	30.30	30.30
Population	1,452	1,452
Unit flow factor (m3/person/day)	0.03	0.05
Daily Flow (m3/day)	43.56	72.60
Peak Flow Factor	3	2
Peak Flow (m3/day)	130.68	145.20
Total Daily Flow (m3/day)	44	73
Total Peak Flow (m3/day)	131	145

Remarks:

1) Based on WSD DI no.1309, peak flow rates in distribution mains for:
   - Fresh water = 3 x mean daily demand
   - Salt water = 2 x mean daily demand
2) Mean daily unit demand given in Table 1 of WSD DI no.1309.

	Fresh Water (l/h/d)	Flushing Water (l/h/d)
Residential - R1	230	70
Service Trade - Kowloon City	55	0

ARUP		Job No.	Sheet No.	Rev.
			04	01
		Member/Location		
Job Title	Nga Tsin Wai Road/ Carpenter Road Development Scheme (KC-017)	Drg. Ref.		
Calculation	Water Consumption Estimation	Made by: IP	Date: 18 May 22	Chd.: YL

Calculation for Water Consumption Estimation

Eastern Site (Site C1)

Retail		
Total GFA, m2	1,400	1,400
Area/Employee	28.57	28.57
Population	49	49
Unit flow factor (m3/person/day)	0.03	0.05
Daily Flow (m3/day)	1.47	2.45
Peak Flow Factor	3	2
Peak Flow (m3/day)	4.41	4.90
Restaurant		
Total GFA, m2 (assumed 30% of total retail GFA are F&B)	600	600
Area/Employee	19.61	19.61
Population	31	31
Unit flow factor (m3/person/day)	1.20	0.14
Daily Flow (m3/day)	37.20	4.34
Peak Flow Factor	3	2
Peak Flow (m3/day)	111.60	8.68
Total Daily Flow (m3/day)	39	7
Total Peak Flow (m3/day)	116	14

Remarks:

1) Based on WSD DI no.1309, peak flow rates in distribution mains for:
   - Fresh water = 3 x mean daily demand
   - Salt water = 2 x mean daily demand
2) Mean daily unit demand given in Table 1 of WSD DI no.1309.

	Fresh Water (l/h/d)	Flushing Water (l/h/d)
Residential - R1	230	70
Service Trade - Kowloon City	55	0

ARUP		Job No.	Sheet No.	Rev.
			5	1
		Member/Location		
Job Title	Nga Tsin Wai Road/ Carpenter Road Development Scheme (KC-017)	Drg. Ref.		
Calculation	Hydraulic Performance Review Of Existing Water Main	Made by: IP	Date: 11/5/22	Chd.: YL

HYDRAULIC PERFORMANCE REVIEW OF EXISTING FRESH WATER MAIN FROM PROPOSED DEVELOPMENT

Notes:
Calculate by Continuity Equation: Q = AV

where Q = the discharge flow rate for demand purpose,
A= the cross sectional area of the water main and V = the design velocity of the water main

b) Flow velocity limit for fresh water distribution mains:

>DN 700	≤3 m/s
DN 700 – DN 525	≤2.5 m/s
DN 450 – DN 375	≤2 m/s
DN 300 – DN 200	≤1.5 m/s

c) Flow velocity limit for salt water distribution mains:

>=DN 1000	≤3 m/s
DN 900 – DN 800	≤2.5 m/s
DN 700 – DN 525	≤2 m/s
DN 450 – DN 300	≤1.5 m/s

Site	Daily Flow from KC-017	Design Peak from KC-017 (Q)	Water Mains Diameter	Flow Area (A)	Flow Velocity (V)	Remark
	(m3/day)	(m3/day)	(mm)	(m/s)	(m/s)	
Site C2	1,622	4,865	250	0.05	1.15	-
Site A	1,914	5,741	250	0.05	1.35	Including Billionnaire Avant
Site B	44	131	80	0.01	0.30	-
Site C1	39	116	40	0.00	1.07	-

HYDRAULIC PERFORMANCE REVIEW OF EXISTING SALT WATER MAIN FROM PROPOSED DEVELOPMENT

Notes:
Calculate by Continuity Equation: Q = AV

A= the cross sectional area of the water main and V = the design velocity of the water main

b) Flow velocity limit for fresh water distribution mains:

>DN 700	≤3 m/s
DN 700 – DN 525	≤2.5 m/s
DN 450 – DN 375	≤2 m/s
DN 300 – DN 200	≤1.5 m/s

c) Flow velocity limit for salt water distribution mains:

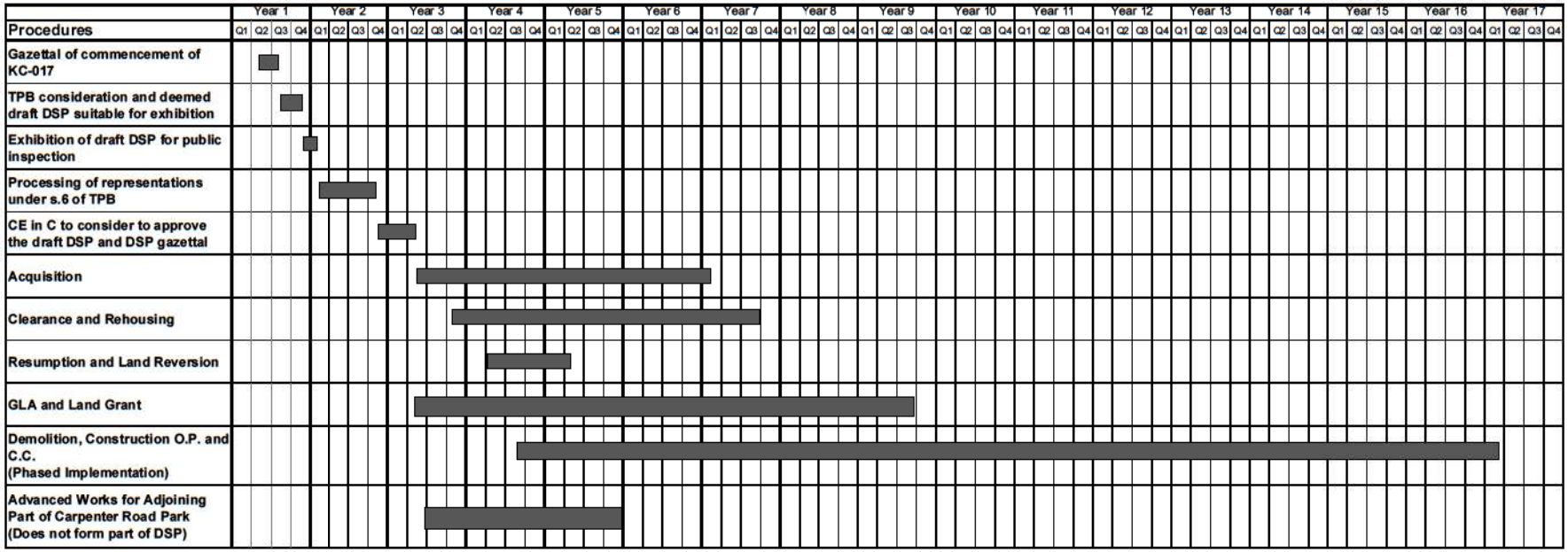
>=DN 1000	≤3 m/s
DN 900 – DN 800	≤2.5 m/s
DN 700 – DN 525	≤2 m/s
DN 450 – DN 300	≤1.5 m/s

Site	Daily Flow from KC-017	Design Peak from KC-017 (Q)	Water Mains Diameter	Flow Area (A)	Flow Velocity (V)	Remark
	(m3/day)	(m3/day)	(mm)	(m/s)	(m/s)	
Site C2	379	1,138	150	0.02	0.75	-
Site A	446	1,339	150	0.02	0.88	Including Billionnaire Avant
Site B	73	218	50	0.00	1.28	-
Site C1	7	20	40	0.00	0.19	-

Appendix 11

Tentative Implementation Programme

KC-017 URA Nga Tsin Wai Road / Carpenter Road Development Scheme
Tentative Implementation Programme



Appendix 12

Acquisition and Resumption of Affected Properties

Principles Adopted by the Urban Renewal Authority in Property Acquisition (Other than Industrial Properties)

This pamphlet briefly outlines the principles adopted by the Urban Renewal Authority ("URA") in the acquisition of properties (other than industrial properties) affected by URA's urban renewal projects ("URA Projects").

Domestic Properties

1. URA will offer an owner-occupier of domestic property within a URA Project the market value (assessed on vacant possession basis) of the affected property plus an ex-gratia allowance, namely Home Purchase Allowance ("HPA"), for purchase of the affected property. The amount of HPA payable to individual owners is the difference between the value of a notional replacement flat and the market value of the property being acquired. The notional replacement flat is based on a seven-year-old flat of a size similar to the affected property and in the same locality. The notional replacement flat is assumed to be in a comparable quality building, situated in a similar locality in terms of characteristics and accessibility. The notional replacement flat will be situated at the middle floor of a notional building with average orientation, i.e. not facing south or west, and without sea view.

2. "Owner-occupier" here means an owner who occupies the affected property as his/her sole residence. If an owner does not reside in the affected property as his/her sole residence, the occupancy status of the affected property will be treated as "Vacant" and the owner will be offered Supplementary Allowance ("SA") instead of HPA. SA is a percentage of HPA. The criteria for determining whether an owner occupies the affected property as his/her "sole residence" will be determined by URA according to URA's prevailing policy.

3. An owner-occupier will be offered HPA for no more than three properties in a redevelopment project. (Please see **Appendix I** for examples of calculation of HPA and **Appendix II** for HPAs available in different scenarios.)

4. Property used as sole residence by an owner's "immediate family members" will be treated as being occupied by the owner himself/herself as sole residence for the purpose of ascertainment of his/her eligibility for HPA. "Immediate family members" of an owner means parents, children, dependent brothers and sisters, grandparents, grandchildren, step-parents, spouse's parents, and spouse's step-parents.

5. An owner who leaves the affected property vacant will be offered the market value (assessed on vacant possession basis) of the affected property plus SA. In addition, URA will offer an Allowance for Vacant Property ("AVP") to the owner who has (i) left the affected property vacant on the first day of the freezing survey conducted for the relevant URA Project ("FS Date") and thereafter; (ii) accepted URA's initial acquisition offer within the validity period of the offer; and (iii) sold the affected property with vacant possession to URA. AVP is equivalent to 2 times the amount of the Rateable Value of the affected property.

6. An owner who lets the affected property out will be offered the market value (assessed on vacant possession basis) of the affected property plus SA.

7. An owner of tenanted or vacant properties will be offered SA for no more than two properties in a URA Project. (Please see **Appendix I** for examples of calculation of SA and **Appendix II** for different SAs available in different scenarios.)

8. In addition to HPA or SA, URA will offer an Incidental Cost Allowance ("ICA") to owners of domestic properties to assist the owners' payment of removal expenses and expenditure relating to the purchase of a domestic replacement flat and the legal cost incurred in the sale of the affected properties to URA. The actual amount of ICA shall be determined and announced by URA as and when an offer to purchase is made for each individual project. If the owner does not accept the initial acquisition offer within the validity period of the offer but URA still decides to negotiate with the owner for the purchase of his/her property despite the lapse of the offer (which shall be at the absolute discretion of URA whether or not to do so), the amount of ICA will be deducted by 30%.

9. If the amount of necessary and reasonable expenses actually incurred by the owner of a domestic property in selling the affected property to URA, namely (i) legal cost incurred by selling the affected property to URA; (ii) stamp duty, agency fee and legal cost incurred in purchasing a domestic replacement flat and (iii) removal cost, exceeds the amount of ICA offered by URA, the owner may be reimbursed with the difference ("the Expense"). The owner can only submit one single reimbursement claim for each domestic property sold to URA, and must fulfill the following eligibility criteria:

   (a) The owner must have accepted the initial acquisition offer of URA within the validity period of the offer;

   (b) The reimbursement claim must be made within 12 months from the date of execution of assignment of the affected property sold to URA, and the reimbursable amount must be the actual expenses already paid by the owner within 12 months after the property is sold to URA;

   (c) The domestic replacement flat must be located in Hong Kong and must be purchased after the date of issuance of initial acquisition offer by URA; and

   (d) The owner should be the sole registered owner or one of the registered owners of the domestic replacement flat, and his/her interest in the replacement flat must be recorded in the land register.

10. In general, the principles in assessing the reimbursable amount of the Expense as described in Paragraph 9 above are:

   (a) The reimbursable amount for stamp duty should be calculated at the lower rates (Scale 2) of the ad valorem stamp duty payable for a domestic replacement flat;

   (b) The reimbursable amount for real estate agency fee should follow the general market practice but not exceed 1% of the purchase price of the domestic replacement property;

   (c) The reimbursable amounts in both item (a) and item (b) above will be subject to a ceiling to be calculated on the basis of a domestic replacement property with a purchase price of 110% of the total of (i) the market value of the affected

property and (ii) the sum of HPA/SA as stipulated in the initial acquisition offer of URA;

(d) URA will only reimburse the Expense which is reasonable, absolutely necessary and actually paid by the owner in relation to the expenses described above;

(e) The owner should provide sufficient documentary evidence for the Expenses submitted in the reimbursement claim; and

(f) URA will consider each reimbursement claim on its own merits, and URA has the sole discretion in determining the amount of the Expenses reimbursable in each case.

11. If a domestic property has been sub-divided into several flats with undivided shares ("sub-divided flat") before the FS date and an owner-occupier of a sub-divided flat elects not to receive the HPA, subject to eligibility criteria and other requirements, such an owner-occupier will be offered re-housing.

12. The HPA or SA may be payable for non-domestic property which has been issued with an occupation permit other than for domestic purpose but nevertheless has been used by the same owner for domestic purpose for a long time (generally about 10 years) in the following situation:

(a) An owner-occupier who has used the affected property for domestic purposes for a long time will be offered market value (assessed on vacant possession basis) of the affected property plus the higher of:

(i) HPA and ICA as a domestic property; and

(ii) the allowance applicable to non-domestic properties (other than Industrial Properties).

(b) An owner of tenanted property which has been occupied for domestic purpose for a long time will be offered market value (assessed on vacant possession basis) of the affected property plus the higher of:

(i) SA and ICA as a domestic property less the Ex-gratia Allowance payable to a domestic tenant; and

(ii) the allowance applicable to non-domestic properties (other than Industrial Properties).

13. For URA Projects which are commenced after the promulgation of the new Urban Renewal Strategy on 24 February 2011:

(a) Subject to the conditions and provisions contained in the "Urban Renewal Authority Flat-for-Flat Pamphlet" ("the Pamphlet"), eligible owner-occupiers of domestic properties in URA Projects, who will be offered HPA, can opt to participate in URA's "Flat-for-Flat" Scheme ("the Scheme"). For details of the Scheme, please refer to the Pamphlet which will be available when an offer to purchase is made for each individual project.

(b) Elderly owners of tenanted domestic properties in URA Project may apply for the Elderly Domestic Owner-Landlords Compassionate Allowance ("EDOLCA") in addition to the market values of their properties and SA as described in Paragraph 6 above, subject to the eligibility criteria set by URA. Eligible elderly owners can apply for EDOLCA after receiving URA's initial acquisition offers. EDOLCA is only payable to eligible elderly owners who have accepted the initial acquisition offers of URA within the validity period of the offer. Please refer to the pamphlet of *"Elderly Domestic Owner-Landlords Compassionate Allowance"* for details of the eligibility criteria and the arrangement.

Non-domestic Properties (Other than Industrial Properties)

14. URA will offer an owner of a non-domestic property (other than industrial property) the market value of the affected property (assessed on vacant possession basis) and an ex-gratia allowance. The amount of the ex-gratia allowance for tenanted or vacant non-domestic property (other than industrial property) is equivalent to 10% of its market value (assessed on vacant possession basis) or one time its Rateable Value, whichever is higher. In addition, URA will offer AVP at 2 times the amount of the Rateable Value of the affected property to the owner who has (i) left the affected property vacant on the FS Date and thereafter; (ii) accepted URA's initial acquisition offer within the validity period of the offer; and (iii) sold the affected property with vacant possession to URA. The amount of ex-gratia allowance for owner-occupied non-domestic property (other than industrial property) is equivalent to 35% of its market value (assessed on vacant possession basis) or 4 times its Rateable Value, whichever is higher. "Owner-occupier" here means an owner who occupies and operates his/her business in the affected property.

15. In addition to the ex-gratia allowance described in Paragraph 14 above, an additional payment of the Ex-gratia Business Allowance ("EGBA") is payable to an owner-occupier of non-domestic property (other than industrial property) who had commenced occupying the premises for business use before the FS Date and have accepted the initial acquisition offer from URA both unconditionally and within the validity period of the offer. The amount of EGBA is directly proportional to the number of years of continuous operation by the owner-occupier as business owner in the affected property. In calculating the total number of years of continuous operation, the last date of the continuous operation is set at 2 years from the date on which URA issues initial acquisition offer to the property owner. The amount of EGBA is payable at a rate of 0.1 times the Rateable Value for each year that the owner-occupier has operated the business as the business owner in the property concerned, subject to a maximum of 30 years. For an incomplete year, the amount of EGBA is calculated on a pro-rata basis to the nearest month. The amount of EGBA is subject to a maximum amount of $700,000 and a minimum amount as described in the table below:

Continuous Operation for	**Minimum Amount of EGBA**
(a) 10 years or less	HK$110,000 (effective from 1 April 2020 and subject to annual review)
(b) More than 10 years (maximum 30 years)	The minimum amount for (a) above plus an additional HK$10,000 for each completed year after 10 years.

In applying for EGBA, an owner-occupier is required to substantiate the period of continuous operation in the property as business owner. The owner-occupier may choose to claim for severance payments payable to his/her employees under the Employment Ordinance (Chapter 57) as an alternative to EGBA.

16. URA will also offer ICA to owners of non-domestic properties (other than industrial property) to assist their payment of expenditure relating to the purchase of a non-domestic replacement property and the legal cost incurred in the sale of the affected properties to URA. The amount of ICA payable is 5% of the market value (assessed on vacant possession basis) of the affected property. Payment of the ICA is subject to the condition that the owner must have accepted the initial acquisition offer of URA within the validity period.

17. If the amount of necessary and reasonable expenses actually incurred by the owner in selling the affected non-domestic property to URA, namely (i) legal cost incurred by selling the affected non-domestic property to URA and (ii) stamp duty, agency fee and legal cost incurred in purchasing a non-domestic replacement property, exceeds the amount of ICA offered by URA, the owner may be reimbursed with the difference ("the Expense for Non-domestic Property"). The owner can only submit one single reimbursement claim for each non-domestic property sold to URA, and must fulfill the following eligibility criteria:

    (a) The owner must have accepted the initial acquisition offer of URA within the validity period of the offer;

    (b) The reimbursement claim must be made within 12 months from the date of execution of assignment of the affected property sold to URA, and the reimbursable amount must be the actual expenses already paid by the owner within 12 months after the property is sold to URA;

    (c) The non-domestic replacement property must be located in Hong Kong and must be purchased after the date of issuance of initial acquisition offer by URA; and

    (d) The owner should be the sole registered owner or one of the registered owners of the non-domestic replacement property, and his/her interest in the replacement property must be recorded in the land register.

18. In general, the principles in assessing the reimbursable amount of the Expense for Non-domestic Property as described in Paragraph 17 above are:

    (a) The reimbursable amount for stamp duty shall be calculated at Scale 2 rates of the ad valorem stamp duty payable for a non-domestic replacement property;

    (b) The reimbursable amount for real estate agency fee should follow the general market practices but not exceed 1% of the purchase price of the non-domestic replacement property;

    (c) The reimbursable amounts in both item (a) and item (b) above will be subject to a ceiling to be calculated on the basis of a non-domestic replacement property with a purchase price of 110% of the market value of the affected property as stipulated in the initial acquisition offer of URA;

(d) URA will only reimburse the Expense for Non-domestic Property which is reasonable, absolutely necessary and actually paid by the owner in relation to the expenses described above;

(e) The owner should provide sufficient documentary evidence for the expenses submitted with the reimbursement claim; and

(f) URA will consider each reimbursement claim on its own merits, and URA has the sole discretion in determining the amount of the Expenses for Non-domestic Property reimbursable in each case.

19. An owner-occupier may choose to claim for business loss as an alternative to all the above-mentioned allowances for an affected non-domestic property.

Domestic Properties being used for Non-domestic Purposes

20. If an affected property with an occupation permit for domestic use has been used for non-domestic purpose, the owner-occupier will be offered market value (assessed on vacant possession basis) of the affected property plus the higher of:

(i) the allowances applicable to owner-occupied non-domestic properties (other than industrial properties); and

(ii) SA and ICA for domestic properties.

21. An owner of an affected property with an occupation permit for domestic use being leased out for non-domestic use will be offered market value (assessed on vacant possession basis) of the affected property plus the higher of:

(i) the allowances applicable to tenanted non-domestic properties (other than industrial properties); and

(ii) SA plus ICA for domestic properties less 3 times the Rateable Value of the affected property.

Separate Roof Top Interest (Not ancillary to any Domestic/Non-domestic Property)

22. The title of the rooftop property must be legal.

23. An owner of a tenanted rooftop property will be offered the market value of the property on an open roof basis (disregarding any illegal structure or any rent passing) plus an ex-gratia allowance at 10% of the said market value.

24. An owner of a vacant rooftop property will be offered the market value of the property on an open roof basis (disregarding any illegal structure) plus an ex-gratia allowance at 10% of the said market value. In addition, URA will offer the owner AVP at 2 times of the Rateable Value of the affected rooftop property if the owner has (i) left the rooftop property vacant on the FS Date and thereafter; and (ii) accepted the initial acquisition offer within the validity period of the offer; and (iii) sold the affected rooftop property with vacant possession to URA.

25. An owner-occupier of a rooftop property will be offered the market value of the property on an open roof basis (disregarding any illegal structure) plus:

    (a) rehousing if the owner-occupier fulfills the normal eligibility criteria for public rental housing application of Hong Kong Housing Authority or Hong Kong Housing Society, or

    (b) an ex-gratia allowance at 10% of the market value (on open roof basis disregarding any illegal structure) of the property if the owner-occupier is not eligible for re-housing or does not opt for re-housing. In addition, if the owner-occupier has accepted the initial acquisition offer within the validity period of the offer, URA will offer him/her an allowance at 2 times of the Rateable Value of the property.

Buildings in Single Ownership

26. An owner of a building in single ownership will be offered the higher of (a) and (b) below:

    (a) The total amount of the existing use values of individual units of the building plus the allowances applicable to the non-domestic units (if any) of the building and the allowances applicable to the domestic units (if any) of the building, as if the building is in multiple ownership.

    (b) The redevelopment value of the building (assuming redevelopment of the building on its own) plus:

        (i) an ex-gratia allowance at 5% of the redevelopment value; and

        (ii) ICA at 5% of the redevelopment value, subject to the condition that an owner must have accepted the initial acquisition offer of URA within the validity period. An owner may claim for reimbursement of the actual expenses in selling the affected building to URA and purchase of a replacement building in accordance with the same criteria and principles described in Paragraphs 17 to 18 above but the replacement property must be a building in single ownership.

Vacant Sites

27. An owner of a vacant site will be offered:

    (a) the redevelopment value of the vacant site (assuming redevelopment of the site on its own);

    (b) an ex-gratia allowance at 5% of the redevelopment value; and

    (c) ICA at 5% of the redevelopment value, subject to the condition that an owner must have accepted the initial acquisition offer of URA within the validity period of the offer. An owner may claim for reimbursement of the actual expenses in purchasing a replacement site in accordance with the same criteria and principles

as described in paragraphs 17 to 18 above but the replacement property must be a vacant site.

Other General Rules

28. Calculation of the market value of a property is based on the saleable area of the property. The definition of saleable area shall follow the Code of Measuring Practice issued in March 1999 and the Supplement to the Code of Measuring Practice issued in July 2014 by the Hong Kong Institute of Surveyors. Subject always to the owner having good title to the property or any part thereof, area calculations may be based on the boundary of the property as delineated on the assignment plan and the area as measured from the latest relevant building plans approved by the Buildings Department (if any).

29. For the purpose of calculating the value of the notional replacement flat, URA will appoint seven professional surveyor firms to provide the assessments.

30. URA will provide an allowance to the owner, who has employed a professionally qualified surveyor to assess the market value of the affected property (which shall not include any ex-gratia allowance, such as HPA and SA etc.), as a subsidy for the owner's payment of the surveyor's fees for the relevant services. Please refer to the pamphlet of "Allowance for Surveyor's Fees" for details of the arrangement.

31. If an owner only purchased the affected property in the project on/after the FS Date, URA will not pay to such owner any of the above-mentioned HPA, SA, AVP, EDOLCA or any allowances applicable to non-domestic property, separate rooftop interest, single-owned building and vacant site.

32. URA will consider acquiring property from a holder of a valid adverse possessory order granted by the Court in favour of him/her. Depending on the circumstances of individual cases, URA may impose appropriate additional requirements to safeguard the interest of URA when acquiring properties with adverse possessory title.

33. URA will not purchase a structure which is not erected in compliance with the Buildings Ordinance or the terms of the Government lease and no value, compensation or allowance will be paid by URA in respect of such structure.

34. If an owner is found to have given false or misleading information to URA, URA reserves the right to revise its offers and/or take legal action against such owner and/or report the matter to relevant enforcement authorities.

35. URA's acquisition offer is made by reference to the occupancy status of an owner's property on the FS Date and in accordance with the URA's prevailing principles and practice for property acquisition. One of such prevailing principles is that an owner whose property was owner-occupied on the FS Date but is let out at the time URA's acquisition offer is made will only be offered the allowances for the acquisition of the affected property on a tenanted basis.

36. Particularly, URA would draw the attention to owners whose properties had been tenanted out on the FS Date that URA will not make a higher offer to them to acquire their properties in the following situations:

    (a) the properties are subsequently left vacant; or

    (b) the owners have entered into new tenancies, whether with the existing tenants or new tenants; or

    (c) the owners have subsequently obtained possession and occupied their properties for their own self-use.

37. URA would remind owners that it is an offence for a landlord to unlawfully deprive a tenant of occupation of property or to make an unwarranted demand with menaces with a view to gaining for himself/herself or others or to defraud against URA. URA will report to the enforcement authorities on all cases of suspected criminal offences.

This pamphlet is issued for the purpose of general reference only. The information contained herein is with reference to the principles and practice of the Urban Renewal Authority prevailing at the date of issue of this pamphlet. It shall not constitute any representation on the part of the Urban Renewal Authority or give rise to any expectation whatsoever and shall not be relied on as such. Each case will be considered on its own merits having regard to all factors and circumstances. The terms of acquisition to be offered are subject to the principles and practice of the Urban Renewal Authority prevailing at the time the offer of acquisition is made and are subject to review from time to time as the Urban Renewal Authority shall at its absolute discretion consider appropriate. The Urban Renewal Authority's right to add to, amend or delete the whole or any part of this pamphlet is hereby reserved.

For enquiries, please call URA External Relations Department:
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March 2022

Appendix I

Examples (Domestic Properties)

(Figures are based on assumption and for reference only)

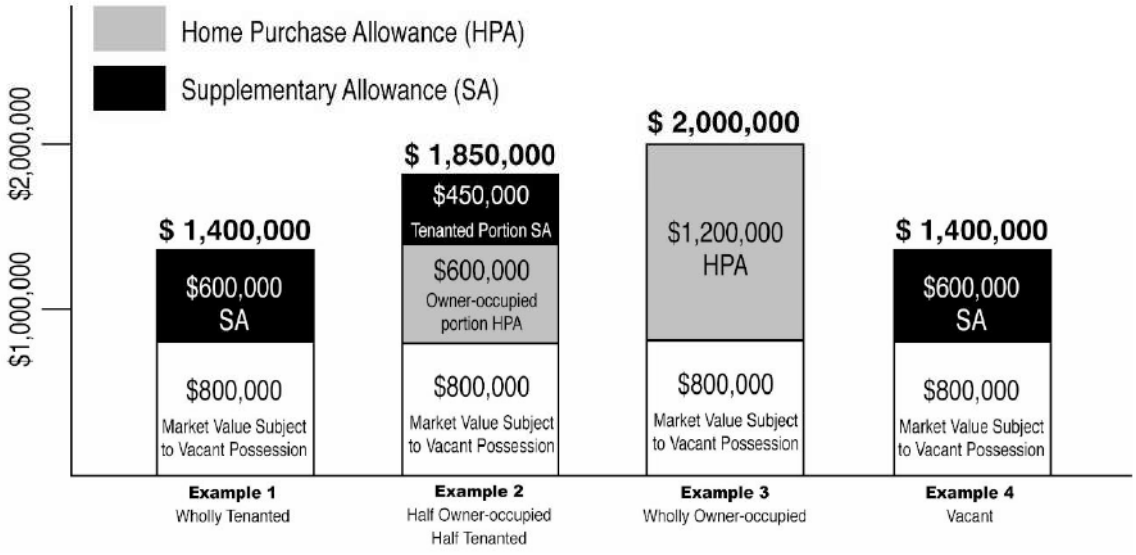
Assuming the market value of a domestic flat on vacant possession (VP) basis is HK$800,000 and the value of a notional replacement flat is HK$2,000,000. The HPA will then be HK$1,200,000.

Example One
An owner of the above domestic flat who lets out the entire flat
This owner will get the market value of his flat (on VP basis) of HK$800,000 and SA of HK$600,000 (HK$1,200,000 x 50%). In total, this owner will receive HK$1,400,000.

Example Two
An owner of the above domestic flat who occupies half of the flat and leases out the other half
This owner will get the market value of his flat (on VP basis) of HK$800,000 and HPA of HK$600,000 for the owner-occupied portion and SA of HK$450,000 (HK$600,000 x 75%) for the tenanted portion. In total, this owner will receive HK$1,850,000.

Example Three
An owner of the above domestic flat who occupies the entire flat for his own use
This owner will get the market value of his flat (on VP basis), which is HK$800,000, plus HPA which is HK$1,200,000. In total, this owner will receive HK$2,000,000.

Example Four
An owner of the above domestic flat who leaves the entire flat vacant
The owner will get the market value of his flat (on VP basis), which is HK$800,000, plus SA of HK$600,000 (HK$1,200,000 x 50%). In total, this owner will receive HK$1,400,000.



Appendix II : Domestic Properties - Diagramatic Illustration of HPA, SA & EUV

One Flat

Occupation Status	HPA	SA	Market Value
1 Owner-occupied	100%		EUV(VP)
2 Partially Owner-occupied & Partially Tenanted	Owner-occupied portion : 100%	Tenanted portion : 75%	EUV(VP)
3 Wholly Tenanted		50%	EUV(VP)
4 Vacant		50%	EUV(VP)

Two Flats

Occupation Status	HPA	SA	Market Value
5 Owner-occupied	100%		EUV(VP)
Owner-occupied	100%		EUV(VP)
6 Owner-occupied	100%		EUV(VP)
Partially Owner-occupied & Partially Tenanted	Owner-occupied portion : 100%	Tenanted portion : 75%	EUV(VP)
7 Owner-occupied	100%		EUV(VP)
Wholly Tenanted		50%	EUV(VP)
8 Partially Owner-occupied & Partially Tenanted	Owner-occupied portion : 100%	Tenanted portion : 75%	EUV(VP)
Partially Owner-occupied & Partially Tenanted	Owner-occupied portion : 100%	Tenanted portion : 75%	EUV(VP)
9 Partially Owner-occupied & Partially Tenanted	Owner-occupied portion : 100%	Tenanted portion : 75%	EUV(VP)
Wholly Tenanted		50%	EUV(VP)
10 Wholly Tenanted		50%	EUV(VP)
Wholly Tenanted		25%	EUV(VP)
11 Vacant		50%	EUV(VP)
Vacant		25%	EUV(VP)

Three Flats

Occupation Status	HPA	SA	Market Value
12 Owner-occupied	100%		EUV(VP)
Owner-occupied	100%		EUV(VP)
Owner-occupied	100%		EUV(VP)
13 Owner-occupied	100%		EUV(VP)
Owner-occupied	100%		EUV(VP)
Partially Owner-occupied & Partially Tenanted	Owner-occupied portion : 100%	Tenanted portion : 75%	EUV(VP)
14 Owner-occupied	100%		EUV(VP)
Partially Owner-occupied & Partially Tenanted	Owner-occupied portion : 100%	Tenanted portion : 75%	EUV(VP)
Partially Owner-occupied & Partially Tenanted	Owner-occupied portion : 100%	Tenanted portion : 75%	EUV(VP)
15 Owner-occupied	100%		EUV(VP)
Partially Owner-occupied & Partially Tenanted	Owner-occupied portion : 100%	Tenanted portion : 75%	EUV(VP)
Wholly Tenanted		50%	EUV(VP)
16 Owner-occupied	100%		EUV(VP)
Owner-occupied	100%		EUV(VP)
Wholly Tenanted		50%	EUV(VP)
17 Owner-occupied	100%		EUV(VP)
Wholly Tenanted		50%	EUV(VP)
Wholly Tenanted		25%	EUV(VP)

Occupation Status	HPA	SA	Market Value
18 Partially Owner-occupied & Partially Tenanted	Owner-occupied portion : 100%	Tenanted portion : 75%	EUV(VP)
Partially Owner-occupied & Partially Tenanted	Owner-occupied portion : 100%	Tenanted portion : 75%	EUV(VP)
Partially Owner-occupied & Partially Tenanted	Owner-occupied portion : 100%	Tenanted portion : 75%	EUV(VP)
19 Partially Owner-occupied & Partially Tenanted	Owner-occupied portion : 100%	Tenanted portion : 75%	EUV(VP)
Partially Owner-occupied & Partially Tenanted	Owner-occupied portion : 100%	Tenanted portion : 75%	EUV(VP)
Wholly Tenanted		50%	EUV(VP)
20 Partially Owner-occupied & Partially Tenanted	Owner-occupied portion : 100%	Tenanted portion : 75%	EUV(VP)
Wholly Tenanted		50%	EUV(VP)
Wholly Tenanted		25%	EUV(VP)
21 Wholly Tenanted		50%	EUV(VP)
Wholly Tenanted		25%	EUV(VP)
Wholly Tenanted			EUV(VP)
22 Vacant		50%	EUV(VP)
Vacant		25%	EUV(VP)
Vacant			EUV(VP)

Abbreviations:

HPA Home Purchase Allowance
SA Supplementary Allowance
EUV Existing Use Value
VP Vacant Possession

Appendix 13

Rehousing and Ex-Gratia Payment Package for Domestic and Non-Domestic Tenants

Principles Adopted by the Urban Renewal Authority for Tenant Re-housing and Ex-gratia Allowance for Projects announced under the Urban Renewal Authority Ordinance (Not applicable to Tenants of Industrial Premises)

This leaflet briefly outlines the current principles and policies adopted by the Urban Renewal Authority ("URA") for providing re-housing and ex-gratia allowance to affected tenants of projects announced by the URA under the Urban Renewal Authority Ordinance ("URAO") (other than tenants of industrial premises).

(A) Re-housing for Domestic Tenants

(I) Public Rental Housing ("PRH")

Re-housing Arrangement

1. Eligible domestic tenants living in acquired properties of the URA will be re-housed in units provided by the Hong Kong Housing Authority ("HKHA") or the Hong Kong Housing Society ("HKHS"). In addition, they may opt for other subsidized housing schemes provided by the HKHA and the HKHS, if available.

Re-housing Eligibility

2. Domestic tenants must have been genuinely living in the properties within the project area continuously before and since the first day of Freezing Survey of the project ("the date of Freezing Survey") conducted by the URA until the date of re-housing offers issued by the URA to the domestic tenants, and have no alternative accommodation during the same period.

3. Domestic tenants must fulfill the prevailing eligibility criteria for PRH of the HKHA and the HKHS.

Re-housing Eligibility of Illegal Rooftop Structure Occupiers

4. Since there is no difference between the illegal rooftop structures within the URA's redevelopment project areas and the illegal rooftop structures in other domestic buildings, the re-housing eligibility of illegal rooftop structure occupiers for PRH of the HKHA is the same as the eligibility criteria adopted by the HKHA in re-housing the illegal rooftop structure occupiers in domestic buildings affected by the enforcement actions taken by the Buildings Department. Therefore, in addition to the general eligibility criteria for PRH of the HKHA, occupiers of illegal rooftop structures have to satisfy that they have been genuinely living in the structures within the project area continuously since two years before the date of Freezing Survey until the date of re-housing offers issued by the

URA to the occupiers, and have no alternative accommodation during the same period, and that the structures were built on or before 1 June 1982 in order to be eligible for PRH of the HKHA.

5. Occupiers of the illegal rooftop structures who can only fulfill the requirement of having been genuinely living in the relevant illegal rooftop structures continuously before and since the date of Freezing Survey until the date of re-housing offers issued by the URA to the occupiers, and have no alternative accommodation during the same period, will be eligible for re-housing in the PRH of the HKHS subject to meeting the eligibility criteria for PRH of the HKHS.

(II) URA Re-housing Block

Re-housing Arrangement

1. Domestic tenants living in URA acquired properties, who due to various reasons are not provided PRH re-housing as described in Part (A)(I) above, may be re-housed in units of Re-housing Block provided by the URA subject to fulfillment of the following eligibility criteria of the URA.

Re-housing Eligibility

2. A tenant and his/her household members must have been genuinely living in the properties within the project area continuously before and since the date of Freezing Survey until the date of re-housing offers issued by the URA to the tenants, and have no alternative accommodation during the same period.

3. All household members of a tenant must be legally residing in Hong Kong without any conditions of stay (excluding a time limit of stay).

4. All household members of a tenant, whether personally or through a company, must not own nor have any interest in any domestic property in Hong Kong.

5. The total monthly income of all household members of a tenant (including a tenant with all household members aged 60 or above) must not exceed 3 times the prevailing PRH maximum income limit of the HKHA for ordinary family applicants according to the tenant's household size. The total net asset of all household members of a tenant (including a tenant with all household members aged 60 or above) must not exceed 84 times the prevailing PRH maximum income limit of the HKHA for ordinary family applicants according to the tenant's household size.

6. Tenants and their household members, who are eligible for registration on the Application for PRH of the HKHA, must make the application accordingly.

7. Allocation of re-housing unit is governed by the prevailing policy of the URA on household composition.

(III) Ex-gratia Removal Allowance

1. Domestic tenants who accept rehousing arrangement will also be offered an ex-gratia removal allowance of an amount equivalent to the prevailing ex-gratia allowance offered by the Lands Department on resumption by the Government ("Government EGA") or the prevailing rates of the Ex-gratia Domestic Removal Allowance of HKHA, whichever is higher.

(IV) Compassionate Re-housing

1. Domestic tenants who do not fulfill the above rehousing eligibility criteria may be re-housed on compassionate grounds if they have genuine hardship arising from factors such as ill health, disability or special family circumstances.

(B) Ex-gratia Allowances

(I) Domestic Tenants

1. According to Landlord and Tenant (Consolidation) Ordinance, domestic tenants are required to move out from the properties and are not entitled to any compensation or forms of payments if their tenancies are terminated and are not renewed. However, for tenants of the URA acquired properties who decline re-housing as described in Part (A) above or who are not provided re-housing due to various reasons and agreed to move out from the properties, the URA will still offer to them an appropriate amount of ex-gratia allowances as described below.

Tenants who commenced occupying the properties before the date of Freezing Survey

2. Subject to the exceptions described in Paragraph 4 of Part (B)(I) below, the URA will offer an ex-gratia allowance to domestic tenants who had commenced occupying the properties under valid tenancies before the date of Freezing Survey. Based on the rateable value of the properties

concerned, the ex-gratia allowance is calculated according to the method as listed in **Table 1** below:

Table 1

Rateable Value ("RV")	Ex-gratia Allowance
1st HK$10,000	9 times RV
2nd HK$10,000	8 times RV
3rd HK$10,000	7 times RV
4th HK$10,000	6 times RV
5th HK$10,000	5 times RV
6th HK$10,000	4 times RV
7th HK$10,000	3 times RV
8th HK$10,000	2 times RV
9th HK$10,000 and above	1 times RV

3. Subject to the exceptions described in Paragraph 4 of Part (B)(I) below, the total amount of ex-gratia allowance is subject to a minimum amount of HK$170,000 (1) for an one-person household and a minimum amount of HK$190,000 (1) for a two-person or larger household.

Note: (1) Effective from 1 April 2022 and subject to annual review

4. The ex-gratia allowance described in Paragraph 2 of Part (B)(I) above and the minimum amount described in Paragraph 3 of Part (B)(I) above do not apply to domestic tenants who, at any time before and since the date of Freezing Survey and until the date of ex-gratia allowance offers issued by the URA to the tenants,

(i) have alternative accommodation; or

(ii) are not genuinely residing in properties within the project.

Domestic tenants who fall under any of these circumstances will be offered an ex-gratia allowance equal to 3 times Government EGA. However, if the tenants are not legal Hong Kong residents holding valid Hong Kong Identity Card ("HKIC"), they will only be offered 2 times Government EGA.

Tenants who commenced occupying the properties on or after the date of Freezing Survey

5. Subject to the exceptions described in Paragraph 6 of Part (B)(I) below, the URA will only offer an ex-gratia allowance equal to 2 times Government EGA to domestic tenants who had commenced occupying the properties under valid tenancies on or after the date of Freezing Survey.

6. The ex-gratia allowance described in Paragraph 5 of Part (B)(I) above does not apply to domestic tenants who,

(i) at any time before and since their occupation of the properties until the date of ex-gratia allowance offers issued by the URA to the tenants,

(a) have alternative accommodation; or
(b) are not genuinely residing in properties within the project; or

(ii) have received from the URA within two years prior to the date of Freezing Survey or at any time after the date of Freezing Survey any of the following allowances or arrangement:

(a) allowances for owners of domestic properties but excluding the incidental cost allowance; or
(b) ex-gratia allowances for domestic tenant being higher than Government EGA; or
(c) Relocation Assistance; or
(d) re-housing; or

(iii) are not legal Hong Kong residents holding valid HKIC.

Domestic tenants who fall under any of these circumstances will only be offered an ex-gratia allowance equal to 1 times Government EGA.

Principal Tenants

7. Subject to the exceptions described in Paragraph 8 of Part (B)(I) below, for principal tenants who had commenced occupying their properties and whose domestic tenancies commenced before the date of Freezing Survey, the URA will offer to them an ex-gratia allowance equal to the ex-gratia allowance described in Paragraph 2 of Part (B)(I) above subject to a minimum amount described in Paragraph 3 of Part (B)(I) above, plus an additional ex-gratia allowance equal to 24 months' profit rent (i.e. rent received from the sub-tenants after deduction of the rent payable by them to their landlords).

8. The ex-gratia allowance and minimum amount described in Paragraph 7 of Part (B)(I) above does not apply to principal tenants who, at any time before and since the date of Freezing Survey and until the date of ex-gratia allowance offers issued by the URA to the tenants,

(i) have alternative accommodation; or
(ii) are not genuinely residing in their properties within the project.

Principal tenants who fall under any of these circumstances will be offered an ex-gratia allowance equal to 3 times Government EGA plus 24 months' profit rent. However, if the principal tenants are not legal Hong Kong

residents holding valid HKIC, they will only be offered 2 times the Government EGA plus 24 months' profit rent.

9. Principal tenants occupying the properties and whose domestic tenancies commenced on or after the date of Freezing Survey will be offered an ex-gratia allowance according to Paragraphs 5 or 6 of Part (B)(I) above, whichever is applicable.

10. For those principal tenants who do not occupy their properties and whose domestic tenancies commenced before the date of Freezing Survey, they will be offered a minimum amount of HK$20,000 (1) or 24 months' profit rent, whichever is the higher. No ex-gratia allowance will be offered to principal tenants whose tenancies commenced on or after the date of Freezing Survey.

Note: (1) Effective from 1 April 2022 and subject to annual review

11. Principal tenants will be offered rental reduction from the URA. Where any sub-tenant surrenders his leased portion to the URA before the principal tenant delivers vacant possession, the rent payable by principal tenant will be reduced accordingly.

(II) Non-domestic Tenants (Other than Tenants of Industrial Premises)

Ex-gratia Allowance

1. According to the Landlord and Tenant (Consolidation) Ordinance, non-domestic tenants are required to move out from their properties and are not entitled to any compensation or other payments if their tenancies are terminated and are not renewed. However, the URA will still offer an ex-gratia allowance equals to 3 times the RV of the affected properties or an ex-gratia allowance equivalent to the prevailing ex-gratia allowance offered by the Lands Department on resumption by the Government, whichever is higher, to non-domestic tenants (other than tenants of industrial premises) who agreed to move out from their properties.

2. In addition to the ex-gratia allowance described in Paragraph 1 of Part (B)(II) above, additional payment of ex-gratia business allowance ("EGBA") is payable to any tenant-operator of non-domestic property (other than tenants of industrial premises) who had commenced occupying their properties for business use before the date of Freezing Survey and have accepted the ex-gratia allowance offer from the URA both unconditionally and within the validity period of the offer and agreed to move out from their properties. The amount of EGBA is directly proportional to the number of years of continuous operation by the tenant-operator as business owner in the property. In calculating the number of

years of continuous operation, the expiry date of continuous operation is 2 years from the date which the URA issues initial acquisition offers to property owners. The amount of EGBA is payable at a rate of 0.1 times the RV for each year, subject to a maximum of 30 years. For an incomplete year, the amount of EGBA is calculated on a pro-rata basis to the nearest month. The amount of EGBA is subject to a maximum amount of $700,000 and a minimum amount as described in **Table 2** below.

Table 2

Continuous Operation for	**Minimum Amount of EGBA**
(a) 10 years or less	HK$110,000 (effective from 1 April 2022 and subject to annual review)
(b) More than 10 years (maximum 30 years)	The minimum amount for (a) above plus an additional HK$10,000 for each completed year after 10 years.

3. In the application for EGBA, the Tenant-operator is required to substantiate the period of continuous operation in the property as business owner. "Tenant-operator" here means a tenant who occupies his property, which is a legal premises, for his own business.

4. A tenant-operator may choose to claim for (i) severance payment (if any) paid to his/her employees under Employment Ordinance (Chapter 57); and (ii) value of an unexpired lease term and professional fee reasonably incurred (if any), as an alternative to the EGBA (if applicable).

5. A tenant-operator may also choose to claim for business loss (including the claims as mentioned in Paragraph 4 of Part (B)(II) above) as an alternative to the two allowances referred to in Paragraphs 1 and 2 of Part (B)(II) above (if applicable).

(C) Payment Arrangement

1. All applicable allowance mentioned above, half will be paid upon the execution of surrender agreement and the remaining half will be paid after the delivery of vacant possession.

(D) Other General Rules

1. Trespassers occupying properties (domestic or non-domestic) in the project, who move in on or after the date of Freezing Survey, will be required to move out without any allowance or re-housing.

2. In cases where the property is occupied for domestic and non-domestic uses simultaneously, the URA will determine whether the tenancy is domestic or non-domestic in accordance with the provisions of the Landlord and Tenant (Consolidation) Ordinance.

3. If tenants (domestic or non-domestic) refuse to accept ex-gratia allowance or re-housing offer or execute surrender documents, the URA will recover vacant possession of their properties in accordance with the laws.

4. Domestic tenants whose tenancy commenced before the date of Freezing Survey and who was requested by their landlord to move out from the affected properties due to the expiry or termination of their tenancies before the URA acquired the affected properties successfully and who are unable to receive the ex-gratia allowances according to Part (B)(I) (the "affected domestic tenants") can apply for the URA's "Domestic Tenant Compassionate Assistance Programme" ("DTCAP"). The affected domestic tenants should submit application to the URA with tenancy agreement, rent receipts, termination notice served by the landlord to the affected domestic tenants and residential proof etc., at least 1 month before moving out from the affected properties, to facilitate the URA to conduct initial assessment on their eligibility of receiving Special Ex-gratia Allowance or Special Re-housing. Amount of the Special Ex-gratia Allowance is equal to the ex-gratia allowance described in Paragraph 2 and Paragraph 3 of Part (B)(I) above.

5. To become eligible for DTCAP, the affected domestic tenants should fulfill the following eligibility criteria:

   (i) they have been genuinely residing with valid tenancy in the affected properties continuously before and since the date of Freezing Survey and have been genuinely residing in the affected properties for at least 6 months continuously before moving out from the affected properties; and
   (ii) they do not have alternative accommodation elsewhere before and since the date of Freezing Survey until their moving out from the affected properties; and
   (iii) they are required to leave the affected properties not because of their breach of tenancy on their part; and
   (iv) after the expiry of their tenancies, they have not refused to renew their tenancies due to unreasonable grounds and circumstances; and
   (v) they have not received any compensation or other payment from their landlords for vacating the affected properties; and
   (vi) they are legal Hong Kong residents holding valid HKIC; and
   (vii) their landlords have not served the termination notice to them before the date of Freezing Survey; and
   (viii) they have registered on the Application for PRH of the HKHA; and

(ix) if Special Re-housing is to be offered, they have to fulfill the eligibility criteria of PRH laid down by the HKHA and/or HKHS or of URA re-housing.

Tenants who moved in on or after the date of Freezing Survey are not eligible for DTCAP.

6. If the affected domestic tenants are eligible for DTCAP, the URA will pay Special Ex-gratia Removal Allowance in advance. The amount is equal to the ex-gratia removal allowance as described in Paragraph 1 of Part (A)(III) above. The pre-paid amount will be deducted from the future payment of Special Ex-gratia Allowance.

After completion of the acquisition or government resumption of the affected properties, the URA will assess the eligibility of the affected domestic tenants in receiving the Special Ex-gratia Allowance or Special Re-housing.

7. Domestic tenants, who undergo the same situation as mentioned in Paragraph 4 of Part (D) above and are not eligible for DTCAP, can apply for the URA's Relocation Assistance. The affected domestic tenants must fulfill the eligibility criteria mentioned in items (i) to (vi) of Paragraph 5 of Part (D) above, and should submit application and provide sufficient evidence to the URA at least 1 month before moving out from the affected properties for URA's verification and assessment.

8. The URA will pay Relocation Assistance to the affected domestic tenants after they have moved out from the affected properties. Affected domestic tenants who have received Relocation Assistance are not eligible to apply for DTCAP described in Paragraph 4 of Part (D) above in the same project.

9. Domestic tenants who opt for receiving any ex-gratia allowance of a total amount more than 1 times the Government EGA (but excluding the 24 months' profit rent) or Relocation Assistance as described in Paragraph 7 of Part (D) above have to agree to give up their rights to public housing assistance for the next 2 years. Such tenants are only allowed to submit fresh applications for PRH and other public housing assistance after the expiry of the 2-years period.

10. Non-domestic tenant-operator (except tenants of industrial premises) whose tenancy commenced before the date of Freezing Survey and who was requested by their landlord to move out from the affected properties due to the expiry or termination of their tenancies before the URA acquired the affected properties successfully and moving out from the affected non-domestic properties after the date of Freezing Survey and who are unable to receive the ex-gratia allowances according to Part (B)(II) (the "affected non-domestic tenants") can apply for the URA's Special EGBA. The amount is equal to EGBA as described in Paragraph 2 of Part (B)(II) above. The affected non-domestic tenants should provide

sufficient evidence of business operation, including tenancy agreements, rental receipts, termination notice served by their landlord and other relevant documents, at least 1 month before moving out from the affected non-domestic properties, to facilitate the URA to conduct initial assessment on their eligibility of receiving Special EGBA.

11. To become eligible for Special EGBA, the affected non-domestic tenants should fulfill the following criteria:

    (i) they are operating in a legal premises; and
    (ii) they have commenced operating business in the affected properties with valid tenancy continuously before and since the date of Freezing Survey and have been in operation for at least 6 months continuously before moving out from the affected properties; and
    (iii) they are required to leave the affected properties not because of his/her breach of tenancy terms; and
    (iv) the tenancy is terminated or not renewed by the landlord and they have not terminated the tenancy early at their own will; and
    (v) they have received no compensation or other payment from their landlord for vacating the affected properties; and
    (vi) after the expiry of the tenancy, they have not refused to renew their tenancy due to unreasonable grounds and circumstances.

    After completion of the acquisition or government resumption of the affected properties, the URA will assess the eligibility of the affected non-domestic tenants in receiving the Special EGBA.

12. The URA has drawn to the attention of landlords whose properties had been tenanted out on the date of Freezing Survey that the URA will not consider making a higher offer to them to acquire their properties in the following situations: -

    (i) properties being left vacant; or
    (ii) landlords entering into new tenancies, whether with the existing tenants or new tenants; or
    (iii) landlords occupying their properties for their own use.

13. The URA would remind landlords / tenants that it is an offence for landlords to unlawfully deprive a tenant of occupation of property or to make an unwarranted demand with menaces with a view to gain for himself or others or to defraud against the URA. The URA will report to the enforcement authorities on all cases of suspected criminal offences.

14. The information contained in this leaflet applies to projects announced by the URA under the URAO only (i.e. not applicable to tenants of industrial premises). The URA reserves the right to adopt different policies and procedures for its other projects.

This leaflet is issued for the purpose of general reference only. The information contained herein is with reference to the principles and practice of the Urban Renewal Authority prevailing at the date of issue of this leaflet. It shall not constitute any representation on the part of the Urban Renewal Authority or give rise to any expectation whatsoever and shall not be relied on as such. Each case will be considered on its own merits having regard to all factors and circumstances. The terms of re-housing and/or ex-gratia allowance to be offered are subject to the principles and practice of the Urban Renewal Authority prevailing at the time the offer of re-housing and/or ex-gratia allowance is made and are subject to review from time to time as the Urban Renewal Authority shall at its absolute discretion consider appropriate. The Urban Renewal Authority's right to add to, amend or delete the whole or any part of this leaflet is hereby reserved.

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