METRO PLANNING COMMITTEE
OF THE TOWN PLANNING BOARD

MPC Paper No. 2/20
For Consideration by the
Metro Planning Committee on 29.5.2020

PROPOSED AMENDMENTS TO THE APPROVED CHAI WAN OUTLINE ZONING PLAN NO. S/H20/23

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1. Introduction

This paper is to seek Members' agreement that:

(a) the proposed amendments to the approved Chai Wan Outline Zoning Plan (OZP) No. S/H20/23 as shown on the draft OZP No. S/H20/23A (**Attachment II**) (to be renumbered as S/H20/24 upon exhibition) and its Notes (**Attachment III**) are suitable for exhibition for public inspection under section 5 of the Town Planning Ordinance (the Ordinance); and

(b) the revised Explanatory Statement (ES) of the OZP (**Attachment IV**) should be adopted as an expression of the planning intentions and objectives of the Town Planning Board (the Board) for various land use zonings of the OZP, and is suitable for exhibition together with the draft OZP and its Notes.

2. Status of the Current OZP

2.1 On 5.9.2017, the Chief Executive in Council (CE in C), under section 9(1)(a) of the Ordinance, approved the draft Chai Wan OZP. On 15.9.2017, the approved Chai Wan OZP No. S/H20/23 (**Attachment I**) was exhibited for public inspection under section 9(5) of the Ordinance.

2.2 On 7.1.2020, the CE in C agreed to refer the approved Chai Wan OZP to the Board for amendment under section 12(1)(b)(ii) of the Ordinance. The reference back of the OZP was notified in the Gazette on 17.1.2020 under section 12(2) of the Ordinance.

3. Proposed Amendments to the OZP

3.1 The proposed amendments are mainly related to:

(a) rezoning of a site at the junction of Sun Yip Street and Siu Sai Wan Road for the development of a composite building with ambulance depot and departmental quarters (DQ) for the Fire Services Department (FSD); and

(b) rezoning of a site at Cheung Man Road for public housing development by the Hong Kong Housing Authority (HKHA).

3.2 Opportunity is also taken to revise the Notes to incorporate the latest revision of the Master Schedule of Notes to Statutory Plans (MSN).

4. **Amendment Item A – Proposed Ambulance Depot and DQ at the Junction of Sun Yip Street and Siu Sai Wan Road, Siu Sai Wan (Plans 1 to 5)**

Background

4.1 The site (about 2,356m^2), located at the junction of Sun Yip Street and Siu Sai Wan Road, falls within an area zoned "Government, Institution or Community" ("G/IC") on the OZP. It is a piece of government land currently occupied by the Highways Department (HyD) as works area under temporary government land allocation (**Plan 2**).

4.2 In the 2014 Policy Address, the Government announced its policy to expedite DQ projects for disciplined services departments. In response to the Government's policy, the site, which had been reserved for an ambulance depot, was proposed to be jointly used for development of an ambulance depot and DQ for FSD.

4.3 On 28.7.2017, the Metro Planning Committee (the Committee) of the Board partially agreed to a section 12A application (No. Y/H20/4)[1] submitted by FSD to rezone the site from "Government, Institution or Community" ("G/IC") to "G/IC(4)" with stipulation of a maximum building height restriction (BHR) of 100mPD to facilitate the proposed composite development of ambulance depot and DQ. An extract of the relevant meeting minutes is at **Attachment V**.

4.4 According to the indicative scheme submitted by FSD, the proposed development comprises a 31-storey composite building with 4 storeys of ambulance depot on the lower floors and 27 storeys of DQ above. Photomontages of the indicative scheme are at **Attachment Va**. The proposed ambulance depot will have a 4-bay appliance room, a drill yard and other ancillary facilities such as offices, barracks and stores. The main development parameters of the indicative scheme are summarized as follows:

Site Area	2,730 m^2 (about) - "G/IC": 2,356 m^2 - "O": 374 m^2 (to be kept as a planting strip)
Total Gross Floor Area (GFA)	18,000 m^2 (about) - domestic: 15,500 m^2 - non-domestic: 2,500 m^2
Plot Ratio (PR) *	7.6 (about) - domestic: 6.57 - non-domestic: 1.06
Building Height (BH)	Not exceeding 100mPD
No. of Storeys	31 - ambulance depot: 4 - departmental quarters: 27
No. of Department Quarters	243 (about)
Design Population #	729 (about)
Site Coverage (SC) *	38%
Ambulance Depot	An ambulance depot with a 4-bay appliance room

1 The application covered a larger site mainly zoned "G/IC" with a minor portion zoned "Open Space" ("O") on the OZP. While a strip of land zoned "O" was included in the application, no zoning amendment was proposed for the "O" portion which was proposed to be kept as a non-building landscaped area. The current proposed amendment to the OZP covers only the "G/IC" portion of the application site.

Ancillary Parking Facilities	
- Private Car Parking Spaces	20
- Motorcycle Parking Spaces	2
- Loading/Unloading Bay	1

* PR and SC are calculated based on the area of the "G/IC" zone of about 2,356m^2
# Design population is based on a Person-Per-Flat ratio of 3.0

4.5 The Committee considered that the proposed development was compatible with its surroundings and noted that the technical assessments submitted, including Traffic Impact Assessment (TIA), Visual Impact Assessment, Air Ventilation Assessment – Initial Study (AVA-IS), etc., were accepted by the relevant government departments.

4.6 To take forward the decision of the Committee on the s.12A application, it is proposed to rezone the site from "G/IC" to "G/IC(4)" with stipulation of a maximum BHR of 100mPD, to add 'Flat (Government Staff Quarters only) (for "G/IC(4)" only)' under Column 1 of the Notes of the "G/IC" zone, and to replace 'Flat' with 'Flat (not elsewhere specified)' under Column 2 of the Notes.

5. Amendment Items B1 and B2 – Proposed Public Housing Development at Cheung Man Road, Chai Wan (Plans 6 to 12b)

Background

5.1 According to the 2013 Policy Address, the Government would adopt a multi-pronged approach to build up land reserve with a view to meeting housing and other development needs. It was reaffirmed in the 2014 Policy Address that the Government would continue to review various land uses and rezone sites as appropriate for residential use.

5.2 Upon a land use review and subsequent confirmation with relevant departments on its technical feasibility, a site at Cheung Man Road has been identified for public housing development by HKHA to meet the pressing housing need.

The Site and its Surroundings

5.3 The site (about 0.49 ha) is located at Cheung Man Road near Chai Wan Park in the western core area of Chai Wan. The site currently falls largely within the "Green Belt" ("GB") zone with a minor portion within an area shown as 'Road' on the OZP (**Plan 7**). It is a piece of vacant government land situated on a vegetated slope and is currently fenced off.

5.4 The site is located in a mixed land-use area comprising of open space, Government, institution and community (GIC), industrial, commercial and residential developments (**Plan 7**). The French International School, Chong Gene Hang College and Meng Tak Catholic School, with BH ranging from 35mPD to 80mPD, are located to the north of the site. To the northeast and east/southeast of the site is Cheung Man Road Rest Garden and Chai Wan Park respectively. To the southwest of the site is a cluster of industrial/commercial buildings with BH ranging from 40mPD to 149mPD. Residential developments, namely Greenwood Terrace and Neptune Terrace, with BH ranging from 102mPD to 136mPD are located further to the west and northwest of the site.

The Development Proposal

5.5 The conceptual scheme for the proposed public housing development as prepared by the Housing Department (HD) is shown in **Attachment VI**. The main development parameters of the proposal are summarized as follows:

Site Area	0.49ha (about)
Domestic PR	8
BH	Not exceeding 135mPD
No. of Units	850 (about)
Design Population	2,380 (about)
Ancillary Parking Facilities - Private Car Parking Spaces - Motorcycle Parking Spaces - Loading/Unloading Bay	 65 8 1
Open Space	To be provided in accordance with the Hong Kong Planning Standards and Guidelines (HKPSG) requirement.
Other Facilities	A 60-place Day Care Centre for the Elderly with 3 ancillary public light bus parking spaces, subject to detailed design and liaison with relevant departments.

5.6 The conceptual scheme is preliminary in nature and may be subject to refinements at detailed design stage. The proposed public housing development will be guided by administrative planning brief prepared by HD in consultation with the relevant bureaux/departments, which would set out planning parameters, design requirements, provision of GIC, local open space, recreational, social welfare and parking facilities, as well as any further technical assessment to be conducted for the proposed development.

Land Use and Development Intensity

5.7 According to HD's conceptual scheme, a BHR of 135mPD is proposed for the public housing development. This has taken into account various site-specific considerations, including small site area with sloping terrain (site level at about 36mPD (**Plan 7**)), the need for setback from Cheung Man Road for road widening and air ventilation purposes (**Plan 12a**), specific building design, layout and disposition requirements for mitigating noise impact from nearby industrial developments and the need to optimize land resources.

5.8 As mentioned in paragraph 5.4 above, the site is located in a mixed land-use area. The proposed public housing development is considered generally compatible with the surrounding GIC and residential developments along Cheung Man Road. While the BHs of the surrounding developments are about 40mPD to 149mPD at the Chai Wan Town Centre, the current BHRs as stipulated on the OZP for these developments and those further inland towards the western hillside are 120mPD and 140mPD respectively. The proposed BHR of 135mPD is considered not incompatible with the planned BH profile.

5.9 To take forward the proposed public housing development, it is proposed to rezone the site from "GB" and an area shown as 'Road' to "R(A)" subject to BHR of 135mPD (**Amendment Item B1**).

Technical Assessments

5.10 To ascertain the technical feasibility of the proposed public housing development, HD has conducted Visual Appraisal (VA), AVA-IS, Landscape Assessment, TIA and Quantitative Risk Assessment (QRA). These assessments have demonstrated that the proposed development would not cause insurmountable problems on visual, air ventilation, landscape, traffic and risk aspects. The major findings of these assessments are summarized in the following paragraphs.

Visual Aspect

5.11 The site adjoins a cluster of industrial/commercial buildings which is zoned "OU(B)" with a BHR of 120mPD on the OZP. According to the VA (**Attachment VII**), the proposed public housing development with BH of 135mPD would integrate with the existing built environment as a cluster and would not cause significant visual incompatibility when viewed from a longer distance (**Plans 11b to 11e**). The visual impact would, however, be moderately adverse when viewed from a shorter distance (**Plans 11a and 11f**). Appropriate and careful mitigation measures, including terraced podium design, responsive building disposition and orientation, façade treatment with harmonious colour scheme, and at-grade and vertical greening, would be explored at detailed design stage to soften the visual impact.

Air Ventilation Aspect

5.12 Several building design features were adopted in the conceptual scheme (i.e. the proposed scheme) to enhance its wind performance including stepped podium design that makes use of the sloping profile of the site, empty bays at podium level and tower setback from Cheung Man Road. According to the AVA-IS (**Attachment VIII**), better annual Local Spatial Average Wind Velocity Ratio (LVR) and Site Spatial Average Wind Velocity Ratio (SVR) are achieved by the proposed scheme when compared with the base scheme (i.e. existing scenario). Decreased summer SVR is found under the proposed scheme when compared with base scheme while summer LVR are the same. No significant impact is anticipated to the surrounding pedestrian wind environment due to the proposed scheme.

Traffic Aspect

5.13 According to the TIA (**Attachment IX**), all critical junctions will operate at their ample capacities in design year 2031 for construction phase and in design year 2034 for operation phase with the proposed junction improvement measures implemented, including modification to the method of control for the junctions of Chai Wan Road/Tai Tam Road and Chai Wan Road/Lok Man Road, and adjustment to the pedestrian green time at the junction of Chai Wan Road/Hong Man Street. Road widening works are also proposed at Cheung Man Road near the proposed public housing site in order to allow sufficient turning space for heavy-duty vehicles (**Plan 12a**).

5.14 In terms of pedestrian accessibility, the existing staircase along the south-western boundary of the site serves as the main pedestrian connection between the site and Chai Wan MTR Station which is within a walking distance of about 200m. According to the pedestrian assessment, the existing staircase will be operating with ample spare capacity in the operation phase and is considered sufficient for the proposed development.

5.15 To improve the overall pedestrian accessibility of the area along Cheung Man Road, and to provide better walking environment and barrier-free access for the elderly and disabled, a 24-hour publicly accessible pedestrian footbridge between Cheung Man Road and Chai Wan MTR Station is proposed to be constructed (**Plan 12b**). The walking distance to/from the MTR station is expected to be greatly minimized with a more direct pedestrian connection and it is anticipated that pedestrian trips to/from the proposed public housing development and existing developments along Cheung Man Road would be diverted to the proposed footbridge.

Landscape Aspect

5.16 According to the preliminary tree survey (**Attachment X**), there are about 429 nos. and 38 nos. of trees of common species respectively within the site and the area affected by the proposed footbridge mentioned in paragraph 5.15 above. No Old and Valuable Tree or flora of important conservation value were identified. The major landscape impacts identified include the removal of existing vegetation, construction activities during construction phase and new building structures during operation phase. While all the trees within the site are proposed to be felled for the proposed housing development, mitigation measures such as temporary green installations and green hoardings with vertical greening and amenity planting would be implemented during construction phase, and strategic landscape design and provision of open space would be implemented during operation phase. The loss of trees will also be compensated in a ratio of 1:1 in accordance with the latest Development Bureau Technical Circular (Works) on Tree Preservation as far as possible.

Quantitative Risk Aspect

5.17 As there is a liquefied petroleum gas (LPG) storage facility near Greenwood Terrace, which is about 60m to the west of the site (**Plan 7**), a QRA has been conducted to assess the increase of risk due to the proposed public housing development (**Attachment XI**). According to the QRA, the individual risk complied with the guidelines and the societal risk would not be significantly affected as the additional risk associated with the proposed development is insignificant.

Environmental and Infrastructural Aspects

5.18 Noting that the proposed public housing development is not polluting in nature and is not incompatible with the surrounding environment, the Director of Environmental Protection (DEP) considered that there is no insurmountable environmental problem. In order to address the potential environmental impacts that may arise from both construction and operation phases of the proposed development, Preliminary Environmental Review and Environmental Assessment Study would be carried out by the Civil Engineering and Development Department (CEDD) and HD following the established mechanism for the agreement of relevant departments at the detailed design stage. Water Supply Impact Assessment would also be carried out by CEDD at that stage.

5.19 Other relevant government departments, including the Commissioner for Transport, Director of Electrical and Mechanical Services, Chief Town Planner/Urban Design and Landscape, Planning Department, the Chief Engineer/Construction, Water Supplies Department, Chief Engineer/Hong Kong & Islands, Drainage Services Department, and Head of Geotechnical Engineering Office, CEDD, have no in-principle objection to or no adverse comment on the proposed amendments from traffic, risk assessment, visual, air ventilation and landscape, water supply, drainage and sewerage, and geotechnical perspectives.

Other Related Amendment

5.20 Two residual strips of land within the “GB” zone (about 638 m^2) resulting from the proposed amendment in relation to Amendment Item B1 above are proposed to be designated as areas shown as ‘Road’ to reflect the existing pedestrian staircase/passageway connecting Cheung Man Road and Chai Wan MTR Station and the proposed road widening works at Cheung Man Road near the proposed public housing development (**Amendment Item B2**).

6. Provision of GIC Facilities and Open Space

6.1 Taking into account the proposed developments, the planned population of the Planning Scheme Area is estimated to be about 168,962 persons. Based on the requirements in HKPSG and the planned population, as shown in **Attachment XII**, the planned provision for open space and various community facilities is generally sufficient except that there will be shortfall in primary school classrooms, child care centres, and centre-based Day Care Centres/Units for the Elderly and Residential Care Homes for the Elderly (RCHE).

6.2 The shortfall of primary school classrooms in the area can be catered by the surplus of primary school classrooms in the surrounding area, in particular the Shau Kei Wan area which is within the same school net. As for the child care centres and centre-based Day Care Centres/Units for the Elderly and RCHE, the HKPSG requirements for these facilities, which were reintroduced recently, are long-term goals and the actual provision would be subject to the consideration of the Social Welfare Department (SWD) in the planning and development process as appropriate. A 60-place Day Care Centre for the Elderly will be provided at the proposed public housing development at Cheung Man Road to serve the locals, subject to further liaison with SWD.

7. Proposed Amendments to Matters shown on the OZP

The proposed amendments as shown on the draft Chai Wan OZP No. S/H20/23A (**Attachment II**) are as follows:

Amendment Item A (about 2,356 m^2)

(a) Rezoning of a site at the junction of Sun Yip Street and Siu Sai Wan Road from “G/IC” to “G/IC(4)” with the stipulation of a maximum BH of 100mPD.

Amendment Item B1 (about 0.49 ha)

(b) Rezoning of a site at Cheung Man Road from “GB” and an area shown as ‘Road’ to “R(A)” with the stipulation of a maximum BH of 135mPD.

Amendment Item B2 (about 638 m²)

(c) Rezoning of two strips of land near Cheung Man Road from "GB" to areas shown as 'Road'.

8. Proposed Amendments to the Notes of the OZP

8.1 Amendments to the Notes of the OZP are proposed as follows:

(a) in relation to Amendment Item A above, 'Flat (Government Staff Quarter) (for "G/IC(4)" only)' is proposed to be added under Column 1 of the Notes of the "G/IC" zone, and 'Flat' under Column 2 is proposed to be replaced with 'Flat (not elsewhere specified)';

(b) on 11.1.2019, the Board promulgated a revised set of MSN to Statutory Plans. Under the revised MSN, 'Market' use is being subsumed under 'Shop and Services' use. To effectuate such changes, updates have been made to the Notes of "Comprehensive Development Area", "R(A)", "G/IC" and "Other Specified Uses" annotated "Mass Transit Railway Comprehensive Development Area" zones; and

(c) amendments to the planning intention of "Industrial" zone to accord with the latest MSN to Statutory Plans.

8.2 The proposed amendments to the Notes of the OZP (with additions in ***bold and italics*** and deletions in '~~crossed out~~') are at **Attachment III** for Members' consideration.

9. Revision to the Explanatory Statement of the OZP

The ES of the OZP has been revised to take into account the proposed amendments as mentioned in the above paragraphs. Opportunity has also been taken to update the general information for various land use zones to reflect the latest status and planning circumstances of the OZP. The proposed amendments to the ES of the OZP (with additions in ***bold and italics*** and deletions in '~~crossed out~~') are at **Attachment IV** for Members' consideration.

10. Plan Number

Upon exhibition for public inspection, the OZP will be renumbered as S/H20/24.

11. Consultation

Departmental Circulation

11.1 The proposed amendments have been circulated to the relevant Government departments for comments. Comments from relevant bureaux/departments have been incorporated into the above paragraphs, where appropriate. The following bureaux/departments have no objection to/no adverse comment on the proposed amendments:

- Secretary for Development;
- Secretary for Education;
- District Lands Officer/Hong Kong East, Lands Department;
- Chief Building Surveyor/Hong Kong East & Heritage, Buildings Department;
- Chief Highway Engineer/Hong Kong, HyD;
- Chief Architect/Central Management Division 2, Architectural Services Department;
- Project Manager/South, CEDD;
- Director of Leisure and Cultural Services;
- Director of Food and Environmental Hygiene;
- Director of Social Welfare;
- Director of Agriculture, Fisheries and Conservation;
- Executive Secretary (Antiquities & Monuments), Antiquities and Monuments Office;
- Director of Fire Services;
- Commissioner of Police;
- District Officer (Eastern), Home Affairs Department;
- Government Property Administrator; and
- Director of Health.

Public Consultation

11.2 On 24.4.2020, the Planning, Works and Housing Committee (PWHC) of the Eastern District Council (EDC) was consulted on the proposed OZP amendments. PWHC in general supported the proposed amendments. A few EDC members considered that HD should ensure an appropriate flat mix for the new public housing development to meet the housing needs of small and large families, review the provision of day care centre for the elderly at the site given its accessibility, and consider providing retail facilities in the proposed development.

11.3 If the proposed amendments are agreed by the Committee, the draft OZP (to be renumbered to S/H20/24 upon exhibition) and its Notes will be exhibited under section 5 of the Ordinance. Members of the public can submit representations on the OZP amendments to the Board during the two-month statutory public inspection period.

12. Decision Sought

Members are invited to:

(a) agree to the proposed amendments to the approved Chai Wan OZP No. S/H20/23 and that the draft Chai Wan OZP No. S/H20/23A at **Attachment II** (to be renumbered to S/H20/24 upon exhibition) and its Notes at **Attachment III** are suitable for exhibition under section 5 of the Ordinance; and

(b) adopt the revised ES for the draft Chai Wan OZP No. S/H20/23A at **Attachment IV** an expression of the planning intentions and objectives of the Board for various land use zonings of the OZP and the revised ES will be published together with the OZP.

13. Attachments

Attachment I	Approved Chai Wan OZP No. S/H20/23 (Reduced Size)
Attachment II	Draft Chai Wan OZP No. S/H20/23A
Attachment III	Revised Notes of Draft Chai Wan OZP No. S/H20/23A
Attachment IV	Revised ES of Draft Chai Wan OZP No. S/H20/23A
Attachment V	Extract of minutes of the MPC meeting held on 28.7.2017
Attachment Va	Photomontages submitted by the applicant of application No. Y/H20/4
Attachment VI	Preliminary Concept Layout and Sectional Plans for Amendment Item B1
Attachment VII	VA for Amendment Item B1
Attachment VIII	AVA-IS for Amendment Item B1
Attachment IX	TIA for Amendment Item B1
Attachment X	Landscape Assessment for Amendment Item B1
Attachment XI	QRA for Amendment Item B1
Attachment XII	Provision of Major Community Facilities and Open Space in Chai Wan

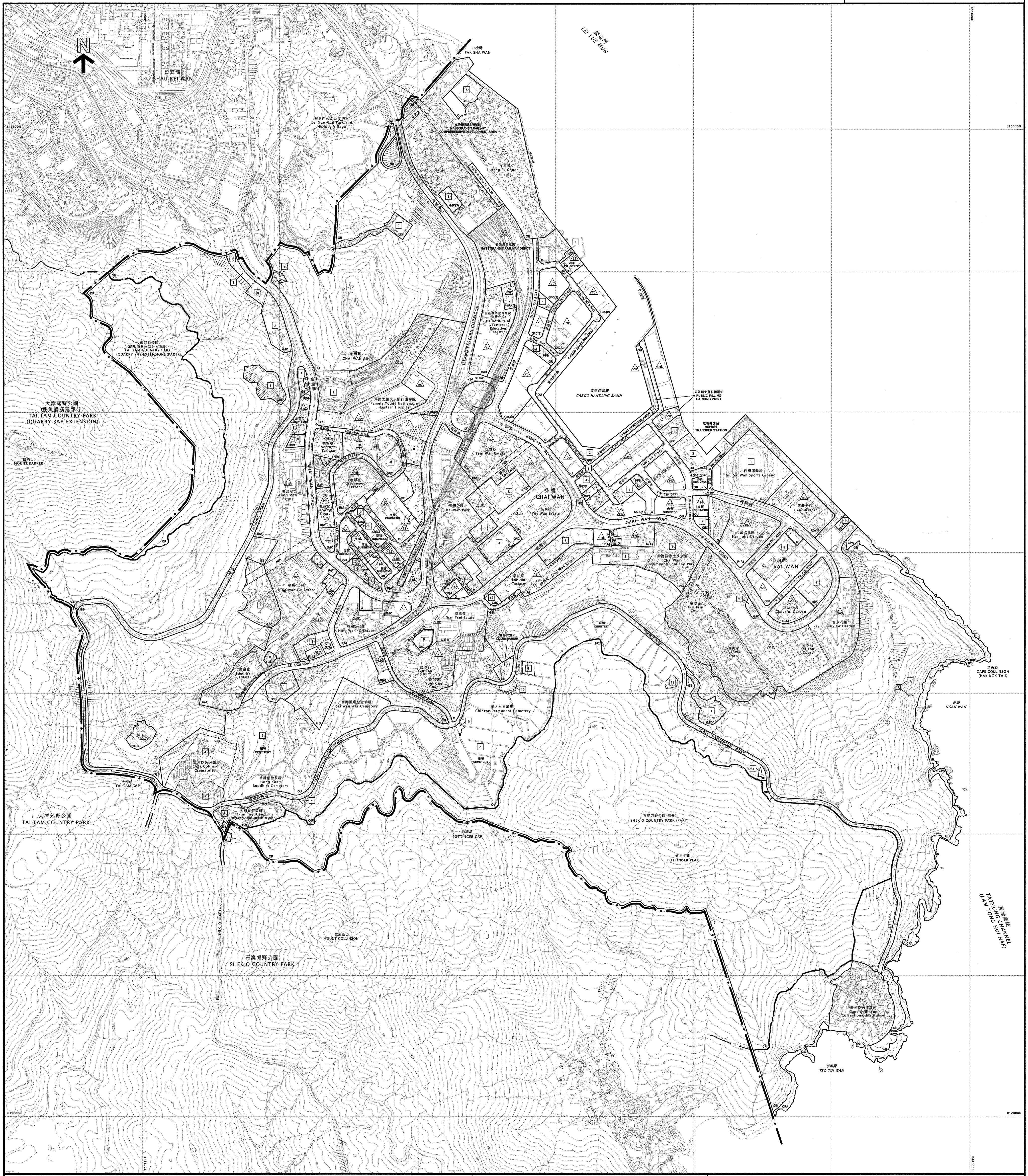
<u>Amendment Item A</u>

Plan 1	Comparison of Existing and Proposed Zonings
Plans 2 to 5	Site Plan, Aerial Photo and Site Photos

<u>Amendment Items B1 and B2</u>

Plan 6	Comparison of Existing and Proposed Zonings
Plans 7 to 10	Site Plan, Aerial Photo and Site Photos
Plans 11a to 11f	Photomontages
Plans 12a and 12b	Proposed Road Improvement and Pedestrian Footbridge

PLANNING DEPARTMENT
MAY 2020



圖例
NOTATION

ZONES		地帶
COMPREHENSIVE DEVELOPMENT AREA	CDA	綜合發展區
RESIDENTIAL (GROUP A)	R(A)	住宅（甲類）
INDUSTRIAL	I	工業
GOVERNMENT, INSTITUTION OR COMMUNITY	G/IC	政府、機構或社區
OPEN SPACE	O	休憩用地
OTHER SPECIFIED USES	OU	其他指定用途
GREEN BELT	GB	綠化地帶
COASTAL PROTECTION AREA	CPA	海岸保護區
COUNTRY PARK	CP	郊野公園

COMMUNICATIONS		交通
RAILWAY AND STATION	車站 STATION	鐵路及車站
RAILWAY AND STATION (UNDERGROUND)	車站 STATION	鐵路及車站（地下）
RAILWAY AND STATION (ELEVATED)	車站 STATION	鐵路及車站（高架）
MAJOR ROAD AND JUNCTION		主要道路及路口
ELEVATED ROAD		高架道路

MISCELLANEOUS		其他
BOUNDARY OF PLANNING SCHEME		規劃範圍界線
BOUNDARY OF COUNTRY PARK		郊野公園界線
BUILDING HEIGHT CONTROL ZONE BOUNDARY		建築物高度管制區界線
MAXIMUM BUILDING HEIGHT (IN METRES ABOVE PRINCIPAL DATUM)	120	最高建築物高度（在主水平基準上若干米）
MAXIMUM BUILDING HEIGHT (IN NUMBER OF STOREYS)	8	最高建築物高度（樓層數目）
PETROL FILLING STATION	P F S	加油站
NON-BUILDING AREA	NBA	非建築用地

土地用途及面積一覽表
SCHEDULE OF USES AND AREAS

USES	大約面積及百分率 APPROXIMATE AREA & %		用途
	公頃 HECTARES	% 百分率	
COMPREHENSIVE DEVELOPMENT AREA	1.37	0.22	綜合發展區
RESIDENTIAL (GROUP A)	72.88	11.88	住宅（甲類）
INDUSTRIAL	6.19	1.01	工業
GOVERNMENT, INSTITUTION OR COMMUNITY	70.58	11.50	政府、機構或社區
OPEN SPACE	20.98	3.42	休憩用地
OTHER SPECIFIED USES	88.15	14.37	其他指定用途
GREEN BELT	181.32	29.55	綠化地帶
COASTAL PROTECTION AREA	5.88	0.96	海岸保護區
COUNTRY PARK	115.43	18.81	郊野公園
MAJOR ROAD ETC.	50.77	8.28	主要道路等
TOTAL PLANNING SCHEME AREA	613.55	100.00	規劃範圍總面積

夾附的《註釋》屬這份圖則的一部分
THE ATTACHED NOTES ALSO FORM PART OF THIS PLAN

行政長官會同行政會議於２０１７年９月５日　根據城市規劃條例第９（１）（ａ）條核准的圖則
APPROVED BY THE CHIEF EXECUTIVE IN COUNCIL UNDER SECTION 9(1)(a) OF THE TOWN PLANNING ORDINANCE ON 5 SEPTEMBER 2017

Ms Kinnie WONG 黃潔怡女士
CLERK TO THE EXECUTIVE COUNCIL 行政會議秘書

香港城市規劃委員會依據城市規劃條例擬備的柴灣（港島規劃區第２０區）分區計劃大綱圖
TOWN PLANNING ORDINANCE, HONG KONG TOWN PLANNING BOARD
HONG KONG PLANNING AREA No. 20 - CHAI WAN - OUTLINE ZONING PLAN

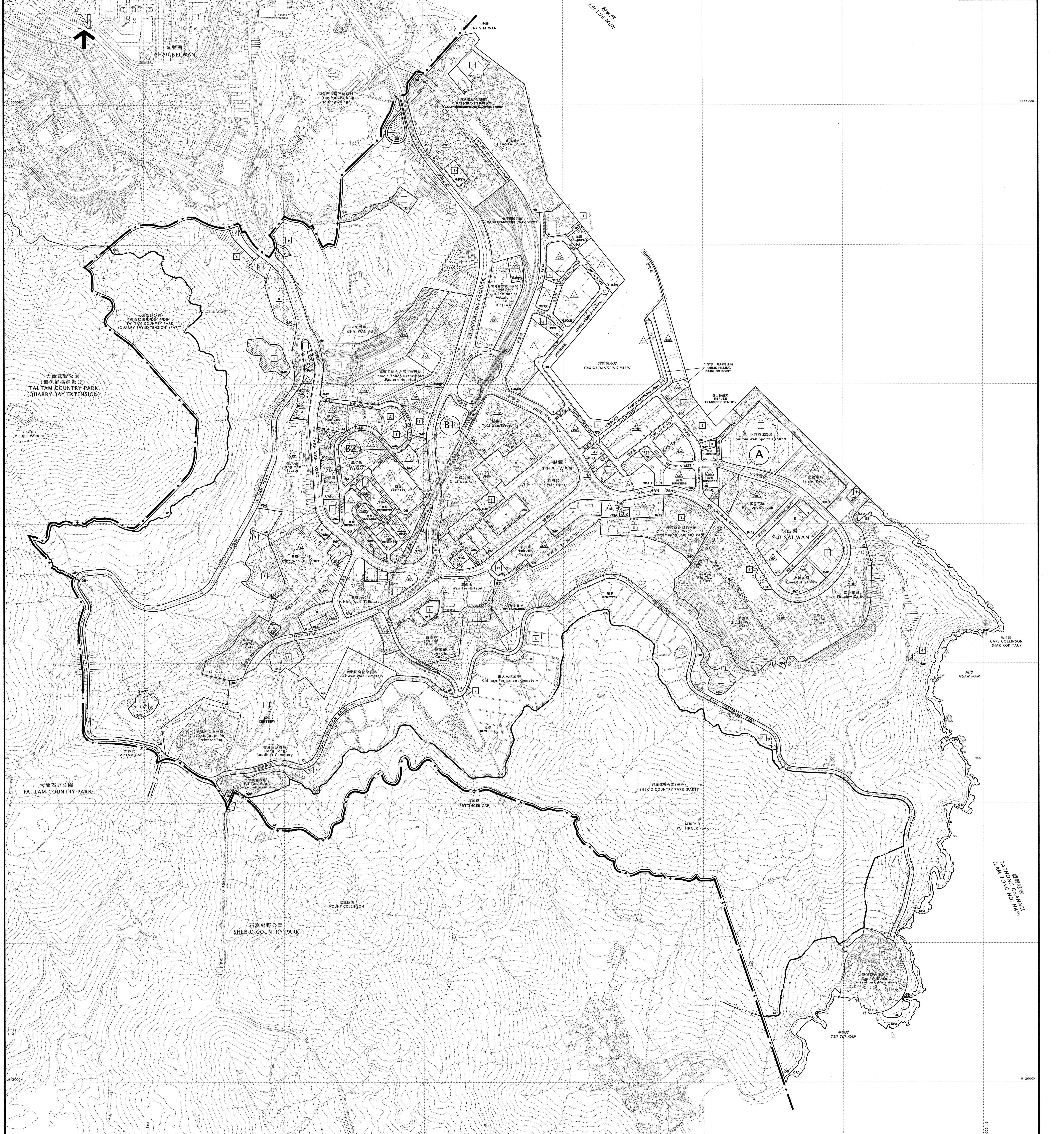
SCALE 1:5000 比例尺

米 METRES 100 0 200 400 600 800 METRES 米

規劃署遵照城市規劃委員會指示擬備
PREPARED BY THE PLANNING DEPARTMENT UNDER THE DIRECTION OF THE TOWN PLANNING BOARD

圖則編號
PLAN No. S/H20/23

Attachment II of
MPC Paper No. 2/20



圖例
NOTATION

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GOVERNMENT, INSTITUTION OR COMMUNITY	G/IC	政府、機構或社區
OPEN SPACE	O	休憩用地
OTHER SPECIFIED USES	OU	其他指定用途
GREEN BELT	GB	綠化地帶
COASTAL PROTECTION AREA	CPA	海岸保護區
COUNTRY PARK	CP	郊野公園

COMMUNICATIONS		交通
RAILWAY AND STATION	車站 STATION	鐵路及車站
RAILWAY AND STATION (UNDERGROUND)	車站 STATION	鐵路及車站（地下）
RAILWAY AND STATION (ELEVATED)	車站 STATION	鐵路及車站（高架）
MAJOR ROAD AND JUNCTION		主要道路及路口
ELEVATED ROAD		高架道路

MISCELLANEOUS		其他
BOUNDARY OF PLANNING SCHEME		規劃範圍界線
BOUNDARY OF COUNTRY PARK		郊野公園界線
BUILDING HEIGHT CONTROL ZONE BOUNDARY		建築物高度管制區界線
MAXIMUM BUILDING HEIGHT (IN METRES ABOVE PRINCIPAL DATUM)	120	最高建築物高度（在主水平基準上若干米）
MAXIMUM BUILDING HEIGHT (IN NUMBER OF STOREYS)	8	最高建築物高度（樓層數目）
PETROL FILLING STATION	P F S	加油站
NON-BUILDING AREA	NBA	非建築用地

土地用途及面積一覽表
SCHEDULE OF USES AND AREAS

USES	大約面積及百分率 APPROXIMATE AREA & %		用途
	公頃 HECTARES	% 百分率	
COMPREHENSIVE DEVELOPMENT AREA	1.37	0.22	綜合發展區
RESIDENTIAL (GROUP A)	73.38	11.96	住宅（甲類）
INDUSTRIAL	6.19	1.01	工業
GOVERNMENT, INSTITUTION OR COMMUNITY	70.58	11.50	政府、機構或社區
OPEN SPACE	20.98	3.42	休憩用地
OTHER SPECIFIED USES	88.15	14.37	其他指定用途
GREEN BELT	180.78	29.46	綠化地帶
COASTAL PROTECTION AREA	5.88	0.96	海岸保護區
COUNTRY PARK	115.43	18.81	郊野公園
MAJOR ROAD ETC.	50.81	8.29	主要道路等
TOTAL PLANNING SCHEME AREA	613.55	100.00	規劃範圍總面積

夾附的《註釋》屬這份圖則的一部分，
現經修訂並按照城市規劃條例第５條展示。
THE ATTACHED NOTES ALSO FORM PART OF THIS PLAN
AND HAVE BEEN AMENDED FOR EXHIBITION UNDER
SECTION 5 OF THE TOWN PLANNING ORDINANCE

核准圖編號 S/H20/23 的修訂
AMENDMENTS TO APPROVED PLAN No. S/H20/23

AMENDMENTS EXHIBITED UNDER SECTION 5 OF THE TOWN PLANNING ORDINANCE	按照城市規劃條例第５條展示的修訂
AMENDMENT ITEM A	修訂項目Ａ項
AMENDMENT ITEM B1	修訂項目Ｂ１項
AMENDMENT ITEM B2	修訂項目Ｂ２項

（參看附表）
(SEE ATTACHED SCHEDULE)

香港城市規劃委員會依據城市規劃條例擬備的柴灣（港島規劃區第２０區）分區計劃大綱圖
TOWN PLANNING ORDINANCE, HONG KONG TOWN PLANNING BOARD
HONG KONG PLANNING AREA No. 20 - CHAI WAN - OUTLINE ZONING PLAN

SCALE 1:5000 比例尺

米 METRES 100 0 200 400 600 800 METRES 米

規劃署遵照城市規劃委員會指示擬備
PREPARED BY THE PLANNING DEPARTMENT UNDER THE DIRECTION OF THE TOWN PLANNING BOARD

圖則編號 PLAN No. S/H20/23A

HONG KONG PLANNING AREA NO. 20

~~APPROVED~~ *DRAFT* CHAI WAN OUTLINE ZONING PLAN NO. S/H20/23*A*

(Being ~~an Approved~~ *Draft* Plan for the Purposes of the Town Planning Ordinance)

NOTES

(N. B. These form part of the Plan)

(1) These Notes show the uses or developments on land falling within the boundaries of the Plan which are always permitted and which may be permitted by the Town Planning Board, with or without conditions, on application. Where permission from the Town Planning Board for a use or development is required, the application for such permission should be made in a prescribed form. The application shall be addressed to the Secretary of the Town Planning Board, from whom the prescribed application form may be obtained.

(2) Any use or development which is always permitted or may be permitted in accordance with these Notes must also conform to any other relevant legislation, the conditions of the Government lease concerned, and any other Government requirements, as may be applicable.

(3) (a) No action is required to make the existing use of any land or building conform to this Plan until there is a material change of use or the building is redeveloped.

(b) Any material change of use or any other development (except minor alteration and/or modification to the development of the land or building in respect of the existing use which is always permitted) or redevelopment must be always permitted in terms of the Plan or, if permission is required, in accordance with the permission granted by the Town Planning Board.

(c) For the purposes of subparagraph (a) above, "existing use of any land or building" means -

(i) before the publication in the Gazette of the notice of the first statutory plan covering the land or building (hereafter referred as 'the first plan'),

- a use in existence before the publication of the first plan which has continued since it came into existence; or
- a use or a change of use approved under the Buildings Ordinance which relates to an existing building; and

(ii) after the publication of the first plan,

- a use permitted under a plan which was effected during the effective period of that plan and has continued since it was effected; or
- a use or a change of use approved under the Buildings Ordinance which relates to an existing building and permitted under a plan prevailing at the time when the use or change of use was approved.

(4) Except as otherwise specified by the Town Planning Board, when a use or material change of use is effected or a development or redevelopment is undertaken, as always permitted in terms of the Plan or in accordance with a permission granted by the Town Planning Board, all permissions granted by the Town Planning Board in respect of the site of the use or material change of use or development or redevelopment shall lapse.

(5) Road junctions, alignments of roads and railway tracks, and boundaries between zones may be subject to minor adjustments as detailed planning proceeds.

(6) Temporary uses (expected to be 5 years or less) of any land or building are always permitted as long as they comply with any other relevant legislation, the conditions of the Government lease concerned, and any other Government requirements, and there is no need for these to conform to the zoned use or these Notes. For temporary uses expected to be over 5 years, the uses must conform to the zoned use or these Notes.

(7) The following uses or developments are always permitted on land falling within the boundaries of the Plan except (a) where the uses or developments are specified in Column 2 of the Notes of individual zones or (b) as provided in paragraph (8) in relation to areas zoned "Coastal Protection Area":

(a) provision, maintenance or repair of plant nursery, amenity planting, open space, rain shelter, refreshment kiosk, road, bus/public light bus stop or lay-by, cycle track, Mass Transit Railway station entrance, Mass Transit Railway structure below ground level, taxi rank, nullah, public utility pipeline, electricity mast, lamp pole, telephone booth, telecommunications radio base station, automatic teller machine and shrine;

(b) geotechnical works, local public works, road works, sewerage works, drainage works, environmental improvement works, marine related facilities, waterworks (excluding works on service reservoir) and such other public works co-ordinated or implemented by Government; and

(c) maintenance or repair of watercourse and grave.

(8) In areas zoned "Coastal Protection Area",

(a) the following uses or developments are always permitted:

(i) maintenance or repair of plant nursery, amenity planting, sitting out area, rain shelter, refreshment kiosk, road, watercourse, nullah, public utility pipeline, electricity mast, lamp pole, telephone booth, shrine and grave; and

(ii) geotechnical works, local public works, road works, sewerage works, drainage works, environmental improvement works, marine related facilities, waterworks (excluding works on service reservoir) and such other public works co-ordinated or implemented by Government; and

(b) the following uses or developments require permission from the Town Planning Board:

provision of plant nursery, amenity planting, sitting out area, rain shelter, refreshment kiosk, footpath, public utility pipeline, electricity mast, lamp pole, telephone booth and shrine.

(9) In any area shown as 'Road', all uses or developments except those specified in paragraph (7) above and those specified below require permission from the Town Planning Board:

on-street vehicle park, railway track.

(10) Unless otherwise specified, all building, engineering and other operations incidental to and all uses directly related and ancillary to the permitted uses and developments within the same zone are always permitted and no separate permission is required.

(11) In these Notes, "existing building" means a building, including a structure, which is physically existing and is in compliance with any relevant legislation and the conditions of the Government lease concerned.

HONG KONG PLANNING AREA NO. 20

~~APPROVED~~ *DRAFT* CHAI WAN OUTLINE ZONING PLAN NO. S/H20/23*A*

Schedule of Uses

COMPREHENSIVE DEVELOPMENT AREA

Column 1 Uses always permitted	Column 2 Uses that may be permitted with or without conditions on application to the Town Planning Board
	Ambulance Depot Commercial Bathhouse/Massage Establishment Eating Place Educational Institution Exhibition or Convention Hall Flat Government Refuse Collection Point Government Use (not elsewhere specified) Hospital Hotel House Information Technology and Telecommunications Industries Institutional Use (not elsewhere specified) Library ~~Market~~ Mass Transit Railway Vent Shaft and/or Other Structure above Ground Level other than Entrances Off-course Betting Centre Office Petrol Filling Station Place of Entertainment Place of Recreation, Sports or Culture Private Club Public Clinic Public Convenience Public Transport Terminus or Station Public Utility Installation Public Vehicle Park (excluding container vehicle) Recyclable Collection Centre Religious Institution Research, Design and Development Centre Residential Institution School Shop and Services Social Welfare Facility Training Centre Utility Installation for Private Project

Planning Intention

This zone is intended for comprehensive development/redevelopment of the area for residential and/or commercial uses with the provision of open space and other supporting facilities. The zoning is to facilitate appropriate planning control over the development mix, scale, design and layout of development, taking account of various environmental, traffic, infrastructure and other constraints.

(please see next page)

COMPREHENSIVE DEVELOPMENT AREA (cont'd)

Remarks

(1) Pursuant to section 4A(2) of the Town Planning Ordinance, and except as otherwise expressly provided that it is not required by the Town Planning Board, an applicant for permission for development on land designated "Comprehensive Development Area" or "Comprehensive Development Area (1)" shall prepare a Master Layout Plan for the approval of the Town Planning Board and include therein the following information :-

(i) the area of the proposed land uses, the nature, position, dimensions, and heights of all buildings to be erected in the area;

(ii) the proposed total site area and gross floor area for various uses, total number of flats and flat size, where applicable;

(iii) the details and extent of Government, institution or community (GIC) and recreational facilities, public transport and parking facilities, and open space to be provided within the area;

(iv) the alignment, widths and levels of any roads proposed to be constructed within the area;

(v) the landscape and urban design proposals within the area;

(vi) programmes of development in detail;

(vii) an environmental assessment report to examine any possible environmental problems that may be caused to or by the proposed development during and after construction and the proposed mitigation measures to tackle them;

(viii) a drainage and sewerage impact assessment report to examine any possible drainage and sewerage problems that may be caused by the proposed development and the proposed mitigation measures to tackle them;

(ix) a traffic impact assessment report to examine any possible traffic problems that may be caused by the proposed development and the proposed mitigation measures to tackle them;

(x) an air ventilation assessment report to examine any possible air ventilation problems that may be caused by the proposed development and the proposed mitigation measures to tackle them;

(xi) a visual impact assessment to examine any possible visual impacts that may be caused by the proposed development and the proposed mitigation measures to tackle them; and

(xii) such other information as may be required by the Town Planning Board.

(2) The Master Layout Plan should be supported by an explanatory statement which contains an adequate explanation of the development proposal, including such information as land tenure, relevant lease conditions, existing conditions of the site, the character of the site in relation to the surrounding areas, principles of layout design, major development parameters, design population, types of GIC facilities, and recreational and open space facilities.

(3) On land designated "Comprehensive Development Area", no new development, or addition, alteration and/or modification to or redevelopment of an existing building shall result in a total development and/or redevelopment in excess of the maximum building height, in terms of metres above Principal Datum, as stipulated on the Plan, or the height of the existing building, whichever is the greater. The provision for development/redevelopment to the height of the existing building is not applicable to part of the Chai Wan Flatted Factory site which is subject to a maximum building height of 21mPD, as stipulated on the Plan.

(please see next page)

COMPREHENSIVE DEVELOPMENT AREA (cont'd)

Remarks (cont'd)

(4) On land designated "Comprehensive Development Area (1)", no new development, or addition, alteration and/or modification to or redevelopment of an existing building shall result in a total development and/or redevelopment in excess of a maximum gross floor area of 86,268m^2 and the maximum building height, in terms of metres above Principal Datum, as stipulated on the Plan, or the gross floor area and the height of the existing building, whichever is the greater.

(5) In determining the maximum gross floor area for the purposes of paragraph (4) above, any floor space that is constructed or intended for use solely as car park, loading/unloading bay, plant room, caretaker's office and caretaker's quarters, or recreational facilities for the use and benefit of all the owners or occupiers of the domestic building or domestic part of the building, provided such uses and facilities are ancillary and directly related to the development or redevelopment, may be disregarded. Any floor space that is constructed or intended for use solely as public transport facilities, or GIC facilities, as required by the Government, may also be disregarded.

(6) Based on the individual merits of a development or redevelopment proposal, minor relaxation of the building height and gross floor area restrictions stated in paragraphs (3) and (4) above may be considered by the Town Planning Board on application under section 16 of the Town Planning Ordinance.

RESIDENTIAL (GROUP A)

Column 1 Uses always permitted	Column 2 Uses that may be permitted with or without conditions on application to the Town Planning Board
Ambulance Depot Flat Government Use (not elsewhere specified) House Library Market Place of Recreation, Sports or Culture Public Clinic Public Transport Terminus or Station (excluding open-air terminus or station) Residential Institution School (in free-standing purpose-designed building only) Social Welfare Facility Utility Installation for Private Project	Commercial Bathhouse/Massage Establishment Eating Place Educational Institution Exhibition or Convention Hall Government Refuse Collection Point Hospital Hotel Institutional Use (not elsewhere specified) Mass Transit Railway Vent Shaft and/or Other Structure above Ground Level other than Entrances Office Petrol Filling Station Place of Entertainment Private Club Public Convenience Public Transport Terminus or Station (not elsewhere specified) Public Utility Installation Public Vehicle Park (excluding container vehicle) Religious Institution School (not elsewhere specified) Shop and Services ***(not elsewhere specified)*** Training Centre

(please see next page)

RESIDENTIAL (GROUP A) (cont'd)

In addition, the following uses are always permitted (a) on the lowest three floors of a building, taken to include basements; or (b) in the purpose-designed non-residential portion of an existing building, both excluding floors containing wholly or mainly car parking, loading/unloading bays and/or plant room:

Eating Place
Educational Institution
Institutional Use (not elsewhere specified)
Off-course Betting Centre
Office
Place of Entertainment
Private Club
Public Convenience
Recyclable Collection Centre
School
Shop and Services
Training Centre

Planning Intention

This zone is intended primarily for high-density residential developments. Commercial uses are always permitted on the lowest three floors of a building or in the purpose-designed non-residential portion of an existing building.

Remarks

(1) On land designated "Residential (Group A)" ("R(A)"), no new development, or addition, alteration and/or modification to or redevelopment of an existing building shall result in a total development and/or redevelopment in excess of the maximum building height in terms of metres above Principal Datum, as stipulated on the Plan, or the height of the existing building, whichever is the greater.

(2) On land designated "R(A)1", no new development, or addition, alteration and/or modification to or redevelopment of an existing building shall result in a total development and/or redevelopment in excess of the maximum building height, in terms of metres above Principal Datum, as stipulated on the Plan.

(3) A minimum 30m wide non-building area to the south of Hing Man Estate shall be provided as stipulated on the Plan. In addition, a minimum 20m wide non-building area shall be provided within Tsui Wan Estate (covering part of Tsui Wan Street), and a minimum 10m wide non-building area shall be provided from the lot boundary of Greenwood Terrace fronting Hong Man Street as stipulated on the Plan.

(4) Based on the individual merits of a development or redevelopment proposal, minor relaxation of the building height restrictions stated in paragraphs (1) and (2) above may be considered by the Town Planning Board on application under section 16 of the Town Planning Ordinance.

(5) Under exceptional circumstances, for a development or redevelopment proposal, minor relaxation of the non-building area restrictions as stipulated on the Plan or stated in paragraph (3) above may be considered by the Town Planning Board on application under section 16 of the Town Planning Ordinance.

INDUSTRIAL

Column 1 Uses always permitted	Column 2 Uses that may be permitted with or without conditions on application to the Town Planning Board
Ambulance Depot Art Studio (excluding those involving direct provision of services or goods) Bus Depot Cargo Handling and Forwarding Facility (not elsewhere specified) Eating Place (Canteen, Cooked Food Centre only) Government Refuse Collection Point Government Use (not elsewhere specified) Industrial Use (not elsewhere specified) Information Technology and Telecommunications Industries Office (Audio-visual Recording Studio, Design and Media Production, Office Related to Industrial Use only) Public Convenience Public Transport Terminus or Station Public Utility Installation Public Vehicle Park (excluding container vehicle) Radar, Telecommunications Electronic Microwave Repeater, Television and/or Radio Transmitter Installation Recyclable Collection Centre Research, Design and Development Centre Shop and Services (Motor-vehicle Showroom on ground floor, Service Trades only) Utility Installation for Private Project Vehicle Repair Workshop Warehouse (excluding Dangerous Goods Godown)	Broadcasting, Television and/or Film Studio Cargo Handling and Forwarding Facility (Container Freight Station, free-standing purpose-designed Logistics Centre only) Concrete Batching Plant Container Vehicle Park/Container Vehicle Repair Yard Dangerous Goods Godown Eating Place (not elsewhere specified) (in wholesale conversion of an existing building only) Educational Institution (ground floor only except in wholesale conversion of an existing building) Exhibition or Convention Hall Industrial Use (Bleaching and Dyeing Factory, Electroplating/Printed Circuit Board Manufacture Factory, Metal Casting and Treatment Factory/Workshop only) Institutional Use (not elsewhere specified) (in wholesale conversion of an existing building only) Marine Fuelling Station Mass Transit Railway Vent Shaft and/or Other Structure above Ground Level other than Entrances Off-course Betting Centre Offensive Trades Office (not elsewhere specified) Open Storage Petrol Filling Station Pier Place of Entertainment (ground floor only except in wholesale conversion of an existing building) Place of Recreation, Sports or Culture (not elsewhere specified) Private Club Public Clinic (in wholesale conversion of an existing building only) Religious Institution (ground floor only except in wholesale conversion of an existing building) Ship-building, Ship-breaking and Ship-repairing Yard Shop and Services (not elsewhere specified) (ground floor only, except in wholesale conversion of an existing building and Ancillary Showroom# which may be permitted on any floor) Training Centre Vehicle Stripping/Breaking Yard Wholesale Trade

(please see next page)

INDUSTRIAL (cont'd)

In addition, the following uses are always permitted in the purpose-designed non-industrial portion on the lower floors (except basements and floors containing wholly or mainly car parking, loading/unloading bays and/or plant room) of an existing building, provided that the uses are separated from the industrial uses located above by a buffer floor or floors and no industrial uses are located within the non-industrial portion:	In addition, the following use may be permitted with or without conditions on application to the Town Planning Board in the purpose-designed non-industrial portion on the lower floors (except basements and floors containing wholly or mainly car parking, loading/unloading bays and/or plant room) of an existing building, provided that the use is separated from the industrial uses located above by a buffer floor or floors and no industrial uses are located within the non-industrial portion:
Eating Place Educational Institution Exhibition or Convention Hall Institutional Use (not elsewhere specified) Off-course Betting Centre Office Place of Entertainment Place of Recreation, Sports or Culture Private Club Public Clinic Religious Institution Shop and Services Training Centre	Social Welfare Facility (excluding those involving residential care)

\# Ancillary Showroom requiring planning permission refers to showroom use of greater than 20% of the total usable floor area of an industrial firm in the same premises or building.

Planning Intention

This zone is intended primarily for general industrial uses to ensure an adequate supply of industrial floor space to meet demand from production-oriented industries. Information technology and telecommunications industries, ~~and~~ office related to industrial use, ***and selected uses akin to industrial production and would not compromise building and fire safety*** are also always permitted in this zone.

Remarks

(1) On land designated "Industrial", no new development, or addition, alteration and/or modification to or redevelopment of an existing building shall result in a total development and/or redevelopment in excess of a maximum plot ratio of 12 and the maximum building height, in terms of metres above Principal Datum, as stipulated on the Plan, or the plot ratio and the height of the existing building, whichever is the greater.

(2) In determining the maximum plot ratio for the purpose of paragraph (1) above, any floor space that is constructed or intended for use solely as car park, loading/unloading bay, plant room and caretaker's office, provided such uses and facilities are ancillary and directly related to the development or redevelopment, may be disregarded.

(please see next page)

INDUSTRIAL (cont'd)

Remarks (cont'd)

(3) Where the permitted plot ratio as defined in Building (Planning) Regulations is permitted to be exceeded in circumstances as set out in Regulation 22(1) or (2) of the said Regulations, the plot ratio for the building on land to which paragraph (1) applies may be increased by the additional plot ratio by which the permitted plot ratio is permitted to be exceeded under and in accordance with the said Regulation 22(1) or (2), notwithstanding that the relevant maximum plot ratio specified in paragraph (1) above may thereby be exceeded.

(4) Based on the individual merits of a development or redevelopment proposal, minor relaxation of the building height and plot ratio restrictions stated in paragraph (1) above may be considered by the Town Planning Board on application under section 16 of the Town Planning Ordinance.

GOVERNMENT, INSTITUTION OR COMMUNITY

Column 1 Uses always permitted	Column 2 Uses that may be permitted with or without conditions on application to the Town Planning Board
Ambulance Depot Animal Quarantine Centre (in Government building only) Broadcasting, Television and/or Film Studio Cable Car Route and Terminal Building Eating Place (Canteen, Cooked Food Centre only) Educational Institution Exhibition or Convention Hall Field Study/Education/Visitor Centre ***Flat (Government Staff Quarters only) (for "G/IC(4)" only)*** Government Refuse Collection Point Government Use (not elsewhere specified) Hospital Institutional Use (not elsewhere specified) Library Market Mass Transit Railway Depot (for "G/IC(3)" only) Pier Place of Recreation, Sports or Culture Public Clinic Public Convenience Public Transport Terminus or Station Public Utility Installation Public Vehicle Park (excluding container vehicle) Recyclable Collection Centre Religious Institution Research, Design and Development Centre School Service Reservoir Social Welfare Facility Training Centre Wholesale Trade	Animal Boarding Establishment Animal Quarantine Centre (not elsewhere specified) Columbarium Correctional Institution Crematorium Driving School Eating Place (not elsewhere specified) Flat ***(not elsewhere specified)*** Funeral Facility Helicopter Landing Pad Helicopter Fuelling Station Holiday Camp Hotel House Marine Fuelling Station Mass Transit Railway Vent Shaft and/or Other Structure above Ground Level other than Entrances Off-course Betting Centre Office Petrol Filling Station Place of Entertainment Private Club Radar, Telecommunications Electronic Microwave Repeater, Television and/or Radio Transmitter Installation Refuse Disposal Installation (Refuse Transfer Station only) Residential Institution Sewage Treatment/Screening Plant Shop and Services ***(not elsewhere specified)*** Utility Installation for Private Project Zoo

Planning Intention

This zone is intended primarily for the provision of Government, institution or community facilities serving the needs of the local residents and/or a wider district, region or the territory. It is also intended to provide land for uses directly related to or in support of the work of the Government, organizations providing social services to meet community needs, and other institutional establishments.

(please see next page)

GOVERNMENT, INSTITUTION OR COMMUNITY (cont'd)

Remarks

(1) On land designated "Government, Institution or Community" ("G/IC") ***and "G/IC(4)"***, no new development, or addition, alteration and/or modification to or redevelopment of an existing building shall result in a total development and/or redevelopment in excess of the maximum building height, in terms of metres above Principal Datum or number of storeys, as stipulated on the Plan, or the height of the existing building, whichever is the greater.

(2) On land designated "G/IC(1)", no new development, or addition, alteration and/or modification to or redevelopment of an existing building shall result in a total development and/or redevelopment in excess of a maximum building height of 4 storeys, except a drill tower up to 9 storeys, or the height of the existing building, whichever is the greater.

(3) On land designated "G/IC(2)", no new development, or addition, alteration and/or modification to or redevelopment of an existing building shall result in a total development and/or redevelopment in excess of the maximum building height, in terms of metres above Principal Datum (including roof-top structures) as stipulated on the Plan, or the height of the existing building, whichever is the greater.

(4) On land designated "G/IC(3)", no new development, or addition, alteration and/or modification to or redevelopment of an existing building shall result in a total development and/or redevelopment in excess of a maximum building height of 8 storeys, excluding the Mass Transit Railway depot below, or the height of the existing building, whichever is the greater.

(5) A minimum 30m wide non-building area shall be provided to the north of the Sai Wan Service Reservoir as stipulated on the Plan.

(6) In determining the relevant maximum number of storey(s) for the purposes of paragraphs (1) and (2) above, any basement floor(s) may be disregarded.

(7) Based on the individual merits of a development or redevelopment proposal, minor relaxation of the building height restrictions stated in paragraphs (1) to (4) above may be considered by the Town Planning Board on application under section 16 of the Town Planning Ordinance.

(8) Under exceptional circumstances, for a development or redevelopment proposal, minor relaxation of the non-building area restriction as stipulated on the Plan or stated in paragraph (5) above may be considered by the Town Planning Board on application under section 16 of the Town Planning Ordinance.

OPEN SPACE

Column 1 Uses always permitted	Column 2 Uses that may be permitted with or without conditions on application to the Town Planning Board
Aviary Field Study/Education/Visitor Centre Park and Garden Pavilion Pedestrian Area Picnic Area Playground/Playing Field Promenade Public Convenience Sitting Out Area Zoo	Barbecue Spot Cable Car Route and Terminal Building Eating Place Government Refuse Collection Point Government Use (not elsewhere specified) Holiday Camp Mass Transit Railway Vent Shaft and/or Other Structure above Ground Level other than Entrances Pier Place of Entertainment Place of Recreation, Sports or Culture Private Club Public Transport Terminus or Station Public Utility Installation Public Vehicle Park (excluding container vehicle) Religious Institution Service Reservoir Shop and Services Tent Camping Ground Utility Installation for Private Project

Planning Intention

This zone is intended primarily for the provision of outdoor open-air public space for active and/or passive recreational uses serving the needs of local residents as well as the general public.

OTHER SPECIFIED USES

For "Business" only

Column 1 Uses always permitted	Column 2 Uses that may be permitted with or without conditions on application to the Town Planning Board

Schedule I: for open-air development or for building other than industrial or industrial-office building@

Column 1	Column 2
Ambulance Depot	Broadcasting, Television and/or Film Studio
Commercial Bathhouse/Massage Establishment	Cargo Handling and Forwarding Facility
Eating Place	Government Refuse Collection Point
Educational Institution	Government Use (not elsewhere specified)
Exhibition or Convention Hall	Hotel
Government Use (Police Reporting Centre, Post Office only)	Mass Transit Railway Vent Shaft and/or Other Structure above Ground Level other than Entrances
Information Technology and Telecommunications Industries	Non-polluting Industrial Use (not elsewhere specified)
Institutional Use (not elsewhere specified)	Petrol Filling Station
Library	School (not elsewhere specified)
Non-polluting Industrial Use (excluding industrial undertakings involving the use/storage of Dangerous Goods#)	Social Welfare Facility (excluding those involving residential care)
Off-course Betting Centre	Warehouse (excluding Dangerous Goods Godown)
Office	Wholesale Trade
Place of Entertainment	
Place of Recreation, Sports or Culture	
Private Club	
Public Clinic	
Public Convenience	
Public Transport Terminus or Station	
Public Utility Installation	
Public Vehicle Park (excluding container vehicle)	
Radar, Telecommunications Electronic Microwave Repeater, Television and/or Radio Transmitter Installation	
Recyclable Collection Centre	
Religious Institution	
Research, Design and Development Centre	
School (excluding free-standing purpose-designed building and kindergarten)	
Shop and Services	
Training Centre	
Utility Installation for Private Project	

(please see next page)

OTHER SPECIFIED USES (cont'd)

For "Business" only (cont'd)

Column 1 Uses always permitted	Column 2 Uses that may be permitted with or without conditions on application to the Town Planning Board

Schedule II: for industrial or industrial-office building @

Column 1	Column 2
Ambulance Depot Art Studio (excluding those involving direct provision of services or goods) Bus Depot Cargo Handling and Forwarding Facility (not elsewhere specified) Eating Place (Canteen only) Government Refuse Collection Point Government Use (not elsewhere specified) Information Technology and Telecommunications Industries Non-polluting Industrial Use (excluding industrial undertakings involving the use/storage of Dangerous Goods#) Office (excluding those involving direct provision of customer services or goods) Public Convenience Public Transport Terminus or Station Public Utility Installation Public Vehicle Park (excluding container vehicle) Radar, Telecommunications Electronic Microwave Repeater, Television and/or Radio Transmitter Installation Recyclable Collection Centre Research, Design and Development Centre Shop and Services (Motor-vehicle Showroom on ground floor, Service Trades only) Utility Installation for Private Project Warehouse (excluding Dangerous Goods Godown)	Broadcasting, Television and/or Film Studio Cargo Handling and Forwarding Facility (Container Freight Station, free-standing purpose-designed Logistics Centre only) Educational Institution (ground floor only) Industrial Use (not elsewhere specified) Mass Transit Railway Vent Shaft and/or Other Structure above Ground Level other than Entrances Off-course Betting Centre Office (not elsewhere specified) Petrol Filling Station Place of Entertainment (ground floor only) Place of Recreation, Sports or Culture (not elsewhere specified) Private Club Religious Institution (ground floor only) Shop and Services (not elsewhere specified) (ground floor only except Ancillary Showroom* which may be permitted on any floor) Training Centre Vehicle Repair Workshop Wholesale Trade

In addition, for building without industrial undertakings involving offensive trades or the use/storage of Dangerous Goods#, the following use is always permitted :

Office

(please see next page)

OTHER SPECIFIED USES (cont'd)

For "Business" only (cont'd)

In addition, the following uses are always permitted in the purpose-designed non-industrial portion on the lower floors (except basements and floors containing wholly or mainly car parking, loading/unloading bays and/or plant room) of an existing building, provided that the uses are separated from the industrial uses located above by a buffer floor or floors and no industrial uses are located within the non-industrial portion:	In addition, the following use may be permitted with or without conditions on application to the Town Planning Board in the purpose-designed non-industrial portion on the lower floors (except basements and floors containing wholly or mainly car parking, loading/unloading bays and/or plant room) of an existing building, provided that the use is separated from the industrial uses located above by a buffer floor or floors and no industrial uses are located within the non-industrial portion:
Commercial Bathhouse/Massage Establishment Eating Place Educational Institution Exhibition or Convention Hall Institutional Use (not elsewhere specified) Library Off-course Betting Centre Office Place of Entertainment Place of Recreation, Sports or Culture Private Club Public Clinic Religious Institution School (excluding kindergarten) Shop and Services Training Centre	Social Welfare Facility (excluding those involving residential care)

@ An industrial or industrial-office building means a building which is constructed for or intended to be used by industrial or industrial-office purpose respectively as approved by the Building Authority.

Dangerous Goods refer to substances classified as Dangerous Goods and requiring a licence for their use/storage under the Dangerous Goods Ordinance (Cap. 295).

* Ancillary Showroom requiring planning permission refers to showroom use of greater than 20% of the total usable floor area of an industrial firm in the same premises or building.

Planning Intention

This zone is intended primarily for general business uses. A mix of information technology and telecommunications industries, non-polluting industrial, office and other commercial uses are always permitted in new "business" buildings. Less fire hazard-prone office use that would not involve direct provision of customer services or goods to the general public is always permitted in existing industrial or industrial-office buildings.

(please see next page)

OTHER SPECIFIED USES (cont'd)

For "Business" Only (cont'd)

Remarks

(1) No new development, or addition, alteration and/or modification to or redevelopment of an existing building shall result in a total development and/or redevelopment in excess of a maximum plot ratio of 12, and the maximum building height in terms of metres above Principal Datum as stipulated on the Plan, or the plot ratio and height of the existing building, whichever is the greater. The provision for development/redevelopment to the height of the existing building is not applicable to an area between Chai Wan Industrial Centre and Minico Building which is subject to a maximum building height of 23mPD, as stipulated on the Plan.

(2) A minimum 3m wide non-building area shall be provided from the lot boundary of 45 Kut Shing Street and 10 Hong Man Street fronting Hong Man Street, and 4m from the lot boundary of 44 Lee Chung Street and 40 Lee Chung Street fronting Hong Man Street as stipulated on the Plan.

(3) In determining the relevant maximum plot ratio for the purposes of paragraph (1) above, any floor space that is constructed or intended for use solely as car park, loading/unloading bay, plant room and caretaker's office, provided such uses and facilities are ancillary and directly related to the development or redevelopment, may be disregarded.

(4) Where the permitted plot ratio as defined in the Building (Planning) Regulations is permitted to be exceeded in circumstances as set out in Regulation 22(1) or (2) of the said Regulations, the plot ratio for the building on land to which paragraph (1) applies may be increased by the additional plot ratio by which the permitted plot ratio is permitted to be exceeded under and in accordance with the said Regulation 22(1) or (2), notwithstanding that the relevant maximum plot ratio specified in paragraph (1) above may thereby be exceeded.

(5) Based on the individual merits of a development or redevelopment proposal, minor relaxation of the building height and plot ratio restrictions stated in paragraph (1) above may be considered by the Town Planning Board on application under section 16 of the Town Planning Ordinance.

(6) Under exceptional circumstances, for a development or redevelopment proposal, minor relaxation of the non-building area restriction as stipulated on the Plan or stated in paragraph (2) above may be considered by the Town Planning Board on application under section 16 of the Town Planning Ordinance.

(please see next page)

OTHER SPECIFIED USES (cont'd)

Column 1 Uses always permitted	Column 2 Uses that may be permitted with or without conditions on application to the Town Planning Board

For "Cargo Handling Area" only

Cargo Handling Area Public Convenience	Government Use Public Utility Installation Utility Installation for Private Project

Planning Intention

This zone is intended to reserve land for cargo handling area use.

Remarks

(1) No new development, or addition, alteration and/or modification to or redevelopment of an existing building shall result in a total development and/or redevelopment in excess of the maximum building height in terms of number of storeys as stipulated on the Plan, or the height of the existing building, whichever is the greater.

(2) In determining the maximum number of storey(s) for the purposes of paragraph (1) above, any basement floor(s) may be disregarded.

(3) Based on the individual merits of a development or redevelopment proposal, minor relaxation of the building height restrictions stated in paragraph (1) above may be considered by the Town Planning Board on application under section 16 of the Town Planning Ordinance.

(please see next page)

OTHER SPECIFIED USES (cont'd)

Column 1 Uses always permitted	Column 2 Uses that may be permitted with or without conditions on application to the Town Planning Board

For "Cemetery" only

Columbarium Crematorium Funeral Facility Government Use Grave Public Convenience	Place of Recreation, Sports or Culture Public Transport Terminus or Station Public Utility Installation Religious Institution Shop and Services Utility Installation for Private Project

Planning Intention

This zone is intended to reserve land for cemetery use.

Remarks

(1) No new development, or addition, alteration and/or modification to or redevelopment of an existing building shall result in a total development and/or redevelopment in excess of the maximum building height in terms of number of storeys as stipulated on the Plan, or the height of the existing building, whichever is the greater.

(2) In determining the maximum number of storey(s) for the purposes of paragraph (1) above, any basement floor(s) may be disregarded.

(3) Based on the individual merits of a development or redevelopment proposal, minor relaxation of the building height restrictions stated in paragraph (1) above may be considered by the Town Planning Board on application under section 16 of the Town Planning Ordinance.

(please see next page)

OTHER SPECIFIED USES (cont'd)

Column 1 Uses always permitted	Column 2 Uses that may be permitted with or without conditions on application to the Town Planning Board
For "Columbarium" only	
Columbarium Garden of Remembrance Government Use	Public Utility Installation Utility Installation for Private Project

Planning Intention

This zone is primarily for land intended for columbarium and garden of remembrance use.

Remarks

(1) No new development, or addition, alteration and/or modification to or redevelopment of an existing building shall result in a total development and/or redevelopment in excess of the maximum building height in terms of number of storeys as stipulated on the Plan, or the height of the existing building, whichever is the greater.

(2) In determining the maximum number of storey(s) for the purposes of paragraph (1) above, any basement floor(s) may be disregarded.

(3) Based on the individual merits of a development or redevelopment proposal, minor relaxation of the building height restriction stated in paragraph (1) above may be considered by the Town Planning Board on application under section 16 of the Town Planning Ordinance.

(please see next page)

OTHER SPECIFIED USES (cont'd)

Column 1 Uses always permitted	Column 2 Uses that may be permitted with or without conditions on application to the Town Planning Board

For "Mass Transit Railway Comprehensive Development Area" only

Column 1	Column 2
Ambulance Depot	Broadcasting, Television and/or Film Studio
Eating Place	Commercial Bathhouse/Massage Establishment
Educational Institution (in a commercial building or in the purpose-designed non-residential portion+ of an existing building only)	Educational Institution (not elsewhere specified)
Exhibition or Convention Hall	Government Refuse Collection Point
Flat	Hotel
Government Use (not elsewhere specified)	Institutional Use (not elsewhere specified)
House	Mass Transit Railway Vent Shaft and/or Other Structure above Ground Level other than Entrances
Mass Transit Railway Depot	Petrol Filling Station
Library	Pier
~~Market~~	Public Convenience
Off-course Betting Centre	Recyclable Collection Centre
Office	Religious Institution
Place of Entertainment	School (not elsewhere specified)
Place of Recreation, Sports or Culture	
Private Club	
Public Clinic	
Public Transport Terminus or Station	
Public Utility Installation	
Public Vehicle Park (excluding container vehicle)	
Residential Institution	
School (in a free-standing purpose-designed school building, in a commercial building or in the purpose-designed non-residential portion+ of an existing building only)	
Shop and Services	
Social Welfare Facility	
Training Centre	
Utility Installation for Private Project	

\+ Excluding floors containing wholly or mainly car parking, loading/unloading bays and/or plant room.

Planning Intention

This zone is intended to demarcate the Heng Fa Chuen residential site and its adjoining area.

(please see next page)

OTHER SPECIFIED USES (cont'd)

For "Mass Transit Railway Comprehensive Development Area" only (cont'd)

Remarks

(1) No new development, or addition, alteration and/or modification to or redevelopment of an existing building shall result in a total development and/or redevelopment in excess of the maximum building height in terms of metres above Principal Datum as stipulated on the Plan, and a maximum gross floor area of 425,000m² for residential use and 26,750m² for commercial use, or the height and gross floor area of the existing building, whichever is the greater.

(2) In determining the maximum gross floor area for the purposes of paragraph (1) above, any floor space that is constructed or intended for use solely as car park, loading/unloading bay, plant room or caretaker's office and caretaker's quarters or recreational facilities for the use and benefit of all the owners or occupiers of the domestic building or domestic part of the building, provided such uses and facilities are ancillary and directly related to the development or redevelopment, may be disregarded. Any floor space that is constructed or intended for use solely as rail depot and station, public transport facilities, and GIC facilities, as required by the Government, may also be disregarded.

(3) Based on the individual merits of a development or redevelopment proposal, minor relaxation of the building height and gross floor area restrictions stated in paragraph (1) above, may be considered by the Town Planning Board on application under section 16 of the Town Planning Ordinance.

(please see next page)

OTHER SPECIFIED USES (cont'd)

Column 1 Uses always permitted	Column 2 Uses that may be permitted with or without conditions on application to the Town Planning Board

For "Refuse Transfer Station" only

Refuse Transfer Station	Government Use (not elsewhere specified) Public Utility Installation Utility Installation for Private Project

Planning Intention

This zone is intended to reserve land for the purpose of a refuse transfer station.

Remarks

(1) No new development, or addition, alteration and/or modification to or redevelopment of an existing building shall result in a total development and/or redevelopment in excess of the maximum building height in terms of number of storeys as stipulated on the Plan, or the height of the existing building, whichever is the greater.

(2) In determining the maximum number of storey(s) for the purposes of paragraph (1) above, any basement floor(s) may be disregarded.

(3) Based on the individual merits of a development or redevelopment proposal, minor relaxation of the building height restrictions stated in paragraph (1) above may be considered by the Town Planning Board on application under section 16 of the Town Planning Ordinance.

(please see next page)

OTHER SPECIFIED USES (cont'd)

Column 1 Uses always permitted	Column 2 Uses that may be permitted with or without conditions on application to the Town Planning Board

For All Other Sites (Not Listed Above)

As Specified on the Plan	Government Use Mass Transit Railway Vent Shaft and/or Other Structure above Ground Level other than Entrances Public Utility Installation Utility Installation for Private Project

Planning Intention

This zone is intended to identify land reserved for purposes as specified on the plan.

Remarks

(1) No new development, or addition, alteration and/or modification to or redevelopment of an existing building shall result in a total development and/or redevelopment in excess of the maximum building height in terms of metres above Principal Datum or number of storeys as stipulated on the Plan, or the height of the existing building, whichever is the greater.

(2) In determining the maximum number of storey(s) for the purposes of paragraph (1) above, any basement floor(s) may be disregarded.

(3) Based on the individual merits of a development or redevelopment proposal, minor relaxation of the building height restrictions stated in paragraph (1) above may be considered by the Town Planning Board on application under section 16 of the Town Planning Ordinance.

GREEN BELT

Column 1 Uses always permitted	Column 2 Uses that may be permitted with or without conditions on application to the Town Planning Board
Agricultural Use Country Park* Government Use (Police Reporting Centre only) Nature Reserve Nature Trail On-Farm Domestic Structure Picnic Area Public Convenience Tent Camping Ground Wild Animals Protection Area	Animal Boarding Establishment Barbecue Spot Broadcasting, Television and/or Film Studio Burial Ground Cable Car Route and Terminal Building Columbarium (within a Religious Institution or extension of existing Columbarium only) Crematorium (within a Religious Institution or extension of existing Crematorium only) Field Study/Education/Visitor Centre Flat Funeral Facility Government Refuse Collection Point Government Use (not elsewhere specified) Holiday Camp House Marine Fuelling Station Mass Transit Railway Vent Shaft and/or Other Structure above Ground Level other than Entrances Petrol Filling Station Pier Place of Recreation, Sports or Culture Public Transport Terminus or Station Public Utility Installation Public Vehicle Park (excluding container vehicle) Radar, Telecommunications Electronic Microwave Repeater, Television and/or Radio Transmitter Installation Religious Institution Residential Institution School Service Reservoir Social Welfare Facility Utility Installation for Private Project Zoo

*Country Park means a country park or special area as designated under the Country Parks Ordinance (Cap. 208). All uses and developments require consent from the Country and Marine Parks Authority and approval from the Town Planning Board is not required.

Planning Intention

The planning intention of this zone is primarily for the conservation of the existing natural environment amid the built-up areas/at the urban fringe, to safeguard it from encroachment by urban type development, and to provide additional outlets for passive recreational activities. There is a general presumption against development within this zone.

COASTAL PROTECTION AREA

Column 1 Uses always permitted	Column 2 Uses that may be permitted with or without conditions on application to the Town Planning Board
Agricultural Use (other than Plant Nursery) Nature Reserve Nature Trail On-Farm Domestic Structure Picnic Area Wild Animals Protection Area	Barbecue Spot Field Study/Education/Visitor Centre Government Use Holiday Camp House (Redevelopment only) Pier Public Convenience Public Utility Installation Radar, Telecommunications Electronic Microwave Repeater, Television and/or Radio Transmitter Installation Tent Camping Ground Utility Installation for Private Project

Planning Intention

This zoning is intended to conserve, protect and retain the natural coastlines and the sensitive coastal natural environment, including attractive geological features, physical landform or area of high landscape, scenic or ecological value, with a minimum of built development. It may also cover areas which serve as natural protection areas sheltering nearby developments against the effects of coastal erosion.

There is a general presumption against development in this zone. In general, only developments that are needed to support the conservation of the existing natural landscape or scenic quality of the area or are essential infrastructure projects with overriding public interest may be permitted.

Remarks

No redevelopment, including alteration and/or modification, of an existing house shall result in a total redevelopment in excess of the plot ratio, site coverage and height of the house which was in existence on the date of the first publication in the Gazette of the notice of the draft Chai Wan Outline Zoning Plan No. S/H20/16.

COUNTRY PARK

Country Park means a country park or special area as designated under the Country Parks Ordinance (Cap. 208). All uses and developments require consent from the Country and Marine Parks Authority and approval from the Town Planning Board is not required.

Attachment IV of
<u>MPC Paper No. 2/20</u>

HONG KONG PLANNING AREA NO. 20

~~APPROVED~~ *DRAFT* CHAI WAN OUTLINE ZONING PLAN NO. S/H20/23*A*

EXPLANATORY STATEMENT

HONG KONG PLANNING AREA NO. 20

~~APPROVED~~ *DRAFT* CHAI WAN OUTLINE ZONING PLAN NO. S/H20/23*A*

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HONG KONG PLANNING AREA NO. 20

~~APPROVED~~ *DRAFT* CHAI WAN OUTLINE ZONING PLAN NO. S/H20/23*A*

(Being ~~an Approved~~ ***Draft*** Plan for the Purposes of the Town Planning Ordinance)

EXPLANATORY STATEMENT

Note: For the purposes of the Town Planning Ordinance, this statement shall not be deemed to constitute a part of the Plan.

1. INTRODUCTION

This explanatory statement is intended to assist an understanding of the ~~approved~~***draft*** Chai Wan Outline Zoning Plan (OZP) No. S/H20/23*A*. It reflects the planning intention and objectives of the Town Planning Board (the Board) for the various land use zonings of the Plan.

2. AUTHORITY FOR THE PLAN AND PROCEDURES

2.1 On 9 August 1957, the draft Chai Wan Outline Development Plan No. LH20/1/2, being the first statutory plan covering the Chai Wan area, was gazetted under the Town Planning Ordinance (the Ordinance). Since then, the plan had been amended many times to reflect the changing circumstances and updated land use development.

2.2 On 6 September 1988, the Chai Wan OZP No. S/H20/4 was approved by the then Governor in Council under section 9(1)(a) of the Ordinance. On 6 November 1990, the then Governor in Council referred the approved OZP to the Board for amendment under section 12(1)(b)(ii) of the Ordinance. Since then, the OZP had been amended ten times and exhibited for public inspection under section 5 or 7 of the Ordinance to reflect the changing circumstances.

2.3 On 26 November 2002, the Chief Executive in Council (CE in C), under section 9(1)(a) of the Ordinance, approved the draft Chai Wan OZP, which was subsequently renumbered as S/H20/15. On 8 July 2003, the CE in C referred the approved Chai Wan OZP No. S/H20/15 to the Board for amendment under section 12(1)(b)(ii) of the Ordinance. On 21 October 2004, the draft Chai Wan OZP No. S/H20/16 was exhibited for public inspection under section 5 of the Ordinance.

2.4 On 8 November 2005, the CE in C under section 9(1)(a) of the Ordinance, approved the draft Chai Wan OZP, which was subsequently renumbered as S/H20/17. On 20 June 2006, the CE in C referred the approved Chai Wan OZP No. S/H20/17 to the Board for amendment under section 12(1)(b)(ii) of the Ordinance. The OZP was amended three times and exhibited for public inspection under section 5 or 7 of the Ordinance.

2.5 On 5 February 2013, the CE in C, under section 9(1)(a) of the Ordinance, approved the draft Chai Wan OZP, which was subsequently renumbered as S/H20/21. On 29 April 2014, the CE in C agreed to refer the approved Chai Wan OZP to the Board for amendment under section 12(1)(b)(ii) of the Ordinance. ~~The reference back of the OZP was notified in the Gazette on 16 May 2014 under section 12(2) of the Ordinance.~~***The OZP was subsequently amended once and exhibited for public inspection under section 5 of the Ordinance.***

~~2.6~~ ~~On 18 November 2016, the draft Chai Wan OZP No. S/H20/22, incorporating amendments mainly to rezone a site at the junction of Chai Wan Road, Wing Ping Street and San Ha Street from "Open Space" to "Residential (Group A)", and to rezone a site at Cape Collinson Road from "Other Specified Uses" annotated "Funeral Parlour" to "Other Specified Uses" annotated "Columbarium", was exhibited for public inspection under section 5 of the Ordinance. During the exhibition period, a total of 4 representations were received. On 10 February 2017, the Board published the representations for public comments and, in the first three weeks of the publication period, no comment was received. After giving consideration to the representations on 19 May 2017, the Board decided not to uphold the representations.~~

2.~~7~~***6*** On 5 September 2017, the CE in C, under section 9(1)(a) of the Ordinance, approved the draft Chai Wan OZP, which was subsequently renumbered as S/H20/23. ~~On 15 September 2017, the approved Chai Wan OZP No. S/H20/23 (the Plan) was exhibited for public inspection under section 9(5) of the Ordinance.~~ ***On 7 January 2020, the CE in C referred the approved Chai Wan OZP to the Board for amendment under section 12(1)(b)(ii) of the Ordinance. The reference back of the OZP was notified in the Gazette on 17 January 2020 under section 12(2) of the Ordinance.***

2.7 On ________ 2020, the draft Chai Wan OZP No. S/H20/23A (the Plan), incorporating amendments mainly to rezone a site at the junction of Sun Yip Street and Siu Sai Wan Road from "Government, Institution or Community" ("G/IC") to "G/IC(4)", and to rezone a site at Cheung Man Road from "Green Belt" and an area shown as 'Road' to "Residential (Group A)", was exhibited for public inspection under section 5 of the Ordinance.

3. OBJECT OF THE PLAN

3.1 The object of the Plan is to indicate the broad land use zonings and major transport networks so that development and redevelopment within the Planning Scheme Area ***(the Area)*** can be put under statutory planning control.

3.2 The Plan is to illustrate ~~only~~ the broad principles of development within the ~~Planning Scheme~~ Area. It is a small-scale plan and the transport alignments and boundaries between the land use zones may be subject to minor ***adjustments*** ~~alterations~~ as detailed planning proceeds.

3.3 Since the Plan is to show broad land use zoning***s***, there would be cases that small strips of land not intended for building development purposes and carry no development right under the lease, such as the areas restricted for garden, slope maintenance and access road purposes, are included in the residential zones. The general principle is that such areas should not be taken into account in plot ratio and site coverage calculation. Development within residential zones should be restricted to building lots carrying development right in order to maintain the character and amenity of the Chai Wan area and not to overload the road network in this area.

4. NOTES OF THE PLAN

4.1 Attached to the Plan is a set of Notes which shows the types of uses or developments which are always permitted within the ~~Planning Scheme~~ Area and in particular zones and which may be permitted by the Board, with or without conditions, on application. The provision for application for planning permission under section 16 of the Ordinance allows greater flexibility in land use planning and control of development to meet changing needs.

4.2 For the guidance of the general public, a set of definitions that explains some of the terms used in the Notes may be obtained from the Technical Services Division of the Planning Department and can be downloaded from the Board's website at http://www.info.gov.hk/tpb.

5. THE PLANNING SCHEME AREA

5.1 The ~~Planning Scheme~~ Area ~~(the Area)~~ is located in the eastern part of Hong Kong Island. It is bounded by Heng Fa Chuen to the north, Tai Tam Country Park to the west, and Shek O Country Park to the south. –To the east, it extends to the waterfront. The boundary of the Area is shown by a heavy broken line on the Plan. It covers an area of about 614 hectares of land. Developments in the Area are mainly on land reclaimed from the sea, with reclamation started in 1961.

5.2 Chai Wan has been predominantly a public housing area. There exist a number of public rental housing estates, Home Ownership Schemes (HOS) and Private Sector Participation Schemes (PSPS) developments. Nevertheless, there are also a number of private residential developments, such as Heng Fa Chuen on top of and adjacent to the Mass Transit Railway (MTR) depot and Island Resort in Siu Sai Wan.

5.3 Chai Wan is also one of the major industrial areas on Hong Kong Island. Industrial developments are located around Lee Chung Street near MTR Chai Wan Station and adjacent to the cargo handling basin.

5.4 Siu Sai Wan has been developed mainly for residential uses with some government, institution and community (GIC) uses. Public rental housing estates, HOS and PSPS developments have been developed along the foothills of Pottinger Peak. Adjoining it is the Siu Sai Wan reclamation area which has been developed for both public and private housing, sports ground, open space and GIC facilities.

5.5 The hillside to the south along Cape Collinson Road is dominated by cemeteries including crematorium and columbarium uses. The Area also covers parts of Shek O Country Park and Tai Tam Country Park.

6. POPULATION

Based on the ~~2011~~***2016*** Population ***By-c***~~C~~ensus, the population of the Area was estimated by the Planning Department as about ~~179,050~~***173,200***. It is estimated that the planned population of the Area would be about ~~178,510~~***168,962***.

7. BUILDING HEIGHT RESTRICTIONS *IN THE AREA*

7.1 In the absence of building height control, tall buildings may proliferate at random locations and the scale may be out-of-context in the locality, resulting in negative impacts on the visual quality of the Area and may sometimes obstructing air ventilation. In order to provide better planning control on the development intensity and building height upon development/redevelopment, to prevent excessively tall or out-of-context buildings and to meet public aspirations for greater certainty and transparency in the statutory planning system, a review of the Chai Wan OZP has been undertaken with a view to incorporating appropriate building height restrictions on the Plan for various development zones.

7.2 The review has taken into account urban design considerations and various factors including preservation of public view to the ridgelines, the stepped height concept in general as recommended in the Urban Design Guidelines, the local topography and characteristics, local wind environment, compatibility of building masses in the wider setting, as well as the need to strike a balance between public interest and private development rights.

7.3 Building height restrictions of 35 to 100 metres above Principal Datum (mPD) are generally adopted for the "Other Specified Uses" ("OU"), "Government, Institution or Community" ("G/IC") and "Industrial" ("I") sites located at the central waterfront around the Basin area. Specific "OU" and "G/IC" sites directly abutting the waterfront are restricted to more stringent height restrictions to maintain the low-rise character of waterfront developments. Further inland in the Chai Wan Town Centre area, maximum height of 100 to 120mPD are adopted in order to achieve a stepped building height profile and to preserve the existing view to the ridgelines.

7.4 Following the topography of the area which rises further uphill in the northern, western and southern peripheries, and against the mountain backdrop, higher building height restrictions of 70 to 140mPD and 160 to 210mPD are adopted respectively for the Pamela Youde Nethersole Eastern Hospital under "G/IC" zoning at the northern periphery and the "R(A)" zones located in the southern periphery of the area in Siu Sai Wan/areas north of Cape Collinson Road as well as in the western periphery area near the foothills of Mount Parker.

7.5 Specific building height restrictions for the "G/IC" and "OU" zones in terms of number of storeys or mPD, which mainly reflect the building heights of existing and committed developments, have been incorporated into the Plan to provide visual and spatial relief to the high density environment of the Area.

7.6 An Expert Evaluation on Air Ventilation Assessment (AVA) has been undertaken to assess the existing wind environment and the likely impact of the proposed building heights of the development sites within the Area on the pedestrian wind environment. The building height and non-building area restrictions as well as the building gap requirements incorporated into the Plan have taken the findings of the AVA into consideration.

7.7 In general, the major prevailing annual wind comes from the north-east and east directions, and the prevailing summer wind mainly comes from the south-west, south, south-east to east directions. There are strong northeast-southwest and east-southwest channelling effects at or near the ground level due to the surrounding topography and the area's proximity to the waterfront.

7.8 To facilitate better air ventilation in the Area, the AVA has recommended that existing open space and low-rise GIC or OU sites and the major breezeways should be maintained to allow penetration of wind inland. Non-building areas (NBAs) and building gaps are stipulated on the Plan to facilitate the air ventilation at major ventilation corridors. Furthermore, future developments are encouraged to adopt suitable design measures to minimize any possible adverse air ventilation impacts. These include greater permeability of podiums, wider gap between buildings, building set-back to create air/wind path for better ventilation and minimizing the blocking of air/wind flow through positioning of building towers and podiums to align with the prevailing wind directions, as appropriate.

7.9 In general, a minor relaxation clause in respect of building height restrictions is incorporated into the Notes of the Plan in order to provide incentive for developments/redevelopments with planning and design merits and to cater for circumstances with specific site constraints. Each planning application for minor relaxation of building height restrictions under section 16 of the Ordinance will be considered on its own merits and the relevant criteria for consideration of such application are as follows:

(a) amalgamating smaller sites for achieving better urban design and local area improvements;

(b) accommodating the bonus plot ratio granted under the Buildings Ordinance in relation to surrender/dedication of land/area for use as a public passage/street widening;

(c) providing better streetscape/good quality street level public urban space;

(d) providing separation between buildings to enhance air and visual permeability;

(e) accommodating building design to address specific site constraints in achieving the permissible plot ratio under the Plan; and

(f) other factors such as need for tree preservation, innovative building design and planning merits that would bring about improvements to townscape and amenity of the locality and would not cause adverse landscape and visual impacts.

7.10 However, for any existing building with building height already exceeding the building height restrictions in terms of mPD and/or number of storeys as stated in the Notes of the Plan and/or stipulated on the Plan, there is a general presumption against such application for minor relaxation unless under exceptional circumstances.

NBAs

7.11 In order to facilitate ventilation along major corridors, 3 NBAs are designated in the area:

(a) a 30m wide NBA is designated to the south of Hing Man Estate to facilitate air ventilation along the southwest-northeast air corridor. It will facilitate the valley wind to flow over the 4-storeyed Chai Wan Health Centre across Chai Wan Road towards the proposed NBA along Hong Man Street;

(b) NBAs are designated along Hong Man Street to facilitate the flowing of valley winds from the southerly quarters. These comprise a 10m wide NBA from the lot boundary of Greenwood Terrace, 3m wide NBAs from the lot boundary of 45 Kut Shing Street and 10 Hong Man Street fronting Hong Man Street, 4m wide NBAs from the lot boundary of 44 Lee Chung Street and 40 Lee Chung Street fronting Hong Man Street with the 6m wide footpath between them; and

(c) a 20m wide NBA within Tsui Wan Estate (covering part of Tsui Wan Street) is designated to facilitate the air ventilation along the major southwest-northeast air path and the penetration of sea breeze between the waterfront and the inland.

Building Gaps

7.12 Gaps between buildings play a key role in creating air paths by appropriate design and disposition of building blocks.

(a) A 5m wide setback requirement within the "CDA" zone above 21mPD (about 15m above ground level) along the northwestern side of the existing Chai Wan Flatted Factory is imposed. With wind channeling through the existing 3-storeyed Telephone Exchange Building at Cheung Lee Street to Chui Hang Street, Lee Chung Street and the existing open-air bus terminus at Ning Foo Street, the proposed setback together with Chui Hang Street will create a 20m wide building gap to facilitate air ventilation along the major southwest-northeast air path; and

(b) A 15m wide building gap above 23mPD (about 15m above ground level) between two existing industrial buildings, namely Chai Wan Industrial Centre and Minico Building, is introduced taking account of the existing building gap above podium level for air/wind penetration as well as visual permeability, and to facilitate the air ventilation along the major southwest-northeast air path.

8. LAND USE ZONINGS

8.1 Comprehensive Development Area ("CDA") : Total Area 1.37 ha

8.1.1 This zone is intended for comprehensive development/redevelopment of the area for residential and/or commercial uses with the provision of open space and other supporting facilities. The zoning is to facilitate appropriate planning control over the development mix, scale, design and layout of development, taking account of various environmental, traffic, infrastructure and other constraints.

8.1.2 This zone covers two sites, one located to the immediate west of the MTR Chai Wan Station and the other one at Chai Wan Road near Siu Sai Wan Road. Pursuant to section 4A(1) of the Ordinance, any development within the "CDA" zone would require approval of the Board by way of a planning application under section 16 of the Ordinance. A Master Layout Plan (MLP) should be submitted in accordance with the requirements as specified in the Notes for the approval of the Board pursuant to section 4A(2) of the Ordinance. A copy of the approved MLP would be available for public inspection in the Land Registry pursuant to section 4A(3) of the Ordinance.

8.1.3 The "CDA" site to the immediate west of the MTR Chai Wan Station is for the conservation and conversion of the Chai Wan Flatted Factory (CWFF) building for public rental housing use. The conservation and conversion project of the CWFF building is already completed.

8.1.4 The "CDA(1)" site at Chai Wan Road near Siu Sai Wan Road covers part of the bus depot, formerly occupied by the China Motor Bus (CMB), and the adjoining bus terminus. It is intended for comprehensive development/redevelopment for residential and/or commercial uses with the provision of supporting facilities. While a maximum building height restriction of 140mPD is imposed, a stepped height profile should be adopted for future development. To ensure that the development will be of compatible scale, a maximum total gross floor area of 86,268m^2 is specified in the Notes of the Plan.

8.1.5 Minor relaxation of the gross floor area and building height restrictions may be considered by the Board on application. Each application will be considered on its own merits.

8.2 Residential (Group A) ("R(A)") : Total Area ***73.38***~~72.88~~ ha

8.2.1 This zoning is intended primarily for high-density residential developments. Commercial uses such as shops, services and eating places are always permitted on the lowest three floors of a building or in the purpose-designed non-residential portion of an existing building.

8.2.2 Public housing projects include public rental housing estates, HOS and PSPS and a few private residential developments are within this zone. Major community facilities and open space as well as commercial facilities are provided within these public housing developments to serve the needs of the residents.

8.2.3 Developments and redevelopments within the "R(A)" zone are subject to building height restrictions as stipulated on the Plan or the height of the existing building, whichever is the greater. Following the topography of the area and adopting the urban design principle of stepped heights, residential developments within the zone are restricted to the range of 100mPD to 120mPD at the town centre and the Siu Sai Wan waterfront area (with the exception of Island Resort); 100mPD to 140mPD at the inland area in Siu Sai Wan and along the foothills of Pottinger Peak in the south and Mount Parker in the west and 160 to 210mPD for the uphill location in the western periphery area near Mount Parker.

8.2.4 Island Resort on the waterfront of Siu Sai Wan is a private residential development with a public transport interchange and public car park and is zoned "R(A)1" on the Plan. The existing building height of the development at 193mPD is considered incompatible and incongruous with the surrounding developments and the waterfront setting. In order to respect the urban design principle for maintaining lower building heights on the waterfront to avoid out-of-context and incompatible developments, a maximum building height of 140mPD is imposed on this "R(A)1" site. Future redevelopment to the existing building height is not permitted.

8.2.5 A non-building area of 30m wide is designated to the south of Hing Man Estate to facilitate valley wind from the southwest to penetrate into the inland area. Two non-building areas of 10m and 20m wide are imposed within Greenwood Terrace and Tsui Wan Estate (covering part of Tsui Wan Street) respectively to facilitate valley wind from the southwest to the northeastern part of the area.

8.2.6 An AVA Expert Evaluation (AVA EE (2016)) has been carried out for the "R(A)" site at the junction of Chai Wan Road, Wing Ping Street and San Ha Street. The AVA EE (2016) indicates that tower setbacks and permeability design of domestic block on top of the podium should be incorporated in the proposed development to alleviate the potential ventilation impact to the surrounding area. A planning brief ~~will be~~***has been*** prepared to guide the development of the site.

8.2.7 An AVA has been carried out for the "R(A)" site at Cheung Man Road. Several mitigation measures have been proposed in the AVA including two empty bays at podium level and a tower setback from Cheung Man Road to alleviate the potential ventilation impact to the surrounding area. A further quantitative AVA should be carried out by the Housing Department at the detailed design stage for scheme optimization and the requirement will be set out in a planning brief which is to guide the development of the site.

8.2.*8*~~7~~ Minor relaxation of the building height restrictions and the non-building area requirements may be considered by the Board on application. Each application will be considered on its own merits.

8.3 Industrial ("I") : Total Area 6.19 ha

8.3.1 This zone is intended primarily for general industrial uses to ensure an adequate supply of industrial floor space to meet demand from production-oriented industries. Information technology and telecommunications industries, ~~and~~ office related to industrial use***, and selected uses akin to industrial production and would not compromise building and fire safety*** are always permitted in this zone. However, general commercial and office uses, other than those permitted in the purpose-designed non-industrial portion on the lower floors of an existing building will require permission from the Board.

8.3.2 Industrial developments to the east and south of the Basin are subject to a maximum plot ratio of 12 having regard to the traffic condition in the area and a maximum building height of 100mPD. Established industrial developments are mainly located in the vicinity of Wing Tai Road, Ka Yip Street, Fung Yip Street and On Yip Street.

8.3.3 In the circumstances set out in Regulation 22 of the Building (Planning) Regulations, the above specified maximum plot ratio may be increased by what is permitted to be exceeded under Regulation 22. This is to maintain flexibility for unique circumstances such as dedication of part of a site for road widening or public uses.

8.3.4 Minor relaxation of the building height and plot ratio restrictions may be considered by the Board on application. Each application will be considered on its own merits.

8.4. Government, Institution or Community ("G/IC") : Total Area 70.58 ha

8.4.1 This zone is intended primarily for the provision of government, institution and community (GIC) facilities serving the needs of the local residents and/or a wider district, region or the territory. It is also intended to provide land for uses directly related to or in support of the work of the Government, organizations providing social services to meet community needs, and other institutional establishments. Such developments, particularly for those which are low-rise, serve to provide visual and spatial relief to the densely built-up environment of the Area.

8.4.2 Existing facilities include the Siu Sai Wan Complex, Youth Square, a swimming pool complex, a health centre, a technical institute, a divisional police station, two fire stations, some service reservoirs, a fresh water pumping station, a salt water pumping station, a switching cum pumping station, electricity sub-stations, a refuse collection point, a cooked food centre, a telephone exchange, churches and a number of primary and secondary schools. In addition, there are two existing correctional services institutions, i.e. Lai Chi Rehabilitation Centre and Cape Collinson Correctional Institution. The police rank-and-file quarters are located near Yue Wan Estate. The Fire Services Department Staff Quarters are located at Fei Tsui Road. A minimum 30m wide non-building area to the north of the Sai Wan Service Reservoir shall be provided to facilitate the flowing of valley wind.

8.4.3 A standard sports ground is provided in the Siu Sai Wan reclamation area primarily to meet the district demand and to serve as the main venue for school athletic events.

~~8.4.4 The "G/IC" site covering a site at the junction of Siu Sai Wan Road and Sun Yip Street is reserved for an ambulance depot.~~

8.4.*4*~~5~~ The "G/IC(3)" site at Heng Fa Chuen is subject to a maximum building height of 8 storeys, excluding the Mass Transit Railway depot, for the provision of land for the depot with GIC facilities above.

8.4.5 The "G/IC(4)" site at the junction of Sun Yip Street and Siu Sai Wan Road is reserved for a composite development of ambulance depot and departmental quarters. Responsive building design such as appropriate building set back distances from Siu Sai Wan Road Garden and Siu Sai Wan Road, vertical greening and permeable building design should be adopted at the detailed design stage to minimize the visual impact brought by the proposed development. A quantitative AVA has been carried out for the proposed development. Several mitigation measures including various tower and podium setbacks, have been proposed in the assessment to alleviate the potential impact on the pedestrian wind environment. The project proponent should take into account these proposed mitigation measures in devising the future development scheme.

8.4.6 A site to the north of Lok Man Road is occupied by Pamela Youde Nethersole Eastern Hospital (the Eastern Hospital). Maximum building height restrictions of 120mPD and 140mPD have been imposed for the southern and northern parts of the site respectively to reflect their respective existing heights. For Chai Wan Laundry located at the western part of the Hospital, a building height of 120mPD has been imposed generalizing the building height of the adjacent Main Block/Pathology Block and having regard to the Hospital's expansion plan. The eastern portion of the Hospital, which is under the Hospital's helicopter flight path, is zoned "G/IC(2)" and building height restrictions of 70mPD and 100mPD, including roof-top structures, are imposed.

8.4.7 For the Hong Kong Institute of Vocational Education north of Shun Tai Road, a building height restriction of 55mPD is imposed for the Institute portion. As for the staff quarters in the northern part of the site, which is zoned "G/IC(2)" on the Plan, a building height restriction of 70mPD, including roof-top structures, is imposed as the area is under the helicopter flight path of the Eastern Hospital.

8.4.8 Some sites to the north of the cargo handling area in Chai Wan East are reserved for future GIC developments including a site at the junction of

Sheung Mau Street and Sheung On Street for a joint-user government building. Due consideration should be given to incorporating suitable landscaping treatment and innovative design elements in the future development of these sites to enhance the environment near the waterfront. This area is under the helicopter flight path of the Eastern Hospital and is zoned "G/IC(2)" with a maximum building height restriction of 70mPD, including roof-top structures, so as to safeguard the operation of helicopters and to facilitate the penetration of sea breeze into the inland area. The Government Flying Services should be consulted on any development on the sites under the flight path.

8.4.9 Law Uk near the junction of Chai Wan Road and Kut Shing Street has been developed into a folk museum.

8.4.10 Development and redevelopment within the "G/IC", "G/IC(1)", "G/IC(2)" and "G/IC(3)" zones are subject to maximum building height restrictions as stipulated on the Plan/in the Notes, or the height of the existing building, whichever is the greater. Minor relaxation of the building height restrictions and the non-building area requirement may be considered by the Board on application. The Government Flying Services should be consulted on any application for minor relaxation of building height restrictions for "G/IC(2)" sites. Each application will be considered on its own merits.

8.5 Open Space ("O") : Total Area 20.98 ha

8.5.1 This zoning is intended primarily for the provision of outdoor open-air public space for active and/or passive recreational uses serving the needs of local residents as well as the general public.

8.5.2 Chai Wan Park which occupies a central location in Chai Wan has provided a wide range of recreational facilities to serve the population in the Area. As part of the Wan Tsui Estate redevelopment, a site to its south has been developed as a public park.

8.5.3 Within the Siu Sai Wan reclamation area, open spaces are planned near Harmony Garden as well as along the waterfront for the convenience of the public and for their enjoyment of sea view. Another site at Sheung On Street near the waterfront is also reserved for open space development.

8.5.4 Open spaces are also provided within public housing estates, and within private residential developments such as Heng Fa Chuen and Island Resort. These open spaces do not fall within areas zoned "O". Smaller pockets of open spaces are reserved and developed at suitable locations to provide as far as possible an even distribution of recreational facilities within the Area.

8.6 Other Specified Uses ("OU") : Total Area 88.15 ha

8.6.1 Heng Fa Chuen and the adjoining area are zoned "OU(Mass Transit Railway Comprehensive Development Area)". Heng Fa Chuen is a comprehensive commercial/residential development on top of and adjacent to the MTR depot. Adequate open space and community facilities have been provided within the development to serve the residents. Having regard to the existing building height and its waterfront location, a stepped height of 70mPD and 90mPD are imposed for the lower platform near the waterfront and for the upper platform above the MTR Heng Fa Chuen Station respectively. A maximum domestic and non-domestic GFA of 425,000m^2 and 26,750m^2 respectively for residential and commercial uses is also imposed.

8.6.2 The industrial sites to the west of MTR Chai Wan Station (except for the Chai Wan Flatted Factory site) and the sites at Sun Yip Street in Siu Sai Wan are designated for "Business" use (totaling 5.56 ha) to allow flexibility in the use of existing industrial and industrial-office (I-O) buildings as well as in the development of new buildings for both commercial and clean industrial uses. The planning intention of the "OU(B)" zone is primarily for general business uses. A mix of information technology and telecommunications industries, non-polluting industrial, office and other commercial uses are always permitted in new "business" buildings. Less fire hazard-prone office use that would not involve direct provision of customer services or goods to the general public is always permitted in the existing industrial or I-O buildings within this zone.

8.6.3 As it is not possible to phase out existing polluting and hazardous industrial uses all at once, it is necessary to ensure compatibility of the uses within the same building and in existing industrial areas until the whole area is transformed to cater for the new non-polluting business uses. Development within this zone should make reference to the relevant Town Planning Board Guidelines.

8.6.4 Having regard to the traffic capacity in the two "OU(Business)" areas, a plot ratio restriction of 12 is imposed on the "OU(Business)" zones. A building height restriction of 120mPD for the "OU(Business)" zones to the west of MTR Chai Wan Station and those clustered around Sun Yip Street is imposed.

8.6.5 In the circumstances set out in Regulation 22 of the Building (Planning) Regulations, the above specified maximum plot ratio may be increased by what is permitted to be exceeded under Regulation 22. This is to maintain flexibility for unique circumstances such as dedication of part of a site for road widening or public uses.

8.6.6 Other specified uses in the Area include a public filling barging point, a cargo handling area, a refuse transfer station, liquefied petroleum gas cum petrol filling stations, oil depot, cemeteries and columbarium. These facilities are subject to building height restrictions as stipulated on the Plan.

8.6.7 A 3m wide non-building area from the lot boundary of 45 Kut Shing Street and 10 Hong Man Street, and 4m wide non-building area from the lot boundary of 44 Lee Chung Street and 40 Lee Chung Street, all fronting Hong Man Street are imposed. In addition, a building gap of 15m wide above 23mPD (about 15m above ground level) is imposed between Chai Wan Industrial Centre and Minico Building.

8.6.8 Minor relaxation of the plot ratio and building height restrictions, and the non-building area requirements, may be considered by the Board on application. Each application will be considered on its own merits.

8.7 Green Belt ("GB") : Total Area ***180.78***~~181.32~~ ha

8.7.1 The planning intention of this zone is primarily for the conservation of the existing natural environment amid the built-up areas/at the urban fringe, to safeguard it from encroachment by urban type development, and to provide additional outlets for passive recreational activities. There is a general presumption against development within this zone.

8.7.2 This zone covers the steep hillsides to the west and south-west where, because of difficult topography, urban type development as well as extensive recreational uses are not possible. However, the area contributes visually to the environment of the district. Development within this zone will be carefully controlled and development proposals will be assessed on individual merits taking into account the relevant Town Planning Board Guidelines.

8.7.3 There is a large site to the north of the Area which was originally part of Lei Yue Mun Barracks. A portion of the site has been turned into Lei Yue Mun Park to serve as a natural break between the built-up areas of Chai Wan and Shau Kei Wan, apart from providing some recreational outlets for the residents.

8.8 Coastal Protection Area ("CPA") : Total Area 5.88 ha

8.8.1 This zoning is intended to conserve, protect and retain the natural coastlines and the sensitive coastal natural environment, including attractive geological features, physical landform or area of high landscape, scenic or ecological value, with a minimum of built development. It may also cover areas which serve as natural protection areas sheltering nearby developments against the effects of coastal erosion.

8.8.2 There is a general presumption against development in this zone. In general, only developments that are needed to support the conservation of the existing natural landscape or scenic quality of the area or the development is an essential infrastructure project with overriding public interest may be permitted.

8.8.3 This zone comprises mainly areas of natural coastlines with attractive coastal features such as boulders and rocky shore. These areas of high scenic quality should be protected from development. Falling within this area are undeveloped coastal areas mainly below the 20 metre contour, including the coastal areas of Cape Collinson and Ngan Wan southwards towards Tso Tui Wan.

8.9 Country Park ("CP") : Total Area 115.43 ha

Country Park means a country park or special area as designated under the Country Parks Ordinance (Cap. 208). All uses and developments require consent from the Country and Marine Parks Authority and approval from the Town Planning Board is not required. This zone covers parts of Tai Tam Country Park and Shek O Country Park which fall within the planning scheme boundary of the Plan. The Country Parks contribute to the conservation of the natural environment. Both passive and active recreational outlets are available within the Country Parks.

9. COMMUNICATIONS

9.1 Roads

Chai Wan Road and Island Eastern Corridor are major roads connecting the Area to other parts of Hong Kong Island. It is also proposed to widen Cape Collinson Road.

9.2 Mass Transit Railway (MTR)

The Area is served by the MTR Island Line with Chai Wan Station and Heng Fa Chuen Station. The railway is elevated and traverses the Area in a north-south direction.

9.3 Public Transport Termini

There are several existing public transport termini within the Area, including the ones at MTR Chai Wan Station, Siu Sai Wan Estate, Heng Fa Chuen, Sheung On Street and within the Island Resort.

10. UTILITY SERVICES

10.1 Fresh water supply to the Area is served by five fresh water service reservoirs beside the Eastern Hospital, Heng Fa Chuen, Shan Tsui Court, Hing Wah Estate and Siu Sai Wan Estate respectively. Salt water supply to the Area is served by a salt water service reservoir to the east of Fung Wah Estate.

10.2 There is a sewage screening plant and a refuse transfer station at Sun Yip Street.

10.3 Three electricity substations are located respectively at Shing Tai Road, Chai Wan Road and Cheung Lee Street to serve the Area. There is a telephone exchange to the west of Lee Chung Street to provide telephone services to the community.

10.4 No great difficulty is envisaged in meeting the future requirements for services and public utilities.

11. CULTURAL HERITAGE

11.1 Law Uk ***and Rock Carving at Cape Collinson are***~~is a~~ declared monument*s*. Chai Wan Factory Estate at No. 2 Kut Shing Street is a Grade 2 historic building. Meng Tak Primary School, Old Portion at No. 1 Cheung Man Road, the Cape Collinson Muslim Cemetery, Mosque and the Cape Collinson Light house are Grade 3 historic buildings.

11.2 ***On 19 March 2009,*** ~~T~~the Antiquities Advisory Board (AAB) ~~has~~ released the list of ***1,444*** historic buildings, ***in which the buildings/structures within the Area have been accorded gradings. There are also a number of new items in addition to the list of 1,444 historic buildings. These items are subject to grading assessment by AAB.*** ~~and d~~ *D*etails of ***the list of 1,444*** historic buildings ***and new items for grading assessment*** have been uploaded onto the official website of the ***AAB at http://www.aab.gov.hk.*** ~~Antiquities and Monuments Office (AMO) of the Leisure and Cultural Services Department (LCSD) at http://www.amo.gov.hk for reference.~~

11.3 Prior consultation with the ***Antiquities and Monuments Office*** *(*AMO*)* ~~of the LCSD~~ should be made if any development, ***redevelopment*** or rezoning proposals might affect the declared monuments~~/~~*,* graded historic buildings***/structures, new item(s) pending grading assessment and their immediate environs.***

12. IMPLEMENTATION

12.1 Although existing uses non-conforming to the statutory zonings are tolerated, any material change of use and any other development/redevelopment must be always permitted in terms of the Plan or, if permission is required, in accordance with the permission granted by the Board. The Board has published a set of Guidelines for the interpretation of existing use in the urban and new town areas. Any person who intends to claim an "existing use right" should refer to the Guidelines and will need to provide sufficient evidence to support his claim. The enforcement of the zonings mainly rests with the Buildings Department, the Lands Department and the various licensing authorities.

12.2 The Plan provides a broad land use framework within which more detailed non-statutory plans for the Area are prepared by the Planning Department. These detailed plans are used as the basis for public works planning and site reservation within Government departments. Disposal of sites is undertaken by the Lands Department. Public works projects are co-ordinated by the Civil Engineering and Development Department in conjunction with the client departments and the works departments, such as the Highways Department and the Architectural Services Department. In the course of implementation of the Plan, the Eastern District Council would be consulted as appropriate.

12.3 Planning applications to the Board will be assessed on individual merits. In general, the Board's consideration of the planning applications will take into account all relevant planning considerations which may include the departmental outline development plans/layout plans and the Guidelines published by the Board. The outline development plans and layout plans are available for public inspection at the Planning Department. Guidelines published by the Board are available from the Board's website, the Secretariat of the Board and the Technical Services Division of the Planning Department. Application forms and Guidance Notes for planning applications can be downloaded from the Board's website and are available from the Secretariat of the Board and the Technical Services Division and the relevant District Planning Office of the Planning Department. Applications should be supported by such materials as the Board thinks appropriate to enable it to consider the applications.

TOWN PLANNING BOARD

________*2020*~~*SEPTEMBER 2017*~~

Extract of minutes of the MPC meeting held on 28.7.2017

Hong Kong District

Agenda Item 3

Section 12A Application

[Open Meeting (Presentation and Question Sessions only)]

Y/H20/4 Application for Amendment to the Draft Chai Wan Outline Zoning Plan No. S/H20/22, To rezone the application site from “Government, Institution or Community” and “Open Space” to “Government, Institution or Community (4)” with stipulation of building height restriction of 100mPD, Government Land at the junction of Sun Yip Street and Siu Sai Wan Road, Chai Wan, Hong Kong
(MPC Paper No. Y/H20/4A)

[This item was conducted in English and Cantonese.]

3. The Secretary reported that the application site was located in Chai Wan. Urbis Limited (Urbis) and AIM Group Limited (AIM) were two of the consultants of the applicant. The following Members had declared interests on the item:

Mr Thomas O.S. Ho	-	his company having current business dealings with Urbis
Mr K.K. Cheung	-	his firm having current business dealings with AIM
Mr Franklin Yu	-	having past business dealings with Urbis
Mr Raymond K.W. Lee (the Chairman)	-	co-owning with his spouse/his spouse owning properties in Chai Wan area
Mr Sunny L.K. Ho	-	owning and co-owning with his spouse properties in Chai Wan area
Mr Dominic K.K. Lam	-	being a director of a company which owned a property in Chai Wan area

4. The Committee noted that Mr Dominic K.K. Lam had tendered apologies for being unable to attend the meeting and Mr Franklin Yu had not yet arrived at the meeting. As Messrs K.K. Cheung and Thomas O.S. Ho had no involvement in the application and the properties owned/co-owned by Mr Raymond K.W. Lee and/or his spouse and the properties owned/co-owned by Mr Sunny L.K. Ho and his spouse did not have a direct view of the application site, the Committee agreed that they could stay in the meeting.

Presentation and Question Sessions

5. Mr Louis K.H. Kau, District Planning Officer/Hong Kong (DPO/HK), Mr J.J. Austin, Senior Town Planner/Hong Kong (STP/HK), and the following representatives of the applicant were invited to the meeting at this point:

Fire Services Department

Mr Yuk Ping Wong]
Mr Ling Jim Ng]
Mr Chun Pong Ho]
Mr Ho Man Wong] Applicant's representatives
Urbis Limited
Mr Alan Macdonald]
Ms Winona Ip]

Ms Oliver Cheung]

Ramboll Environ Hong Kong Limited

Mr Roger Leung]

6. The Chairman extended a welcome and explained the procedure of the hearing. He then invited the representatives of the Planning Department (PlanD) to brief Members on the background of the application. With the aid of a PowerPoint presentation, Mr J.J. Austin, STP/HK, presented the application and covered the following aspects as detailed in the Paper:

(a) background to the application;

(b) the proposed rezoning of the application site from “Government, Institution or Community” (“G/IC”) and “Open Space” (“O”) to “G/IC(4)” and “O” with stipulation of a maximum building height restriction (BHR) of 100mPD for the “G/IC(4)” sub-zone, and to add ‘Flat (for “G/IC(4)” only)’ under Column 1 of the Notes for the “G/IC” zone for the development of a composite building with an ambulance depot on the lower floors and departmental quarters (DQs) above for the Fire Services Department (FSD). No zoning amendment was proposed for the “O” portion of the Site which would be kept as a planting strip;

(c) departmental comments – departmental comments were set out in paragraph 9 of the Paper. The Secretary for Security (S for S) advised that the Security Bureau had given in-principle policy support for the project in view of the persistent shortage in DQs. The Chief Town Planner, Urban Design and Landscape, PlanD, advised that the proposed development would impose moderate visual impact on public viewers at close range. Building set back distance from Siu Sai Wan Road Garden and Siu Sai Wan Road should be maximized and additional visual mitigation measures such as vertical greening and permeable building design should be adopted to minimize the visual impact of the proposed development. Other concerned government departments had no objection to or no adverse comment on the application;

(d) during the first three weeks of the statutory publication period, a total of 26 public comments were received, including two supportive comments from individuals, 22 opposing comments from the residents of Harmony Garden and individuals, one comment from an Eastern District Council member and one comment from the Incorporated Owners of Harmony Garden providing the results of a questionnaire survey on residents' views on the application. Major supportive views and objection grounds were set out in paragraph 10 of the Paper; and

[Dr Wilton W.T. Fok arrived to join the meeting at this point.]

(e) PlanD's Views – PlanD had no objection to the application based on the assessments set out in paragraph 11 of the Paper. The subject site was one of the sites identified as suitable for a composite development of ambulance depot and DQs. The proposed BHR of 100mPD tallied with the BHR stipulated for Harmony Garden, the closest residential development in the vicinity. Although the proposed development would impose moderate visual impact on public viewers at close range, visual mitigation measures could be adopted to minimize the visual impact. Though located close to a data centre and an industrial building, the Director of Environmental Protection confirmed that the proposal was acceptable upon implementation of the noise mitigation measures proposed by the applicant. Other technical assessments submitted by the applicant were considered acceptable by the relevant government departments. Regarding the public comments received, the comments of government departments and the planning assessments above were relevant. To better reflect the intention to allow 'Government Staff Quarters' as a use that was always permitted at the site, it was recommended that 'Flat (Government Staff Quarters only) (for "G/IC(4)" only)' should be put under Column 1 of the Notes for the "G/IC" zone, instead of 'Flat (for "G/IC(4)" only)' as applied for.

7. The Chairman then invited the applicant's representatives to elaborate on the application. Mr Alan Macdonald made the following main points:

(a) there were over 35,000 emergency ambulance calls per annum in Hong Kong. FSD had a performance pledge to respond to 92.5% of emergency ambulance calls within 12 minutes from the time of receipt of an emergency ambulance call. To enable FSD to meet the target response rate, ambulance depot should be strategically located to enable staff to respond to the call promptly;

(b) meanwhile, there was significant shortfall in DQs for the FSD;

(c) from land use planning and urban design perspectives, it was not expected that the proposed development of a composite building with ambulance depot and DQs would have significant impacts on the surrounding areas;

(d) only a limited number of staff would be accommodated within the site and the proposed development would have insignificant impact on the provision of government, institution and community facilities in the area;

(e) to compensate for the loss of trees due to the proposed development, sufficient compensatory planting would be provided and native species would be planted; and

(f) in conclusion, the proposed development was vital to FSD for meeting the target response rate and addressing the pressing need for DQs.

8. Some Members raised the following questions:

(a) whether the current proposal with only four parking spaces for ambulance would be sufficient to meet the increasing demand in future;

(b) the mitigation measures proposed by the applicant to alleviate the noise impact during operation of the ambulance depot and to reduce disturbances to the local residents;

(c) whether there was any planned extension of the MTR Hong Kong Line to Siu Sai Wan, the walking distance between the site and Chai Wan MTR station and any measures to improve connectivity between Chai Wan MTR station, and the residential developments in the area; and

(d) the meaning of 'partially agree' as stated in paragraph 12.1 of the Paper.

9. Mr Louis K.H. Kau, DPO/HK, made the following responses:

(a) an Environmental Assessment (EA) report was submitted by the applicant to assess, amongst others, the construction and operational noise impacts of the proposed development on the surrounding residential developments, in particular, Harmony Garden, as well as the future DQs above the ambulance depot. Noise mitigation measures at source were proposed to mitigate the noise impact on the DQs due to the cooling towers at the podium of an adjoining industrial building. Besides, the sound power level (SWL) of sirens of ambulance during night time missions would be lowered to mitigate the impact on the surrounding noise sensitive receivers (NSRs). With the mitigation measures, the residual noise impact due to the proposed development was acceptable under relevant legislation/regulations;

(b) under the Railway Development Strategy 2014, there was no proposal to extend the MTR Hong Kong Line to Siu Sai Wan. While the existing residential developments were located at a distance from the Chai Wan MTR station, they were well-served by buses and mini-buses. Besides, there were footbridges and at grade crossing facilities for residents' access to the Chai Wan MTR station; and

(c) to better reflect the intention to allow 'Government Staff Quarters' (rather than 'Flat' in general) as an always permitted use at the site, PlanD recommended that 'Flat (Government Staff Quarters only) (for "G/IC(4)" only)' should be placed under Column 1 of the Notes of the "G/IC" zone, instead of 'Flat (for "G/IC(4)" only)' as proposed by the applicant, and thus, PlanD's recommendation was to partially approve the application.

[Dr Frankie W.C. Yeung arrived to join the meeting at this point.]

10. Mr Yuk Ping Wong, the applicant's representative, also made the following responses:

(a) regarding the provision of ambulance parking spaces within the site, as each parking space would be able to accommodate three standard ambulances, the proposed four parking spaces would be able to accommodate a total of 12 ambulances. Comparing with the current provision in Chai Wan Ambulance Station which could accommodate only four ambulances, the proposed provision was considered sufficient to meet the future demand; and

(b) regarding the noise impact of the proposed ambulance depot, a number of mitigation measures had been adopted with a view to reducing disturbances on the local residents particularly at night time. The public announcement (PA) system would switch to a different mode at night time in that there would be no announcement at the drill yard and repeated announcement by the PA system would be reduced. Only flashing light would be used by ambulance without the need for sirens at night time unless there was blockage in traffic. Through better design, the gate would be closed at a reduced speed at night time to reduce noise nuisance.

11. As the applicant's representatives had no further points to make and Members had no questions to raise, the Chairman informed the applicant's representatives that the hearing procedure for the application had been completed and the Committee would deliberate on the application in their absence and inform the applicant of the Committee's decision in due course. The Chairman thanked the applicant's representatives and PlanD's representatives for attending the meeting. They left the meeting at this point.

Deliberation Session

12. After further deliberation, the Committee decided to partially agree to the application by rezoning the "G/IC" portion of the Site to "G/IC(4)" with stipulation of a maximum BHR of 100mPD, adding 'Flat (Government Staff Quarters only) (for "G/IC(4)" only)' under Column 1 of the Notes for the "G/IC" zone, and replacing 'Flat' with 'Flat (not elsewhere specified)' under Column 2 of the Notes.

13. The relevant proposed amendments to the draft Chai Wan Outline Zoning Plan No. S/H20/22 would be submitted to the Committee for agreement prior to gazetting under section 5 of the Town Planning Ordinance.

Photomontages submitted by the applicant of s.12A application No. Y/H20/4
(Extracted from MPC Paper No. Y/H20/4A)

Attachment Va of MPC Paper No. 2/20

Key Plan


Existing Conditions

Proposed Development

FSD Contract No. FSD/CO7/2015
Consultancy Service for Preparation of Amendment of Plan under Section 12A of the Town Planning Ordinance (CAP.131) for Relaxation of Building Height Restriction for Proposed Reprovisioning of Chai Wan Ambulance Depot with the Provision of Departmental Quarters

Title: View Point 1 - View from Siu Sai Wan Road Garden

Scale	Date	Figure No.
As Shown	September 2016	3

(資料來源：由申請人提供)
(SOURCE : SUBMITTED BY THE APPLICANT)

參考編號 REFERENCE No.	繪圖 DRAWIN
Y/H20/4	Z - 8

Key Plan

Existing Conditions

Proposed Development

FSD Contract No. FSD/CO7/2015

Consultancy Service for Preparation of Amendment of Plan under Section 12A of the Town Planning Ordinance (CAP.131) for Relaxation of Building Height Restriction for Proposed Reprovisioning of Chai Wan Ambulance Depot with the Provision of Departmental Quarters

Urbis 雄邦 LIMITED

Title: View Point 2 - View from Siu Sai Wan Sports Ground		
Scale: As Shown	Date: September 2016	Figure No. 4

(資料來源：由申請人提供)
(SOURCE : SUBMITTED BY THE APPLICANT)

參考編號 REFERENCE No.	繪圖 DRAWING
Y/H20/4	Z - 9

Key Plan

Existing Conditions

Proposed Development

FSD Contract No. FSD/CO7/2015

Consultancy Service for Preparation of Amendment of Plan under Section 12A of the Town Planning Ordinance (CAP.131) for Relaxation of Building Height Restriction for Proposed Reprovisioning of Chai Wan Ambulance Depot with the Provision of Departmental Quarters

Urbis 雅邦 Limited

Title: View Point 3 - View from Siu Sai Wan Plaza and Swimming Pool Footbridge

Scale	Date	Figure No.
As Shown	September 2016	5

(資料來源：由申請人提供)
(SOURCE : SUBMITTED BY THE APPLICANT)

參考編號 REFERENCE No.	繪圖 DRAWING
Y/H20/4	Z - 10

Key Plan

Existing Conditions

Proposed Development

FSD Contract No. FSD/CO7/2015
Consultancy Service for Preparation of Amendment of Plan under Section 12A of the Town Planning Ordinance (CAP.131) for Relaxation of Building Height Restriction for Proposed Reprovisioning of Chai Wan Ambulance Depot with the Provision of Departmental Quarters

Urbis Limited

Title	View Point 4 - View from Chai Wan Swimming Pool and Park	
Scale: As Shown	Date: September 2016	Figure No.: 6

（資料來源：由申請人提供）
(SOURCE : SUBMITTED BY THE APPLICANT)

參考編號 REFERENCE No.	繪圖 DRAWING
Y/H20/4	Z - 11

Key Plan

Existing Conditions

Proposed Development

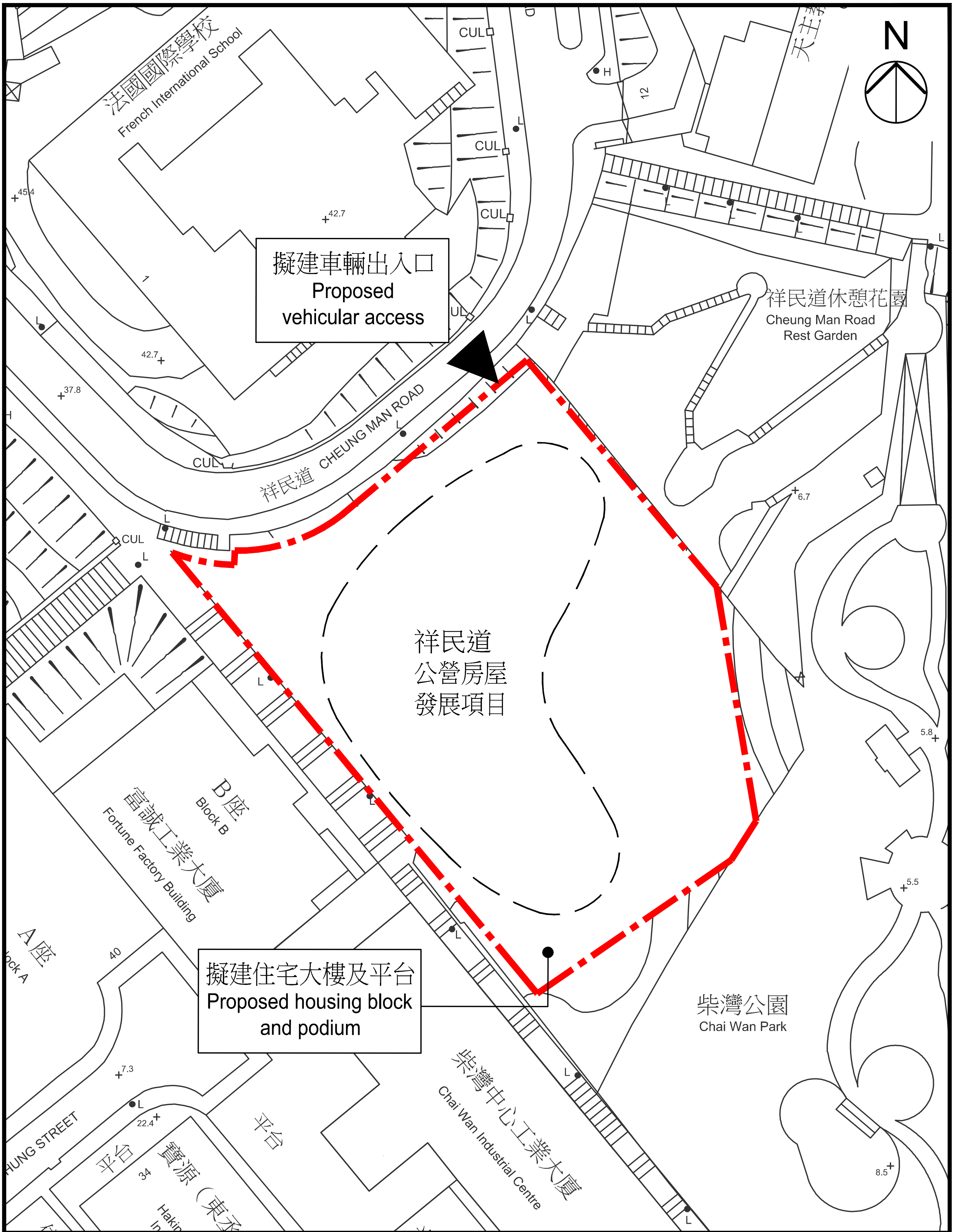
FSD Contract No. FSD/CO7/2015
Consultancy Service for Preparation of Amendment of Plan under Section 12A of the Town Planning Ordinance (CAP.131) for Relaxation of Building Height Restriction for Proposed Reprovisioning of Chai Wan Ambulance Depot with the Provision of Departmental Quarters

Title: View Point 5 - View from Pottinger Peak

Scale	Date	Figure No
As Shown	September 2016	7

(資料來源：由申請人提供)
(SOURCE : SUBMITTED BY THE APPLICANT)

參考編號 REFERENCE No.	繪圖 DRAWING
Y/H20/4	Z - 12



圖例:
LEGEND:

擬建地盤界線
PROPOSED SITE BOUNDARY

METERS 8 0 8 16 24 40 METERS 米

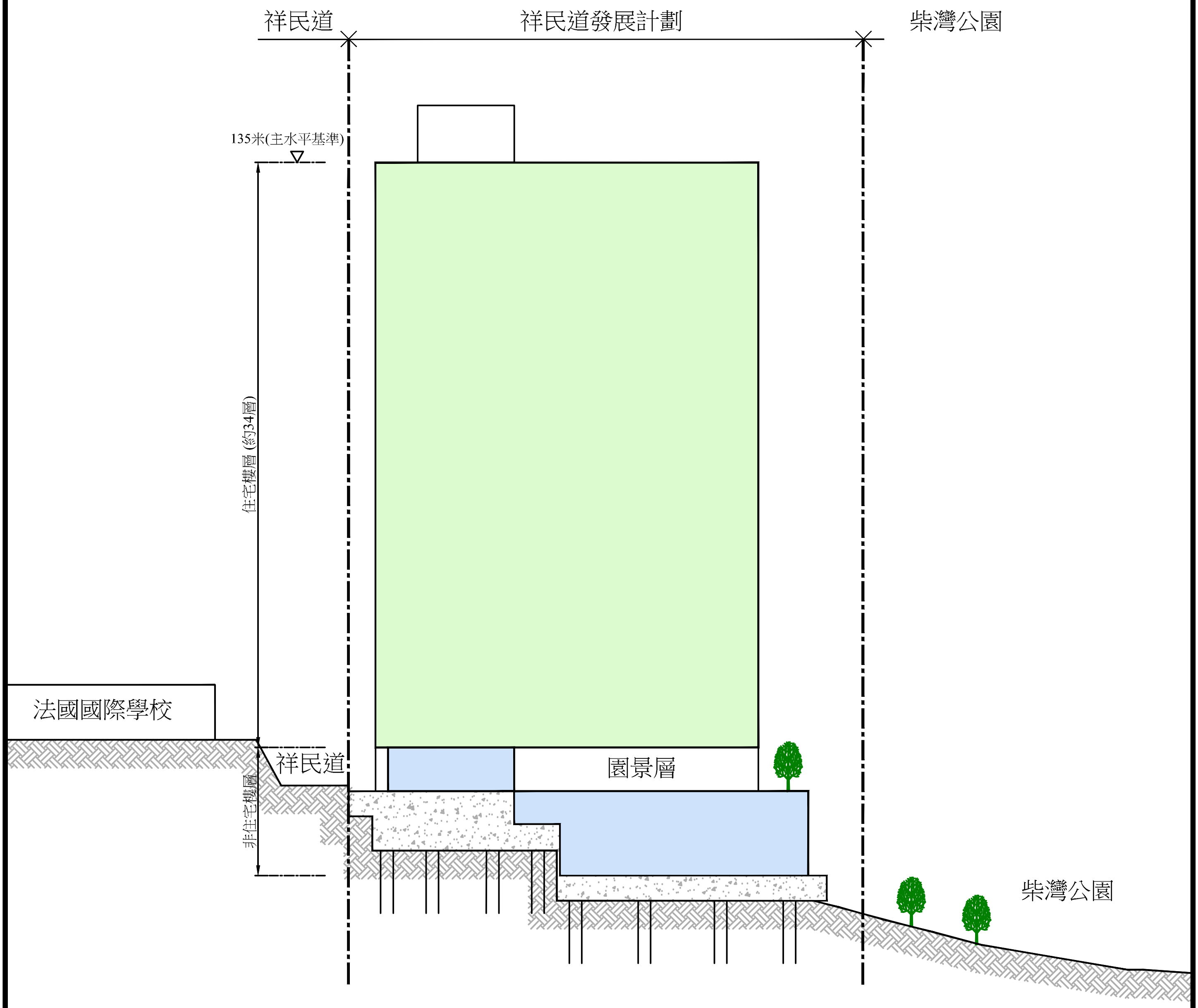
比例 SCALE 1:800 (A4)

擬建祥民道公營房屋發展計劃 – 概念設計圖
PROPOSED PUBLIC HOUSING DEVELOPMENT AT CHEUNG MAN ROAD - CONCEPTUAL LAYOUT PLAN

房 屋 署
HOUSING DEPARTMENT

附件一
ANNEX 1

日 期 DATE:
03/2020



擬建祥民道公營房屋發展計劃 – 剖面示意圖

PROPOSED PUBLIC HOUSING DEVELOPMENT AT CHEUNG MAN ROAD - SCHEMATIC SECTION

房 屋 署

HOUSING DEPARTMENT

附件二
ANNEX 2

日 期 DATE:
03/2020

Visual Appraisal for the Proposed Public Housing Development at Cheung Man Road, Chai Wan

1 Purpose

1.1 This Visual Appraisal (VA) aims to examine the possible visual impact of the proposed public housing development (proposed development) at Cheung Man Road (the Site), Chai Wan to support the rezoning from "Green Belt" ("GB"), "Open Space" ("O") and area shown as 'Road' to "Residential (Group A)" ("R(A)") use.

1.2 The VA assesses the impact of the overall site layout, development scale, form, massing, disposition and character of the development and its spatial relationship with overall townscape and surrounding landscape of the Site. This will facilitate the Metro Planning Committee (MPC) of the Town Planning Board (TPB) to visualise the three-dimensional connections of the proposed housing development with the surrounding environment.

2 Methodology

2.1 The scope of the VA includes the following steps:

a) Identification of the visual context and character within the wider context of Chai Wan where the Site is located;

b) Illustration of the visual impact of the proposed development in the respective areas by using computer-generated photomontages with the indicative layout of the development in the Site;

c) Identification and selection of viewpoints (VPs) to assess the visual impact locally for the Site. The VPs should be easily accessible and popular to the public and/or tourists and be able to demonstrate the visual impact of the proposed development on the adjacent neighbourhood areas. Important views to special landmarks, valued landscape features, ridgelines, etc. should be assessed where possible; and

d) Identification of the scale of the development in the Site. Using computer-generated photomontages to illustrate the visual impact and their significance from the identified VPs. Providing VA by evaluating the overall visual impact of the proposed development. Any design features or mitigation measures that help alleviate the visual impact will be discussed.

3 Site Particulars

3.1 The Site (about 0.49 ha) is located on a slope at Cheung Man Road in central Chai Wan. The Site is accessible via Cheung Man Road, a meandering road with narrow footpath and roadside plantation. The Site is zoned “GB”, “O” and area shown as ‘Road’ on the Chai Wan Outline Zoning Plan (OZP) No. S/H20/23. It is a piece of government land currently fenced off and vacant with natural terrain covered by dense vegetation, trees and bare soil. A water work reserves of 95m is located along the south-western boundary of the Site.

3.2 Buildings to the north of the Site are relatively low with French International School (51mPD), Cheong Gene Hang College (47-51mPD) and Meng Tak Catholic School (51-80mPD). To the northeast of the Site is Cheung Man Road Rest Garden and to the east of the Site is Chai Wan Park with mature trees on slopes. And the southwest of the Site are relatively higher with industrial/commercial buildings with maximum building height of 120mPD. The E-Trade Plaza (149mPD) is the tallest iconic building in the locality. The industrial/commercial buildings and the Site are separated by the existing pedestrian staircase that connects Cheung Man Road and Chai Wan MTR Station. To the northwest of the Site are existing high-rise residential buildings with diversity in building height and mass, including Greenwood Terrace (102-110mPD) and Neptune Terrace (132-136mPD). A small part of Chai Wan Park managed by Leisure and Cultural Services Department is located along the eastern and southern boundary of the Site. In the wider context, the Site is surrounded by green and blue visual elements about 500-600m off the Site, including the ridgeline of Mount Parker and Chai Wan Au to the north and Pottinger Peak to the southeast with vegetated green backdrop to the northeast and the Victoria Harbour to the north.

4 The Proposed Development

4.1 Development of one public housing building block is proposed at the Cheung Man Road Site. The proposed development parameters are set out below:

Site Area	:	About 0.49 ha
Maximum Plot Ratio	:	8/15 (domestic/non-domestic)
Maximum Building Height	:	135 mPD
Number of Flats	:	About 884

Design Population : About 2,475

Road widening work along Cheung Man Road would be required at the north-eastern boundary of the Site to accommodate better vehicles manoeuvring at Cheung Man Road. A footbridge linking the proposed development and the MTR station may be required in future subject to the Traffic Impact Assessment (TIA). As such, a footbridge to link the existing footbridge at Chai Wan MTR Station (Exit D) is assumed in this VA.

4.2 The Site adjoins a neighbourhood with a building height restriction of 120mPD under the OZP. It is justifiable to propose building height relaxation to 135mPD to maximise the development potential of public housing at the Site to accommodate domestic and non-domestic plot ratio 8/15 with severe site constraints. These include small site area on a slope, designation of non-building area for water works reserve, set back of 5m from Cheung Man Road to meet air quality requirement, specific building design, layout and disposition to address severe noise problems from nearby roads, MTR railway and fixed noise sources in adjacent industrial buildings. A sizable podium is also required to cater for high-end car parking ratio, additional ancillary car parks and welfare facilities.

5 Visual Appraisal

5.1 Six VPs are selected from different directions and distance (**Plan 2**). These VPs represent views from key pedestrian nodes and popular areas used by public for outdoor activities and public open spaces easily accessible to the public:

VP1 Basketball Court, Chai Wan Park – a public sports ground for outdoor and recreational activities within the neighbourhood area.

VP2 Chai Wan MTR Station (Exit E) at footbridge level – a key pedestrian route for residents and visitors between Chai Wan MTR Station and New Jade Garden, Chai Wan Government Offices, Chai Wan Maternal & Child Health Centre, Y Loft Youth Square, Chai Wan Law Uk Folk Museum, Hing Wah Community Centre and Hing Wah Estate. It is directly facing the Site and able to show the wider surrounding environment, including Chai Wan Flatted Factory and E-Trade Plaza.

VP3 Chinese Permanent Cemetery – a cemetery visited by the public for grave sweeping.

VP4 Podium of On Hing House, Hing Wan (II) Estate – a podium adjacent to the Red Cross Disaster Relief Warehouse and Hing Wah (II) Estate Office with an open view directly facing the Site.

VP5 Chai Wan North Service Reservoir Playground – a public playground with football field, rest and sitting-out area directly facing the Site.

VP6 Model Boat Pool, Chai Wan Park – a popular pedestrian route for park users and residents of Yee Tsui Court, Yue Wan Estate to/from MTR Station (Exit D) directly facing the Site.

5.2 Six photomontages are prepared to demonstrate the visual impact of the proposed development from the respective VPs.

VP1- Basketball Court, Chai Wan Park **(Figure 1)**

5.3 This VP is about 200m to the northeast of the Site. Chai Wan Park is a popular public open space providing a wide range of recreational facilities to serve the population of Chai Wan district. The basketball court is frequently used by the public and also has benches for sitting-out purpose regularly utilised during after-school hours and weekends by local residents. Given there are different types of user in the park for various activities ranging from pedestrian passing to long-stay activities, such as ball court users, the visual sensitivity is weighed medium.

5.4 As shown in **Figure 1**, the visual context of this view consists of mainly the industrial and commercial area, as well as the Chong Gene Hang College with existing trees in the foreground, and a residential development (known as the Greenwood Terrace) situates further back. The existing sky view is slightly blocked by E-Trade Plaza.

5.5 Based on the photomontage (**Figure 1**), a direct sight to the proposed development is envisaged with reduced visual openness and blockage of sky view. Given the proximity of the Site to VP1 and development intensity of the proposed development, it is inevitable that the visual impact will be more pronounced and the height of the proposed building is to a certain extent more prominent against the existing character of medium-rise industrial, institutional and residential building cluster. Nonetheless, given the adjacent industrial/commercial cluster is subject to a maximum building height restriction of 120mPD, the proposed development is not considered not incompatible in terms of the planned context. On balance, the overall visual change from this VP would be moderately adverse. The proposed footbridge would be fully screened by existing luxuriant trees and would be invisible at VP1.

5.6 To mitigate the visual impact while maximizing flat production, appropriate façade treatment would be investigated in the detailed design stage to minimise the visual impact of the proposed development. Existing mature trees of Chai Wan Park and future landscaping elements of the proposed development would also soften the visual impact.

<u>VP2 - Chai Wan MTR Station (Exit E) at footbridge level **(Figure 2)**</u>

5.7 VP2 is located at a footbridge about 320m away from the Site. It serves as a key circulation route to/from Chai Wan MTR Station frequently accessed by MTR riders and pedestrians. As shown in **Figure 2**, the view from the MTR Station towards the Site is dominated by various business/industrial and residential buildings. The proposed development in terms of scale, height, proportion would blend in with the visual composition of the built environment from VP2.

5.8 From this VP, the existing Cheung Tat Centre (91mPD) and E-Trade Plaza at Lee Chung Street have blocked part of the sky view. The proposed residential block (135mPD) would add on a very marginal impact behind the E-Trade Plaza with the local context. Only a small corner of the proposed building would be visible from this VP while maintaining the open sky view.

5.9 The visual sensitivity of VP2 is considered low as this VP largely serves as a circular space for MTR riders gaining access to and from the station without long stay. Very little visual change would be resulted to MTR riders and pedestrians and no adverse impact on the public perception attached to this view currently enjoyed. Particularly, the existing trees and buildings screen off most part of the proposed building. As such, the visual impact is considered negligible as demonstrated from this VP and the proposal would cause minimal visual incompatibility with the surroundings.

VP3 - Chinese Permanent Cemetery **(Figure 3)**

5.10 VP3 provides a distant view at about 780m from the Site to Mount Parker (507mPD), Tai Tam Country Park (Quarry Bay Extension) and Chai Wan Au and view of Chai Wan town centre. This VP is normally visited by grave sweepers and graveyard keepers during the Ching Ming and Chung Yeung Festivals and/or other special memorial occasions for ancestors. Considering that the visitors to the cemetery are generally limited to short stay, the visual sensitivity of VP3 is low. Sight of the existing ridgeline of Mount Parker is partly obstructed by E-Trade Plaza, Shan Tsui Court (171-177mPD) and Pamela Youde Nethersole Eastern Hospital (91-139mPD). The proposed residential block (135mPD) set in the middle when viewed from this VP would blend in with the existing urban visual context with a variety of building height, form and scale.

5.11 The proposed development would block a small portion of the ridgeline obstructing view to Shau Kei Wan Typhoon Shelter afar. However, limited impact on grave sweepers and graveyard keepers would be resulted as it is a distant view to the proposed development and most of the ridgeline, view to the harbour and visual openness could be preserved. The proposed building mass and bulk of block are also considered not excessive with slight change to existing view.

5.12 Overall, the proposed development could relate harmoniously with clusters of existing industrial/commercial, residential and institutional buildings. The visual impact from this VP is considered slightly adverse.

VP4 - Podium of On Hing House, Hing Wah (II) Estate **(Figure 4)**

5.13 VP4 is a sitting-out area normally visited by the local residents of Hing Wah (II) Estate for leisure purpose. It has an open and direct view about 460m towards the Site. It forms part of the footpath along Fei Tsui Road enroute to/from the bus stops at Chai Wan Road, Hing Wah Community Hall and Chai Wan MTR Station via a lift tower at Yu Hing House.

5.14 From this VP, the proposed residential block (135mPD) would be situated at a lower level in between Hong Man Industrial Centre (103mPD) and E-Trade Plaza. Only upper floors of the proposed development would be visible from VP4. The proposed mass, height and scale result in visual balance is considered compatible with the surrounding characters that could fit in well with the existing building clusters. **Figure 4** shows that the proposed development blocks only a small portion of the sky view with minimal impact on visual amenity.

5.15 The visual sensitivity of VP4 is medium given that the podium is a common area for the local residents to bypass and get together. The duration of the local residents to stay varies. The public perception of value attached to this view currently enjoyed by local residents would not be changed drastically. As such, the overall visual impact is considered slightly adverse and it would not cause significant visual incompatibility with the surroundings.

VP5 - Chai Wan North Service Reservoir Playground **(Figure 5)**

5.16 VP5 is located at a public playground with a football field and sitting-out area directly facing the Site of about 380m. This view towards the Site is predominated by the existing development of Pamela Youde Nethersole Eastern Hospital Pathology Block (91mPD), Chinese Permanent Cemetery (100mPD), E-Trade Plaza, Greenwood Terrace and Neptune Terrace and ridgeline of Pottinger Peak in the background. Based on **Figure 5**, with the presence of existing buildings in the locality, the proposed development blends into the existing built environment in relation to its height, location, mass, scale and proportion. Only the upper floors of the proposed development could be visible from VP5. The scale and mass, building height and disposition of the proposed block are not incompatible with the existing high-rise buildings and the urban context of Chai Wan District. Given the Site is relatively far from this VP, the proposed development would only be seen as an added component of the urban setting while maintaining the open sky view and preserving the existing visual openness.

5.17 The ridgeline of Pottinger Peak (312mPD) and Mount Collinson (348mPD) at the backdrop would be partially blocked by the proposed development (**Figure 5**), while ridgeline of Mount Collinson could largely be maintained. The visual sensitivity of VP5 is medium given that the playground is a public open space with ball courts and benches. The duration of the local residents could be up to a few hours depending on their purposes of the visit. Playground users sitting on the benches or playing the ball games originally view parts of a mountain backdrop. With the proposed development, they would see directly the upper floors of the proposed development and parts of mountain backdrop at both sides. The ridgeline and vegetated mountain backdrop could be partially maintained. The visual change is considered slight.

5.18 Public viewers would see it together with the existing built environment as a cluster. Existing trees and landscape areas in front of VP5 would help to alleviate the overall visual impact to existing park users with responsive building height profile, building orientation and building mass which will be explored at the detailed design stage. As such, the visual impact from this VP is considered slightly adverse.

VP6 - Model Boat Pool, Chai Wan Park **(Figure 6)**

5.19 This VP has various water features and sitting areas where visitors and local communities would rest and enjoy the urban greenery. Being a popular pedestrian route to/from Chai Wan MTR Station (Exit D), it is also a hotspot for electronic model boats players.

5.20 The proposed development would be compatible with E-Trade Plaza, Shan Tsui Court and the Pamela Youde Nethersole Eastern Hospital in terms of building height, scale and mass. The overall visual composition would be changed moderately with less visual openness, but most of the sky view would still be maintained.

5.21 The proposed development is clearly visible due to its close proximity to VP6 from a distance of about 290m. A direct sight to the proposed development is envisaged with less visual openness based on the photomontage (**Figure 6**). Given there are different types of user in the park for various activities ranging from pedestrian passing to long-stay activities, such as model boat users, the visual sensitivity is weighed medium. Users and pedestrians walking around VP6 originally enjoy a rather open sky view and would inevitably encounter the building mass of the proposed development obstructing the open sky view. The presence of E-Trade Plaza has already set a precedent of iconic high-rise building in the area. Comparatively, the proposed development would not cause an eyesore development. The proposed footbridge would be screened by mature trees when viewed from VP6. The visual change is considered slight.

5.22 The proposal would be visible from VP6 but it would not affect the public realm and not cause significant blockage to visual openness and visual amenity of the surroundings. As such, the proposed public housing development from this VP is considered moderately adverse.

5.23 To mitigate the visual impact while maximizing flat production, appropriate façade treatment would be investigated in the detailed design stage to minimise the visual impact of the proposed development. Other mitigation measures include terraced podium design, planting proposal to soften the development edge and integration with existing trees and landscaped areas in Chai Wan Park.

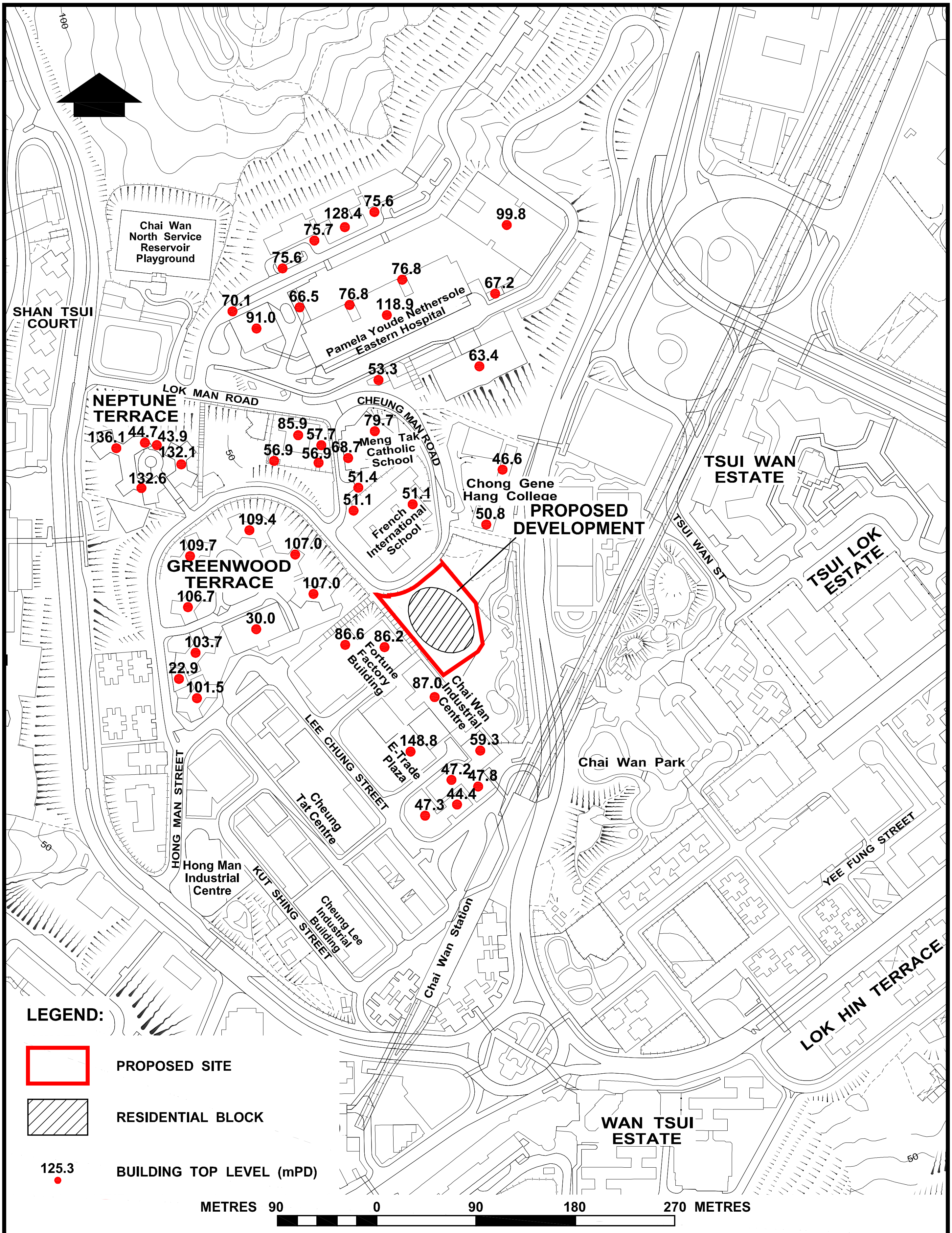
6 Conclusion

6.1 The proposed development will undoubtedly bring some visual changes to the general neighbourhood and it would to a certain extent, inevitably affect the overall visual openness in the immediate neighbourhood of Chai Wan. The visual impact of the proposed development will be negligible as viewed from VP2 due to nearby building blockages; slightly adverse from VP3, VP4 and VP5 when viewed from a longer distance; and moderately adverse from VP1 and VP6 when viewed from a shorter distance. The major disruptions to visual sensitive users would be in Chai Wan Park (VP1 and VP6) where they would experience visual changes with less open sky view. Efforts will be made to mitigate the impacts.

6.2 Due to the small site size and some severe site constraints, like severe noise and existence of water works reserve, the proposed development would be a high-rise building to optimise the development intensity for flat production. Appropriate and careful mitigation measures would be explored at the detailed design stage to soften the overall visual impact. These include, but not limited to, terraced podium design, responsive building disposition and orientation, façade treatment with harmonious colour scheme, open space, at-grade greening and vertical greening. By integrating the proposed development well with the locality, it is possible to conclude after assessing the six VPs that the visual impact of the proposed development is considered slightly adverse and will not induce insurmountable visual impact on the surrounding environment.

Attachments

Plan 1	Surrounding Building Height
Plan 2	Location Plan and Viewpoints
Figure 1	Photomontage at VP1 (View from Basketball Court, Chai Wan Park)
Figure 2	Photomontage at VP2 (View from Chai Wan MTR Station (Exit E) at Footbridge Level)
Figure 3	Photomontage at VP3 (View from Chinese Permanent Cemetery)
Figure 4	Photomontage at VP4 (View from Podium of On Hing House, Hing Wah (II) Estate)
Figure 5	Photomontage at VP5 (View from Chai Wan North Service Reservoir Playground)
Figure 6	Photomontage at VP6 (View from Model Boat Pool, Chai Wan Park)



SURROUNDING BUILDING HEIGHT

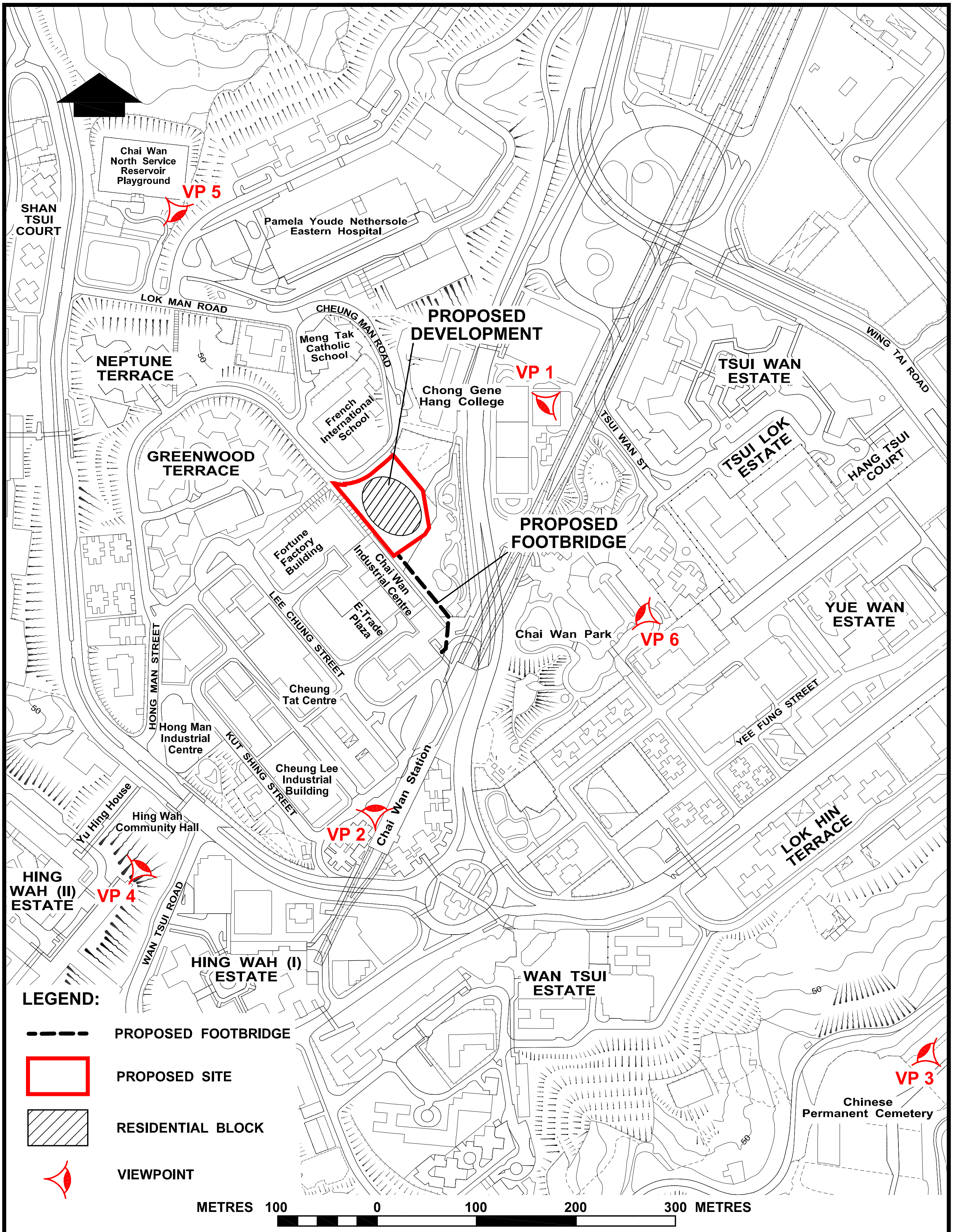
HOUSING DEPARTMENT
PLANNING SECTIONS

PLAN 1

DATE : 04. 12. 2018

BASE EXTRACTED FROM SHT. No. 11-SE-D

18_1207HK_Plan1



HOUSING DEPARTMENT
PLANNING SECTIONS

LOCATION PLAN AND VIEWPOINTS

PLAN 2

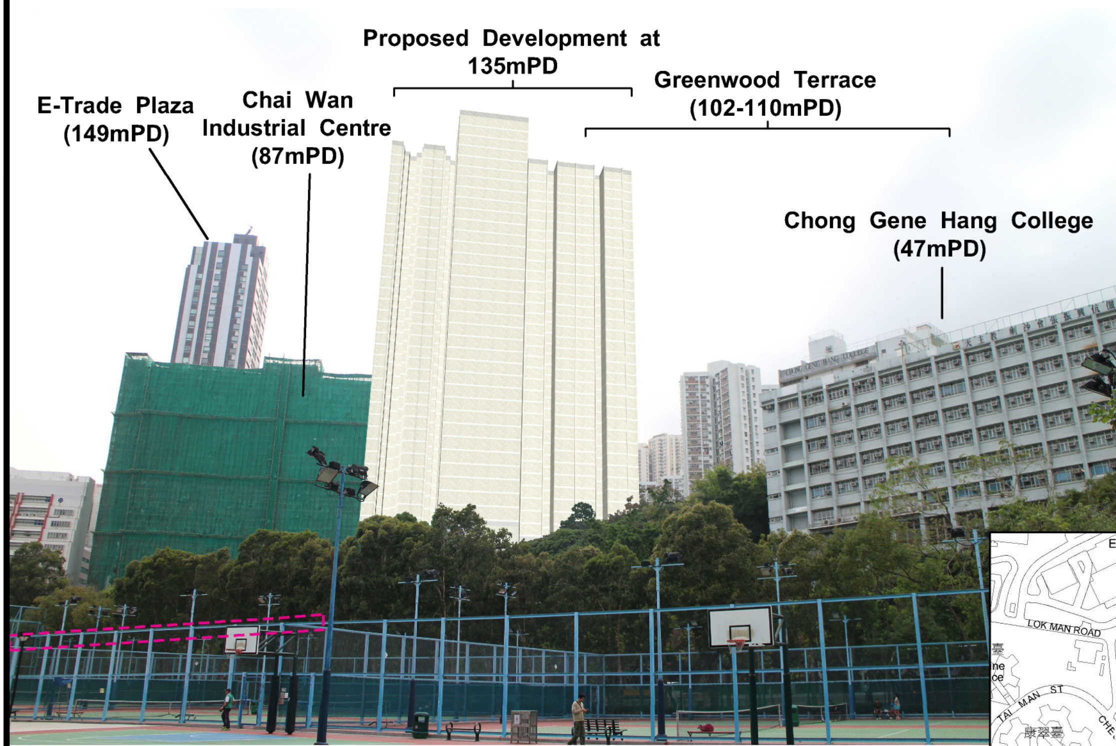
DATE :
04. 12. 2018

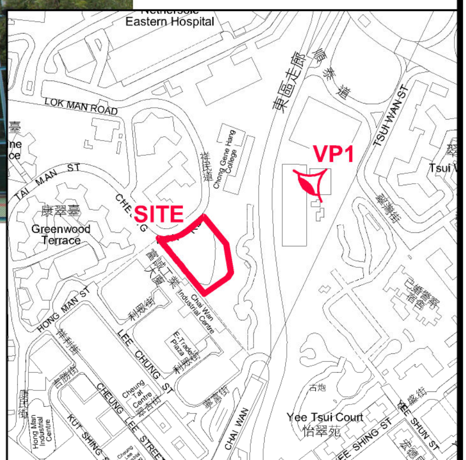
BASE EXTRACTED FROM SHT. No. 11-SE-D

18_1207HK_Plan2

Existing View

With Proposed Development





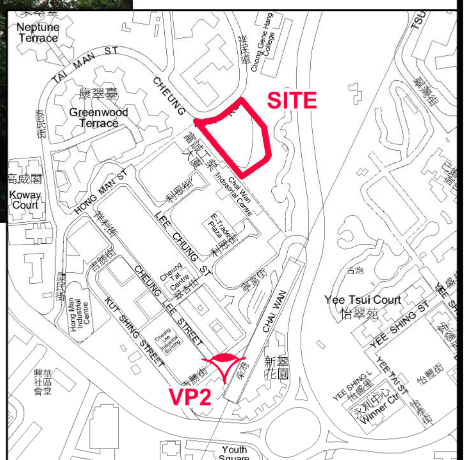
LEGEND:

PROPOSED NEW FOOTBRIDGE

PHOTOMONTAGE AT VIEWPOINT 1 (VIEW FROM BASKETBALL COURT, CHAI WAN PARK)	HOUSING DEPARTMENT PLANNING SECTIONS	
	Figure 1	DATE : 04. 12. 2018

Existing View

With Proposed Development



PHOTOMONTAGE AT VIEWPOINT 2 (VIEW FROM CHAI WAN MTR STATION (EXIT E) AT FOOTBRIDGE LEVEL)

HOUSING DEPARTMENT
PLANNING SECTIONS

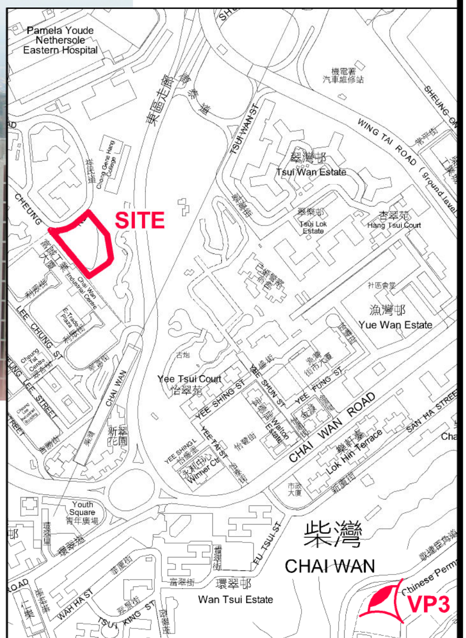
Figure 2

DATE :
04. 12. 2018

18_1206HK_VP2

Existing View

With Proposed Development



PHOTOMONTAGE AT VIEWPOINT 3 (VIEW FROM CHINESE PERMANENT CEMETERY)

HOUSING DEPARTMENT
PLANNING SECTIONS

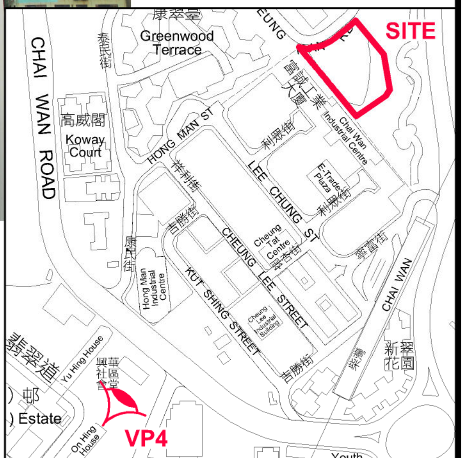
Figure 3

DATE : 04. 12. 2018

18_1206HK_VP3

Existing View

With Proposed Development



PHOTOMONTAGE AT VIEWPOINT 4 (VIEW FROM PODIUM OF ON HING HOUSE, HING WAH (II) ESTATE)

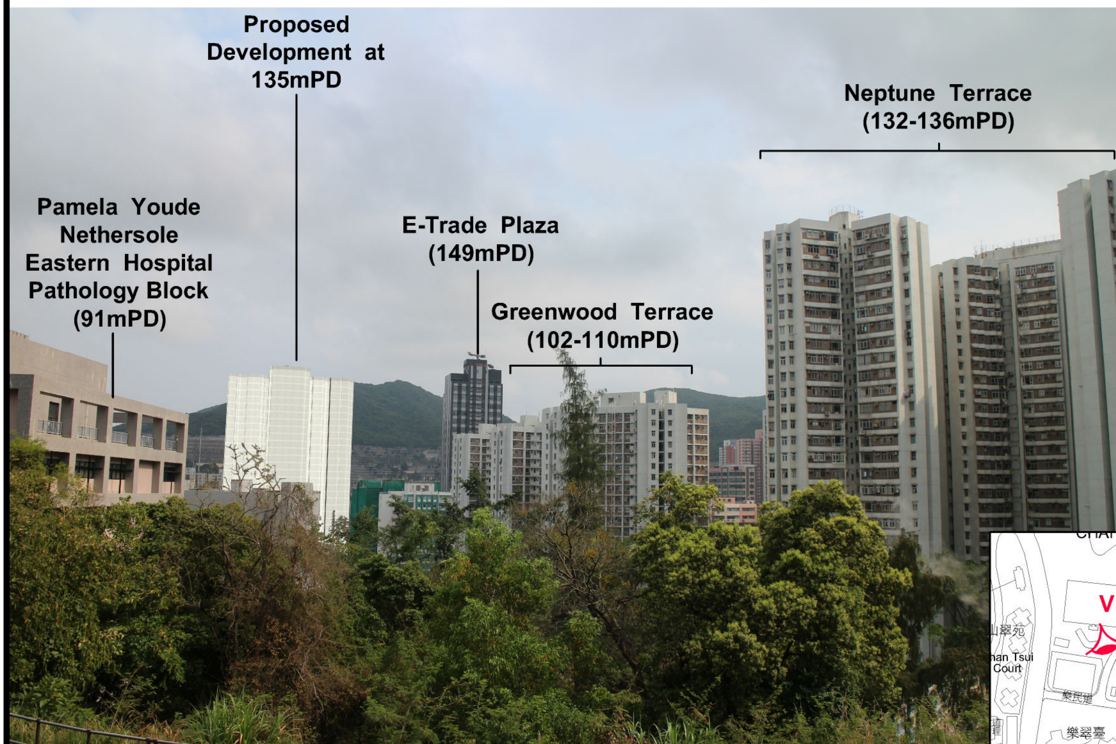
HOUSING DEPARTMENT
PLANNING SECTIONS

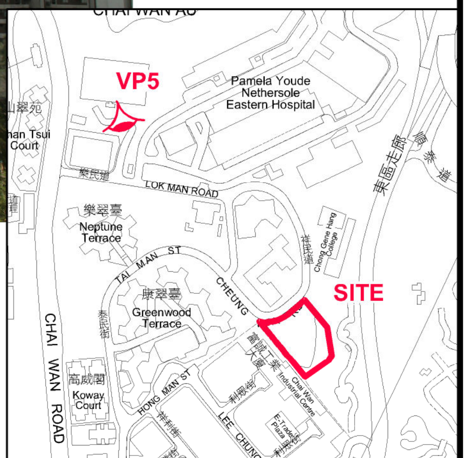
Figure 4	DATE : 04. 12. 2018

18_1206HK_VP4

Existing View

With Proposed Development





PHOTOMONTAGE AT VIEWPOINT 5 (VIEW FROM CHAI WAN NORTH SERVICE RESERVOIR PLAYGROUND)

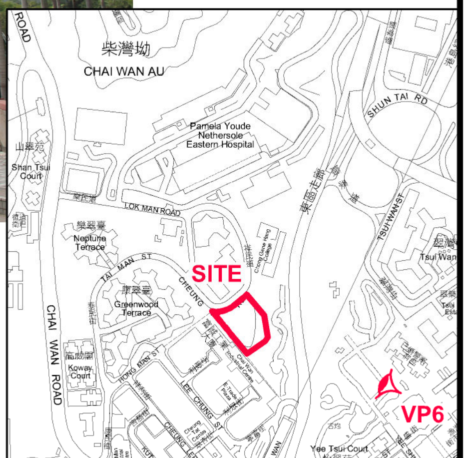
HOUSING DEPARTMENT
PLANNING SECTIONS

Figure 5	DATE : 04. 12. 2018

18_1206HK_VP5

Existing View

With Proposed Development



LEGEND:

PROPOSED NEW FOOTBRIDGE

PHOTOMONTAGE AT VIEWPOINT 6 (VIEW FROM MODEL BOAT POOL, CHAI WAN PARK)

HOUSING DEPARTMENT
PLANNING SECTIONS

Figure 6

DATE :
04. 12. 2018

Attachment VIII of
MPC Paper No. 2/20

AECOM

Hong Kong Housing Authority

CB20170587

Consultancy for Environmental Design Studies for Public Housing Development at Cheung Man Road, Chai Wan

Air Ventilation Assessment – Initial Study (AVA-IS)

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1 INTRODUCTION

Background

1.1 AECOM Asia Co. Ltd. has been commissioned by the Hong Kong Housing Authority (HKHA) to undertake an Air Ventilation Assessment (AVA) Study – Initial Study (IS) using Computational Fluid Dynamics (CFD) for the rezoning proposal of the potential Public Housing Development located at Cheung Man Road, Chai Wan to examine the air ventilation impact of the proposed building design quantitatively and formulate effective and practicable measures enhancing the air ventilation as part of the continuous design improvement process.

Objectives

1.2 The AVA Study for the proposed public housing development at Cheung Man Road (i.e. the Project Area) has been conducted in accordance with the methodology outlined in the Technical Guide for AVA for Developments in Hong Kong (the Technical Guide) annexed in HPLB and ETWB TC No. 1/06. The main purposes of this AVA Study, echoing the Technical Guide, are:

- To assess the characteristics of the wind availability (V_∞) of the Site;
- To give a general pattern and a rough quantitative estimate of wind performance at the pedestrian level reported using Wind Velocity Ratio (VR);
- To quantitatively assess the air ventilation performance in the neighbourhood of the Proposed Development; and
- To compare two design scenarios in terms of air ventilation performance aspect.

Content of This Report

1.3 Section 1 is the introduction section. The remainder of the report is organized as follows:

- Section 2 on site characteristics;
- Section 3 on assessment methodology;
- Section 4 on assessment criteria;
- Section 5 on key findings of AVA study;
- Section 6 on directional analysis; and
- Section 7 with a summary and conclusion.

2 SITE CHARACTERISTICS

Project Area and Its Surrounding Area

2.1 The Project Area is currently an unoccupied site with an area of approximately 0.49 ha. It is located at Cheung Man Road, Chai Wan, bounded by Cheung Man Road in the north-west direction, existing natural slopes and Chai Wan Park from the north-east to the south-east direction and existing industrial buildings in the south-west direction.

Figure 2.1 Overview of the Project Area and its Surroundings (Source: Lands Department)

2.2 According to the "Approved Chai Wan Outline Zoning Plan No. S/H20/23", the Project Area is zoned as "Green Belt" ("GB"), "Road" and "Open Space" ("O"). To the north of the Project Area across the Cheung Man Road is low to mid-rise "G/IC" cluster on the uphill topography including the French International School, Chong Gene Hang College, Meng Tak Catholic School and Chai Wan Police Station. Higher building height restrictions of 70 to 140mPD are adopted for the Pamela Youde Nethersole Eastern Hospital against the mountain backdrop.

2.3 To the immediate northeast, east and southeast of the Project Area lies the existing natural slopes and a large "Open Space" ("O") Chai Wan Park amid the built-up area of Chai Wan.

2.4 To the south and south-west of the Project Area are industrial sites. Maximum height of 100 to 120mPD for this "Other Specified Uses" ("OU") zone is adopted in the inland in order to achieve a stepped building height profile and to preserve the existing view to the ridgelines. The two high-rise existing industrial buildings near the Project Area are Fortune Factory Building Block B and Chai Wan Industrial Centre Block A.

2.5 **Figure 2.2** shows that a 15m wide building gap above 23mPD (about 15m above ground level) between Chai Wan Industrial Centre and Minico Building has been proposed in "AVRG67" (AVA-EE of Chai Wan Area) and OZP "S/H20/23", taking account of the existing building gap above podium level for air/wind penetration to facilitate the air ventilation along the major southwest-northeast designated air path.

2.6 To the north-west of the Project Area lies a "Residential (Group A)" ("R(A)") zone with a building height restriction of 120mPD.

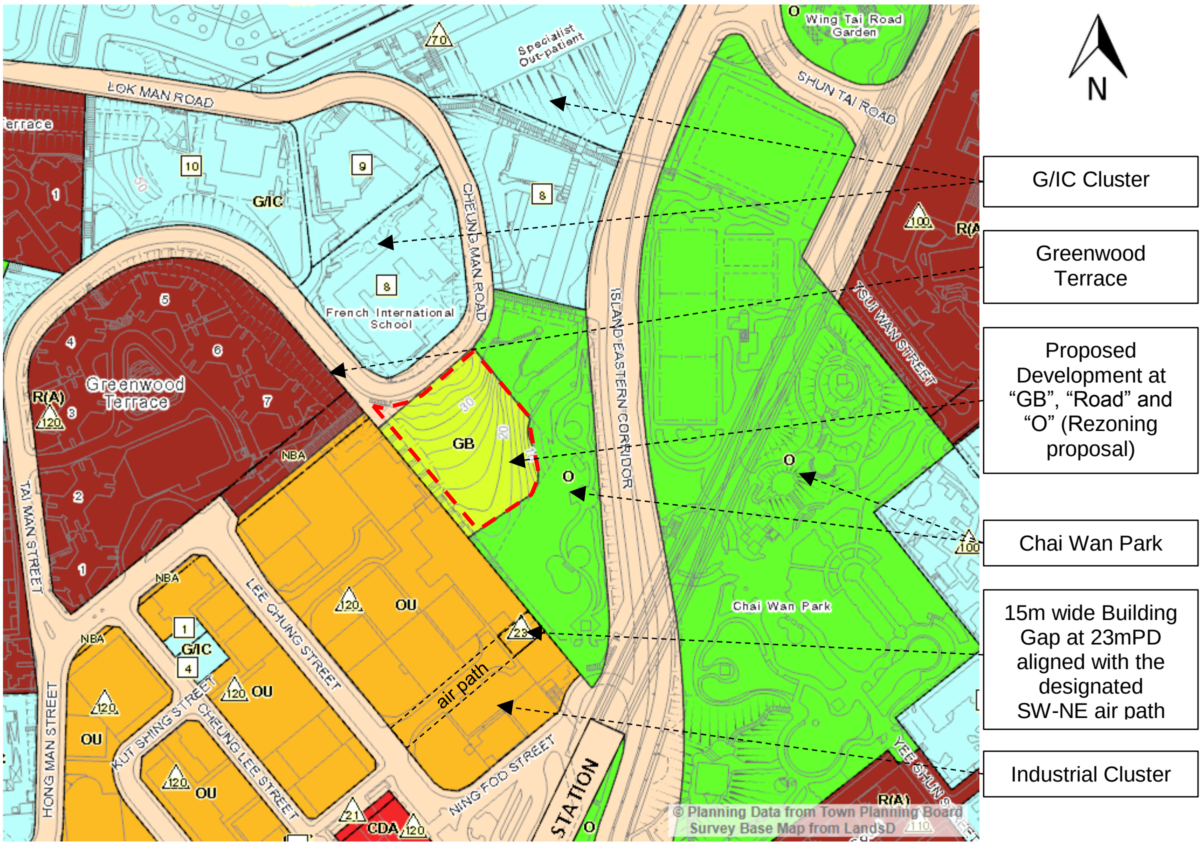


Figure 2.2 **Close-up view of the Project Area and its Surroundings as shown on the OZP (Source: Town Planning Board)**

3 ASSESSMENT METHODOLOGY

3.1 This AVA study was carried out in accordance with the guidelines stipulated in the Technical Guide for AVA for Developments in Hong Kong with regard to Computational Fluid Dynamics (CFD) modelling. Reference was also made to the "Recommendations on the use of CFD in Predicting Pedestrian Wind Environment" issued by a working group of the COST action C14 "Impact of Wind and Storms on City Life and Built Environment" (COST stands for the European Cooperation in the field of Scientific and Technical Research). COST action C14 is developed by European Laboratories/Institutes dealing with wind and/or structural engineering, whose cumulative skills, expertise and facilities have an internationally leading position. Thus, it is considered that the COST action C14 is a valid and good reference for CFD modelling in AVA study.

Modelling Tool and Model Setup

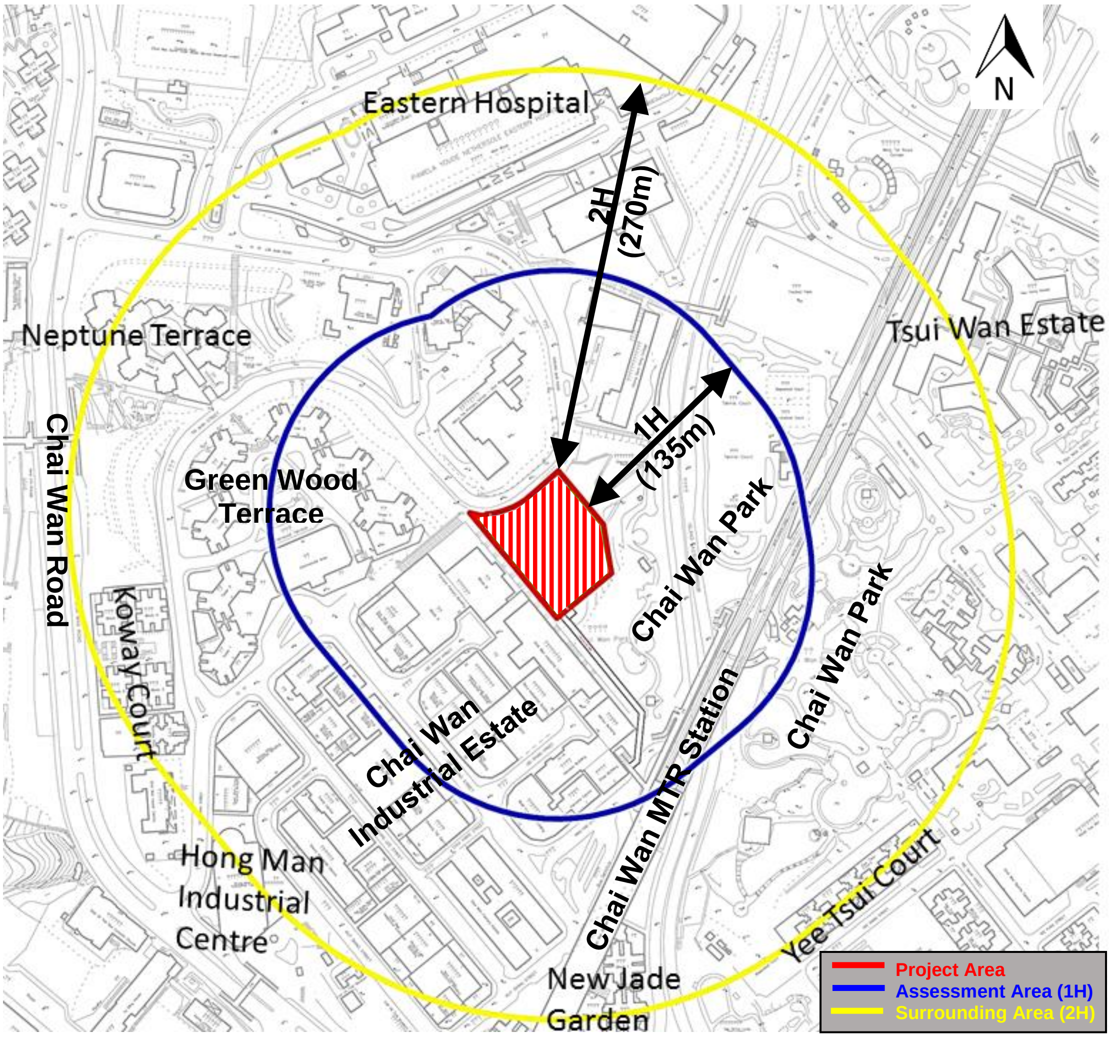
3.2 Assessment was conducted by means of 3-dimensional CFD model. The well-recognised commercial CFD package FLUENT was used in this exercise. FLUENT model had been widely applied for various AVA research and studies worldwide. The accuracy level of the FLUENT model was very much accepted by the industry for AVA application.

Computational Domain

3.3 A 3D CFD model including major topographical features and building morphology which would likely affect the wind flow was constructed. The methodology described in the Technical Guide was adopted for this assessment. According to the Technical Guide, the Assessment Area should include the project's surrounding up to a perpendicular distance of 1H while the Surrounding Area should at least include the project's surrounding up to a perpendicular distance of 2H calculating from the project boundary, H being the height of the tallest building on site. In this study, the value of H being 135 meters with the computational domain size of around 6000m x 6000m x 2000m. In addition, the blockage ratio would be not greater than 3%. The ground of the computational domain would include topography.

Assessment and Surrounding Areas

3.4 Both the Base Scheme and Proposed Scheme are assessed under annual and summer wind conditions. A 3D model will be built according to the GIS information obtained from Lands Department. All known planned/committed developments, including those under approved planning applications, rezoning proposals, approved building plans and all other major elevated structures, noise barriers, within the Surrounding Area are also included in the model. The Assessment Area (marked in Blue) and Surrounding Area (Marked in Yellow) have also been incorporated in the simulation model for Air Ventilation Assessment as shown in **Figure 3.1**.



H being the height of the tallest building on site

Figure 3.1 Boundaries of the Project Area, Assessment Area and Surrounding Area

Studied Schemes

3.5 **Figure 3.2** and **Figure 3.3** demonstrated model geometry of the Base Scheme and the Proposed Scheme in the simulation.

Base Scheme

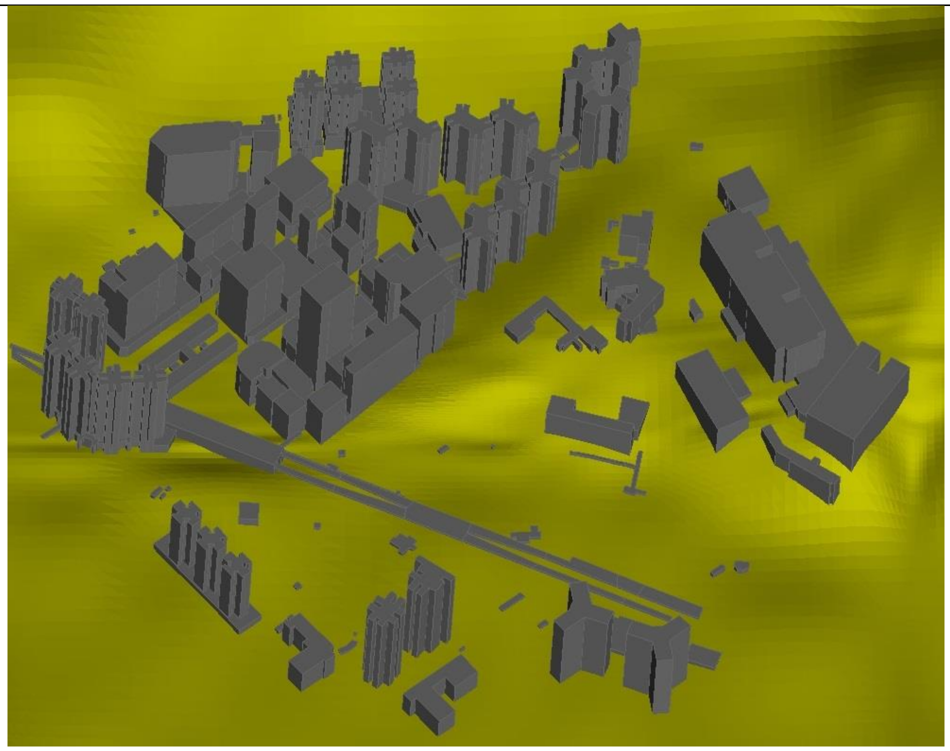
3.6 The Base Scheme adopts the current site condition prior to the construction of the Proposed Development. The Base Scheme is a “Green Belt” (“GB”) in Outline Zoning Plan (OZP) S/H20/23 for the conservation of existing natural environment.

Proposed Scheme

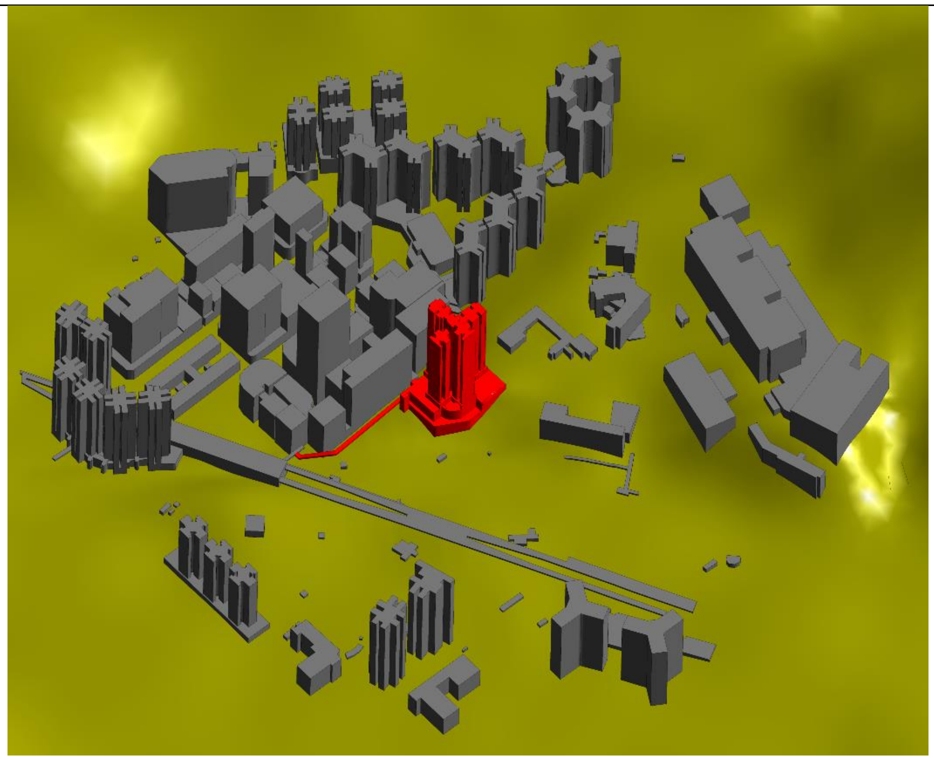
3.7 The Proposed Scheme comprises of a 34-storey residential block, a 1-storey semi-basement carpark, 1-storey semi-basement for building services and 1-storey semi-basement for welfare facility, and estate management office. The Proposed Development has a building height of 135mPD.

3.8 It is noticed that there might be lift tower and footbridge linking from the Proposed Development towards the MTR station (the F/B from hereafter) constructed in the future. Although at the current stage, the proposal, design layout and alignment of the F/B would be subjected to the Traffic Impact Assessment and / or public demands and remains uncertain, in order to assess the cumulative impact of the proposal with the F/B, a simple F/B is included in the model as follows:

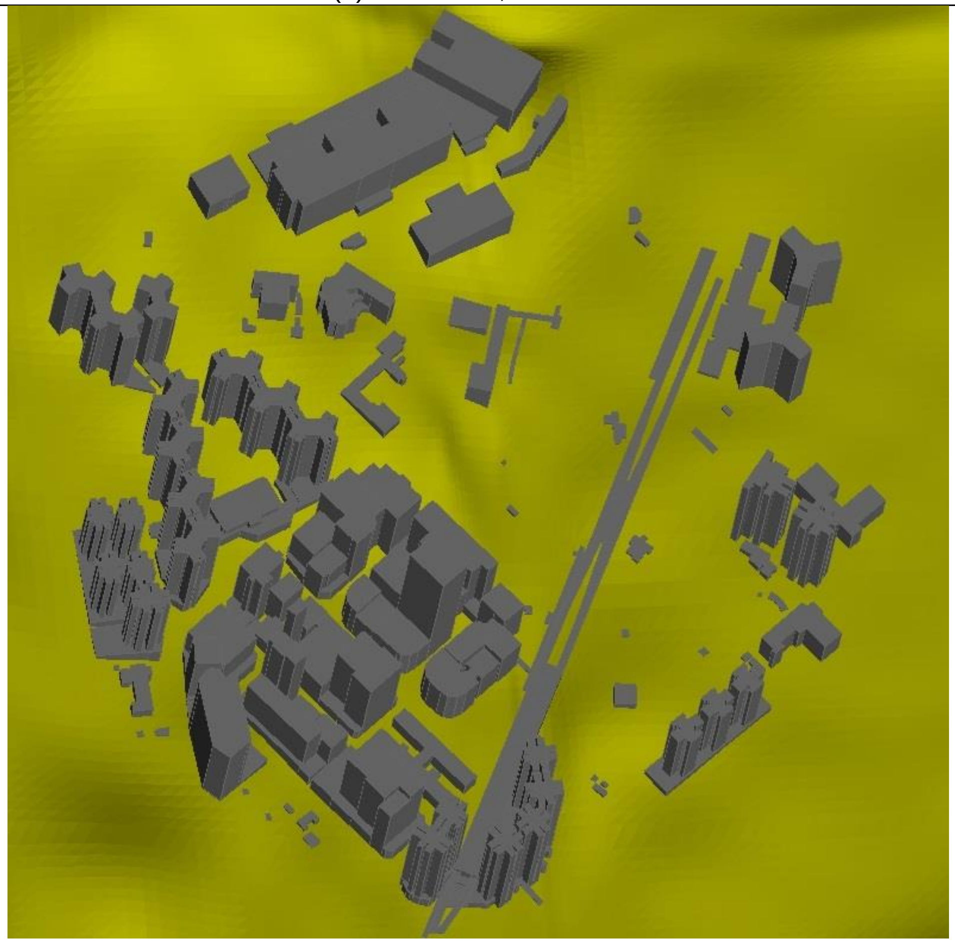
a) The F/B is elevated and generally much more than 2m above the adjoining ground level;
b) It is an open sided structure with good porosity for air passage;
c) The lift tower would be close proximity to the Proposed Development;
d) The F/B would connect to existing elevated MTR station/tracks and walkways at similar level.



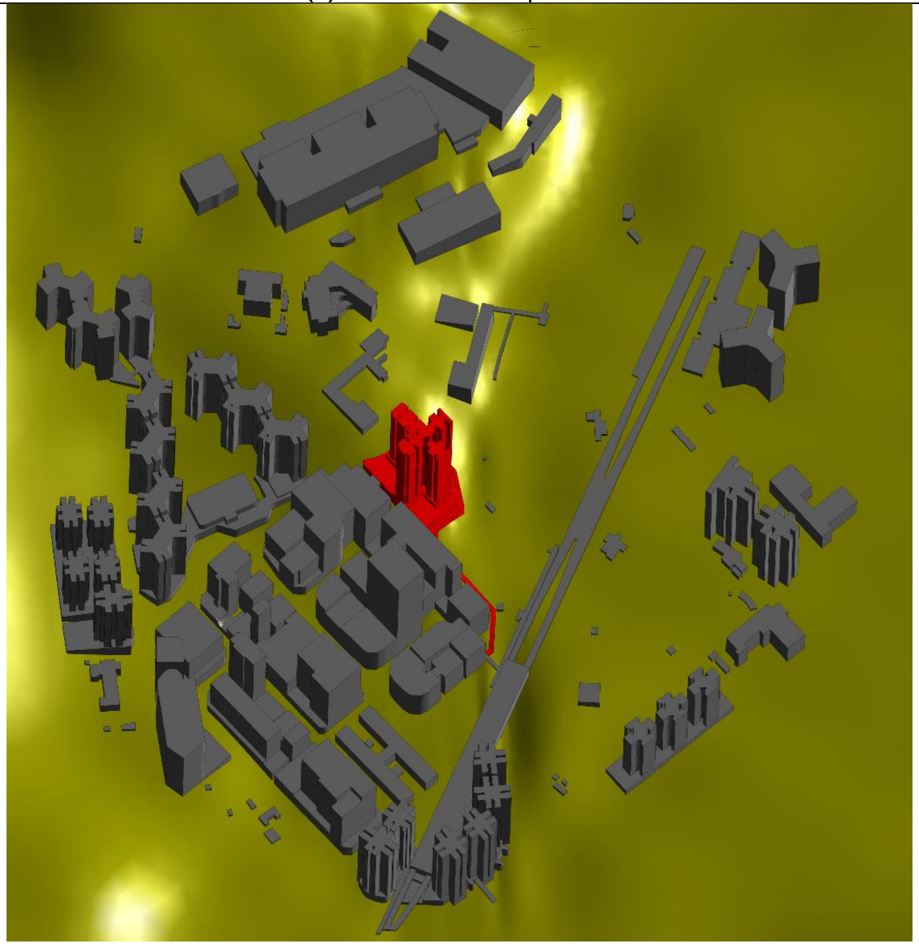
(a) East View, Base Scheme



(b) East View, Proposed Scheme

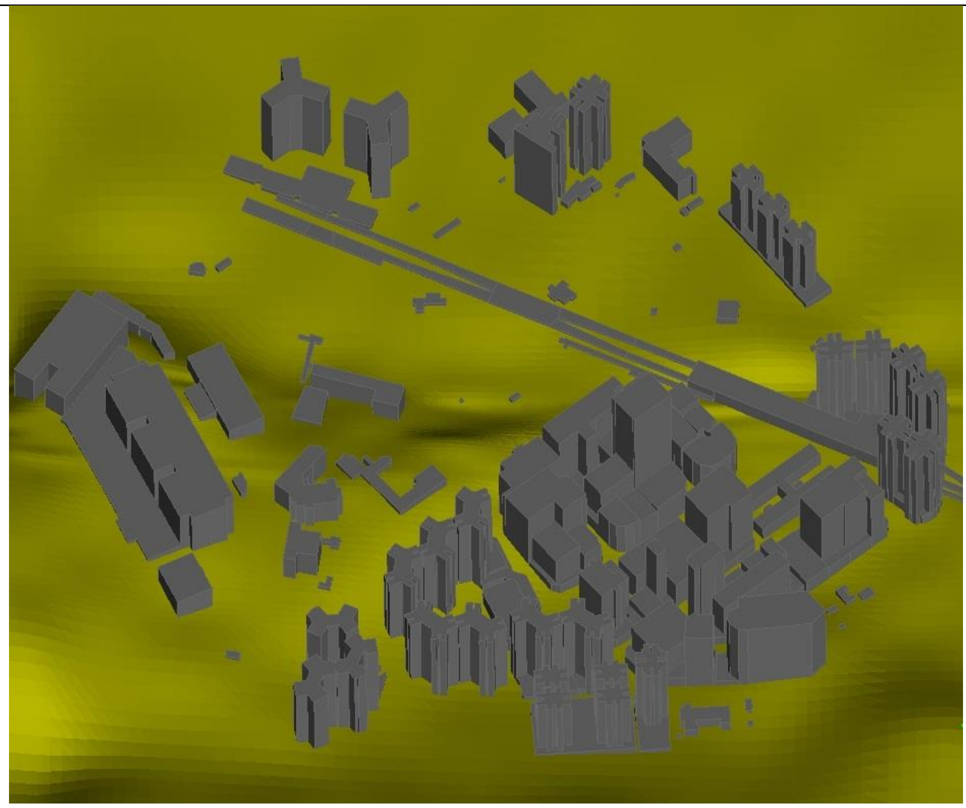


(c) South View, Base Scheme

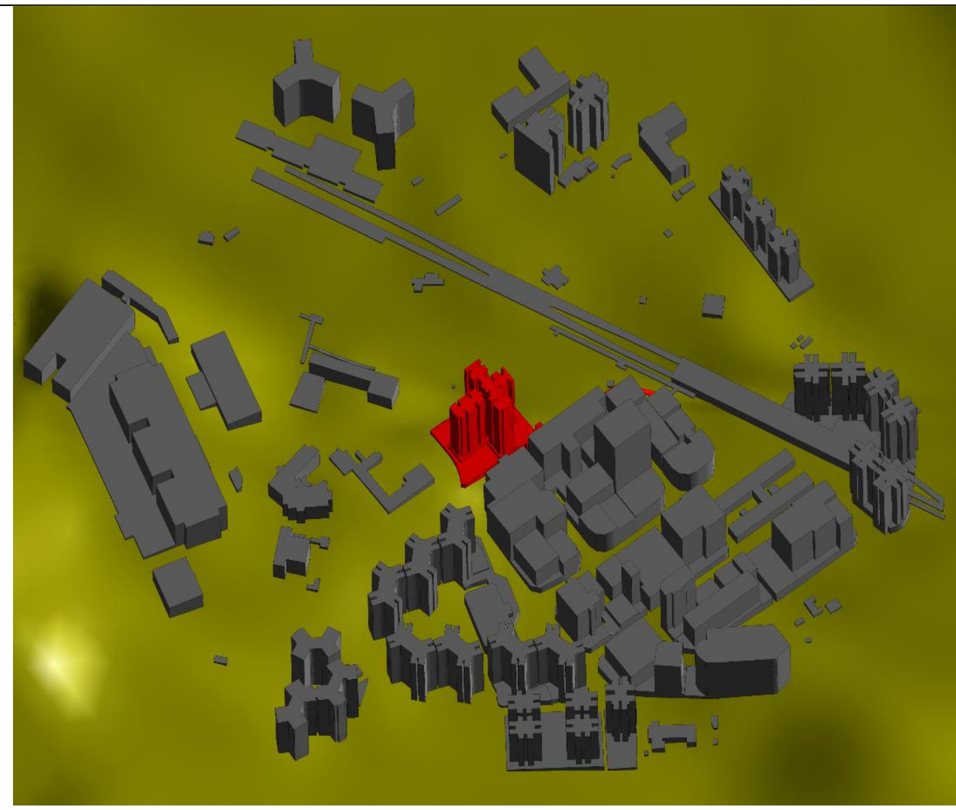


(d) South View, Proposed Scheme

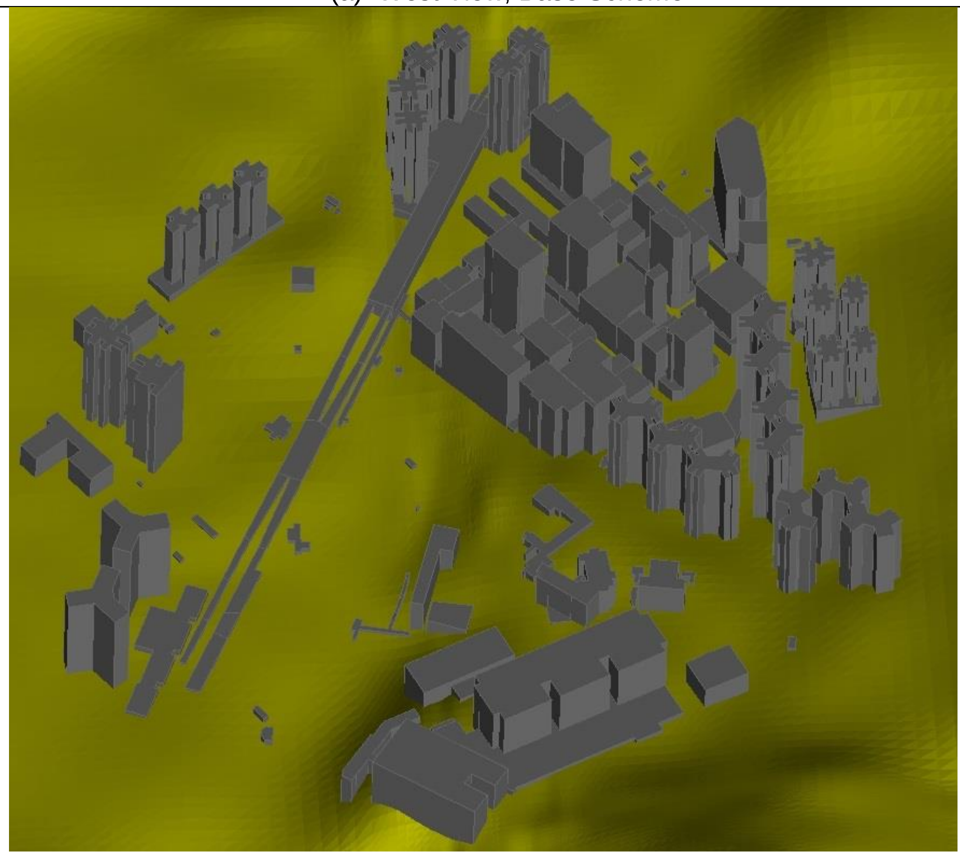
Figure 3.2 Model Geometry under East and South view



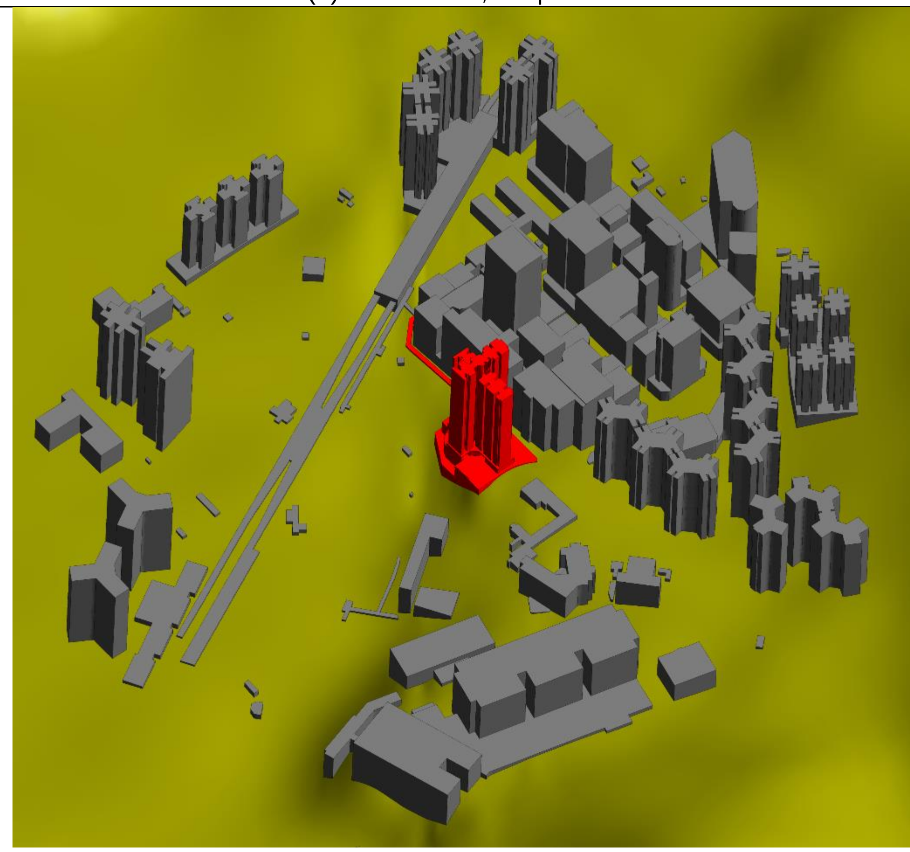
(a) West View, Base Scheme



(b) West View, Proposed Scheme



(c) North View, Base Scheme



(d) North View, Proposed Scheme

Figure 3.3 Model Geometry under West and North views

Wind Environment

3.9 The site wind availability of the Project Area will be simulated under at least 8 probable prevailing wind directions (which would represent occurrence of more than 75% of time) under both annual and summer condition to illustrate the change in local wind condition due to the Proposed Development. These prevailing wind directions are determined based on the wind availability simulation result of Regional Atmospheric Modelling System (RAMS) model published by Planning Department (PlanD from hereafter). **Figure 3.4** shows the location of relevant wind data extraction while the wind roses representing annual and summer winds at the Project Area of this study are presented in **Figure 3.5** below. Furthermore, the summarized chosen prevailing wind directions and their related occurrence probability are listed in **Table 3.1**. Details of the wind probability table is presented in Appendix A.

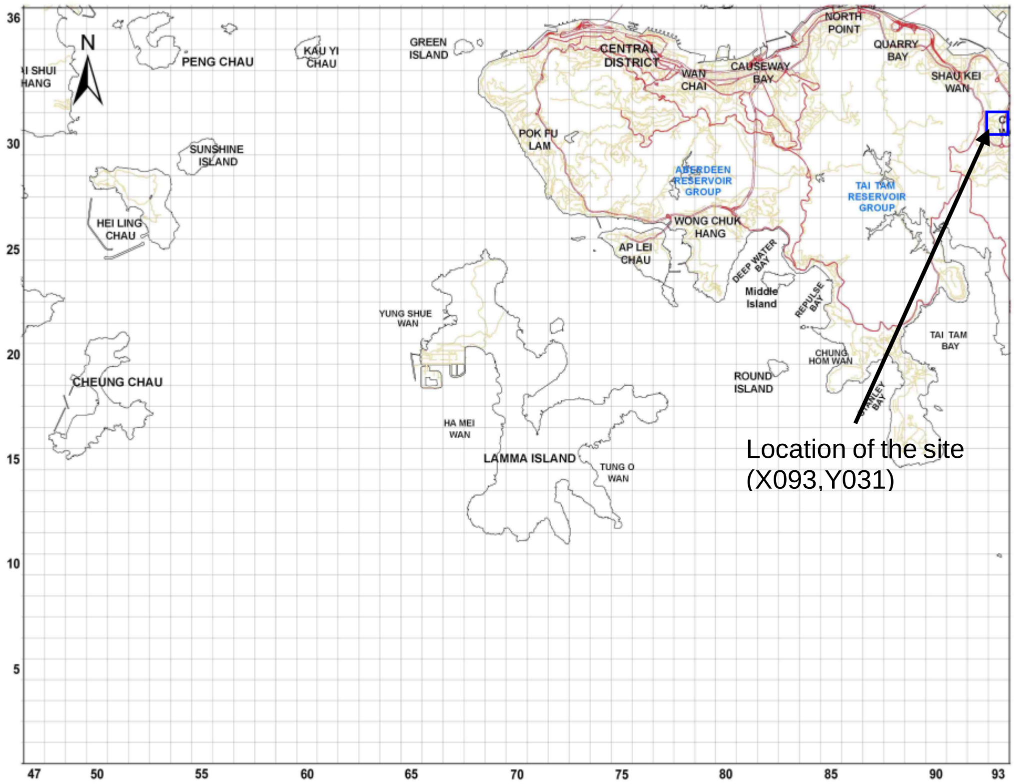
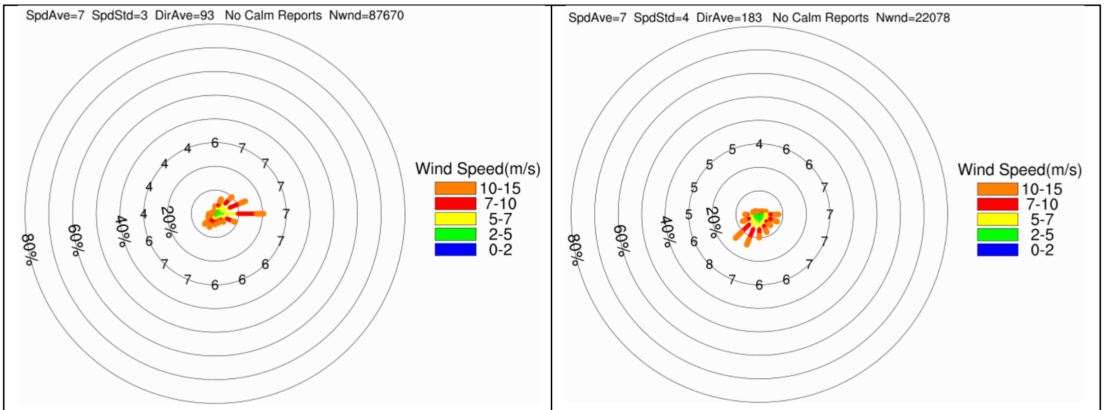


Figure 3.4 **Location of data extraction in RAMS model**



(a) Annual Wind Rose (b) Summer Wind Rose

Figure 3.5 **Wind Rose at Grid (X093, Y031) (500m height)**

Table 3.1 Simulated Wind Directions and their corresponding percentage occurrence, at 500m height

Annual Wind Direction	% of Annual Occurrence	Summer Wind Direction	% of Summer Occurrence
22.5º (NNE)	6.8%	90º (E)	8.4%
45º (NE)	10.2%	112.5º (ESE)	8.4%
67.5º (ENE)	14.0%	135º (SE)	6.8%
90º (E)	20.7%	157.5º (SSE)	8.3%
112.5º (ESE)	9.1%	180º (S)	10.3%
135º (SE)	5.0%	202.5º (SSW)	14.3%
202.5º (SSW)	6.2%	225º (SW)	14.9%
225º (SW)	6.3%	247.5º (WSW)	7.8%
Total occurrence	**78.3%**	**Total occurrence**	**79.2%**

Vertical Wind Profiles

3.10 Wind environment under different wind directions will be defined in the CFD environment. According to the Technical Guide (HPLB and ETWB, 2006) per Para 20, wind profile for the Project Area could be appropriated from the V_∞ data developed from RAMS and with reference to the Power Law or Log Law using coefficients appropriate to the site conditions. In this assessment, vertical wind profile condition below 20mPD is determined using the Log Law while the wind speed above 20mPD is adopted from the RAMS wind and wind profile in PlanD's website.

3.11 Vertical wind profile and roughness lengths are determined accordingly as follows:

$$\text{Log Law} \quad U_z = \frac{u^*}{\sigma}\ln\left(\frac{Z}{Z_0}\right)$$

Where U_Z : wind speed at height z from ground
u^* : friction velocity
σ : von Karman constant = 0.4 for fully rough surface
Z : height z from ground
Z_0 : roughness length.

3.12 The roughness length for determining vertical wind profiles under different wind direction is tabulated in **Table 3.2**. In this study, the land further away from the surrounding area are urban areas with mid to high-rise developments, as a result, a roughness length with Z_0=3 is adopted for the inflow wind profiles.

Table 3.2 Roughness Length for Determining Vertical Wind Profiles under Different Wind Directions

Land Type of Upwind Area(1)	Roughness Length(2), Z_O
Urban area with mid and high-rise developments	3
Sea or open space	0.1

Notes:
(1) The land type refers to the area upwind of the model domain further away from the Surrounding Area
(2) With reference to Feasibility Study for Establishment of Air Ventilation Assessment System (CUHK, 2005)

Mesh Setup

3.13 The total number of cells for this study is about 17,000,000 cells in polyhedral mesh. Tetrahedral mesh cells counts can often be much smaller than comparable tetrahedral meshes with equivalent accuracy as well as improve mesh quality and manner of convergence (Franklyn, 2006). Grids may be converted to polyhedral mesh, if necessary. The horizontal grid size employed in the CFD model in the vicinity of the Project Area will be taken as a global minimum size of about 2m (smaller grid size was also employed for specific fine details) and increased for the grid cells further away from the Project Area. The maximum mesh size within the whole computational domain will be about 60m. Besides, four layers of prism cells (each layer of 0.5m thick) were employed above the terrain.

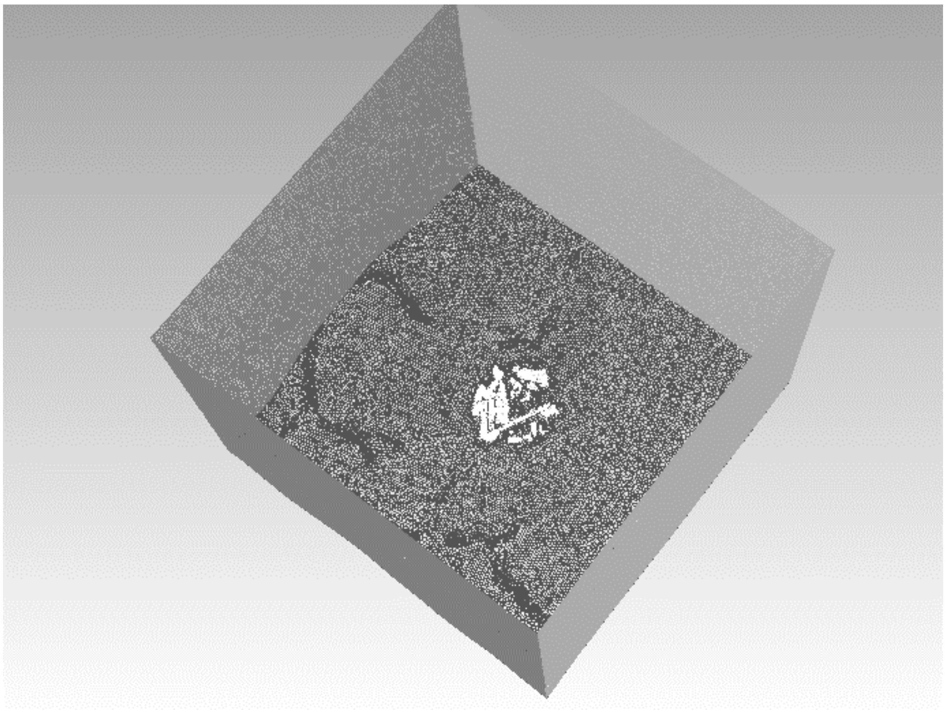


Figure 3.6 Mesh of the simulation domain

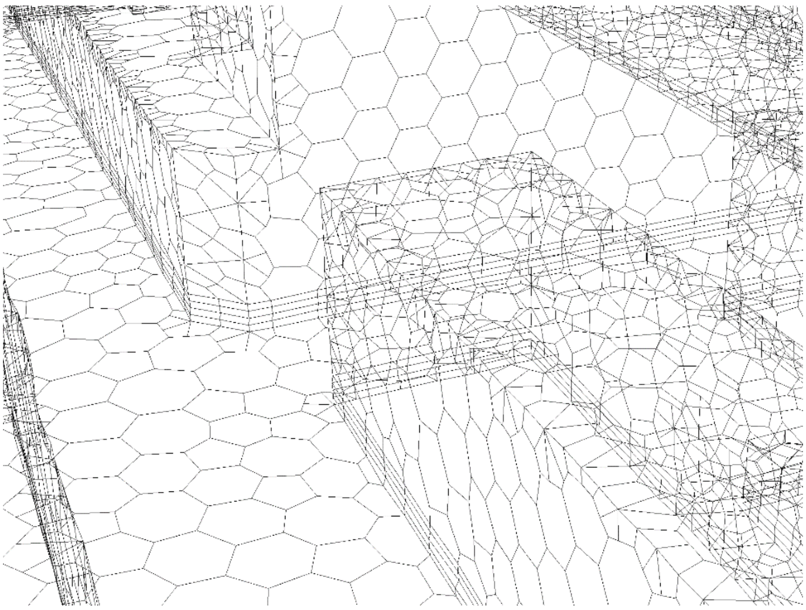


Figure 3.7 Prism layers near ground

Turbulence Model

3.14 As recommended in COST action C14, realizable K-epsilon turbulence model was adopted in the CFD model to simulate the real life problem. Common computational fluid dynamics equations were adopted in the analysis.

3.15 Variables including fluid velocities and fluid static pressure were calculated throughout the domain. The CFD code captures, simulates and determines the air flow inside the domain under study based on viscous fluid turbulence model. Solutions were obtained by iterations.

Calculation Method and Boundary Condition

3.16 The advection terms of the momentum and viscous terms are resolved with the second order numerical schemes. The scaled residuals are converged to an order of magnitude of at least 1×10^{-4} as recommended in COST action C14.

3.17 The inflow face of the computational domain is set as the velocity inlet condition and the outflow face is set as the zero gradient condition. For the two lateral and top faces, symmetric boundary condition is used. Lastly for the ground and building walls, no slip condition is employed.

4 ASSESSMENT CRITERIA AND TEST POINTS LOCATION

Wind Velocity Ratio (VR)

4.1 Wind velocity ratio (VR) indicates how much of the wind availability is experienced by pedestrians on the ground which is a relatively simple indicator to reflect the wind environment of the study site. VR is defined as VR = Vp $/V_{INF}$ where V_{INF} is the wind velocity at the top of the wind boundary layer (greater than 500m in height) would not be affected by the ground roughness and local site features and Vp is the wind velocity at the 2m pedestrian level.

4.2 VRw is the frequency weighted wind velocity ratio calculated based on the frequency of occurrence of 8 selected wind directions for annual and summer respectively for the purpose of comparison.

4.3 For Site Air Ventilation Assessment, the Site Spatial Average Wind Velocity Ratio (SVRw) and individual VR_W of all perimeter test points are reported. SVRw is the average of VRw of all perimeter test points.

4.4 For Local Air Ventilation Assessment, the Local Spatial Average Wind Velocity Ratio (LVRw) of all overall test points and perimeter test points, and individual VRw of the overall test points are reported. LVRw is the average of all overall test points and perimeter test points.

4.5 The SVRw and LVRw are worked out so as to understand the overall impact of air ventilation on the immediate and further surroundings of the Project Area due to the Proposed Development.

Test Points

4.6 Both perimeter test points and overall test points will be selected within the Assessment Area in order to assess the impact on the immediate surroundings and local areas respectively. Overall test points will be evenly distributed over surrounding open spaces, streets and other parts of the Assessment Area where pedestrian can or will mostly access. There will be 31 Perimeter Test Points and 100 Overall Test Points. Preliminary locations of perimeter and overall test points are illustrated in **Figure 4.1**.

4.7 The Test Points are further divided into 10 groups in order to analysis the respective localized wind environment performances. The coverage of the Test Points Groups are shown in **Figure 4.1** while the description of major covering regions of each group are summarized in **Table 4.1.**

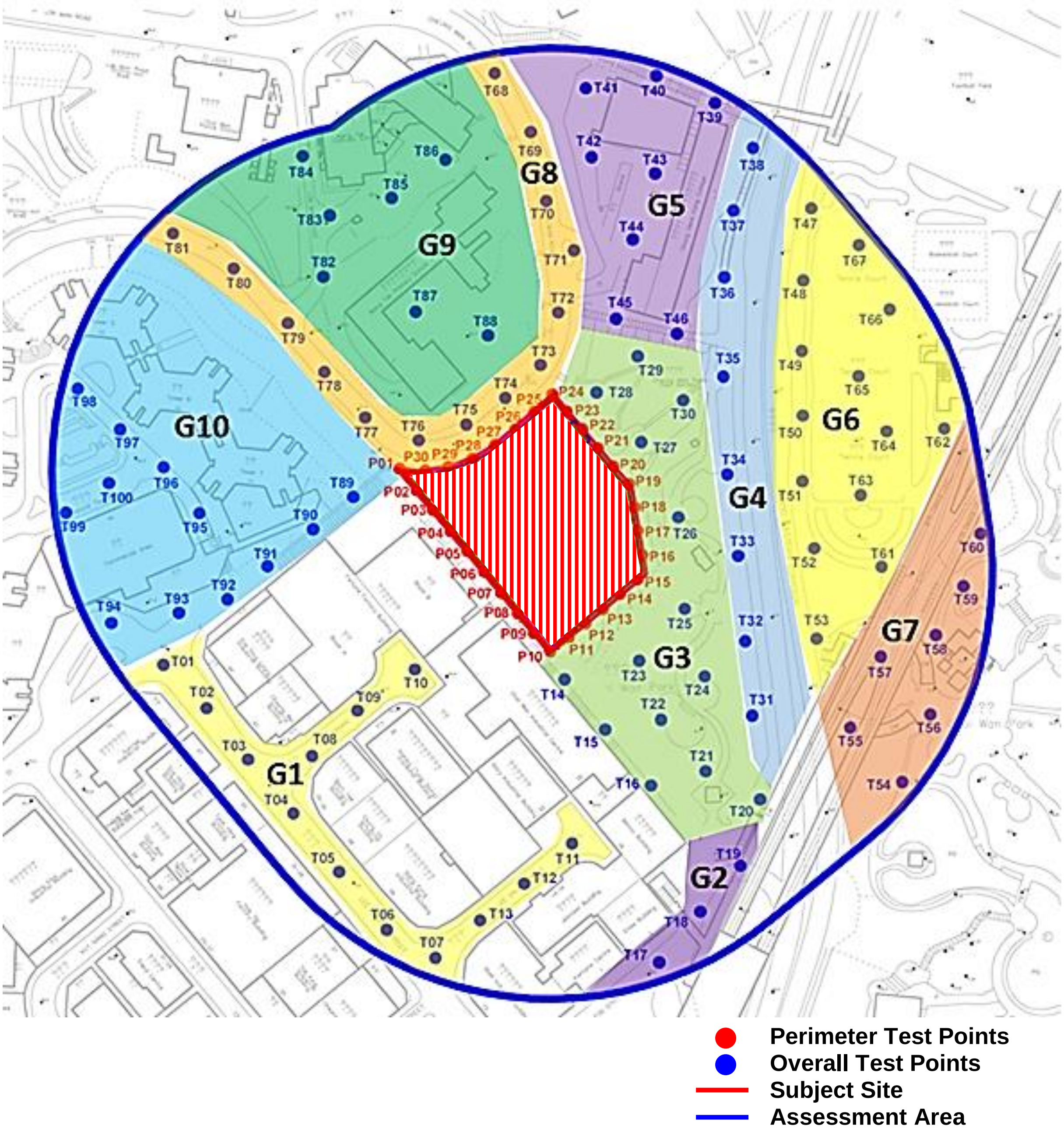


Figure 4.1 Distribution of Test Points

Table 4.1 Test Point Groups and respective represented locations

Test Point Groups	Test Point Numbers	Major location covered
G1	T1 – T13	Lee Chung Street
G2	T17 – T19	Ming Foo Street
G3	T14 – T16, T20 – T30	Rest garden west to the Island Eastern Corridor
G4	T31 – T38	Island Eastern Corridor
G5	T39 – T46	Chong Gene Hang College
G6	T47 – T53, T61 – T67	Sports ground of Chai Wan Park
G7	T54 – T60	Chai Wan Park
G8	T68 – T81	Cheung Man Road
G9	T82 – T88	French International School and Meng Tak Catholic School
G10	T89 – T100	Greenwood Terrace

5 KEY FINDINGS OF AVA STUDY

Local Situation

5.1 The preliminary plan and section of the Proposed Scheme is shown in **Figure 5.1** and **Figure 5.2** on the next page. The Proposed Scheme is a single block development that would minimize wall effect across prevailing wind direction as far as possible.

5.2 Buffer between the Proposed Development and adjacent developments is maximized as far as possible. Adjoining street canyons, the continuous projected façade length (Lp) along a street should not exceed 5 times the mean width of street canyon (U) as far as possible.

5.3 Widen streets by the building setback along the prevailing wind direction is considered such as Cheung Man Road and the stairway down to Chai Wan Park.

5.4 The Proposed Scheme makes use of sloping profile of the site to accommodate carpark and other auxiliary accommodations below Cheung Man Road level to increase the air flow at Cheung Man Road street level as oppose to an elevated podium structure.

5.5 To increase the air permeable space at Cheung Man Road street level, empty bays at podium level of the Proposed Scheme could promote air movement at pedestrian level. Considering noise mitigation measures which may affect permeability of air flow at street level, the Proposed Scheme will avoid using noise barrier as far as possible.

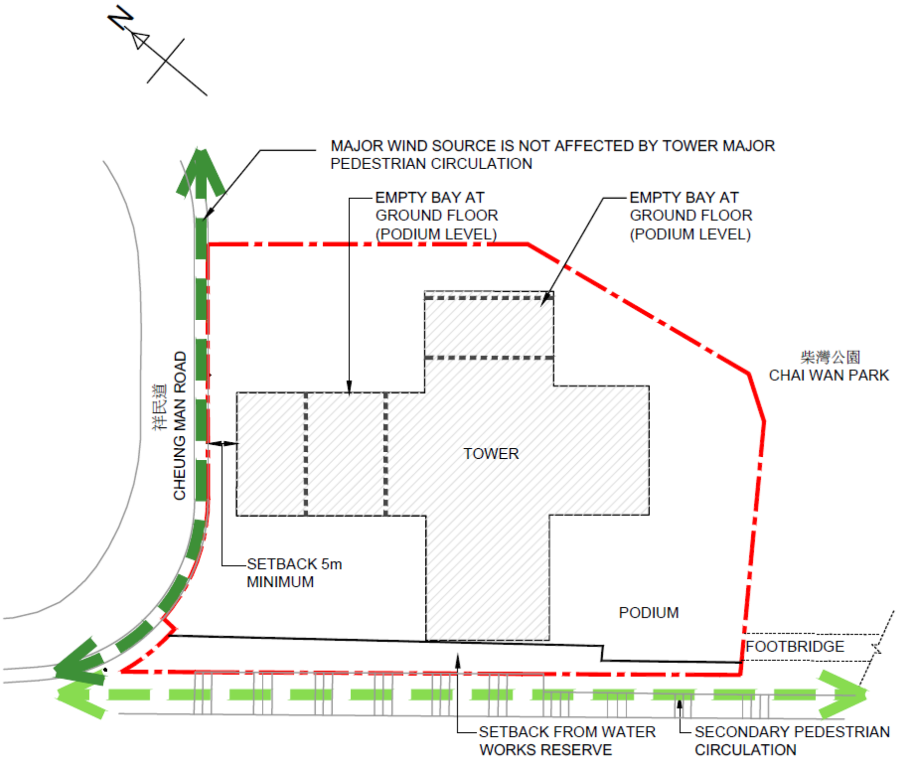


Figure 5.1 **Preliminary setting out of the Proposed Scheme (for illustration only)**

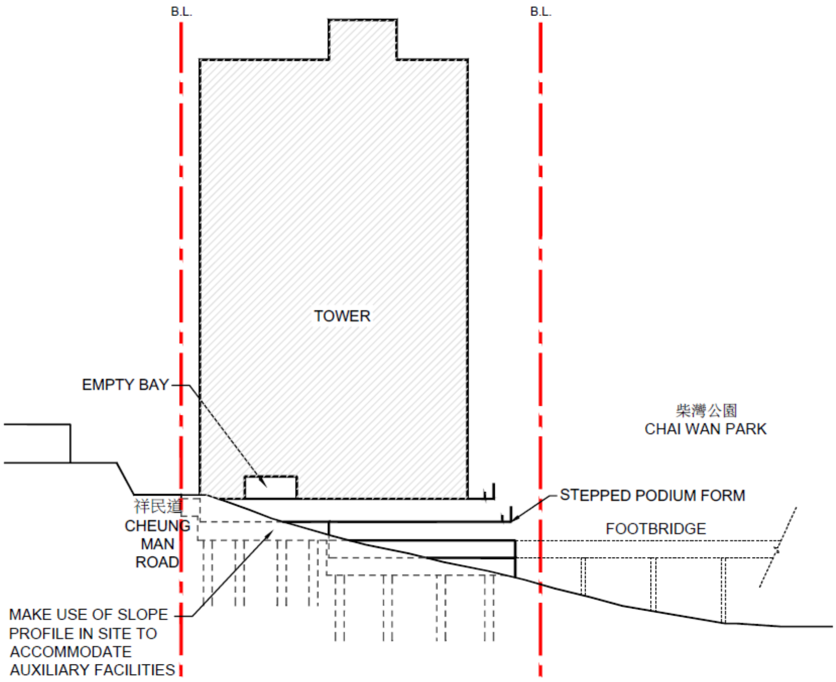


Figure 5.2 **The schematic of the Proposed Scheme (for illustration only)**

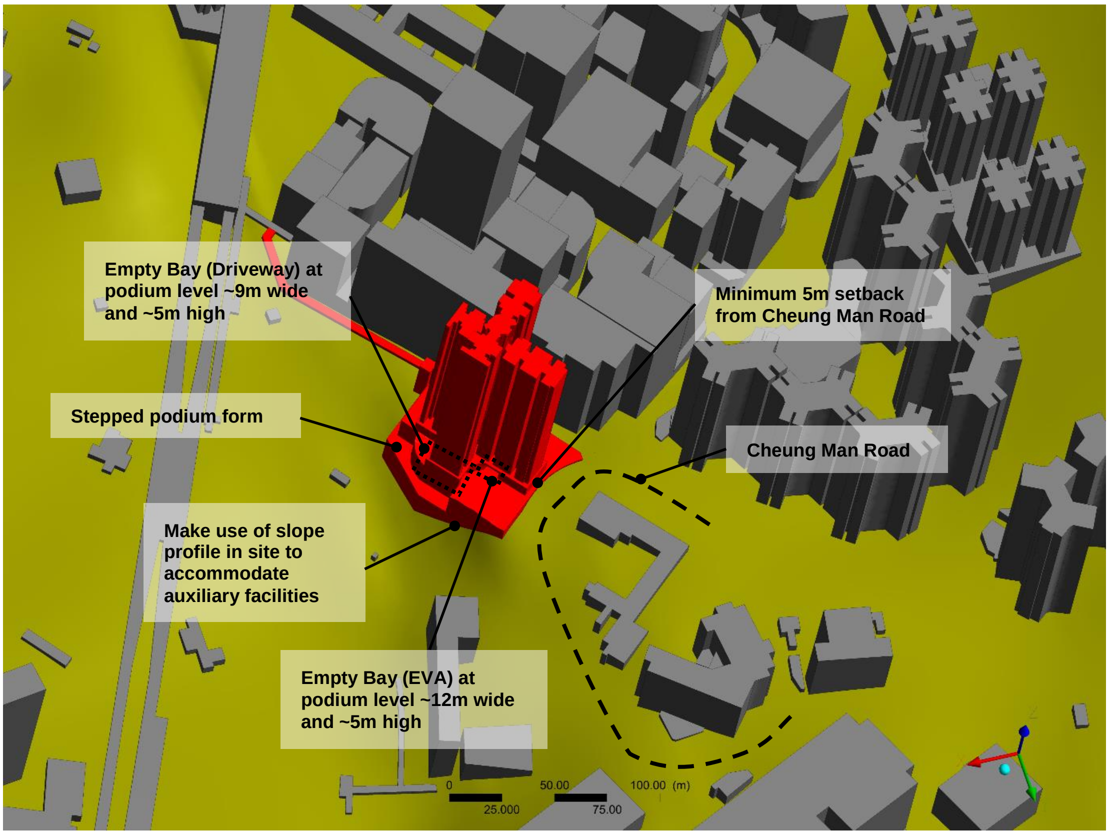


Figure 5.3 Good Design Features in the Simulation Model

Wind Velocity Ratio Results

5.6 A summary of the predicted wind velocity ratios for the Perimeter Test Points and the Overall Test Points i.e. SVR_W and LVR_W under both annual and summer prevailing winds are presented in **Table 5.1** below. Details of the predicted wind velocity ratios are presented in Appendix B.

Table 5.1 Summary of Wind Velocity Ratio

	Annual Winds		Summer Winds	
	Base Scheme	Proposed Scheme	Base Scheme	Proposed Scheme
SVR_W	0.19	0.24	0.14	0.12
LVR_W	0.20	0.24	0.13	0.13

5.7 The results of VRw for different groups of test points are summarized in **Table 5.2** below.

Table 5.2 Summary of Wind Velocity Ratio for Different Test Point Groups

Group	Description	Test Points	Average VR_w (Annual Winds)		Average VR_w (Summer Winds)	
			Base Scheme	Proposed Scheme	Base Scheme	Proposed Scheme
G1	Test points located south-west to the Project Area, covering Lee Chung Street	T1 – T13	0.11	0.13	0.08	0.09
G2	Test points located south-east to the Project Area, covering Ning Foo Street	T17 – T19	0.28	0.38	0.17	0.20

Group	Description	Test Points	Average VR_w (Annual Winds)		Average VR_w (Summer Winds)	
			Base Scheme	Proposed Scheme	Base Scheme	Proposed Scheme
G3	Test points located north to the Project Area, covering Rest garden west to the Island Eastern Corridor	T14 – T16, T20 – T30	0.21	0.25	0.13	0.12
G4	Test points located east to the Project Area, covering Island Eastern Corridor	T31 – T38	0.30	0.39	0.16	0.19
G5	Test points located north to the Project Area, covering Chong Gene Hang College	T39 – T46	0.16	0.19	0.08	0.10
G6	Test points located north-east to the Project Area, covering Sports ground of Chai Wan Park	T47 – T53, T61 – T67	0.27	0.37	0.17	0.22
G7	Test points located south-east to the Project Area, covering Chai Wan Park	T54 – T60	0.20	0.23	0.16	0.17
G8	Test points located from north to north-west of the Project Area, covering Cheung Man Road	T68 – T81	0.19	0.20	0.15	0.12
G9	Test points located north to the Project Area, covering French International School and Meng Tak Catholic School	T82 – T88	0.16	0.17	0.12	0.11
G10	Test points located west to the Project Area, covering Greenwood Terrace	T89 – T100	0.16	0.19	0.10	0.11

5.8 Contour plots of wind velocity ratio at 2m above the pedestrian level of assessment area under prevailing wind directions are shown in directional analysis in Section 6.

Site Air Ventilation Assessment

5.9 The layouts of the Proposed Scheme consist of a single tower and a podium making use of sloping profile of the site for auxiliary facilities, while Base Scheme are existing natural slopes. With the possible mitigation measures, the air ventilation impact at its site perimeter by the Proposed Scheme could be minimized when comparing to the Base Scheme.

5.10 The SVRw indicates how the lower portion of the buildings within the Project Area affecting the wind environment of its immediate vicinity. Under annual winds, the average of predicted SVRw over these prevailing winds for the Base Scheme and Proposed Scheme are 0.19 and 0.24 respectively. While in summer, the SVRw are maintained at 0.14 and 0.12 by Base Scheme and Proposed Scheme respectively. The result indicates that the Proposed Scheme can be considered from an observable impact than the Base Scheme in terms of air ventilation performance in its immediate vicinity due to the fact that the Proposed Scheme would impose blockage effect to easterly summer winds on the existing open space. The annual overall wind environment around the site perimeter could be improved when the high-rise domestic block diverts a portion of downwash wind reaching pedestrian level.

5.11 Test points P1 and P24 to P30 located along the portion of Cheung Man Road at the north perimeter of the Site. As this focus area is at downwind under easterly wind in annual and summer conditions, the Proposed Scheme would partially obstruct the incoming winds, reducing the VRw from 0.15 to 0.10 for the Base and Proposed Scheme respectively for summer condition, while they are 0.17 and 0.22 in annual condition due to wind channelling effect of north-easterly wind between Proposed Scheme and French International School.

5.12 There is ventilation performance improvement in the stairway sandwiched by the Industrial Cluster and the Project Area due to benefits from wind channelling and downwash. The annual and summer VRw of Test Points P02 – P10 at this area is improved from 0.15 to 0.25 and 0.08 to 0.13 respectively for the Base and Proposed Scheme.

5.13 It is expected that the Proposed Scheme would impact the north and east perimeter of the site under summer condition, however, this open space is non-accessible natural slopes which could be excluded from SVRw. The ventilation performance is monitored by Test Points P11 – P24, of which VR increases from 0.23 to 0.26 in annual conditions while from VR decreases 0.16 to 0.12 in summer conditions for the Base and Proposed Scheme.

Local Air Ventilation Assessment

5.14 The LVRw indicates the overall wind environment within the Assessment Area of the two schemes under the annual and summer winds. The LVRw for the Base Scheme and Proposed Scheme are 0.20 and 0.24 respectively under the annual prevailing winds. While during the summer seasons, the LVRw are both 0.13. The results indicate that the Proposed Scheme maintained at similar to a slightly better wind environment than the Base Scheme at the Project Area boundary and throughout the Assessment Area.

5.15 The averaged wind velocity ratio of Group 1 test points reflects the wind environment along the Lee Shung Street and the Access Road within the mid to high-rise Industrial Cluster to the south-west of the Project Area, which contains multiple mid-rise clusters. The Proposed Scheme maintained a slightly better wind environment within the Group 1 area compared to that of the Base Scheme under both annual and summer winds, since averaged VRw in Group 1 Test Points maintains at 0.11 and 0.13 for the Base Scheme and the Proposed Scheme respectively. While in summer seasons, the averaged VRw for Base Scheme and Proposed Scheme are 0.08 and 0.09 respectively.

5.16 Group 2 Test Points located at Ning Foo Street near Chai Wan Station to the south-east of the Project Area, and the VRw obtained indicated the pedestrian wind environment there. It is noticed that the averaged velocity ratio obtained by the Proposed Scheme is slightly increased compared to the Base Scheme at this area. The annual VRw are 0.28 and 0.38 respectively for Base and Proposed Scheme, while that in summer condition are maintained at 0.17 and 0.20. Such improvement is mainly due to the massing of the Proposed Scheme deflects and accelerates north-easterly air flow at Chai Wan Park and along Island Eastern Corridor. Increase in VR is observed in these areas and downwind at Ning Foo Street.

5.17 The VRw values of Group 3 Test Points indicate the air ventilation performance of the western portion of the Chai Wan Park adjoining the Cheung Man Road Rest Garden uphill at the immediate surrounding of the Project Area. Under the annual winds, the wind environment under Proposed Scheme in this region is slightly better than that in the Base Scheme, with the VRw values of 0.21 and 0.25 for the Proposed Scheme and Base Scheme respectively, due to the massing of the Proposed Scheme deflects and accelerates north-easterly air flow at Chai Wan Park and along Island Eastern Corridor. In summer prevailing winds, the VRw maintained by Proposed Scheme within this area is 0.12, compared to that of 0.13 maintained by Base Scheme which may be caused by the downwash effect taking place at Chai Wan Park creating a wake under the south-easterly winds. The result indicates a slight impact on wind environment during summer seasons under south-westerly winds when downwash air along the stairway to encounter the diverted potion of wind at the corner to the east of the Industrial Cluster at Chai Wan Park.

5.18 Group 4 Test Points are equally spaced at pedestrian walkway along the Island Eastern Corridor to the east of Project Area. Under annual condition, the VRw could be maintained at 0.39 and 0.30 for Proposed and Base Scheme which implies that there is obvious overall enhancement in air ventilation due to the massing of the Proposed Scheme deflects and accelerates north-easterly air flow at Chai Wan Park and along Island Eastern Corridor. Similarly in summer winds, there is a little improvement in Proposed Scheme with the overall VRw of 0.19 compared to that of 0.16 for the Base Scheme.

5.19 The ventilation performance of the Chong Gene Hang College including the stairways leading to the entrances is assessed by Group 5 Test Points. There is slight ventilation enhancement on this monitoring region for the Proposed Scheme as the VRw increases from 0.16 to 0.19 under annual conditions and from 0.08 to 0.10 for the summer seasons. The Proposed Scheme would divert a portion of north-easterly wind flow at Cheung Man Road, improving the overall air ventilation performance at this area.

5.20 Group 6 Test Points mainly cover the sports fields and courts in eastern portion of Chai Wan Park across the Island Eastern Corridor. The results of annual VRw are 0.27 and 0.37 for Base and Proposed Scheme which shows an observable improvement on air ventilation in this monitoring region for the Proposed Scheme, as the massing of the Proposed Scheme deflects and accelerates the air flow at Chai Wan Park and along Island Eastern Corridor. Increase in VR is observed in these areas under north-east quadrant winds. In summer winds, the VRw for Base and Proposed Scheme are found slightly improved from 0.17 to 0.22.

5.21 Some of the test points distributed on the pathway within the assessment boundary of Chai Wan Park are in Group 7. The averaged VRw values obtained from these test points for Base Scheme and Proposed Scheme are 0.20 and 0.23 respectively under the annual winds due to the massing of the Proposed Scheme deflects and accelerates north-easterly air flow at Chai Wan Park and along Island Eastern Corridor, while they are maintained at 0.16 and 0.17 respectively in summer as wind effect to this focus area is insignificant due to the location at upwind under easterly wind while at lateral region under south-west quadrant winds. It suggests that the Proposed Scheme would have slightly better ventilation performance.

5.22 Group 8 Test Points mainly cover Cheung Man Road and part of Tai Man Road bounding French International School and Meng Tak Catholic School in a semicircle. It is noticed that the averaged velocity ratio in the annual condition obtained by Base Scheme and Proposed Scheme at this area are 0.19 and 0.20 respectively as the Proposed Scheme would not impact north-east quadrant winds and also allow the downwash air flow towards the pedestrian level at Cheung Man Road and school sites nearby. While the summer seasons would saw VRw maintained at 0.15 and 0.12 by Base Scheme and Proposed Scheme respectively. Such impact is mainly due to the blockage of south-easterly wind flow to this downwind region.

5.23 Group 9 Test Points are the French International School and Meng Tak Catholic School bounded by Cheung Man Road. Wind environment within this region under annual winds is enhanced from 0.16 to 0.17 for the Base and Proposed Scheme, since the morphology of Proposed Scheme diverts a portion of both north-easterly and south-easterly wind flowing to these school sites. Similarly in summer prevailing winds, the averaged VRw is maintained at 0.12 and 0.11 for the Base Scheme and Proposed Scheme. A drawback is observed under south-west quadrant prevailing winds when the Proposed Scheme diverts a portion of wind flow at Cheung Man Road before reaching this area. The overall air ventilation performance in summer is found similar.

5.24 Wind environment along the stairway from Cheung Man Road down to Hong Man Street and covering part of Greenwood Terrace within the assessment boundary to the west of the Project Area is represented Group 10 Test Points. In annual conditions, a slight improvement at Hong Man Road is observed under south-easterly prevailing wind due to the change of flow pattern at leeside of the Proposed Scheme, resulting the averaged VRw of 0.16 and 0.19 respectively for Base Scheme and Proposed Scheme. While in summer, the averaged VRw is 0.10 and 0.11 for the Base and Proposed Scheme.

6 DIRECTIONAL ANALYSIS

NNE: (Annual: 6.8%)

6.1 Under NNE wind, site wind availability of the Project Area mainly relies on wind from Island Eastern Corridor and Chai Wan Park.

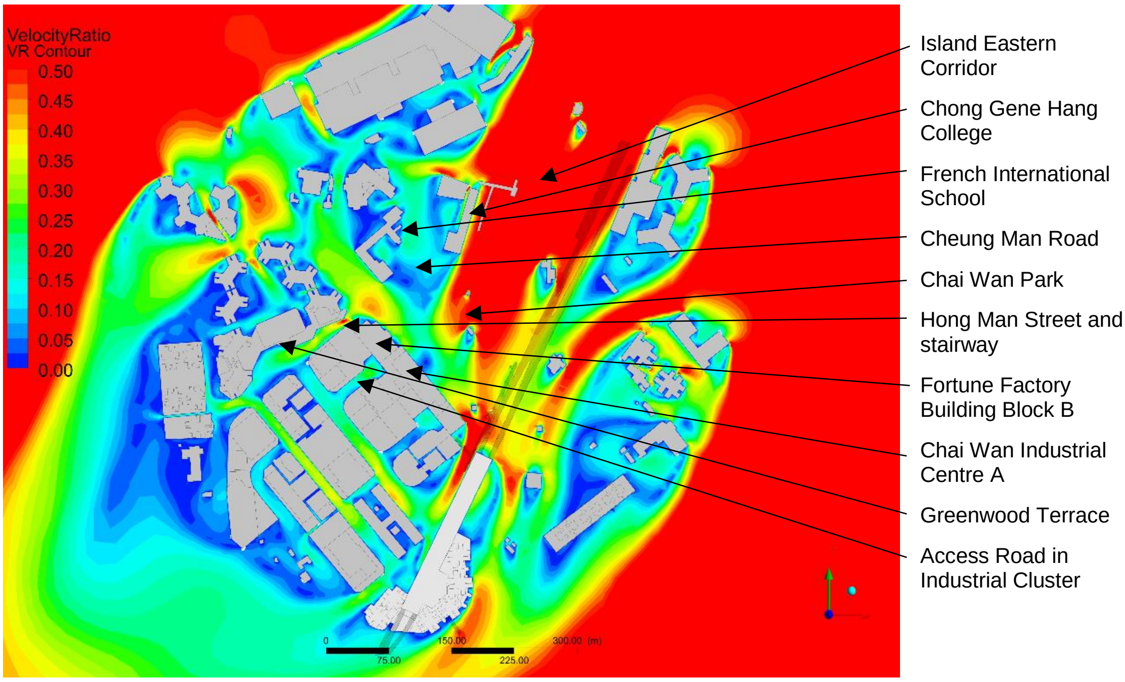
6.2 In the Base Scheme, the NNE wind is diverted by Chong Gene Hang College towards Cheung Man Road and Chai Wan Park that creates a wake within the Project Area. Downwash effect is observed at the north-east perimeter of the Industrial Cluster, which diverts high-level wind to ventilate the pedestrian level of stairway connecting Cheung Man Road and Chai Wan Park.

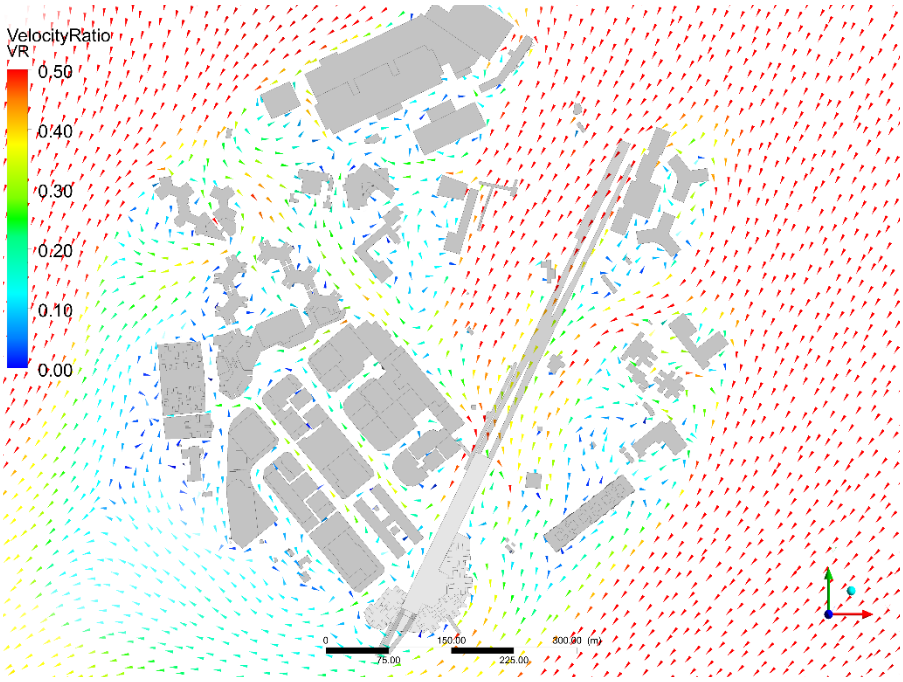
6.3 In the Proposed Scheme, a slight enhancement of winds is observed at French International School, Chong Gene Hang College, Cheung Man Road and Chai Wan Park as the morphology of the Proposed Development in the Project Area diverts the flow around the site perimeter. A portion of incoming flow is redirected and channelled into Hong Man Street and stairway. However, wind stagnant is observed at leeside of French International School due to the cumulative wind effect from the Proposed Scheme and Greenwood Terrace.

6.4 The massing of the Proposed Scheme deflects and accelerates the air flow at Chai Wan Park and along Island Eastern Corridor. Increase in VR is observed in these areas.

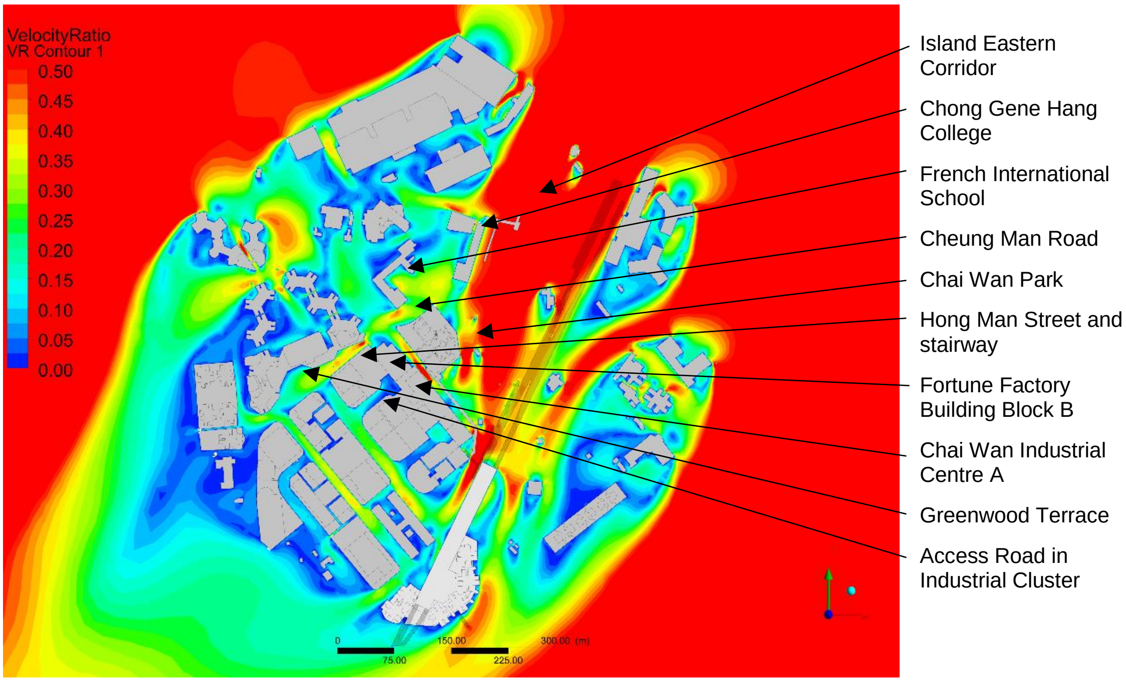
6.5 The Proposed Scheme obstructs the NNE wind from entering the Access Road in the Industrial Cluster through the building gap between the Fortune Factory Building Block B and Chai Wan Industrial Centre A, wind stagnant is observed at this section of road.

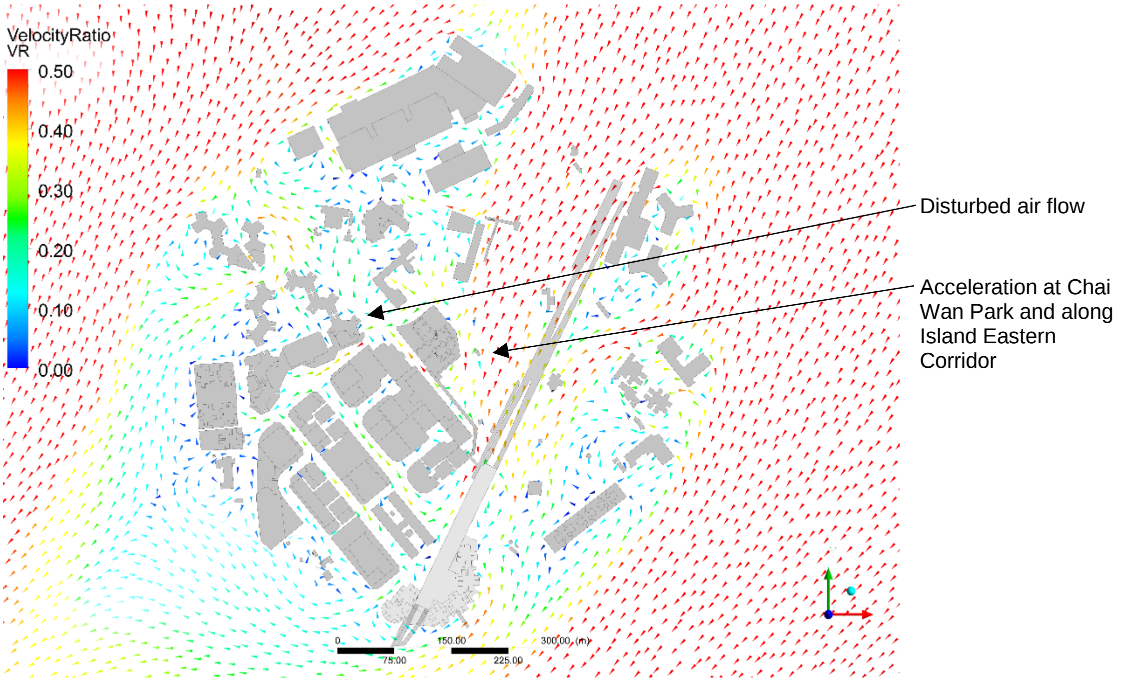
Base Scheme


VelocityRatio
VR Contour
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
Island Eastern Corridor
Chong Gene Hang College
French International School
Cheung Man Road
Chai Wan Park
Hong Man Street and stairway
Fortune Factory Building Block B
Chai Wan Industrial Centre A
Greenwood Terrace
Access Road in Industrial Cluster
0
75.00
150.00
225.00
300.00 (m)


VelocityRatio
VR
0.50
0.40
0.30
0.20
0.10
0.00
0
75.00
150.00
225.00
300.00 (m)

Proposed Scheme





NE: (Annual: 10.2%)

6.6 Under NE wind, site wind availability of the Project Area mainly relies on undisturbed wind from Island Eastern Corridor and Chai Wan Park.

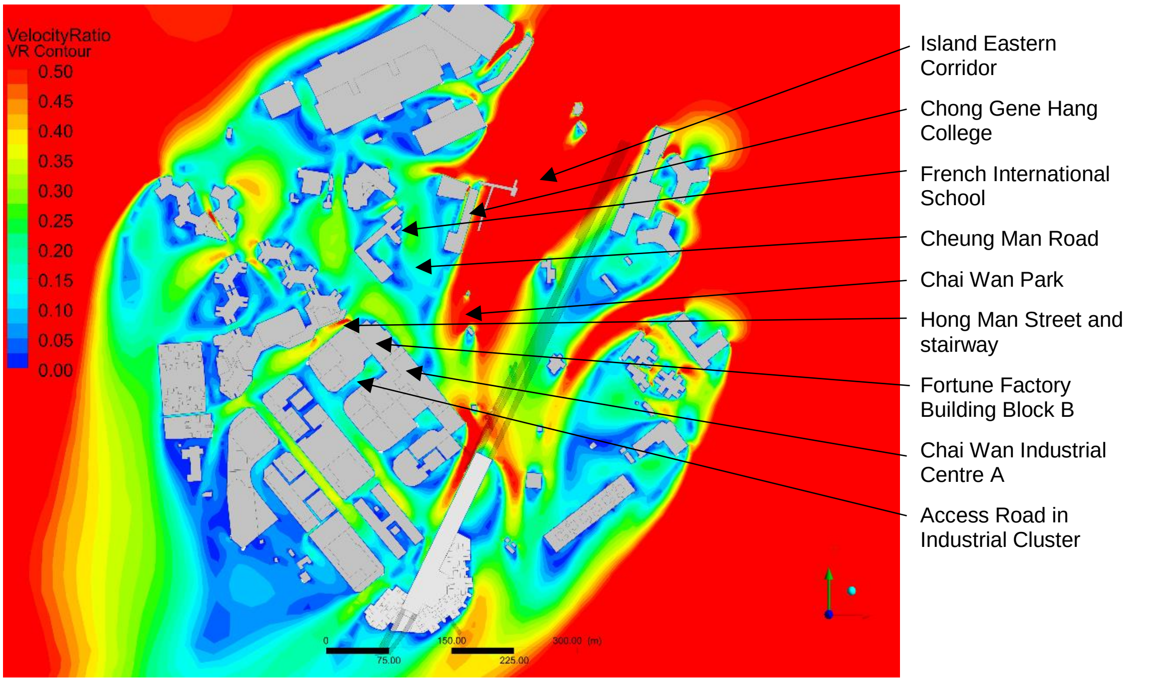
6.7 In the Base Scheme, the NE wind is diverted by Chong Gene Hang College towards Cheung Man Road and Chai Wan Park that creates a wake within the Project Area. Downwash effect is observed at the north-east perimeter of Industrial Cluster, which diverts high-level wind towards pedestrian level to ventilate the stairway connecting Cheung Man Road and Chai Wan Park.

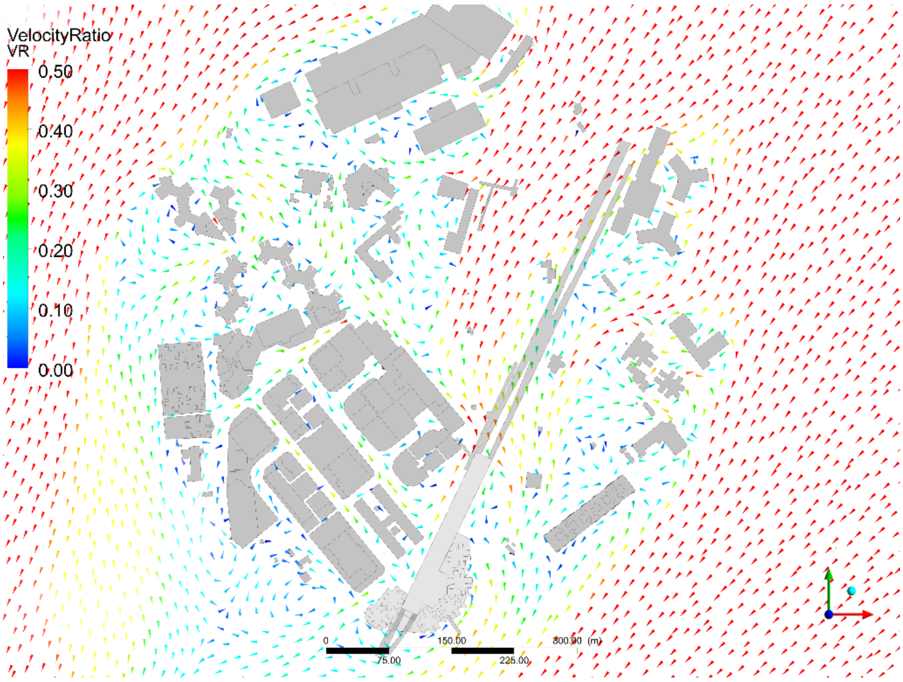
6.8 In the Proposed Scheme, a slight enhancement of winds is observed at French International School, Chong Gene Hang College, Cheung Man Road and Chai Wan Park as the morphology of the Proposed Development in the Project Area splits and accelerates the flow around the site perimeter. The massing of the Proposed Scheme deflects and accelerates the air flow at Chai Wan Park and along Island Eastern Corridor. Increase in VR is observed in these areas.

6.9 The Proposed Scheme obstructs the NE wind from entering the Access Road in the Industrial Cluster through the building gap between the Fortune Factory Building Block B and Chai Wan Industrial Centre A, a slight impact is observed.

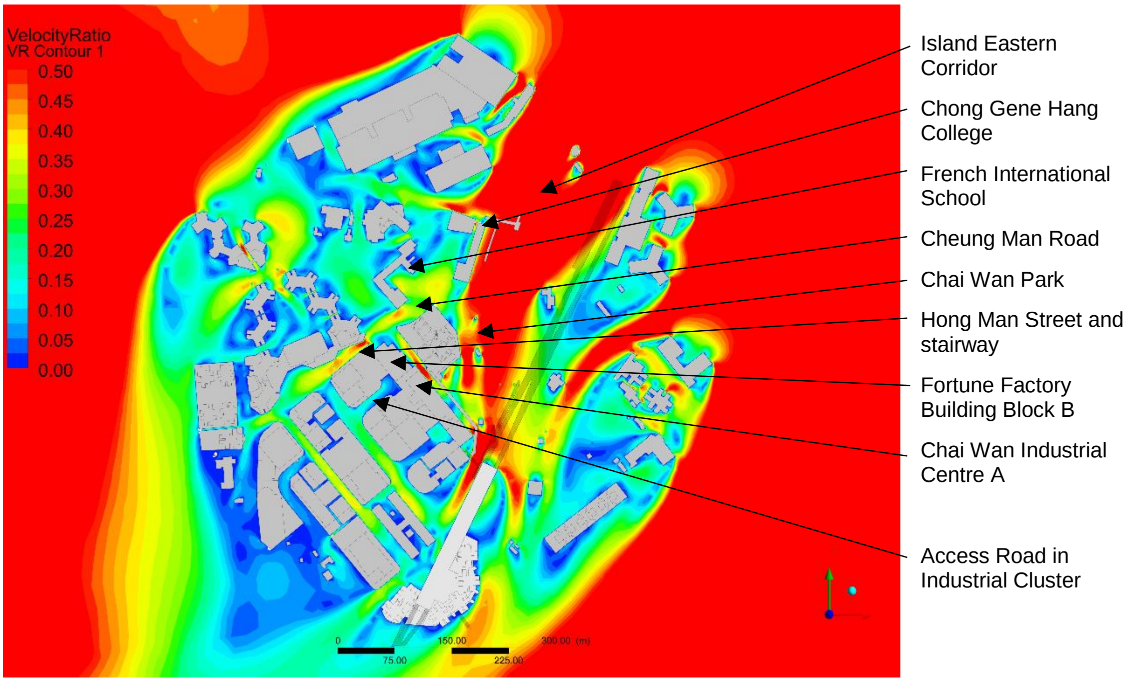
6.10 The high-rise residential block of the Proposed Scheme allows the downwash air flow towards the pedestrian level at Cheung Man Road and school sites nearby. A portion of incoming flow is redirected and channelled into Hong Man Street and stairway. However, a larger wind stagnant is created at leeside of French International School.

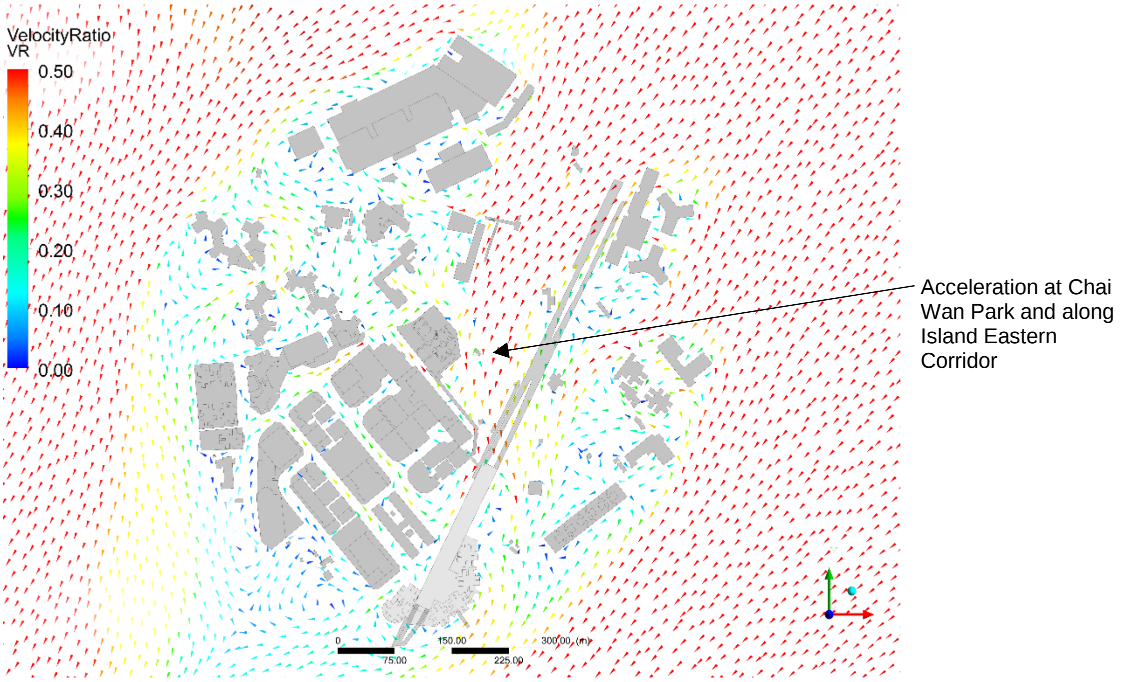
Base Scheme


VelocityRatio
VR Contour
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
Island Eastern Corridor
Chong Gene Hang College
French International School
Cheung Man Road
Chai Wan Park
Hong Man Street and stairway
Fortune Factory Building Block B
Chai Wan Industrial Centre A
Access Road in Industrial Cluster
0
75.00
150.00
225.00
300.00 (m)


VelocityRatio
VR
0.50
0.40
0.30
0.20
0.10
0.00
0
75.00
150.00
225.00
300.00 (m)

Proposed Scheme





ENE: (Annual: 14.0%)

6.11 Site wind availability of the Project Area from ENE wind is partially obstructed by Tsui Wan Estate but is able to reach the Project Area via Island Eastern Corridor and Chai Wan Park.

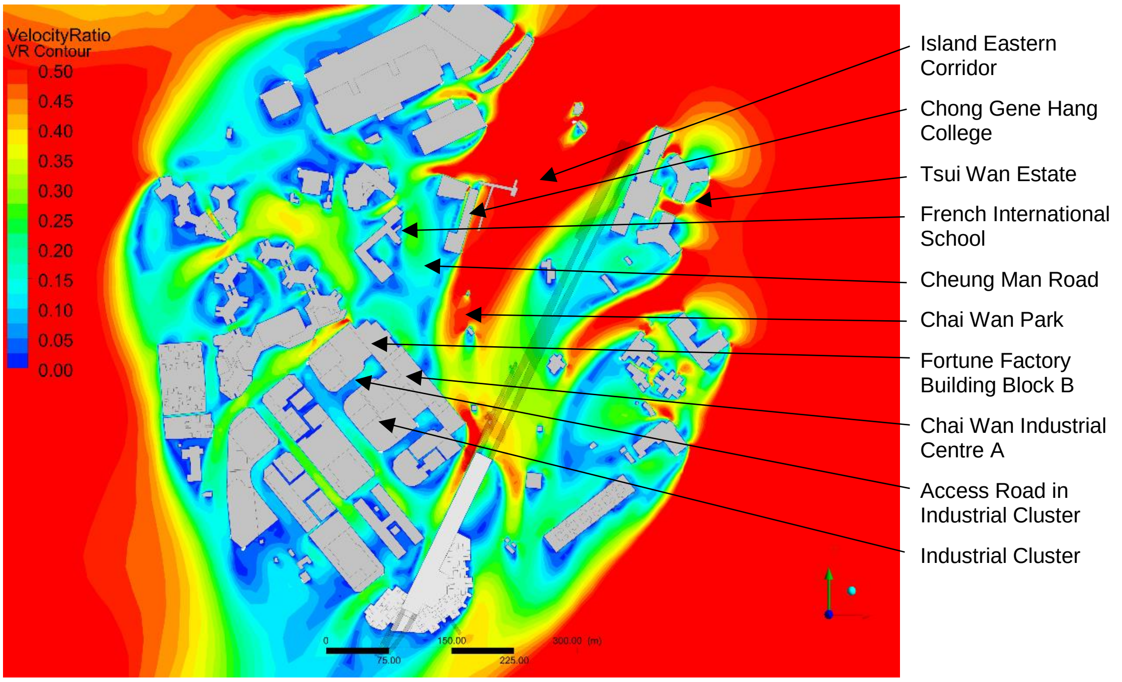
6.12 In the Base Scheme, the ENE wind is diverted by Chong Gene Hang College towards Cheung Man Road and Chai Wan Park that creates a wake within the Project Area. Downwash effect is observed at the north-east perimeter of the Industrial Cluster, which diverts high-level wind towards pedestrian level to ventilate the stairway connecting Cheung Man Road and Chai Wan Park.

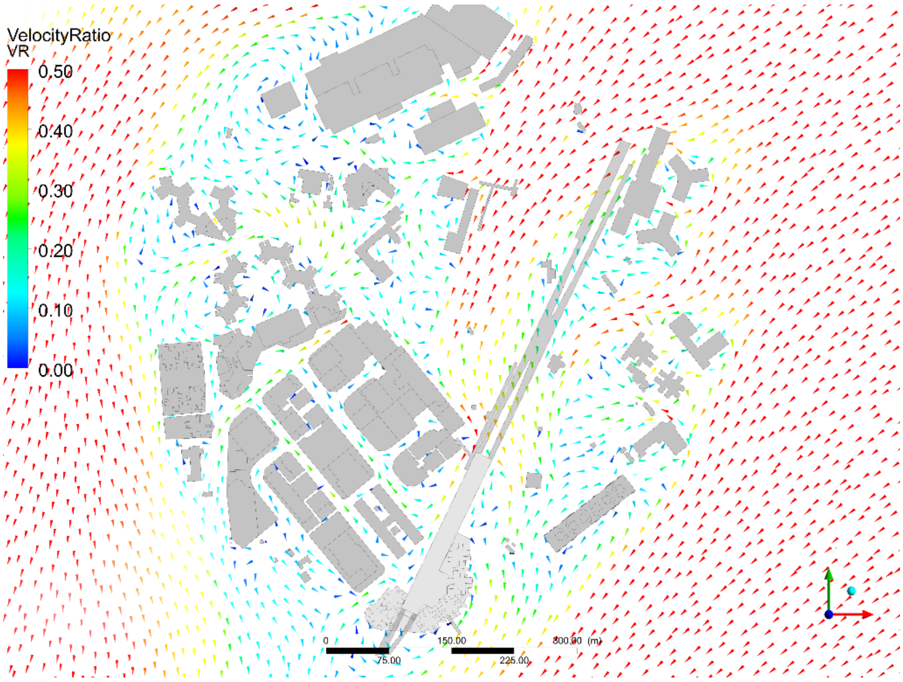
6.13 The Proposed Scheme obstructs the ENE wind from entering the Access Road in the Industrial Cluster through the building gap between the Fortune Factory Building Block B and Chai Wan Industrial Centre A, a slight impact is observed.

6.14 In the Proposed Scheme, a slight enhancement of winds is observed at Cheung Man Road and school sites nearby due to the diverted and downwash air flow to ventilate these areas. The massing of the Proposed Development modulates the diverted air flow towards Island Eastern Corridor and Chai Wan Park to ventilate these areas.

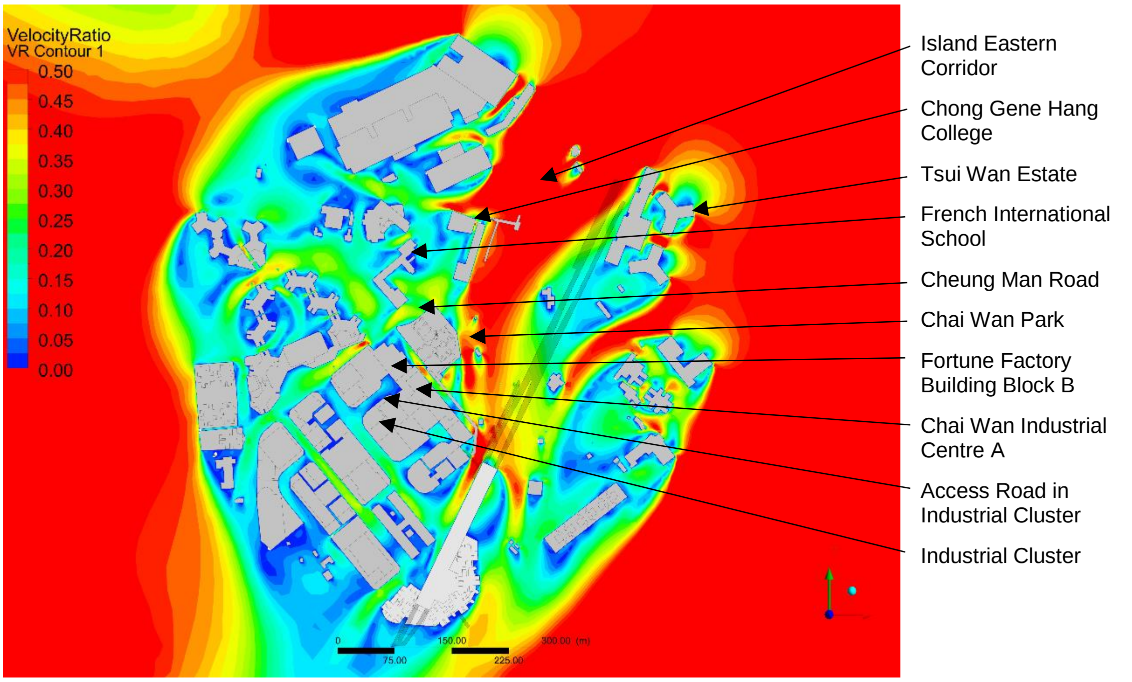
6.15 There is a potential impact at Hong Man Street where the Proposed Scheme partially deflects the ENE wind at Cheung Man Road that disturbed the penetration of flow along Hong Man Street.

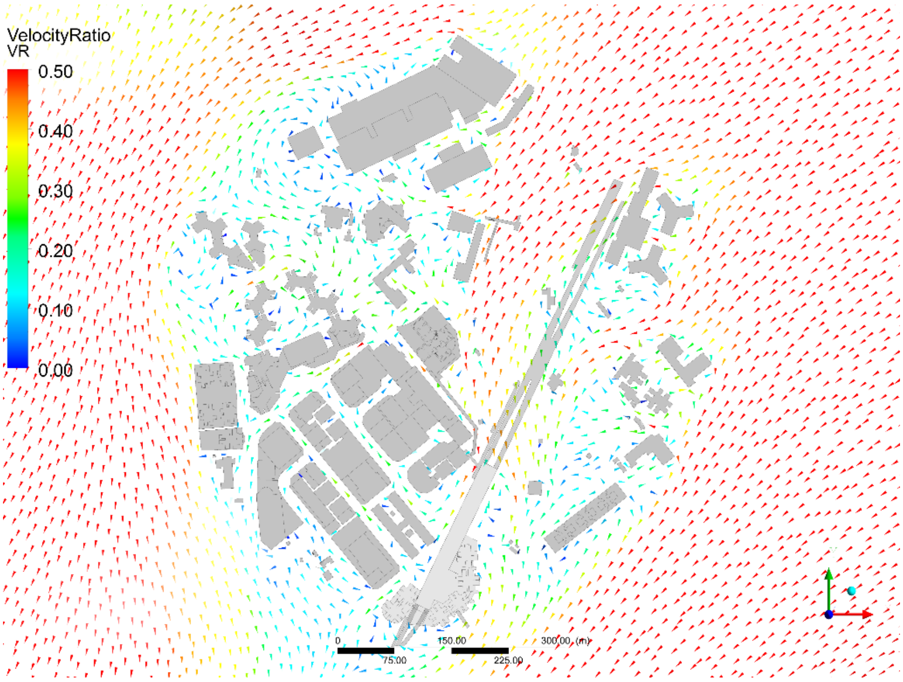
Base Scheme


VelocityRatio
VR Contour
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
Island Eastern Corridor
Chong Gene Hang College
Tsui Wan Estate
French International School
Cheung Man Road
Chai Wan Park
Fortune Factory Building Block B
Chai Wan Industrial Centre A
Access Road in Industrial Cluster
Industrial Cluster


VelocityRatio
VR
0.50
0.40
0.30
0.20
0.10
0.00

Proposed Scheme





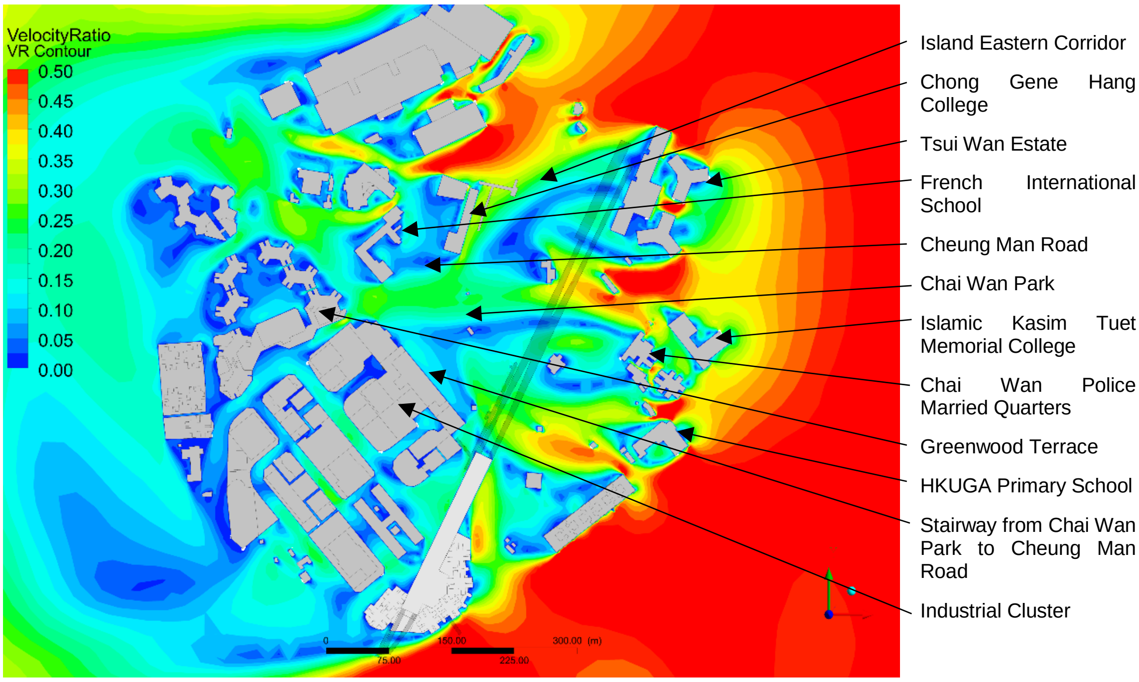
E: (Annual: 20.7%; Summer: 8.4%)

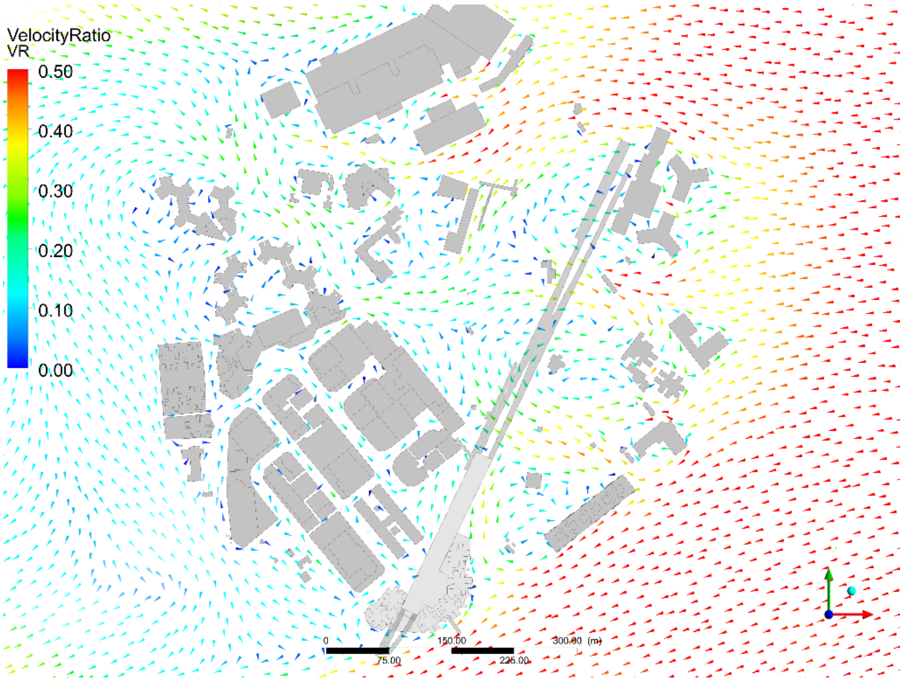
6.16 E incoming wind is weakened by Tsui Wan Estate and G/IC sites including Islamic Kasim Tuet Memorial College, Chai Wan Police Married Quarters and HKUGA Primary School at upwind but a portion of wind could reach the Project Area through building gaps, Island Eastern Corridor and Chai Wan Park.

6.17 In the Base Scheme, the E wind passes through the building gaps between G/IC sites at upwind that creates a wake region extended to the Project Area. A portion of wind flows along the north-east perimeter of the Industrial Cluster over the natural slopes in the Project Area freely and reattaches to the diverted wind flow from Chong Gene Hang College at Cheung Man Road.

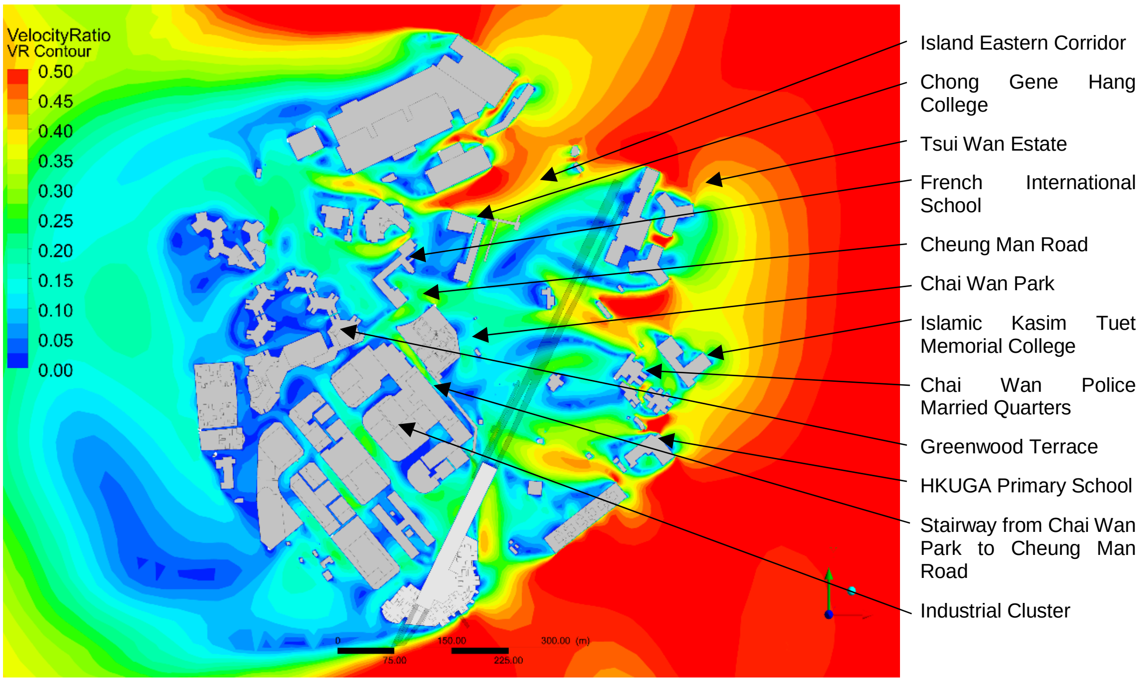
6.18 In the Proposed Scheme, the downwash effect diverts a portion of wind flow to the pedestrian level to slightly improve the ventilation performance of the Chai Wan Park. Wind channelling effect is observed at the stairway from Chai Wan Park to Cheung Man Road. However, the Proposed Scheme shields the entrances for easterly wind at Hong Man Road and the air path between Greenwood Terrace and French International School.

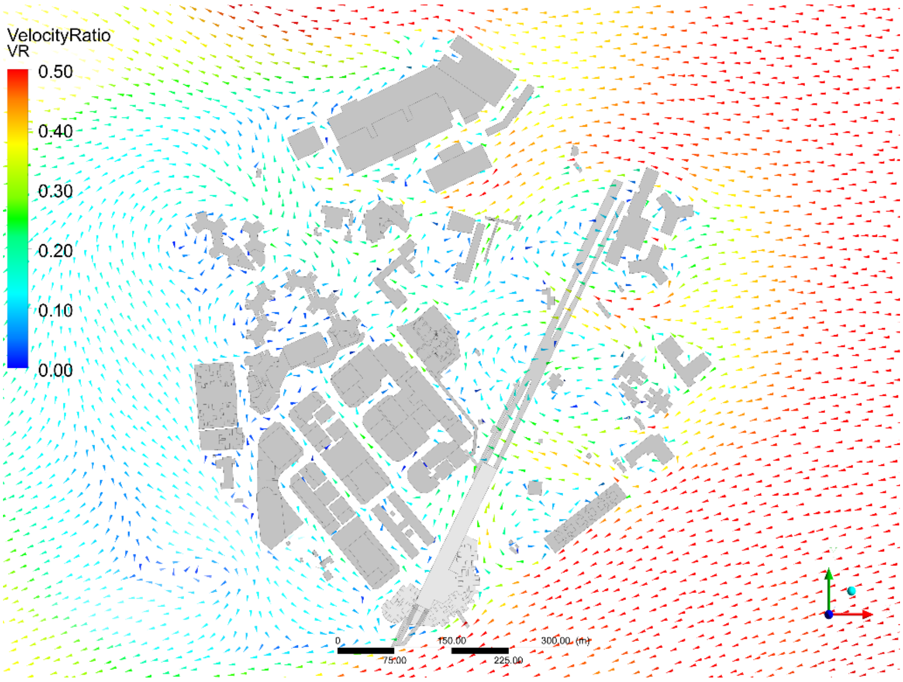
Base Scheme


VelocityRatio
VR Contour
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
Island Eastern Corridor
Chong Gene Hang College
Tsui Wan Estate
French International School
Cheung Man Road
Chai Wan Park
Islamic Kasim Tuet Memorial College
Chai Wan Police Married Quarters
Greenwood Terrace
HKUGA Primary School
Stairway from Chai Wan Park to Cheung Man Road
Industrial Cluster


VelocityRatio
VR
0.50
0.40
0.30
0.20
0.10
0.00

Proposed Scheme





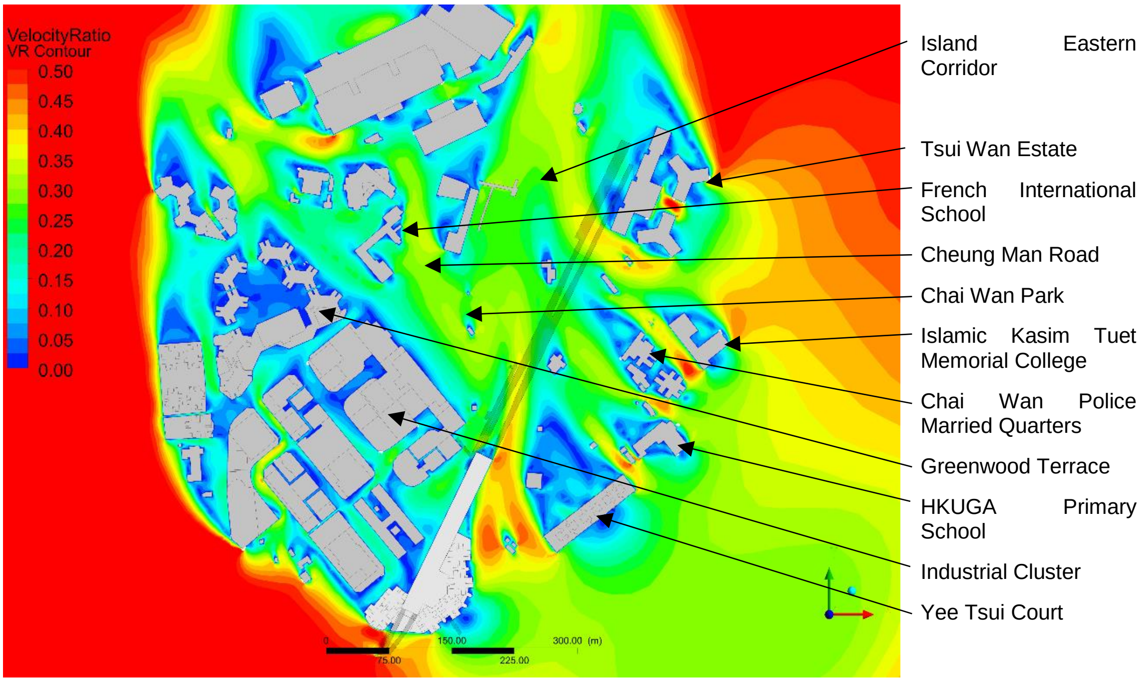
ESE: (Annual: 9.1%; Summer: 8.4%)

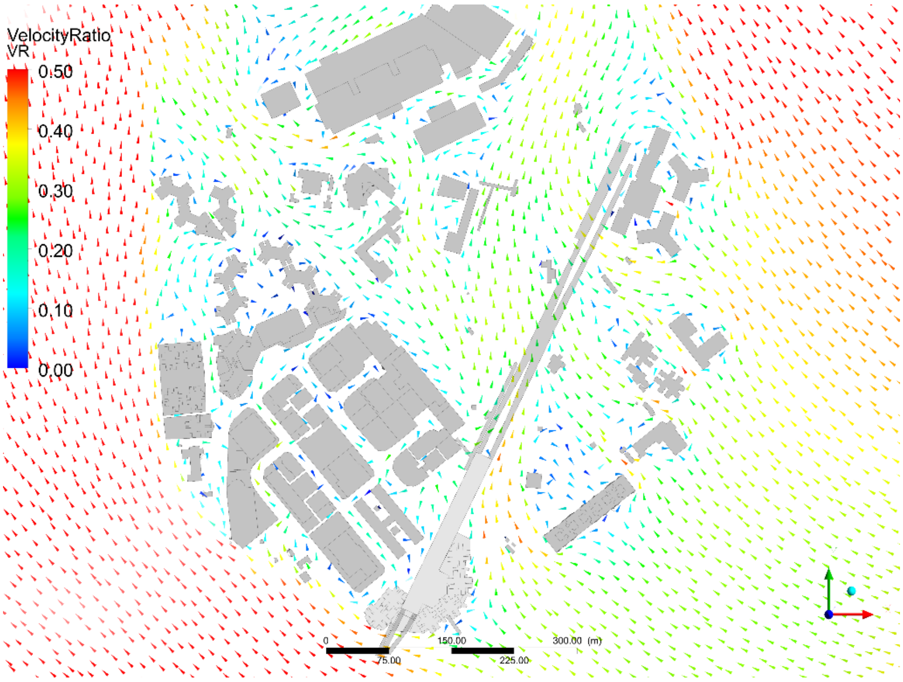
6.19 ESE incoming wind is weakened by Tsui Wan Estate, G/IC sites including Islamic Kasim Tuet Memorial College, Chai Wan Police Married Quarters & HKUGA Primary School, and Yee Tsui Court at upwind but a portion of wind could reach the Project Area through building gaps, Island Eastern Corridor and Chai Wan Park.

6.20 In the Base Scheme, the ESE wind passes through the building gaps between G/IC sites and Yee Tsui Court flows through the Project Area freely and enters a section of Cheung Man Road between the Greenwood Terrace and French International School to ventilate the downwind area.

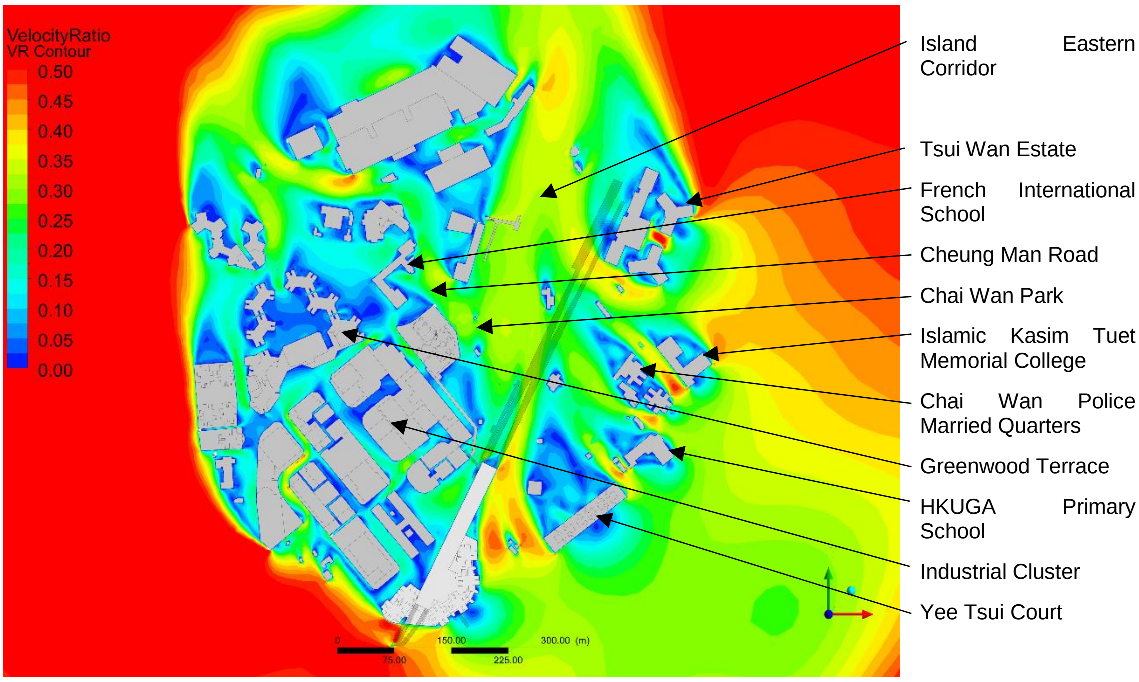
6.21 In the Proposed Scheme, the residential block diverts a portion of wind to pedestrian level at Chai Wan Park that encounters the incoming wind along Island Eastern Corridor near Yee Tsui Court. A wake region is observed in the windward of the Project Area. Wind channelling effect is observed at the stairway from Chai Wan Park to Cheung Man Road. However, the Proposed Scheme shields part of Cheung Man Road at leeside and the entrance of air path for easterly wind between Greenwood Terrace and French International School. There is no observable enhancement of wind in the Proposed Scheme compared to the Base Scheme.

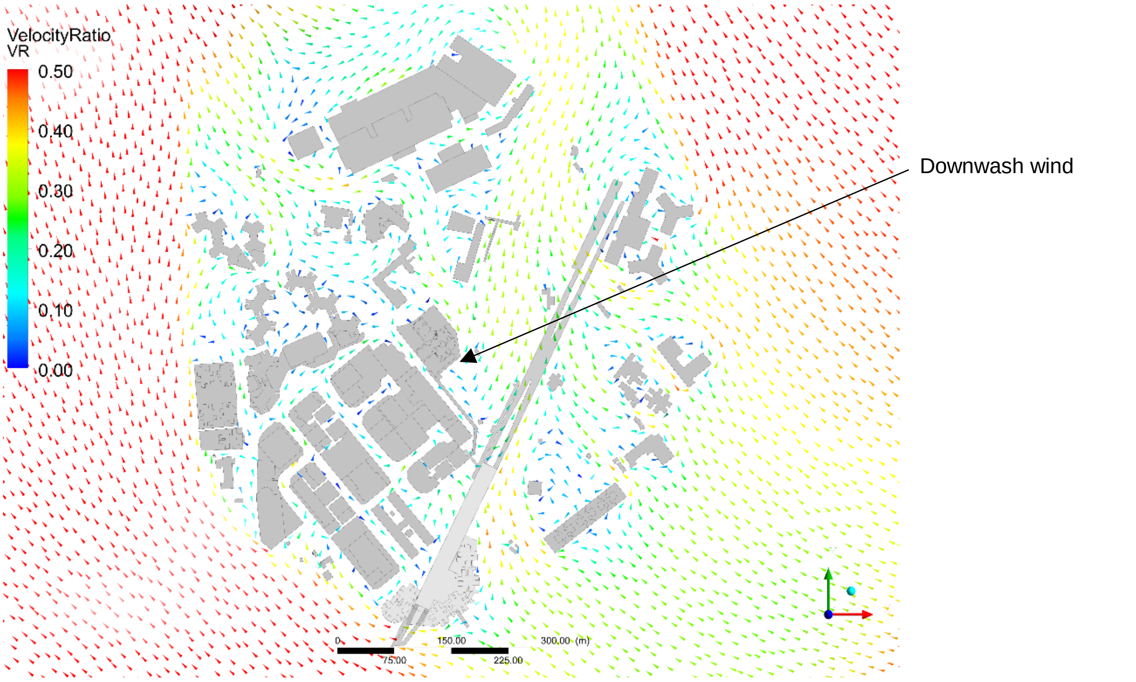
Base Scheme


VelocityRatio
VR Contour
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
Island Eastern Corridor
Tsui Wan Estate
French International School
Cheung Man Road
Chai Wan Park
Islamic Kasim Tuet Memorial College
Chai Wan Police Married Quarters
Greenwood Terrace
HKUGA Primary School
Industrial Cluster
Yee Tsui Court
0
75.00
150.00
225.00
300.00 (m)


VelocityRatio
VR
0.50
0.40
0.30
0.20
0.10
0.00
0
75.00
150.00
225.00
300.00 (m)

Proposed Scheme





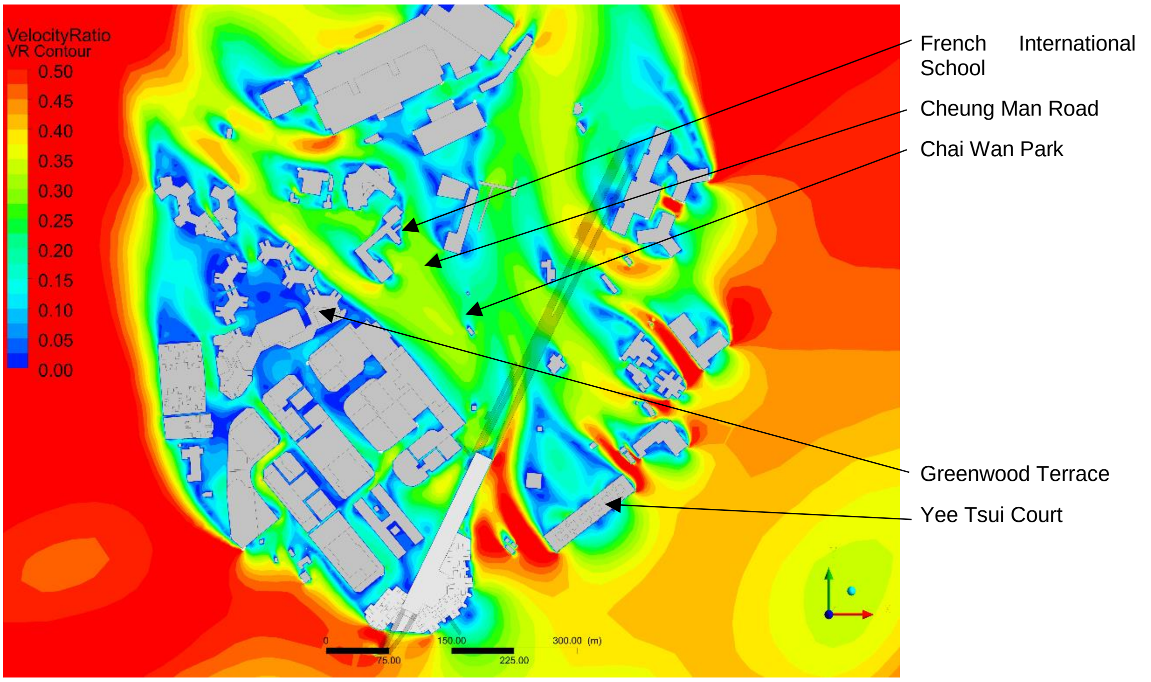
SE: (Annual: 5.0%; Summer: 6.8%)

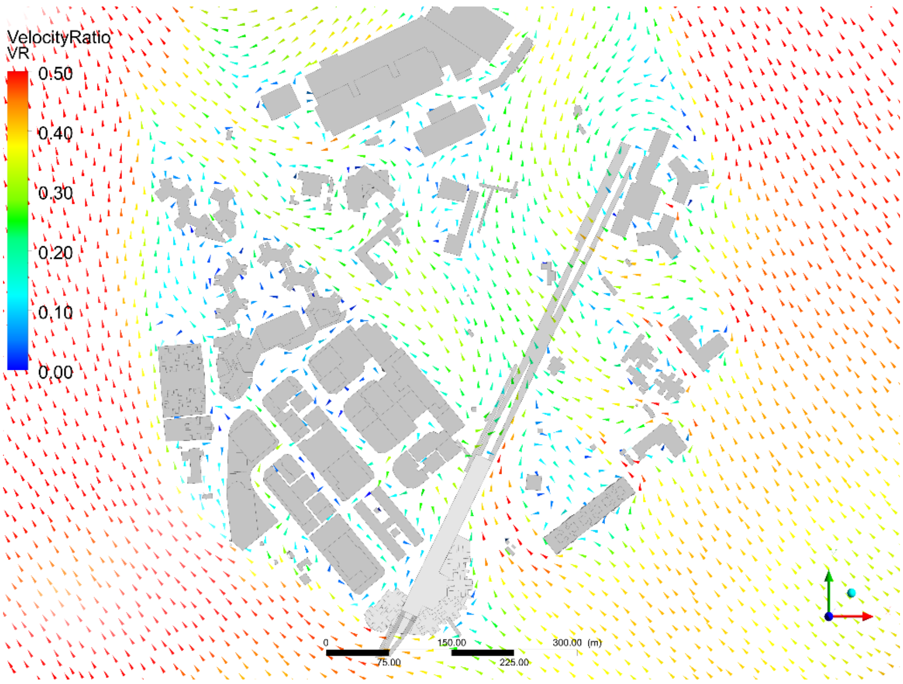
6.22 SE incoming wind is partially obstructed by Yee Tsui Court that creates a wake region and reattaches within Chai Wan Park.

6.23 In the Base Scheme, the SE wind passes through the building gaps around Yee Tsui Court flows through the Project Area freely and enters a section of Cheung Man Road between the Greenwood Terrace and French International School to ventilate the downwind area.

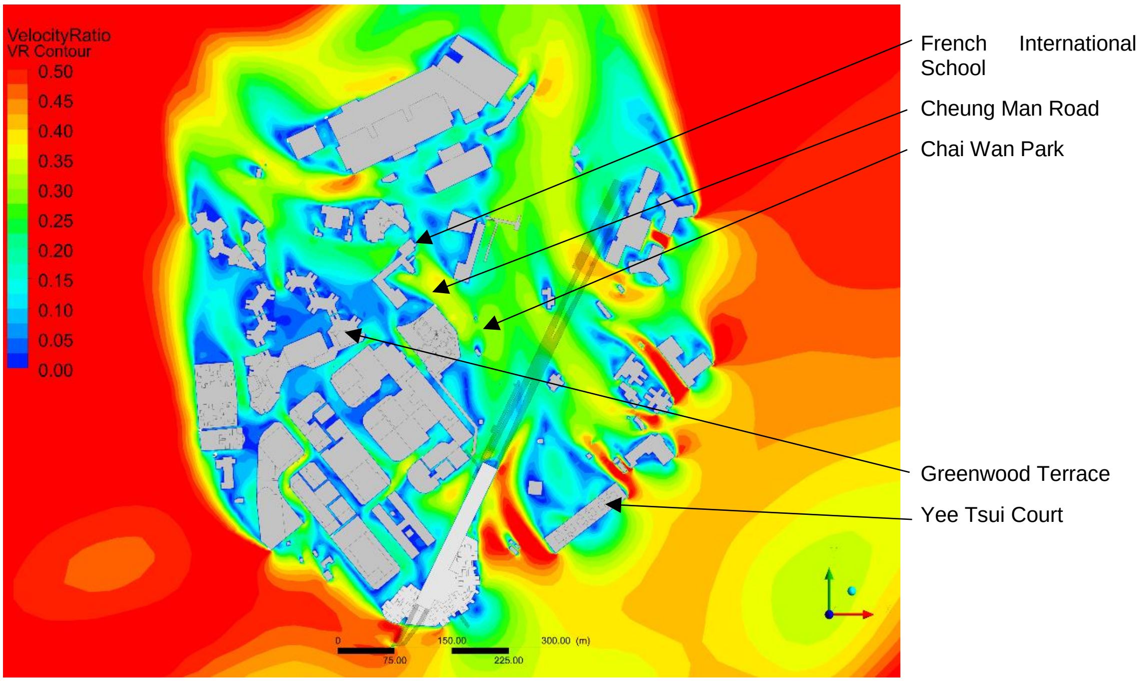
6.24 In the Proposed Scheme, the residential block diverts a portion of wind to pedestrian level at Chai Wan Park that encounters the incoming wind along Island Eastern Corridor near Yee Tsui Court. A wake region is observed in the windward of the Project Area. Wind channelling effect is observed at the stairway from Chai Wan Park to Cheung Man Road. However, the Proposed Scheme shields part of Cheung Man Road at leeside and the entrance of air path for south-easterly wind between Greenwood Terrace and French International School. There is no observable enhancement of wind in the Proposed Scheme compared to the Base Scheme.

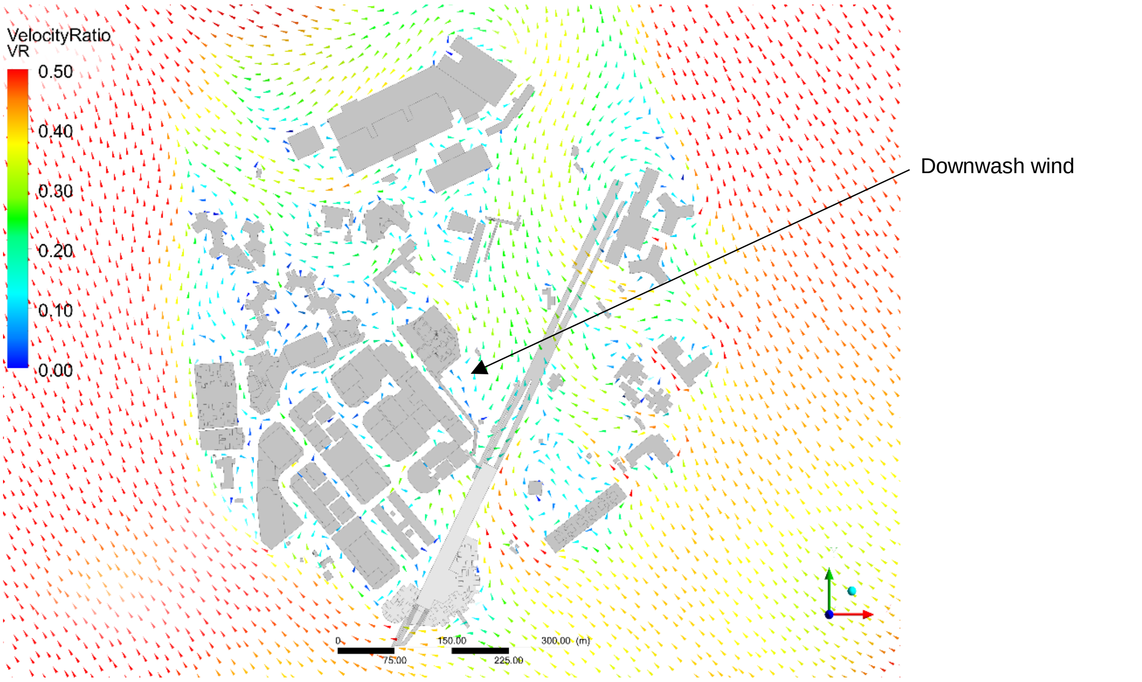
Base Scheme


VelocityRatio
VR Contour
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
French International School
Cheung Man Road
Chai Wan Park
Greenwood Terrace
Yee Tsui Court
0
75.00
150.00
225.00
300.00 (m)


VelocityRatio
VR
0.50
0.40
0.30
0.20
0.10
0.00
0
75.00
150.00
225.00
300.00 (m)

Proposed Scheme





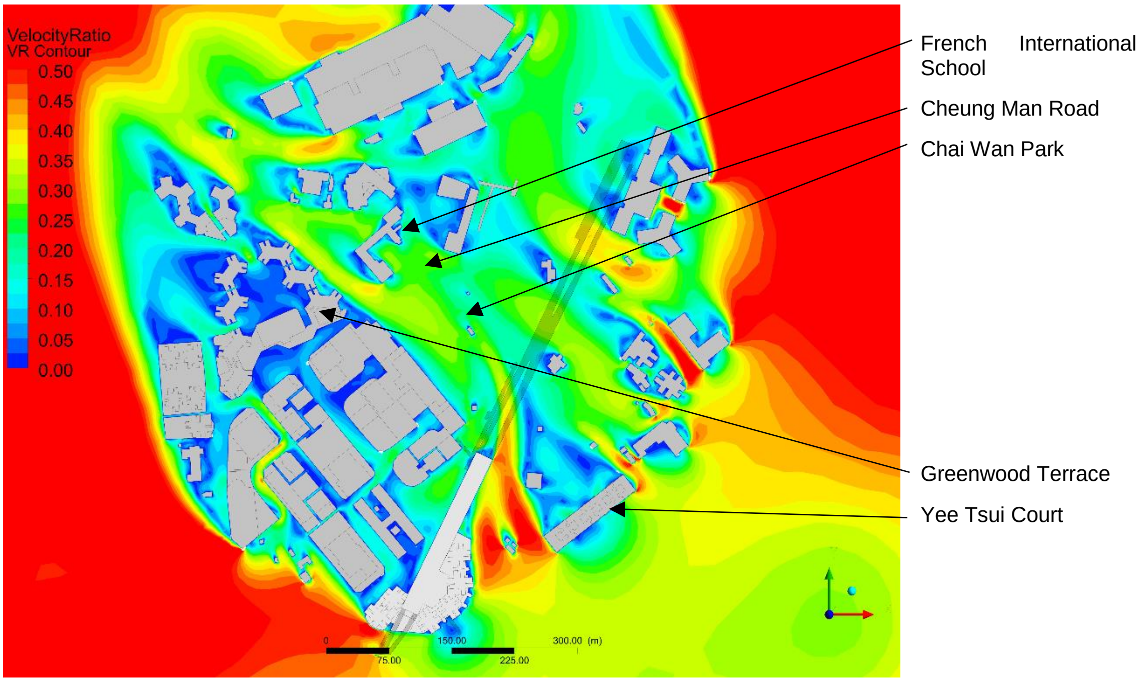
SSE: (Summer: 8.3%)

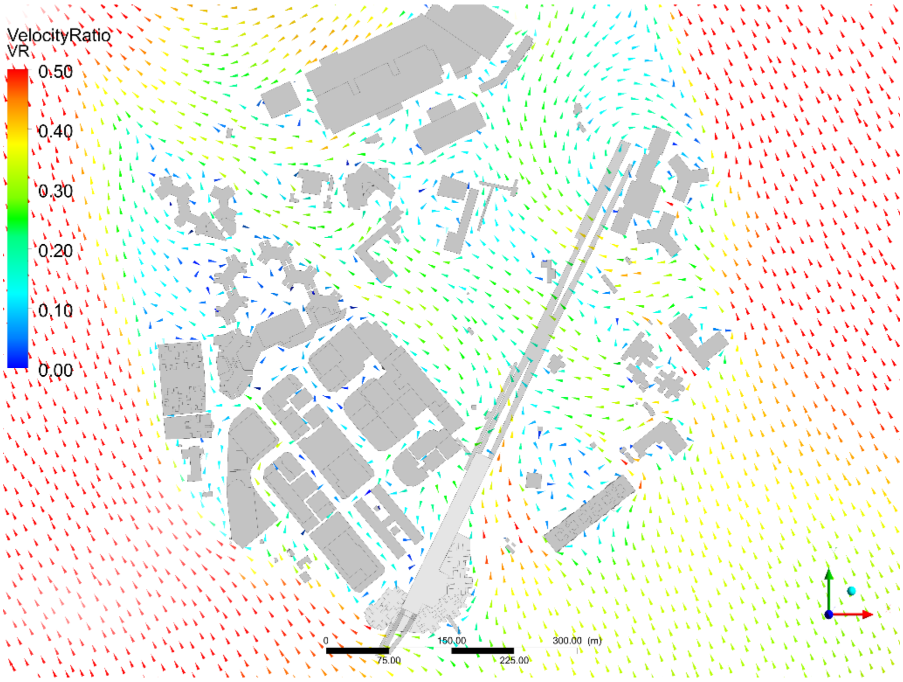
6.25 SSE incoming wind is partially obstructed by Yee Tsui Court that creates a wake region and reattaches within Chai Wan Park.

6.26 In the Base Scheme, the SSE wind passes through the building gaps around Yee Tsui Court flows through the Project Area freely and enters a section of Cheung Man Road between the Greenwood Terrace and French International School to ventilate the downwind area

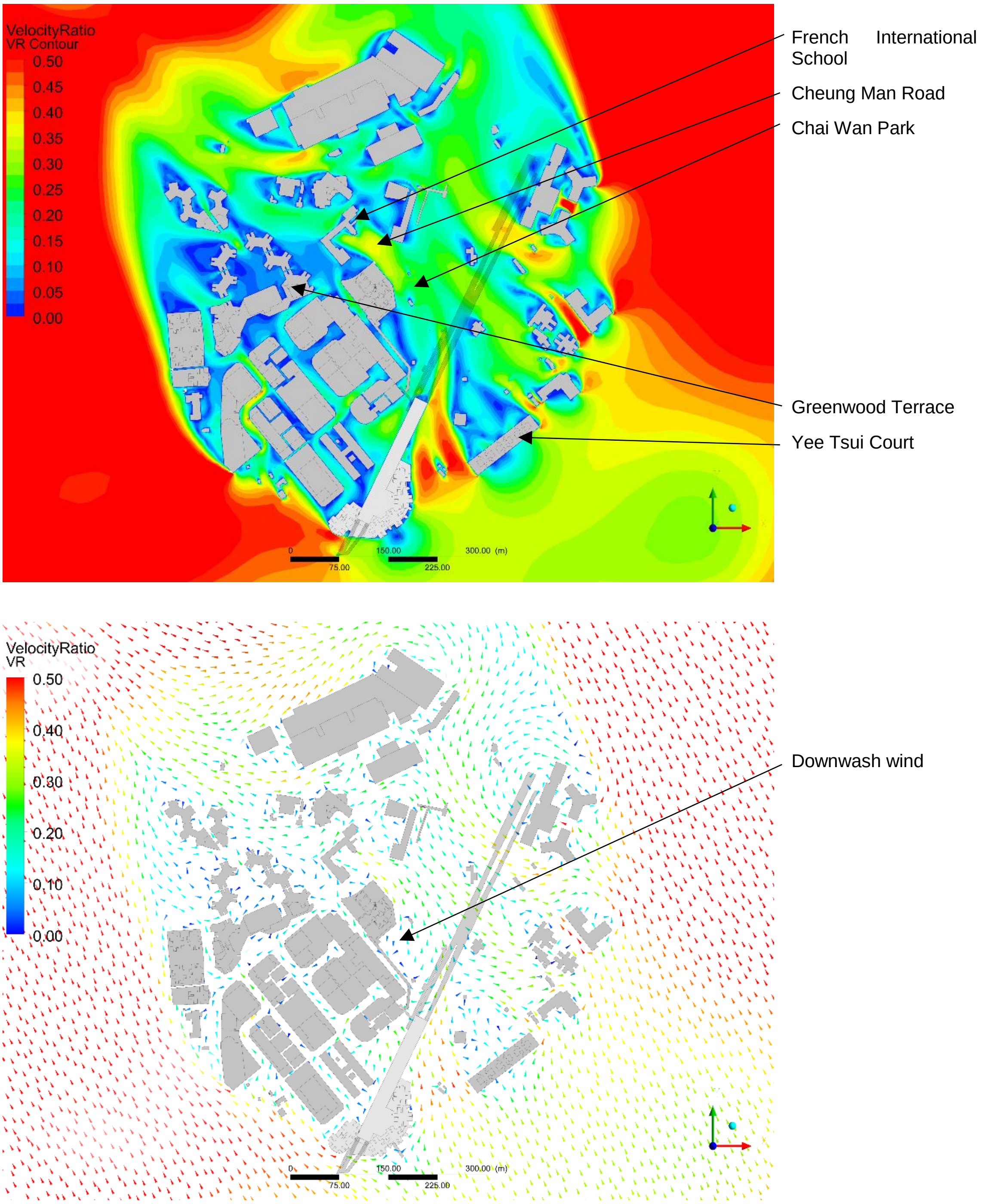
6.27 In the Proposed Scheme, the residential block diverts a portion of wind to pedestrian level at Chai Wan Park that encounters the incoming wind along Island Eastern Corridor near Yee Tsui Court. A wake region is observed in the windward of the Project Area. Wind channelling effect is observed at the stairway from Chai Wan Park to Cheung Man Road. However, the Proposed Scheme shields part of Cheung Man Road at leeside and the entrance of air path for south-easterly wind between Greenwood Terrace and French International School. There is no observable enhancement of wind in the Proposed Scheme compared to the Base Scheme.

Base Scheme


VelocityRatio
VR Contour
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
French International School
Cheung Man Road
Chai Wan Park
Greenwood Terrace
Yee Tsui Court
0
75.00
150.00
225.00
300.00 (m)


VelocityRatio
VR
0.50
0.40
0.30
0.20
0.10
0.00
0
75.00
150.00
225.00
300.00 (m)

Proposed Scheme



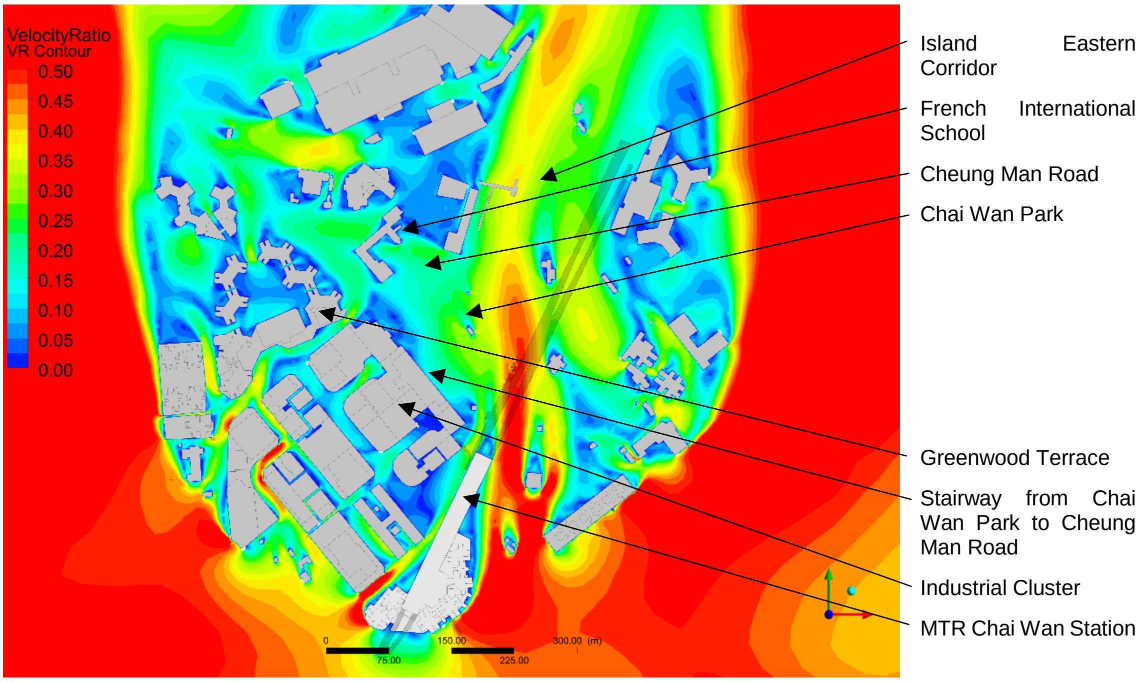
S: (Summer: 10.3%)

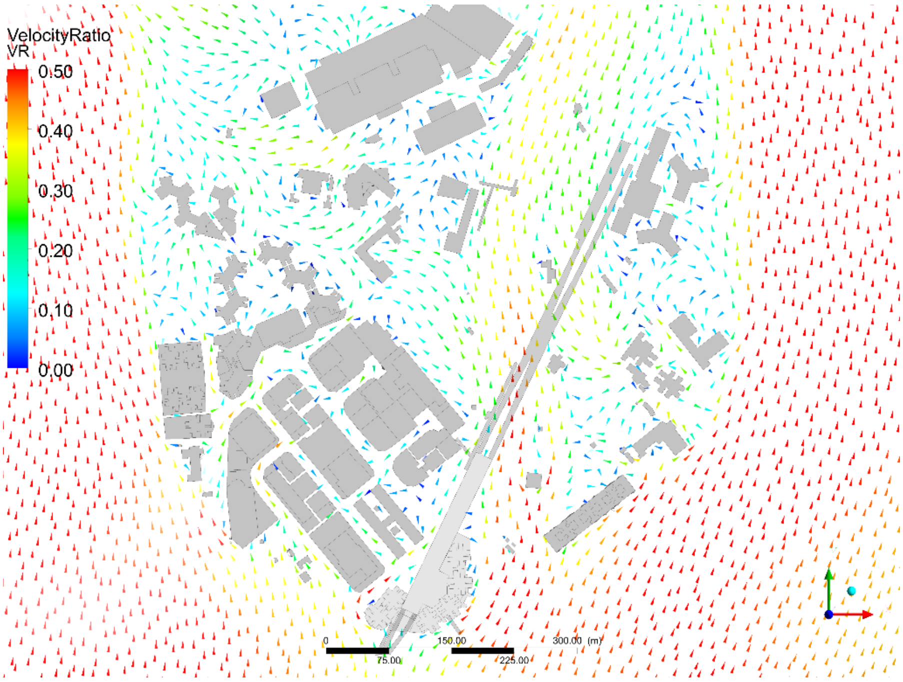
6.28 Under S wind, Island Eastern Corridor and Chai Wan Park forms a continuous south-north air path to facilitate southerly wind penetration within the region. However, the Project Area is positioned at leeside of the dense industrial developments to the west of MTR Chai Wan Station that creates a wake at Project Area. A portion of wind is regulated by Greenwood Terrace and enters Cheung Man Road via Hong Man Road.

6.29 In the Base Scheme, the Project Area is under shadow of the Industrial Cluster as the upwind morphology does not favour southerly wind penetration. A large wake with generally low VR is observed at Cheung Man Road, Chai Wan Park and school sites at downwind.

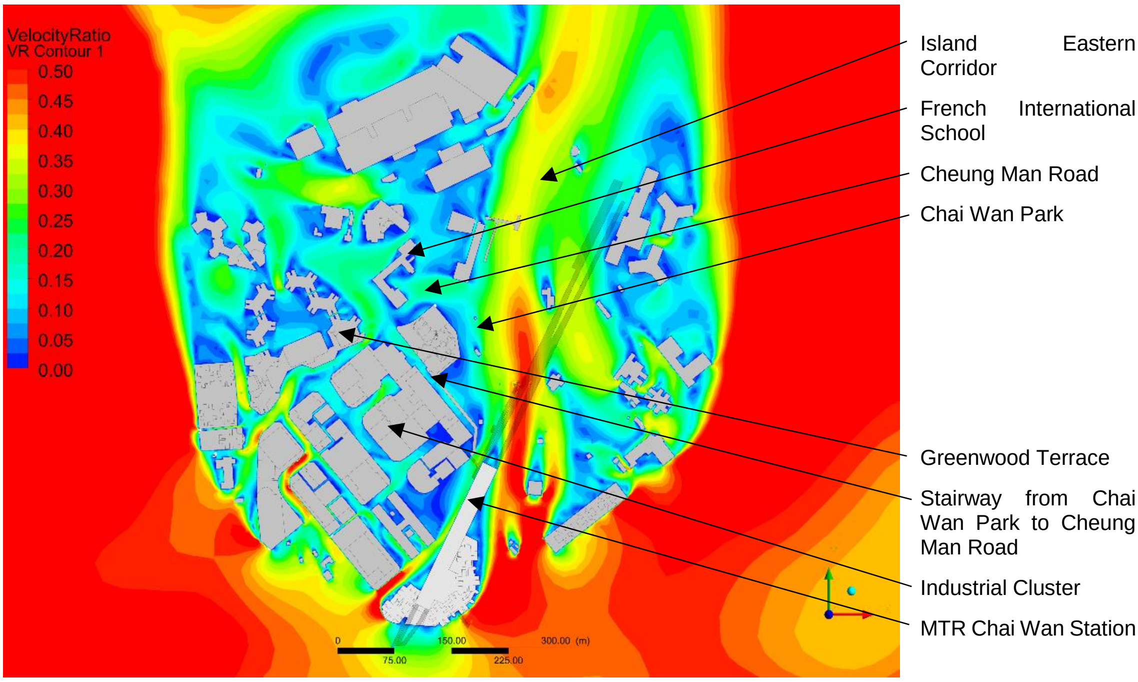
6.30 In the Proposed Scheme, the ventilation performance is similar compared to Base Scheme as the upwind morphology does not favour southerly wind penetration. The Project Area is under shadow of the Industrial Cluster and therefore, the Proposed Scheme would not impact the air ventilation significantly. Downwash air flow along the stairway from Cheung Man Road down to Chai Wan Park is observed in the Proposed Scheme. On the other hand, wake regions are observed around the podium structure.

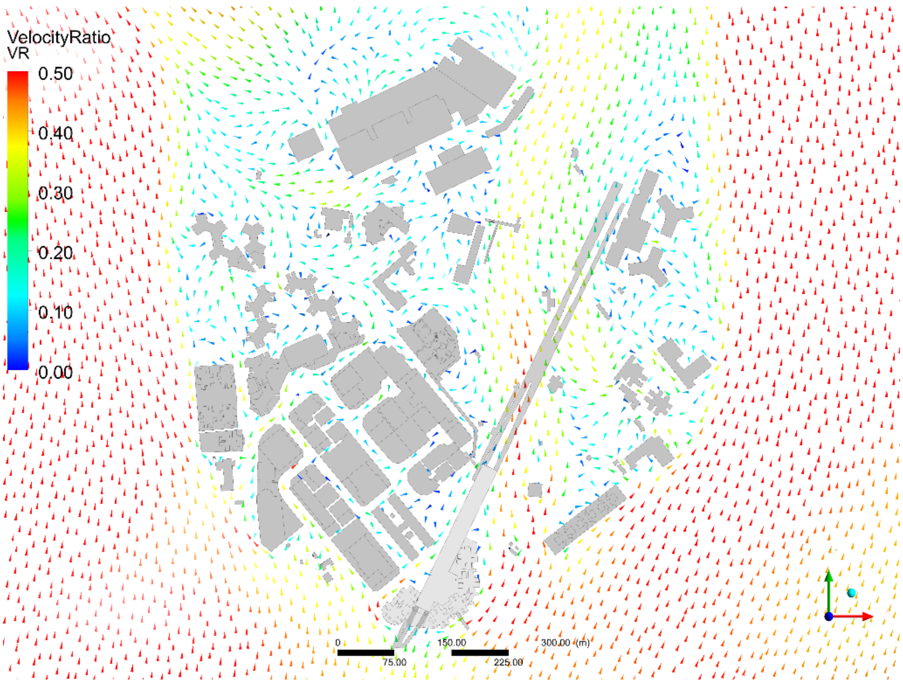
Base Scheme


VelocityRatio
VR Contour
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
Island Eastern Corridor
French International School
Cheung Man Road
Chai Wan Park
Greenwood Terrace
Stairway from Chai Wan Park to Cheung Man Road
Industrial Cluster
MTR Chai Wan Station


VelocityRatio
VR
0.50
0.40
0.30
0.20
0.10
0.00

Proposed Scheme





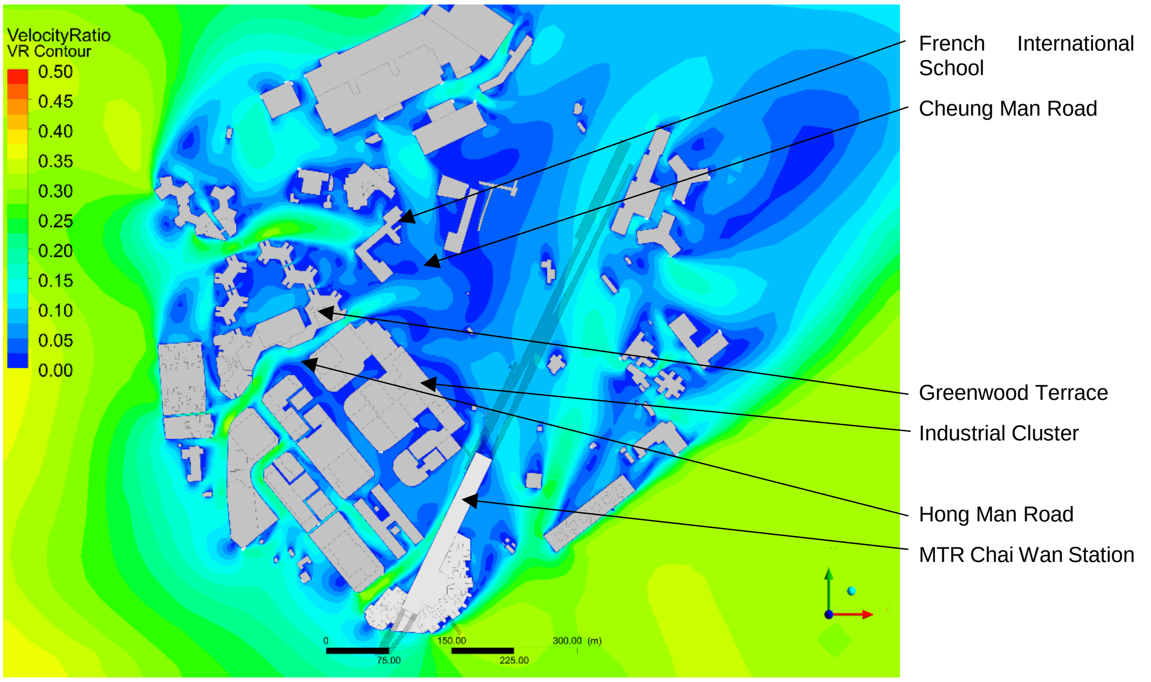
SSW: (Annual: 6.2%; Summer: 14.3%))

6.31 SSW downhill wind is weakened by the topography and the dense industrial developments to the west of MTR Chai Wan Station that creates a wake at Project Area. A portion of wind is regulated by Greenwood Terrace and enters Cheung Man Road via Hong Man Road.

6.32 In the Base Scheme, generally lower VR is observed when SSW wind passes the hilly topography at upwind. An air path is identified along Hong Man Road and Cheung Man Road adjacent to the Project Area. The Project Area is under shadow of the Industrial Cluster as the upwind morphology does not favour southerly wind penetration.

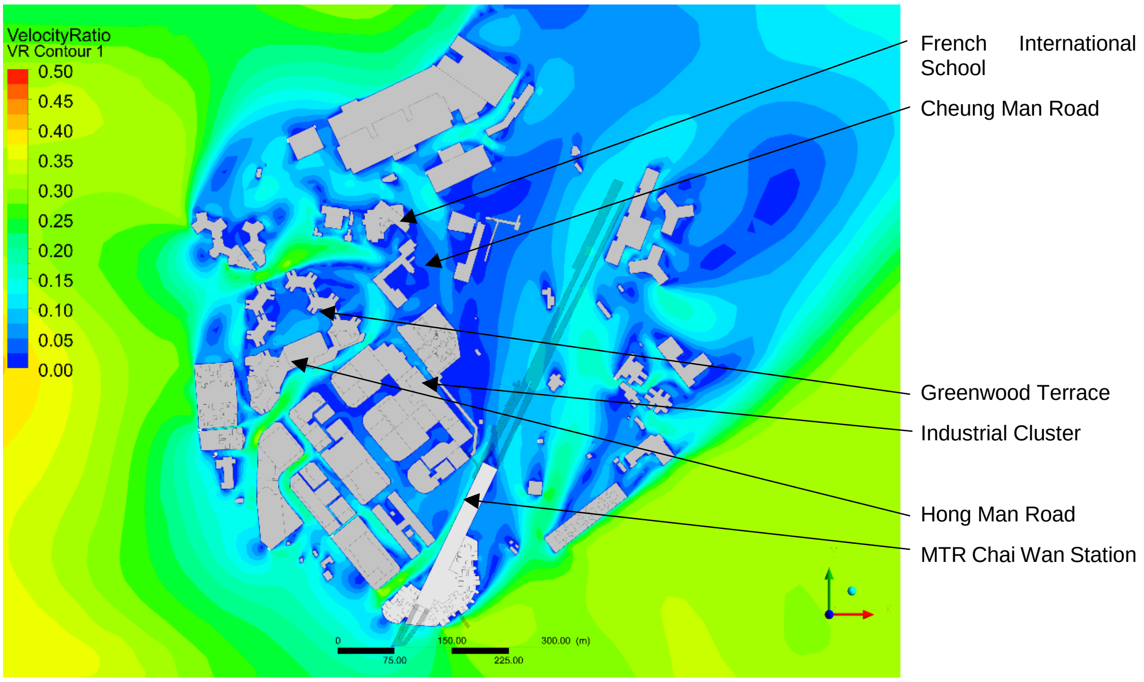
6.33 In the Proposed Scheme, similarly, low VR is observed in general at downwind of the Industrial Cluster. The Proposed Development would not impact the air path along Hong Man Road but divert the wind flow at Cheung Man Road adjacent to the Project Area. A reduction in VR is observed between the Project Area and French International School.

Base Scheme


VelocityRatio
VR Contour
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
French International School
Cheung Man Road
Greenwood Terrace
Industrial Cluster
Hong Man Road
MTR Chai Wan Station
0
75.00
150.00
225.00
300.00 (m)


VelocityRatio
VR
0.50
0.40
0.30
0.20
0.10
0.00
0
75.00
150.00
225.00
300.00 (m)

Proposed Scheme



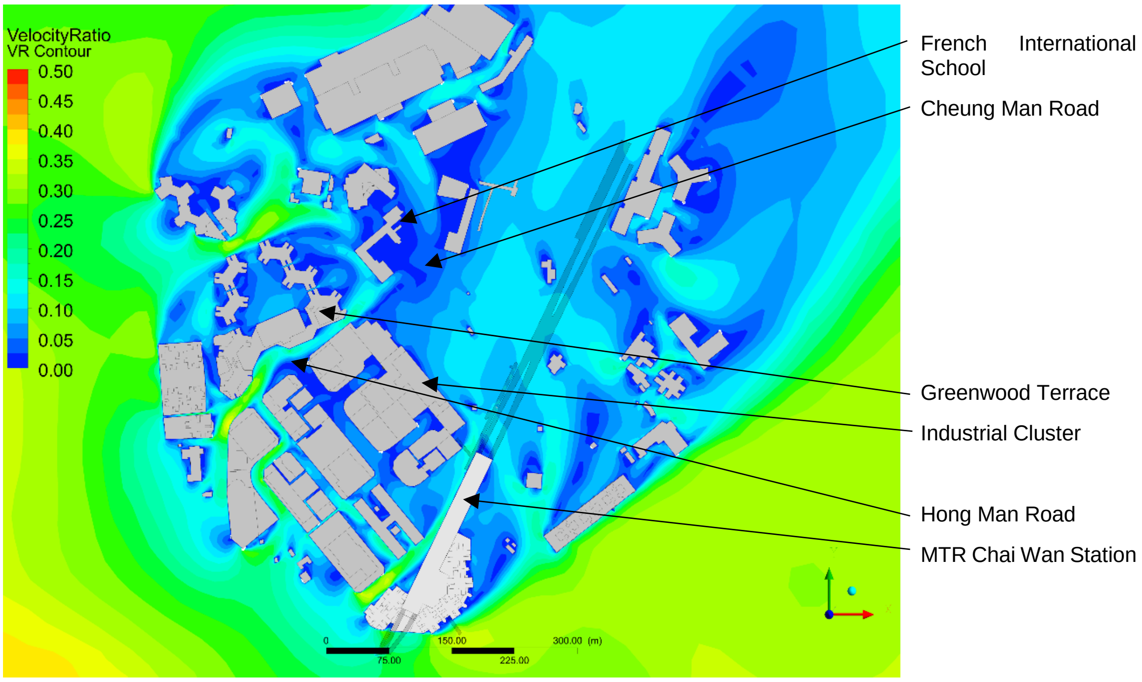
SW: (Annual: 6.3%; Summer: 14.9%)

6.34 SW downhill wind is weakened by the topography and the dense industrial developments to the west of MTR Chai Wan Station that creates a wake at Project Area. A portion of wind is regulated by Greenwood Terrace and enters Cheung Man Road via Hong Man Road.

6.35 In the Base Scheme, generally lower VR is observed when SW wind passes the hilly topography at upwind. An air path is identified along Hong Man Road and Cheung Man Road adjacent to the Project Area. The Project Area is under shadow of the Industrial Cluster as the upwind morphology does not favour south-westerly wind penetration.

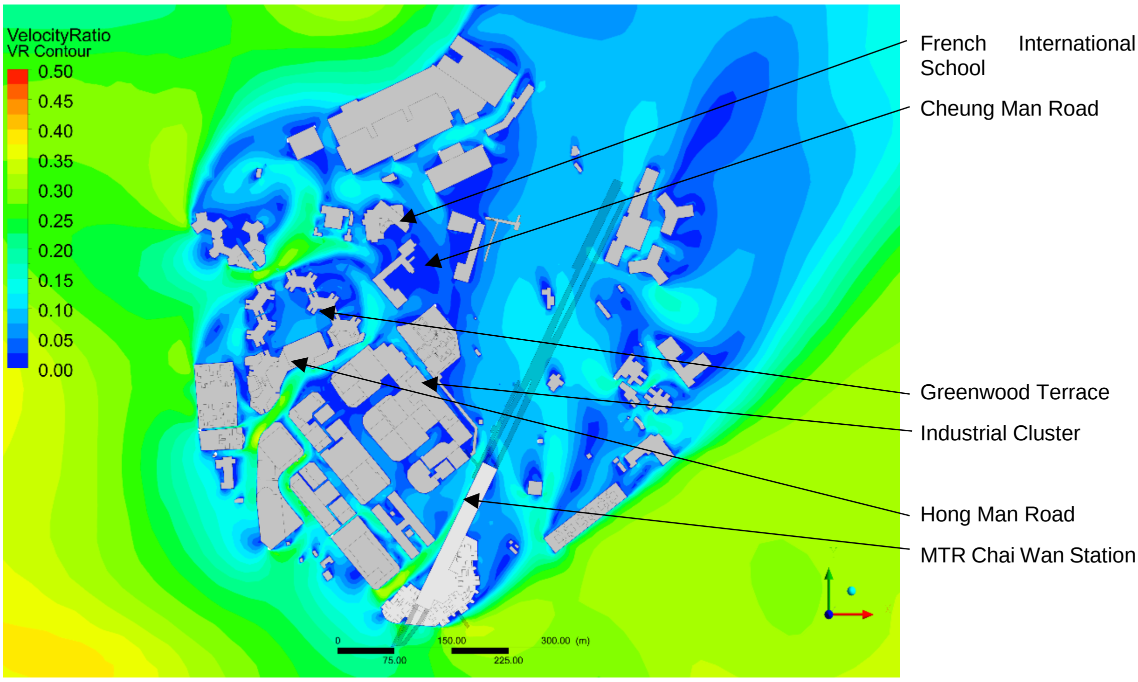
6.36 In the Proposed Scheme, similarly, low VR is observed in general at downwind of the Industrial Cluster. The Proposed Development would not impact the air path along Hong Man Road but divert the wind flow at Cheung Man Road adjacent to the Project Area. A reduction in VR is observed between the Project Area and French International School.

Base Scheme


VelocityRatio
VR Contour
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
French International School
Cheung Man Road
Greenwood Terrace
Industrial Cluster
Hong Man Road
MTR Chai Wan Station
0
75.00
150.00
225.00
300.00 (m)


VelocityRatio
VR
0.50
0.40
0.30
0.20
0.10
0.00
0
75.00
150.00
225.00
300.00 (m)

Proposed Scheme



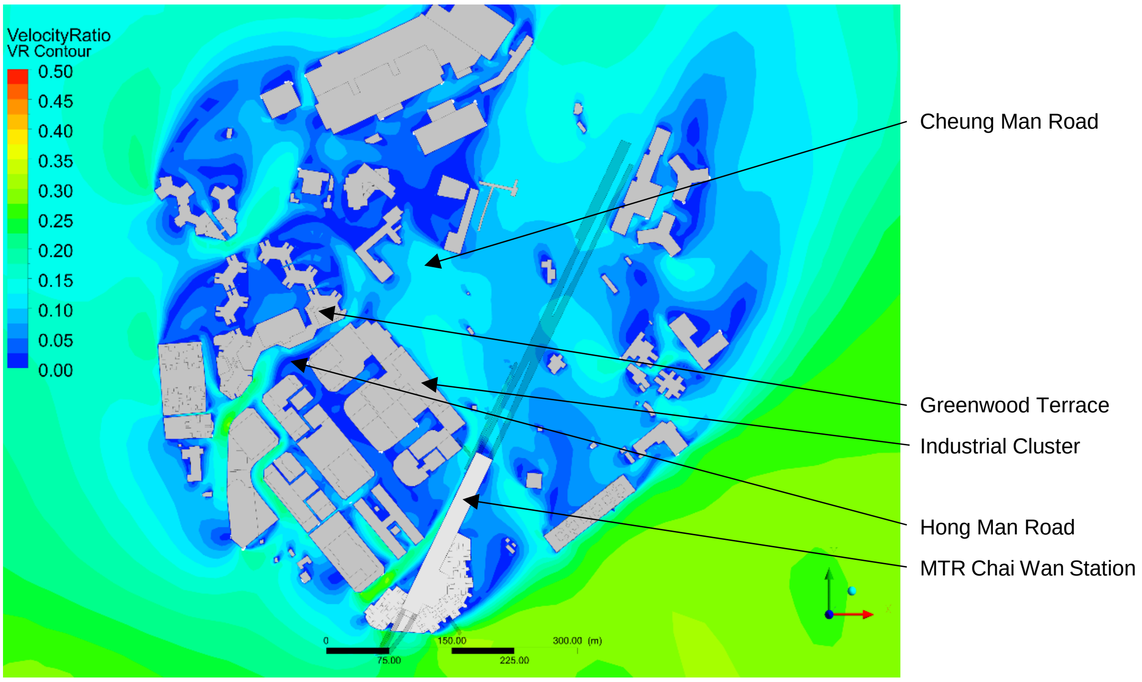
WSW: (Summer: 7.8%)

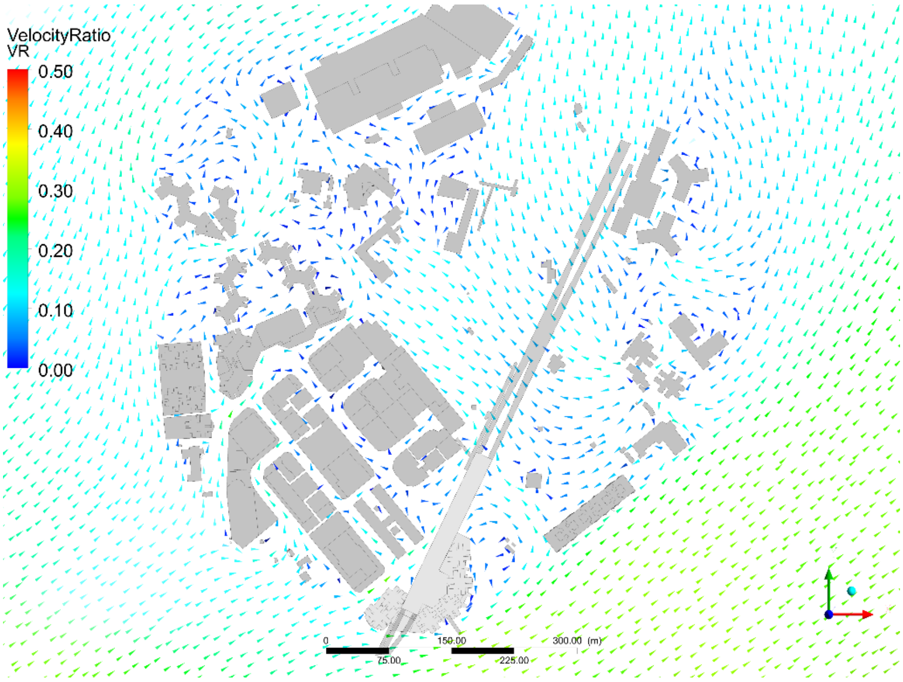
6.37 WSW downhill wind is weakened by the topography and the dense industrial developments to the west of MTR Chai Wan Station that creates a wake at Project Area. A portion of wind is regulated by Greenwood Terrace and enters Cheung Man Road via Hong Man Road.

6.38 In the Base Scheme, generally lower VR is observed when WSW wind passes the hilly topography at upwind. An air path is identified along Hong Man Road and Cheung Man Road adjacent to the Project Area. The Project Area is under shadow of the Industrial Cluster as the upwind morphology does not favour south-westerly wind penetration.

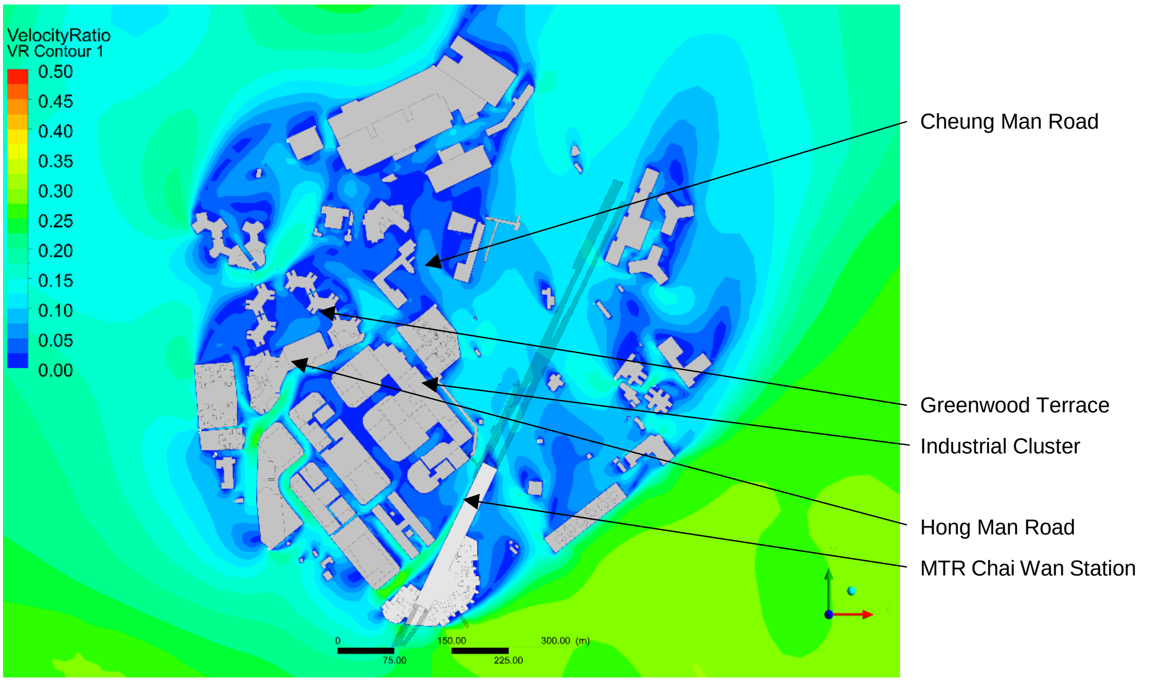
6.39 In the Proposed Scheme, low VR is observed in general at downwind of the Industrial Cluster. The Proposed Development would not impact the air path along Hong Man Road. The change of air flow pattern is observed at Cheung Man Road and French International School adjacent to the Project Area leading to air stagnant. There is a slight drawback observed at Chai Wan Park when downwash air along the stairway to encounter the diverted potion of wind at the corner to the east of the Industrial Cluster.

Base Scheme


VelocityRatio
VR Contour
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
Cheung Man Road
Greenwood Terrace
Industrial Cluster
Hong Man Road
MTR Chai Wan Station
0
75.00
150.00
225.00
300.00 (m)


VelocityRatio
VR
0.50
0.40
0.30
0.20
0.10
0.00
0
75.00
150.00
225.00
300.00 (m)

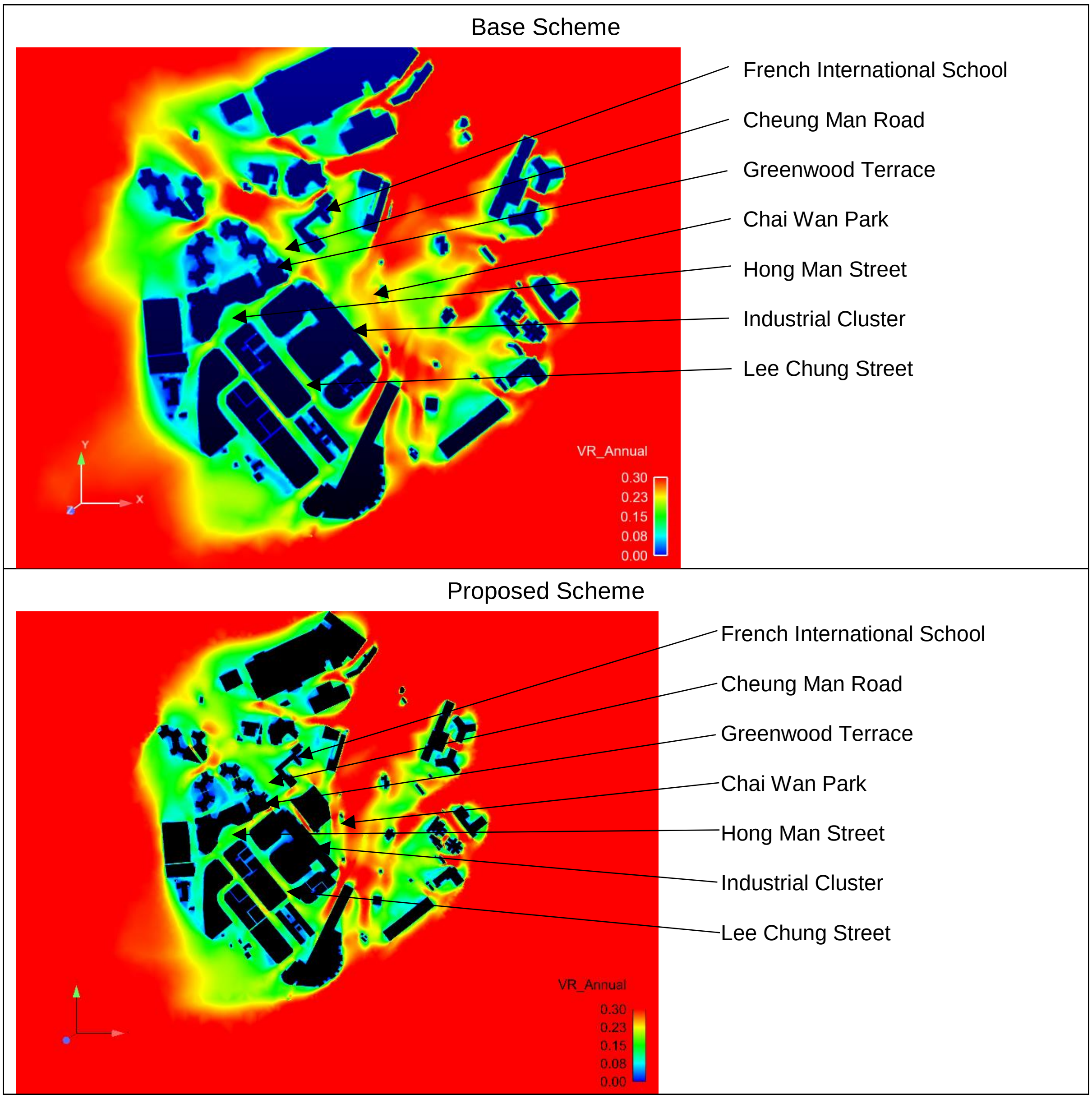
Proposed Scheme



Overall Annual Frequency Weighted VR (78.3%)

6.40 According to the overall annual frequency weighted VR plot, observable air ventilation enhancements and drawbacks are summarized as follow:

- Downwash wind of the Proposed Scheme improves the localized air ventilation performance at Cheung Man Road and stairway to Chai Wan Park, on the other hand, the this air movement could disturb the air flow pattern that creates air stagnant area at Cheung Man Road
- The Proposed Scheme induces more flow along Lee Chung Street under north-easterly wind, however, slightly impacts the Access Road in the Industrial Cluster
- With the Proposed Scheme, more south-easterly wind could enter Hong Man Road
- The Proposed Scheme partially obstructs south-easterly wind to enter Cheung Man Road between the Greenwood Terrace and French International School to ventilate the downwind area

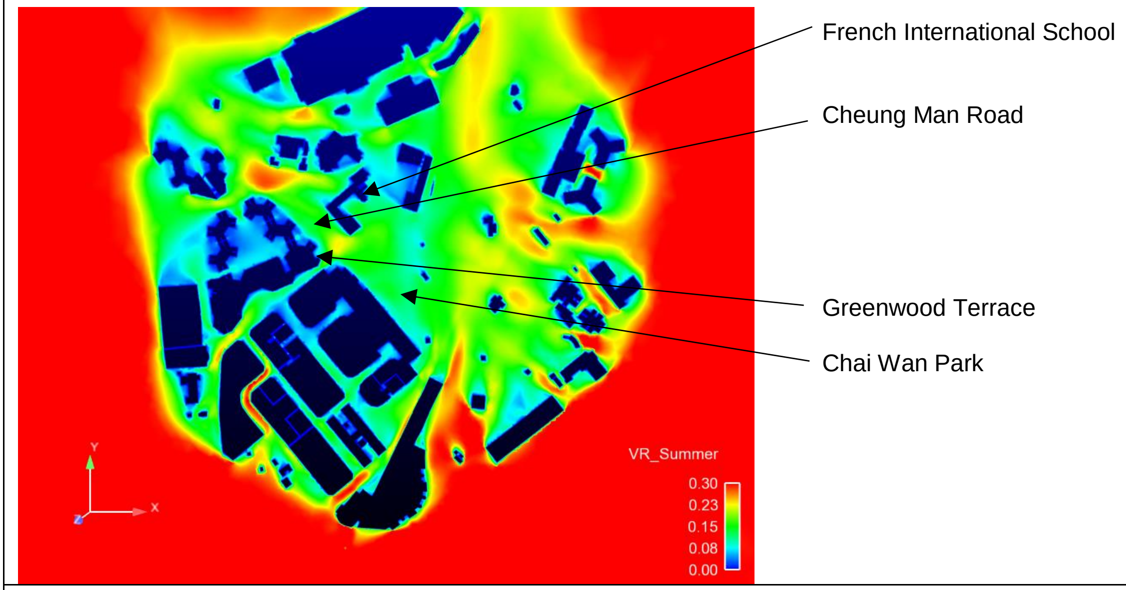


Overall Summer Frequency Weighted VR (79.2%)

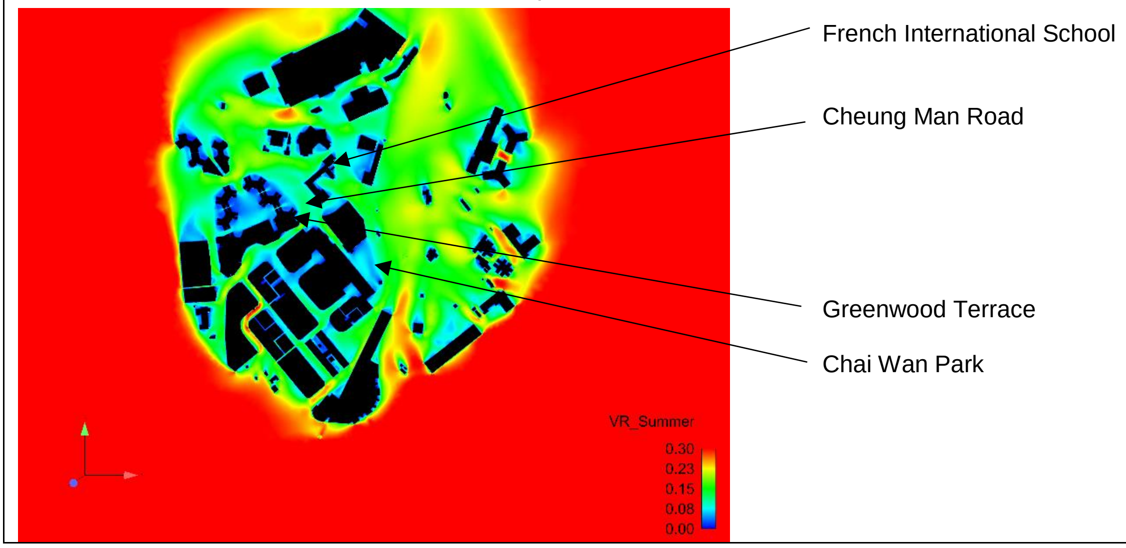
6.41 According to the overall summer frequency weighted VR plot, observable air ventilation enhancements and drawbacks are summarized as follow:

- The Proposed Scheme partially obstructs south-easterly wind to enter Cheung Man Road between the Greenwood Terrace and French International School to ventilate the downwind area
- Downwash wind of the Proposed Scheme under south-easterly wind could disturb the air flow pattern that creates air stagnant area at Chai Wan Park

Base Scheme



Proposed Scheme



7 SUMMARY AND CONCLUSIONS

7.1 This AVA Study Report aims at assessing the characteristics of the wind availability of the site, providing a general pattern and a quantitative estimate of wind performance at the pedestrian level under the annual and summer wind directions with the highest occurrence and investigating the effectiveness of ventilation for the existing scenario and the Proposed Development namely the Base Scheme and the Proposed Scheme for the potential Cheung Man Road Public Housing Development.

7.2 To mitigate the potential air ventilation impact on site perimeter by the Proposed Development, several good design features were considered in the Proposed Scheme, such as building setback, use of sloping profile of the site to accommodate carpark and other auxiliary accommodations, empty bays at podium level, noise mitigation measures other than noise barrier as far as practicable to enhance wind environment in the immediate vicinity.

7.3 From the finding of this AVA Initial Study, the SVRw for Base Scheme is maintained at 0.19 under the annual prevailing wind from NNE, NE, ENE, E, ESE, SE, SSW and SW directions which amount to about 78.3% of the whole time in a year, while that of the Proposed Scheme is 0.24. Thus, an air ventilation improvement is observed in the vicinity of the Proposed Scheme under annual prevailing winds. This is due to the fact that the Proposed Scheme would divert a portion of downwash wind to pedestrian level and accelerate air flow around podium.

7.4 The LVRw for the Base Scheme and the Proposed Scheme are 0.20 and 0.24 respectively under the annual wind directions stated above. It can be concluded that the Proposed Scheme would have a better air ventilation performance compared to Base Scheme under the major annual winds.

7.5 From the finding of this AVA Initial Study, the SVRw for Base Scheme is maintained at 0.14 under the summer prevailing wind from E, ESE, SE, SSE, S, SSW, SW and WSW directions which amount to about 79.2% of the whole time in a year, while that of the Proposed Scheme is maintained at 0.12. Since the proposed new development would impact the existing wind environment in the vicinity of the Proposed Scheme.

7.6 The LVRw for the Base Scheme and the Proposed Scheme are both 0.13 under summer wind conditions. It can be concluded that the Proposed Scheme would have a similar air ventilation performance compared to Base Scheme.

7.7 In addition to the good design features identified, the followings are some general recommendations that would be adopted as far as practical in the detailed design stage of the Proposed Development to facilitate wind penetration:

- Building Permeability (refer to P in the PNAP APP-152 Sustainable Building Design Guideline);
- Building setback;
- Greenery (preferably tree planting) of no less than 20% for sites below 1 ha, preferably at grade;
- Avoidance of long continuous facades;
- Reference could also be made to recommendations of design measures in the Hong Kong Planning Standards and Guidelines;
- Alternative approach (such as acoustic window and/ or acoustic balcony) in resolving noise issue to reduce extent of noise barriers for more effective air paths; and
- Terraced podium design to further mitigate the ventilation impact at site perimeter.

7.8 To conclude, according to the simulation results in Table 5.1, better annual LVR and SVR are achieved by the Proposed Scheme when compared with the Base Scheme. Decreased summer SVR is found under the Proposed Scheme when compared with Base Scheme while summer LVR are the same. No significant impact is anticipated to the surrounding pedestrian wind environment due to the proposed development.

Appendix A

Wind Probability Table

<u>Tabulated Results - Percentage Occurrence of Directional Winds</u>
<u>Annual - at 500m</u>

h_00282	Wind direction	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
V infinity (m/s)	Sum	0.033	0.068	0.102	0.140	0.207	0.091	0.050	0.042	0.047	0.062	0.063	0.032	0.027	0.014	0.011	0.011
00_to_01	0.017	0.001	0.001	0.001	0.001	0.003	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.003	0.001	0.001	0.001
01_to_02	0.041	0.003	0.003	0.002	0.002	0.004	0.002	0.002	0.002	0.002	0.003	0.003	0.003	0.004	0.002	0.002	0.002
02_to_03	0.067	0.004	0.004	0.006	0.005	0.008	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.005	0.002	0.002	0.002
03_to_04	0.088	0.005	0.007	0.010	0.009	0.010	0.007	0.006	0.007	0.007	0.005	0.004	0.004	0.004	0.002	0.001	0.001
04_to_05	0.111	0.004	0.009	0.013	0.014	0.018	0.011	0.007	0.008	0.008	0.005	0.004	0.003	0.004	0.002	0.001	0.001
05_to_06	0.127	0.003	0.007	0.016	0.017	0.025	0.016	0.009	0.006	0.007	0.007	0.006	0.003	0.002	0.002	0.001	0.001
06_to_07	0.127	0.003	0.007	0.015	0.020	0.029	0.015	0.007	0.004	0.005	0.007	0.008	0.003	0.002	0.001	0.001	0.001
07_to_08	0.120	0.002	0.007	0.012	0.020	0.031	0.013	0.005	0.004	0.005	0.007	0.008	0.003	0.001	0.001	0.001	0.000
08_to_09	0.096	0.002	0.006	0.010	0.017	0.026	0.009	0.003	0.002	0.003	0.007	0.006	0.003	0.001	0.000	0.001	0.000
09_to_10	0.072	0.002	0.004	0.007	0.013	0.021	0.006	0.002	0.001	0.002	0.005	0.005	0.002	0.001	0.000	0.000	0.000
10_to_11	0.049	0.002	0.004	0.004	0.009	0.014	0.003	0.001	0.001	0.001	0.004	0.004	0.001	0.000	0.000	0.000	0.000
11_to_12	0.030	0.001	0.003	0.002	0.006	0.007	0.002	0.001	0.001	0.001	0.002	0.003	0.001	0.000	0.000	0.000	0.000
12_to_13	0.019	0.001	0.002	0.001	0.003	0.004	0.001	0.001	0.001	0.001	0.002	0.003	0.001	0.000	0.000	0.000	0.000
13_to_14	0.013	0.000	0.001	0.001	0.002	0.003	0.001	0.001	0.000	0.000	0.001	0.002	0.001	0.000	0.000	0.000	0.000
14_to_15	0.008	0.000	0.001	0.001	0.001	0.002	0.001	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000
15_to_16	0.005	0.000	0.001	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000
16_to_17	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000
17_to_18	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
18_to_19	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
19_to_20	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
20_to_21	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
21_to_22	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
22_to_23	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
23_to_24	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Tabulated Results - Percentage Occurrence of Directional Winds
Summer - at 500m

h_00282	Wind direction	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
V infinity (m/s)	Sum	0.012	0.014	0.020	0.033	0.084	0.084	0.068	0.083	0.103	0.143	0.149	0.078	0.061	0.029	0.022	0.014
00_to_01	0.024	0.001	0.001	0.001	0.001	0.003	0.001	0.001	0.002	0.001	0.001	0.001	0.002	0.004	0.001	0.001	0.001
01_to_02	0.055	0.002	0.002	0.002	0.002	0.004	0.002	0.003	0.003	0.004	0.006	0.006	0.007	0.006	0.002	0.001	0.001
02_to_03	0.090	0.003	0.002	0.003	0.003	0.005	0.005	0.006	0.007	0.010	0.010	0.009	0.010	0.011	0.003	0.002	0.002
03_to_04	0.099	0.002	0.002	0.003	0.004	0.005	0.006	0.007	0.011	0.013	0.009	0.008	0.009	0.010	0.005	0.002	0.001
04_to_05	0.107	0.001	0.001	0.002	0.005	0.009	0.010	0.009	0.011	0.014	0.011	0.008	0.007	0.009	0.005	0.003	0.002
05_to_06	0.109	0.001	0.001	0.002	0.002	0.010	0.013	0.009	0.010	0.012	0.016	0.013	0.006	0.006	0.004	0.003	0.002
06_to_07	0.104	0.001	0.001	0.001	0.002	0.010	0.013	0.007	0.009	0.011	0.016	0.017	0.008	0.004	0.003	0.002	0.001
07_to_08	0.102	0.000	0.001	0.001	0.003	0.008	0.008	0.006	0.009	0.013	0.018	0.020	0.007	0.003	0.001	0.001	0.001
08_to_09	0.080	0.000	0.000	0.001	0.002	0.007	0.007	0.004	0.005	0.008	0.017	0.014	0.007	0.002	0.001	0.002	0.001
09_to_10	0.061	0.001	0.000	0.000	0.002	0.005	0.005	0.004	0.004	0.005	0.013	0.012	0.004	0.002	0.001	0.001	0.001
10_to_11	0.049	0.000	0.001	0.000	0.002	0.005	0.003	0.002	0.004	0.004	0.010	0.010	0.004	0.001	0.001	0.001	0.000
11_to_12	0.033	0.000	0.000	0.001	0.001	0.003	0.003	0.002	0.003	0.002	0.005	0.008	0.002	0.001	0.000	0.000	0.000
12_to_13	0.025	0.000	0.001	0.001	0.001	0.002	0.003	0.001	0.002	0.001	0.004	0.007	0.002	0.000	0.000	0.000	0.000
13_to_14	0.020	0.000	0.000	0.001	0.001	0.002	0.001	0.002	0.000	0.001	0.002	0.007	0.001	0.000	0.000	0.000	0.000
14_to_15	0.013	0.000	0.000	0.001	0.001	0.003	0.001	0.001	0.000	0.001	0.002	0.003	0.001	0.000	0.000	0.000	0.000
15_to_16	0.009	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.001	0.001	0.003	0.000	0.000	0.000	0.000	0.000
16_to_17	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.002	0.000	0.000	0.000	0.000	0.000
17_to_18	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000
18_to_19	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
19_to_20	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
20_to_21	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
21_to_22	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
22_to_23	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
23_to_24	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Appendix B

Wind Velocity Ratios

VRs of Base Scheme

Base	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	Annual	Summer
Annual	**6.80%**	**10.20%**	**14.00%**	**20.70%**	**9.10%**	**5.00%**			**6.20%**	**6.30%**		**78.30%**	
Summer				**8.40%**	**8.40%**	**6.80%**	**8.30%**	**10.30%**	**14.30%**	**14.90%**	**7.80%**		**79.20%**
P01	0.42	0.31	0.15	0.26	0.07	0.27	0.29	0.11	0.14	0.13	0.05	0.22	0.16
P02	0.43	0.30	0.19	0.26	0.06	0.25	0.26	0.06	0.11	0.03	0.06	0.21	0.12
P03	0.39	0.27	0.16	0.23	0.06	0.22	0.23	0.07	0.04	0.03	0.08	0.18	0.10
P04	0.31	0.23	0.15	0.14	0.07	0.20	0.20	0.08	0.04	0.02	0.09	0.15	0.09
P05	0.27	0.24	0.18	0.10	0.08	0.18	0.17	0.06	0.05	0.03	0.10	0.14	0.08
P06	0.20	0.21	0.17	0.07	0.08	0.14	0.12	0.03	0.06	0.05	0.10	0.12	0.07
P07	0.28	0.30	0.27	0.10	0.10	0.13	0.12	0.09	0.08	0.07	0.12	0.17	0.10
P08	0.27	0.30	0.26	0.14	0.05	0.13	0.12	0.05	0.04	0.02	0.09	0.17	0.07
P09	0.16	0.20	0.18	0.13	0.04	0.11	0.10	0.05	0.02	0.01	0.09	0.12	0.06
P10	0.07	0.10	0.08	0.12	0.04	0.11	0.09	0.10	0.02	0.02	0.09	0.08	0.06
P11	0.13	0.13	0.17	0.11	0.18	0.25	0.25	0.18	0.05	0.09	0.13	0.13	0.14
P12	0.22	0.25	0.29	0.09	0.21	0.28	0.28	0.21	0.06	0.09	0.13	0.18	0.15
P13	0.31	0.36	0.38	0.07	0.25	0.31	0.29	0.23	0.06	0.10	0.13	0.22	0.16
P14	0.37	0.42	0.43	0.06	0.28	0.32	0.29	0.25	0.06	0.10	0.13	0.24	0.17
P15	0.41	0.46	0.46	0.06	0.30	0.32	0.28	0.28	0.05	0.10	0.13	0.26	0.17
P16	0.45	0.50	0.48	0.06	0.31	0.32	0.28	0.28	0.04	0.10	0.12	0.27	0.17
P17	0.46	0.49	0.48	0.12	0.32	0.32	0.26	0.28	0.04	0.09	0.11	0.29	0.17
P18	0.46	0.49	0.47	0.19	0.31	0.29	0.24	0.25	0.04	0.08	0.11	0.30	0.17
P19	0.46	0.47	0.45	0.22	0.30	0.27	0.24	0.23	0.05	0.08	0.12	0.30	0.17
P20	0.41	0.39	0.37	0.24	0.30	0.28	0.23	0.22	0.06	0.07	0.12	0.28	0.17
P21	0.24	0.22	0.21	0.25	0.29	0.28	0.24	0.21	0.06	0.06	0.12	0.21	0.17
P22	0.12	0.14	0.13	0.24	0.29	0.29	0.24	0.20	0.06	0.05	0.12	0.18	0.16
P23	0.11	0.14	0.14	0.20	0.29	0.29	0.25	0.19	0.05	0.03	0.11	0.16	0.15
P24	0.11	0.16	0.16	0.13	0.29	0.30	0.25	0.19	0.04	0.03	0.11	0.15	0.14

P25	0.05	0.11	0.13	0.19	0.26	0.31	0.27	0.17	0.05	0.03	0.10	0.15	0.15
P26	0.04	0.07	0.10	0.21	0.23	0.29	0.27	0.15	0.07	0.03	0.09	0.14	0.15
P27	0.12	0.10	0.06	0.22	0.19	0.28	0.27	0.14	0.09	0.03	0.09	0.14	0.15
P28	0.23	0.19	0.09	0.24	0.18	0.29	0.29	0.13	0.11	0.03	0.09	0.18	0.15
P29	0.31	0.25	0.12	0.25	0.18	0.31	0.31	0.11	0.11	0.03	0.08	0.20	0.15
P30	0.39	0.30	0.14	0.28	0.17	0.33	0.35	0.05	0.12	0.09	0.07	0.23	0.16
T001	0.12	0.26	0.29	0.13	0.04	0.06	0.06	0.09	0.03	0.02	0.03	0.14	0.05
T002	0.14	0.10	0.10	0.14	0.10	0.08	0.10	0.14	0.02	0.01	0.03	0.10	0.07
T003	0.16	0.13	0.09	0.15	0.06	0.03	0.06	0.10	0.03	0.04	0.02	0.10	0.06
T004	0.20	0.17	0.12	0.19	0.07	0.05	0.07	0.13	0.04	0.04	0.02	0.13	0.07
T005	0.24	0.22	0.16	0.22	0.11	0.11	0.11	0.11	0.06	0.06	0.01	0.17	0.09
T006	0.31	0.30	0.24	0.15	0.17	0.21	0.15	0.07	0.06	0.06	0.04	0.19	0.10
T007	0.17	0.16	0.12	0.07	0.23	0.28	0.20	0.18	0.04	0.04	0.03	0.12	0.12
T008	0.12	0.09	0.05	0.04	0.04	0.03	0.02	0.17	0.01	0.01	0.03	0.05	0.04
T009	0.18	0.14	0.10	0.02	0.07	0.05	0.02	0.23	0.04	0.05	0.05	0.08	0.07
T010	0.17	0.17	0.12	0.03	0.03	0.07	0.05	0.18	0.01	0.03	0.03	0.08	0.05
T011	0.16	0.15	0.09	0.13	0.11	0.14	0.11	0.02	0.04	0.04	0.06	0.11	0.07
T012	0.05	0.05	0.04	0.09	0.10	0.12	0.10	0.08	0.02	0.07	0.07	0.07	0.07
T013	0.10	0.11	0.10	0.12	0.23	0.29	0.21	0.15	0.03	0.03	0.04	0.12	0.12
T014	0.07	0.07	0.05	0.12	0.06	0.12	0.11	0.13	0.04	0.05	0.10	0.08	0.08
T015	0.25	0.26	0.25	0.11	0.10	0.15	0.13	0.14	0.05	0.07	0.10	0.16	0.10
T016	0.38	0.42	0.40	0.10	0.10	0.13	0.12	0.09	0.03	0.07	0.11	0.21	0.08
T017	0.36	0.32	0.28	0.11	0.21	0.27	0.22	0.17	0.08	0.11	0.10	0.21	0.15
T018	0.62	0.60	0.53	0.17	0.25	0.28	0.24	0.31	0.12	0.15	0.15	0.34	0.20
T019	0.52	0.51	0.47	0.18	0.25	0.29	0.23	0.27	0.07	0.11	0.12	0.31	0.18
T020	0.43	0.42	0.39	0.26	0.21	0.21	0.17	0.19	0.08	0.10	0.11	0.28	0.16
T021	0.35	0.38	0.37	0.05	0.16	0.18	0.15	0.10	0.01	0.07	0.10	0.20	0.09
T022	0.29	0.35	0.37	0.08	0.19	0.25	0.24	0.19	0.02	0.10	0.13	0.20	0.13
T023	0.24	0.31	0.35	0.08	0.22	0.28	0.27	0.22	0.03	0.10	0.14	0.20	0.15

T024	0.33	0.33	0.30	0.20	0.29	0.29	0.22	0.27	0.08	0.11	0.12	0.25	0.18
T025	0.17	0.22	0.24	0.12	0.30	0.31	0.26	0.29	0.06	0.11	0.12	0.19	0.18
T026	0.49	0.51	0.49	0.16	0.24	0.21	0.21	0.20	0.03	0.08	0.10	0.29	0.14
T027	0.47	0.46	0.45	0.24	0.29	0.25	0.20	0.22	0.05	0.08	0.12	0.30	0.16
T028	0.11	0.12	0.11	0.19	0.28	0.26	0.24	0.20	0.05	0.04	0.11	0.15	0.15
T029	0.16	0.18	0.17	0.18	0.19	0.18	0.26	0.19	0.03	0.06	0.10	0.16	0.13
T030	0.54	0.55	0.53	0.21	0.23	0.17	0.21	0.22	0.03	0.08	0.10	0.32	0.14
T031	0.43	0.41	0.36	0.20	0.26	0.21	0.15	0.25	0.08	0.09	0.10	0.27	0.16
T032	0.48	0.47	0.39	0.15	0.30	0.25	0.26	0.30	0.08	0.10	0.10	0.28	0.18
T033	0.50	0.52	0.44	0.04	0.33	0.27	0.25	0.34	0.05	0.11	0.10	0.27	0.17
T034	0.57	0.59	0.53	0.22	0.30	0.23	0.19	0.32	0.01	0.10	0.11	0.34	0.17
T035	0.56	0.57	0.54	0.16	0.25	0.18	0.22	0.28	0.02	0.09	0.10	0.31	0.15
T036	0.52	0.53	0.50	0.22	0.24	0.13	0.12	0.23	0.02	0.07	0.08	0.31	0.13
T037	0.50	0.52	0.49	0.29	0.26	0.16	0.15	0.23	0.02	0.07	0.08	0.32	0.14
T038	0.52	0.52	0.48	0.30	0.27	0.25	0.19	0.27	0.03	0.08	0.10	0.33	0.17
T039	0.29	0.30	0.27	0.20	0.04	0.06	0.08	0.05	0.02	0.02	0.03	0.18	0.06
T040	0.45	0.52	0.51	0.38	0.05	0.11	0.06	0.04	0.01	0.01	0.01	0.31	0.07
T041	0.07	0.07	0.08	0.09	0.19	0.02	0.12	0.05	0.10	0.08	0.02	0.09	0.09
T042	0.05	0.09	0.10	0.04	0.16	0.12	0.12	0.07	0.07	0.07	0.02	0.08	0.08
T043	0.13	0.12	0.11	0.08	0.13	0.11	0.07	0.06	0.03	0.02	0.02	0.09	0.06
T044	0.13	0.15	0.15	0.08	0.09	0.08	0.05	0.06	0.01	0.01	0.03	0.10	0.04
T045	0.07	0.06	0.07	0.10	0.27	0.25	0.25	0.25	0.05	0.04	0.12	0.11	0.15
T046	0.45	0.50	0.49	0.30	0.15	0.10	0.20	0.14	0.01	0.05	0.07	0.30	0.12
T047	0.57	0.56	0.53	0.16	0.26	0.24	0.11	0.36	0.04	0.10	0.10	0.32	0.16
T048	0.56	0.57	0.54	0.05	0.26	0.24	0.14	0.36	0.04	0.10	0.10	0.29	0.15
T049	0.58	0.59	0.52	0.09	0.27	0.24	0.21	0.38	0.04	0.11	0.10	0.30	0.17
T050	0.59	0.59	0.49	0.19	0.29	0.24	0.26	0.41	0.04	0.11	0.10	0.33	0.19
T051	0.58	0.55	0.42	0.20	0.30	0.25	0.25	0.42	0.05	0.11	0.09	0.32	0.20
T052	0.49	0.43	0.33	0.07	0.30	0.27	0.20	0.44	0.07	0.11	0.09	0.24	0.18

T053	0.39	0.33	0.30	0.15	0.27	0.24	0.17	0.44	0.07	0.08	0.08	0.23	0.18
T054	0.34	0.29	0.31	0.26	0.17	0.09	0.12	0.33	0.09	0.10	0.07	0.23	0.15
T055	0.35	0.28	0.30	0.21	0.37	0.31	0.12	0.50	0.09	0.10	0.08	0.25	0.21
T056	0.20	0.22	0.26	0.08	0.17	0.22	0.21	0.35	0.09	0.11	0.08	0.16	0.16
T057	0.35	0.25	0.28	0.15	0.29	0.23	0.16	0.45	0.10	0.11	0.09	0.22	0.19
T058	0.31	0.20	0.24	0.16	0.15	0.08	0.03	0.19	0.08	0.07	0.03	0.17	0.10
T059	0.26	0.15	0.17	0.24	0.17	0.29	0.29	0.20	0.07	0.09	0.11	0.19	0.16
T060	0.23	0.12	0.12	0.09	0.27	0.31	0.29	0.28	0.10	0.11	0.11	0.15	0.18
T061	0.39	0.26	0.25	0.13	0.29	0.24	0.24	0.45	0.09	0.11	0.08	0.21	0.19
T062	0.16	0.06	0.08	0.37	0.23	0.25	0.21	0.25	0.07	0.09	0.08	0.19	0.18
T063	0.44	0.37	0.27	0.15	0.32	0.26	0.28	0.46	0.08	0.11	0.09	0.24	0.21
T064	0.37	0.30	0.23	0.28	0.26	0.31	0.26	0.36	0.08	0.10	0.10	0.25	0.20
T065	0.59	0.57	0.43	0.08	0.27	0.28	0.20	0.39	0.06	0.11	0.10	0.29	0.17
T066	0.59	0.60	0.45	0.04	0.23	0.16	0.06	0.26	0.07	0.09	0.08	0.27	0.12
T067	0.57	0.59	0.55	0.05	0.25	0.19	0.15	0.32	0.05	0.10	0.10	0.29	0.14
T068	0.25	0.24	0.19	0.33	0.29	0.24	0.14	0.10	0.11	0.07	0.03	0.24	0.15
T069	0.20	0.21	0.21	0.12	0.30	0.21	0.05	0.07	0.10	0.07	0.02	0.17	0.11
T070	0.17	0.23	0.24	0.11	0.31	0.22	0.10	0.06	0.08	0.05	0.01	0.18	0.11
T071	0.12	0.17	0.19	0.10	0.30	0.19	0.07	0.05	0.07	0.06	0.02	0.15	0.10
T072	0.14	0.20	0.22	0.08	0.32	0.29	0.28	0.24	0.06	0.04	0.11	0.16	0.16
T073	0.10	0.16	0.18	0.08	0.29	0.30	0.26	0.19	0.03	0.03	0.11	0.14	0.14
T074	0.03	0.09	0.12	0.17	0.24	0.29	0.26	0.16	0.05	0.04	0.09	0.13	0.14
T075	0.14	0.10	0.04	0.20	0.15	0.23	0.24	0.14	0.08	0.04	0.07	0.13	0.13
T076	0.36	0.27	0.09	0.27	0.21	0.35	0.36	0.10	0.09	0.11	0.08	0.22	0.18
T077	0.34	0.21	0.19	0.18	0.21	0.37	0.37	0.20	0.04	0.10	0.10	0.20	0.17
T078	0.29	0.22	0.30	0.13	0.23	0.31	0.25	0.22	0.06	0.04	0.10	0.19	0.15
T079	0.28	0.30	0.31	0.17	0.22	0.28	0.22	0.20	0.04	0.07	0.06	0.22	0.14
T080	0.23	0.27	0.32	0.24	0.22	0.27	0.25	0.22	0.19	0.05	0.05	0.24	0.18
T081	0.20	0.16	0.39	0.29	0.23	0.32	0.29	0.20	0.25	0.11	0.03	0.26	0.21

T082	0.17	0.25	0.22	0.10	0.14	0.18	0.20	0.22	0.16	0.07	0.03	0.16	0.14
T083	0.10	0.20	0.21	0.31	0.24	0.29	0.29	0.21	0.11	0.10	0.02	0.22	0.18
T084	0.17	0.25	0.23	0.08	0.17	0.20	0.14	0.07	0.05	0.09	0.03	0.15	0.10
T085	0.02	0.16	0.22	0.31	0.21	0.25	0.23	0.18	0.02	0.03	0.03	0.19	0.14
T086	0.15	0.16	0.17	0.21	0.17	0.16	0.12	0.06	0.02	0.02	0.02	0.15	0.08
T087	0.16	0.15	0.14	0.11	0.14	0.20	0.21	0.16	0.03	0.01	0.06	0.12	0.10
T088	0.11	0.11	0.11	0.08	0.26	0.31	0.26	0.19	0.03	0.02	0.09	0.12	0.13
T089	0.34	0.26	0.16	0.23	0.12	0.03	0.04	0.25	0.17	0.18	0.11	0.20	0.15
T090	0.52	0.56	0.55	0.35	0.14	0.04	0.04	0.28	0.18	0.18	0.12	0.36	0.17
T091	0.27	0.34	0.37	0.18	0.11	0.06	0.06	0.17	0.11	0.13	0.07	0.22	0.12
T092	0.30	0.38	0.39	0.12	0.13	0.11	0.08	0.17	0.11	0.12	0.05	0.22	0.11
T093	0.28	0.35	0.32	0.08	0.12	0.09	0.05	0.20	0.14	0.16	0.08	0.19	0.12
T094	0.22	0.26	0.23	0.07	0.09	0.06	0.02	0.18	0.13	0.15	0.10	0.15	0.11
T095	0.07	0.07	0.07	0.07	0.02	0.02	0.05	0.05	0.03	0.03	0.02	0.05	0.03
T096	0.10	0.12	0.12	0.10	0.04	0.04	0.08	0.08	0.08	0.07	0.05	0.09	0.07
T097	0.15	0.18	0.08	0.08	0.03	0.03	0.04	0.06	0.05	0.06	0.04	0.09	0.05
T098	0.26	0.26	0.22	0.04	0.06	0.06	0.05	0.10	0.04	0.05	0.04	0.13	0.06
T099	0.14	0.13	0.13	0.13	0.05	0.04	0.04	0.12	0.08	0.08	0.06	0.11	0.08
T100	0.12	0.10	0.14	0.11	0.06	0.05	0.04	0.12	0.09	0.09	0.07	0.10	0.08

VRs of Proposed Scheme

	NNE	**NE**	**ENE**	**E**	**ESE**	**SE**	**SSE**	**S**	**SSW**	**SW**	**WSW**	**Annual**	**Summer**
Annual	**6.80%**	**10.20%**	**14.00%**	**20.70%**	**9.10%**	**5.00%**			**6.20%**	**6.30%**		**78.30%**	
Summer				**8.40%**	**8.40%**	**6.80%**	**8.30%**	**10.30%**	**14.30%**	**14.90%**	**7.80%**		**79.20%**
P01	0.29	0.31	0.27	0.31	0.12	0.08	0.07	0.12	0.07	0.07	0.07	0.22	0.11
P02	0.24	0.15	0.13	0.15	0.10	0.10	0.08	0.15	0.05	0.08	0.09	0.13	0.10
P03	0.26	0.16	0.14	0.16	0.10	0.10	0.09	0.16	0.08	0.10	0.11	0.14	0.11
P04	0.30	0.25	0.04	0.25	0.16	0.17	0.14	0.14	0.07	0.08	0.08	0.17	0.13
P05	0.33	0.30	0.09	0.30	0.20	0.22	0.18	0.12	0.07	0.07	0.07	0.21	0.14
P06	0.31	0.30	0.20	0.30	0.16	0.20	0.18	0.10	0.07	0.08	0.05	0.22	0.13
P07	0.48	0.46	0.36	0.46	0.19	0.22	0.19	0.13	0.10	0.11	0.04	0.34	0.17
P08	0.58	0.57	0.46	0.57	0.14	0.19	0.17	0.14	0.06	0.06	0.02	0.40	0.15
P09	0.55	0.52	0.42	0.52	0.07	0.11	0.11	0.13	0.07	0.08	0.03	0.36	0.13
P10	0.45	0.41	0.32	0.41	0.06	0.05	0.04	0.11	0.06	0.06	0.05	0.28	0.10
P11	0.31	0.31	0.22	0.31	0.04	0.06	0.06	0.02	0.01	0.01	0.02	0.20	0.06
P12	0.36	0.42	0.35	0.42	0.05	0.06	0.06	0.03	0.02	0.02	0.04	0.27	0.08
P13	0.30	0.36	0.31	0.36	0.06	0.06	0.04	0.03	0.02	0.02	0.04	0.24	0.07
P14	0.18	0.21	0.17	0.21	0.10	0.10	0.05	0.02	0.01	0.02	0.05	0.15	0.06
P15	0.51	0.49	0.47	0.49	0.17	0.17	0.14	0.04	0.01	0.05	0.11	0.36	0.13
P16	0.52	0.53	0.51	0.53	0.19	0.20	0.18	0.06	0.01	0.06	0.13	0.38	0.14
P17	0.46	0.48	0.47	0.48	0.21	0.24	0.22	0.07	0.01	0.06	0.13	0.36	0.15
P18	0.42	0.44	0.44	0.44	0.26	0.30	0.27	0.08	0.02	0.05	0.13	0.35	0.17
P19	0.32	0.34	0.34	0.34	0.29	0.34	0.31	0.08	0.02	0.04	0.12	0.29	0.16
P20	0.18	0.20	0.21	0.20	0.29	0.34	0.32	0.07	0.04	0.02	0.11	0.19	0.15
P21	0.08	0.09	0.11	0.09	0.29	0.36	0.34	0.06	0.05	0.01	0.10	0.12	0.14
P22	0.18	0.21	0.21	0.21	0.25	0.33	0.32	0.06	0.05	0.03	0.08	0.19	0.14
P23	0.28	0.32	0.31	0.32	0.23	0.30	0.31	0.08	0.04	0.03	0.06	0.26	0.14
P24	0.36	0.38	0.37	0.38	0.23	0.32	0.32	0.14	0.04	0.03	0.04	0.30	0.16

P25	0.23	0.24	0.22	0.24	0.06	0.08	0.08	0.05	0.04	0.04	0.02	0.17	0.07
P26	0.29	0.31	0.29	0.31	0.06	0.08	0.07	0.07	0.04	0.04	0.03	0.22	0.08
P27	0.29	0.30	0.28	0.30	0.05	0.06	0.05	0.06	0.03	0.03	0.02	0.21	0.07
P28	0.23	0.23	0.21	0.23	0.03	0.05	0.04	0.05	0.03	0.02	0.04	0.16	0.06
P29	0.24	0.25	0.24	0.25	0.03	0.03	0.03	0.03	0.04	0.02	0.04	0.17	0.05
P30	0.32	0.35	0.35	0.35	0.19	0.19	0.16	0.09	0.04	0.06	0.06	0.27	0.13
T001	0.27	0.29	0.24	0.29	0.08	0.06	0.06	0.12	0.03	0.02	0.04	0.20	0.08
T002	0.17	0.14	0.10	0.14	0.13	0.11	0.12	0.15	0.01	0.02	0.04	0.11	0.08
T003	0.20	0.17	0.12	0.17	0.07	0.06	0.08	0.11	0.03	0.03	0.02	0.12	0.07
T004	0.25	0.23	0.16	0.23	0.08	0.08	0.09	0.12	0.04	0.04	0.02	0.16	0.08
T005	0.27	0.25	0.19	0.25	0.12	0.14	0.13	0.10	0.06	0.06	0.02	0.19	0.10
T006	0.32	0.31	0.24	0.31	0.18	0.22	0.17	0.12	0.07	0.07	0.04	0.24	0.13
T007	0.20	0.19	0.13	0.19	0.24	0.30	0.23	0.17	0.04	0.04	0.03	0.17	0.14
T008	0.13	0.13	0.09	0.13	0.03	0.04	0.07	0.17	0.02	0.02	0.01	0.09	0.06
T009	0.10	0.12	0.06	0.12	0.05	0.04	0.04	0.22	0.03	0.04	0.03	0.08	0.07
T010	0.02	0.05	0.05	0.05	0.05	0.08	0.07	0.18	0.02	0.02	0.01	0.04	0.06
T011	0.17	0.18	0.17	0.18	0.12	0.15	0.13	0.02	0.04	0.04	0.05	0.14	0.08
T012	0.08	0.03	0.05	0.03	0.12	0.15	0.14	0.08	0.04	0.07	0.06	0.06	0.08
T013	0.04	0.08	0.13	0.08	0.26	0.32	0.26	0.15	0.03	0.03	0.04	0.11	0.13
T014	0.32	0.32	0.26	0.32	0.10	0.07	0.06	0.09	0.04	0.05	0.05	0.23	0.09
T015	0.04	0.09	0.13	0.09	0.13	0.12	0.12	0.13	0.02	0.04	0.07	0.09	0.08
T016	0.26	0.27	0.21	0.27	0.12	0.12	0.13	0.09	0.02	0.02	0.06	0.19	0.09
T017	0.38	0.37	0.32	0.37	0.20	0.26	0.21	0.14	0.08	0.10	0.10	0.29	0.16
T018	0.60	0.61	0.55	0.61	0.22	0.25	0.21	0.27	0.11	0.14	0.15	0.45	0.23
T019	0.53	0.54	0.49	0.54	0.21	0.24	0.19	0.25	0.09	0.09	0.11	0.40	0.20
T020	0.44	0.46	0.43	0.46	0.17	0.18	0.14	0.22	0.07	0.09	0.11	0.34	0.17
T021	0.30	0.32	0.35	0.32	0.07	0.08	0.07	0.02	0.01	0.04	0.08	0.23	0.07
T022	0.21	0.33	0.35	0.33	0.07	0.04	0.02	0.10	0.03	0.05	0.11	0.23	0.09
T023	0.41	0.32	0.14	0.32	0.10	0.09	0.05	0.07	0.02	0.04	0.11	0.21	0.09

T024	0.38	0.40	0.41	0.40	0.13	0.17	0.15	0.17	0.01	0.08	0.12	0.30	0.14
T025	0.42	0.49	0.48	0.49	0.12	0.14	0.14	0.14	0.01	0.07	0.12	0.34	0.14
T026	0.44	0.46	0.44	0.46	0.25	0.26	0.22	0.11	0.01	0.06	0.10	0.35	0.16
T027	0.27	0.30	0.32	0.30	0.30	0.34	0.31	0.09	0.03	0.03	0.11	0.26	0.16
T028	0.24	0.26	0.24	0.26	0.27	0.34	0.34	0.12	0.06	0.04	0.08	0.23	0.16
T029	0.20	0.20	0.17	0.20	0.22	0.26	0.27	0.18	0.03	0.03	0.08	0.17	0.14
T030	0.46	0.49	0.49	0.49	0.26	0.25	0.23	0.16	0.02	0.05	0.10	0.37	0.17
T031	0.48	0.49	0.44	0.49	0.23	0.23	0.18	0.25	0.06	0.09	0.10	0.37	0.19
T032	0.55	0.56	0.48	0.56	0.25	0.25	0.20	0.28	0.03	0.09	0.11	0.41	0.20
T033	0.53	0.55	0.49	0.55	0.28	0.29	0.24	0.30	0.03	0.09	0.13	0.41	0.21
T034	0.51	0.53	0.50	0.53	0.28	0.29	0.25	0.27	0.03	0.08	0.13	0.40	0.21
T035	0.51	0.54	0.52	0.54	0.27	0.26	0.21	0.25	0.03	0.07	0.11	0.41	0.19
T036	0.49	0.51	0.48	0.51	0.26	0.20	0.14	0.19	0.02	0.05	0.08	0.38	0.16
T037	0.47	0.50	0.47	0.50	0.27	0.21	0.17	0.19	0.02	0.05	0.08	0.37	0.16
T038	0.49	0.50	0.46	0.50	0.29	0.26	0.23	0.26	0.03	0.06	0.09	0.38	0.19
T039	0.27	0.27	0.23	0.27	0.04	0.07	0.14	0.06	0.02	0.02	0.02	0.18	0.07
T040	0.43	0.50	0.49	0.50	0.06	0.10	0.09	0.05	0.02	0.01	0.01	0.34	0.09
T041	0.11	0.11	0.13	0.11	0.11	0.12	0.18	0.07	0.10	0.08	0.03	0.11	0.10
T042	0.13	0.11	0.08	0.11	0.11	0.15	0.13	0.10	0.08	0.06	0.02	0.10	0.09
T043	0.10	0.10	0.11	0.10	0.13	0.09	0.04	0.07	0.03	0.02	0.03	0.09	0.06
T044	0.13	0.13	0.13	0.13	0.11	0.10	0.07	0.08	0.01	0.02	0.04	0.11	0.06
T045	0.24	0.24	0.20	0.24	0.30	0.31	0.29	0.22	0.05	0.02	0.09	0.21	0.16
T046	0.43	0.48	0.47	0.48	0.17	0.14	0.15	0.15	0.04	0.04	0.06	0.35	0.14
T047	0.54	0.54	0.52	0.54	0.30	0.27	0.17	0.35	0.04	0.08	0.10	0.42	0.21
T048	0.53	0.55	0.53	0.55	0.30	0.26	0.21	0.35	0.05	0.09	0.10	0.42	0.22
T049	0.54	0.57	0.52	0.57	0.31	0.26	0.24	0.37	0.06	0.10	0.11	0.43	0.23
T050	0.56	0.57	0.49	0.57	0.32	0.26	0.25	0.40	0.06	0.10	0.11	0.43	0.24
T051	0.56	0.56	0.45	0.56	0.33	0.27	0.22	0.41	0.07	0.10	0.12	0.42	0.24
T052	0.54	0.51	0.40	0.51	0.31	0.25	0.22	0.42	0.08	0.10	0.11	0.39	0.23

T053	0.46	0.43	0.37	0.43	0.28	0.21	0.25	0.38	0.08	0.08	0.09	0.34	0.21
T054	0.35	0.31	0.33	0.31	0.21	0.17	0.08	0.34	0.09	0.09	0.08	0.26	0.17
T055	0.41	0.36	0.35	0.36	0.29	0.10	0.24	0.49	0.10	0.09	0.10	0.29	0.21
T056	0.21	0.22	0.25	0.22	0.17	0.18	0.16	0.34	0.09	0.11	0.08	0.20	0.16
T057	0.41	0.32	0.33	0.32	0.32	0.19	0.13	0.47	0.10	0.11	0.10	0.29	0.21
T058	0.33	0.24	0.25	0.24	0.19	0.10	0.04	0.21	0.08	0.08	0.04	0.21	0.12
T059	0.28	0.19	0.19	0.19	0.17	0.25	0.26	0.20	0.08	0.09	0.11	0.18	0.15
T060	0.27	0.15	0.16	0.15	0.25	0.31	0.29	0.28	0.11	0.12	0.12	0.18	0.19
T061	0.41	0.34	0.30	0.34	0.31	0.23	0.19	0.47	0.10	0.11	0.10	0.29	0.22
T062	0.13	0.06	0.09	0.06	0.24	0.28	0.24	0.27	0.08	0.10	0.10	0.11	0.16
T063	0.48	0.43	0.33	0.43	0.32	0.25	0.25	0.48	0.09	0.11	0.10	0.34	0.24
T064	0.40	0.36	0.27	0.36	0.32	0.31	0.28	0.40	0.09	0.11	0.11	0.30	0.23
T065	0.57	0.56	0.43	0.56	0.32	0.30	0.26	0.42	0.08	0.11	0.11	0.42	0.25
T066	0.57	0.59	0.46	0.59	0.30	0.24	0.11	0.28	0.07	0.09	0.08	0.43	0.20
T067	0.54	0.58	0.54	0.58	0.30	0.26	0.17	0.33	0.06	0.09	0.09	0.43	0.21
T068	0.21	0.20	0.20	0.20	0.25	0.15	0.21	0.11	0.09	0.06	0.03	0.18	0.13
T069	0.18	0.17	0.15	0.17	0.21	0.09	0.10	0.11	0.07	0.05	0.05	0.15	0.10
T070	0.07	0.08	0.13	0.08	0.23	0.14	0.09	0.12	0.05	0.04	0.06	0.10	0.09
T071	0.23	0.22	0.18	0.22	0.22	0.11	0.06	0.08	0.05	0.03	0.04	0.18	0.09
T072	0.35	0.36	0.30	0.36	0.32	0.38	0.36	0.20	0.04	0.02	0.08	0.29	0.19
T073	0.34	0.36	0.34	0.36	0.22	0.32	0.33	0.19	0.03	0.03	0.04	0.28	0.16
T074	0.24	0.25	0.24	0.25	0.08	0.09	0.09	0.05	0.05	0.05	0.03	0.19	0.08
T075	0.34	0.35	0.32	0.35	0.08	0.07	0.06	0.08	0.05	0.05	0.04	0.25	0.09
T076	0.41	0.42	0.35	0.42	0.17	0.16	0.13	0.06	0.04	0.06	0.09	0.30	0.13
T077	0.15	0.15	0.24	0.15	0.01	0.05	0.06	0.19	0.13	0.13	0.11	0.14	0.11
T078	0.19	0.26	0.31	0.26	0.05	0.06	0.07	0.22	0.08	0.12	0.11	0.20	0.12
T079	0.24	0.27	0.28	0.27	0.10	0.10	0.09	0.20	0.06	0.07	0.09	0.20	0.12
T080	0.22	0.22	0.27	0.22	0.13	0.16	0.16	0.20	0.05	0.06	0.06	0.19	0.12
T081	0.15	0.13	0.29	0.13	0.13	0.19	0.21	0.17	0.19	0.12	0.04	0.17	0.15

T082	0.13	0.17	0.15	0.17	0.13	0.20	0.18	0.20	0.03	0.04	0.03	0.14	0.11
T083	0.11	0.16	0.16	0.16	0.18	0.25	0.22	0.18	0.15	0.11	0.03	0.16	0.15
T084	0.18	0.20	0.17	0.20	0.09	0.09	0.03	0.10	0.08	0.08	0.05	0.16	0.09
T085	0.13	0.18	0.22	0.18	0.21	0.25	0.18	0.15	0.02	0.02	0.04	0.16	0.11
T086	0.15	0.19	0.19	0.19	0.09	0.12	0.09	0.09	0.03	0.02	0.02	0.15	0.07
T087	0.30	0.29	0.24	0.29	0.13	0.21	0.22	0.11	0.00	0.01	0.04	0.21	0.11
T088	0.31	0.32	0.27	0.32	0.17	0.27	0.29	0.19	0.02	0.01	0.04	0.24	0.14
T089	0.19	0.24	0.18	0.24	0.20	0.17	0.14	0.20	0.14	0.11	0.06	0.20	0.15
T090	0.53	0.59	0.56	0.59	0.24	0.20	0.16	0.26	0.16	0.16	0.11	0.45	0.23
T091	0.38	0.39	0.35	0.39	0.17	0.14	0.11	0.14	0.11	0.11	0.07	0.30	0.15
T092	0.41	0.43	0.35	0.43	0.18	0.17	0.16	0.12	0.10	0.10	0.05	0.31	0.15
T093	0.33	0.35	0.28	0.35	0.15	0.12	0.08	0.16	0.15	0.15	0.08	0.27	0.15
T094	0.22	0.24	0.18	0.24	0.07	0.07	0.03	0.19	0.13	0.15	0.09	0.18	0.13
T095	0.09	0.08	0.05	0.08	0.03	0.03	0.03	0.04	0.02	0.02	0.02	0.06	0.03
T096	0.10	0.10	0.09	0.10	0.04	0.06	0.06	0.07	0.08	0.07	0.05	0.09	0.07
T097	0.17	0.17	0.07	0.17	0.04	0.05	0.06	0.06	0.05	0.05	0.04	0.11	0.06
T098	0.23	0.23	0.21	0.23	0.07	0.06	0.07	0.09	0.05	0.05	0.04	0.17	0.08
T099	0.13	0.12	0.17	0.12	0.06	0.05	0.04	0.11	0.08	0.08	0.06	0.11	0.08
T100	0.10	0.11	0.14	0.11	0.07	0.06	0.06	0.11	0.09	0.09	0.07	0.10	0.09

Reference number CHK50196317

PROPOSED PUBLIC HOUSING DEVELOPMENT AT CHEUNG MAN ROAD
TRAFFIC IMPACT ASSESSMENT STUDY

Hong Kong Housing Authority
香港房屋委員會

In association with
Mott MacDonald Hong Kong Ltd.
ENVIRON Hong Kong Ltd.
Cinotech Consultants Ltd.
Maurice Lee & Associates Ltd.

SYSTRA MVA

PROPOSED PUBLIC HOUSING DEVELOPMENT AT CHEUNG MAN ROAD

PROPOSED PUBLIC HOUSING DEVELOPMENT AT CHEUNG MAN ROAD

TRAFFIC IMPACT ASSESSMENT STUDY

IDENTIFICATION TABLE	
Client/Project owner	Hong Kong Housing Authority
Project	Proposed Public Housing Development at Cheung Man Road
Study	Proposed Public Housing Development at Cheung Man Road Traffic Impact Assessment Study
Type of document	Draft Report
Date	08/05/2019
File name	L:\HKTE\HK501963 (Classified)\CHK50196317 (M8)\Working Files\Report\CMR_TIA_20190503.docx
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LIST OF DRAWING NO.S

LIST OF TABLES

1. INTRODUCTION

1.1 Background

1.1.1 MVA Hong Kong Limited (MVA) was commissioned by the Hong Kong Housing Authority (HKHA) in 2018 to conduct the Traffic Impact Assessment (TIA) study for the proposed public housing development at Cheung Man Road. **Drawing No. 1.1** shows the location of the development site.

1.1.2 This study is to examine the impact of the traffic generated by the proposed development on the existing and planned road networks in the near vicinity. Any deficiency would be identified and improvement proposals would be recommended if necessary to resolve any foreseeable problem.

1.2 Study Objectives

1.2.1 The main objectives of the study area are as follows:

1.2.2 To assess the existing traffic conditions in the vicinity of the proposed development;

1.2.3 To forecast traffic demands on the adjacent road network in the design year 2034;

1.2.4 To estimate the likely traffic generated by the proposed development based on the updated planning parameters;

1.2.5 To assess the impacts of traffic generated by the proposed development on the adjacent road network;

1.2.6 To recommend improvement measures, if necessary, to alleviate any traffic problems on the road network; and

1.3 Structure of the Report

1.3.1 Following this introductory chapter, there are six further chapters.

1.3.2 **Chapter 2 – The Proposed Development**, which presents the planning parameters of the proposed development.

1.3.3 **Chapter 3 – Existing Traffic Conditions**, which describes the existing road network in the vicinity of the proposed development, presents the summary of traffic count survey and assesses the existing traffic conditions.

1.3.4 **Chapter 4 – Construction Traffic Impact Assessment**, which presents the findings of the construction traffic impact assessment in the future design year.

1.3.5 **Chapter 5 – Future Traffic Conditions**, which discusses the potential traffic generations and attractions of the proposed development under the proposed development proposal. It also summarizes the methodology for future traffic forecasts.

1.3.6 **Chapter 6 – Traffic Impact Assessment**, which presents the findings of the traffic impact assessment in the future design year and recommends improvement measures if necessary.

1.3.7 **Chapter 7 – Future Pedestrian Conditions**, which discusses the potential pedestrian generations and attractions of the proposed development under the proposed development proposal. It also summarizes the methodology for future pedestrian forecasts.

1.3.8 **Chapter 8 – Public Transport Provisions Service**, which provides an examination of the provisions of public transport facilities in the vicinity of the proposed development.

1.3.9 **Chapter 9 – Summary and Conclusion**, which summarizes the findings of the study and presents the conclusion regarding the traffic issues of the proposed development.

Rev.	Description	Checked	Date
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-	-	-	-
-	-	-	-

Project Title

PROPOSED PUBLIC HOUSING DEVELOPMENT
AT CHEUNG MAN ROAD, CHAI WAN - TIA

Drawing Title

LOCATION PLAN

SYSTRA MVA

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CHK50196317/TIA1/F11.DGN/CPW/25FEB19

2. THE PROPOSED DEVELOPMENT

2.1 Site Location

2.1.1 As shown in **Drawing No. 1.1**, the development site is bounded by Cheung Man Road to the northwest, Cheung Man Road Rest Garden and Chai Wan Park to the East, and some industrial developments to the Southwest.

2.2 Proposed Development

2.2.1 The proposed development is planned as a public housing development consist of 884 no. of flats. The proposed development is scheduled to be completed by 2031.

2.3 Vehicular Access of Proposed Development

2.3.1 As shown in **Drawing No. 2.1,** the vehicular access of the proposed development will be located at Cheung Man Road. At present Cheung Man Road is a single-2 lane carriageway with running in north-south direction.

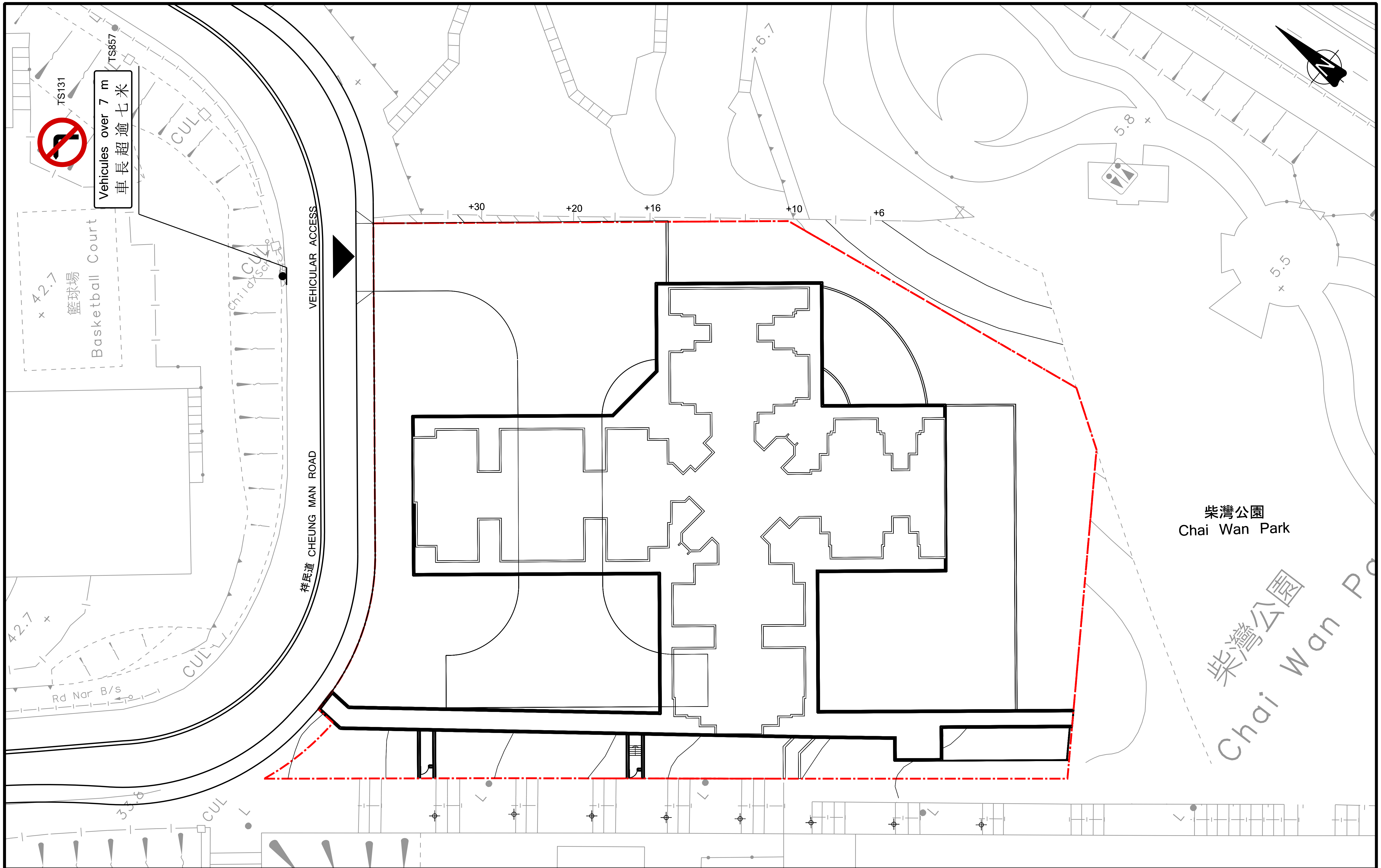
2.3.2 Considering the Cheung Man Road has only two traffic lanes, long vehicles with length over 7m from the development turning left onto the southbound direction would encroach to opposite traffic lane. Therefore, it is proposed the restrict the left turning movement from the proposed development for vehicles with length below 7m. For long vehicles with length over 7m, they would turn right onto the northbound direction. To facilitate the above traffic arrangement, associated traffic signs has been proposed. Moreover, a new layby will be provided at Cheung Man Road outside the proposed development for loading/unloading activities. The proposed arrangement is illustrated in **Drawing No. 2.1**

2.4 Parking and Servicing Facilities Provision of Proposed Development

2.4.1 The proposed parking provisions for the proposed development are summarized in **Table 2.1**

Table 2.1 Proposed Parking Provisions for Proposed Development

Parking Facilities	Proposed Provision	Remarks
Ancillary Car Park		
Car Parking Spaces	59	1 space per 15 flats
Car Parking Spaces (Ancillary)	5	Agreed with TD via email on 4 October 2018
Car Parking Spaces (Visitor)	3	3 spaces per residential block
Motorcycle Parking Spaces	8	1 space per 110 flats
Loading/Unloading	1	1 bay per residential block
Private Light Buses	3	Requested by SWD if 60-place Day Care Centre for the Elderly would be provided.



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Project Title

PROPOSED PUBLIC HOUSING DEVELOPMENT
AT CHEUNG MAN ROAD, CHAI WAN - TIA

Drawing Title

GROUND FLOOR PLAN OF PROPOSED DEVELOPMENT

Designed	Checked	Scale	Date	Drawing No.	Rev.
LAU	GPH	1:400(A3)	FEB 2019	2.1	-

CHK50196317/TIA1/F21.DGN/CPW/25FEB19

3. EXISTING TRAFFIC AND PEDESTRIAN CONDITIONS

3.1 Existing Road Network

3.1.1 **Drawing No. 3.1** shows the proposed development is mainly served by Cheung Man Road, Tai Man Street, Lok Man Road and Chai Wan Road.

3.1.2 Cheung Man road is single-2 lane carriageway running in north-south direction between Tai Man Street and Lok Man Road serving as the primary access for numerous school sites. It will also be the primary access of the proposed development.

3.1.3 Tai Man Street is a single-2 lane carriageway running from east-west direction which serves the Greenwood Terrace, Neptune Terrace and numerous industrial developments in the vicinity of the proposed development.

3.1.4 Lok Man Road is a single-2 lane carriageway running in east-west direction serves as a main access of Pamela Youde Nethersole Eastern Hospital. At present, there is an heavy goods vehicle weight restriction at end of Lok Man Road in the southbound direction.

3.1.5 Chai Wan Road is a dual 2/3 lane carriageway connecting with Island Eastern Corridor and Shau Kei Wan Road to the north, while connecting Siu Sai Wan Road to the south.

3.2 Critical Junctions

3.2.1 Eight junctions were identified to be critical for assessment of traffic impact due to the proposed development and summarized in **Table 3.1**.

Table 3.1 Critical Junctions for Assessment

Ref.	Junction	Type	Drawing No.
A	Chai Wan Road/ Tai Tam Road	Signal	3.2
B	Chai Wan Road/ Lok Man Road	Signal	3.3
C	Hong Man Street/ Tai Man Street	Priority	3.4
D	Chai Wan Road/ Hong Man Street	Signal	3.5
E	Chai Wan Road/ Wan Tsui Road	Priority	3.6
F	Chai Wan Road Roundabout	Roundabout	3.7
G	Hong Man Street/ Lee Chung Street	Priority	3.8
H	Ning Foo Street/ Lee Chung Street	Signal	3.9

3.2.2 The locations of the above eight junctions are illustrated in **Drawing No.3.1**. the existing junction layout arrangements and method of control for Junction A to Junction H are shown in **Drawings No. 3.2** to **3.9** respectively.

3.2.3 In order to appraise the existing traffic conditions of these junctions, a traffic survey in the form of manual classified count was conducted at a typical weekly in May 2018 and February 2019. Analysis of the observed traffic data indicates that the AM and PM peak hour flows occurred from 08:15 to 09:15 and from 17:00 to 18:00 respectively. The results are shown in **Drawing No. 3.10**.

3.2.4 Existing operational performance of the critical junctions and the results are listed in **Table 3.2** below.

Table 3.2 Operational Performance of Critical Junctions in 2018

Ref.	Junction	Type	2018 RC/RFC	
			AM Peak	PM Peak
A	Chai Wan Road/ Tai Tam Road	Signal	24%	22%
B	Chai Wan Road/ Lok Man Road	Signal	14%	59%
C	Hong Man Street/ Tai Man Street	Priority	0.42	0.21
D	Chai Wan Road/ Hong Man Street	Signal	43%	71%
E	Chai Wan Road/ Wan Tsui Road	Priority	0.37	0.37
F	Chai Wan Road Roundabout	Roundabout	0.46	0.53
G	Hong Man Street/ Lee Chung Street	Priority	0.061	0.053
H	Ning Foo Street/ Lee Chung Street	Signal	>100%	>100%

Note : (1) RC represents the reserve capacity for signal junction and. RFC represents the design flow to capacity ratio.

3.2.5 The assessment results in **Table 3.2** indicate that all critical junctions are at present operating with ample capacities.

3.3 Road Links

3.3.1 Four Road links within the study area were identified for assessment of traffic impact for the proposed development and summarized in **Table 3.3**.

Table 3.3 Road Links for Assessment

Ref.	Road Link	Direction
L1	Tai Man Street	Eastbound
		Westbound
L2	Lok Man Road	Eastbound
		Westbound
L3	Cheung Man Road	Northbound
		Southbound
L4	Hong Man Street	Northbound
		Southbound

3.3.2 The locations of the above four road links are illustrated in **Drawing No.3.11**.

3.3.3 Existing operational performance of the road links and the results are listed in **Table 3.4** below.

Table 3.4 Operation Performance of Road Links in 2018

Ref.	Junction	Direction	Capacity (pcu/hr)		2018 Observed			
					Link Flow		V/C Ratio	
			AM(1)&(2)	PM(1)&(3)	AM	PM	AM	PM
L1	Tai Man Street	Two-way	1580	1630	570	320	0.36	0.20
L2	Lok Man Road	Two-way	2190	2160	560	320	0.26	0.15
L3	Cheung Man Road	Two-way	1680	1675	365	190	0.22	0.11
L4	Hong Man Street	Two-way	1980	2060	495	440	0.25	0.21

Notes : (1) With reference to TPDM Volume 2 Chapter 2, Table 2.4.1.1 A
(2) L1: 1700 veh/hr x 1.22 PCU Factor x 0.76 HV Reduction Factor, L2: 2200 veh/hr x 1.13 PCU Factor x 0.88 HV Reduction Factor, L3: 1700 veh/hr x 1.14 PCU Factor x 0.87 HV Reduction Factor, L4: 2200 veh/hr x 1.36 PCU factor x 0.66 HV Reduction Factor.
(3) L1: 1700 veh/hr x 1.17 PCU Factor x 0.82 HV Reduction Factor, L2: 2200 veh/hr x 1.13 PCU Factor x 0.87 HV Reduction Factor, L3: 1700 veh/hr x 1.18 PCU Factor x 0.84 HV Reduction Factor, L4: 2200 veh/hr x 1.25 PCU factor x 0.75 HV Reduction Factor

3.3.4 The results in **Table 3.4** indicated that all the identified road links are at present operating with ample spare capacity.

3.4 Existing Pedestrian Facilities

3.4.1 At present, pedestrian facilities are provided along the northern and eastern side of the proposed development. At the western side, there is an existing footpath provided along Cheung Man Road. At the western side, there are staircases provided to connect Cheung Man Road to the Chai Wan MTR Station as shown in **Drawing No. 3.12**

3.4.2 Pedestrian flows survey has been conducted in the vicinity of the proposed development to ascertain the pedestrian demand at existing pedestrian facilities.

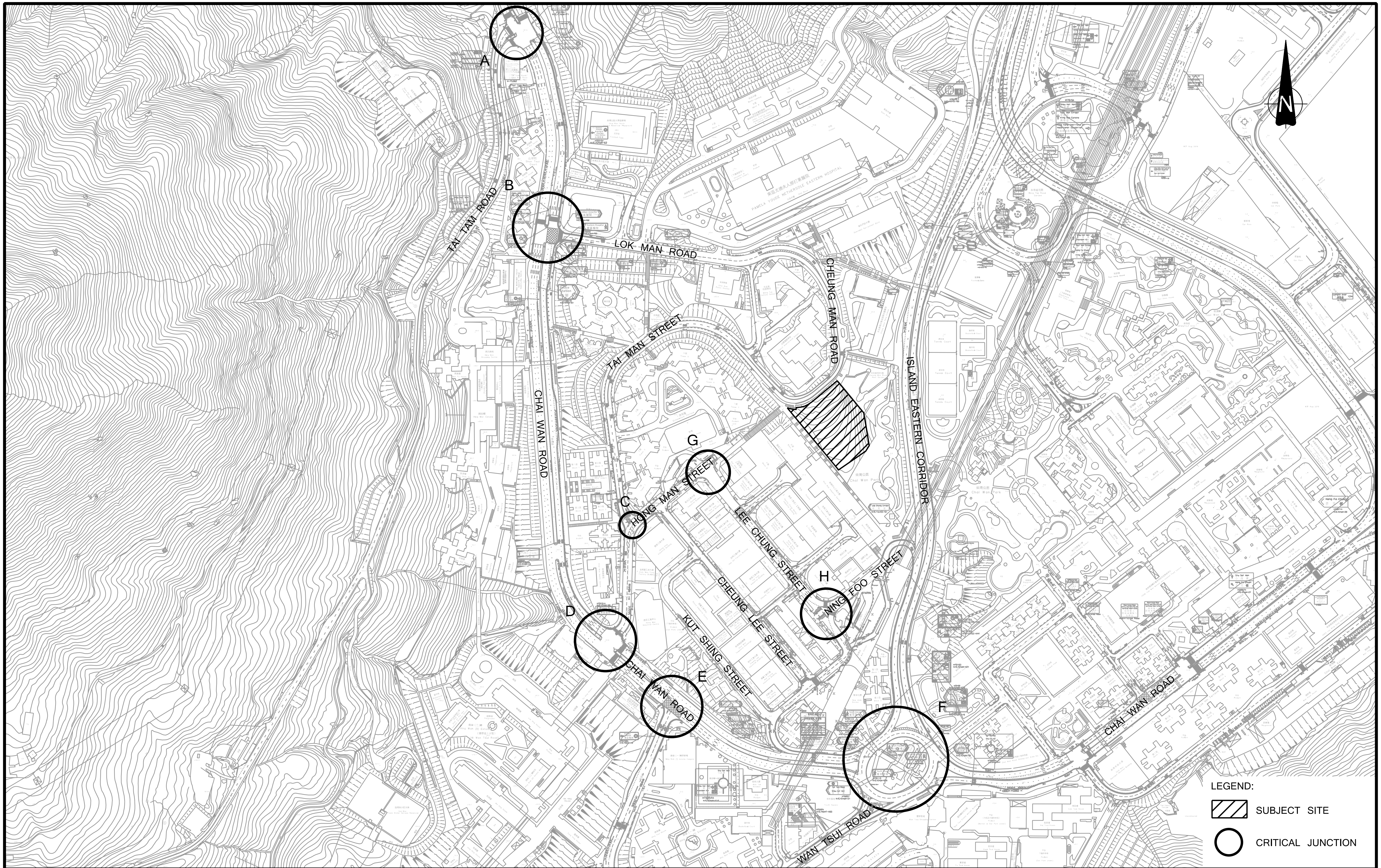
3.4.3 The existing operation performance of the existing pedestrian facilities have been assessed in terms of the Level of Service (LOS) requirement and the results are summarized in **Table 3.5.**

Table 3.5 Operation Performance of Staircase in 2018

Section (1)	Total Width (m)	Effective Width (m) (2)	Two-way Hourly Pedestrian Flows (in ped/15min)		Two-way Hourly Pedestrian Flow Rate (in ped/min/m) (3)		Level of Service (LOS) (4)	
			AM	PM	AM	PM	AM	PM
S1	2.5	1.5	45	30	2.0	1.3	A	A

Notes : (1) As shown in Drawing No. 3.12.
(2) Effective width of proposed footpath is defined as the actual width of proposed footpath by excluding the dead widths on both sides.
(3) Two–way pedestrian flow rate = Two-way 15-mins pedestrian flows / 15 min / Effective width of footpath.
(4) Details of Pedestrian Walkway LOS refer to T.P.D.M. Volume 6 Chapter 10 Section 10.4.2.

3.4.4 The results in **Table 3.5** indicated that the existing staircases is at present operating with ample spare capacity.



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Project Title

PROPOSED PUBLIC HOUSING DEVELOPMENT
AT CHEUNG MAN ROAD, CHAI WAN - TIA

Drawing Title

EXISTING ROAD NETWORK & CRITICAL JUNCTIONS

Designed	Checked	Scale	Date	Drawing No.	Rev.
LAU	GPH	1:4000(A3)	FEB 2019	3.1	-

SYSTRA MVA

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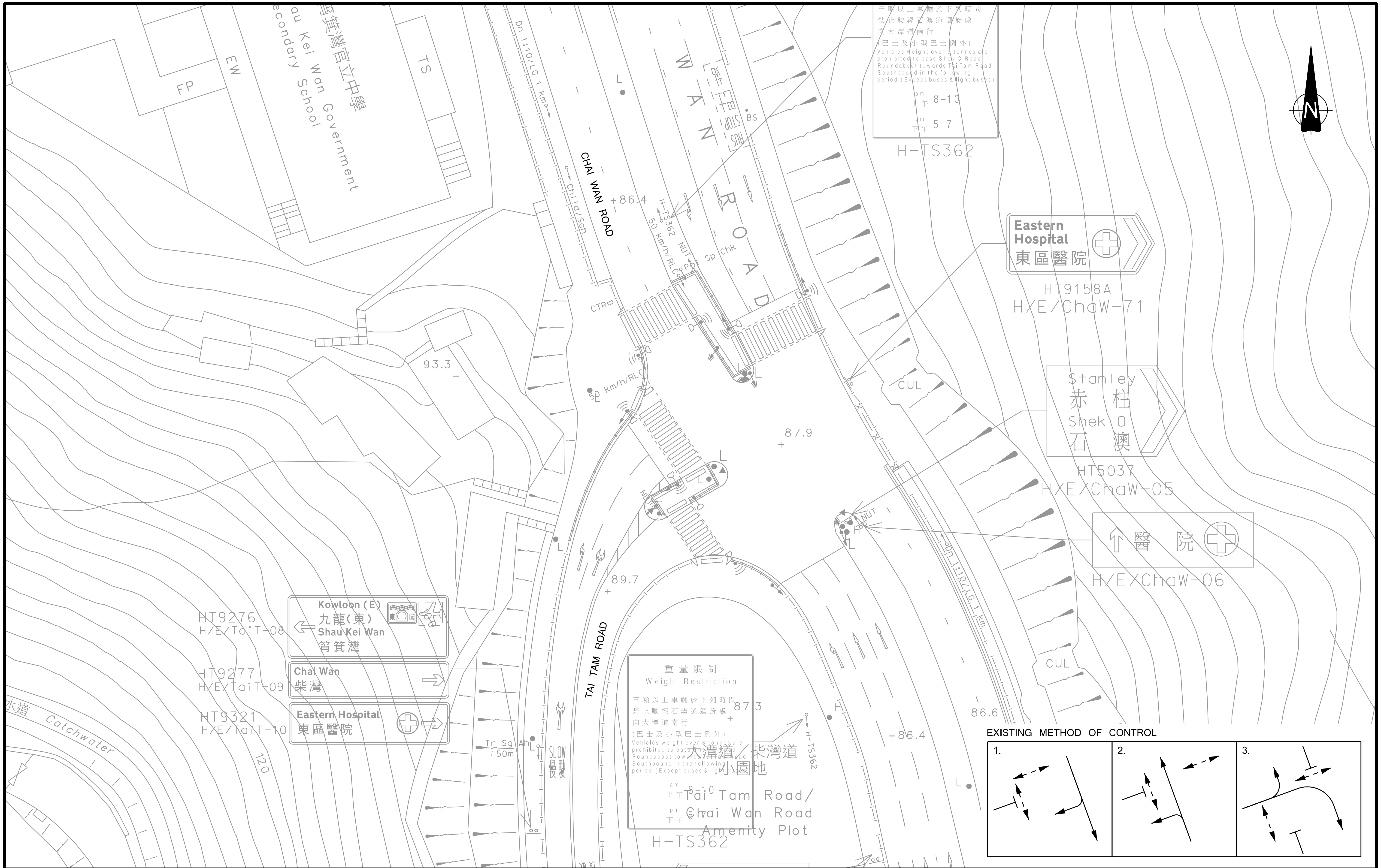

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Rev.	Description	Checked	Date

Project Title

PROPOSED PUBLIC HOUSING DEVELOPMENT
AT CHEUNG MAN ROAD, CHAI WAN - TIA

Drawing Title

EXISTING JUNCTION LAYOUT OF
CHAI WAN ROAD / TAI TAM ROAD (A)

SYSTRA MVA

Designed	Checked	Scale	Date	Drawing No.	Rev.
LAU	GPH	1:500(A3)	FEB 2019	3.2	-

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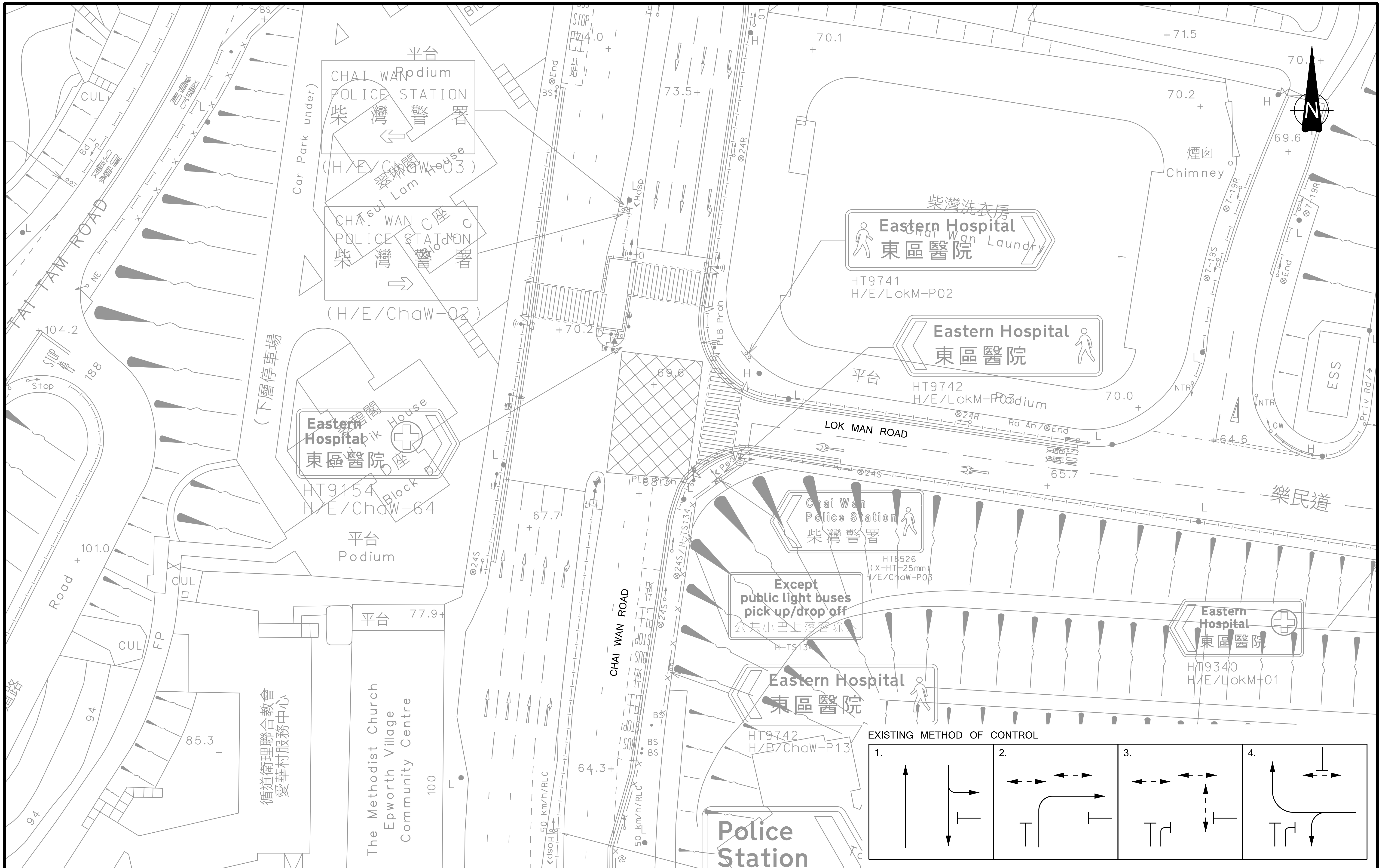

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Project Title

PROPOSED PUBLIC HOUSING DEVELOPMENT
AT CHEUNG MAN ROAD, CHAI WAN - TIA

Drawing Title

EXISTING JUNCTION LAYOUT OF CHAI WAN ROAD / LOK MAN ROAD (B)

Designed	Checked	Scale	Date	Drawing No.	Rev.
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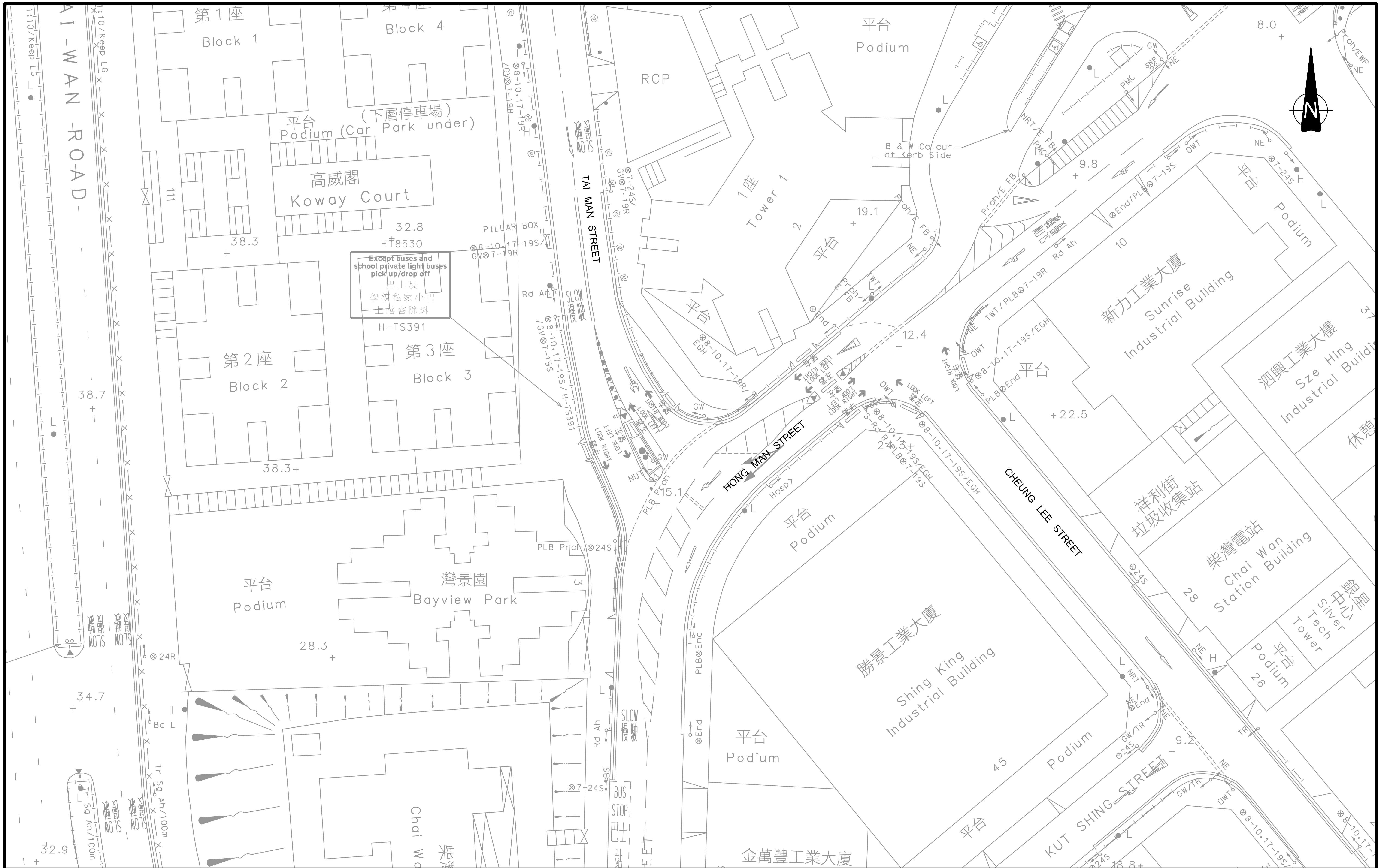

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Project Title

PROPOSED PUBLIC HOUSING DEVELOPMENT
AT CHEUNG MAN ROAD, CHAI WAN - TIA

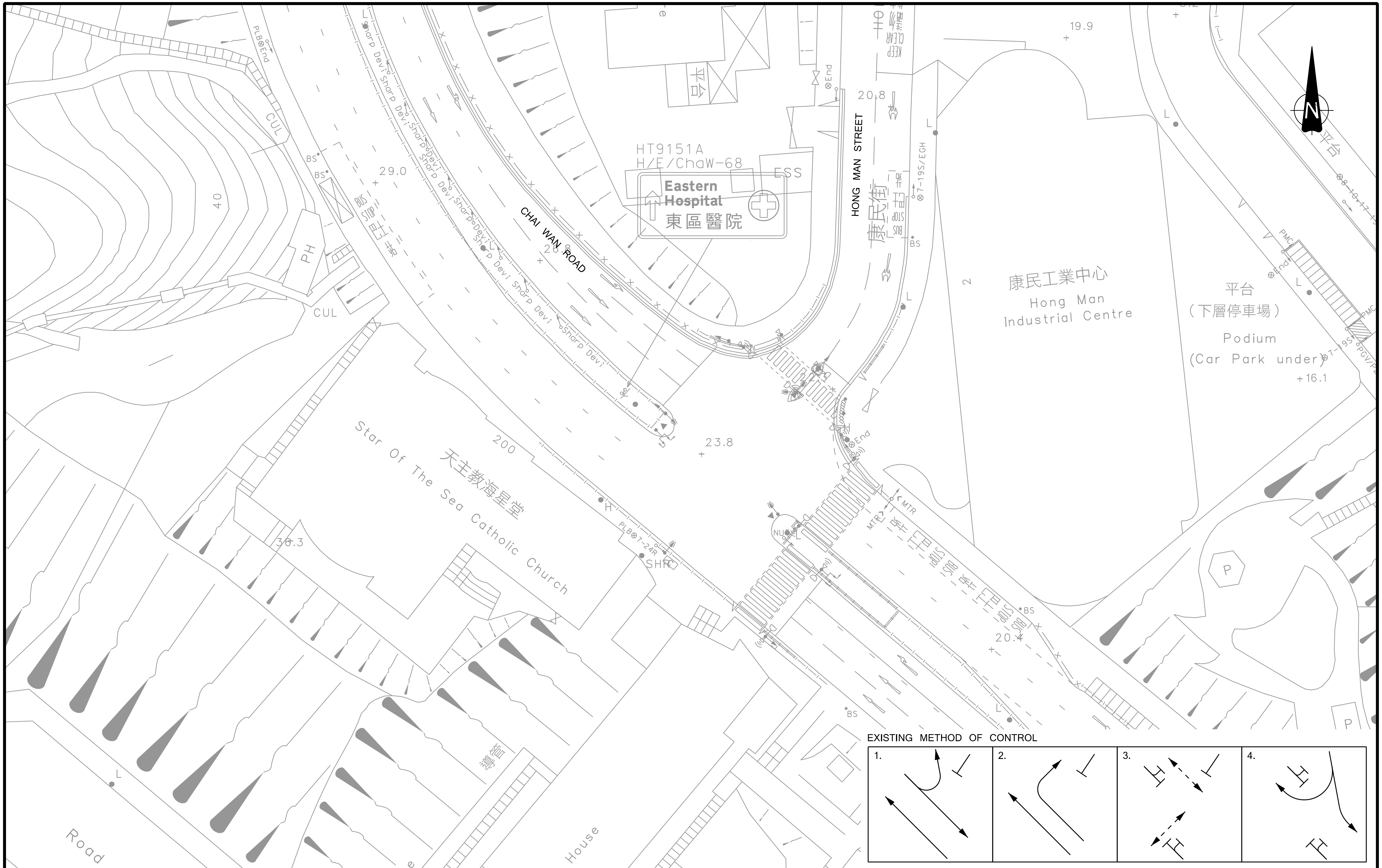
Drawing Title

EXISTING JUNCTION LAYOUT OF
HONG MAN STREET / TAI MAN STREET (C)

Designed	Checked	Scale	Date	Drawing No.	Rev.
LAU	GPH	1:500(A3)	FEB 2019	3.4	-

SYSTRA MVA

CHK50196317/TIA1/F34.DGN/CPW/25FEB19



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Project Title

PROPOSED PUBLIC HOUSING DEVELOPMENT
AT CHEUNG MAN ROAD, CHAI WAN - TIA

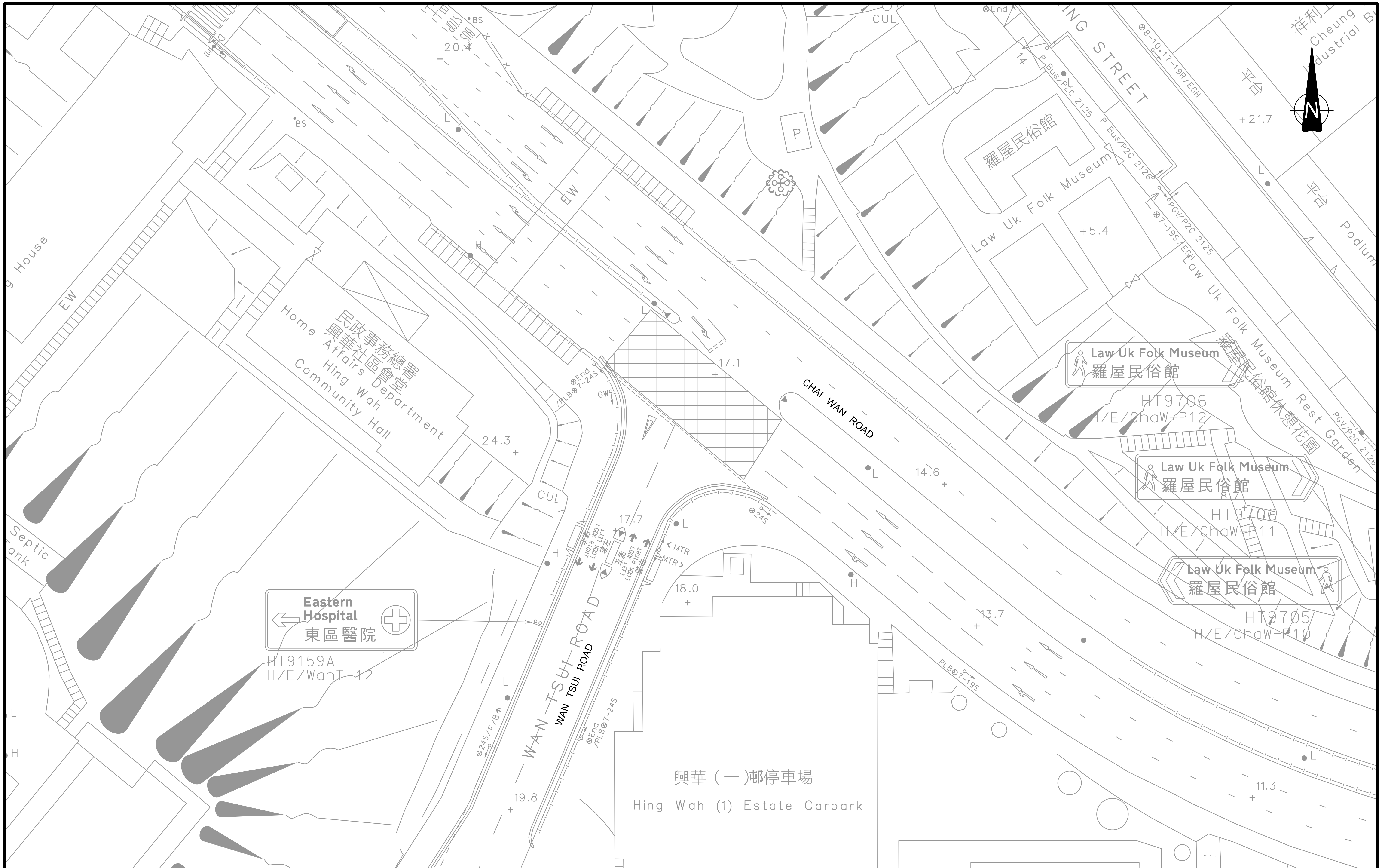
Drawing Title

EXISTING JUNCTION LAYOUT OF
CHAI WAN ROAD / HONG MAN STREET (D)

Designed	Checked	Scale	Date	Drawing No.	Rev.
LAU	GPH	1:500(A3)	FEB 2019	3.5	-

SYSTRA MVA

CHK50196317/TIA1/F35.DGN/CPW/25FEB19



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Project Title

PROPOSED PUBLIC HOUSING DEVELOPMENT
AT CHEUNG MAN ROAD, CHAI WAN - TIA

Drawing Title

EXISTING JUNCTION LAYOUT OF
CHAI WAN ROAD / WAN TSUI ROAD (E)

SYSTRA MVA

Designed	Checked	Scale	Date	Drawing No.	Rev.
LAU	GPH	1:500(A3)	FEB 2019	3.6	-

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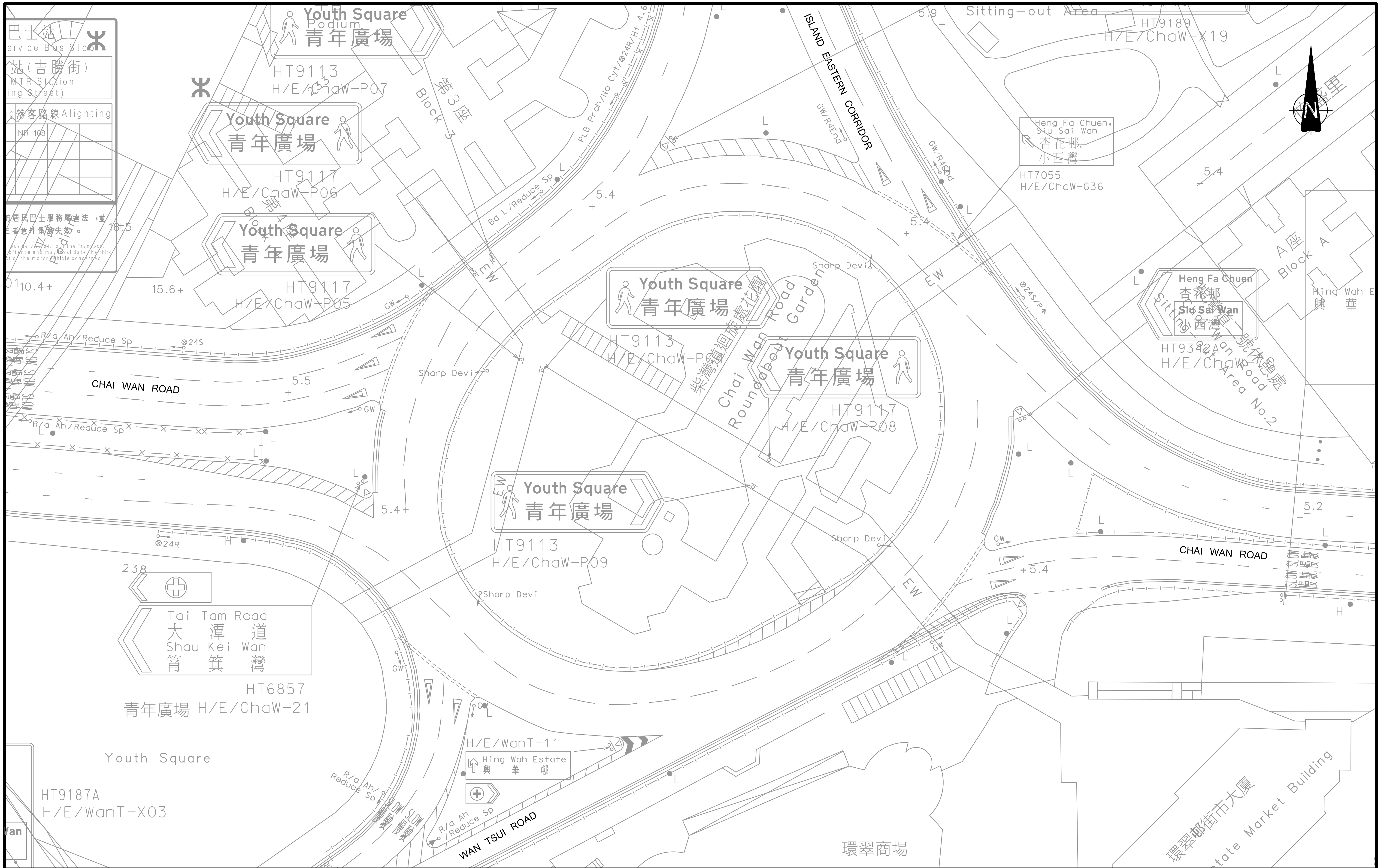

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Project Title

PROPOSED PUBLIC HOUSING DEVELOPMENT AT CHEUNG MAN ROAD, CHAI WAN - TIA

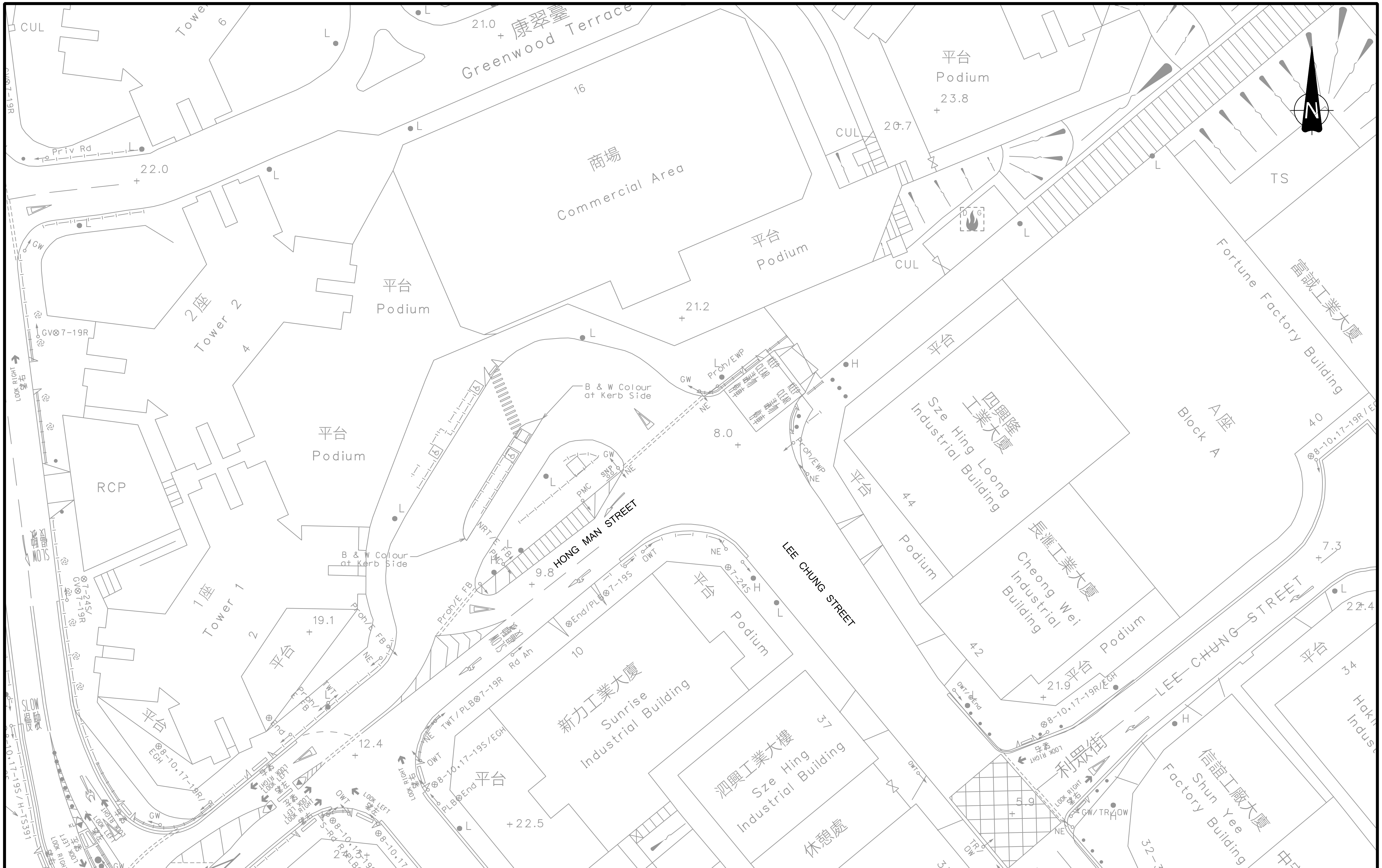
Drawing Title

EXISTING JUNCTION LAYOUT OF CHAI WAN ROAD ROUNDABOUT (F)

Designed	Checked	Scale	Date	Drawing No.	Rev.
LAU	GPH	1:500(A3)	FEB 2019	3.7	-

SYSTRA MVA

CHK50196317/TIA/F37.DGN/CPW/25EFB19



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Project Title

PROPOSED PUBLIC HOUSING DEVELOPMENT
AT CHEUNG MAN ROAD, CHAI WAN - TIA

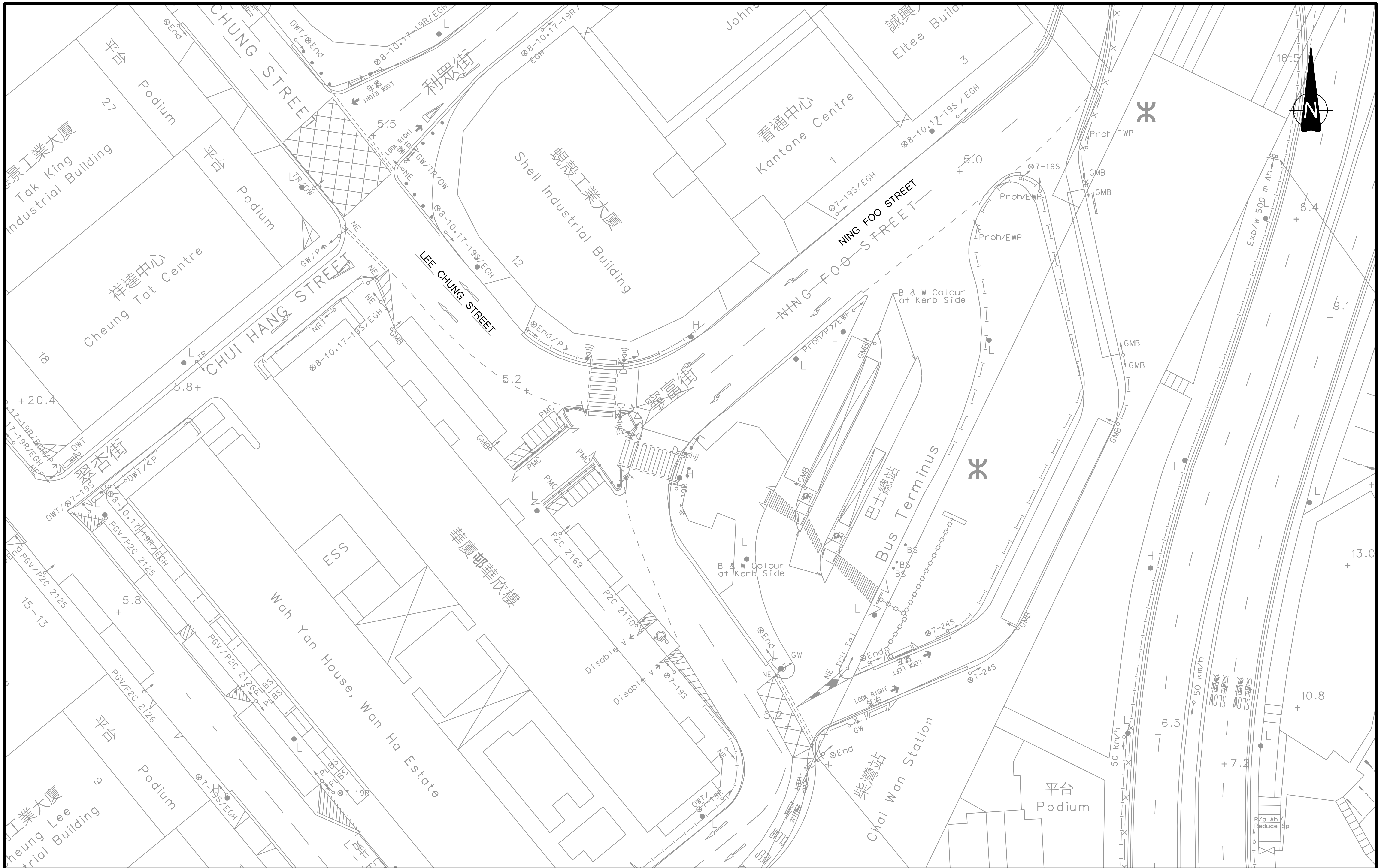
Drawing Title

EXISTING JUNCTION LAYOUT OF HONG MAN STREET/LEE CHUNG STREET (G)

Designed	Checked	Scale	Date	Drawing No.	Rev.
LAU	GPH	1:500(A3)	AUG 2018	3.8	-

SYSTRA MVA

CHK50196317/TIA1/F38.DGN/CPW/25FEB19



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Project Title

PROPOSED PUBLIC HOUSING DEVELOPMENT
AT CHEUNG MAN ROAD, CHAI WAN - TIA

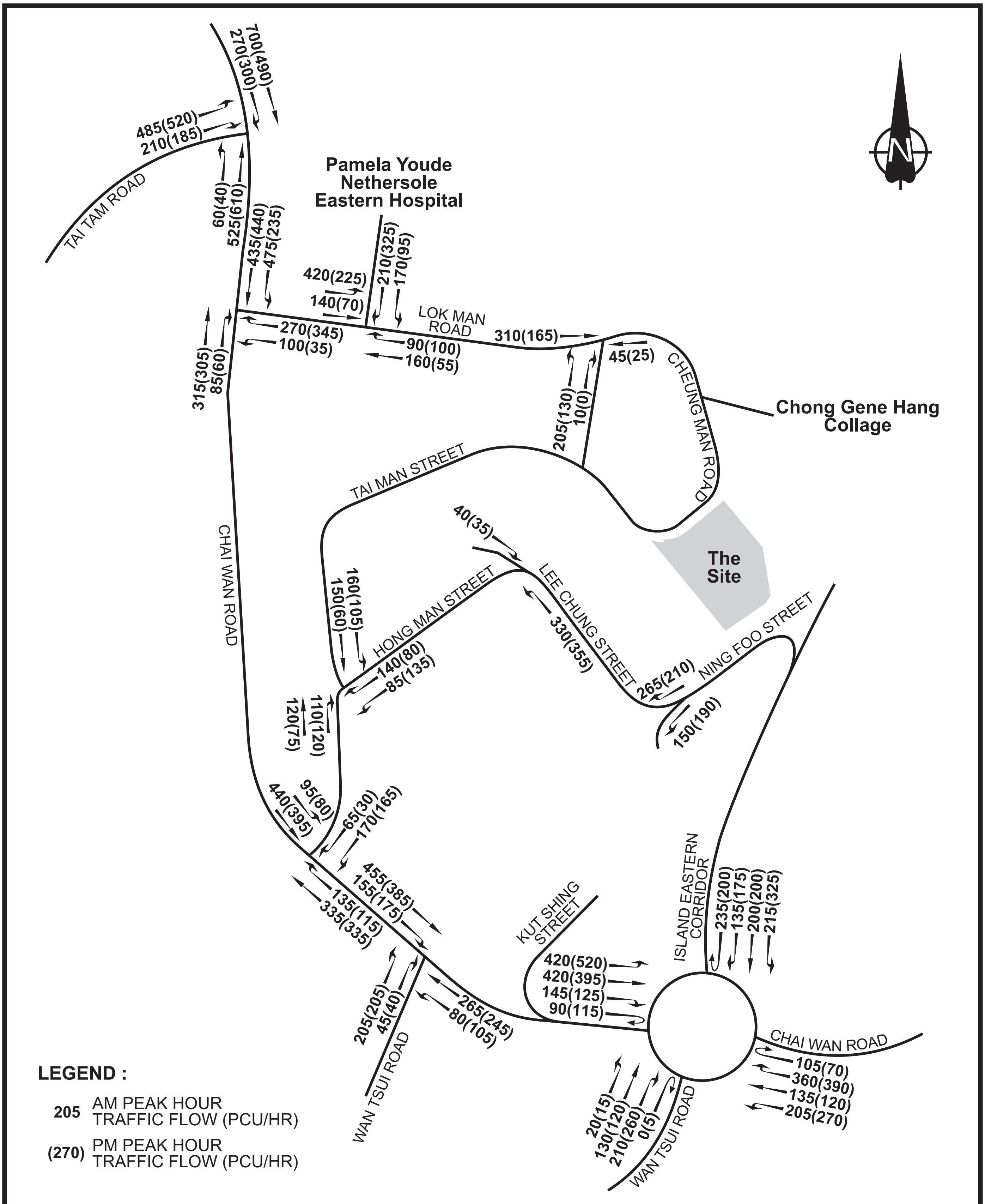
Drawing Title

EXISTING JUNCTION LAYOUT OF LEE CHUNG STREET/NING FOO STREET (H)

Designed	Checked	Scale	Date	Drawing No.	Rev.
LAU	GPH	1:500(A3)	AUG 2018	3.9	-

SYSTRA MVA

CHK50196317/TIA1/F39.DGN/CPW/25FEB19



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A	MINOR AMENDMENT	GPH	26APR19	-	-	-	-

Project Title

PROPOSED PUBLIC HOUSING DEVELOPMENT
AT CHEUNG MAN ROAD, CHAI WAN - TIA

Drawing Title

2018 OBSERVED TRAFFIC FLOWS

SYSTRA MVA

Designed	Checked	Scale	Date	Drawing No.	Rev.
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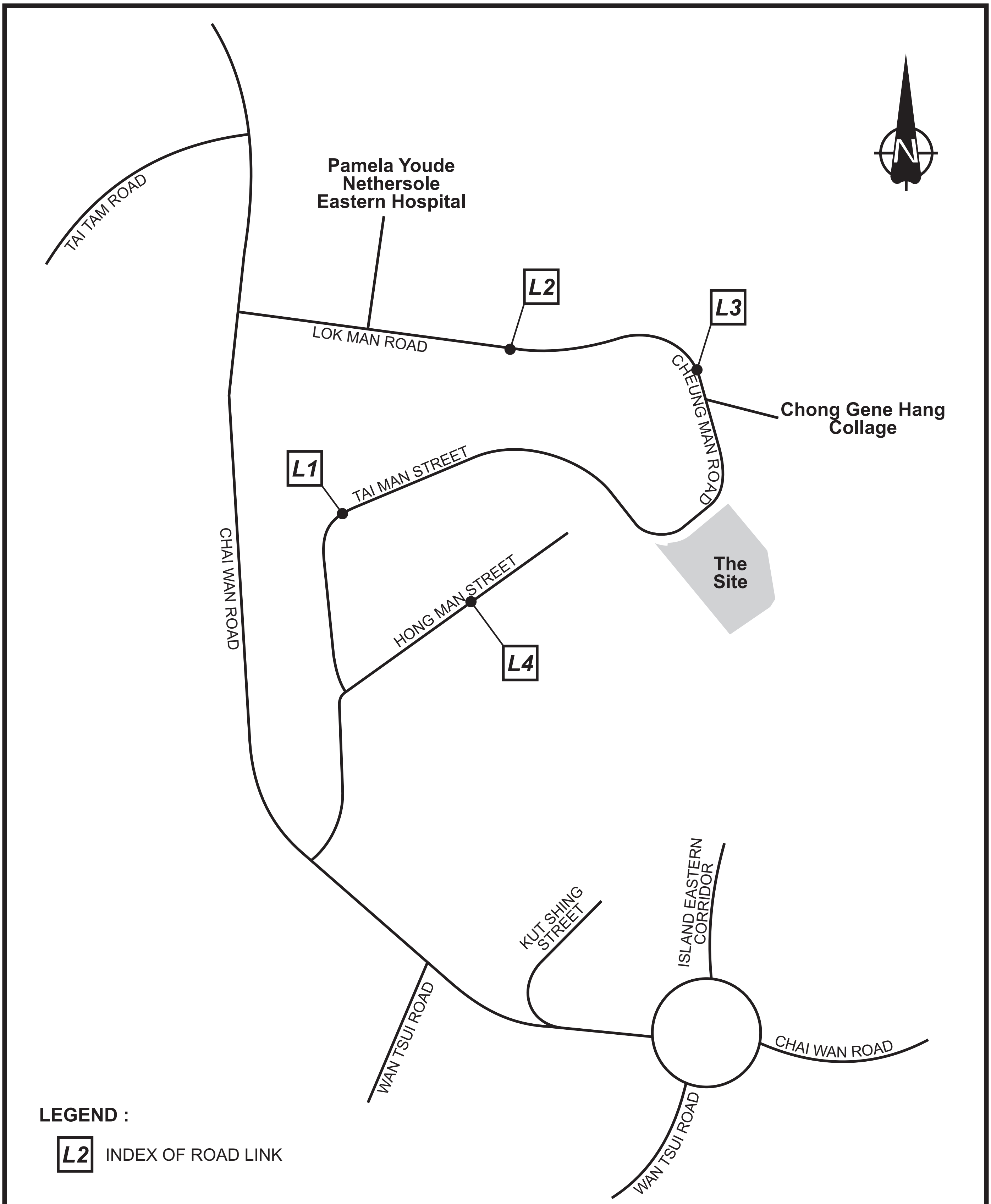

LEGEND :

L2 INDEX OF ROAD LINK

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Project Title

PROPOSED PUBLIC HOUSING DEVELOPMENT
AT CHEUNG MAN ROAD, CHAI WAN - TIA

Drawing Title

LOCATION PLAN OF ROAD LINK

SYSTRA MVA

Designed	Checked	Scale	Date	Drawing No.	Rev.
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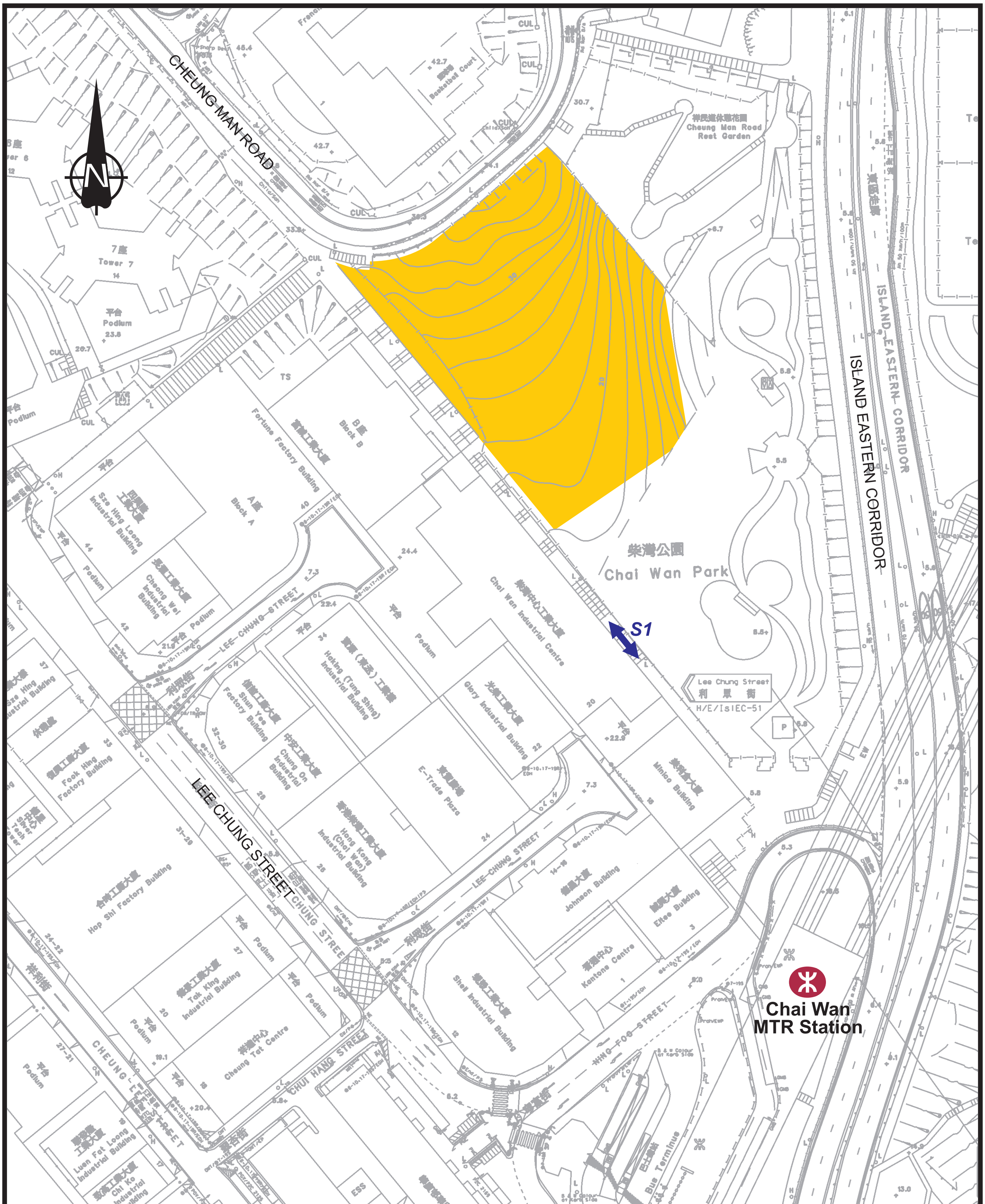

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Project Title

PROPOSED PUBLIC HOUSING DEVELOPMENT AT CHEUNG MAN ROAD, CHAI WAN - TIA

Drawing Title

LOCATION PLAN OF STAIRCASE

Designed	Checked	Scale	Date	Drawing No.	Rev.
HKH	GPH	NTS	FEB 2019	3.12	-

CHK50196317/TIA2/F312.CDR/LLH/22FEB19

4. CONSTRUCTION TRAFFIC IMPACT ASSESSMENT

4.1 Design Year

4.1.1 It is anticipated that the proposed development will be completed by year 2031 as a conservative approach. In order to assess the impact of construction traffic on the local road network, year 2031 was adopted for the design year for the construction traffic impact assessment. The main construction activities include the building construction works and the road widening works at Cheung Man Road. The building construction stage includes foundation and building works of the proposed housing development.

4.2 Construction Site Access and Traffic Routing

4.2.1 The construction site access will be provided at Cheung Man Road. **Drawing No. 4.1** shows the location of construction site access.

4.2.2 It is anticipated that most of the traffic volume due to construction vehicles will be generated during the building construction stage. It is planned that most of the demolition/construction materials will be transported to the South East New Territories Landfill, Tsueng Kwan O. In order not to affect the traffics to/from Pamela Youde Nethersole Eastern Hospital and the nearby colleges and considering the existing Heavy Goods Vehicle weight restriction at Lok Man Road southbound, all construction vehicles would access/egress via Tai Man Street/Cheung Man Road. The tentative construction traffic routings for building construction stage are shown in **Drawing No. 4.1**.

4.2.3 There will be road widening works at Cheung Man Road prior to the building construction of the proposed development. In view of the uncertainty of the construction programme, the same design year, year 2031 has been adopted for the road widening. To facilitate the road widening works, the section of Cheung Man Road southbound lane abutting proposed development will be temporary closed. The inbound construction traffic would be same to the routing as identified in **Drawing No.4.1**. However, the outbound construction traffic would have to leave via Lok Man Road northbound as there would not be sufficient space for the vehicle to turn around and exit via Tai Man Street southbound. The tentative construction traffic routings during the road widening works at Cheung Man Road are shown in **Drawing No.4.2**. The affected road section will be operated under one-lane two-way temporary traffic arrangement.

4.3 Construction Traffic Forecast

Growth Rate

4.3.1 To estimate the 2031 reference traffic flows (without construction traffic) in the local road network, an appropriate growth factor has to be identified for the area.

4.3.2 Since there is no major change in road network in the vicinity of the proposed development the traffic forecast has been derived based on the review of the following information:

- 2014-based Territorial Population and Employment Data Matrix (TPEDM) published by Planning Department;
- Hong Kong Population Projections 2017 – 2066 published by Census and Statistics Department; and
- Planned developments in the vicinity of the proposed development

Planning Data

4.3.3 Reference has been made to the latest 2014-based Territorial Population and Employment Data Matrices (TPEDM) planning data published by the Planning Department for years 2014 and 2026 in Eastern District. The average annual growth rate in terms of population from year 2014 to year 2026 are illustrated in **Table 4.1.**

Table 4.1 Population Growth in the Local Area (2014-2026)

TPEDM Zone	Population			Growth Rate per annum (%)
	2014	2021	2026	2014-2026
Eastern	573,150	551,000	523,500	-0.75%
Adopted Growth Rate per annum (%)				**0.5%**

4.3.4 From **Table 4.1**, the population growth rate in the vicinity of the area from 2014 to 2026 is -0.75% per annum. For conservative approach, an annual growth rate of 0.5% p.a. was adopted from year 2018 to year 2026.

4.3.5 For years beyond 2026, reference has been made to the latest Population Projections 2017 – 2066 data published by Census and Statistics Department in Hong Kong SAR. The average annual growth rate in terms of population from years 2026 to 2036 is illustrated in **Table 4.2**.

Table 4.2 Population Growth in Hong Kong SAR (2026-2036)

Population (in thousand)			Growth Rate per annum (%)
2026	2031	2036	2026-2036
7825.2	7996.2	8141.7	0.4%

4.3.6 From **Table 4.2**, an annual growth rate of 0.4% p.a. was adopted from year 2026 to year 2031.

Planned/Committed Development Traffic

4.3.7 In the vicinity of the subject site, there are some planned developments and the details are summarized in **Table 4.3**. The locations for the planned/committed development have been indicated in **Drawing No.4.3**.

Table 4.3 Planned/Committed Development

Site No.	Sites	Development Parameters	Designated Land Uses
A	Private Residential Development 33 Chai Wan Road	470 flats	Private Residential Development
B	Public Housing Development Chai Wan Road / Wing Ping Street	828 flats	Public Housing Development
C	Public Housing Development Lin Shing Road	288 flats	Public Housing Development
D	Private Residential Development at 391 Chai Wan Road	780 flats	Private Residential Development
E	Public Housing Development Wing Tai Road	880 flats	Public Housing Development

4.3.8 In order to estimate the traffic generation and attraction of the planned/committed development in the vicinity, reference will be made to the trip generation rates as stipulated in Volume 1 Chapter 3 Appendix D Table 1 of the latest Transport Planning and Design Manual (TPDM). The adopted trip rates are summarized in **Table 4.4.**

Table 4.4 Adopted Trip Rates of Planned Developments

Land Use		AM Peak		PM Peak	
		Generation	Attraction	Generation	Attraction
A	Private Housing: Medium-Density / R(B) (Average flat size:80sq.m) pcu/hr/flat	0.1058	0.0605	0.0426	0.0590
B	Public Housing Development pcu/hr/flat	0.0432	0.0326	0.0237	0.0301
C	Public Housing Development pcu/hr/flat	0.0432	0.0326	0.0237	0.0301
D	Private Housing: Medium-Density / R(B) (Average flat size:100sq.m) pcu/hr/flat	0.1887	0.0942	0.0862	0.1214
E	Public Housing Development pcu/hr/flat	0.0432	0.0326	0.0237	0.0301

4.3.9 Based on the planned/committed development parameters and the adopted trip rate shown in **Table 4.3 to 4.4, Table 4.5** summarizes the volume of traffic generated by the planned development.

Table 4.5 Traffic Generations of Planned Developments (pcu/hr)

Sites		Designated Land Uses	AM Peak		PM Peak	
			Generation	Attraction	Generation	Attraction
A	Private Residential Development 33 Chai Wan Road	Private Residential Development	50	28	20	28
B	Public Housing Development Chai Wan Road / Wing Ping Street	Public Housing Development	39	30	22	27
C	Public Housing Development Lin Shing Road	Public Housing Development	11	9	6	7
D	Private Residential Development at 391 Chai Wan Road	Private Residential Development	147	74	67	95
E	Public Housing Development Wing Tai Road	Public Housing Development	38	29	21	26

Reference Traffic Flows

4.3.10 The 2031 AM and PM peak Reference Traffic Flows (without construction traffic) are shown in **Drawing No. 4.4**.

2031 Reference Flows = 2018 Observed Flow x Growth Factor (0.5% p.a.) for 8 years x Growth Factor (0.4% p.a.) for 5 years + Planned/Committed Development Traffic

Construction Traffic Generation for Road Widening Works

4.3.11 Considering the extent of the road widening works, there would be minimal construction traffic for daily transport of construction material. It is estimated that the construction traffic would be less than 5 truck/hour. For conservative, 10 pcu/hour has been assumed. **Table 4.6** summarizes the construction traffic generations (Road Widening Works) at the AM and PM peak hour.

Construction Traffic Generation for Building Construction Stage

4.3.12 The anticipated number of construction trucks are estimated based on the volume of demolition/construction material to be transported.

4.3.13 Based on the latest estimate, the approximate amount of the total demolition/construction material volume would be 44,740m^3.

4.3.14 According to the development program, foundation and building works would be completed within 63 months. It is assumed that there are 1,575 days in 63 months (i.e. 300 days in 12 months) and 8 working hours a day from 08:00 to 18:00 hours. Also, the capacity of a dump truck is about 5m^3. According to the above assumptions, it is estimated the proposed development will generate and attract about less than 5 dump truck/hour [44,740m^3/5m^3/1,575 days/8 working hours] during the construction period. During the building construction stage, 5 dump truck/hr (i.e. 13 pcu/hr) has been assumed for conservative. **Table 4.6** summarizes the construction traffic generations (Building Construction Stage) at the AM and PM peak hour.

Table 4.6 Construction Traffic Generation in Year 2031 AM/PM Peak Hour

Construction Traffic Generation	Year 2031 AM/PM Peak Hour	
	Generation (pcu/hr)	Attraction (pcu/hr)
Road Widening Works	10	10
Building Construction Stage	13	13

4.3.15 The construction traffic flows were then superimposed onto the 2031 reference traffic flows (without Construction Traffic) based on the routing in **Drawing Nos. 4.1 and 4.2** to derive the 2031 design traffic forecasts (with Construction Traffic).

2031 Design Flows = 2031 Reference Flows + Construction Traffic

4.3.16 The 2031 AM and PM peak Design Traffic Flows (with road widening works & with building construction stage) at the critical junctions are shown in **Drawing Nos. 4.5 and 4.6** respectively.

4.4 Construction Traffic Impact Assessment for Road Widening Works

4.4.1 To assess the construction traffic impact due to the road widening works, capacity analysis of the identified critical junctions in the study area for both reference and design scenarios in year 2031 has been carried out based on the routing as illustrated in **Drawing No.4.2**. The results are summarized and presented in **Table 4.7**.

Table 4.7 Operational Performance of Critical Junctions in 2031 (Road Widening)

Ref.	Junction	Type	Layout	2031 RC/RFC [1]			
				Reference Scenario (Without Construction Traffic)		Design Scenario (With Construction Traffic)	
				AM	PM	AM	PM
B	Chai Wan Road/Lok Man Road	Signal	Existing	8%	50%	7%	48%
C	Hong Man Street/ Tai Man Street	Priority	Existing	0.45	0.22	0.45	0.22
D	Chai Wan Road/ Hong Man Street	Signal	Existing	14%	36%	12%	32%
E	Chai Wan Road/ Wan Tsui Road	Priority	Existing	0.40	0.39	0.40	0.39
F	Chai Wan Road Roundabout	Roundabout	Existing	0.56	0.58	0.57	0.58

Note : (1) RC represents the reserve capacity for signal junction and. RFC represents the design flow to capacity ratio.

4.4.2 The assessment results in **Table 4.7** indicate that all critical junctions will still operate with ample capacity except Junctions B and Junction D will operate with less reserve capacities in reference scenario (without road widening works). It is worth noting that the construction traffic for the road widening works is very minimal and the reserve capacity would be similar under the reference and design scenarios. The reduction of reserve capacity at this stage is mainly due to the background traffic growth. It is anticipated that there would be no significant construction traffic impact at the critical junctions for the road widening works.

4.4.3 In addition, capacity analysis of the identified critical road links in the study area for both reference and design scenarios in year 2031 have also been conducted. The result area summarized and presented in **Table 4.8**.

Table 4.8 2031 Road Links for Assessment (Road Widening)

Ref.	Junction	Direction	Capacity (pcu/hr)		Link Flow				V/C Ratio			
					2031 Reference		2031 Design		2031 Reference		2031 Design	
			AM (1)&(2)	PM (1)&(3)	AM	PM	AM	PM	AM	PM	AM	PM
L1	Tai Man Street	Two-way	1580	1630	605	335	615	345	0.38	0.21	0.39	0.21
L2	Lok Man Road	Two-way	2190	2160	595	335	605	345	0.27	0.16	0.28	0.16
L3	Cheung Man Road	Two-way	1680	1675	390	200	400	210	0.23	0.12	0.24	0.13
L4	Hong Man Street	Two-way	1980	2060	525	460	525	460	0.27	0.22	0.27	0.22

Notes : (1) With reference to TPDM Volume 2 Chapter 2, Table 2.4.1.1 A
(2) L1: 1700 veh/hr x 1.22 PCU Factor x 0.76 HV Reduction Factor, L2: 2200 veh/hr x 1.13 PCU Factor x 0.88 HV Reduction Factor, L3: 1700 veh/hr x 1.14 PCU Factor x 0.87 HV Reduction Factor, L4: 2200 veh/hr x 1.36 PCU factor x 0.66 HV Reduction Factor.
(3) L1: 1700 veh/hr x 1.17 PCU Factor x 0.82 HV Reduction Factor, L2: 2200 veh/hr x 1.13 PCU Factor x 0.87 HV Reduction Factor, L3: 1700 veh/hr x 1.18 PCU Factor x 0.84 HV Reduction Factor, L4: 2200 veh/hr x 1.25 PCU factor x 0.75 HV Reduction Factor

4.4.4 The assessment results in **Table 4.8** indicate that all critical road links will still operate with ample capacity in design year 2031.

4.4.5 As mentioned, the construction traffic for the road widening works is very minimal and no significant construction traffic impact is anticipated. Noting that the performance of junction B and D would operate with less reserve capacities during the reference scenario (without road widening works) in **Table 4.7**, junction improvement works has been formulated to improve the background traffic condition. The details are summarized in the following paragraphs. It is proposed to implement the proposed junction improvement at Junction B and D before building construction stage.

Proposed Junction Improvement at Junction B - Chai Wan Road/Lok Man Road

4.4.6 Under the proposed improvement scheme as shown in **Drawing No. 4.7**, it is proposed modify the method of control to allow the Chai Wan Road southbound left turn and Lok Man Road right turn movements to be operated under the same stage. To cater for proposed method of control, an additional traffic island has been proposed at Chai Wan Road southbound. At the same time, the central reserve at Chai Wan Road has been setback slightly.

4.4.7 The junction assessment results based on the proposed junction improvement are summarized in **Table 4.9**.

Table 4.9 Junction Improvement for Junction B - Chai Wan Road/Lok Man Road in 2031

Junction	Type	Layout	2031 RC (1)			
			Reference Scenario (Without Construction Traffic for Road Widening Works)		Design Scenario (With Construction Traffic for Road Widening Works)	
			AM	PM	AM	PM
Junction B - Chai Wan Road/ Lok Man Road	Signal	With Improvement (**Drawing 4.7**)	50%	56%	48%	54%

4.4.8 Junction B will operate with ample capacities based on the proposed improvement. As mentioned, the proposed improvement at Junction B as shown in **Drawing No. 4.7** is to improve the background traffic condition which will be implemented before building construction stage. The assessment of Junction B during the operation stage will be discussed in Section 6.

Proposed Junction Improvement at Junction D - Chai Wan Road and Hong Man Street

4.4.9 For Junction D, it is proposed to adjust the pedestrian green time of pedestrian phase to provide additional green time for the vehicular phase. It is proposed reduce the pedestrian green time of the signalized crossing at Chai Wan Road from **46s to 42s** and the junction assessment results are summarized in **Table 4.10**.

Table 4.10 Junction Improvement for Junction D - Chai Wan Road/Hong Man Street in 2031

Junction	Type	Layout	2031 RC (1)			
			Reference Scenario (Without Construction Traffic for Road Widening Works)		Design Scenario (With Construction Traffic for Road Widening Works)	
			AM	PM	AM	PM
Junction D - Chai Wan Road/ Hong Man Street	Signal	With Improvement(2) (**Drawing 3.5**)	24%	48%	21%	43%

Note : (1) RC represents the reserve capacity for signal junction
(2) Existing Junction Layout with adjusted pedestrian green time

4.4.10 The assessment results in **Table 4.10** indicate that Junction D with the adjusted pedestrian green time will operate with ample capacities in design year 2031.

4.4.11 Pedestrian assessment due to the adjusted green time at Junction D has been conducted with respect to the anticipated walking time and capacity.

4.4.12 With reference to the Highway Capacity Manual, the average walking speed of the elderly is 0.8m/s. The length of pedestrian crossing across Chai Wan Road is about 25m. The pedestrian green time required for the elderly to walk across the pedestrian crossing will be about 32s. Therefore, the minimum pedestrian stage would be 42s (32s pedestrian green and 10s flashing green). As shown in above, the reduced pedestrian green (42s) is still sufficient to facilitate the crossing for the elderly.

4.4.13 The assessment results based on volume/capacity ratio for the scenario without and with adjustment of green time are summarized in **Table 4.11** and **4.12** respectively.

Table 4.11 Assessment of Pedestrian Crossing of Junction D in year 2031 (without adjustment of pedestrian green time)

Cycle Time (Sec)	Pedestrian Green Time (Sec)	Green Time Proportion	Lateral Width (m)	Pedestrian Capacity (Ped/hr)	2031 Anticipated 2-way Flow (Ped/hr) (1)	V/C Ratio
South Pedestrian Crossing of the junction						
AM Peak						
110	46	0.42	5.0	3,970	1,165	0.29
PM Peak						
110	46	0.42	5.0	3,970	770	0.19

Note : (1) 2031 Anticiapted Pedestrian Flows = 2018 Observed Flow x Growth Factor (0.5% p.a.) for 8 years x Growth Factor (0.4% p.a.) for 5 years

Table 4.12 Assessment of Pedestrian Crossing of Junction D in year 2031 (with adjustment of pedestrian green time)

Cycle Time (Sec)	Pedestrian Green Time (Sec)	Green Time Proportion	Lateral Width (m)	Pedestrian Capacity (Ped/hr)	2031 Anticipated 2-way Flow (Ped/hr)	V/C Ratio
South Pedestrian Crossing of the junction						
AM Peak						
110	42	0.38	5.0	3,630	1,165	0.32
PM Peak						
110	42	0.38	5.0	3,630	770	0.21

Note : (1) 2031 Anticiapted Pedestrian Flows = 2018 Observed Flow x Growth Factor (0.5% p.a.) for 8 years x Growth Factor (0.4% p.a.) for 5 years

4.4.14 The assessment results in **Table 4.13** and **Table 4.12** indicate that the pedestrian crossing of junction D will still operate with ample capacities upon the adjustment of the pedestrian green time.

4.4.15 The proposed improvement at Junction D is to improve the background traffic condition which will be implemented before building construction stage. The assessment of Junction D during the building construction stage will be discussed in Section 4.5.

4.5 Construction Traffic Impact Assessment for Building Construction Stage

4.5.1 To assess the construction traffic impact due to the building construction stage, capacity analysis of the identified critical junctions in the study area for both reference and design scenarios in year 2031 has been carried out based on the routing as illustrated in **Drawing No.4.1**. The results are summarized and presented in **Table 4.13**.

Table 4.14 Operational Performance of Critical Junctions in 2031 (Building Construction Stage)

Ref.	Junction	Type	Layout	2031 RC/RFC [1]			
				Reference Scenario (Without Construction Traffic for Building Construction Stage)		Design Scenario (With Construction Traffic for Building Construction Stage)	
				AM	PM	AM	PM
C	Hong Man Street/ Tai Man Street	Priority	Existing	0.45	0.22	0.49	0.22
D	Chai Wan Road/ Hong Man Street	Signal	Existing	14%	36%	9%	28%
E	Chai Wan Road/ Wan Tsui Road	Priority	Existing	0.40	0.39	0.40	0.39
F	Chai Wan Road Roundabout	Roundabout	Existing	0.56	0.58	0.57	0.58

Note : (1) RC represents the reserve capacity for signal junction and. RFC represents the design flow to capacity ratio.

4.5.2 The assessment results in **Table 4.13** indicate that all critical junctions will still operate with ample capacity except Junction D will operate close to its capacity in design year 2031 in the AM peak during the building construction stage.

4.5.3 In addition, capacity analysis of the identified critical road links in the study area for both reference and design scenarios in year 2031 have also been conducted. The results are summarized and presented in **Table 4.14.**

Table 4.15 2031 Road Links for Assessment (Building Construction Stage)

Ref.	Junction	Direction	Capacity (pcu/hr)		Link Flow				V/C Ratio			
					2031 Reference		2031 Design		2031 Reference		2031 Design	
			AM (1)&(2)	PM (1)&(3)	AM	PM	AM	PM	AM	PM	AM	PM
L1	Tai Man Street	Two-way	1580	1630	605	335	635	365	0.38	0.21	0.40	0.22
L2	Lok Man Road	Two-way	2190	2160	595	335	595	335	0.27	0.16	0.27	0.16
L3	Cheung Man Road	Two-way	1680	1675	390	200	390	200	0.23	0.12	0.23	0.12
L4	Hong Man Street	Two-way	1980	2060	525	460	525	460	0.27	0.22	0.27	0.22

Notes : (1) With reference to TPDM Volume 2 Chapter 2, Table 2.4.1.1 A
(2) L1: 1700 veh/hr x 1.22 PCU Factor x 0.76 HV Reduction Factor, L2: 2200 veh/hr x 1.13 PCU Factor x 0.88 HV Reduction Factor, L3: 1700 veh/hr x 1.14 PCU Factor x 0.87 HV Reduction Factor, L4: 2200 veh/hr x 1.36 PCU factor x 0.66 HV Reduction Factor.

(3) L1: 1700 veh/hr x 1.17 PCU Factor x 0.82 HV Reduction Factor, L2: 2200 veh/hr x 1.13 PCU Factor x 0.87 HV Reduction Factor, L3: 1700 veh/hr x 1.18 PCU Factor x 0.84 HV Reduction Factor, L4: 2200 veh/hr x 1.25 PCU factor x 0.75 HV Reduction Factor

4.5.4 The assessment results in **Table 4.14** indicate that all critical road links will still operate with ample capacity in design year 2031.

Proposed Junction Improvement at Junction D - Chai Wan Road and Hong Man Street

4.5.5 According to paragraph 4.4.5, the proposed improvement at Junction D is to improve the background traffic condition which will be implemented before building construction stage. Based on the proposed improvement in paragraph 4.4.9, the operation performance of Junction D is summarized in **Table 4.15**.

Table 4.16 Junction Improvement for Junction D - Chai Wan Road/Hong Man Street in 2031

Junction	Type	Layout	2031 RC [1]			
			Reference Scenario (Without Construction Traffic for Building Construction Stage)		Design Scenario (With Construction Traffic for Building Construction Stage)	
			AM	PM	AM	PM
Junction D - Chai Wan Road/ Hong Man Street	Signal	With Improvement[2] (**Drawing 3.5**)	24%	48%	18%	39%

Note : (1) RC represents the reserve capacity for signal junction
(2) Existing Junction Layout with adjusted pedestrian green time

4.5.6 The assessment results in **Table 4.15** indicate that Junction D with the adjusted pedestrian green time will operate with ample capacity in design year 2031.

4.5.7 Pedestrian assessment due to the adjusted green time at Junction D has been conducted with respect to the anticipated walking time and capacity.

4.5.8 With reference to the Highway Capacity Manual, the average walking speed of the elderly is 0.8m/s. The length of pedestrian crossing across Chai Wan Road is about 25m. The pedestrian green time required for the elderly to walk across the pedestrian crossing will be about 32s. Therefore, the minimum pedestrian stage would be 42s (32s pedestrian green and 10s flashing green). As shown in above, the reduced pedestrian green (42s) is still sufficient to facilitate the crossing for the elderly.

4.5.9 The assessment results based on volume/capacity ratio for the scenario without and with adjustment of green time are summarized in **Table 4.16** and **4.17** respectively.

Table 4.17 Assessment of Pedestrian Crossing of Junction D in year 2031 (without adjustment of pedestrian green time)

Cycle Time (Sec)	Pedestrian Green Time (Sec)	Green Time Proportion	Lateral Width (m)	Pedestrian Capacity (Ped/hr)	2031 Anticipated 2-way Flow (Ped/hr) (1)	V/C Ratio
South Pedestrian Crossing of the junction						
AM Peak						
110	46	0.42	5.0	3,970	1,165	0.29
PM Peak						
110	46	0.42	5.0	3,970	770	0.19

Note : (1) 2031 Anticipated Pedestrian Flows = 2018 Observed Flow x Growth Factor (0.5% p.a.) for 8 years x Growth Factor (0.4% p.a.) for 5 years

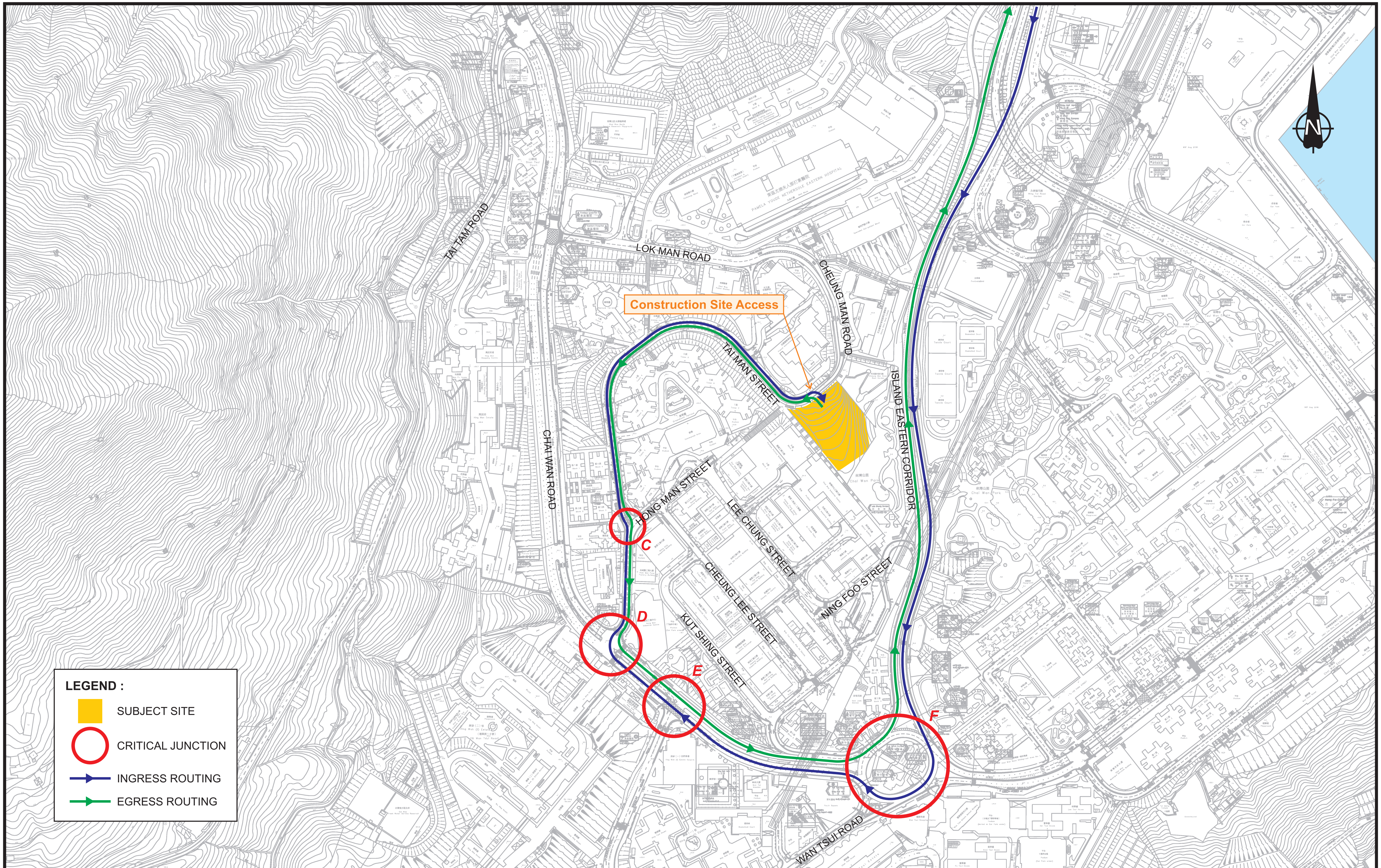
Table 4.18 Assessment of Pedestrian Crossing of Junction D in year 2031 (with adjustment of pedestrian green time)

Cycle Time (Sec)	Pedestrian Green Time (Sec)	Green Time Proportion	Lateral Width (m)	Pedestrian Capacity (Ped/hr)	2031 Anticipated 2-way Flow (Ped/hr)	V/C Ratio
South Pedestrian Crossing of the junction						
AM Peak						
110	42	0.38	5.0	3,630	1,165	0.32
PM Peak						
110	42	0.38	5.0	3,630	770	0.21

Note : (1) 2031 Anticipated Pedestrian Flows = 2018 Observed Flow x Growth Factor (0.5% p.a.) for 8 years x Growth Factor (0.4% p.a.) for 5 years

4.5.10 The assessment results in **Table 4.16** and **Table 4.19** indicate that the pedestrian crossing of junction D will still operate with ample capacity upon the adjustment of the pedestrian green time.

4.5.11 According to paragraph 4.4.5, the proposed improvement at Junction D will be implemented before building construction stage.



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A	MINOR AMENDMENT	GPH	20MAY19
Rev.	Description	Checked	Date

Project Title

PROPOSED PUBLIC HOUSING DEVELOPMENT AT CHEUNG MAN ROAD, CHAI WAN - TIA

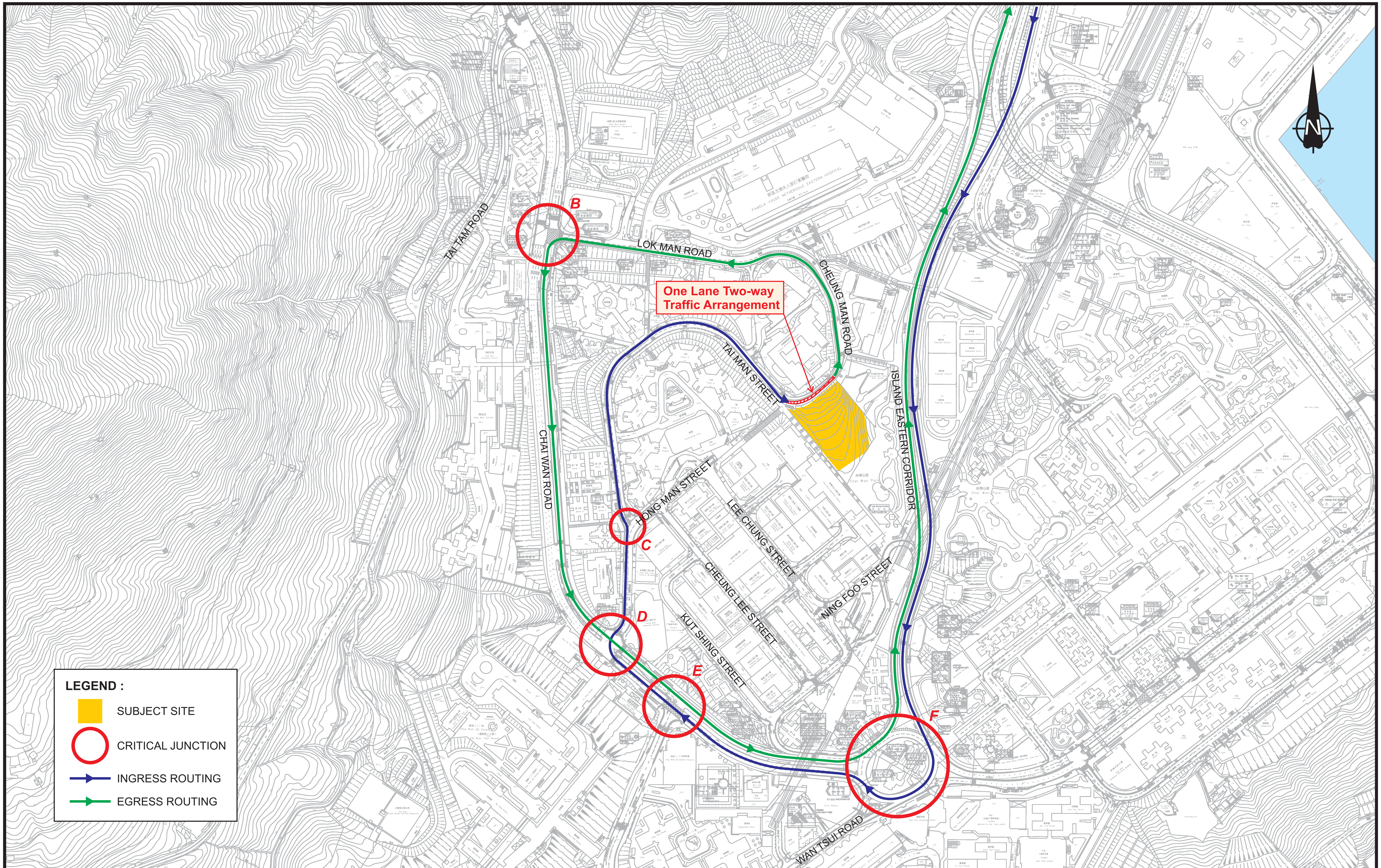
Drawing Title

CONSTRUCTION TRAFFIC ROUTINGS (BUILDING CONSTRUCTION STAGE)

Designed	Checked	Scale	Date	Drawing No.	Rev.
HKH	GPH	NTS	FEB 2019	4.1	A

SYSTRA MVA

CHK50196317/TIA2/F41-A.CDR/LLH/20MAY19



Rev.	Description	Checked	Date
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-	-	-	-
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Project Title

PROPOSED PUBLIC HOUSING DEVELOPMENT AT CHEUNG MAN ROAD, CHAI WAN - TIA

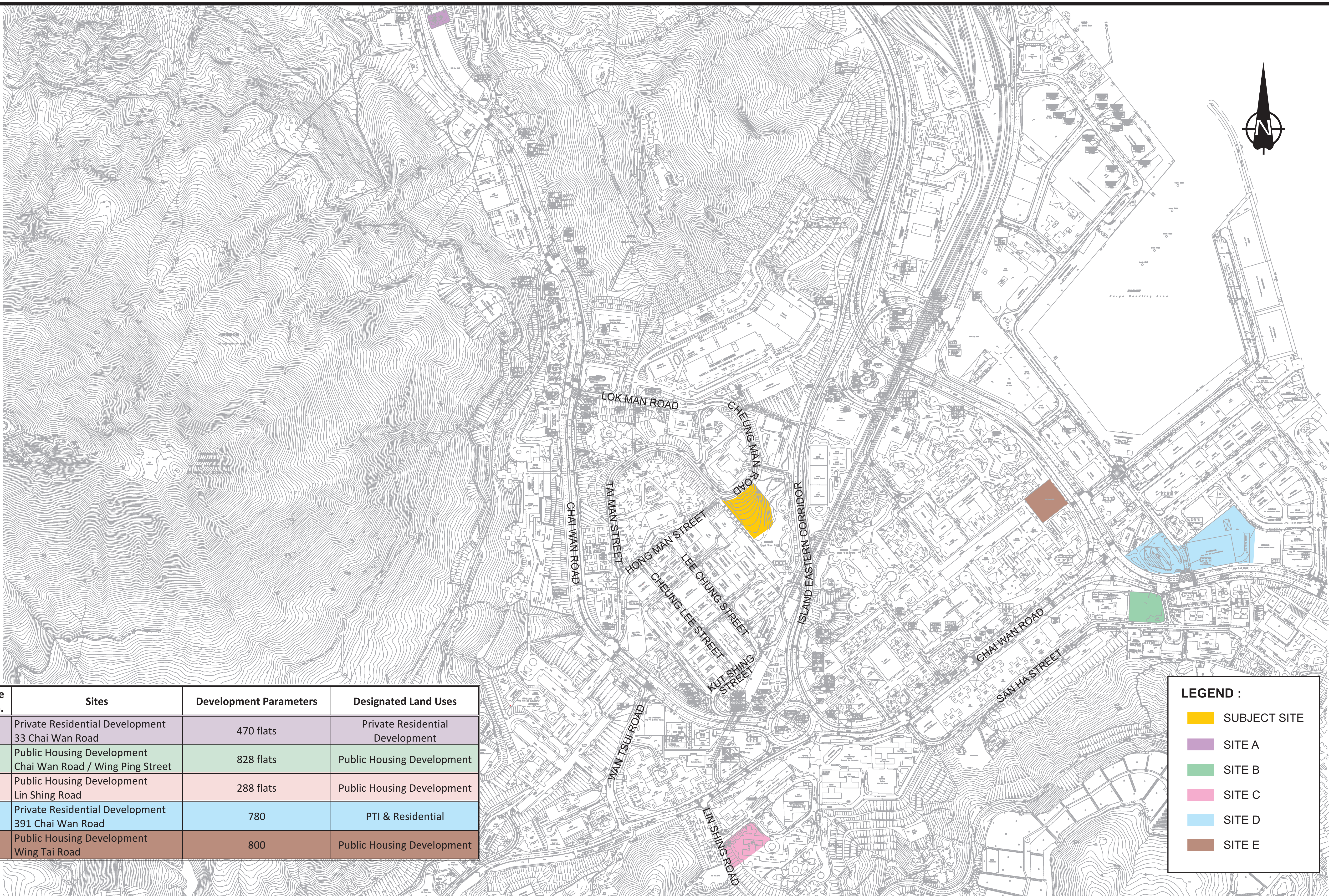
Drawing Title

CONSTRUCTION TRAFFIC ROUTINGS (ROAD WIDENING)

Designed	Checked	Scale	Date	Drawing No.	Rev.
LAU	GPH	NTS	FEB 2019	4.2	-

SYSTRA MVA

CHK50196317/TIA2/F42.CDR/LLH/25FEB19



Site No.	Sites	Development Parameters	Designated Land Uses
A	Private Residential Development 33 Chai Wan Road	470 flats	Private Residential Development
B	Public Housing Development Chai Wan Road / Wing Ping Street	828 flats	Public Housing Development
C	Public Housing Development Lin Shing Road	288 flats	Public Housing Development
D	Private Residential Development 391 Chai Wan Road	780	PTI & Residential
E	Public Housing Development Wing Tai Road	800	Public Housing Development

Rev.	Description	Checked	Date
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-

Project Title

PROPOSED PUBLIC HOUSING DEVELOPMENT AT CHEUNG MAN ROAD, CHAI WAN - TIA

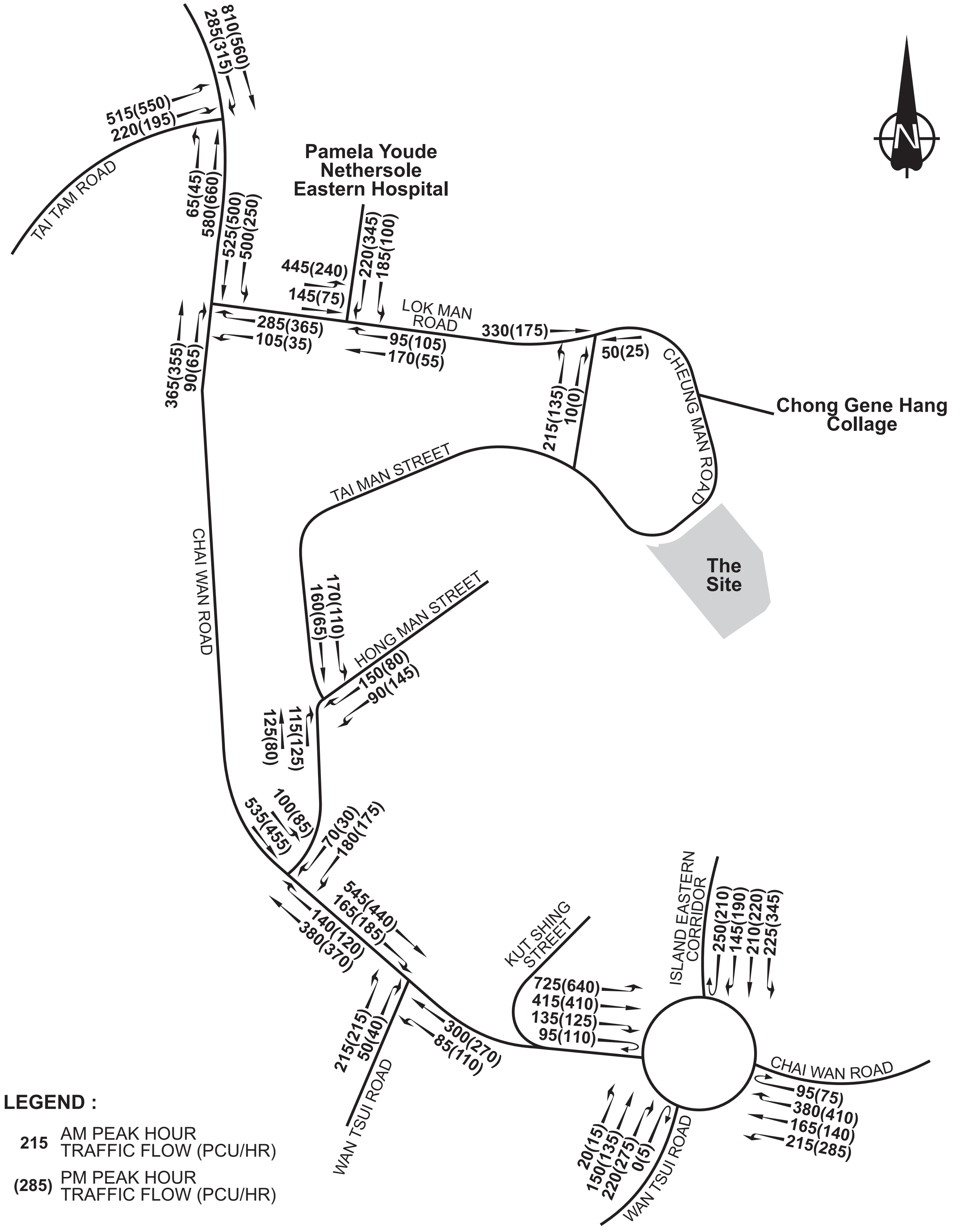
Drawing Title

LOCATION PLAN OF COMMITTED / PLANNED DEVELOPMENT

Designed	Checked	Scale	Date	Drawing No.	Rev.
HKH	GPH	NTS	NOV 2018	4.3	-

SYSTRA MVA

CHK50196317/TIA2/F43.CDR/LLH/28NOV18



B	MINOR AMENDMENT	GPH	26APR19	-	-	-	-
A	MINOR CHANGES	GPH	22FEB19	C	MINOR AMENDMENT	GPH	21MAY19
Rev.	Description	Checked	Date	Rev.	Description	Checked	Date

Project Title

PROPOSED PUBLIC HOUSING DEVELOPMENT
AT CHEUNG MAN ROAD, CHAI WAN - TIA

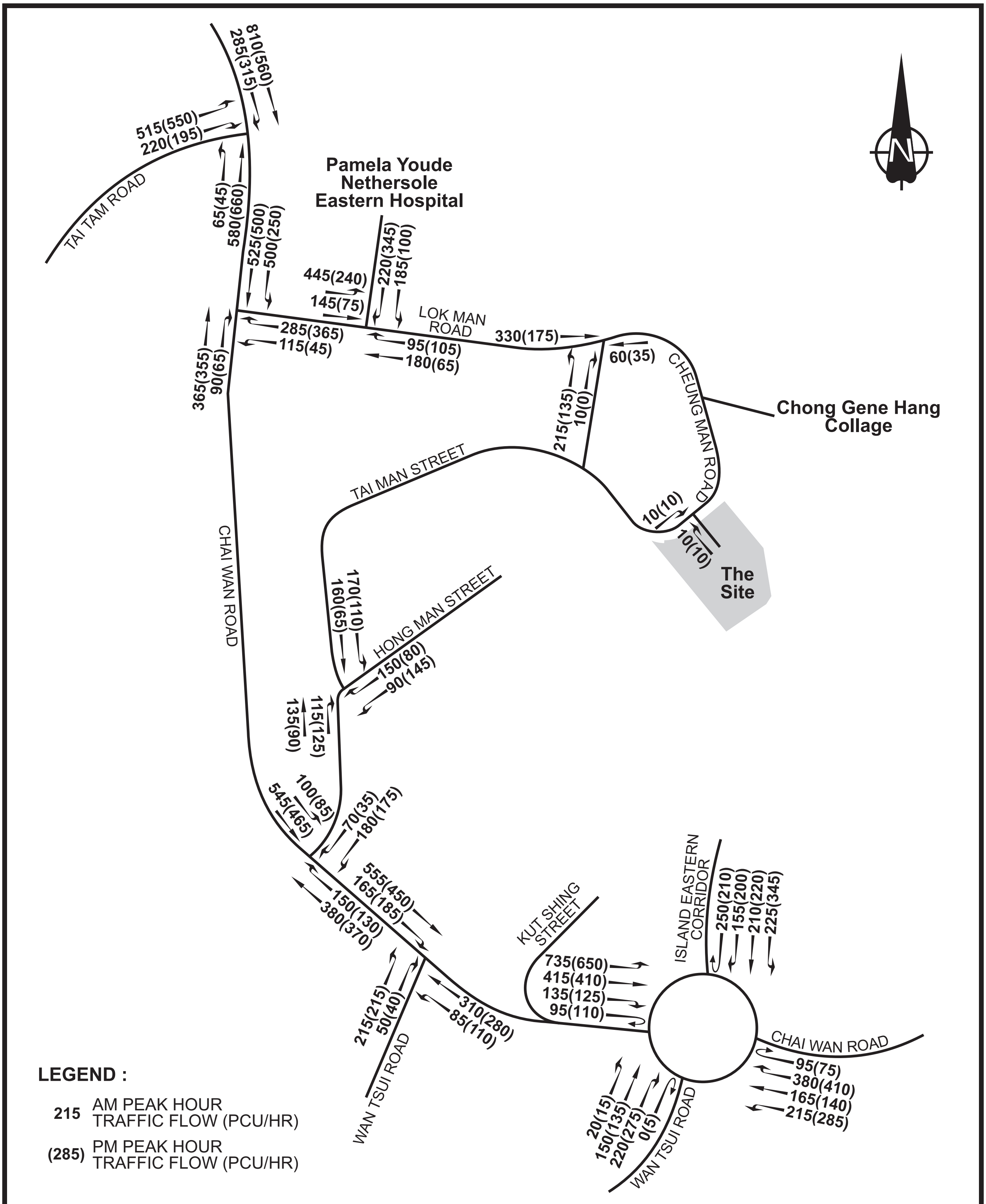
Drawing Title

2031 REFERENCE TRAFFIC FLOWS

SYSTRA MVA

Designed	Checked	Scale	Date	Drawing No.	Rev.
HKH	GPH	NTS	NOV 2018	4.4	C

CHK50196317/TIA2/F44-C.CDR/LLH/21MAY19



B	MINOR AMENDMENT	GPH	26APR19	D	FIGURE NUMBER CHANGED	GPH	21MAY19
A	MINOR CHANGES	GPH	22FEB19	C	MINOR AMENDMENT	GPH	20MAY19
Rev.	Description	Checked	Date	Rev.	Description	Checked	Date

Project Title

PROPOSED PUBLIC HOUSING DEVELOPMENT
AT CHEUNG MAN ROAD, CHAI WAN - TIA

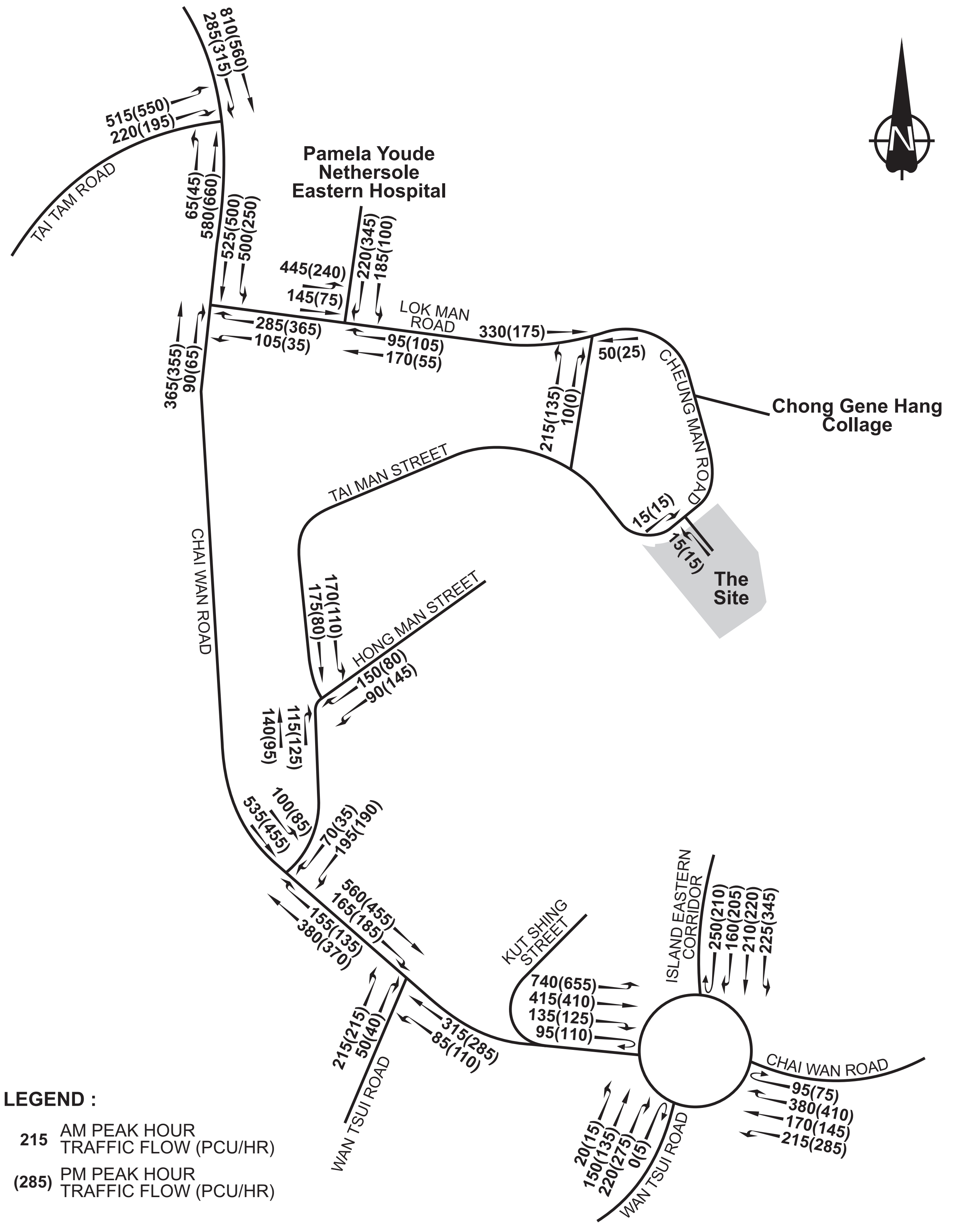
Drawing Title

2031 DESIGN TRAFFIC FLOWS
(FOR ROAD WIDENING)

SYSTRA MVA

Designed	Checked	Scale	Date	Drawing No.	Rev.
HKH	GPH	NTS	DEC 2018	4.5	D

CHK50196317/TIA2/F45-D.CDR/LLH/21MAY19



LEGEND :

215	AM PEAK HOUR TRAFFIC FLOW (PCU/HR)
(285)	PM PEAK HOUR TRAFFIC FLOW (PCU/HR)

Rev.	Description	Checked	Date	Rev.	Description	Checked	Date
B	MINOR AMENDMENT	GPH	26APR19	-	-	-	-
A	MINOR CHANGES	GPH	22FEB19	C	FIGURE NUMBER CHANGED	GPH	21MAY19

Project Title

PROPOSED PUBLIC HOUSING DEVELOPMENT
AT CHEUNG MAN ROAD, CHAI WAN - TIA

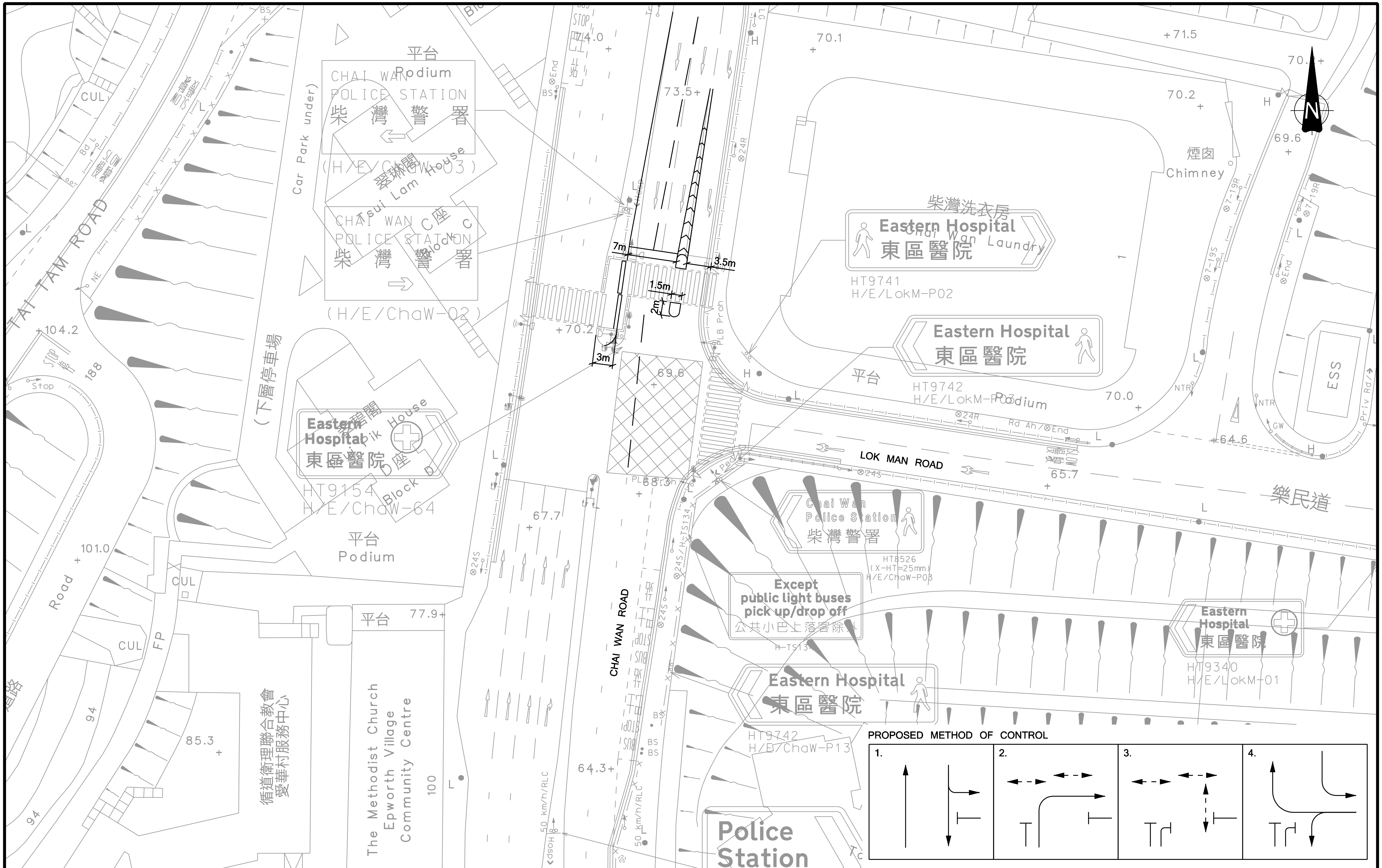
Drawing Title

2031 DESIGN TRAFFIC FLOWS (BUILDING CONSTRUCTION STAGE)

SYSTRA MVA

Designed	Checked	Scale	Date	Drawing No.	Rev.
HKH	GPH	NTS	NOV 2018	4.6	C

CHK50196317/TIA2/F46-C.CDR/LLH/21MAY19



Rev.	Description	Checked	Date
-	-	-	-
-	-	-	-
B	MINOR AMENDMENT	GPH	21MAY19
A	MINOR AMENDMENT	GPH	25APR19

Project Title

PROPOSED PUBLIC HOUSING DEVELOPMENT AT CHEUNG MAN ROAD, CHAI WAN - TIA

Drawing Title

PROPOSED JUNCTION LAYOUT OF CHAI WAN ROAD / LOK MAN ROAD (B)

Designed	Checked	Scale	Date	Drawing No.	Rev.
PML	GPH	1:500(A3)	FEB 2019	4.7	B

SYSTRA MVA

CHK50196317/TIA1/F47-B.DGN/CKC/21MAY19

5. FUTURE TRAFFIC CONDITIONS

5.1 Design Year

5.1.1 It is anticipated that the proposed development will be completed by year 2031. In order to assess the impact of the development related traffic on the local road network, it is necessary to forecast the traffic flows for design year 2034, the adopted design year, which is 3 years upon completion.

5.2 Reference Traffic Flows

5.2.1 Based on the adopted annual growth rates in **Tables 4.1** and **4.2** and the traffic generation of planned developments in **Table 4.5,** 2034 reference traffic flows is shown in **Drawing No. 5.1**.

2034 Reference Flows = 2018 Observed Flow x Growth Factor (0.5% p.a.) for 8 years x Growth Factor (0.4% p.a.) for 8 years + Planned/Committed Development Traffic

5.3 Development Traffic Generation

5.3.1 In order to estimate the traffic generation and attraction of the proposed development, reference will be made to the trip generation rates as stipulated in Volume 1 Chapter 3 Appendix D Table 1 of the latest T.P.D.M. and the proposed flat size. The adopted trip rates are summarized in **Table 5.1**.

Table 5.1 Adopted Trip Rates

	AM Peak		PM Peak	
	Generation	Attraction	Generation	Attraction
Public Housing Development (pcu/hr/flat)	0.0622	0.0426	0.0297	0.0401

5.3.2 As a conservative approach, an additional 10% allowance will be allowed for the proposed development to cater for future design variation. The traffic impact assessment will be based on 884 x 1.1 = 972 flats.

5.3.3 Based on the adopted trip rates given in **Table 5.1**, the total trips generated by the proposed development are computed and shown in **Table 5.2**.

Table 5.2 Traffic Generations of Proposed Developments (pcu/hr)

Development Parameters	AM Peak		PM Peak	
	Generation	Attraction	Generation	Attraction
972 Flats	61	42	29	39

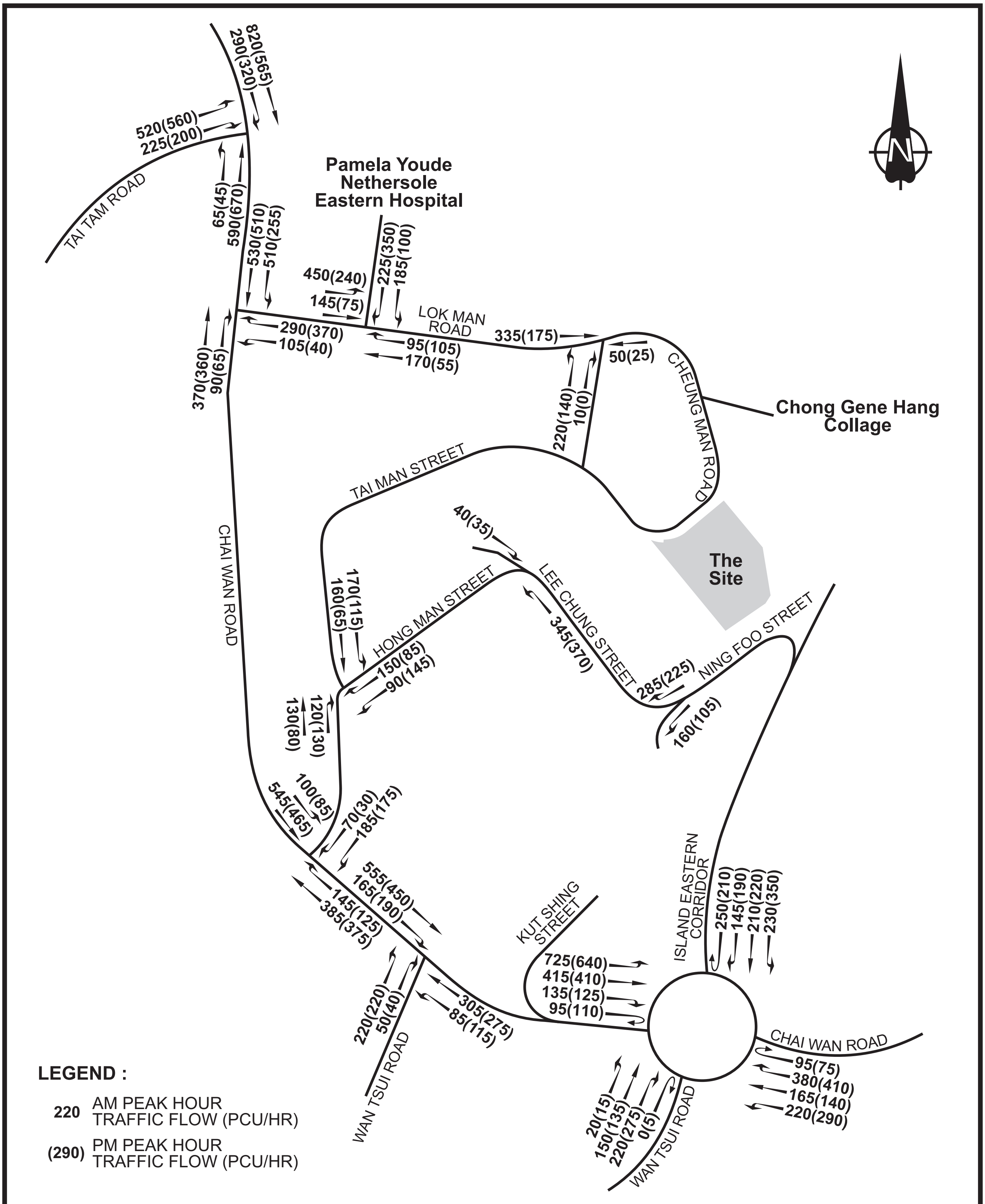
5.3.4 It is estimated that the proposed development will generate and attract about 61pcu/hr and 42pcu/hr in the AM peak hour, and generate and attract about 29pcu/hr and 39pcu/hr in the PM peak hour respectively.

5.4 Design Traffic Forecasts

5.4.1 The development traffic flows were then superimposed onto the 2034 reference traffic flows (without development) as shown in **Drawing No. 5.1** to derive the 2034 design traffic forecasts (with development).

5.4.2 2034 Design Flows = 2034 Reference Flows + Proposed Development Traffic

5.4.3 The 2034 AM and PM peak design traffic forecast (with development) are shown in **Drawing No. 5.2**.



Rev.	Description	Checked	Date	Rev.	Description	Checked	Date
B	MINOR AMENDMENT	GPH	26APR19	-	-	-	-
A	MINOR CHANGES	GPH	25FEB19	-	-	-	-

Project Title

PROPOSED PUBLIC HOUSING DEVELOPMENT
AT CHEUNG MAN ROAD, CHAI WAN - TIA

Drawing Title

2034 REFERENCE TRAFFIC FLOWS

SYSTRA MVA

Designed	Checked	Scale	Date	Drawing No.	Rev.
HKH	GPH	NTS	NOV 2018	5.1	B

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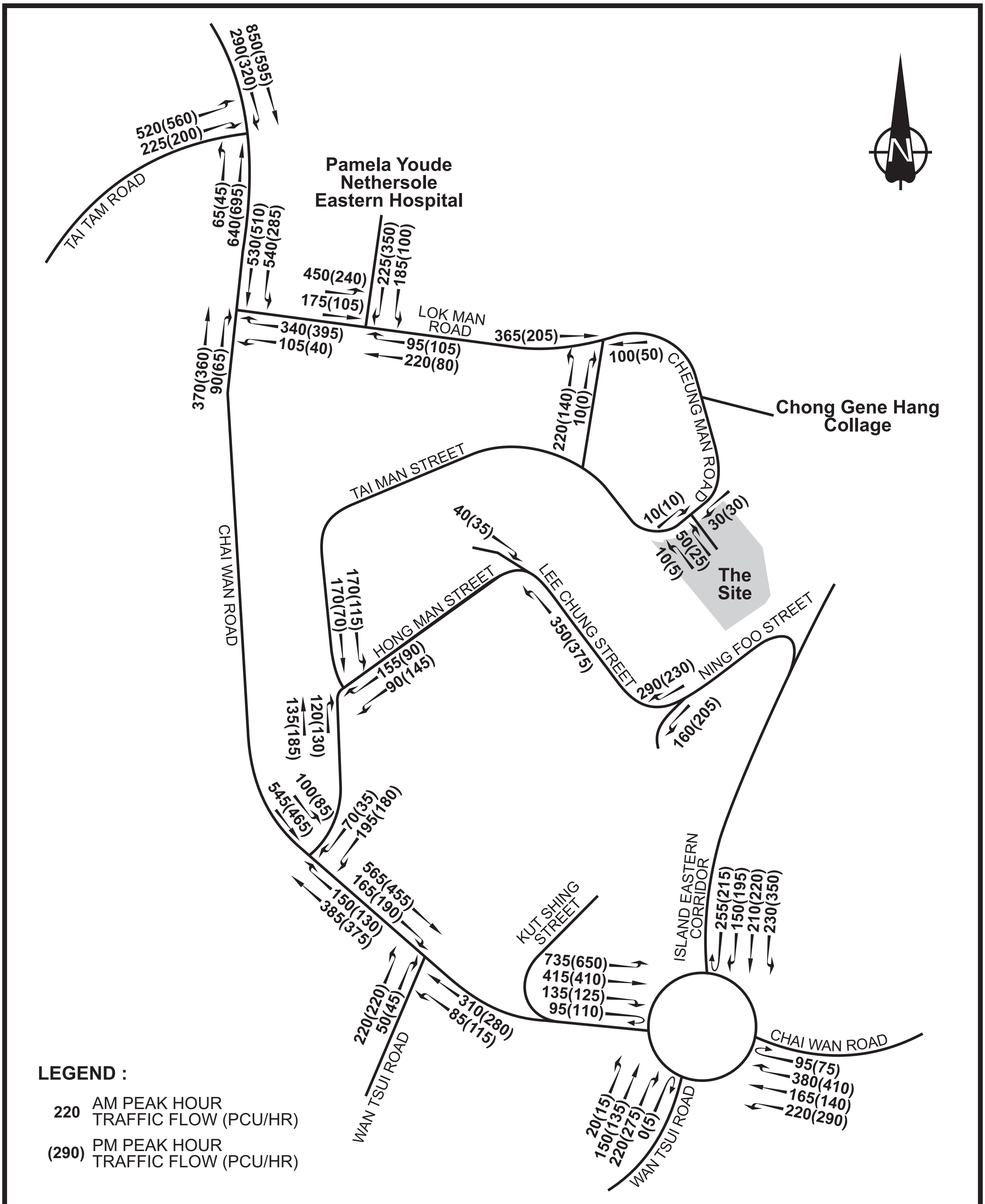


B	MINOR AMENDMENT	GPH	26APR19	-	-	-	-
A	MINOR CHANGES	GPH	25APR19	-	-	-	-
Rev.	Description	Checked	Date	Rev.	Description	Checked	Date

Project Title

PROPOSED PUBLIC HOUSING DEVELOPMENT
AT CHEUNG MAN ROAD, CHAI WAN - TIA

Drawing Title

2034 DESIGN TRAFFIC FLOWS

SYSTRA MVA

Designed	Checked	Scale	Date	Drawing No.	Rev.
HKH	GPH	NTS	NOV 2018	5.2	B

CHK50196317/TIA2/F52-B.CDR/LLH/26APR19

6. TRAFFIC IMPACT ASSESSMENT

6.1 Junction Capacity Assessment

6.1.1 To assess the traffic impact due to the proposed development, capacity analysis of the identified critical junctions in the study area for both reference and design scenarios in year 2034 has been carried out.

6.1.2 The assessment of Junction A, B, C, E, F, G, H would be based on the existing layout while Junction D would be based on the improvement scheme proposed in **Section 4.5**. The results are summarized and presented in **Table 6.1**.

Table 6.1 Operational Performance of Critical Junctions in 2034

Ref.	Junction	Type	Layout	2034 RC/RFC (1)			
				Reference Scenario (Without Development)		Design Scenario (With Development)	
				AM	PM	AM	PM
A	Chai Wan Road/ Tai Tam Road	Signal	Existing	10%	12%	7%	11%
B	Chai Wan Road/ Lok Man Road	Signal	Existing	7%	47%	-2%	36%
C	Hong Man Street/ Tai Man Street	Priority	Existing	0.45	0.23	0.51	0.25
D	Chai Wan Road/ Hong Man Street	Signal	Existing	12%	34%	9%	30%
E	Chai Wan Road/ Wan Tsui Road	Priority	Existing	0.41	0.40	0.41	0.40
F	Chai Wan Road Roundabout	Roundabout	Existing	0.56	0.58	0.57	0.58
G	Hong Man Street/ Lee Chung Street	Priority	Existing	0.06	0.05	0.06	0.05
H	Ning Foo Street/ Lee Chung Street	Signal	Existing	>100%	>100%	>100%	>100%

Notes : (1) RC represents the reserve capacity for signal junction and. RFC represents the design flow to capacity ratio.
(2) Refer to junction improvement in Drawing 4.7

6.1.3 The assessment results in **Table 6.1** revealed that all critical junctions will still operate with ample capacity in design year 2034 except Junction A, B and D. Junction B – Chai Wan Road/Lok Man Road will be overloaded while Junction A - Chai Wan Road/Tai Tam Road and Junction D – Chai Wan Road/Hong Man Street will operate close to their capacities in design year 2034 at the AM peak.

6.2 Road Link Capacity Assessment

6.2.1 In addition, capacity analysis of the identified critical road links in the study area for both reference and design scenarios in year 2034 have also been conducted. The results are summarized and presented in **Table 6.2**.

Table 6.2 Road Links for Assessment

Ref.	Junction	Direction	Capacity (pcu/hr)		Link Flow				V/C Ratio			
					2034 Reference		2034 Design		2034 Reference		2034 Design	
			AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
L1	Tai Man Street	Two-way	1580	1630	610	345	630	360	0.39	0.21	0.40	0.23
L2	Lok Man Road	Two-way	2190	2160	595	335	675	390	0.27	0.16	0.31	0.18
L3	Cheung Man Road	Two-way	1680	1675	395	200	475	230	0.24	0.12	0.28	0.14
L4	Hong Man Street	Two-way	1980	2060	530	475	535	480	0.27	0.23	0.27	0.24

Notes : (1) With reference to TPDM Volume 2 Chapter 2, Table 2.4.1.1 A

(2) L1: 1700 veh/hr x 1.22 PCU Factor x 0.76 HV Reduction Factor, L2: 2200 veh/hr x 1.13 PCU Factor x 0.88 HV Reduction Factor, L3: 1700 veh/hr x 1.14 PCU Factor x 0.87 HV Reduction Factor, L4: 2200 veh/hr x 1.36 PCU factor x 0.66 HV Reduction Factor.

(3) L1: 1700 veh/hr x 1.17 PCU Factor x 0.82 HV Reduction Factor, L2: 2200 veh/hr x 1.13 PCU Factor x 0.87 HV Reduction Factor, L3: 1700 veh/hr x 1.18 PCU Factor x 0.84 HV Reduction Factor, L4: 2200 veh/hr x 1.25 PCU factor x 0.75 HV Reduction Factor

6.2.2 The assessment results in **Table 6.2** indicate that all critical road links will still operate with ample capacity in design year 2034.

6.3 Proposed Junction Improvement

Proposed Junction Improvement at Junction A - Chai Wan Road/Tai Tam Road

6.3.1 According to **Table 6.1**, the operational performance of Junction A is the same under the reference and design scenarios indicating the additional impact due to the proposed development will be minimal. Nevertheless, junction improvement has been proposed for future design consideration.

6.3.2 Under the proposed improvement scheme as shown in **Drawing No. 6.1**, it is proposed modify the method of control to allow the Chai Wan Road northbound and southbound straight head movements to be operated under the same stage. To cater for proposed method of control, an additional traffic island has been proposed at Chai Wan Road with minor setback of the eastern kerbline. The proposed improvement at Junction A will be implemented before the population intake of the proposed development.

Proposed Junction Improvement at Junction B - Chai Wan Road/Lok Man Road

6.3.3 According to paragraph 4.4.5, the proposed improvement at Junction B will be implemented before building construction stage.

Proposed Junction Improvement at Junction D - Chai Wan Road and Hong Man Street

6.3.4 According to paragraph 4.4.5, the proposed improvement at Junction D will be implemented before building construction stage.

6.3.5 The junction assessment results based on the proposed junction improvement are summarized in **Table 6.3**.

Table 6.3 Operational Performance of Critical Junctions in 2034 (with Improvement)

Junction	Type	Layout	2034 RC (1)			
			Reference Scenario (Without Development)		Design Scenario (With Development)	
			AM	PM	AM	PM
Junction A - Chai Wan Road/ Tai Tam Road	Signal	With Improvement (**Drawing 6.1**)	24%	16%	22%	15%
Junction B - Chai Wan Road/ Lok Man Road	Signal	With Improvement (**Drawing 4.7**)	51%	55%	41%	50%
Junction D - Chai Wan Road/ Hong Man Street	Signal	With Improvement(2) (**Drawing 3.5**)	21%	45%	18%	41%

Note : (1) RC represents the reserve capacity for signal junction
(2) Existing Junction Layout with adjusted pedestrian green time

6.3.6 The results indicated that Junction A, B and D will operate with ample capacities with the proposed junction improvement scheme.

6.3.7 Pedestrian assessment due to the adjusted green time at Junction D has been conducted with respect to the anticipated walking time and capacity.

6.3.8 With reference to the Highway Capacity Manual, the average walking speed of the elderly is 0.8m/s. The length of pedestrian crossing across Chai Wan Road is about 25m. The pedestrian green time required for the elderly to walk across the pedestrian crossing will be about 32s. Therefore, the minimum pedestrian stage would be 42s (32s pedestrian green and 10s flashing green). As shown in above, the reduced pedestrian green (42s) is still sufficient to facilitate the crossing for the elderly.

6.3.9 The assessment results based on volume/capacity ratio for the scenario without and with adjustment of green time are summarized in **Table 6.4** and **6.5** respectively.

Table 6.4 Assessment of Pedestrian Crossing of Junction D in year 2034 (without adjustment of pedestrian green time)

Cycle Time (Sec)	Pedestrian Green Time (Sec)	Green Time Proportion	Lateral Width (m)	Pedestrian Capacity (Ped/hr)	2034 Anticipated 2-way Flow (Ped/hr) (1)	V/C Ratio
South Pedestrian Crossing of the junction						
AM Peak						
110	46	0.42	5.0	3,970	1,180	0.30
PM Peak						
110	46	0.42	5.0	3,970	780	0.20

Note : (1) 2031 Anticipated Pedestrian Flows = 2018 Observed Flow x Growth Factor (0.5% p.a.) for 8 years x Growth Factor (0.4% p.a.) for 8 years

Table 6.5 Assessment of Pedestrian Crossing of Junction D in year 2034 (with adjustment of pedestrian green time)

Cycle Time (Sec)	Pedestrian Green Time (Sec)	Green Time Proportion	Lateral Width (m)	Pedestrian Capacity (Ped/hr)	2034 Anticipated 2-way Flow (Ped/hr)	V/C Ratio
South Pedestrian Crossing of the junction						
AM Peak						
110	42	0.38	5.0	3,630	1,180	0.33
PM Peak						
110	42	0.38	5.0	3,630	780	0.21

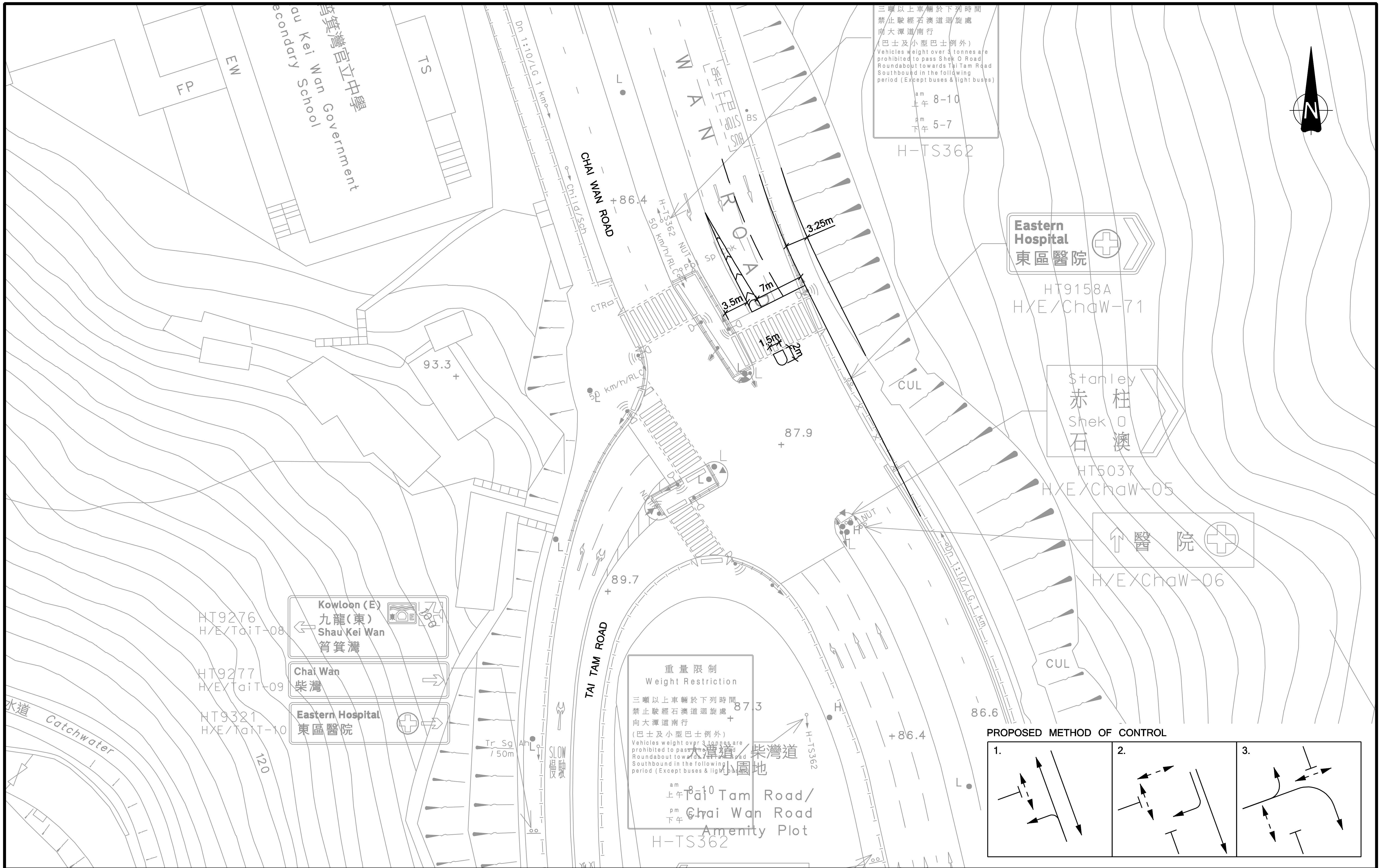
Note : (1) 2031 Anticipated Pedestrian Flows = 2018 Observed Flow x Growth Factor (0.5% p.a.) for 8 years x Growth Factor (0.4% p.a.) for 8 years

6.3.10 The assessment results in **Table 6.6** and **Table 6.5** indicate that the pedestrian crossing of junction D will still operate with ample capacity upon the adjustment of the pedestrian green time.

6.4 Proposed Road Widening Scheme at Cheung Man Road

6.4.1 At present, the road section of Cheung Man Road near the project site is not sufficient to accommodate the heavy vehicles turning simultaneously. Therefore, it is proposed to widen the road section to accommodate the maneuvering of 2 long vehicles simultaneously and the proposed road improvement scheme is illustrated in **Drawing No. 6.2**. The swept path analysis of 12m man coach for the proposed road improvement scheme is illustrated in **Drawing No. 6.3**.

6.4.2 The proposed modification would allow long vehicles to/from the proposed development to access via Cheung Man Road.



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A	MINOR AMENDMENT	GPH	24APR19
Rev.	Description	Checked	Date

Project Title

PROPOSED PUBLIC HOUSING DEVELOPMENT
AT CHEUNG MAN ROAD, CHAI WAN - TIA

Drawing Title

PROPOSED JUNCTION LAYOUT OF
CHAI WAN ROAD / TAI TAM ROAD (A)

Designed	Checked	Scale	Date	Drawing No.	Rev.
LAU	GPH	1:500(A3)	FEB 2019	6.1	A

SYSTRA MVA

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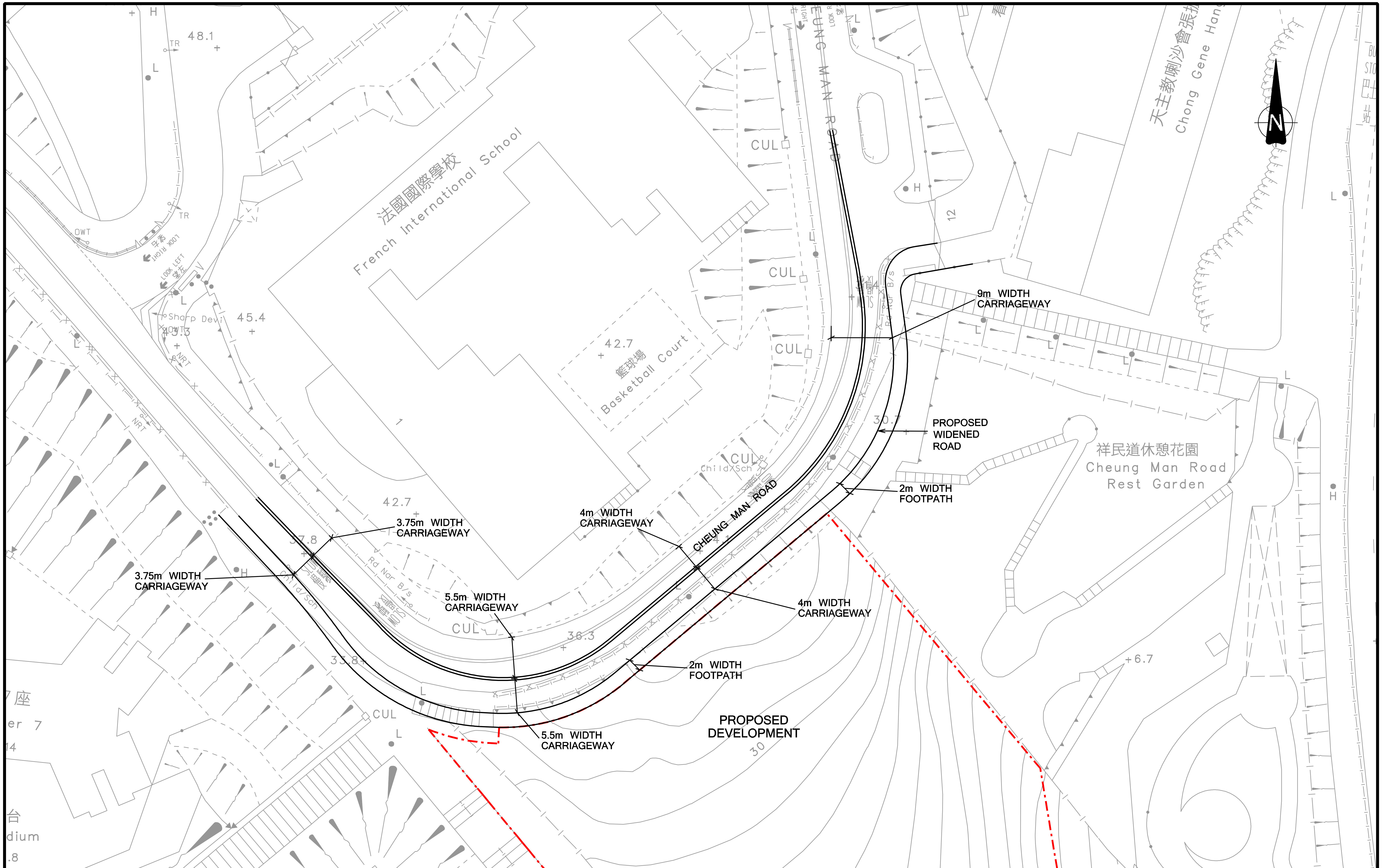

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A	MINOR AMENDMENT	GPH	21MAY19

Project Title
PROPOSED PUBLIC HOUSING DEVELOPMENT AT CHEUNG MAN ROAD, CHAI WAN - TIA

Drawing Title
PROPOSED ROAD IMPROVEMENT OF CHEUNG MAN ROAD

SYSTRA MVA

Designed	Checked	Scale	Date	Drawing No.	Rev.
LAU	GPH	1:500(A3)	FEB 2019	6.2	A

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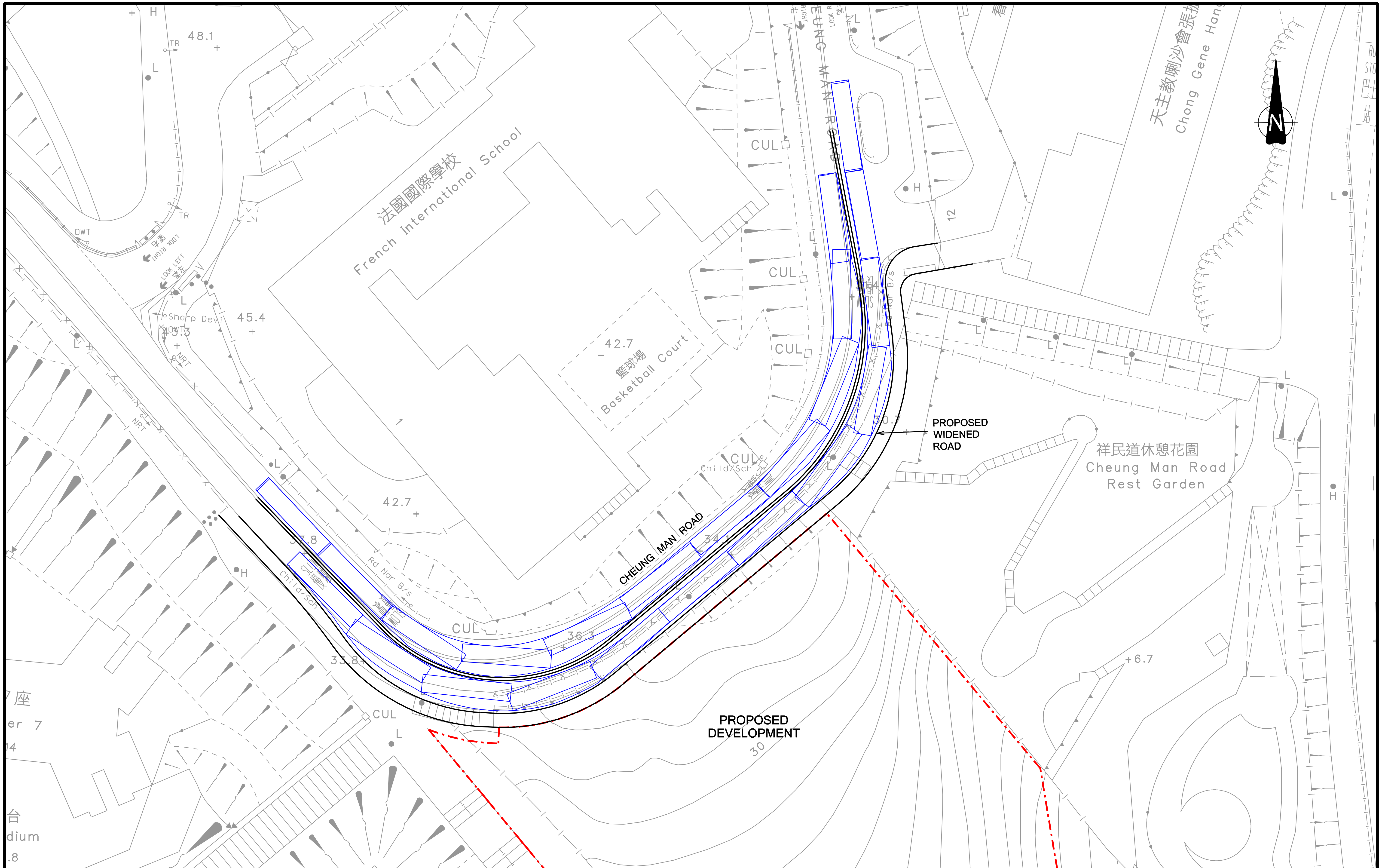

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A	MINOR AMENDMENT	GPH	21MAY19

Project Title

PROPOSED PUBLIC HOUSING DEVELOPMENT AT CHEUNG MAN ROAD, CHAI WAN - TIA

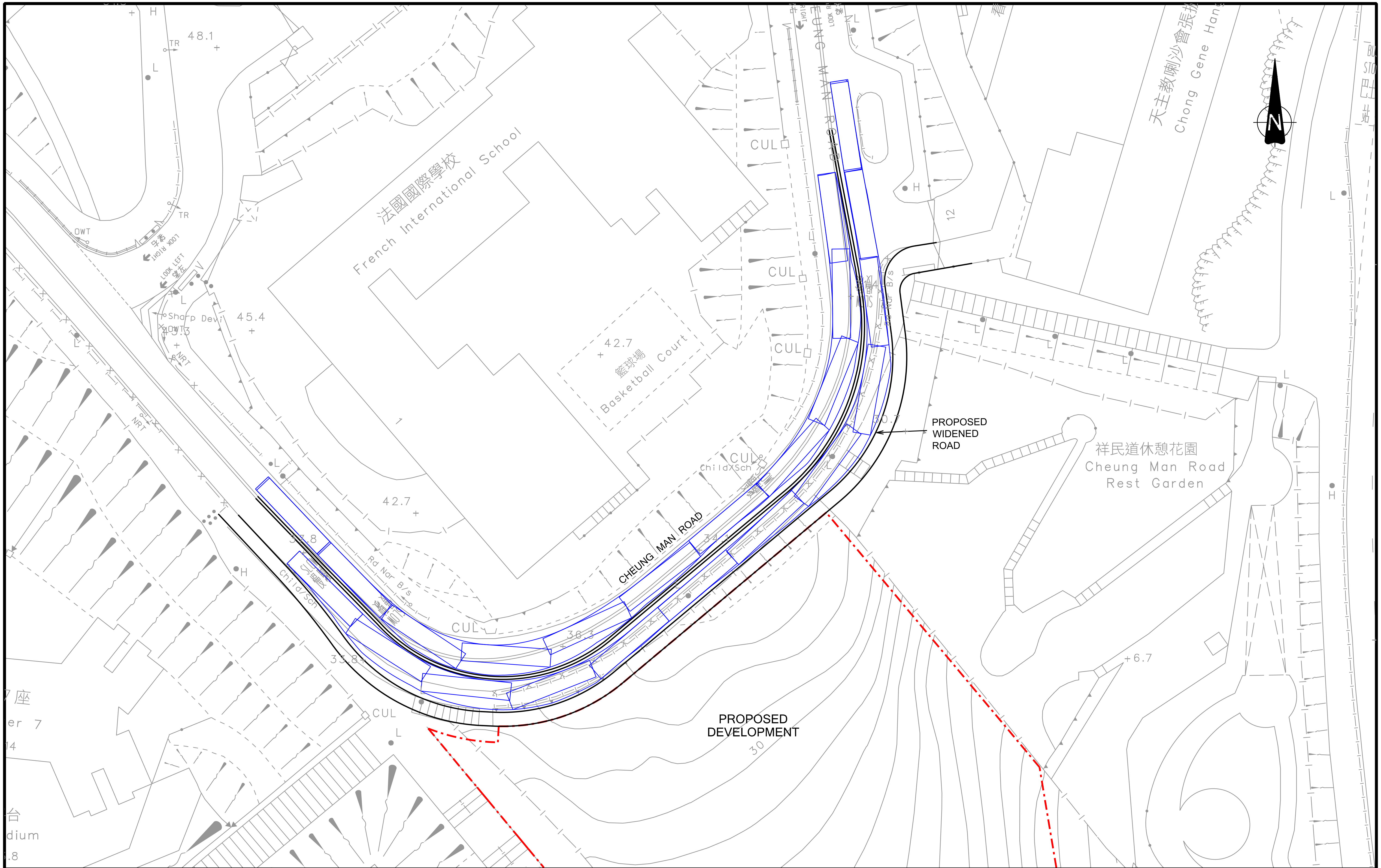
Drawing Title

SWEPT PATH ANALYSIS OF 12.8m VEHICLE FOR THE PROPOSED ROAD IMPROVEMENT OF CHEUNG MAN ROAD

Designed	Checked	Scale	Date	Drawing No.	Rev.
LAU	GPH	1:500(A3)	FEB 2019	6.3	A

SYSTRA MVA

CHK50196317/TIA1/F63-A.DGN/CKC/21MAY19



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Project Title

PROPOSED PUBLIC HOUSING DEVELOPMENT
AT CHEUNG MAN ROAD, CHAI WAN - TIA

Drawing Title

SWEPT PATH ANALYSIS OF 12.8m VEHICLE FOR THE PROPOSED ROAD IMPROVEMENT OF CHEUNG MAN ROAD

Designed	Checked	Scale	Date	Drawing No.	Rev.
LAU	GPH	1:500(A3)	FEB 2019	6.4	-

SYSTRA MVA

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7. FUTURE PEDESTRIAN CONDITIONS

7.1 Design Year

7.1.1 It is anticipated that the proposed development will be completed by year 2031. In order to assess the impact of the development related traffic on the local road network, it is necessary to forecast the traffic flows for design year 2034, the adopted design year, which is 3 years upon completion.

7.2 Reference Pedestrian Flows

7.2.1 Pedestrian flows survey has been conducted to determine the existing pedestrian.

7.2.2 Based on the adopted annual growth rates in **Tables 4.1** and **4.2**, the 2034 reference pedestrian flows at the staircase near the proposed development would be

2034 Reference Pedestrian Flows = 2018 Observed Flow x Growth Factor (0.5% p.a.) for 8 years x Growth Factor (0.4% p.a.) for 8 years

7.3 Design Pedestrian Flows

7.3.1 The development traffic flows were then superimposed onto the 2034 reference traffic flows (without development) to derive the 2034 design pedestrian forecasts (with development).

7.3.2 2034 Design Pedestrian Flows (without Footbridge) = 2034 Reference Pedestrian Flows + Proposed Development Pedestrian Flow

<u>Pedestrian trip generations of the proposed development</u>

7.3.3 In order to estimate the potential pedestrian trip generations of the proposed development, trip generation rate of similar characteristics has been adopted for the different proposed development components. The reference surveyed trip rates are summarized in **Table 7.1**.

Table 7.1 Reference Trip Rate

Survey Site	Pedestrian Trip Rates (pedestrians/flat/hr)			
	AM Peak		PM Peak	
	Generation	Attraction	Generation	Attraction
flats(ped/hr/flat)(1)	0.59	0.15	0.13	0.29

Note : (1) Trip rate obtained from survey at Yuet Tsui Court, Wan Tsui Estate

7.3.4 Based on the proposed development and the surveyed trip rates given in **Table 7.1**, the total pedestrian trips generated by the proposed development under the updated development proposals are computed and shown in **Table 7.2**.

Table 7.2 Pedestrian Generations of Proposed Development

Proposed Development	Pedestrian Trip Rates (pedestrians/flat/hr)			
	AM Peak		PM Peak	
	Generation	Attraction	Generation	Attraction
flats (972 units)	574	146	126	282

7.3.5 As shown in **Drawing 7.1**, the walking distance between the proposed development and Chai Wan MTR Station is only 200m. In view of the close proximity of the exiting staircase, it is anticipated majority of the future residents of the proposed development would use this existing staircases to/from the Chai Wan MTR Station. The operation performance of the staircase has been assessed and summarized in **Table 7.3.**

7.4 Pedestrian Assessment

7.4.1 To assess the pedestrian impact due to the proposed development pedestrian flows, capacity analysis of the identified staircases for both reference and design scenarios in year 2034. The results are summarized and presented in **Table 7.3**.

Table 7.3 Operation Performance of Staircases in 2034

Footpath Section (1)	Total Width (m)	Effective Width (m) (2)	Scenario	Two-way Hourly Pedestrian Flows (in ped/15min)		Two-way Hourly Pedestrian Flow Rate (in ped/min/m) (3)		Level of Service (LOS) (4)	
				AM	PM	AM	PM	AM	PM
S1	2.5	1.5	Reference	50	35	2.2	1.6	A	A
			Design	230	135	10.2	6.0	A	A

Notes : (1) As shown in Drawing No. 3.12.
(2) Effective width of proposed footpath is defined as the actual width of proposed footpath by excluding the dead widths on both sides.
(3) Two–way pedestrian flow rate = Two-way 15-mins pedestrian flows / 15 min / Effective width of footpath.
(4) Details of Pedestrian Walkway LOS refer to T.P.D.M. Volume 6 Chapter 10 Section 10.4.2.

7.4.2 Based on the assessments result in **Table 7.3**, the existing staircases will be operating with ample spare capacity in 2034 at LOS A. Therefore, the existing pedestrian facilities are considered sufficient for the proposed development.

7.5 Proposed Footbridge

7.5.1 To improve the overall accessibility of the adjacent developments in the districts, it is proposed to provide a footbridge, which will be opened to public 24 hours a day between Cheung Man Road and the Chai Wan MTR Station Exit D. The proposed alignment is as shown in **Drawing No. 7.1**. With the proposed footbridge, the walking distance of adjacent developments to/from existing MTR Station could be greatly minimized.

7.5.2 At present, the existing staircase does not provide cover and is inconvenient for the elderly, the above proposed footbridge could provide better walking environment for existing pedestrians. Furthermore, the proposed footbridge could provide barrier free access for elderly and disable to access the MTR Station.

7.5.3 The proposed footbridge and the associated lift tower(s) shall be constructed by Civil Engineering and Development Department (as the works agent). The management and maintenance responsibility of the proposed footbridge and the associated lift tower(s) shall rest with the Transport Department and the Highways Department respectively.

7.5.4 Pedestrian assessment has been conducted for existing footbridge, proposed footbridge and existing staircases to recommend the minimum effective width requirement for future design consideration.

Design Width for Proposed Footbridge

7.5.5 As mentioned, the walking distance between the proposed development and Chai Wan MTR Station is relatively short. It is anticipated that majority of the future residents of the proposed development would use the staircases to/from the Chai Wan MTR Station. With the proposed footbridge, these pedestrians trips would be diverted to use the proposed footbridge.

7.5.6 Apart from the pedestrian flows from the proposed development, pedestrians flows from some of the existing developments along Cheung Man Road (i.e. existing school sites, police station and hospital) would also be attracted to the proposed footbridge. At present, these pedestrians either walk via the existing staircases/footpaths of Cheung Man Road or travel to Cheung Man Road by Green Minibus. With the direct connection provided by the proposed footbridge, these pedestrian trips would also be diverted to the proposed footbridge.

7.5.7 The additional pedestrian flows due to existing and proposed developments were then superimposed onto the 2034 design traffic flows (without footbridge) to derive the 2034 design pedestrian forecasts (with footbridge)

2034 Design Pedestrian Flows (with Footbridge) = 2034 Design Pedestrian Flows (without Footbridge) + Existing Development Pedestrian Flows diverted to Proposed Footbridge

7.5.8 Based on the above derivation, the 2034 design pedestrian flows at proposed footbridge are 365 ped/15min and 145 ped/15min at AM and PM peak respectively.

7.5.9 With reference to the flow rate requirement under LOS C, a minimum effective width of 0.8 m (365 ped/15min / 15min / 33ped/m/min) at the footbridge is recommended to cater for the anticipated pedestrian demand.

Min. Effective width = 2034 Design Pedestrian Flows (with Footbridge) / LOS C requirement (i.e 33 ped/min/m).

Existing Footbridge to MTR Chai Wan Station

7.5.10 To assess the pedestrian impact due to the proposed development pedestrian flow at the existing footbridge connecting to exit D of MTR Chai Wan Station, capacity analysis have been conducted for both reference (without proposed development) and design scenarios (with proposed development) in year 2034.

7.5.11 Pedestrian survey has been conducted at the existing footbridge connecting to exit D of MTR Chai Wan Station and results are summarized in **Table 7.4**.

Table 7.4 Operation Performance of Existing Footbridge in 2018

Footpath Section (1)	Total Width (m)	Effective Width (m) (2)	Scenario	Two-way Hourly Pedestrian Flows (in ped/15min)		Two-way Hourly Pedestrian Flow Rate (in ped/min/m) (3)		Level of Service (LOS) (4)	
				AM	PM	AM	PM	AM	PM
Foot bridge at Exit D of Chai Wan Station	3.3	2.3	Existing	95	145	2.8	4.2	A	A

Notes : (1) As shown in Drawing No. 7.1.
(2) Effective width of proposed footpath is defined as the actual width of proposed footpath by excluding the dead widths on both sides.
(3) Two–way pedestrian flow rate = Two-way 15-mins pedestrian flows / 15 min / Effective width of footpath.
(4) Details of Pedestrian Walkway LOS refer to T.P.D.M. Volume 6 Chapter 10 Section 10.4.2.

7.5.12 The 2034 reference and design pedestrian forecast have been derived as follows.

2034 Reference Pedestrian Flows at existing Footbridge at Exit D = 2019 Observed Flow x Growth Factor (0.5% p.a.) for 7 years x Growth Factor (0.4% p.a.) for 8 years

2034 Design Pedestrian Flows at existing Footbridge at Exit D = 2019 Observed Flow x Growth Factor (0.5% p.a.) for 7 years x Growth Factor (0.4% p.a.) for 8 years + Proposed Development Pedestrian Flow + Existing Development Pedestrian Flows diverted to Proposed Footbridge

7.5.13 Based on the above derivation, the 2034 reference and design pedestrian flows and assessment at proposed footbridge are summarized and presented in **Table 7.5**.

Table 7.5 Operation Performance of Existing Footbridge in 2034

Footpath Section (1)	Total Width (m)	Effective Width (m) (2)	Scenario	Two-way Hourly Pedestrian Flows (in ped/15min)		Two-way Hourly Pedestrian Flow Rate (in ped/min/m) (3)		Level of Service (LOS) (4)	
				AM	PM	AM	PM	AM	PM
Foot bridge at Exit D of Chai Wan Station	3.3	2.3	Reference	100	155	2.9	4.5	A	A
			Design	415	265	12.0	7.7	A	A

Note: (1) As shown in Drawing No. 7.1.
(2) Effective width of proposed footpath is defined as the actual width of proposed footpath by excluding the dead widths on both sides.
(3) Two–way pedestrian flow rate = Two-way 15-mins pedestrian flows / 15 min / Effective width of footpath.
(4) Details of Pedestrian Walkway LOS refer to T.P.D.M. Volume 6 Chapter 10 Section 10.4.2.

7.5.14 The above assessment indicated that the existing footbridge connected to footbridge D with operate with ample spare capacity in 2034 at LOS A.

Design Width for Existing Staircase to be maintained (With Footbridge)

7.5.15 Considering the columns will be provided at the existing staircase to support the proposed footbridge, the width of the existing staircase will be further reduced at some localized section. Pedestrian assessment has been conducted to recommend the minimum effective width at these localized section for future design consideration.

7.5.16 Upon the provision of footbridge, it is anticipated that some of the pedestrians will still use the existing staircases. For conservative, it is assumed that all of the existing pedestrians will still use the existing staircase. The design pedestrian flows (without footbridge) in **Table 7.3** would be adopted for assessment.

7.5.17 Based on the above derivation, the 2034 design pedestrian flows at existing staircases are 230 ped/15min and 135 ped/15min at AM and PM peak respectively.

7.5.18 With reference to the flow rate requirement under LOS C, a minimum effective width of 0.5 m (230ped/15min / 15min / 33ped/m/min) at the staircase is recommended to cater for the anticipated pedestrian demand.

Min. Effective width = 2034 Design Pedestrian Flows at Staircases (with Footbridge) / LOS C requirement (i.e. 33 ped/min/m).

7.6 Proposed Pedestrian Crossing

7.6.1 To further enhance the accessibility in the vicinity of the proposed development. It is proposed to provide a cautionary pedestrian crossing at Cheung Man Road near the existing French International School.

7.6.2 The proposed pedestrian crossing together with the proposed traffic measures are illustrated in **Drawing No. 7.2**.

7.6.3 The observed pedestrian flows crossing Cheung Man Road near the existing French International School is 25 ped/15min and 10 ped/15min in AM and PM peak.

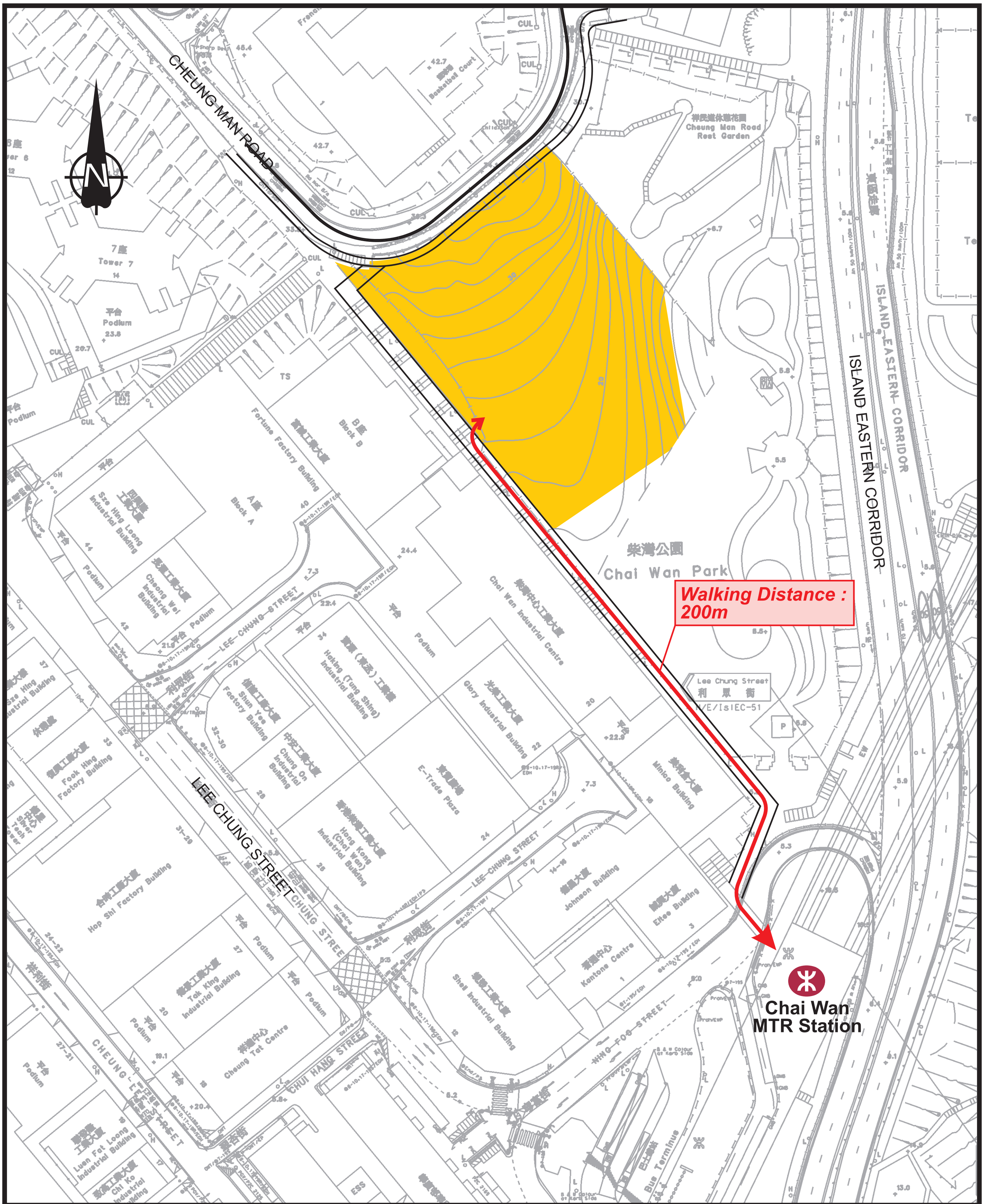
7.6.4 The design pedestrian flows are estimated as follows.

2034 Design Pedestrian Flows at proposed pedestrian crossing = 2019 Observed Flow x Growth Factor (0.5% p.a.) for 7 years x Growth Factor (0.4% p.a.) for 8 years + Existing Development Pedestrian Flows diverted to Proposed Footbridge

7.6.5 Based on the above derivation, the 2034 design pedestrian flows at proposed pedestrian crossing are 160 ped/15min and 20 ped/15min at AM and PM peak respectively.

7.6.6 The proposed pedestrian crossing shall be constructed by Civil Engineering and Development Department (as the works agent). The management and maintenance responsibility of the proposed pedestrian crossing shall rest with the Transport Department and the Highways Department respectively.

7.6.7 The proposed pedestrian crossing would be 2.5m wide. According to Table 3.7.2.1, Chapter 3.7, Vol.2 in TPDM, 2.5m crossing width can facilitate 1,500 – 3,000 pedestrians per hour for both directions. Therefore, the proposed 2.5m wide pedestrian crossing could cater for the anticipated pedestrian flows.



Rev.	Description	Checked	Date	Rev.	Description	Checked	Date
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Project Title

PROPOSED PUBLIC HOUSING DEVELOPMENT AT CHEUNG MAN ROAD, CHAI WAN - TIA

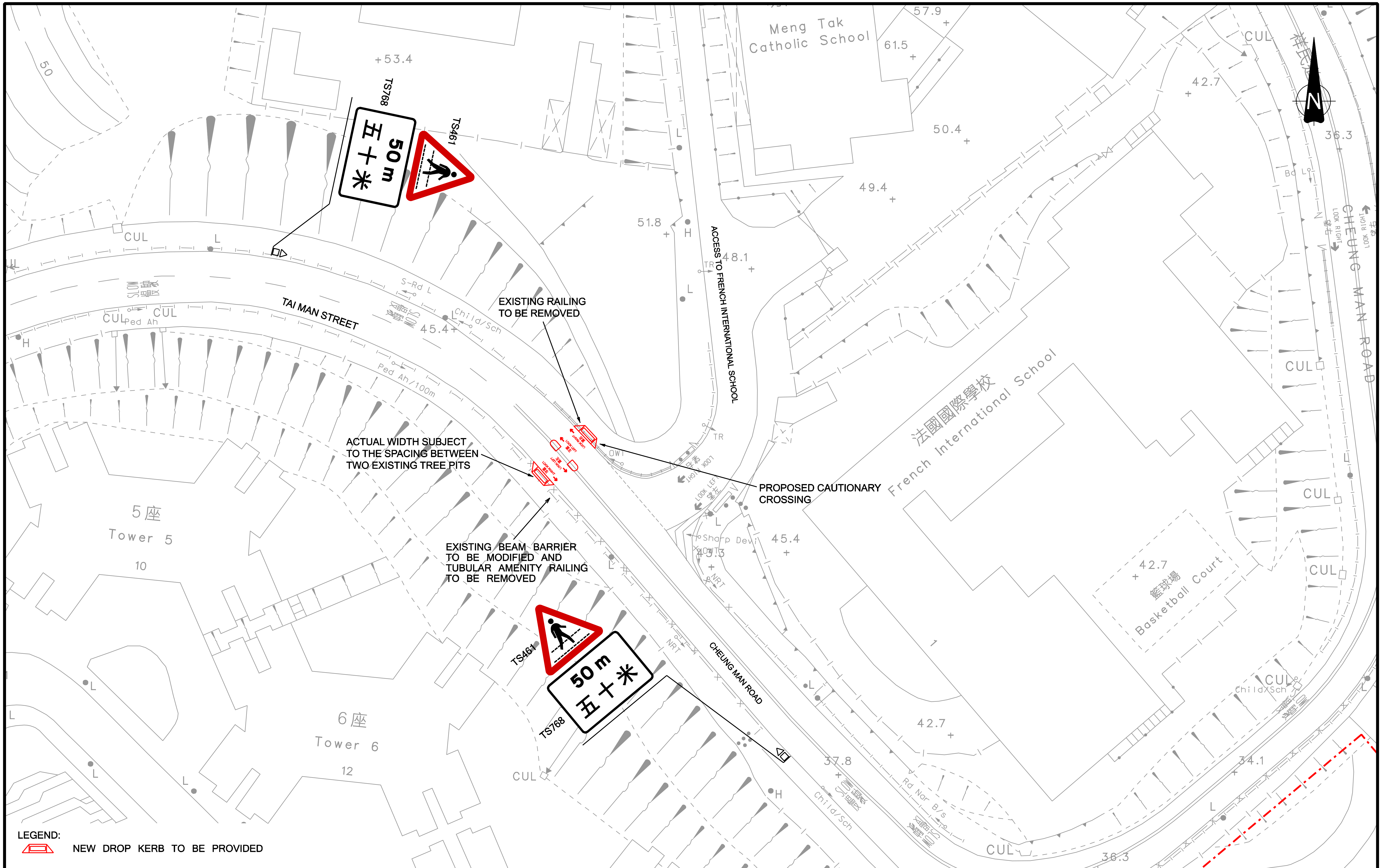
Drawing Title

FUTURE WALKING PATH FROM THE PROPOSED DEVELOPMENT TO CHAI WAN MTR STATION

SYSTRA MVA

Designed	Checked	Scale	Date	Drawing No.	Rev.
HKH	GPH	NTS	NOV 2018	7.1	-

CHK50196317/TIA2/F71.CDR/LLH/28NOV18



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NEW DROP KERB TO BE PROVIDED

Rev.	Description	Checked	Date
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Project Title

PROPOSED PUBLIC HOUSING DEVELOPMENT AT CHEUNG MAN ROAD, CHAI WAN - TIA

Drawing Title

PROPOSED PEDESTRIAN CROSSING AT CHEUNG MAN ROAD / TAI MAN STREET

Designed	Checked	Scale	Date	Drawing No.	Rev.
LAU	GPH	1:500(A3)	APR 2019	7.2	-

SYSTRA MVA

CHK50196317/TIA2/F72.DGN/CKC/25APR19

8. PUBLIC TRANSPORT PROVISION SERVICE

8.1 Existing Arrangement of Public Transport Interchange

8.1.1 There are currently operating bus routes and operating in the vicinity of the proposed development.

8.1.2 Details of the existing public transport services in the vicinity are summarized in **Table 8.1** and illustrated in **Drawings No. 8.1** & **8.2**.

Table 8.1 Existing Public Transport Services in the Vicinity of the Proposed Development

Route	Service	Destinations	Service Hour	Peak Hour Frequency (minutes)
Bus Routes (Drawing No. 8.1)				
Daytime Service Routes				
8	NWFB	Wan Chai North – Heng Fa Chuen	0530-0045	11
8H	NWFB	Siu Sai Wan (Island Resort) – Tung Wah Eastern Hospital	0900-2020	30
8P	NWFB	Wan Chai North – Siu Sai Wan (Island Resort)	0530-0055	4
		Siu Sai Wan (Island Resort) -> Hysan Place	0530-0015	4
8X	CTB	Siu Sai Wan (Island Resort) – Happy Valley (Lower)	0526-0045	5
9	NWFB	Shek O – Shau Kei Wan	0600-0030	15
14	NWFB	Grand Promenade – Stanley Fort (Gate)/ Ma Hang	0820-0000	20
19	CTB	Siu Sai Wan (Island Resort) – Happy Valley (Upper), Tai Hang Road	0540-2330	15
81	NWFB	Lai Tak Tsuen – Hing Wah Estate	0600-0018	15
82	NWFB	Siu Sai Wan (Island Resort) – North Point Ferry Pier	0520-0040	7
82X	NWFB	Siu Sai Wan (Island Resort) – Quarry Bay	0640-2028	9
85	CTB	Siu Sai Wan (Island Resort) – Braemar Hill	0600-2253	10
106	KMB/NWFB	Siu Sai Wan (Island Resort) – Wong Tai Sin	0535-0000	4
118	KMB/CTB	Siu Sai Wan (Island Resort) – Cheung Sha Wan (Sham Mong Road)	0602-0000	4
606	KMB/CTB	Siu Sai Wan (Island Resort) – Choi Wan (Fung Shing Street)	0930-2000	15
682	NWFB	Chai Wan (East) – Ma On Shan (Wu Kai Sha Station)	0540-2350	10
694	NWFB	Siu Sai Wan Estate – Tiu Keng Leng Station	0600-2350	15
780	CTB	Chai Wan (East) – Central (Ferry Piers)	0535-0030	9

Route	Service	Destinations	Service Hour	Peak Hour Frequency (minutes)
788	CTB	Siu Sai Wan (Island Resort) – Central (Macau Ferry)	0530-0030	3
789	CTB	Siu Sai Wan (Island Resort) – Admiralty (Rodney Street)	0625-0030	4
A12	Cityflyer	Siu Sai Wan (Island Resort) - Airport	0530-0010	20
Peaks Only/ Special Departure Routes				
8S	Citybus	Happy Valley Racecourse -> Siu Sai Wan (Island Resort)	-	-
18X	NWFB	Chai Wan Station -> Belcher Bay	-	-
81A	NWFB	Lai Tak Tsuen – Hing Wah Estate	-	-
81S	NWFB	Harmony Garden -> Braemar Hill	-	-
82M	NWFB	Harmony Garden -> Chai Wan Station	-	-
		Chai Wan Station – Siu Sai Wan (Island Resort) (Circular)	-	20
82S	NWFB	Shaukeiwan Plaza -> Siu Sai Wan (Island Resort)	-	-
		Siu Sai Wan (Island Resort) -> Yiu Tung (Wai Hang Street)	-	-
85	Citybus	Siu Sai Wan (Island Resort) – North Point Pier	2230-0000	-
85P	Citybus	Siu Sai Wan (Island Resort) – Braemar Hill	-	-
88X	NWFB	Siu Sai Wan (Island Resort) -> Kennedy Town (Belcher Bay)	-	-
106P	KMB/NWFB	Siu Sai Wan (Island Resort) – Wong Tai Sin	-	-
118P	KMB/Citybus	Siu Sai Wan (Island Resort) –> Cheung Sha Wan (Sham Mong Road)	0718-0835	5
		Cheung Sha Wan (Sham Mong Road) -> Siu Sai Wan (Island Resort)	1655-1855	12
388	NWFB	Chai Wan Station – Buddhist Cemetery (Cape Collinson Road) (Circular)	-	-
389	NWFB	Shau Kei Wan – Buddhist Cemetery (Cape Collinson Road) (Circular)	-	-
606X	KMB/Citybus	Siu Sai Wan (Island Resort) – Kowloon Bay	0610-0910	10
682	NWFB	Lee On Estate -> Chai Wan (East)	-	-
682A	NWFB	Chai Wan (East) – Nai Chung	-	-
682B	NWFB	Chai Wan (East) – Shui Chuen O Estate	-	20
682P	NWFB	Nai Chung -> Chai Wan (East)	-	-
		Wu Kai Sha Station -> Chai Wan (East) (omit Lee On Estate BT)	-	-
		Wu Kai Sha Station -> Chai Wan (East) (via Lee On Estate BT)	-	-
		Lee On Estate -> Chai Wan (East)	-	-
780P	Citybus	Hing Wah Estate -> Central (Ferry Piers)	0715-0835	20

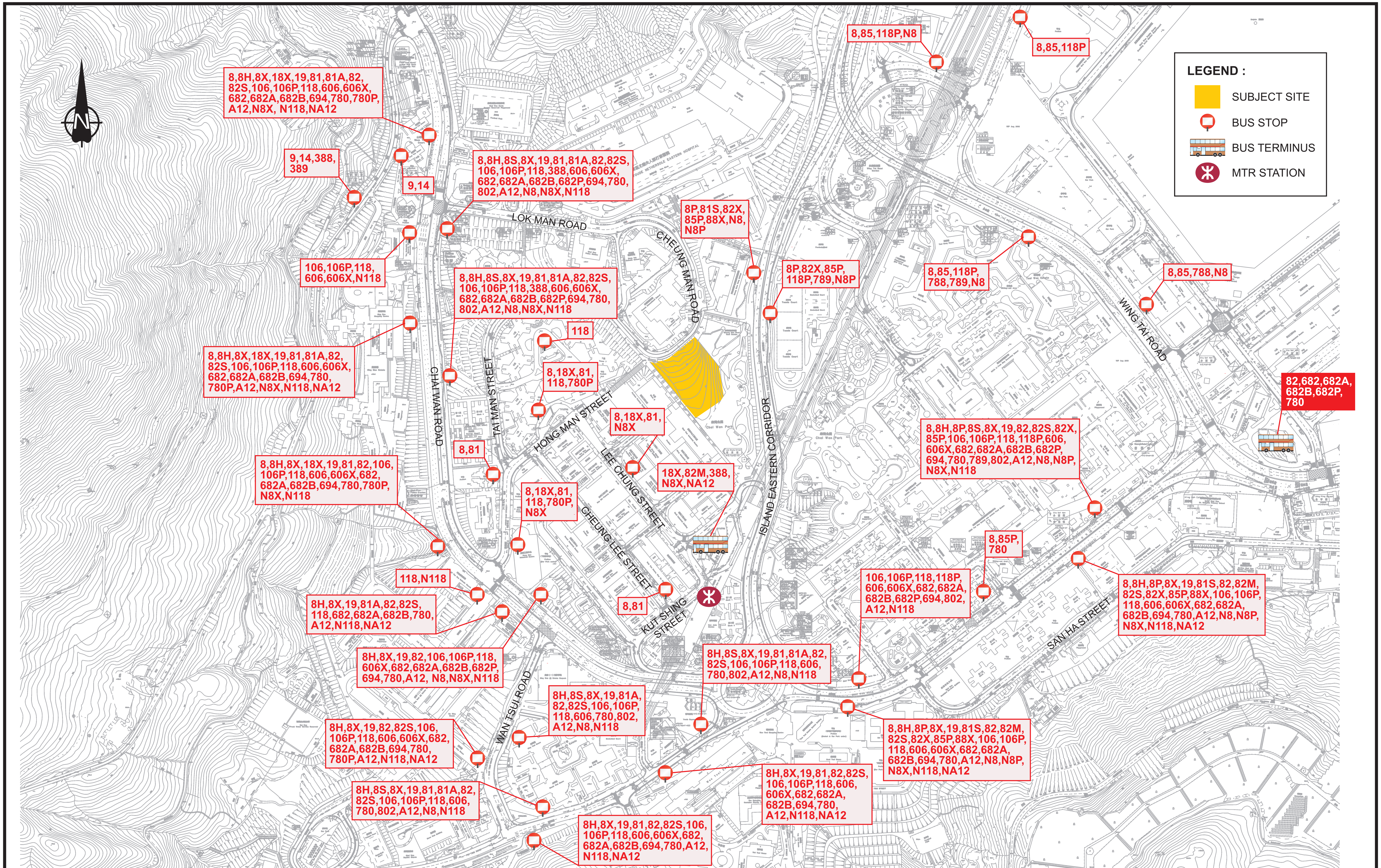
Route	Service	Destinations	Service Hour	Peak Hour Frequency (minutes)
802	KMB/NWFB	Sha Tin Racecourse -> Siu Sai Wan (Island Resort)	-	-
N8	NWFB	Wan Chai North – Heng Fa Chuen	0015-0500	15
N8P	NWFB	Siu Sai Wan (Island Resort) – Wan Chai (Harbour Road)	0035-0540	15
N8X	Citybus	Siu Sai Wan (Island Resort) – Central (Macau Ferry)	0015-0545	30
N118	KMB/Citybus	Siu Sai Wan (Island Resort) – Cheung Sha Wan (Sham Mong Road)	0010-0555	15
NA12	Cityflyer	Siu Sai Wan (Island Resort) -> Airport	-	-
GMB (Drawing No. 8.2)				
Daytime Service Routes				
16M	GMB	Chai Wan Station – Chung Hom Kok	0530-2322	5
16X	GMB	Chai Wan Station – Stanley Village	0545-2330	15
20	GMB	Grand Promenade – Chai Wan Industrial City	0600-2340	7
20M	GMB	Hing Man Estate – Chai Wan Industrial City	0615-0045	6
43M	GMB	Fung Wah Estate – Chai Wan Station	0600-0116	5
47E	GMB	Siu Sai Wan Estate – Pamela Youde Nethersole Eastern Hospital	1000-1700	20
47M	GMB	Siu Sai Wan Estate – Chai Wan Station	0600-0115	2
47S	GMB	Harmony Garden – Chai Wan Station	0600-0000	10
48M	GMB	Eastern Hospital – Chai Wan Station	0612-0000	2
62	GMB	Heng Fa Chuen – Cheerful Garden	0615-0120	6
62A	GMB	Heng Fa Chuen – Island Resort	0615-2330	8
65	GMB	Pamela Youde Nethersole Eastern Hospital – North Point (Fort Street)	0600-0000	5
65A	GMB	Chai Wan (Hong Man Street) – Quarry Bay (Circular)	0830-2045	10
66	GMB	Aldrich Bay – Chai Wan (Wan Tsui Road) (Circular)	0630-2300	8
66A	GMB	Aldrich Bay – Pamela Youde Nethersole Eastern Hospital	0900-2310	8
Peaks Only/ Special Departure Routes				
16A	GMB	Chai Wan Station – Chung Hom Kok (Cheshire Home)	-	-
18M	GMB	Chai Wan Station – Cape Collinson Correctional Institution	-	-
44M	GMB	Siu Sai Wan Estate – Chai Wan Station	0000-0600	15
47M	GMB	Hiu Tsui Court – Chai Wan Station	-	10
		Chai Wan Station -> Chai Wan (Wing Ping Street)	0730-0815	10
61	GMB	Siu Sai Wan (Island Resort) – Mong Kok (Fife Street)	2300-0530	30

Route	Service	Destinations	Service Hour	Peak Hour Frequency (minutes)
MTR (Drawing No. 8.1 & 8.2)				
Island Line	MTRC	Chai Wan Station	0555-0035	1.9

8.1.3 At present, the nearest GMB stop is 48M, which is located away from the proposed development. On the other hand, the proposed footbridge to MTR station is located adjacent to the proposed development. The proposed footbridge could provide direct and weather protected connection to MTR Station. It is anticipated majority of the future residents of the proposed development would use the proposed footbridge to/from the Chai Wan MTR Station and only minimal pedestrian would likely to ride the existing GMB services to/from MTR Station.

8.1.4 Furthermore, with reference to site survey, majority of the GMB vehicles of 48M has only 16 seats. With conversion of 16 seats to 19 seats progressively, the existing capacity of 48M would be enhanced.

8.1.5 With the proposed footbridge, the accessibility to the MTR Chai Wan Station has been greatly enhanced.



Rev.	Description	Checked	Date
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-

Project Title

PROPOSED PUBLIC HOUSING DEVELOPMENT AT CHEUNG MAN ROAD, CHAI WAN - TIA

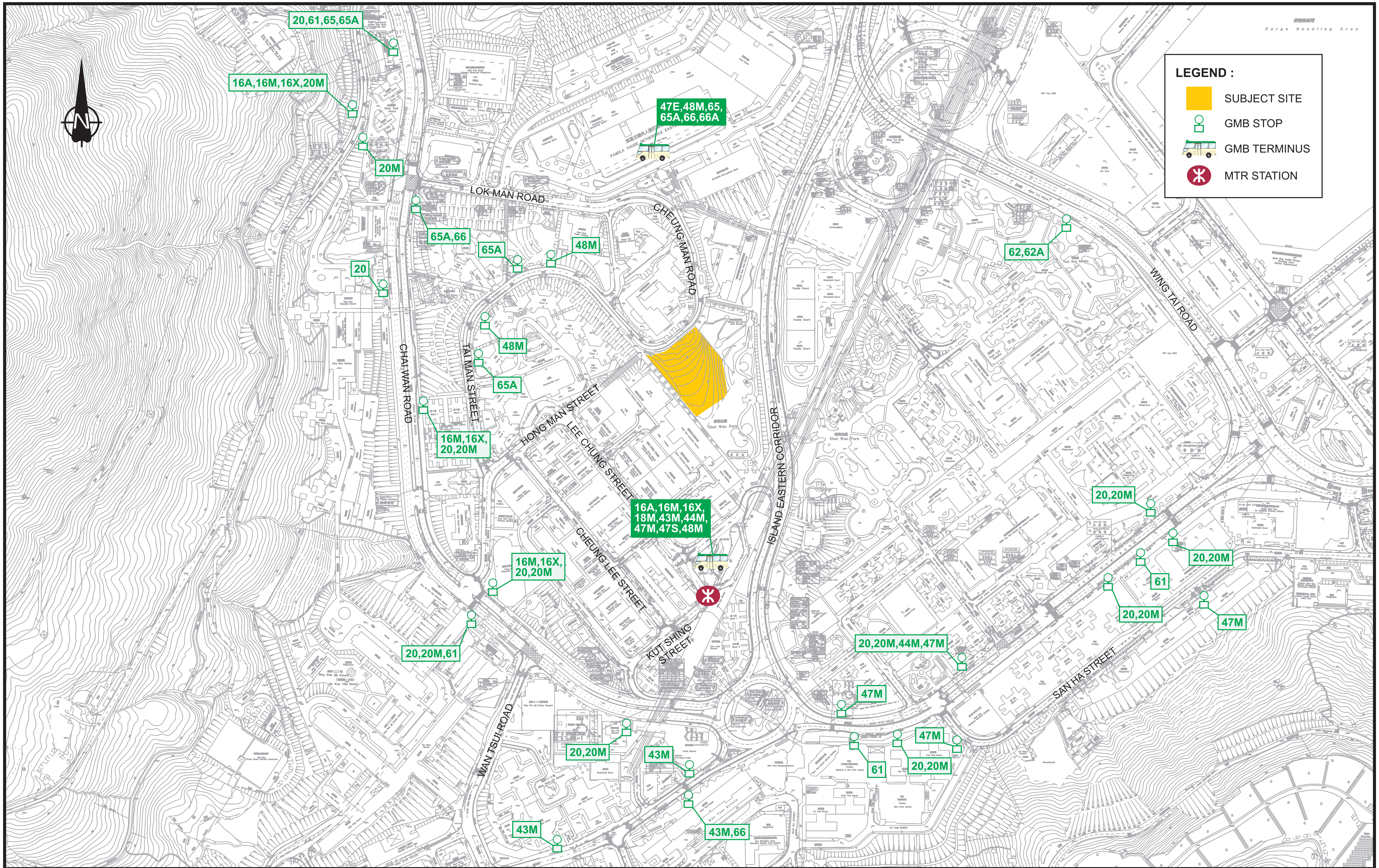
Drawing Title

EXISTING BUS SERVICE IN THE VICINITY OF THE PROPOSED DEVELOPMENT

Designed	Checked	Scale	Date	Drawing No.	Rev.
HKH	GPH	NTS	NOV 2018	8.1	-

SYSTRA MVA

CHK50196317/TIA2/F81.CDR/LLH/28NOV18



Rev.	Description	Checked	Date
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-

Project Title

PROPOSED PUBLIC HOUSING DEVELOPMENT AT CHEUNG MAN ROAD, CHAI WAN - TIA

Drawing Title

EXISTING GMB SERVICE IN THE VICINITY OF THE PROPOSED DEVELOPMENT

Designed	Checked	Scale	Date	Drawing No.	Rev.
HKH	GPH	NTS	NOV 2018	8.2	-

CHK50196317/TIA2/F82.CDR/LLH/28NOV18

9. SUMMARY AND CONCLUSION

9.1 Summary

9.1.1 MVA Hong Kong Limited (MVA) was commissioned by the Hong Kong Housing Authority (HKHA) in 2018 to conduct a Traffic Impact Assessment (TIA) study for Public Housing Development at Cheung Man Road.

9.1.2 The public housing development comprise of 884 flats which is anticipated to be completed by 2031. In conservative approach, an additional 10% allowance had been allowed for the proposed development to cater for future design variation. The traffic impact assessment has been based on 972 flats.

9.1.3 To appraise the existing traffic condition, traffic count surveys were conducted in the surrounding road network of the proposed development in year 2018. Moreover, current operational performance of the critical junctions was assessed with the observed traffic flows. The operational assessment results revealed that all critical junctions and road links are at present operating with ample capacities.

9.1.4 In order to assess the impact of the construction traffic on the local road network, it is necessary to forecast the traffic flows for 2031, the adopted design year, which is the completion year.

<u>Assessment for Road Widening Works</u>

9.1.5 Traffic generation and attraction due to road widening works have been assessed. Assessment of operational performance revealed that all critical junctions and road links will still operate within their capacities in design year 2031 during the road widening works except Junction B - Chai Wan Road/ Lok Man Road and Junction D - Chai Wan Road/ Hong Man Street will operate with less reserve capacities in reference scenario (without road widening works). The reduction of reserve capacities at this stage is mainly due to the background traffic growth. It is anticipated that there would be no significant construction traffic impact at the critical junctions for the road widening works.

9.1.6 Noting that the performance of junction B and Junction D would operate with less reserve capacities during the reference scenario (without road widening works), junction improvement works has been formulated to improve the background traffic condition.

9.1.7 For Junction B, it is proposed modify the junction method control together with the provision of a new traffic island. For Junction D, it is proposed to adjust the pedestrian green time of pedestrian phase to provide additional green time for the vehicular phase.

9.1.8 Junction B and D will operate with ample capacities based on the proposed improvement. It is proposed to implement the proposed junction improvement at Junction B and D before building construction stage.

Assessment for Building Construction Stage

9.1.9 Traffic generation and attraction due to building construction stage have been assessed. Assessment of operational performance revealed that all critical junctions and road links will still operate within their capacities in design year 2031 during the building construction stage except Junction D will operate close to its capacity in design year 2031 in the AM peak.

9.1.10 As mentioned, the proposed improvement at Junction D will be implemented before building construction stage. Based on the proposed improvement, Junction D will operate with ample capacity in design year 2031.

Assessment for Operational Stage

9.1.11 In order to assess the impact of the development related traffic on the local road network for the operational stage, it is necessary to forecast the traffic flows for 2034, the adopted design year, which is 3 years upon completion.

9.1.12 Traffic generation and attraction from the proposed development has been assessed. There are only minimal traffic generation and attraction. It is estimated that the proposed development will generate and attract about 61pcu/hr and 42pcu/hr in the AM peak hour, and generate and attract about 29pcu/hr and 39pcu/hr in the PM peak hour respectively.

9.1.13 Assessment of operational performance revealed that all critical junctions and road links will still operate with ample capacities in design year 2034 except Junction A, B and D. Junction B – Chai Wan Road/Lok Man Road will be overloaded while Junction A - Chai Wan Road/Tai Tam Road and Junction D – Chai Wan Road/Hong Man Street will operate close to their capacities in design year 2034 at the AM peak.

9.1.14 The proposed improvement at Junction A will be implemented before the population intake of the proposed development, while the proposed improvement at Junction B and D will be implemented before building construction stage.

9.1.15 At present, the road section of Cheung Man Road near the project site is not sufficient to accommodate the heavy vehicles turning simultaneously. Therefore, it is proposed to widen the road section to accommodate the maneuvering of 2 long vehicles simultaneously.

Pedestrian Facilities and Public Transport Facilities

9.1.16 Based on the pedestrian assessment, the existing staircases will be operating with ample spare capacity in 2034. Therefore, the existing pedestrian facilities are considered sufficient for the proposed development.

9.1.17 To improve the overall accessibility of the adjacent developments in the districts, it is proposed to provide a footbridge between Cheung Man Road and the Chai Wan MTR Station Exit D. With the proposed footbridge, the walking distance of adjacent developments to/from existing MTR Station could be greatly minimized.

9.1.18 At present, the existing staircase does not provide cover and is inconvenient for the elderly, the above proposed footbridge could provide better walking environment for existing pedestrians. Furthermore, the proposed footbridge could provide barrier free access for elderly and disable to access the MTR Station.

9.1.19 The proposed footbridge and the associated lift tower(s) shall be constructed by Civil Engineering and Development Department (as the works agent). The management and maintenance responsibility of the proposed footbridge and the associated lift tower(s) shall rest with the Transport Department and the Highways Department respectively.

9.1.20 Pedestrian assessment has been conducted for proposed footbridge and existing staircases to recommend the minimum effective width requirement for future design consideration.

9.1.21 To further enhance the accessibility in the vicinity of the proposed development. It is proposed to provide a cautionary pedestrian crossing at Cheung Man Road near the existing French International School.

9.1.22 The proposed pedestrian crossing shall be constructed by Civil Engineering and Development Department (as the works agent). The management and maintenance responsibility of the proposed pedestrian crossing shall rest with the Transport Department and the Highways Department respectively.

9.2 Conclusion

9.2.1 In conclusion, the construction traffic impact assessment has demonstrated that the traffic generated by the construction works can be absorbed by the nearby road network with the proposed improvement measure and its acceptable in traffic terms.

9.2.2 The traffic impact assessment study has demonstrated that the traffic generated by the proposed development with the proposed improvement measures can be absorbed by the nearby road network and would not cause any adverse traffic impact. Hence it can be concluded that the proposed development is acceptable in traffic terms.

Appendix A – Junction Calculation Sheets

2018 Observed Flows

TRAFFIC SIGNALS CALCULATION

Job No.: HK501522 **MVA HONG KONG LIMITED**

Junction: Chai Wan Road / Tai Tam Road Design Year: 2018

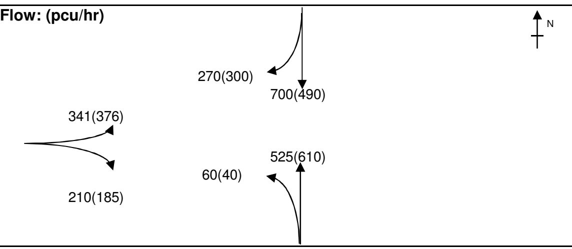
Description: 2018 Observed Traffic Flows Designed By: LAU Checked By: GPH

Approach	Movements	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Gradient (%)	Pro. Turning (%) AM	Pro. Turning (%) PM	Revised Saturation Flow (pcu/hr) AM	Revised Saturation Flow (pcu/hr) PM	AM Peak Flow (pcu/hr)	AM Peak y Value	AM Peak Critical y	PM Peak Flow (pcu/hr)	PM Peak y Value	PM Peak Critical y
Chai Wan Road (SB)		A	1	3.650			3.5			1835	1835	337	0.184		236	0.129	
		A	1	3.650			3.5			1975	1975	363	0.184	0.184	254	0.129	
		A	1	3.650		15	3.5			1795	1795	270	0.150		300	0.167	0.167
Chai Wan Road (NB)		B	2	3.650	15		3.5			1665	1665	60	0.036		40	0.024	
		B	2	3.650			3.5			1975	1975	263	0.133	0.133	305	0.154	0.154
		B	2	3.650			3.5			1975	1975	262	0.133		305	0.154	
Tai Tam Road (EB)*		C	3	3.500	20	25		62% / 38%	67% / 33%	1840	1835	551	0.299	0.299	561	0.306	0.306
Pedestrian Crossing		Dp	1	MIN GREEN + FLASH =			7	+	8	=	15						
		Ep	2,3	MIN GREEN + FLASH =			21	+	10	=	31						
		Fp	3	MIN GREEN + FLASH =			7	+	8	=	15						
		Gp	1,2	MIN GREEN + FLASH =			21	+	12	=	33						

Notes:

* 20m flare lane

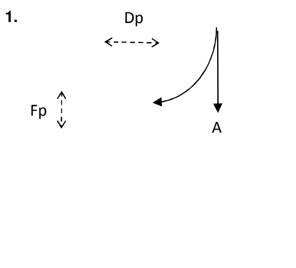
Flow: (pcu/hr)



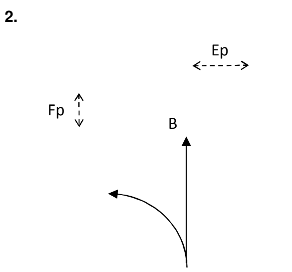
Group	Dp,B,C	A,B,C	Group	Dp,B,C	A,B,C
y	0.433	0.616	y	0.460	0.627
L (sec)	33	16	L (sec)	33	16
C (sec)	110	110	C (sec)	110	110
y pract.	0.630	0.769	y pract.	0.630	0.769
R.C. (%)	46%	25%	R.C. (%)	37%	23%

Stage / Phase Diagrams

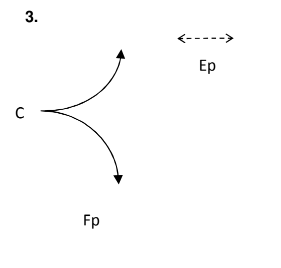
1.



2.



3.



4.

5.

I/G= 6		I/G= 6		I/G= 7		I/G=		I/G=	
I/G= 6		I/G= 6		I/G= 7		I/G=		I/G=	

Date: APR, 2019 **Junction:** Chai Wan Road / Tai Tam Road A

TRAFFIC SIGNALS CALCULATION

Job No.: HK501522 **MVA HONG KONG LIMITED**

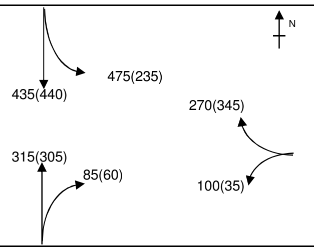
Junction: Chai Wan Road / Lok Man Road Design Year: 2018

Description: 2018 Observed Traffic Flows Designed By: LAU Checked By: GPH

Approach	Movements	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Gradient (%)	Pro. Turning (%) AM	Pro. Turning (%) PM	Revised Saturation Flow (pcu/hr) AM	Revised Saturation Flow (pcu/hr) PM	AM Peak Flow (pcu/hr)	AM Peak y Value	AM Peak Critical y	PM Peak Flow (pcu/hr)	PM Peak y Value	PM Peak Critical y
Chai Wan Road (SB)		A	1	3.500	15					1785	1785	475	0.266	0.266	235	0.132	0.132
		A	1	3.500						2105	2105	218	0.104		220	0.105	
		A	1	3.500						2105	2105	217	0.103		220	0.105	
Chai Wan Road (NB)		B	1	3.000						1915	1915	100	0.052		97	0.051	
		B	1	3.000						2055	2055	108	0.053		104	0.051	
		B	1	3.000						2055	2055	107	0.052		104	0.051	
		C	2	4.000		17				1980	1980	85	0.043	0.043	60	0.030	
Lok Man Road (WB)		D	4	4.000	15	20		27% / 73%	9% / 91%	1865	1870	370	0.198	0.198	380	0.203	0.203
Pedestrian Crossing		Ep	2,3,4	MIN GREEN + FLASH =			6	+	9	=	15						
		Fp	2,3	MIN GREEN + FLASH =			5	+	9	=	14						
		Gp	3	MIN GREEN + FLASH =			7	+	12	=	19			*			*

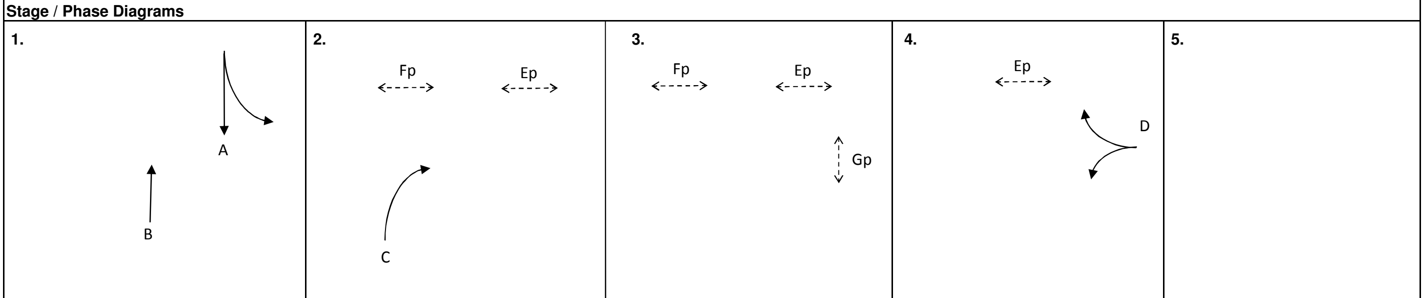
Notes:

Flow: (pcu/hr)



Group	B,C,Gp,D	A,C,Gp,D	Group	B,C,Gp,D	A,C,Gp,D
y	0.294	0.507	y	0.284	0.335
L (sec)	41	39	L (sec)	41	45
C (sec)	110	110	C (sec)	110	110
y pract.	0.565	0.581	y pract.	0.565	0.532
R.C. (%)	92%	14%	R.C. (%)	99%	59%

Stage / Phase Diagrams



I/G= 5		I/G= 5		I/G= 9	19	I/G= 4		I/G=
I/G= 5		I/G= 5	5	I/G= 9	19	I/G= 4		I/G=

Date: APR, 2019 **Junction:** Chai Wan Road / Lok Man Road (B)

TRANSPORT RESEARCH LABORATORY

CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

Visual PICADY 4 ANALYSIS PROGRAM
RELEASE 2.1 (DEC 1998)

THE USER OF THIS COMPUTER PROGRAM FOR THE SOLUTION OF AN ENGINEERING PROBLEM IS
IN NO WAY RELIEVED OF HIS RESPONSIBILITY FOR THE CORRECTNESS OF THE SOLUTION

Run with file:- "o:\lau\CHK50196317_Cheung Man Road\Junctions\JC Hong Ma Street_Tai Man Street\JC_2018OBSAM.vpi" at 20:28:20 on Friday, 22 June 2018

RUN TITLE
****
JC - Hong Man St / Tai Man St (2018OBSAM)

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA

```
MAJOR ROAD (ARM C) --------------------- MAJOR ROAD (ARM A)
                            I
                            I
                            I
                            I
                            I
                            I
                    MINOR ROAD (ARM B)
```

ARM A IS Hong Man St (NB)
ARM B IS Tai Man St (SB)
ARM C IS Hong Man St (WB)

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

ETC.

.GEOMETRIC DATA

DATA ITEM	MINOR ROAD B
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	(W) 10.30 M.
CENTRAL RESERVE WIDTH	(WCR) 0.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B) 3.50 M.
- VISIBILITY	(VC-B) 50.0 M.
- BLOCKS TRAFFIC	NO
MINOR ROAD - VISIBILITY TO LEFT	(VB-C) 50.0 M.
- VISIBILITY TO RIGHT	(VB-A) 50.0 M.
- LANE 1 WIDTH	(WB-C) 2.20 M.
- LANE 2 WIDTH	(WB-A) 2.20 M.

.

.TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 08.00 AND ENDS 09.30

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	2.88	4.31	2.88
ARM B	15.00	45.00	75.00	3.88	5.81	3.88
ARM C	15.00	45.00	75.00	2.81	4.22	2.81

.

TIME	FROM/TO	ARM A	ARM B	ARM C
		TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) / (PERCENTAGE OF H.V.S)		
08.00 - 09.30				
	ARM A	0.000	0.522	0.478
		0.0	120.0	110.0
		(0.0)	(0.1)	(0.1)

```
I                   I        I        I        I        I
I                   I  ARM B  I  0.484 I  0.000 I  0.516 I
I                   I        I  150.0 I    0.0 I  160.0 I
I                   I        I (  0.0)I (  0.0)I (  0.0)I
I                   I        I        I        I        I
I                   I  ARM C  I  0.378 I  0.622 I  0.000 I
I                   I        I   85.0 I  140.0 I    0.0 I
I                   I        I (  0.0)I (  0.0)I (  0.0)I
I                   I        I        I        I        I
----------------------------------------------------------

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

.------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY      GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/   I
I                              (RFC)    (PEDS/MIN)  (VEHS)  (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.00-08.15                                                                                    I
I   B-C       2.00      9.03    0.221                0.0    0.3        4.0                       I
I   B-A       1.88      7.03    0.267                0.0    0.4        5.1                       I
I   C-A       1.06                                                                               I
I   C-B       1.75     10.85    0.161                0.0    0.2        2.8                       I
I   A-B       1.50                                                                               I
I   A-C       1.38                                                                               I
I                                                                                                I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                          I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                  I
I     MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                    I
I      CHANGE:     (.1M)       (.1M)       (.1M)        (M)           (M)                        I
I                                                                                                I
I       B-C         0.098      0.002                                 0.009                       I
I       B-A         0.076      0.005       0.018      0.004          0.007                       I
I       C-B         0.103      0.003                  0.010                                      I
--------------------------------------------------------------------------------------------------

.------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY      GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/   I
I                              (RFC)    (PEDS/MIN)  (VEHS)  (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.15-08.30                                                                                    I
I   B-C       2.39      8.81    0.271                0.3    0.4        5.3                       I
I   B-A       2.24      6.85    0.327                0.4    0.5        6.9                       I
I   C-A       1.27                                                                               I
I   C-B       2.09     10.73    0.195                0.2    0.2        3.5                       I
I   A-B       1.79                                                                               I
I   A-C       1.64                                                                               I
I                                                                                                I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                          I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                  I
I     MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                    I
I      CHANGE:     (.1M)       (.1M)       (.1M)        (M)           (M)                        I
I                                                                                                I
I       B-C         0.096      0.002                                 0.008                       I
I       B-A         0.075      0.006       0.018      0.004          0.007                       I
I       C-B         0.102      0.004                  0.010                                      I
--------------------------------------------------------------------------------------------------

.------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY      GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/   I
I                              (RFC)    (PEDS/MIN)  (VEHS)  (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.30-08.45                                                                                    I
I   B-C       2.92      8.50    0.344                0.4    0.5        7.5                       I
I   B-A       2.74      6.60    0.415                0.5    0.7        9.9                       I
I   C-A       1.55                                                                               I
I   C-B       2.56     10.56    0.242                0.2    0.3        4.6                       I
I   A-B       2.19                                                                               I
I   A-C       2.01                                                                               I
I                                                                                                I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                          I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                  I
I     MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                    I
I      CHANGE:     (.1M)       (.1M)       (.1M)        (M)           (M)                        I
I                                                                                                I
I       B-C         0.092      0.003                                 0.008                       I
I       B-A         0.072      0.007       0.018      0.004          0.006                       I
I       C-B         0.101      0.005                  0.010                                      I
--------------------------------------------------------------------------------------------------

.------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY      GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/   I
I                              (RFC)    (PEDS/MIN)  (VEHS)  (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.45-09.00                                                                                    I
I   B-C       2.92      8.50    0.344                0.5    0.5        7.8                       I
I   B-A       2.74      6.60    0.415                0.7    0.7       10.4                       I
I   C-A       1.55                                                                               I
I   C-B       2.56     10.56    0.242                0.3    0.3        4.8                       I
I   A-B       2.19                                                                               I
I   A-C       2.01                                                                               I
I                                                                                                I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                          I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                  I
I     MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                    I
I      CHANGE:     (.1M)       (.1M)       (.1M)        (M)           (M)                        I
I                                                                                                I
I       B-C         0.092      0.003                                 0.008                       I
I       B-A         0.072      0.007       0.018      0.004          0.006                       I
I       C-B         0.101      0.005                  0.010                                      I
--------------------------------------------------------------------------------------------------

.------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY      GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/   I
I                              (RFC)    (PEDS/MIN)  (VEHS)  (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 09.00-09.15                                                                                    I
I   B-C       2.39      8.80    0.271                0.5    0.4        5.9                       I
I   B-A       2.24      6.85    0.327                0.7    0.5        7.8                       I
I   C-A       1.27                                                                               I
I   C-B       2.09     10.73    0.195                0.3    0.2        3.8                       I
I   A-B       1.79                                                                               I
I   A-C       1.64                                                                               I
```

```
I                                                                                               I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)           (M)                      I
I                                                                                               I
I       B-C         0.096      0.002                                  0.008                     I
I       B-A         0.074      0.006       0.018       0.004          0.007                     I
I       C-B         0.102      0.004                   0.010                                    I
-------------------------------------------------------------------------------------------------

.-------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY     FLOW      QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS)  (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 09.15-09.30                                                                                   I
I  B-C       2.00      9.02    0.222                 0.4    0.3        4.4                      I
I  B-A       1.88      7.03    0.267                 0.5    0.4        5.8                      I
I  C-A       1.06                                                                               I
I  C-B       1.75     10.85    0.161                 0.2    0.2        3.0                      I
I  A-B       1.50                                                                               I
I  A-C       1.38                                                                               I
I                                                                                               I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)           (M)                      I
I                                                                                               I
I       B-C         0.098      0.002                                  0.009                     I
I       B-A         0.076      0.005       0.018       0.004          0.007                     I
I       C-B         0.103      0.003                   0.010                                    I
-------------------------------------------------------------------------------------------------
.
QUEUE FOR STREAM   B-C
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  08.15           0.3
  08.30           0.4
  08.45           0.5    *
  09.00           0.5    *
  09.15           0.4
  09.30           0.3
.
QUEUE FOR STREAM   B-A
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  08.15           0.4
  08.30           0.5
  08.45           0.7    *
  09.00           0.7    *
  09.15           0.5
  09.30           0.4
.
QUEUE FOR STREAM   C-B
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  08.15           0.2
  08.30           0.2
  08.45           0.3
  09.00           0.3
  09.15           0.2
  09.30           0.2
.
                QUEUEING DELAY INFORMATION OVER WHOLE PERIOD
                --------------------------------------------

---------------------------------------------------------------------------
I STREAM I    TOTAL DEMAND  I   * QUEUEING *      I * INCLUSIVE QUEUEING * I
I        I                  I    * DELAY *        I       * DELAY *        I
I        I---------------------------------------------------------------I
I        I  (VEH)   (VEH/H) I  (MIN)     (MIN/VEH) I    (MIN)     (MIN/VEH) I
---------------------------------------------------------------------------
I  B-C   I  219.4 I  146.3 I    34.9 I    0.16   I      34.9  I    0.16   I
I  B-A   I  205.7 I  137.1 I    45.8 I    0.22   I      45.8  I    0.22   I
I  C-A   I  116.6 I   77.7 I         I           I            I           I
I  C-B   I  192.0 I  128.0 I    22.4 I    0.12   I      22.4  I    0.12   I
I  A-B   I  164.5 I  109.7 I         I           I            I           I
I  A-C   I  150.8 I  100.6 I         I           I            I           I
---------------------------------------------------------------------------
I  ALL   I 1049.0 I  699.3 I   103.1 I    0.10   I     103.1  I    0.10   I
---------------------------------------------------------------------------


* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.


END OF JOB
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TRANSPORT RESEARCH LABORATORY

CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

Visual PICADY 4 ANALYSIS PROGRAM
RELEASE 2.1 (DEC 1998)

THE USER OF THIS COMPUTER PROGRAM FOR THE SOLUTION OF AN ENGINEERING PROBLEM IS
IN NO WAY RELIEVED OF HIS RESPONSIBILITY FOR THE CORRECTNESS OF THE SOLUTION

Run with file:- "o:\lau\CHK50196317_Cheung Man Road\Junctions\JC Hong Ma Street_Tai Man Street\JC_2018OBSPM.vpi" at 20:28:23 on Friday, 22 June 2018

RUN TITLE
****
JC - Hong Man St / Tai Man St (2018OBSPM)

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA

```
MAJOR ROAD (ARM C) --------------------- MAJOR ROAD (ARM A)
                             I
                             I
                             I
                             I
                             I
                             I
                      MINOR ROAD (ARM B)
```

ARM A IS Hong Man St (NB)
ARM B IS Tai Man St (SB)
ARM C IS Hong Man St (WB)

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

ETC.

.GEOMETRIC DATA

DATA ITEM		MINOR ROAD B
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	(W)	10.30 M.
CENTRAL RESERVE WIDTH	(WCR)	0.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B)	3.50 M.
- VISIBILITY	(VC-B)	50.0 M.
- BLOCKS TRAFFIC		NO
MINOR ROAD - VISIBILITY TO LEFT	(VB-C)	50.0 M.
- VISIBILITY TO RIGHT	(VB-A)	50.0 M.
- LANE 1 WIDTH	(WB-C)	2.20 M.
- LANE 2 WIDTH	(WB-A)	2.20 M.

.

.TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 17.15 AND ENDS 18.45

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	2.44	3.66	2.44
ARM B	15.00	45.00	75.00	2.06	3.09	2.06
ARM C	15.00	45.00	75.00	2.69	4.03	2.69

.

TIME	FROM/TO	ARM A	ARM B	ARM C
		TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) / (PERCENTAGE OF H.V.S)		
17.15 - 18.45				
	ARM A	0.000	0.385	0.615
		0.0	75.0	120.0
		(0.0)	(0.1)	(0.1)

```
I                    I        I        I        I        I
I                    I  ARM B  I  0.364 I  0.000 I  0.636 I
I                    I        I   60.0 I    0.0 I  105.0 I
I                    I        I (  0.0)I (  0.0)I (  0.0)I
I                    I        I        I        I        I
I                    I  ARM C  I  0.628 I  0.372 I  0.000 I
I                    I        I  135.0 I   80.0 I    0.0 I
I                    I        I (  0.0)I (  0.0)I (  0.0)I
I                    I        I        I        I        I
----------------------------------------------------------

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/   I
I                              (RFC)    (PEDS/MIN)  (VEHS)  (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.15-17.30                                                                                  I
I   B-C       1.31      9.44    0.139                0.0     0.2        2.3                    I
I   B-A       0.75      7.17    0.105                0.0     0.1        1.7                    I
I   C-A       1.69                                                                             I
I   C-B       1.00     10.94    0.091                0.0     0.1        1.5                    I
I   A-B       0.94                                                                             I
I   A-C       1.50                                                                             I
I                                                                                              I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                       I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY               I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                 I
I      CHANGE:     (.1M)       (.1M)       (.1M)        (M)           (M)                      I
I                                                                                              I
I       B-C         0.103      0.002                                 0.009                     I
I       B-A         0.078      0.004       0.018      0.005          0.007                     I
I       C-B         0.104      0.003                  0.011                                    I
------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/   I
I                              (RFC)    (PEDS/MIN)  (VEHS)  (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.30-17.45                                                                                  I
I   B-C       1.57      9.31    0.168                0.2     0.2        2.9                    I
I   B-A       0.90      7.02    0.128                0.1     0.1        2.1                    I
I   C-A       2.02                                                                             I
I   C-B       1.19     10.84    0.110                0.1     0.1        1.8                    I
I   A-B       1.12                                                                             I
I   A-C       1.79                                                                             I
I                                                                                              I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                       I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY               I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                 I
I      CHANGE:     (.1M)       (.1M)       (.1M)        (M)           (M)                      I
I                                                                                              I
I       B-C         0.101      0.002                                 0.009                     I
I       B-A         0.076      0.005       0.018      0.004          0.007                     I
I       C-B         0.103      0.003                  0.010                                    I
------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/   I
I                              (RFC)    (PEDS/MIN)  (VEHS)  (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.45-18.00                                                                                  I
I   B-C       1.92      9.14    0.210                0.2     0.3        3.8                    I
I   B-A       1.10      6.81    0.161                0.1     0.2        2.8                    I
I   C-A       2.47                                                                             I
I   C-B       1.46     10.70    0.137                0.1     0.2        2.3                    I
I   A-B       1.37                                                                             I
I   A-C       2.19                                                                             I
I                                                                                              I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                       I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY               I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                 I
I      CHANGE:     (.1M)       (.1M)       (.1M)        (M)           (M)                      I
I                                                                                              I
I       B-C         0.099      0.003                                 0.009                     I
I       B-A         0.074      0.006       0.018      0.004          0.007                     I
I       C-B         0.102      0.004                  0.010                                    I
------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/   I
I                              (RFC)    (PEDS/MIN)  (VEHS)  (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 18.00-18.15                                                                                  I
I   B-C       1.92      9.14    0.210                0.3     0.3        4.0                    I
I   B-A       1.10      6.81    0.161                0.2     0.2        2.9                    I
I   C-A       2.47                                                                             I
I   C-B       1.46     10.70    0.137                0.2     0.2        2.4                    I
I   A-B       1.37                                                                             I
I   A-C       2.19                                                                             I
I                                                                                              I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                       I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY               I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                 I
I      CHANGE:     (.1M)       (.1M)       (.1M)        (M)           (M)                      I
I                                                                                              I
I       B-C         0.099      0.003                                 0.009                     I
I       B-A         0.074      0.006       0.018      0.004          0.007                     I
I       C-B         0.102      0.004                  0.010                                    I
------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/   I
I                              (RFC)    (PEDS/MIN)  (VEHS)  (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 18.15-18.30                                                                                  I
I   B-C       1.57      9.31    0.168                0.3     0.2        3.1                    I
I   B-A       0.90      7.02    0.128                0.2     0.1        2.3                    I
I   C-A       2.02                                                                             I
I   C-B       1.19     10.84    0.110                0.2     0.1        1.9                    I
I   A-B       1.12                                                                             I
I   A-C       1.79                                                                             I
```

```
I                                                                                               I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I      MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I       CHANGE:     (.1M)       (.1M)       (.1M)        (M)           (M)                      I
I                                                                                               I
I        B-C         0.101      0.002                                  0.009                    I
I        B-A         0.076      0.005       0.018       0.004          0.007                    I
I        C-B         0.103      0.003                   0.010                                   I
-------------------------------------------------------------------------------------------------

.-------------------------------------------------------------------------------------------------
I  TIME       DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW      QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 18.30-18.45                                                                                   I
I   B-C      1.31      9.44    0.139               0.2    0.2        2.5                        I
I   B-A      0.75      7.17    0.105               0.1    0.1        1.8                        I
I   C-A      1.69                                                                               I
I   C-B      1.00     10.94    0.091               0.1    0.1        1.5                        I
I   A-B      0.94                                                                               I
I   A-C      1.50                                                                               I
I                                                                                               I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I      MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I       CHANGE:     (.1M)       (.1M)       (.1M)        (M)           (M)                      I
I                                                                                               I
I        B-C         0.103      0.002                                  0.009                    I
I        B-A         0.078      0.004       0.018       0.005          0.007                    I
I        C-B         0.104      0.003                   0.011                                   I
-------------------------------------------------------------------------------------------------
.
QUEUE FOR STREAM   B-C
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  17.30           0.2
  17.45           0.2
  18.00           0.3
  18.15           0.3
  18.30           0.2
  18.45           0.2
.
QUEUE FOR STREAM   B-A
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  17.30           0.1
  17.45           0.1
  18.00           0.2
  18.15           0.2
  18.30           0.1
  18.45           0.1
.
QUEUE FOR STREAM   C-B
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  17.30           0.1
  17.45           0.1
  18.00           0.2
  18.15           0.2
  18.30           0.1
  18.45           0.1
.
                QUEUEING DELAY INFORMATION OVER WHOLE PERIOD
                --------------------------------------------

---------------------------------------------------------------------------
I STREAM I   TOTAL DEMAND  I   * QUEUEING *      I * INCLUSIVE QUEUEING * I
I        I                 I    * DELAY *        I       * DELAY *        I
I        I-----------------------------------------------------------------I
I        I  (VEH)  (VEH/H) I  (MIN)    (MIN/VEH) I    (MIN)     (MIN/VEH) I
---------------------------------------------------------------------------
I  B-C   I  144.0 I   96.0 I    18.7 I    0.13   I      18.7  I    0.13   I
I  B-A   I   82.3 I   54.8 I    13.5 I    0.16   I      13.5  I    0.16   I
I  C-A   I  185.1 I  123.4 I         I           I            I           I
I  C-B   I  109.7 I   73.1 I    11.4 I    0.10   I      11.4  I    0.10   I
I  A-B   I  102.8 I   68.6 I         I           I            I           I
I  A-C   I  164.5 I  109.7 I         I           I            I           I
---------------------------------------------------------------------------
I  ALL   I  788.4 I  525.6 I    43.6 I    0.06   I      43.6  I    0.06   I
---------------------------------------------------------------------------


* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.


END OF JOB
```

TRAFFIC SIGNALS CALCULATION

Job No.: HK501522 **MVA HONG KONG LIMITED**

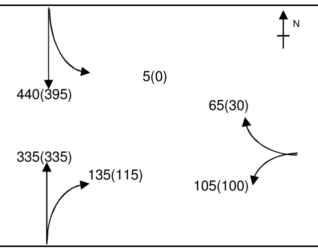
Junction: Chai Wan Road / Hong Man Street Design Year: 2018

Description: 2018 Observed Flow Designed By: LAU Checked By: GPH

Approach	Movements	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Gradient (%)	Pro. Turning (%) AM	Pro. Turning (%) PM	Revised Saturation Flow (pcu/hr) AM	Revised Saturation Flow (pcu/hr) PM	AM Peak Flow (pcu/hr)	AM Peak y Value	AM Peak Critical y	PM Peak Flow (pcu/hr)	PM Peak y Value	PM Peak Critical y
Chai Wan Road (SB)		A	1	3.000	15			2%	0%	1910	1915	214	0.112		191	0.100	0.100
		A	1	3.000						2055	2055	231	0.112	0.112	204	0.099	
Chai Wan Road (NB)		B	1,2	3.500						1965	1965	162	0.082		162	0.082	
		B	1,2	3.500						2105	2105	173	0.082		173	0.082	
		C	2	3.500		15				1915	1915	135	0.070	0.070	115	0.060	0.060
Hong Man Road (WB)		D	4	3.500	25	25		62% / 38%	77% / 23%	1855	1855	170	0.092	0.092	130	0.070	0.070
Pedestrian Crossing		Ep	3	MIN GREEN + FLASH =			36	+	10	=	46			*			*
		Fp	3	MIN GREEN + FLASH =			8	+	7	=	15						

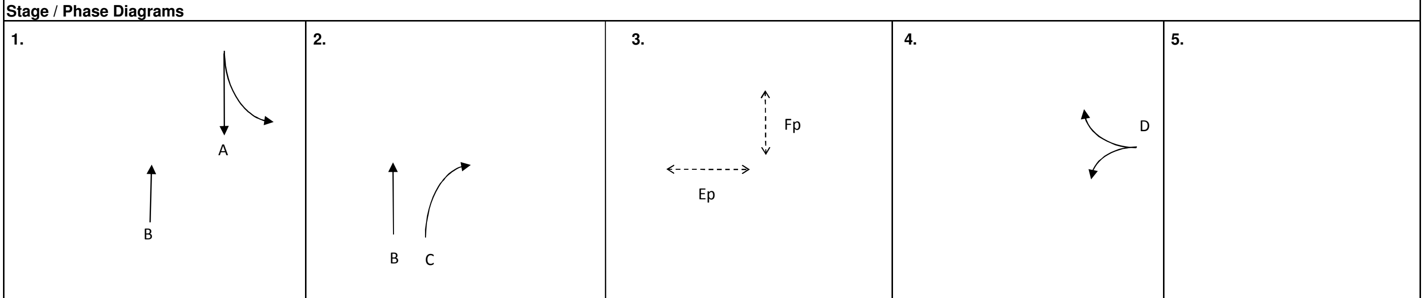
Notes:

Flow: (pcu/hr)



Group	A,C,Fp,D	A,C,Ep,D	Group	A,C,Fp,D	A,C,Ep,D
y	0.275	0.275	y	0.230	0.230
L (sec)	37	62	L (sec)	37	62
C (sec)	110	110	C (sec)	110	110
y pract.	0.597	0.393	y pract.	0.597	0.393
R.C. (%)	118%	43%	R.C. (%)	160%	71%

Stage / Phase Diagrams



I/G= 5		I/G= 5		I/G= 5	46	I/G= 4		I/G=	
I/G= 5		I/G= 5		I/G= 5	46	I/G= 4		I/G=	

Date: APR, 2019 **Junction:** Chai Wan Road / Hong Man Street D

TRANSPORT RESEARCH LABORATORY

CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

Visual PICADY 4 ANALYSIS PROGRAM
RELEASE 2.1 (DEC 1998)

THE USER OF THIS COMPUTER PROGRAM FOR THE SOLUTION OF AN ENGINEERING PROBLEM IS IN NO WAY RELIEVED OF HIS RESPONSIBILITY FOR THE CORRECTNESS OF THE SOLUTION

Run with file:- "o:\lau\Cheung Man Road _20180813\Cheung Man Rd CTIA\Junction 2033\JE Chai Wan Road_Wan Tsui Road\JE_2018OBSAM.vpi" at 16:26:39 on Monday, 13 August 2018

RUN TITLE
****
JE - Chai Wan Road / Wan Tsui Road (2018OBSAM)

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA

```
                    MAJOR ROAD (ARM C) --------------------- MAJOR ROAD (ARM A)
                                                I
                                                I
                                                I
                                                I
                                                I
                                                I
                                          MINOR ROAD (ARM B)
```

ARM A IS Chai Wan Rd (WB)
ARM B IS Wan Tsui Rd (NB)
ARM C IS Chai Wan Rd (EB)

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

ETC.

.GEOMETRIC DATA

DATA ITEM		MINOR ROAD B
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	(W)	17.50 M.
CENTRAL RESERVE WIDTH	(WCR)	3.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B)	3.00 M.
- VISIBILITY	(VC-B)	50.0 M.
- BLOCKS TRAFFIC		NO
MINOR ROAD - VISIBILITY TO LEFT	(VB-C)	50.0 M.
- VISIBILITY TO RIGHT	(VB-A)	50.0 M.
- LANE 1 WIDTH	(WB-C)	3.10 M.
- LANE 2 WIDTH	(WB-A)	3.10 M.

.

.TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 08.00 AND ENDS 09.30

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	4.31	6.47	4.31
ARM B	15.00	45.00	75.00	3.13	4.69	3.13
ARM C	15.00	45.00	75.00	7.63	11.44	7.63

.

TIME	FROM/TO	ARM A	ARM B	ARM C
		TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) / (PERCENTAGE OF H.V.S)		
08.00 - 09.30				
	ARM A	0.000	0.232	0.768
		0.0	80.0	265.0
		(0.0)	(0.0)	(0.0)

```
I                    I        I        I        I        I
I                    I  ARM B  I  0.180 I  0.000 I  0.820 I
I                    I        I   45.0 I    0.0 I  205.0 I
I                    I        I (  0.0)I (  0.0)I (  0.0)I
I                    I        I        I        I        I
I                    I  ARM C  I  0.746 I  0.254 I  0.000 I
I                    I        I  455.0 I  155.0 I    0.0 I
I                    I        I (  0.0)I (  0.0)I (  0.0)I
I                    I        I        I        I        I
-----------------------------------------------------------

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

.-------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/    PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                               (RFC)     (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.00-08.15                                                                                     I
I   B-C       2.56     10.37    0.247                  0.0    0.3        4.7                      I
I   B-A       0.56      8.10    0.069                  0.0    0.1        1.1                      I
I   C-A       5.69                                                                                I
I   C-B       1.94     10.38    0.187                  0.0    0.2        3.3                      I
I   A-B       1.00                                                                                I
I   A-C       3.31                                                                                I
I                                                                                                 I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                          I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                  I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                    I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)          (M)                         I
I                                                                                                 I
I       B-C          0.103      0.004                                 0.010                       I
I       B-A          0.080      0.011       0.019       0.005         0.008                       I
I       C-B          0.104      0.005                   0.010                                     I
--------------------------------------------------------------------------------------------------

.-------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/    PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                               (RFC)     (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.15-08.30                                                                                     I
I   B-C       3.06     10.24    0.299                  0.3    0.4        6.1                      I
I   B-A       0.67      7.86    0.085                  0.1    0.1        1.4                      I
I   C-A       6.79                                                                                I
I   C-B       2.31     10.27    0.225                  0.2    0.3        4.2                      I
I   A-B       1.19                                                                                I
I   A-C       3.96                                                                                I
I                                                                                                 I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                          I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                  I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                    I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)          (M)                         I
I                                                                                                 I
I       B-C          0.101      0.005                                 0.010                       I
I       B-A          0.078      0.013       0.019       0.005         0.008                       I
I       C-B          0.103      0.006                   0.010                                     I
--------------------------------------------------------------------------------------------------

.-------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/    PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                               (RFC)     (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.30-08.45                                                                                     I
I   B-C       3.75     10.05    0.373                  0.4    0.6        8.5                      I
I   B-A       0.82      7.54    0.109                  0.1    0.1        1.8                      I
I   C-A       8.32                                                                                I
I   C-B       2.83     10.12    0.280                  0.3    0.4        5.6                      I
I   A-B       1.46                                                                                I
I   A-C       4.84                                                                                I
I                                                                                                 I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                          I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                  I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                    I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)          (M)                         I
I                                                                                                 I
I       B-C          0.100      0.006                                 0.010                       I
I       B-A          0.075      0.015       0.019       0.005         0.007                       I
I       C-B          0.101      0.007                   0.010                                     I
--------------------------------------------------------------------------------------------------

.-------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/    PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                               (RFC)     (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.45-09.00                                                                                     I
I   B-C       3.75     10.05    0.373                  0.6    0.6        8.8                      I
I   B-A       0.82      7.54    0.109                  0.1    0.1        1.8                      I
I   C-A       8.32                                                                                I
I   C-B       2.83     10.12    0.280                  0.4    0.4        5.8                      I
I   A-B       1.46                                                                                I
I   A-C       4.84                                                                                I
I                                                                                                 I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                          I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                  I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                    I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)          (M)                         I
I                                                                                                 I
I       B-C          0.100      0.006                                 0.010                       I
I       B-A          0.075      0.015       0.019       0.005         0.007                       I
I       C-B          0.101      0.007                   0.010                                     I
--------------------------------------------------------------------------------------------------

.-------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/    PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                               (RFC)     (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 09.00-09.15                                                                                     I
I   B-C       3.06     10.24    0.299                  0.6    0.4        6.7                      I
I   B-A       0.67      7.86    0.085                  0.1    0.1        1.4                      I
I   C-A       6.79                                                                                I
I   C-B       2.31     10.27    0.225                  0.4    0.3        4.5                      I
I   A-B       1.19                                                                                I
I   A-C       3.96                                                                                I
```

```
I                                                                                               I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I      MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I       CHANGE:     (.1M)       (.1M)       (.1M)         (M)           (M)                     I
I                                                                                               I
I        B-C         0.101      0.005                                 0.010                     I
I        B-A         0.078      0.013       0.019      0.005          0.008                     I
I        C-B         0.103      0.006                  0.010                                    I
-------------------------------------------------------------------------------------------------

.-------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 09.15-09.30                                                                                   I
I   B-C       2.56     10.37    0.247                0.4    0.3        5.1                      I
I   B-A       0.56      8.10    0.069                0.1    0.1        1.2                      I
I   C-A       5.69                                                                              I
I   C-B       1.94     10.38    0.187                0.3    0.2        3.6                      I
I   A-B       1.00                                                                              I
I   A-C       3.31                                                                              I
I                                                                                               I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I      MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I       CHANGE:     (.1M)       (.1M)       (.1M)         (M)           (M)                     I
I                                                                                               I
I        B-C         0.103      0.004                                 0.010                     I
I        B-A         0.080      0.011       0.019      0.005          0.008                     I
I        C-B         0.104      0.005                  0.010                                    I
-------------------------------------------------------------------------------------------------
.
QUEUE FOR STREAM   B-C
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  08.15           0.3
  08.30           0.4
  08.45           0.6    *
  09.00           0.6    *
  09.15           0.4
  09.30           0.3
.
QUEUE FOR STREAM   B-A
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  08.15           0.1
  08.30           0.1
  08.45           0.1
  09.00           0.1
  09.15           0.1
  09.30           0.1
.
QUEUE FOR STREAM   C-B
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  08.15           0.2
  08.30           0.3
  08.45           0.4
  09.00           0.4
  09.15           0.3
  09.30           0.2
.
                QUEUEING DELAY INFORMATION OVER WHOLE PERIOD
                --------------------------------------------

---------------------------------------------------------------------------
I STREAM I   TOTAL DEMAND  I   * QUEUEING *      I * INCLUSIVE QUEUEING * I
I        I                 I    * DELAY *        I       * DELAY *        I
I        I---------------------------------------------------------------I
I        I  (VEH)   (VEH/H) I  (MIN)    (MIN/VEH) I    (MIN)     (MIN/VEH) I
---------------------------------------------------------------------------
I  B-C   I  281.1 I  187.4 I    39.9 I    0.14   I      39.9  I    0.14   I
I  B-A   I   61.7 I   41.1 I     8.6 I    0.14   I       8.6  I    0.14   I
I  C-A   I  623.9 I  415.9 I         I           I            I           I
I  C-B   I  212.5 I  141.7 I    27.0 I    0.13   I      27.0  I    0.13   I
I  A-B   I  109.7 I   73.1 I         I           I            I           I
I  A-C   I  363.4 I  242.2 I         I           I            I           I
---------------------------------------------------------------------------
I  ALL   I 1652.3 I 1101.5 I    75.5 I    0.05   I      75.5  I    0.05   I
---------------------------------------------------------------------------


* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.


END OF JOB
```

TRANSPORT RESEARCH LABORATORY

CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

Visual PICADY 4 ANALYSIS PROGRAM
RELEASE 2.1 (DEC 1998)

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Run with file:- "o:\lau\Cheung Man Road _20180813\Cheung Man Rd CTIA\Junction 2033\JE Chai Wan Road_Wan Tsui Road\JE_2018OBSAM.vpi" at 16:26:39 on Monday, 13 August 2018

RUN TITLE
****
JE - Chai Wan Road / Wan Tsui Road (2018OBSAM)

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA

```
MAJOR ROAD (ARM C) --------------------- MAJOR ROAD (ARM A)
                             I
                             I
                             I
                             I
                             I
                             I
                      MINOR ROAD (ARM B)
```

ARM A IS Chai Wan Rd (WB)
ARM B IS Wan Tsui Rd (NB)
ARM C IS Chai Wan Rd (EB)

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

ETC.

.GEOMETRIC DATA

DATA ITEM	MINOR ROAD B	
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	(W)	17.50 M.
CENTRAL RESERVE WIDTH	(WCR)	3.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B)	3.00 M.
- VISIBILITY	(VC-B)	50.0 M.
- BLOCKS TRAFFIC		NO
MINOR ROAD - VISIBILITY TO LEFT	(VB-C)	50.0 M.
- VISIBILITY TO RIGHT	(VB-A)	50.0 M.
- LANE 1 WIDTH	(WB-C)	3.10 M.
- LANE 2 WIDTH	(WB-A)	3.10 M.

.

.TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 08.00 AND ENDS 09.30

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN: FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN): BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	4.31	6.47	4.31
ARM B	15.00	45.00	75.00	3.13	4.69	3.13
ARM C	15.00	45.00	75.00	7.63	11.44	7.63

.

TIME	TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) / (PERCENTAGE OF H.V.S) FROM/TO	ARM A	ARM B	ARM C
08.00 - 09.30				
	ARM A	0.000	0.232	0.768
		0.0	80.0	265.0
		(0.0)	(0.0)	(0.0)

```
I                   I         I         I         I         I
I                   I  ARM B  I  0.180 I  0.000 I  0.820 I
I                   I         I   45.0 I    0.0 I  205.0 I
I                   I         I (  0.0)I (  0.0)I (  0.0)I
I                   I         I         I         I         I
I                   I  ARM C  I  0.746 I  0.254 I  0.000 I
I                   I         I  455.0 I  155.0 I    0.0 I
I                   I         I (  0.0)I (  0.0)I (  0.0)I
I                   I         I         I         I         I
-----------------------------------------------------------
```

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

```
.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY      GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/   I
I                              (RFC)    (PEDS/MIN)  (VEHS)  (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.00-08.15                                                                                    I
I  B-C      2.56    10.37    0.247                0.0    0.3       4.7                          I
I  B-A      0.56     8.10    0.069                0.0    0.1       1.1                          I
I  C-A      5.69                                                                                 I
I  C-B      1.94    10.38    0.187                0.0    0.2       3.3                          I
I  A-B      1.00                                                                                 I
I  A-C      3.31                                                                                 I
I                                                                                                I
I                 EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                           I
I                           MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                   I
I     MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                    I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)            (M)                      I
I                                                                                                I
I      B-C         0.103     0.004                                   0.010                      I
I      B-A         0.080     0.011       0.019       0.005           0.008                      I
I      C-B         0.104     0.005                   0.010                                      I
-------------------------------------------------------------------------------------------------
```

```
.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY      GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/   I
I                              (RFC)    (PEDS/MIN)  (VEHS)  (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.15-08.30                                                                                    I
I  B-C      3.06    10.24    0.299                0.3    0.4       6.1                          I
I  B-A      0.67     7.86    0.085                0.1    0.1       1.4                          I
I  C-A      6.79                                                                                 I
I  C-B      2.31    10.27    0.225                0.2    0.3       4.2                          I
I  A-B      1.19                                                                                 I
I  A-C      3.96                                                                                 I
I                                                                                                I
I                 EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                           I
I                           MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                   I
I     MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                    I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)            (M)                      I
I                                                                                                I
I      B-C         0.101     0.005                                   0.010                      I
I      B-A         0.078     0.013       0.019       0.005           0.008                      I
I      C-B         0.103     0.006                   0.010                                      I
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I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY      GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/   I
I                              (RFC)    (PEDS/MIN)  (VEHS)  (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.30-08.45                                                                                    I
I  B-C      3.75    10.05    0.373                0.4    0.6       8.5                          I
I  B-A      0.82     7.54    0.109                0.1    0.1       1.8                          I
I  C-A      8.32                                                                                 I
I  C-B      2.83    10.12    0.280                0.3    0.4       5.6                          I
I  A-B      1.46                                                                                 I
I  A-C      4.84                                                                                 I
I                                                                                                I
I                 EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                           I
I                           MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                   I
I     MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                    I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)            (M)                      I
I                                                                                                I
I      B-C         0.100     0.006                                   0.010                      I
I      B-A         0.075     0.015       0.019       0.005           0.007                      I
I      C-B         0.101     0.007                   0.010                                      I
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.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY      GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/   I
I                              (RFC)    (PEDS/MIN)  (VEHS)  (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.45-09.00                                                                                    I
I  B-C      3.75    10.05    0.373                0.6    0.6       8.8                          I
I  B-A      0.82     7.54    0.109                0.1    0.1       1.8                          I
I  C-A      8.32                                                                                 I
I  C-B      2.83    10.12    0.280                0.4    0.4       5.8                          I
I  A-B      1.46                                                                                 I
I  A-C      4.84                                                                                 I
I                                                                                                I
I                 EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                           I
I                           MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                   I
I     MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                    I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)            (M)                      I
I                                                                                                I
I      B-C         0.100     0.006                                   0.010                      I
I      B-A         0.075     0.015       0.019       0.005           0.007                      I
I      C-B         0.101     0.007                   0.010                                      I
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I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY      GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/   I
I                              (RFC)    (PEDS/MIN)  (VEHS)  (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 09.00-09.15                                                                                    I
I  B-C      3.06    10.24    0.299                0.6    0.4       6.7                          I
I  B-A      0.67     7.86    0.085                0.1    0.1       1.4                          I
I  C-A      6.79                                                                                 I
I  C-B      2.31    10.27    0.225                0.4    0.3       4.5                          I
I  A-B      1.19                                                                                 I
I  A-C      3.96                                                                                 I
```

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I                                                                                                I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                   I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)          (M)                        I
I                                                                                                I
I       B-C         0.101      0.005                                  0.010                      I
I       B-A         0.078      0.013        0.019       0.005         0.008                      I
I       C-B         0.103      0.006                    0.010                                    I
--------------------------------------------------------------------------------------------------

.-------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 09.15-09.30                                                                                    I
I   B-C       2.56     10.37    0.247                0.4    0.3        5.1                       I
I   B-A       0.56      8.10    0.069                0.1    0.1        1.2                       I
I   C-A       5.69                                                                               I
I   C-B       1.94     10.38    0.187                0.3    0.2        3.6                       I
I   A-B       1.00                                                                               I
I   A-C       3.31                                                                               I
I                                                                                                I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                   I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)          (M)                        I
I                                                                                                I
I       B-C         0.103      0.004                                  0.010                      I
I       B-A         0.080      0.011        0.019       0.005         0.008                      I
I       C-B         0.104      0.005                    0.010                                    I
--------------------------------------------------------------------------------------------------
.
QUEUE FOR STREAM   B-C
------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  08.15           0.3
  08.30           0.4
  08.45           0.6    *
  09.00           0.6    *
  09.15           0.4
  09.30           0.3
.
QUEUE FOR STREAM   B-A
------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  08.15           0.1
  08.30           0.1
  08.45           0.1
  09.00           0.1
  09.15           0.1
  09.30           0.1
.
QUEUE FOR STREAM   C-B
------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  08.15           0.2
  08.30           0.3
  08.45           0.4
  09.00           0.4
  09.15           0.3
  09.30           0.2
.
                QUEUEING DELAY INFORMATION OVER WHOLE PERIOD
                --------------------------------------------

---------------------------------------------------------------------------
I STREAM I   TOTAL DEMAND  I   * QUEUEING *      I * INCLUSIVE QUEUEING * I
I        I                 I    * DELAY *        I       * DELAY *        I
I        I--------------------------------------------------------------I
I        I  (VEH)  (VEH/H) I  (MIN)    (MIN/VEH) I    (MIN)     (MIN/VEH) I
---------------------------------------------------------------------------
I  B-C   I  281.1 I  187.4 I    39.9 I    0.14   I      39.9  I    0.14   I
I  B-A   I   61.7 I   41.1 I     8.6 I    0.14   I       8.6  I    0.14   I
I  C-A   I  623.9 I  415.9 I         I           I            I           I
I  C-B   I  212.5 I  141.7 I    27.0 I    0.13   I      27.0  I    0.13   I
I  A-B   I  109.7 I   73.1 I         I           I            I           I
I  A-C   I  363.4 I  242.2 I         I           I            I           I
---------------------------------------------------------------------------
I  ALL   I 1652.3 I 1101.5 I    75.5 I    0.05   I      75.5  I    0.05   I
---------------------------------------------------------------------------


* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.


END OF JOB
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TRANSPORT RESEARCH LABORATORY

CAPACITIES, QUEUES AND DELAYS AT ROUNDABOUTS

Visual ARCADY 4 ANALYSIS PROGRAM
RELEASE 2.1 (OCT 1998)

THE USER OF THIS COMPUTER PROGRAM FOR THE SOLUTION OF AN ENGINEERING PROBLEM IS IN NO WAY RELIEVED OF HIS RESPONSIBILITY FOR THE CORRECTNESS OF THE SOLUTION

Run with file:- "o:\lau\Cheung Man Road _20180813\Cheung Man Rd CTIA\Junction 2033\JF Chai Wan Road Roundabout\JF_2018OBSAM.vai" at 16:27:45 on Monday, 13 August 2018

.ROUNDABOUT CAPACITY AND DELAY
****

RUN TITLE
****
JF- Chai Wan Road / Island Eastern Corridor / Wan Tsui Road (2018OBSAM)

.INPUT DATA
****
ARM A - Island Eastern Corrodor
ARM B - Chai Wan Road (east of roundabout)
ARM C - Wan Tsui Road
ARM D - Chai Wan Road (west of roundabout)

.GEOMETRIC DATA

ARM	V (M)	E (M)	L (M)	R (M)	D (M)	PHI (DEG)	SLOPE	INTERCEPT (PCU/MIN)
ARM A	7.30	7.30	1.00	100.00	80.00	0.0	0.626	42.145
ARM B	7.30	7.30	1.00	50.00	80.00	0.0	0.620	41.784
ARM C	7.00	7.00	1.00	25.00	80.00	3.0	0.589	39.008
ARM D	10.50	10.50	1.00	50.00	80.00	0.0	0.782	60.101

.TRAFFIC DEMAND DATA

.TIME PERIOD BEGINS 08.00 AND ENDS 09.30
.LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

.DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	9.81	14.72	9.81
ARM B	15.00	45.00	75.00	10.06	15.09	10.06
ARM C	15.00	45.00	75.00	4.50	6.75	4.50
ARM D	15.00	45.00	75.00	13.44	20.16	13.44

TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) / (PERCENTAGE OF H.V.S)

TIME	FROM/TO	ARM A	ARM B	ARM C	ARM D
08.00 - 09.30	ARM A	0.299	0.274	0.255	0.172
		235.0	215.0	200.0	135.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM B	0.447	0.130	0.255	0.168
		360.0	105.0	205.0	135.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM C	0.361	0.583	0.000	0.056
		130.0	210.0	0.0	20.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM D	0.391	0.391	0.135	0.084
		420.0	420.0	145.0	90.0
		(0.0)	(0.0)	(0.0)	(0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

. QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.00-08.15								
ARM A	9.81	34.57	0.284		0.0	0.4	5.8	
ARM B	10.06	35.56	0.283		0.0	0.4	5.8	
ARM C	4.50	31.22	0.144		0.0	0.2	2.5	
ARM D	13.44	49.96	0.269		0.0	0.4	5.4	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.15-08.30								
ARM A	11.72	33.09	0.354		0.4	0.5	8.1	
ARM B	12.02	34.34	0.350		0.4	0.5	7.9	
ARM C	5.37	29.69	0.181		0.2	0.2	3.3	
ARM D	16.05	47.97	0.334		0.4	0.5	7.4	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.30-08.45								
ARM A	14.35	31.06	0.462		0.5	0.9	12.5	
ARM B	14.72	32.67	0.451		0.5	0.8	12.0	
ARM C	6.58	27.60	0.238		0.2	0.3	4.6	
ARM D	19.65	45.25	0.434		0.5	0.8	11.3	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.45-09.00								
ARM A	14.35	31.05	0.462		0.9	0.9	12.8	
ARM B	14.72	32.65	0.451		0.8	0.8	12.2	
ARM C	6.58	27.59	0.239		0.3	0.3	4.7	
ARM D	19.65	45.24	0.434		0.8	0.8	11.5	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
09.00-09.15								
ARM A	11.72	33.07	0.354		0.9	0.6	8.4	
ARM B	12.02	34.32	0.350		0.8	0.5	8.3	
ARM C	5.37	29.67	0.181		0.3	0.2	3.4	
ARM D	16.05	47.95	0.335		0.8	0.5	7.7	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
09.15-09.30								
ARM A	9.81	34.55	0.284		0.6	0.4	6.1	
ARM B	10.06	35.54	0.283		0.5	0.4	6.0	
ARM C	4.50	31.19	0.144		0.2	0.2	2.6	
ARM D	13.44	49.93	0.269		0.5	0.4	5.6	

.QUEUE AT ARM A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.15	0.4	
08.30	0.5	*
08.45	0.9	*
09.00	0.9	*
09.15	0.6	*
09.30	0.4	

.QUEUE AT ARM B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.15	0.4	
08.30	0.5	*
08.45	0.8	*
09.00	0.8	*
09.15	0.5	*
09.30	0.4	

.QUEUE AT ARM C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
08.15	0.2
08.30	0.2
08.45	0.3
09.00	0.3
09.15	0.2
09.30	0.2

.QUEUE AT ARM D

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.15	0.4	
08.30	0.5	*
08.45	0.8	*

09.00	0.8	*
09.15	0.5	*
09.30	0.4	

.

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

ARM	TOTAL DEMAND		* QUEUEING * * DELAY *		* INCLUSIVE QUEUEING * * DELAY *	
	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
A	1076.4	717.6	53.7	0.05	53.7	0.05
B	1103.8	735.9	52.2	0.05	52.2	0.05
C	493.6	329.1	21.0	0.04	21.0	0.04
D	1474.1	982.7	48.9	0.03	48.9	0.03
ALL	4147.9	2765.3	175.8	0.04	175.8	0.04

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD.
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

TRANSPORT RESEARCH LABORATORY

CAPACITIES, QUEUES AND DELAYS AT ROUNDABOUTS

Visual ARCADY 4 ANALYSIS PROGRAM
RELEASE 2.1 (OCT 1998)

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Run with file:- "o:\lau\Cheung Man Road _20180813\Cheung Man Rd CTIA\Junction 2033\JF Chai Wan Road Roundabout\JF_2018OBSPM.vai" at 16:27:48 on Monday, 13 August 2018

.ROUNDABOUT CAPACITY AND DELAY
****

RUN TITLE
****
JF- Chai Wan Road / Island Eastern Corridor / Wan Tsui Road (2018OBSPM)

.INPUT DATA
****
ARM A - Island Eastern Corrodor
ARM B - Chai Wan Road (east of roundabout)
ARM C - Wan Tsui Road
ARM D - Chai Wan Road (west of roundabout)

.GEOMETRIC DATA

ARM	V (M)	E (M)	L (M)	R (M)	D (M)	PHI (DEG)	SLOPE	INTERCEPT (PCU/MIN)
ARM A	7.30	7.30	1.00	100.00	80.00	0.0	0.626	42.145
ARM B	7.30	7.30	1.00	50.00	80.00	0.0	0.620	41.784
ARM C	7.00	7.00	1.00	25.00	80.00	3.0	0.589	39.008
ARM D	10.50	10.50	1.00	50.00	80.00	0.0	0.782	60.101

.TRAFFIC DEMAND DATA

.TIME PERIOD BEGINS 17.15 AND ENDS 18.45
.LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

.DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	11.25	16.88	11.25
ARM B	15.00	45.00	75.00	10.63	15.94	10.63
ARM C	15.00	45.00	75.00	5.00	7.50	5.00
ARM D	15.00	45.00	75.00	14.44	21.66	14.44

TIME	FROM/TO	ARM A	ARM B	ARM C	ARM D
		TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) / (PERCENTAGE OF H.V.S)			
17.15 - 18.45					
	ARM A	0.222	0.361	0.222	0.194
		200.0	325.0	200.0	175.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM B	0.459	0.082	0.318	0.141
		390.0	70.0	270.0	120.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM C	0.300	0.650	0.013	0.038
		120.0	260.0	5.0	15.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM D	0.450	0.342	0.108	0.100
		520.0	395.0	125.0	115.0
		(0.0)	(0.0)	(0.0)	(0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

. QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
17.15-17.30								
ARM A	11.25	34.57	0.325		0.0	0.5	7.1	
ARM B	10.63	35.44	0.300		0.0	0.4	6.3	
ARM C	5.00	31.15	0.161		0.0	0.2	2.8	
ARM D	14.44	49.91	0.289		0.0	0.4	6.0	

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 I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
 I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/     (VEH.MIN/   I
 I                                (RFC)   (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
 I 17.30-17.45                                                                                  I
 I ARM A      13.43     33.09   0.406                  0.5    0.7       10.0                     I
 I ARM B      12.69     34.20   0.371                  0.4    0.6        8.7                     I
 I ARM C       5.97     29.60   0.202                  0.2    0.3        3.7                     I
 I ARM D      17.24     47.92   0.360                  0.4    0.6        8.3                     I
 I                                                                                              I
 -----------------------------------------------------------------------------------------------
.-----------------------------------------------------------------------------------------------
 I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
 I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/     (VEH.MIN/   I
 I                                (RFC)   (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
 I 17.45-18.00                                                                                  I
 I ARM A      16.45     31.06   0.530                  0.7    1.1       16.3                     I
 I ARM B      15.54     32.50   0.478                  0.6    0.9       13.3                     I
 I ARM C       7.31     27.50   0.266                  0.3    0.4        5.3                     I
 I ARM D      21.11     45.18   0.467                  0.6    0.9       12.9                     I
 I                                                                                              I
 -----------------------------------------------------------------------------------------------
.-----------------------------------------------------------------------------------------------
 I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
 I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/     (VEH.MIN/   I
 I                                (RFC)   (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
 I 18.00-18.15                                                                                  I
 I ARM A      16.45     31.05   0.530                  1.1    1.1       16.8                     I
 I ARM B      15.54     32.48   0.478                  0.9    0.9       13.7                     I
 I ARM C       7.31     27.48   0.266                  0.4    0.4        5.4                     I
 I ARM D      21.11     45.17   0.467                  0.9    0.9       13.1                     I
 I                                                                                              I
 -----------------------------------------------------------------------------------------------
.-----------------------------------------------------------------------------------------------
 I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
 I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/     (VEH.MIN/   I
 I                                (RFC)   (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
 I 18.15-18.30                                                                                  I
 I ARM A      13.43     33.07   0.406                  1.1    0.7       10.5                     I
 I ARM B      12.69     34.18   0.371                  0.9    0.6        9.1                     I
 I ARM C       5.97     29.58   0.202                  0.4    0.3        3.9                     I
 I ARM D      17.24     47.89   0.360                  0.9    0.6        8.6                     I
 I                                                                                              I
 -----------------------------------------------------------------------------------------------
.-----------------------------------------------------------------------------------------------
 I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
 I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/     (VEH.MIN/   I
 I                                (RFC)   (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
 I 18.30-18.45                                                                                  I
 I ARM A      11.25     34.55   0.326                  0.7    0.5        7.4                     I
 I ARM B      10.63     35.42   0.300                  0.6    0.4        6.5                     I
 I ARM C       5.00     31.12   0.161                  0.3    0.2        2.9                     I
 I ARM D      14.44     49.88   0.289                  0.6    0.4        6.2                     I
 I                                                                                              I
 -----------------------------------------------------------------------------------------------

.QUEUE AT ARM A
 -------------

  TIME SEGMENT   NO. OF
   ENDING      VEHICLES
               IN QUEUE

   17.30           0.5
   17.45           0.7  *
   18.00           1.1  *
   18.15           1.1  *
   18.30           0.7  *
   18.45           0.5

.QUEUE AT ARM B
 -------------

  TIME SEGMENT   NO. OF
   ENDING      VEHICLES
               IN QUEUE

   17.30           0.4
   17.45           0.6  *
   18.00           0.9  *
   18.15           0.9  *
   18.30           0.6  *
   18.45           0.4

.QUEUE AT ARM C
 -------------

  TIME SEGMENT   NO. OF
   ENDING      VEHICLES
               IN QUEUE

   17.30           0.2
   17.45           0.3
   18.00           0.4
   18.15           0.4
   18.30           0.3
   18.45           0.2

.QUEUE AT ARM D
 -------------

  TIME SEGMENT   NO. OF
   ENDING      VEHICLES
               IN QUEUE

   17.30           0.4
   17.45           0.6  *
   18.00           0.9  *
```

18.15	0.9	*
18.30	0.6	*
18.45	0.4	

.

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

ARM	TOTAL DEMAND (VEH)	TOTAL DEMAND (VEH/H)	* QUEUEING * * DELAY * (MIN)	* QUEUEING * * DELAY * (MIN/VEH)	* INCLUSIVE QUEUEING * * DELAY * (MIN)	* INCLUSIVE QUEUEING * * DELAY * (MIN/VEH)
A	1234.1	822.7	68.1	0.06	68.1	0.06
B	1165.5	777.0	57.6	0.05	57.6	0.05
C	548.5	365.7	24.1	0.04	24.1	0.04
D	1583.7	1055.8	55.1	0.03	55.1	0.03
ALL	4531.9	3021.2	204.8	0.05	204.8	0.05

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD.
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

TRANSPORT RESEARCH LABORATORY

CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

Visual PICADY 4 ANALYSIS PROGRAM
RELEASE 2.1 (DEC 1998)

THE USER OF THIS COMPUTER PROGRAM FOR THE SOLUTION OF AN ENGINEERING PROBLEM IS IN NO WAY RELIEVED OF HIS RESPONSIBILITY FOR THE CORRECTNESS OF THE SOLUTION

Run with file:- "o:\jtc\Junction 2034\JG Hong Man Street_Lee Chung Street\JG_2018OBSAM.vpi" at 11:56:12 on Monday, 25 February 2019

RUN TITLE
****
JG - Hong Man St / Lee Chung St (2018OBSAM)

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA

```
MAJOR ROAD (ARM C) --------------------- MAJOR ROAD (ARM A)
                               I
                               I
                               I
                               I
                               I
                               I
                        MINOR ROAD (ARM B)
```

ARM A IS Hong Man St (NB)
ARM B IS Lee Chung St (SB)
ARM C IS Hong Man St (WB)

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

ETC.

.GEOMETRIC DATA

DATA ITEM	MINOR ROAD B
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	(W) 20.00 M.
CENTRAL RESERVE WIDTH	(WCR) 0.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B) 2.20 M.
- VISIBILITY	(VC-B) 250.0 M.
- BLOCKS TRAFFIC	NO
MINOR ROAD - VISIBILITY TO LEFT	(VB-C) 75.0 M.
- VISIBILITY TO RIGHT	(VB-A) 250.0 M.
- LANE 1 WIDTH	(WB-C) 5.00 M.
- LANE 2 WIDTH	(WB-A) 5.00 M.

.

.TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 08.00 AND ENDS 09.30

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	0.00	0.00	0.00
ARM B	15.00	45.00	75.00	0.50	0.75	0.50
ARM C	15.00	45.00	75.00	4.13	6.19	4.13

.

TIME	TURNING PROPORTIONS TURNING COUNTS (VEH/HR) (PERCENTAGE OF H.V.S) FROM/TO	ARM A	ARM B	ARM C
08.00 - 09.30				
	ARM A	0.000	0.000	0.000
		???????	???????	???????
		(0.0)	(0.0)	(0.0)

```
I                    I         I        I        I        I
I                    I  ARM B  I  1.000 I  0.000 I  0.000 I
I                    I         I   40.0 I    0.0 I    0.0 I
I                    I         I (  0.0)I (  0.0)I (  0.0)I
I                    I         I        I        I        I
I                    I  ARM C  I  1.000 I  0.000 I  0.000 I
I                    I         I  330.0 I    0.0 I    0.0 I
I                    I         I (  0.0)I (  0.0)I (  0.0)I
I                    I         I        I        I        I
-----------------------------------------------------------

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.00-08.15                                                                                   I
I   B-C       0.00     14.06    0.000                 0.0    0.0        0.0                     I
I   B-A       0.50     12.21    0.041                 0.0    0.0        0.6                     I
I   C-A       4.13                                                                              I
I   C-B       0.00     10.89    0.000                 0.0    0.0        0.0                     I
I   A-B       0.00                                                                              I
I   A-C       0.00                                                                              I
I                                                                                               I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I      MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I       CHANGE:      (.1M)       (.1M)      (.1M)        (M)           (M)                      I
I                                                                                               I
I        B-C          0.129      0.000                                0.012                     I
I        B-A          0.102      0.004       0.028      0.008         0.010                     I
I        C-B          0.130      0.000                  0.010                                   I
-------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.15-08.30                                                                                   I
I   B-C       0.00     14.03    0.000                 0.0    0.0        0.0                     I
I   B-A       0.60     12.14    0.049                 0.0    0.1        0.8                     I
I   C-A       4.93                                                                              I
I   C-B       0.00     10.89    0.000                 0.0    0.0        0.0                     I
I   A-B       0.00                                                                              I
I   A-C       0.00                                                                              I
I                                                                                               I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I      MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I       CHANGE:      (.1M)       (.1M)      (.1M)        (M)           (M)                      I
I                                                                                               I
I        B-C          0.129      0.000                                0.012                     I
I        B-A          0.101      0.005       0.028      0.008         0.010                     I
I        C-B          0.130      0.000                  0.010                                   I
-------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.30-08.45                                                                                   I
I   B-C       0.00     13.99    0.000                 0.0    0.0        0.0                     I
I   B-A       0.73     12.05    0.061                 0.1    0.1        0.9                     I
I   C-A       6.03                                                                              I
I   C-B       0.00     10.89    0.000                 0.0    0.0        0.0                     I
I   A-B       0.00                                                                              I
I   A-C       0.00                                                                              I
I                                                                                               I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I      MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I       CHANGE:      (.1M)       (.1M)      (.1M)        (M)           (M)                      I
I                                                                                               I
I        B-C          0.128      0.000                                0.012                     I
I        B-A          0.100      0.006       0.028      0.008         0.010                     I
I        C-B          0.130      0.000                  0.010                                   I
-------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.45-09.00                                                                                   I
I   B-C       0.00     13.99    0.000                 0.0    0.0        0.0                     I
I   B-A       0.73     12.05    0.061                 0.1    0.1        1.0                     I
I   C-A       6.03                                                                              I
I   C-B       0.00     10.89    0.000                 0.0    0.0        0.0                     I
I   A-B       0.00                                                                              I
I   A-C       0.00                                                                              I
I                                                                                               I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I      MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I       CHANGE:      (.1M)       (.1M)      (.1M)        (M)           (M)                      I
I                                                                                               I
I        B-C          0.128      0.000                                0.012                     I
I        B-A          0.100      0.006       0.028      0.008         0.010                     I
I        C-B          0.130      0.000                  0.010                                   I
-------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 09.00-09.15                                                                                   I
I   B-C       0.00     14.03    0.000                 0.0    0.0        0.0                     I
I   B-A       0.60     12.14    0.049                 0.1    0.1        0.8                     I
I   C-A       4.93                                                                              I
I   C-B       0.00     10.89    0.000                 0.0    0.0        0.0                     I
I   A-B       0.00                                                                              I
I   A-C       0.00                                                                              I
```

```
I                                                                                               I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I      MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR)  TO RIGHT                 I
I       CHANGE:     (.1M)       (.1M)       (.1M)         (M)            (M)                    I
I                                                                                               I
I         B-C         0.129     0.000                                  0.012                    I
I         B-A         0.101     0.005       0.028      0.008           0.010                    I
I         C-B         0.130     0.000                  0.010                                    I
-------------------------------------------------------------------------------------------------

.-------------------------------------------------------------------------------------------------
I  TIME       DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END        DELAY     GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE     (VEH.MIN/       (VEH.MIN/  I
I                               (RFC)     (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 09.15-09.30                                                                                   I
I   B-C        0.00     14.06    0.000                0.0    0.0         0.0                    I
I   B-A        0.50     12.21    0.041                0.1    0.0         0.7                    I
I   C-A        4.13                                                                             I
I   C-B        0.00     10.89    0.000                0.0    0.0         0.0                    I
I   A-B        0.00                                                                             I
I   A-C        0.00                                                                             I
I                                                                                               I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I      MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR)  TO RIGHT                 I
I       CHANGE:     (.1M)       (.1M)       (.1M)         (M)            (M)                    I
I                                                                                               I
I         B-C         0.129     0.000                                  0.012                    I
I         B-A         0.102     0.004       0.028      0.008           0.010                    I
I         C-B         0.130     0.000                  0.010                                    I
-------------------------------------------------------------------------------------------------
.
QUEUE FOR STREAM   B-C
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  08.15           0.0
  08.30           0.0
  08.45           0.0
  09.00           0.0
  09.15           0.0
  09.30           0.0
.
QUEUE FOR STREAM   B-A
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  08.15           0.0
  08.30           0.1
  08.45           0.1
  09.00           0.1
  09.15           0.1
  09.30           0.0
.
QUEUE FOR STREAM   C-B
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  08.15           0.0
  08.30           0.0
  08.45           0.0
  09.00           0.0
  09.15           0.0
  09.30           0.0
.
                QUEUEING DELAY INFORMATION OVER WHOLE PERIOD
                --------------------------------------------

---------------------------------------------------------------------------
I STREAM I   TOTAL DEMAND  I   * QUEUEING *      I * INCLUSIVE QUEUEING * I
I        I                 I    * DELAY *        I       * DELAY *        I
I        I--------------------------------------------------------------- I
I        I  (VEH)  (VEH/H) I  (MIN)    (MIN/VEH) I    (MIN)     (MIN/VEH) I
---------------------------------------------------------------------------
I  B-C   I    0.0 I    0.0 I     0.0 I   0.00    I       0.0  I    0.00   I
I  B-A   I   54.8 I   36.6 I     4.7 I   0.09    I       4.7  I    0.09   I
I  C-A   I  452.5 I  301.7 I         I           I            I           I
I  C-B   I    0.0 I    0.0 I     0.0 I   0.00    I       0.0  I    0.00   I
I  A-B   I    0.0 I    0.0 I         I           I            I           I
I  A-C   I    0.0 I    0.0 I         I           I            I           I
---------------------------------------------------------------------------
I  ALL   I  507.3 I  338.2 I     4.7 I   0.01    I       4.7  I    0.01   I
---------------------------------------------------------------------------


* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.


END OF JOB
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TRAFFIC SIGNALS CALCULATION

Job No.: CHK50196317 **MVA HONG KONG LIMITED**

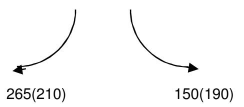
Junction: Ning Foo St/ Lee Chung St Design Year: 2018

Description: 2018 Obs Flow Designed By: HKH Checked By: GPH

Approach	Movements	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Gradient (%)	Pro. Turning (%) AM	Pro. Turning (%) PM	Revised Saturation Flow (pcu/hr) AM	Revised Saturation Flow (pcu/hr) PM	AM Peak Flow (pcu/hr)	AM Peak y Value	AM Peak Critical y	PM Peak Flow (pcu/hr)	PM Peak y Value	PM Peak Critical y
Ning Foo St (WB)		A	1	5.000		20				1965	1965	265	0.135		210	0.107	
Ning Foo St (WB)		A	1	5.000	15					1925	1925	150	0.078	0.078	190	0.099	0.099
Pedestrian Crossing		Bp	2	MIN GREEN + FLASH =			5	+	5	=	10			*			*
		Cp	2	MIN GREEN + FLASH =			5	+	5	=	10						

Notes:

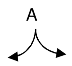
Flow: (pcu/hr)



Group	A,Bp	A,Bp	Group	A,Bp	A,Bp
y	0.078	0.078	y	0.099	0.099
L (sec)	16	16	L (sec)	16	16
C (sec)	60	60	C (sec)	60	60
y pract.	0.660	0.660	y pract.	0.660	0.660
R.C. (%)	747.0%	747.0%	R.C. (%)	569%	569%

Stage / Phase Diagrams

1.



2.

3.

4.

5.

I/G= 3		I/G= 4	10	I/G=		I/G=		I/G=	
I/G= 3		I/G= 4	10	I/G=		I/G=		I/G=	

Date: APR, 2019 **Junction:** Ning Foo St/ Lee Chung St (H)

2031 Reference Flows

TRAFFIC SIGNALS CALCULATION

Job No.: HK501522 **MVA HONG KONG LIMITED**

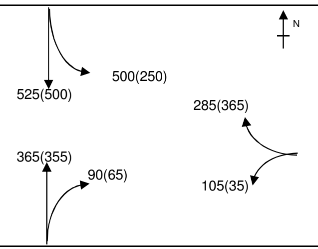
Junction: Chai Wan Road / Lok Man Road Design Year: 2031

Description: 2031 Reference Traffic Flows (Construction) Designed By: LAU Checked By: GPH

Approach	Movements	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Gradient (%)	Pro. Turning (%) AM	Pro. Turning (%) PM	Revised Saturation Flow (pcu/hr) AM	Revised Saturation Flow (pcu/hr) PM	AM Peak Flow (pcu/hr)	AM Peak y Value	AM Peak Critical y	PM Peak Flow (pcu/hr)	PM Peak y Value	PM Peak Critical y
Chai Wan Road (SB)		A	1	3.500	15					1785	1785	500	0.280	0.280	250	0.140	0.140
		A	1	3.500						2105	2105	263	0.125		250	0.119	
		A	1	3.500						2105	2105	262	0.124		250	0.119	
Chai Wan Road (NB)		B	1	3.000						1915	1915	116	0.061		113	0.059	
		B	1	3.000						2055	2055	125	0.061		121	0.059	
		B	1	3.000						2055	2055	124	0.060		121	0.059	
		C	2	3.000		17				1890	1890	90	0.048	0.048	65	0.034	0.034
Lok Man Road (WB)		D	4	4.000	15	20		27% / 73%	9% / 91%	1865	1870	390	0.209	0.209	400	0.214	0.214
Pedestrian Crossing		Ep	2,3,4	MIN GREEN + FLASH =			6	+	9	=	15						
		Fp	2,3	MIN GREEN + FLASH =			5	+	9	=	14						
		Gp	3	MIN GREEN + FLASH =			7	+	12	=	19			*			*

Notes:

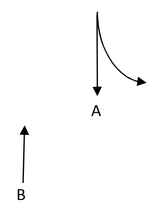
Flow: (pcu/hr)



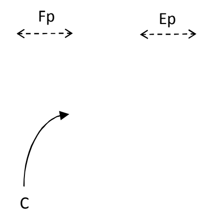
Group	B,C,Gp,D	A,C,Gp,D	Group	B,C,Gp,D	A,C,Gp,D
y	0.318	0.537	y	0.307	0.388
L (sec)	41	39	L (sec)	41	39
C (sec)	110	110	C (sec)	110	110
y pract.	0.565	0.581	y pract.	0.565	0.581
R.C. (%)	78%	8%	R.C. (%)	84%	50%

Stage / Phase Diagrams

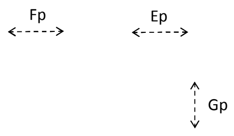
1.



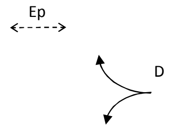
2.



3.



4.



5.

I/G= 5		I/G= 5		I/G= 9	19	I/G= 4		I/G=	
I/G= 5		I/G= 5		I/G= 9	19	I/G= 4		I/G=	

Date: APR, 2019 **Junction:** B Chai Wan Road / Lok Man Road

TRAFFIC SIGNALS CALCULATION

Job No.: HK501522 **MVA HONG KONG LIMITED**

Junction: Chai Wan Road / Lok Man Road — Design Year: 2031

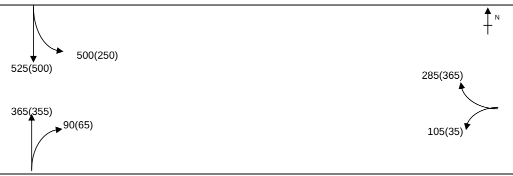
Description: 2031 Reference Traffic Flows (Road Widening)(Pedestrian Green)(IMP) — Designed By: LAU — Checked By: GPH

Approach	Movements	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Gradient (%)	Pro. Turning (%) AM	Pro. Turning (%) PM	Nearside 0/1	Opposing 0/1	Site Factor	Add Saturation Flow (pcu/hr)	Saturation Flow (pcu/hr)	Total Saturation Flow (pcu/hr)	Revised Saturation Flow (pcu/hr) AM	Revised Saturation Flow (pcu/hr) PM	AM Peak Flow (pcu/hr)	AM Peak y Value	AM Peak Critical y	PM Peak Flow (pcu/hr)	PM Peak y Value	PM Peak Critical y
Chai Wan Road (SB)		A2	1,4	3.500	15					1		1	0	1965	1965	1785	1785	500	0.280		250	0.140	
		A1	1	3.500						0		1	0	2105	4210	2105	2105	263	0.125	0.125	250	0.119	0.119
		A1	1	3.500						0		1	0	2105		2105	2105	262	0.124		250	0.119	
Chai Wan Road (NB)		B	1	3.000						1		1	0	1915	6025	1915	1915	116	0.061		113	0.059	
		B	1	3.000						0		1	0	2055		2055	2055	125	0.061		121	0.059	
		B	1	3.000						0		1	0	2055		2055	2055	124	0.060		121	0.059	
		C	2	3.000		17				0	0	1	0	2055	2055	1890	1890	90	0.048	0.048	65	0.034	0.034
Lok Man Street (WB)		D	4	4.000	15	20		27% / 73%	9% / 91%	1	0	1	0	2015	2015	1865	1870	390	0.209	0.209	400	0.214	0.214

Pedestrian Crossing	Phase	Stage							AM Critical y	PM Critical y
	Ep	2,3	MIN GREEN + FLASH =	6	+	10	=	16		
	Fp	2,3	MIN GREEN + FLASH =	5	+	9	=	14		
	Gp	3	MIN GREEN + FLASH =	7	+	12	=	19	*	*

Notes:

Flow: (pcu/hr)



Group	B,C,Gp,D	A1,C,Gp,D	Group	B,C,Gp,D	A1,C,Gp,D
y	0.318	0.382	y	0.307	0.367
L (sec)	41	39	L (sec)	41	39
C (sec)	110	110	C (sec)	110	110
y pract.	0.565	0.581	y pract.	0.565	0.581
R.C. (%)	78%	52%	R.C. (%)	84%	58%

Stage / Phase Diagrams

I/G= 5	I/G= 5	I/G= 9	19	I/G= 4	I/G=
I/G= 5	I/G= 5	I/G= 9	19	I/G= 4	I/G=

Date: MAY, 2019 — Junction: Chai Wan Road / Lok Man Road (B)

CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

Visual PICADY 4 ANALYSIS PROGRAM
RELEASE 2.1 (DEC 1998)

THE USER OF THIS COMPUTER PROGRAM FOR THE SOLUTION OF AN ENGINEERING PROBLEM IS
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Run with file:- "o:\lau\Cheung Man Road\Junctions 2031 (CTIA)\Construction Stage\JC Hong Man Street_Tai Man Street\JC_2031REFAM.vpi" at 16:53:14 on Monday, 26 November 2018

RUN TITLE
****
JC - Hong Man St / Tai Man St (2031REFAM)

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA

```
                    MAJOR ROAD (ARM C) --------------------- MAJOR ROAD (ARM A)
                                                 I
                                                 I
                                                 I
                                                 I
                                                 I
                                                 I
                                            MINOR ROAD (ARM B)
```

ARM A IS Hong Man St (NB)
ARM B IS Tai Man St (SB)
ARM C IS Hong Man St (WB)

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

ETC.

.GEOMETRIC DATA

DATA ITEM		MINOR ROAD B
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	(W)	10.30 M.
CENTRAL RESERVE WIDTH	(WCR)	0.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B)	3.50 M.
- VISIBILITY	(VC-B)	50.0 M.
- BLOCKS TRAFFIC		NO
MINOR ROAD - VISIBILITY TO LEFT	(VB-C)	50.0 M.
- VISIBILITY TO RIGHT	(VB-A)	50.0 M.
- LANE 1 WIDTH	(WB-C)	2.20 M.
- LANE 2 WIDTH	(WB-A)	2.20 M.

.

.TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 08.00 AND ENDS 09.30

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	3.00	4.50	3.00
ARM B	15.00	45.00	75.00	4.13	6.19	4.13
ARM C	15.00	45.00	75.00	3.00	4.50	3.00

.

TIME	FROM/TO	TURNING PROPORTIONS TURNING COUNTS (VEH/HR) (PERCENTAGE OF H.V.S) ARM A	ARM B	ARM C
08.00 - 09.30				
	ARM A	0.000	0.521	0.479
		0.0	125.0	115.0
		(0.0)	(0.1)	(0.1)

```
I                    I        I        I        I        I
I                    I  ARM B  I  0.485 I  0.000 I  0.515 I
I                    I        I  160.0 I    0.0 I  170.0 I
I                    I        I (  0.0)I (  0.0)I (  0.0)I
I                    I        I        I        I        I
I                    I  ARM C  I  0.375 I  0.625 I  0.000 I
I                    I        I   90.0 I  150.0 I    0.0 I
I                    I        I (  0.0)I (  0.0)I (  0.0)I
I                    I        I        I        I        I
-----------------------------------------------------------

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I        (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/   I
I                            (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.00-08.15                                                                                   I
I  B-C       2.13      8.97    0.237                0.0    0.3        4.4                        I
I  B-A       2.00      6.98    0.287                0.0    0.4        5.6                        I
I  C-A       1.13                                                                               I
I  C-B       1.88     10.82    0.173                0.0    0.2        3.0                        I
I  A-B       1.56                                                                               I
I  A-C       1.44                                                                               I
I                                                                                               I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)          (M)                       I
I                                                                                               I
I       B-C         0.098       0.002                                  0.009                    I
I       B-A         0.076       0.005       0.018       0.004          0.007                    I
I       C-B         0.103       0.003                   0.010                                   I
-------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I        (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/   I
I                            (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.15-08.30                                                                                   I
I  B-C       2.54      8.73    0.291                0.3    0.4        5.9                        I
I  B-A       2.39      6.79    0.352                0.4    0.5        7.7                        I
I  C-A       1.34                                                                               I
I  C-B       2.24     10.69    0.209                0.2    0.3        3.8                        I
I  A-B       1.87                                                                               I
I  A-C       1.72                                                                               I
I                                                                                               I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)          (M)                       I
I                                                                                               I
I       B-C         0.095       0.002                                  0.008                    I
I       B-A         0.074       0.006       0.018       0.004          0.007                    I
I       C-B         0.102       0.004                   0.010                                   I
-------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I        (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/   I
I                            (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.30-08.45                                                                                   I
I  B-C       3.11      8.40    0.370                0.4    0.6        8.3                        I
I  B-A       2.92      6.52    0.448                0.5    0.8       11.2                        I
I  C-A       1.65                                                                               I
I  C-B       2.74     10.52    0.261                0.3    0.3        5.1                        I
I  A-B       2.29                                                                               I
I  A-C       2.10                                                                               I
I                                                                                               I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)          (M)                       I
I                                                                                               I
I       B-C         0.091       0.003                                  0.008                    I
I       B-A         0.071       0.008       0.018       0.004          0.006                    I
I       C-B         0.100       0.005                   0.010                                   I
-------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I        (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/   I
I                            (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.45-09.00                                                                                   I
I  B-C       3.11      8.40    0.370                0.6    0.6        8.7                        I
I  B-A       2.92      6.52    0.448                0.8    0.8       11.9                        I
I  C-A       1.65                                                                               I
I  C-B       2.74     10.52    0.261                0.3    0.4        5.2                        I
I  A-B       2.29                                                                               I
I  A-C       2.10                                                                               I
I                                                                                               I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)          (M)                       I
I                                                                                               I
I       B-C         0.091       0.003                                  0.008                    I
I       B-A         0.071       0.008       0.018       0.004          0.006                    I
I       C-B         0.100       0.005                   0.010                                   I
-------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I        (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/   I
I                            (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 09.00-09.15                                                                                   I
I  B-C       2.54      8.72    0.291                0.6    0.4        6.5                        I
I  B-A       2.39      6.78    0.352                0.8    0.6        8.7                        I
I  C-A       1.34                                                                               I
I  C-B       2.24     10.69    0.209                0.4    0.3        4.1                        I
I  A-B       1.87                                                                               I
I  A-C       1.72                                                                               I
```

```
I                                                                                               I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I      MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I       CHANGE:     (.1M)       (.1M)       (.1M)         (M)           (M)                     I
I                                                                                               I
I         B-C         0.095     0.002                                 0.008                     I
I         B-A         0.074     0.006        0.018       0.004        0.007                     I
I         C-B         0.102     0.004                    0.010                                  I
-------------------------------------------------------------------------------------------------

.------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/  I
I                               (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 09.15-09.30                                                                                   I
I   B-C      2.13      8.95    0.237                 0.4    0.3        4.9                      I
I   B-A      2.00      6.97    0.287                 0.6    0.4        6.4                      I
I   C-A      1.13                                                                               I
I   C-B      1.88     10.82    0.173                 0.3    0.2        3.2                      I
I   A-B      1.56                                                                               I
I   A-C      1.44                                                                               I
I                                                                                               I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I      MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I       CHANGE:     (.1M)       (.1M)       (.1M)         (M)           (M)                     I
I                                                                                               I
I         B-C         0.097     0.002                                 0.009                     I
I         B-A         0.076     0.005        0.018       0.004        0.007                     I
I         C-B         0.103     0.003                    0.010                                  I
-------------------------------------------------------------------------------------------------
.
QUEUE FOR STREAM   B-C
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  08.15           0.3
  08.30           0.4
  08.45           0.6    *
  09.00           0.6    *
  09.15           0.4
  09.30           0.3
.
QUEUE FOR STREAM   B-A
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  08.15           0.4
  08.30           0.5    *
  08.45           0.8    *
  09.00           0.8    *
  09.15           0.6    *
  09.30           0.4
.
QUEUE FOR STREAM   C-B
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  08.15           0.2
  08.30           0.3
  08.45           0.3
  09.00           0.4
  09.15           0.3
  09.30           0.2
.
                QUEUEING DELAY INFORMATION OVER WHOLE PERIOD
                --------------------------------------------

---------------------------------------------------------------------------
I STREAM I   TOTAL DEMAND  I   * QUEUEING *      I * INCLUSIVE QUEUEING * I
I        I                 I    * DELAY *        I       * DELAY *        I
I        I--------------------------------------------------------------I
I        I  (VEH)  (VEH/H) I  (MIN)    (MIN/VEH) I    (MIN)     (MIN/VEH) I
---------------------------------------------------------------------------
I  B-C   I  233.1 I  155.4 I    38.6 I    0.17   I      38.6  I    0.17   I
I  B-A   I  219.4 I  146.3 I    51.5 I    0.23   I      51.5  I    0.23   I
I  C-A   I  123.4 I   82.3 I         I           I            I           I
I  C-B   I  205.7 I  137.1 I    24.6 I    0.12   I      24.6  I    0.12   I
I  A-B   I  171.4 I  114.3 I         I           I            I           I
I  A-C   I  157.7 I  105.1 I         I           I            I           I
---------------------------------------------------------------------------
I  ALL   I 1110.7 I  740.5 I   114.7 I    0.10   I     114.7  I    0.10   I
---------------------------------------------------------------------------


* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.


END OF JOB
```

```
                         TRANSPORT RESEARCH LABORATORY

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     CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

                        Visual PICADY 4 ANALYSIS PROGRAM
                             RELEASE 2.1 (DEC 1998)

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 Run with file:- "o:\lau\Cheung Man Road\Junctions 2031 (CTIA)\Construction Stage\JC Hong Man Street_Tai Man
Street\JC_2031REFPM.vpi" at 16:53:18 on Monday, 26 November 2018

  RUN TITLE
  *********
  JC - Hong Man St / Tai Man St (2031REFPM)


 .MAJOR/MINOR JUNCTION CAPACITY AND DELAY
  ****************************************

  INPUT DATA
  ----------

                     MAJOR ROAD (ARM C) --------------------- MAJOR ROAD (ARM A)
                                              I
                                              I
                                              I
                                              I
                                              I
                                              I
                                         MINOR ROAD (ARM B)

 ARM A IS Hong Man St (NB)
 ARM B IS Tai Man St (SB)
 ARM C IS Hong Man St (WB)


 STREAM LABELLING CONVENTION
 ---------------------------

        STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

        ETC.



.GEOMETRIC DATA
 -------------


 ----------------------------------------------------------------
 I               DATA ITEM                 I   MINOR ROAD B    I
 ----------------------------------------------------------------
 I  TOTAL MAJOR ROAD CARRIAGEWAY WIDTH      I ( W  ) 10.30 M.   I
 I  CENTRAL RESERVE WIDTH                   I (WCR )  0.00 M.   I
 I                                          I                   I
 I  MAJOR ROAD RIGHT TURN - WIDTH           I (WC-B)  3.50 M.   I
 I                        - VISIBILITY      I (VC-B)  50.0 M.   I
 I                        - BLOCKS TRAFFIC  I         NO        I
 I                                          I                   I
 I  MINOR ROAD - VISIBILITY TO LEFT         I (VB-C)  50.0 M.   I
 I             - VISIBILITY TO RIGHT        I (VB-A)  50.0 M.   I
 I             - LANE 1 WIDTH               I (WB-C)  2.20 M.   I
 I             - LANE 2 WIDTH               I (WB-A)  2.20 M.   I
 ----------------------------------------------------------------


.
.TRAFFIC DEMAND DATA
 -------------------



 TIME PERIOD BEGINS 16.45 AND ENDS 18.15

 LENGTH OF TIME PERIOD  -  90   MINUTES.
 LENGTH OF TIME SEGMENT -  15   MINUTES.

 DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA


 -----------------------------------------------------------------------------
 I       I   NUMBER OF MINUTES FROM START WHEN    I   RATE OF FLOW (VEH/MIN) I
 I  ARM  I FLOW STARTS I TOP OF PEAK I FLOW STOPS I BEFORE I AT TOP  I AFTER I
 I       I   TO RISE   I  IS REACHED I  FALLING   I  PEAK  I OF PEAK I PEAK  I
 -----------------------------------------------------------------------------
 I ARM A I     15.00   I     45.00   I    75.00   I  2.56  I   3.84  I  2.56 I
 I ARM B I     15.00   I     45.00   I    75.00   I  2.19  I   3.28  I  2.19 I
 I ARM C I     15.00   I     45.00   I    75.00   I  2.81  I   4.22  I  2.81 I
 -----------------------------------------------------------------------------

.
 -----------------------------------------------------------
 I                    I         TURNING PROPORTIONS        I
 I                    I         TURNING COUNTS (VEH/HR)    I
 I                    I        (PERCENTAGE OF H.V.S)       I
 I                    -------------------------------------
 I        TIME        I FROM/TO I  ARM A I  ARM B I  ARM C I
 -----------------------------------------------------------
 I   16.45 - 18.15    I         I        I        I        I
 I                    I  ARM A  I  0.000 I  0.390 I  0.610 I
 I                    I         I    0.0 I   80.0 I  125.0 I
 I                    I         I (  0.0)I (  0.1)I (  0.1)I
```

```
I                    I        I        I        I        I
I                    I  ARM B  I  0.371 I  0.000 I  0.629 I
I                    I        I   65.0 I    0.0 I  110.0 I
I                    I        I (  0.0)I (  0.0)I (  0.0)I
I                    I        I        I        I        I
I                    I  ARM C  I  0.644 I  0.356 I  0.000 I
I                    I        I  145.0 I   80.0 I    0.0 I
I                    I        I (  0.0)I (  0.0)I (  0.0)I
I                    I        I        I        I        I
-----------------------------------------------------------
```

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

```
.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 16.45-17.00                                                                                  I
I  B-C       1.38      9.40    0.146                0.0    0.2        2.5                      I
I  B-A       0.81      7.14    0.114                0.0    0.1        1.8                      I
I  C-A       1.81                                                                              I
I  C-B       1.00     10.91    0.092                0.0    0.1        1.5                      I
I  A-B       1.00                                                                              I
I  A-C       1.56                                                                              I
I                                                                                              I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                       I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY               I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                 I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)          (M)                      I
I                                                                                              I
I       B-C         0.102      0.002                                  0.009                    I
I       B-A         0.078      0.004       0.018      0.005           0.007                    I
I       C-B         0.104      0.003                  0.010                                    I
------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.00-17.15                                                                                  I
I  B-C       1.64      9.27    0.177                0.2    0.2        3.1                      I
I  B-A       0.97      6.98    0.139                0.1    0.2        2.3                      I
I  C-A       2.16                                                                              I
I  C-B       1.19     10.81    0.110                0.1    0.1        1.8                      I
I  A-B       1.19                                                                              I
I  A-C       1.87                                                                              I
I                                                                                              I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                       I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY               I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                 I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)          (M)                      I
I                                                                                              I
I       B-C         0.101      0.002                                  0.009                    I
I       B-A         0.076      0.005       0.018      0.004           0.007                    I
I       C-B         0.103      0.004                  0.010                                    I
------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.15-17.30                                                                                  I
I  B-C       2.01      9.08    0.221                0.2    0.3        4.1                      I
I  B-A       1.19      6.77    0.176                0.2    0.2        3.1                      I
I  C-A       2.65                                                                              I
I  C-B       1.46     10.66    0.137                0.1    0.2        2.3                      I
I  A-B       1.46                                                                              I
I  A-C       2.29                                                                              I
I                                                                                              I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                       I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY               I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                 I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)          (M)                      I
I                                                                                              I
I       B-C         0.099      0.003                                  0.009                    I
I       B-A         0.074      0.006       0.018      0.004           0.006                    I
I       C-B         0.102      0.004                  0.010                                    I
------------------------------------------------------------------------------------------------

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I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.30-17.45                                                                                  I
I  B-C       2.01      9.08    0.221                0.3    0.3        4.2                      I
I  B-A       1.19      6.76    0.176                0.2    0.2        3.2                      I
I  C-A       2.65                                                                              I
I  C-B       1.46     10.66    0.137                0.2    0.2        2.4                      I
I  A-B       1.46                                                                              I
I  A-C       2.29                                                                              I
I                                                                                              I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                       I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY               I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                 I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)          (M)                      I
I                                                                                              I
I       B-C         0.099      0.003                                  0.009                    I
I       B-A         0.074      0.006       0.018      0.004           0.006                    I
I       C-B         0.102      0.004                  0.010                                    I
------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.45-18.00                                                                                  I
I  B-C       1.64      9.27    0.177                0.3    0.2        3.3                      I
I  B-A       0.97      6.98    0.139                0.2    0.2        2.5                      I
I  C-A       2.16                                                                              I
I  C-B       1.19     10.81    0.110                0.2    0.1        1.9                      I
I  A-B       1.19                                                                              I
I  A-C       1.87                                                                              I
```

EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:					
MARGINAL CHANGE:	LANE WIDTH (.1M)	MAJOR RD. WIDTH (.1M)	CENT RES WIDTH (.1M)	VIS TO LEFT (AHEAD FOR MAJOR) (M)	VISIBILITY TO RIGHT (M)
B-C	0.101	0.002			0.009
B-A	0.076	0.005	0.018	0.004	0.007
C-B	0.103	0.004		0.010	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
18.00-18.15								
B-C	1.38	9.40	0.146		0.2	0.2	2.7	
B-A	0.81	7.14	0.114		0.2	0.1	2.0	
C-A	1.81							
C-B	1.00	10.91	0.092		0.1	0.1	1.6	
A-B	1.00							
A-C	1.56							

EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:					
MARGINAL CHANGE:	LANE WIDTH (.1M)	MAJOR RD. WIDTH (.1M)	CENT RES WIDTH (.1M)	VIS TO LEFT (AHEAD FOR MAJOR) (M)	VISIBILITY TO RIGHT (M)
B-C	0.102	0.002			0.009
B-A	0.078	0.004	0.018	0.005	0.007
C-B	0.104	0.003		0.010	

QUEUE FOR STREAM B-C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
17.00	0.2
17.15	0.2
17.30	0.3
17.45	0.3
18.00	0.2
18.15	0.2

QUEUE FOR STREAM B-A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
17.00	0.1
17.15	0.2
17.30	0.2
17.45	0.2
18.00	0.2
18.15	0.1

QUEUE FOR STREAM C-B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
17.00	0.1
17.15	0.1
17.30	0.2
17.45	0.2
18.00	0.1
18.15	0.1

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND (VEH)	TOTAL DEMAND (VEH/H)	* QUEUEING * * DELAY * (MIN)	* QUEUEING * * DELAY * (MIN/VEH)	* INCLUSIVE QUEUEING * * DELAY * (MIN)	* INCLUSIVE QUEUEING * * DELAY * (MIN/VEH)
B-C	150.8	100.6	19.9	0.13	19.9	0.13
B-A	89.1	59.4	14.9	0.17	14.9	0.17
C-A	198.8	132.6				
C-B	109.7	73.1	11.4	0.10	11.4	0.10
A-B	109.7	73.1				
A-C	171.4	114.3				
ALL	829.6	553.1	46.3	0.06	46.3	0.06

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

TRAFFIC SIGNALS CALCULATION

Job No.: HK501522 **MVA HONG KONG LIMITED**

Junction: Chai Wan Road / Hong Man Street

Design Year: 2031

Description: 2031 Reference Traffic Flows (Road Widening) (imp)

Designed By: LAU

Checked By: GPH

Approach	Movements	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Gradient (%)	Pro. Turning (%) AM	Pro. Turning (%) PM	Nearside 0/1	Opposing 0/1	Site Factor	Add Saturation Flow (pcu/hr)	Saturation Flow (pcu/hr)	Total Saturation Flow (pcu/hr)	Revised Saturation Flow (pcu/hr) AM	Revised Saturation Flow (pcu/hr) PM	AM Peak Flow (pcu/hr)	AM Peak y Value	AM Peak Critical y	PM Peak Flow (pcu/hr)	PM Peak y Value	PM Peak Critical y
Chai Wan Road (SB)		A	1	3.000	15			2%	0%	1		1	0	1915	3970	1910	1915	260	0.136		219	0.114	
		A	1	3.000						0		1	0	2055		2055	2055	280	0.136	0.136	236	0.115	0.115
Chai Wan Road (NB)		B	1,2	3.500						1		1	0	1965	4070	1965	1965	183	0.093		179	0.091	
		B	1,2	3.500						0		1	0	2105		2105	2105	197	0.094		191	0.091	
		C	2	3.500		15				0	0	1	0	2105	2105	1915	1915	140	0.073	0.073	120	0.063	0.063
Hong Man Road (WB)		D	4	3.500	25	25		72% / 28%	85% / 15%	1	0	1	0	1965	1965	1855	1855	250	0.135	0.135	205	0.111	0.111
Pedestrian Crossing		Ep	3	MIN GREEN + FLASH =			36	+	10							=	46			*			*
		Fp	3	MIN GREEN + FLASH =			8	+	7							=	15						

Notes:

Flow: (pcu/hr)

Group	A,C,Fp,D	A,C,Ep,D	Group	A,C,Fp,D	A,C,Ep,D
y	0.344	0.344	y	0.288	0.288
L (sec)	37	62	L (sec)	37	62
C (sec)	110	110	C (sec)	110	110
y pract.	0.597	0.393	y pract.	0.597	0.393
R.C. (%)	74%	14%	R.C. (%)	107%	36%

Stage / Phase Diagrams

1. **2.** **3.** **4.** **5.**

I/G= 5	I/G= 5	I/G= 5		46	I/G= 4	I/G=	
I/G= 5	I/G= 5	I/G= 5		46	I/G= 4	I/G=	

Date: MAY, 2019

Junction: D Chai Wan Road / Hong Man Street

TRAFFIC SIGNALS CALCULATION

Job No.: HK501522 **MVA HONG KONG LIMITED**

Junction: Chai Wan Road / Hong Man Street

Design Year: 2031

Description: 2031 Reference Traffic Flows (Construction)(imp)

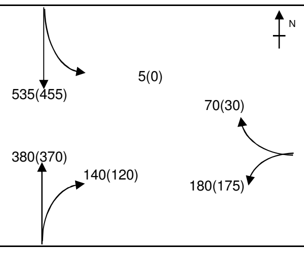
Designed By: LAU

Checked By: GPH

Approach	Movements	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Gradient (%)	Pro. Turning (%) AM	Pro. Turning (%) PM	Revised Saturation Flow (pcu/hr) AM	Revised Saturation Flow (pcu/hr) PM	AM Peak Flow (pcu/hr)	AM Peak y Value	AM Peak Critical y	PM Peak Flow (pcu/hr)	PM Peak y Value	PM Peak Critical y
Chai Wan Road (SB)		A	1	3.000	15			2%	0%	1910	1915	260	0.136		219	0.114	0.114
		A	1	3.000						2055	2055	280	0.136	0.136	236	0.115	
Chai Wan Road (NB)		B	1,2	3.500						1965	1965	183	0.093		179	0.091	
		B	1,2	3.500						2105	2105	197	0.094		191	0.091	
		C	2	3.500		15				1915	1915	140	0.073	0.073	120	0.063	0.063
Hong Man Road (WB)		D	4	3.500	25	25		72% / 28%	85% / 15%	1855	1855	250	0.135	0.135	205	0.111	0.111
Pedestrian Crossing		Ep	3	MIN GREEN + FLASH =			32	+	10	=	42			*			*
		Fp	3	MIN GREEN + FLASH =			8	+	7	=	15						

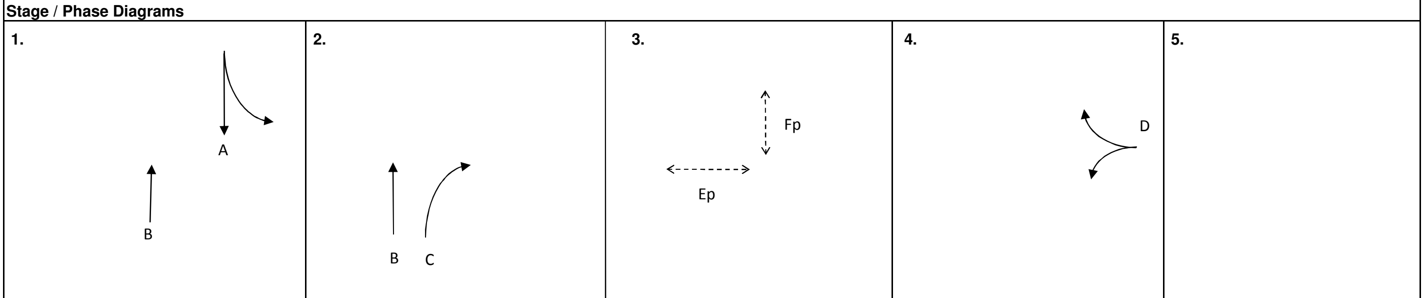
Notes:

Flow: (pcu/hr)



Group	A,C,Fp,D	A,C,Ep,D	Group	A,C,Fp,D	A,C,Ep,D
y	0.344	0.344	y	0.288	0.288
L (sec)	37	58	L (sec)	37	58
C (sec)	110	110	C (sec)	110	110
y pract.	0.597	0.425	y pract.	0.597	0.425
R.C. (%)	74%	24%	R.C. (%)	108%	48%

Stage / Phase Diagrams



I/G= 5		I/G= 5		I/G= 5	42	I/G= 4		I/G=	
I/G= 5		I/G= 5		I/G= 5	42	I/G= 4		I/G=	

Date: APR, 2019

Junction: D Chai Wan Road / Hong Man Street

TRANSPORT RESEARCH LABORATORY

CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

Visual PICADY 4 ANALYSIS PROGRAM
RELEASE 2.1 (DEC 1998)

THE USER OF THIS COMPUTER PROGRAM FOR THE SOLUTION OF AN ENGINEERING PROBLEM IS IN NO WAY RELIEVED OF HIS RESPONSIBILITY FOR THE CORRECTNESS OF THE SOLUTION

Run with file:- "o:\lau\Cheung Man Road\Junctions 2031 (CTIA)\Construction Stage\JE Chai Wan Road_Wan Tsui Road\JE_2031REFAM.vpi" at 16:53:38 on Monday, 26 November 2018

RUN TITLE
****
JE - Chai Wan Road / Wan Tsui Road (2031REFAM)

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA

```
MAJOR ROAD (ARM C) --------------------- MAJOR ROAD (ARM A)
                             I
                             I
                             I
                             I
                             I
                             I
                      MINOR ROAD (ARM B)
```

ARM A IS Chai Wan Rd (WB)
ARM B IS Wan Tsui Rd (NB)
ARM C IS Chai Wan Rd (EB)

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

ETC.

.GEOMETRIC DATA

DATA ITEM		MINOR ROAD B
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	(W)	17.50 M.
CENTRAL RESERVE WIDTH	(WCR)	3.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B)	3.00 M.
- VISIBILITY	(VC-B)	50.0 M.
- BLOCKS TRAFFIC		NO
MINOR ROAD - VISIBILITY TO LEFT	(VB-C)	50.0 M.
- VISIBILITY TO RIGHT	(VB-A)	50.0 M.
- LANE 1 WIDTH	(WB-C)	3.10 M.
- LANE 2 WIDTH	(WB-A)	3.10 M.

.

.TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 08.00 AND ENDS 09.30

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

	NUMBER OF MINUTES FROM START WHEN			RATE OF FLOW (VEH/MIN)		
ARM	FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	4.81	7.22	4.81
ARM B	15.00	45.00	75.00	3.31	4.97	3.31
ARM C	15.00	45.00	75.00	8.88	13.31	8.88

.

		TURNING PROPORTIONS TURNING COUNTS (VEH/HR) (PERCENTAGE OF H.V.S)		
TIME	FROM/TO	ARM A	ARM B	ARM C
08.00 - 09.30				
	ARM A	0.000	0.221	0.779
		0.0	85.0	300.0
		(0.0)	(0.0)	(0.0)

```
I                    I         I         I         I         I
I                    I  ARM B  I  0.189 I  0.000 I  0.811 I
I                    I         I   50.0 I    0.0 I  215.0 I
I                    I         I (  0.0)I (  0.0)I (  0.0)I
I                    I         I         I         I         I
I                    I  ARM C  I  0.768 I  0.232 I  0.000 I
I                    I         I  545.0 I  165.0 I    0.0 I
I                    I         I (  0.0)I (  0.0)I (  0.0)I
I                    I         I         I         I         I
-----------------------------------------------------------

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.00-08.15                                                                                   I
I  B-C       2.69     10.29    0.261                 0.0    0.3        5.0                      I
I  B-A       0.63      7.94    0.079                 0.0    0.1        1.2                      I
I  C-A       6.81                                                                               I
I  C-B       2.06     10.31    0.200                 0.0    0.2        3.6                      I
I  A-B       1.06                                                                               I
I  A-C       3.75                                                                               I
I                                                                                               I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                   I
I      CHANGE:     (.1M)       (.1M)       (.1M)        (M)            (M)                      I
I                                                                                               I
I       B-C         0.102      0.005                                 0.010                      I
I       B-A         0.079      0.012       0.019       0.005         0.008                      I
I       C-B         0.103      0.005                   0.010                                    I
------------------------------------------------------------------------------------------------

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I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.15-08.30                                                                                   I
I  B-C       3.21     10.14    0.316                 0.3    0.5        6.7                      I
I  B-A       0.75      7.67    0.097                 0.1    0.1        1.6                      I
I  C-A       8.13                                                                               I
I  C-B       2.46     10.19    0.242                 0.2    0.3        4.6                      I
I  A-B       1.27                                                                               I
I  A-C       4.48                                                                               I
I                                                                                               I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                   I
I      CHANGE:     (.1M)       (.1M)       (.1M)        (M)            (M)                      I
I                                                                                               I
I       B-C         0.100      0.005                                 0.010                      I
I       B-A         0.076      0.014       0.019       0.005         0.007                      I
I       C-B         0.102      0.006                   0.010                                    I
------------------------------------------------------------------------------------------------

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I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.30-08.45                                                                                   I
I  B-C       3.93      9.93    0.396                 0.5    0.6        9.3                      I
I  B-A       0.91      7.30    0.125                 0.1    0.1        2.1                      I
I  C-A       9.96                                                                               I
I  C-B       3.02     10.03    0.301                 0.3    0.4        6.2                      I
I  A-B       1.55                                                                               I
I  A-C       5.48                                                                               I
I                                                                                               I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                   I
I      CHANGE:     (.1M)       (.1M)       (.1M)        (M)            (M)                      I
I                                                                                               I
I       B-C         0.098      0.007                                 0.010                      I
I       B-A         0.072      0.018       0.019       0.005         0.007                      I
I       C-B         0.100      0.008                   0.010                                    I
------------------------------------------------------------------------------------------------

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I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.45-09.00                                                                                   I
I  B-C       3.93      9.93    0.396                 0.6    0.6        9.7                      I
I  B-A       0.91      7.30    0.125                 0.1    0.1        2.1                      I
I  C-A       9.96                                                                               I
I  C-B       3.02     10.03    0.301                 0.4    0.4        6.4                      I
I  A-B       1.55                                                                               I
I  A-C       5.48                                                                               I
I                                                                                               I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                   I
I      CHANGE:     (.1M)       (.1M)       (.1M)        (M)            (M)                      I
I                                                                                               I
I       B-C         0.098      0.007                                 0.010                      I
I       B-A         0.072      0.018       0.019       0.005         0.007                      I
I       C-B         0.100      0.008                   0.010                                    I
------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 09.00-09.15                                                                                   I
I  B-C       3.21     10.14    0.317                 0.6    0.5        7.3                      I
I  B-A       0.75      7.67    0.097                 0.1    0.1        1.7                      I
I  C-A       8.13                                                                               I
I  C-B       2.46     10.19    0.242                 0.4    0.3        5.0                      I
I  A-B       1.27                                                                               I
I  A-C       4.48                                                                               I
```

EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:

MARGINAL CHANGE:	LANE WIDTH (.1M)	MAJOR RD. WIDTH (.1M)	CENT RES WIDTH (.1M)	VIS TO LEFT (AHEAD FOR MAJOR) (M)	VISIBILITY TO RIGHT (M)
B-C	0.100	0.005			0.010
B-A	0.076	0.014	0.019	0.005	0.007
C-B	0.102	0.006		0.010	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
09.15-09.30								
B-C	2.69	10.29	0.261		0.5	0.4	5.5	
B-A	0.63	7.94	0.079		0.1	0.1	1.3	
C-A	6.81							
C-B	2.06	10.31	0.200		0.3	0.3	3.9	
A-B	1.06							
A-C	3.75							

EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:

MARGINAL CHANGE:	LANE WIDTH (.1M)	MAJOR RD. WIDTH (.1M)	CENT RES WIDTH (.1M)	VIS TO LEFT (AHEAD FOR MAJOR) (M)	VISIBILITY TO RIGHT (M)
B-C	0.102	0.005			0.010
B-A	0.079	0.012	0.019	0.005	0.008
C-B	0.103	0.005		0.010	

QUEUE FOR STREAM B-C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.15	0.3	
08.30	0.5	
08.45	0.6	*
09.00	0.6	*
09.15	0.5	
09.30	0.4	

QUEUE FOR STREAM B-A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
08.15	0.1
08.30	0.1
08.45	0.1
09.00	0.1
09.15	0.1
09.30	0.1

QUEUE FOR STREAM C-B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
08.15	0.2
08.30	0.3
08.45	0.4
09.00	0.4
09.15	0.3
09.30	0.3

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND (VEH)	TOTAL DEMAND (VEH/H)	* QUEUEING * * DELAY * (MIN)	* QUEUEING * * DELAY * (MIN/VEH)	* INCLUSIVE QUEUEING * * DELAY * (MIN)	* INCLUSIVE QUEUEING * * DELAY * (MIN/VEH)
B-C	294.8	196.5	43.5	0.15	43.5	0.15
B-A	68.6	45.7	10.0	0.15	10.0	0.15
C-A	747.3	498.2				
C-B	226.2	150.8	29.6	0.13	29.6	0.13
A-B	116.6	77.7				
A-C	411.4	274.2				
ALL	1864.8	1243.2	83.1	0.04	83.1	0.04

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

Visual PICADY 4 ANALYSIS PROGRAM
RELEASE 2.1 (DEC 1998)

THE USER OF THIS COMPUTER PROGRAM FOR THE SOLUTION OF AN ENGINEERING PROBLEM IS IN NO WAY RELIEVED OF HIS RESPONSIBILITY FOR THE CORRECTNESS OF THE SOLUTION

Run with file:- "o:\lau\Cheung Man Road\Junctions 2031 (CTIA)\Construction Stage\JE Chai Wan Road_Wan Tsui Road\JE_2031REFPM.vpi" at 16:53:42 on Monday, 26 November 2018

RUN TITLE
****
JE - Chai Wan Road / Wan Tsui Road (2031REFPM)

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA

```
                    MAJOR ROAD (ARM C) --------------------- MAJOR ROAD (ARM A)
                                                 I
                                                 I
                                                 I
                                                 I
                                                 I
                                                 I
                                         MINOR ROAD (ARM B)
```

ARM A IS Chai Wan Rd (WB)
ARM B IS Wan Tsui Rd (NB)
ARM C IS Chai Wan Rd (EB)

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

ETC.

.GEOMETRIC DATA

DATA ITEM		MINOR ROAD B
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	(W)	17.50 M.
CENTRAL RESERVE WIDTH	(WCR)	3.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B)	3.00 M.
- VISIBILITY	(VC-B)	50.0 M.
- BLOCKS TRAFFIC		NO
MINOR ROAD - VISIBILITY TO LEFT	(VB-C)	50.0 M.
- VISIBILITY TO RIGHT	(VB-A)	50.0 M.
- LANE 1 WIDTH	(WB-C)	3.10 M.
- LANE 2 WIDTH	(WB-A)	3.10 M.

.

.TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 16.45 AND ENDS 18.15

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	4.75	7.13	4.75
ARM B	15.00	45.00	75.00	3.19	4.78	3.19
ARM C	15.00	45.00	75.00	7.81	11.72	7.81

.

TIME	FROM/TO	TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) / (PERCENTAGE OF H.V.S) ARM A	ARM B	ARM C
16.45 - 18.15				
	ARM A	0.000	0.289	0.711
		0.0	110.0	270.0
		(0.0)	(0.0)	(0.0)

```
I                   I        I        I        I        I
I                   I  ARM B  I  0.157 I  0.000 I  0.843 I
I                   I        I   40.0 I    0.0 I  215.0 I
I                   I        I (  0.0)I (  0.0)I (  0.0)I
I                   I        I        I        I        I
I                   I  ARM C  I  0.704 I  0.296 I  0.000 I
I                   I        I  440.0 I  185.0 I    0.0 I
I                   I        I (  0.0)I (  0.0)I (  0.0)I
I                   I        I        I        I        I
-----------------------------------------------------------

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                               (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 16.45-17.00                                                                                   I
I  B-C       2.69     10.37    0.259                 0.0    0.3        5.0                      I
I  B-A       0.50      8.03    0.062                 0.0    0.1        1.0                      I
I  C-A       5.50                                                                               I
I  C-B       2.31     10.32    0.224                 0.0    0.3        4.1                      I
I  A-B       1.38                                                                               I
I  A-C       3.37                                                                               I
I                                                                                               I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                   I
I      CHANGE:     (.1M)      (.1M)       (.1M)         (M)           (M)                       I
I                                                                                               I
I       B-C         0.103      0.004                                 0.010                      I
I       B-A         0.080      0.011       0.019       0.005         0.008                      I
I       C-B         0.103      0.005                   0.010                                    I
-------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                               (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.00-17.15                                                                                   I
I  B-C       3.21     10.23    0.314                 0.3    0.5        6.6                      I
I  B-A       0.60      7.77    0.077                 0.1    0.1        1.2                      I
I  C-A       6.57                                                                               I
I  C-B       2.76     10.20    0.271                 0.3    0.4        5.4                      I
I  A-B       1.64                                                                               I
I  A-C       4.03                                                                               I
I                                                                                               I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                   I
I      CHANGE:     (.1M)      (.1M)       (.1M)         (M)           (M)                       I
I                                                                                               I
I       B-C         0.101      0.005                                 0.010                      I
I       B-A         0.077      0.013       0.019       0.005         0.007                      I
I       C-B         0.102      0.006                   0.010                                    I
-------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                               (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.15-17.30                                                                                   I
I  B-C       3.93     10.04    0.391                 0.5    0.6        9.2                      I
I  B-A       0.73      7.43    0.098                 0.1    0.1        1.6                      I
I  C-A       8.04                                                                               I
I  C-B       3.38     10.04    0.337                 0.4    0.5        7.3                      I
I  A-B       2.01                                                                               I
I  A-C       4.94                                                                               I
I                                                                                               I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                   I
I      CHANGE:     (.1M)      (.1M)       (.1M)         (M)           (M)                       I
I                                                                                               I
I       B-C         0.099      0.006                                 0.010                      I
I       B-A         0.074      0.016       0.019       0.005         0.007                      I
I       C-B         0.100      0.008                   0.010                                    I
-------------------------------------------------------------------------------------------------

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I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                               (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.30-17.45                                                                                   I
I  B-C       3.93     10.04    0.391                 0.6    0.6        9.5                      I
I  B-A       0.73      7.43    0.098                 0.1    0.1        1.6                      I
I  C-A       8.04                                                                               I
I  C-B       3.38     10.04    0.337                 0.5    0.5        7.5                      I
I  A-B       2.01                                                                               I
I  A-C       4.94                                                                               I
I                                                                                               I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                   I
I      CHANGE:     (.1M)      (.1M)       (.1M)         (M)           (M)                       I
I                                                                                               I
I       B-C         0.099      0.006                                 0.010                      I
I       B-A         0.074      0.016       0.019       0.005         0.007                      I
I       C-B         0.100      0.008                   0.010                                    I
-------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                               (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.45-18.00                                                                                   I
I  B-C       3.21     10.23    0.314                 0.6    0.5        7.2                      I
I  B-A       0.60      7.77    0.077                 0.1    0.1        1.3                      I
I  C-A       6.57                                                                               I
I  C-B       2.76     10.20    0.271                 0.5    0.4        5.8                      I
I  A-B       1.64                                                                               I
I  A-C       4.03                                                                               I
```

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I                                                                                               I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I      MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                 I
I       CHANGE:     (.1M)       (.1M)       (.1M)         (M)           (M)                     I
I                                                                                               I
I         B-C         0.101      0.005                                  0.010                   I
I         B-A         0.077      0.013        0.019       0.005         0.007                   I
I         C-B         0.102      0.006                    0.010                                 I
-------------------------------------------------------------------------------------------------

.-------------------------------------------------------------------------------------------------
I  TIME       DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                                (RFC)    (PEDS/MIN) (VEHS)  (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 18.00-18.15                                                                                   I
I   B-C       2.69     10.36    0.259                 0.5    0.4         5.5                    I
I   B-A       0.50      8.02    0.062                 0.1    0.1         1.0                    I
I   C-A       5.50                                                                              I
I   C-B       2.31     10.32    0.224                 0.4    0.3         4.5                    I
I   A-B       1.38                                                                              I
I   A-C       3.37                                                                              I
I                                                                                               I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I      MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                 I
I       CHANGE:     (.1M)       (.1M)       (.1M)         (M)           (M)                     I
I                                                                                               I
I         B-C         0.103      0.004                                  0.010                   I
I         B-A         0.079      0.011        0.019       0.005         0.008                   I
I         C-B         0.103      0.005                    0.010                                 I
-------------------------------------------------------------------------------------------------
.
QUEUE FOR STREAM   B-C
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  17.00           0.3
  17.15           0.5
  17.30           0.6    *
  17.45           0.6    *
  18.00           0.5
  18.15           0.4
.
QUEUE FOR STREAM   B-A
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  17.00           0.1
  17.15           0.1
  17.30           0.1
  17.45           0.1
  18.00           0.1
  18.15           0.1
.
QUEUE FOR STREAM   C-B
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  17.00           0.3
  17.15           0.4
  17.30           0.5    *
  17.45           0.5    *
  18.00           0.4
  18.15           0.3
.
                QUEUEING DELAY INFORMATION OVER WHOLE PERIOD
                --------------------------------------------

---------------------------------------------------------------------------
I STREAM I   TOTAL DEMAND  I   * QUEUEING *      I * INCLUSIVE QUEUEING * I
I        I                 I    * DELAY *        I       * DELAY *        I
I        I---------------------------------------------------------------I
I        I  (VEH)   (VEH/H) I  (MIN)     (MIN/VEH) I    (MIN)     (MIN/VEH) I
---------------------------------------------------------------------------
I  B-C   I  294.8 I  196.5 I    42.9 I    0.15   I      42.9  I    0.15   I
I  B-A   I   54.8 I   36.6 I     7.7 I    0.14   I       7.7  I    0.14   I
I  C-A   I  603.3 I  402.2 I         I           I            I           I
I  C-B   I  253.7 I  169.1 I    34.6 I    0.14   I      34.6  I    0.14   I
I  A-B   I  150.8 I  100.6 I         I           I            I           I
I  A-C   I  370.2 I  246.8 I         I           I            I           I
---------------------------------------------------------------------------
I  ALL   I 1727.7 I 1151.8 I    85.2 I    0.05   I      85.2  I    0.05   I
---------------------------------------------------------------------------


* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.


END OF JOB
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Run with file:- "o:\HKH\Junction 2031\Construction Stage\JF_2031REFAM.vai" at 19:37:22 on Wednesday, 28 November 2018

.ROUNDABOUT CAPACITY AND DELAY

RUN TITLE

JF- Chai Wan Road / Island Eastern Corridor / Wan Tsui Road (2031REFAM)

.INPUT DATA

ARM A - Island Eastern Corrodor
ARM B - Chai Wan Road (east of roundabout)
ARM C - Wan Tsui Road
ARM D - Chai Wan Road (west of roundabout)

.GEOMETRIC DATA

ARM	V (M)	E (M)	L (M)	R (M)	D (M)	PHI (DEG)	SLOPE	INTERCEPT (PCU/MIN)
ARM A	7.30	7.30	1.00	100.00	80.00	0.0	0.626	42.145
ARM B	7.30	7.30	1.00	50.00	80.00	0.0	0.620	41.784
ARM C	7.00	7.00	1.00	25.00	80.00	3.0	0.589	39.008
ARM D	10.50	10.50	1.00	50.00	80.00	0.0	0.782	60.101

.TRAFFIC DEMAND DATA

.TIME PERIOD BEGINS 08.00 AND ENDS 09.30
.LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

.DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN: FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN): BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	10.38	15.56	10.38
ARM B	15.00	45.00	75.00	10.69	16.03	10.69
ARM C	15.00	45.00	75.00	4.88	7.31	4.88
ARM D	15.00	45.00	75.00	17.13	25.69	17.13

TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) / (PERCENTAGE OF H.V.S)

TIME	FROM/TO	ARM A	ARM B	ARM C	ARM D
08.00 - 09.30					
	ARM A	0.301	0.271	0.253	0.175
		250.0	225.0	210.0	145.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM B	0.444	0.111	0.251	0.193
		380.0	95.0	215.0	165.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM C	0.385	0.564	0.000	0.051
		150.0	220.0	0.0	20.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM D	0.529	0.303	0.099	0.069
		725.0	415.0	135.0	95.0
		(0.0)	(0.0)	(0.0)	(0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

. QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.00-08.15								
ARM A	10.38	34.65	0.299		0.0	0.4	6.3	
ARM B	10.69	35.33	0.303		0.0	0.4	6.4	
ARM C	4.88	30.71	0.159		0.0	0.2	2.8	
ARM D	17.13	49.43	0.346		0.0	0.5	7.8	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.15-08.30								
ARM A	12.39	33.18	0.373		0.4	0.6	8.8	
ARM B	12.76	34.06	0.375		0.4	0.6	8.8	
ARM C	5.82	29.08	0.200		0.2	0.2	3.7	
ARM D	20.45	47.33	0.432		0.5	0.8	11.2	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.30-08.45								
ARM A	15.17	31.18	0.487		0.6	0.9	13.8	
ARM B	15.63	32.33	0.483		0.6	0.9	13.6	
ARM C	7.13	26.85	0.266		0.2	0.4	5.3	
ARM D	25.04	44.47	0.563		0.8	1.3	18.7	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.45-09.00								
ARM A	15.17	31.16	0.487		0.9	0.9	14.1	
ARM B	15.63	32.31	0.484		0.9	0.9	14.0	
ARM C	7.13	26.83	0.266		0.4	0.4	5.4	
ARM D	25.04	44.45	0.563		1.3	1.3	19.2	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
09.00-09.15								
ARM A	12.39	33.16	0.374		0.9	0.6	9.2	
ARM B	12.76	34.04	0.375		0.9	0.6	9.2	
ARM C	5.82	29.05	0.200		0.4	0.3	3.8	
ARM D	20.45	47.30	0.432		1.3	0.8	11.7	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
09.15-09.30								
ARM A	10.38	34.63	0.300		0.6	0.4	6.5	
ARM B	10.69	35.30	0.303		0.6	0.4	6.6	
ARM C	4.88	30.68	0.159		0.3	0.2	2.9	
ARM D	17.13	49.39	0.347		0.8	0.5	8.1	

.QUEUE AT ARM A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.15	0.4	
08.30	0.6	*
08.45	0.9	*
09.00	0.9	*
09.15	0.6	*
09.30	0.4	

.QUEUE AT ARM B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.15	0.4	
08.30	0.6	*
08.45	0.9	*
09.00	0.9	*
09.15	0.6	*
09.30	0.4	

.QUEUE AT ARM C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
08.15	0.2
08.30	0.2
08.45	0.4
09.00	0.4
09.15	0.3
09.30	0.2

.QUEUE AT ARM D

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.15	0.5	*
08.30	0.8	*
08.45	1.3	*
09.00	1.3	*

09.15	0.8	*
09.30	0.5	*

.

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

ARM	TOTAL DEMAND		* QUEUEING * * DELAY *		* INCLUSIVE QUEUEING * * DELAY *	
	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
A	1138.1	758.7	58.6	0.05	58.7	0.05
B	1172.4	781.6	58.6	0.05	58.6	0.05
C	534.8	356.5	23.9	0.04	23.9	0.04
D	1878.6	1252.4	76.8	0.04	76.8	0.04
ALL	4723.8	3149.2	217.9	0.05	217.9	0.05

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD.
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

TRANSPORT RESEARCH LABORATORY

CAPACITIES, QUEUES AND DELAYS AT ROUNDABOUTS

Visual ARCADY 4 ANALYSIS PROGRAM
RELEASE 2.1 (OCT 1998)

THE USER OF THIS COMPUTER PROGRAM FOR THE SOLUTION OF AN ENGINEERING PROBLEM IS IN NO WAY RELIEVED OF HIS RESPONSIBILITY FOR THE CORRECTNESS OF THE SOLUTION

Run with file:- "o:\HKH\Junction 2031\Construction Stage\JF_2031REFPM.vai" at 19:37:25 on Wednesday, 28 November 2018

.ROUNDABOUT CAPACITY AND DELAY
****

RUN TITLE
****
JF- Chai Wan Road / Island Eastern Corridor / Wan Tsui Road (2031REFPM)

.INPUT DATA
****
ARM A - Island Eastern Corrodor
ARM B - Chai Wan Road (east of roundabout)
ARM C - Wan Tsui Road
ARM D - Chai Wan Road (west of roundabout)

.GEOMETRIC DATA

ARM	V (M)	E (M)	L (M)	R (M)	D (M)	PHI (DEG)	SLOPE	INTERCEPT (PCU/MIN)
ARM A	7.30	7.30	1.00	100.00	80.00	0.0	0.626	42.145
ARM B	7.30	7.30	1.00	50.00	80.00	0.0	0.620	41.784
ARM C	7.00	7.00	1.00	25.00	80.00	3.0	0.589	39.008
ARM D	10.50	10.50	1.00	50.00	80.00	0.0	0.782	60.101

.TRAFFIC DEMAND DATA

.TIME PERIOD BEGINS 16.45 AND ENDS 18.15
.LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

.DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN: FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN): BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	12.06	18.09	12.06
ARM B	15.00	45.00	75.00	11.38	17.06	11.38
ARM C	15.00	45.00	75.00	5.38	8.06	5.38
ARM D	15.00	45.00	75.00	16.06	24.09	16.06

TIME	FROM/TO	ARM A	ARM B	ARM C	ARM D
		TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) / (PERCENTAGE OF H.V.S)			
16.45 - 18.15					
	ARM A	0.218	0.358	0.228	0.197
		210.0	345.0	220.0	190.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM B	0.451	0.082	0.313	0.154
		410.0	75.0	285.0	140.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM C	0.314	0.640	0.012	0.035
		135.0	275.0	5.0	15.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM D	0.498	0.319	0.097	0.086
		640.0	410.0	125.0	110.0
		(0.0)	(0.0)	(0.0)	(0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

. QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
16.45-17.00								
ARM A	12.06	34.34	0.351		0.0	0.5	7.9	
ARM B	11.38	35.13	0.324		0.0	0.5	7.0	
ARM C	5.38	30.67	0.175		0.0	0.2	3.1	
ARM D	16.06	49.28	0.326		0.0	0.5	7.1	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
17.00-17.15								
ARM A	14.40	32.81	0.439		0.5	0.8	11.4	
ARM B	13.58	33.83	0.402		0.5	0.7	9.8	
ARM C	6.42	29.03	0.221		0.2	0.3	4.2	
ARM D	19.18	47.16	0.407		0.5	0.7	10.1	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
17.15-17.30								
ARM A	17.64	30.72	0.574		0.8	1.3	19.4	
ARM B	16.64	32.05	0.519		0.7	1.1	15.6	
ARM C	7.86	26.80	0.293		0.3	0.4	6.1	
ARM D	23.49	44.26	0.531		0.7	1.1	16.5	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
17.30-17.45								
ARM A	17.64	30.71	0.575		1.3	1.3	20.1	
ARM B	16.64	32.03	0.519		1.1	1.1	16.1	
ARM C	7.86	26.78	0.294		0.4	0.4	6.2	
ARM D	23.49	44.24	0.531		1.1	1.1	16.9	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
17.45-18.00								
ARM A	14.40	32.79	0.439		1.3	0.8	12.1	
ARM B	13.58	33.80	0.402		1.1	0.7	10.3	
ARM C	6.42	29.00	0.221		0.4	0.3	4.3	
ARM D	19.18	47.12	0.407		1.1	0.7	10.5	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
18.00-18.15								
ARM A	12.06	34.32	0.352		0.8	0.5	8.3	
ARM B	11.38	35.11	0.324		0.7	0.5	7.3	
ARM C	5.38	30.64	0.175		0.3	0.2	3.2	
ARM D	16.06	49.24	0.326		0.7	0.5	7.4	

.QUEUE AT ARM A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.00	0.5	*
17.15	0.8	*
17.30	1.3	*
17.45	1.3	*
18.00	0.8	*
18.15	0.5	*

.QUEUE AT ARM B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.00	0.5	
17.15	0.7	*
17.30	1.1	*
17.45	1.1	*
18.00	0.7	*
18.15	0.5	

.QUEUE AT ARM C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
17.00	0.2
17.15	0.3
17.30	0.4
17.45	0.4
18.00	0.3
18.15	0.2

.QUEUE AT ARM D

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.00	0.5	
17.15	0.7	*
17.30	1.1	*
17.45	1.1	*

18.00	0.7	*
18.15	0.5	

. QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

ARM	TOTAL DEMAND		* QUEUEING * * DELAY *		* INCLUSIVE QUEUEING * * DELAY *	
	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
A	1323.2	882.1	79.2	0.06	79.2	0.06
B	1247.8	831.9	66.3	0.05	66.3	0.05
C	589.6	393.1	27.2	0.05	27.2	0.05
D	1762.0	1174.7	68.5	0.04	68.5	0.04
ALL	4922.6	3281.8	241.2	0.05	241.2	0.05

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD.
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

2031 Design Flows

TRAFFIC SIGNALS CALCULATION

Job No.: HK501522 **MVA HONG KONG LIMITED**

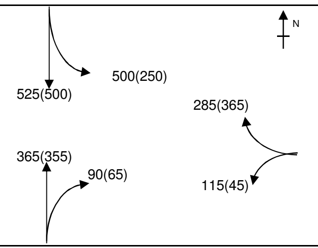
Junction: Chai Wan Road / Lok Man Road — Design Year: 2031

Description: 2031 Design Traffic Flows (Road Widening) — Designed By: LAU — Checked By: GPH

Approach	Movements	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Gradient (%)	Pro. Turning (%) AM	Pro. Turning (%) PM	Revised Saturation Flow (pcu/hr) AM	Revised Saturation Flow (pcu/hr) PM	AM Peak Flow (pcu/hr)	AM Peak y Value	AM Peak Critical y	PM Peak Flow (pcu/hr)	PM Peak y Value	PM Peak Critical y
Chai Wan Road (SB)		A	1	3.500	15					1785	1785	500	0.280	0.280	250	0.140	0.140
		A	1	3.500						2105	2105	263	0.125		250	0.119	
		A	1	3.500						2105	2105	262	0.124		250	0.119	
Chai Wan Road (NB)		B	1	3.000						1915	1915	116	0.061		113	0.059	
		B	1	3.000						2055	2055	125	0.061		121	0.059	
		B	1	3.000						2055	2055	124	0.060		121	0.059	
		C	2	3.000		17				1890	1890	90	0.048	0.048	65	0.034	0.034
Lok Man Road (WB)		D	4	4.000	15	20		29% / 71%	11% / 89%	1860	1870	400	0.215	0.215	410	0.219	0.219
Pedestrian Crossing		Ep	2,3,4	MIN GREEN + FLASH =			6	+	9	=	15						
		Fp	2,3	MIN GREEN + FLASH =			5	+	9	=	14						
		Gp	3	MIN GREEN + FLASH =			7	+	12	=	19			*			*

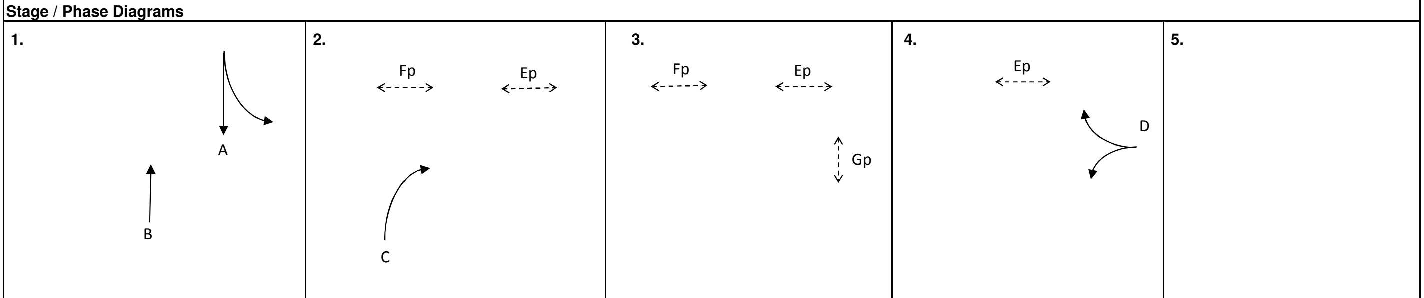
Notes:

Flow: (pcu/hr)



Group	B,C,Gp,D	A,C,Gp,D	Group	B,C,Gp,D	A,C,Gp,D
y	0.324	0.543	y	0.313	0.394
L (sec)	41	39	L (sec)	41	39
C (sec)	110	110	C (sec)	110	110
y pract.	0.565	0.581	y pract.	0.565	0.581
R.C. (%)	75%	7%	R.C. (%)	81%	48%

Stage / Phase Diagrams



I/G= 5		I/G= 5		I/G= 9	19	I/G= 4		I/G=	
I/G= 5		I/G= 5		I/G= 9	19	I/G= 4		I/G=	

Date: APR, 2019 — **Junction:** B — Chai Wan Road / Lok Man Road

TRAFFIC SIGNALS CALCULATION

Job No.: HK501522

MVA HONG KONG LIMITED

Junction: Chai Wan Road / Lok Man Road

Design Year: 2034

Description: 2031 Design Traffic Flows (Road Widening) (Pedestrian Green) (IMP)

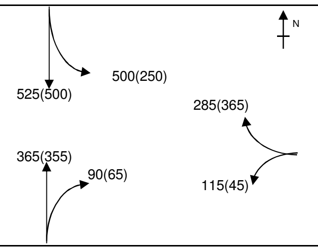
Designed By: LAU

Checked By: GPH

Approach	Movements	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Gradient (%)	Pro. Turning (%) AM	Pro. Turning (%) PM	Revised Saturation Flow (pcu/hr) AM	Revised Saturation Flow (pcu/hr) PM	AM Peak Flow (pcu/hr)	AM Peak y Value	AM Peak Critical y	PM Peak Flow (pcu/hr)	PM Peak y Value	PM Peak Critical y
Chai Wan Road (SB)		A2	1,4	3.500	15					1785	1785	500	0.280		250	0.140	
		A1	1	3.500						2105	2105	263	0.125	0.125	250	0.119	0.119
		A1	1	3.500						2105	2105	262	0.124		250	0.119	
Chai Wan Road (NB)		B	1	3.000						1915	1915	116	0.061		113	0.059	
		B	1	3.000						2055	2055	125	0.061		121	0.059	
		B	1	3.000						2055	2055	124	0.060		121	0.059	
		C	2	3.000		17				1890	1890	90	0.048	0.048	65	0.034	0.034
Lok Man Street (WB)		D	4	4.000	15	20		29% / 71%	11% / 89%	1860	1870	400	0.215	0.215	410	0.219	0.219
Pedestrian Crossing		Ep	2,3	MIN GREEN + FLASH =			6	+	10	=	16						
		Fp	2,3	MIN GREEN + FLASH =			5	+	9	=	14						
		Gp	3	MIN GREEN + FLASH =			7	+	12	=	19			*			*

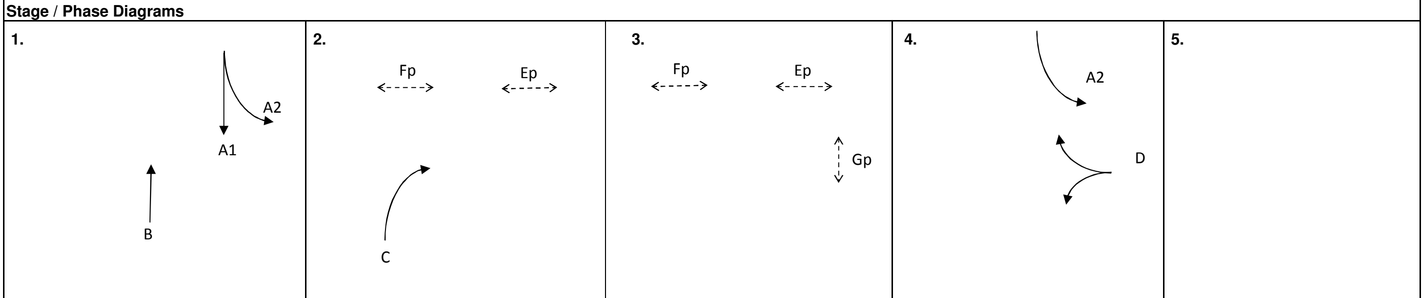
Notes:

Flow: (pcu/hr)



Group	B,C,Gp,D	A1,C,Gp,D	Group	B,C,Gp,D	A1,C,Gp,D
y	0.324	0.388	y	0.313	0.372
L (sec)	42	40	L (sec)	42	40
C (sec)	110	110	C (sec)	110	110
y pract.	0.556	0.573	y pract.	0.556	0.573
R.C. (%)	72%	48%	R.C. (%)	78%	54%

Stage / Phase Diagrams



I/G= 5		I/G= 5		I/G= 9	20	I/G= 4		I/G=	
I/G= 5		I/G= 5		I/G= 9	20	I/G= 4		I/G=	

Date: APR, 2019

Junction: Chai Wan Road / Lok Man Road (B)

TRANSPORT RESEARCH LABORATORY

CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

Visual PICADY 4 ANALYSIS PROGRAM
RELEASE 2.1 (DEC 1998)

THE USER OF THIS COMPUTER PROGRAM FOR THE SOLUTION OF AN ENGINEERING PROBLEM IS IN NO WAY RELIEVED OF HIS RESPONSIBILITY FOR THE CORRECTNESS OF THE SOLUTION

Run with file:- "o:\hkh\Junctions 2031 (CTIA)\Road Widening\JC Hong Man Street_Tai Man Street (Road Widening)\JC_2031DESAM.vpi" at 13:20:08 on Tuesday, 4 December 2018

RUN TITLE
****
JC - Hong Man St / Tai Man St (Road Widening) (2031DESAM)

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA

```
                   MAJOR ROAD (ARM C) --------------------- MAJOR ROAD (ARM A)
                                                 I
                                                 I
                                                 I
                                                 I
                                                 I
                                                 I
                                           MINOR ROAD (ARM B)
```

ARM A IS Hong Man St (NB)
ARM B IS Tai Man St (SB)
ARM C IS Hong Man St (WB)

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

ETC.

.GEOMETRIC DATA

DATA ITEM		MINOR ROAD B
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	(W)	10.30 M.
CENTRAL RESERVE WIDTH	(WCR)	0.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B)	3.50 M.
- VISIBILITY	(VC-B)	50.0 M.
- BLOCKS TRAFFIC		NO
MINOR ROAD - VISIBILITY TO LEFT	(VB-C)	50.0 M.
- VISIBILITY TO RIGHT	(VB-A)	50.0 M.
- LANE 1 WIDTH	(WB-C)	2.20 M.
- LANE 2 WIDTH	(WB-A)	2.20 M.

.

.TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 08.00 AND ENDS 09.30

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN: FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN): BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	3.13	4.69	3.13
ARM B	15.00	45.00	75.00	4.13	6.19	4.13
ARM C	15.00	45.00	75.00	3.00	4.50	3.00

.

TIME	FROM/TO	ARM A	ARM B	ARM C
		TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) / (PERCENTAGE OF H.V.S)		
08.00 - 09.30				
	ARM A	0.000	0.540	0.460
		0.0	135.0	115.0
		(0.0)	(0.1)	(0.1)

```
I                    I        I        I        I        I
I                    I  ARM B  I  0.485 I  0.000 I  0.515 I
I                    I        I  160.0 I    0.0 I  170.0 I
I                    I        I (  0.0)I (  0.0)I (  0.0)I
I                    I        I        I        I        I
I                    I  ARM C  I  0.375 I  0.625 I  0.000 I
I                    I        I   90.0 I  150.0 I    0.0 I
I                    I        I (  0.0)I (  0.0)I (  0.0)I
I                    I        I        I        I        I
----------------------------------------------------------

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/   I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.00-08.15                                                                                   I
I   B-C       2.13      8.96    0.237                0.0    0.3        4.4                      I
I   B-A       2.00      6.97    0.287                0.0    0.4        5.6                      I
I   C-A       1.13                                                                              I
I   C-B       1.88     10.79    0.174                0.0    0.2        3.0                      I
I   A-B       1.69                                                                              I
I   A-C       1.44                                                                              I
I                                                                                               I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                   I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)          (M)                       I
I                                                                                               I
I       B-C         0.097      0.002                                 0.009                      I
I       B-A         0.076      0.005       0.018      0.004          0.007                      I
I       C-B         0.103      0.004                  0.010                                     I
-------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/   I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.15-08.30                                                                                   I
I   B-C       2.54      8.72    0.291                0.3    0.4        5.9                      I
I   B-A       2.39      6.78    0.352                0.4    0.5        7.7                      I
I   C-A       1.34                                                                              I
I   C-B       2.24     10.66    0.210                0.2    0.3        3.9                      I
I   A-B       2.02                                                                              I
I   A-C       1.72                                                                              I
I                                                                                               I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                   I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)          (M)                       I
I                                                                                               I
I       B-C         0.095      0.002                                 0.008                      I
I       B-A         0.074      0.006       0.018      0.004          0.007                      I
I       C-B         0.102      0.004                  0.010                                     I
-------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/   I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.30-08.45                                                                                   I
I   B-C       3.11      8.39    0.371                0.4    0.6        8.3                      I
I   B-A       2.92      6.51    0.449                0.5    0.8       11.2                      I
I   C-A       1.65                                                                              I
I   C-B       2.74     10.48    0.262                0.3    0.4        5.1                      I
I   A-B       2.47                                                                              I
I   A-C       2.10                                                                              I
I                                                                                               I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                   I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)          (M)                       I
I                                                                                               I
I       B-C         0.091      0.003                                 0.008                      I
I       B-A         0.071      0.008       0.018      0.004          0.006                      I
I       C-B         0.100      0.005                  0.010                                     I
-------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/   I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.45-09.00                                                                                   I
I   B-C       3.11      8.38    0.371                0.6    0.6        8.7                      I
I   B-A       2.92      6.51    0.449                0.8    0.8       12.0                      I
I   C-A       1.65                                                                              I
I   C-B       2.74     10.48    0.262                0.4    0.4        5.3                      I
I   A-B       2.47                                                                              I
I   A-C       2.10                                                                              I
I                                                                                               I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                   I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)          (M)                       I
I                                                                                               I
I       B-C         0.091      0.003                                 0.008                      I
I       B-A         0.071      0.008       0.018      0.004          0.006                      I
I       C-B         0.100      0.005                  0.010                                     I
-------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/   I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 09.00-09.15                                                                                   I
I   B-C       2.54      8.71    0.291                0.6    0.4        6.5                      I
I   B-A       2.39      6.77    0.353                0.8    0.6        8.7                      I
I   C-A       1.34                                                                              I
I   C-B       2.24     10.66    0.210                0.4    0.3        4.1                      I
I   A-B       2.02                                                                              I
I   A-C       1.72                                                                              I
```

```
I                                                                                               I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                             MAJOR RD.    CENT RES  VIS TO LEFT     VISIBILITY                 I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)            (M)                     I
I                                                                                               I
I       B-C         0.095      0.002                                 0.008                      I
I       B-A         0.074      0.006       0.018       0.004         0.007                      I
I       C-B         0.102      0.004                   0.010                                    I
-------------------------------------------------------------------------------------------------

.-------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS)  (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 09.15-09.30                                                                                   I
I   B-C       2.13      8.94   0.238                 0.4    0.3        4.9                      I
I   B-A       2.00      6.96   0.287                 0.6    0.4        6.4                      I
I   C-A       1.13                                                                              I
I   C-B       1.88     10.79   0.174                 0.3    0.2        3.3                      I
I   A-B       1.69                                                                              I
I   A-C       1.44                                                                              I
I                                                                                               I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                             MAJOR RD.    CENT RES  VIS TO LEFT     VISIBILITY                 I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)            (M)                     I
I                                                                                               I
I       B-C         0.097      0.002                                 0.009                      I
I       B-A         0.076      0.005       0.018       0.004         0.007                      I
I       C-B         0.103      0.004                   0.010                                    I
-------------------------------------------------------------------------------------------------
.
QUEUE FOR STREAM   B-C
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  08.15           0.3
  08.30           0.4
  08.45           0.6    *
  09.00           0.6    *
  09.15           0.4
  09.30           0.3
.
QUEUE FOR STREAM   B-A
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  08.15           0.4
  08.30           0.5    *
  08.45           0.8    *
  09.00           0.8    *
  09.15           0.6    *
  09.30           0.4
.
QUEUE FOR STREAM   C-B
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  08.15           0.2
  08.30           0.3
  08.45           0.4
  09.00           0.4
  09.15           0.3
  09.30           0.2
.
                QUEUEING DELAY INFORMATION OVER WHOLE PERIOD
                --------------------------------------------

---------------------------------------------------------------------------
I STREAM I   TOTAL DEMAND  I   * QUEUEING *      I * INCLUSIVE QUEUEING * I
I        I                 I    * DELAY *        I       * DELAY *        I
I        I-----------------------------------------------------------------I
I        I  (VEH)   (VEH/H) I  (MIN)     (MIN/VEH) I    (MIN)      (MIN/VEH) I
---------------------------------------------------------------------------
I  B-C   I  233.1 I  155.4 I    38.7 I    0.17   I      38.7  I    0.17   I
I  B-A   I  219.4 I  146.3 I    51.6 I    0.24   I      51.6  I    0.24   I
I  C-A   I  123.4 I   82.3 I         I           I            I           I
I  C-B   I  205.7 I  137.1 I    24.7 I    0.12   I      24.7  I    0.12   I
I  A-B   I  185.1 I  123.4 I         I           I            I           I
I  A-C   I  157.7 I  105.1 I         I           I            I           I
---------------------------------------------------------------------------
I  ALL   I 1124.4 I  749.6 I   115.0 I    0.10   I     115.0  I    0.10   I
---------------------------------------------------------------------------


* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.


END OF JOB
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TRANSPORT RESEARCH LABORATORY

CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

Visual PICADY 4 ANALYSIS PROGRAM
RELEASE 2.1 (DEC 1998)

THE USER OF THIS COMPUTER PROGRAM FOR THE SOLUTION OF AN ENGINEERING PROBLEM IS IN NO WAY RELIEVED OF HIS RESPONSIBILITY FOR THE CORRECTNESS OF THE SOLUTION

Run with file:- "o:\hkh\Junctions 2031 (CTIA)\Road Widening\JC Hong Man Street_Tai Man Street (Road Widening)\JC_2031DESPM.vpi" at 13:20:11 on Tuesday, 4 December 2018

RUN TITLE
****
JC - Hong Man St / Tai Man St (Road Widening) (2031DESPM)

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA

```
MAJOR ROAD (ARM C) --------------------- MAJOR ROAD (ARM A)
                            I
                            I
                            I
                            I
                            I
                            I
                     MINOR ROAD (ARM B)
```

ARM A IS Hong Man St (NB)
ARM B IS Tai Man St (SB)
ARM C IS Hong Man St (WB)

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

ETC.

.GEOMETRIC DATA

DATA ITEM		MINOR ROAD B
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	(W)	10.30 M.
CENTRAL RESERVE WIDTH	(WCR)	0.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B)	3.50 M.
- VISIBILITY	(VC-B)	50.0 M.
- BLOCKS TRAFFIC		NO
MINOR ROAD - VISIBILITY TO LEFT	(VB-C)	50.0 M.
- VISIBILITY TO RIGHT	(VB-A)	50.0 M.
- LANE 1 WIDTH	(WB-C)	2.20 M.
- LANE 2 WIDTH	(WB-A)	2.20 M.

.

.TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 16.45 AND ENDS 18.15

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN: FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN): BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	2.69	4.03	2.69
ARM B	15.00	45.00	75.00	2.19	3.28	2.19
ARM C	15.00	45.00	75.00	2.81	4.22	2.81

.

TIME	FROM/TO	ARM A	ARM B	ARM C
		TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) / (PERCENTAGE OF H.V.S)		
16.45 - 18.15				
	ARM A	0.000	0.419	0.581
		0.0	90.0	125.0
		(0.0)	(0.1)	(0.1)

```
I                    I        I        I        I        I
I                    I  ARM B  I  0.371 I  0.000 I  0.629 I
I                    I        I   65.0 I    0.0 I  110.0 I
I                    I        I (  0.0)I (  0.0)I (  0.0)I
I                    I        I        I        I        I
I                    I  ARM C  I  0.644 I  0.356 I  0.000 I
I                    I        I  145.0 I   80.0 I    0.0 I
I                    I        I (  0.0)I (  0.0)I (  0.0)I
I                    I        I        I        I        I
-----------------------------------------------------------

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

.-------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/   I
I                                (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 16.45-17.00                                                                                    I
I   B-C       1.38      9.39    0.146                 0.0    0.2        2.5                      I
I   B-A       0.81      7.13    0.114                 0.0    0.1        1.8                      I
I   C-A       1.81                                                                               I
I   C-B       1.00     10.89    0.092                 0.0    0.1        1.5                      I
I   A-B       1.13                                                                               I
I   A-C       1.56                                                                               I
I                                                                                                I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                          I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                  I
I     MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                    I
I      CHANGE:     (.1M)       (.1M)       (.1M)        (M)            (M)                       I
I                                                                                                I
I       B-C         0.102      0.002                                 0.009                       I
I       B-A         0.078      0.004       0.018      0.005          0.007                       I
I       C-B         0.104      0.003                  0.010                                      I
--------------------------------------------------------------------------------------------------

.-------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/   I
I                                (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.00-17.15                                                                                    I
I   B-C       1.64      9.26    0.177                 0.2    0.2        3.1                      I
I   B-A       0.97      6.97    0.139                 0.1    0.2        2.3                      I
I   C-A       2.16                                                                               I
I   C-B       1.19     10.77    0.111                 0.1    0.1        1.8                      I
I   A-B       1.34                                                                               I
I   A-C       1.87                                                                               I
I                                                                                                I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                          I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                  I
I     MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                    I
I      CHANGE:     (.1M)       (.1M)       (.1M)        (M)            (M)                       I
I                                                                                                I
I       B-C         0.101      0.002                                 0.009                       I
I       B-A         0.076      0.005       0.018      0.004          0.007                       I
I       C-B         0.103      0.004                  0.010                                      I
--------------------------------------------------------------------------------------------------

.-------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/   I
I                                (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.15-17.30                                                                                    I
I   B-C       2.01      9.07    0.222                 0.2    0.3        4.1                      I
I   B-A       1.19      6.75    0.176                 0.2    0.2        3.1                      I
I   C-A       2.65                                                                               I
I   C-B       1.46     10.62    0.138                 0.1    0.2        2.3                      I
I   A-B       1.65                                                                               I
I   A-C       2.29                                                                               I
I                                                                                                I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                          I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                  I
I     MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                    I
I      CHANGE:     (.1M)       (.1M)       (.1M)        (M)            (M)                       I
I                                                                                                I
I       B-C         0.099      0.003                                 0.009                       I
I       B-A         0.073      0.006       0.018      0.004          0.006                       I
I       C-B         0.101      0.005                  0.010                                      I
--------------------------------------------------------------------------------------------------

.-------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/   I
I                                (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.30-17.45                                                                                    I
I   B-C       2.01      9.07    0.222                 0.3    0.3        4.2                      I
I   B-A       1.19      6.75    0.176                 0.2    0.2        3.2                      I
I   C-A       2.65                                                                               I
I   C-B       1.46     10.62    0.138                 0.2    0.2        2.4                      I
I   A-B       1.65                                                                               I
I   A-C       2.29                                                                               I
I                                                                                                I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                          I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                  I
I     MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                    I
I      CHANGE:     (.1M)       (.1M)       (.1M)        (M)            (M)                       I
I                                                                                                I
I       B-C         0.099      0.003                                 0.009                       I
I       B-A         0.073      0.006       0.018      0.004          0.006                       I
I       C-B         0.101      0.005                  0.010                                      I
--------------------------------------------------------------------------------------------------

.-------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/   I
I                                (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.45-18.00                                                                                    I
I   B-C       1.64      9.25    0.177                 0.3    0.2        3.4                      I
I   B-A       0.97      6.97    0.139                 0.2    0.2        2.5                      I
I   C-A       2.16                                                                               I
I   C-B       1.19     10.77    0.111                 0.2    0.1        1.9                      I
I   A-B       1.34                                                                               I
I   A-C       1.87                                                                               I
```

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I                                                                                               I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I      MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I       CHANGE:     (.1M)       (.1M)       (.1M)        (M)           (M)                      I
I                                                                                               I
I        B-C         0.101      0.002                                 0.009                     I
I        B-A         0.076      0.005       0.018       0.004         0.007                     I
I        C-B         0.103      0.004                   0.010                                   I
-------------------------------------------------------------------------------------------------

.------------------------------------------------------------------------------------------------
I TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START  END      DELAY     GEOMETRIC DELAYI
I        (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                             (RFC)    (PEDS/MIN) (VEHS)  (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 18.00-18.15                                                                                  I
I  B-C       1.38      9.39   0.146                0.2    0.2        2.7                       I
I  B-A       0.81      7.13   0.114                0.2    0.1        2.0                       I
I  C-A       1.81                                                                              I
I  C-B       1.00     10.89   0.092                0.1    0.1        1.6                       I
I  A-B       1.13                                                                              I
I  A-C       1.56                                                                              I
I                                                                                              I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                       I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY               I
I      MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                 I
I       CHANGE:     (.1M)       (.1M)       (.1M)        (M)           (M)                     I
I                                                                                              I
I        B-C         0.102      0.002                                 0.009                    I
I        B-A         0.078      0.004       0.018       0.005         0.007                    I
I        C-B         0.104      0.003                   0.010                                  I
------------------------------------------------------------------------------------------------
.
QUEUE FOR STREAM   B-C
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  17.00           0.2
  17.15           0.2
  17.30           0.3
  17.45           0.3
  18.00           0.2
  18.15           0.2
.
QUEUE FOR STREAM   B-A
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  17.00           0.1
  17.15           0.2
  17.30           0.2
  17.45           0.2
  18.00           0.2
  18.15           0.1
.
QUEUE FOR STREAM   C-B
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  17.00           0.1
  17.15           0.1
  17.30           0.2
  17.45           0.2
  18.00           0.1
  18.15           0.1
.
                QUEUEING DELAY INFORMATION OVER WHOLE PERIOD
                --------------------------------------------

---------------------------------------------------------------------------
I STREAM I   TOTAL DEMAND  I   * QUEUEING *      I * INCLUSIVE QUEUEING * I
I        I                 I    * DELAY *        I       * DELAY *        I
I        I--------------------------------------------------------------I
I        I  (VEH)  (VEH/H) I  (MIN)     (MIN/VEH) I    (MIN)     (MIN/VEH) I
---------------------------------------------------------------------------
I  B-C   I  150.8 I  100.6 I    20.0 I    0.13   I      20.0  I    0.13   I
I  B-A   I   89.1 I   59.4 I    14.9 I    0.17   I      14.9  I    0.17   I
I  C-A   I  198.8 I  132.6 I         I           I            I           I
I  C-B   I  109.7 I   73.1 I    11.5 I    0.10   I      11.5  I    0.10   I
I  A-B   I  123.4 I   82.3 I         I           I            I           I
I  A-C   I  171.4 I  114.3 I         I           I            I           I
---------------------------------------------------------------------------
I  ALL   I  843.3 I  562.2 I    46.4 I    0.05   I      46.4  I    0.05   I
---------------------------------------------------------------------------


* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.


END OF JOB
```

TRAFFIC SIGNALS CALCULATION

Job No.: HK501522 **MVA HONG KONG LIMITED**

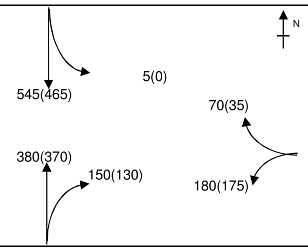
Junction: Chai Wan Road / Hong Man Street   Design Year: 2031

Description: 2031 Design Traffic Flows (Road Widening)(imp)   Designed By: LAU   Checked By: GPH

Approach	Movements	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Gradient (%)	Pro. Turning (%) AM	Pro. Turning (%) PM	Revised Saturation Flow (pcu/hr) AM	Revised Saturation Flow (pcu/hr) PM	AM Peak Flow (pcu/hr)	AM Peak y Value	AM Peak Critical y	PM Peak Flow (pcu/hr)	PM Peak y Value	PM Peak Critical y
Chai Wan Road (SB)		A	1	3.000	15			2%	0%	1910	1915	265	0.139	0.139	224	0.117	
		A	1	3.000						2055	2055	285	0.139		241	0.117	0.117
Chai Wan Road (NB)		B	1,2	3.500						1965	1965	183	0.093		179	0.091	
		B	1,2	3.500						2105	2105	197	0.094		191	0.091	
		C	2	3.500		15				1915	1915	150	0.078	0.078	130	0.068	0.068
Hong Man Road (WB)		D	4	3.500	25	25		72% / 28%	83% / 17%	1855	1855	250	0.135	0.135	210	0.113	0.113
Pedestrian Crossing		Ep	3	MIN GREEN + FLASH =			36	+	10	=	46			*			*
		Fp	3	MIN GREEN + FLASH =			8	+	7	=	15						

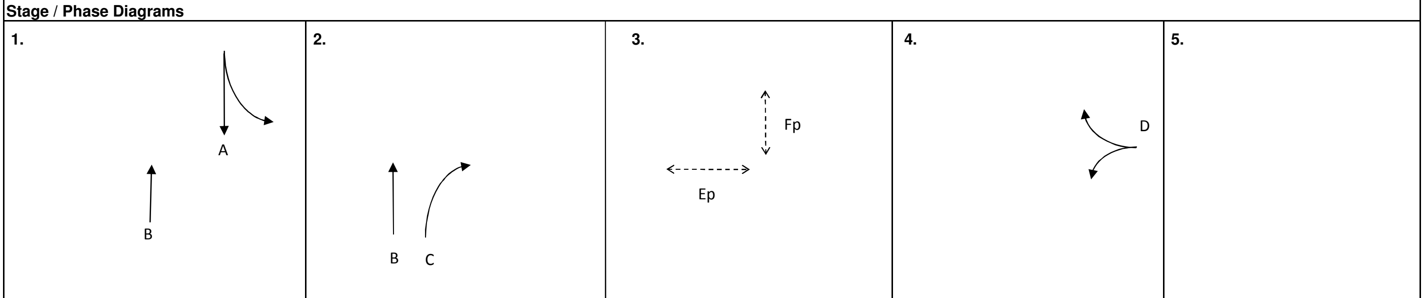
Notes:

Flow: (pcu/hr)



Group	A,C,Fp,D	A,C,Ep,D	Group	A,C,Fp,D	A,C,Ep,D
y	0.352	0.352	y	0.298	0.298
L (sec)	37	62	L (sec)	37	62
C (sec)	110	110	C (sec)	110	110
y pract.	0.597	0.393	y pract.	0.597	0.393
R.C. (%)	70%	12%	R.C. (%)	100%	32%

Stage / Phase Diagrams



I/G= 5		I/G= 5		I/G= 5	46	I/G= 4		I/G=	
I/G= 5		I/G= 5		I/G= 5	46	I/G= 4		I/G=	

Date: APR, 2019   Junction: D Chai Wan Road / Hong Man Street

TRAFFIC SIGNALS CALCULATION

Job No.: HK501522 **MVA HONG KONG LIMITED**

Junction: Chai Wan Road / Hong Man Street

Design Year: 2031

Description: 2031 Design Traffic Flows (Road Widening)(imp)

Designed By: LAU

Checked By: GPH

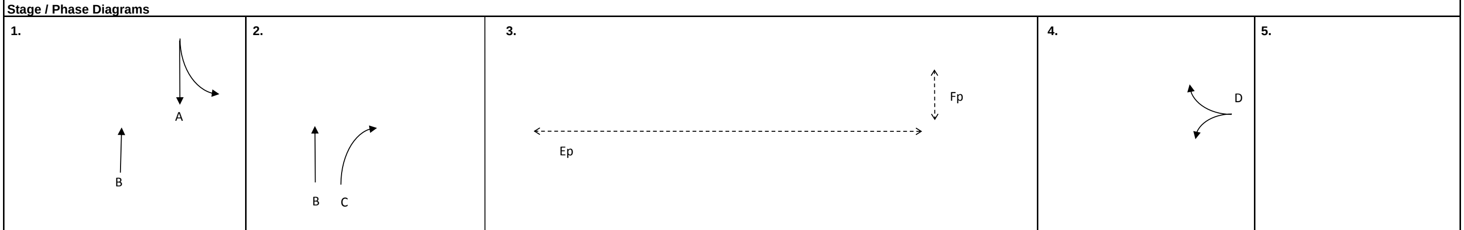
Approach	Movements	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Gradient (%)	Pro. Turning (%) AM	Pro. Turning (%) PM	Nearside 0/1	Opposing 0/1	Site Factor	Add Saturation Flow (pcu/hr)	Saturation Flow (pcu/hr)	Total Saturation Flow (pcu/hr)	Revised Saturation Flow (pcu/hr) AM	Revised Saturation Flow (pcu/hr) PM	AM Peak Flow (pcu/hr)	AM Peak y Value	AM Peak Critical y	PM Peak Flow (pcu/hr)	PM Peak y Value	PM Peak Critical y
Chai Wan Road (SB)		A	1	3.000	15			2%	0%	1		1	0	1915	3970	1910	1915	265	0.139	0.139	224	0.117	
		A	1	3.000						0		1	0	2055		2055	2055	285	0.139		241	0.117	0.117
Chai Wan Road (NB)		B	1,2	3.500						1		1	0	1965	4070	1965	1965	183	0.093		179	0.091	
		B	1,2	3.500						0		1	0	2105		2105	2105	197	0.094		191	0.091	
		C	2	3.500		15				0	0	1	0	2105	2105	1915	1915	150	0.078	0.078	130	0.068	0.068
Hong Man Road (WB)		D	4	3.500	25	25		72% / 28%	83% / 17%	1	0	1	0	1965	1965	1855	1855	250	0.135	0.135	210	0.113	0.113
Pedestrian Crossing		Ep	3	MIN GREEN + FLASH =			32	+	10							=	42			*			*
		Fp	3	MIN GREEN + FLASH =			8	+	7							=	15						

Notes:

Flow: (pcu/hr)

Group	A,C,Fp,D	A,C,Ep,D	Group	A,C,Fp,D	A,C,Ep,D
y	0.352	0.352	y	0.298	0.298
L (sec)	37	58	L (sec)	37	58
C (sec)	110	110	C (sec)	110	110
y pract.	0.597	0.425	y pract.	0.597	0.425
R.C. (%)	70%	21%	R.C. (%)	100%	43%

Stage / Phase Diagrams



I/G= 5		I/G= 5		I/G= 5	42	I/G= 4		I/G=	
I/G= 5		I/G= 5		I/G= 5	42	I/G= 4		I/G=	

Date: MAY, 2019

Junction: Chai Wan Road / Hong Man Street D

TRANSPORT RESEARCH LABORATORY

CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

Visual PICADY 4 ANALYSIS PROGRAM
RELEASE 2.1 (DEC 1998)

Run with file:- "o:\hkh\Junctions 2031 (CTIA)\Road Widening\JE Chai Wan Road_Wan Tsui Road (Road Widening)\JE_2031DESAM.vpi"
at 13:20:32 on Tuesday, 4 December 2018

RUN TITLE
****
JE - Chai Wan Road / Wan Tsui Road (Road Widening) (2031DESAM)

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA

```
MAJOR ROAD (ARM C) --------------------- MAJOR ROAD (ARM A)
                               I
                               I
                               I
                               I
                               I
                               I
                        MINOR ROAD (ARM B)
```

ARM A IS Chai Wan Rd (WB)
ARM B IS Wan Tsui Rd (NB)
ARM C IS Chai Wan Rd (EB)

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

ETC.

.GEOMETRIC DATA

DATA ITEM		MINOR ROAD B
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	(W)	17.50 M.
CENTRAL RESERVE WIDTH	(WCR)	3.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B)	3.00 M.
- VISIBILITY	(VC-B)	50.0 M.
- BLOCKS TRAFFIC		NO
MINOR ROAD - VISIBILITY TO LEFT	(VB-C)	50.0 M.
- VISIBILITY TO RIGHT	(VB-A)	50.0 M.
- LANE 1 WIDTH	(WB-C)	3.10 M.
- LANE 2 WIDTH	(WB-A)	3.10 M.

.

.TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 08.00 AND ENDS 09.30

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	4.94	7.41	4.94
ARM B	15.00	45.00	75.00	3.31	4.97	3.31
ARM C	15.00	45.00	75.00	9.00	13.50	9.00

.

TIME	FROM/TO	ARM A	ARM B	ARM C
		TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) / (PERCENTAGE OF H.V.S)		
08.00 - 09.30				
	ARM A	0.000	0.215	0.785
		0.0	85.0	310.0
		(0.0)	(0.0)	(0.0)

```
I                   I        I        I        I        I
I                   I  ARM B  I  0.189 I  0.000 I  0.811 I
I                   I        I   50.0 I    0.0 I  215.0 I
I                   I        I (  0.0)I (  0.0)I (  0.0)I
I                   I        I        I        I        I
I                   I  ARM C  I  0.771 I  0.229 I  0.000 I
I                   I        I  555.0 I  165.0 I    0.0 I
I                   I        I (  0.0)I (  0.0)I (  0.0)I
I                   I        I        I        I        I
----------------------------------------------------------

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/   I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.00-08.15                                                                                   I
I  B-C       2.69     10.28    0.262                 0.0    0.4        5.0                      I
I  B-A       0.63      7.91    0.079                 0.0    0.1        1.2                      I
I  C-A       6.94                                                                               I
I  C-B       2.06     10.30    0.200                 0.0    0.2        3.6                      I
I  A-B       1.06                                                                               I
I  A-C       3.88                                                                               I
I                                                                                               I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                   I
I      CHANGE:      (.1M)       (.1M)       (.1M)         (M)            (M)                    I
I                                                                                               I
I       B-C          0.102      0.005                                 0.010                     I
I       B-A          0.078      0.012       0.019       0.005         0.008                     I
I       C-B          0.103      0.005                   0.010                                   I
------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/   I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.15-08.30                                                                                   I
I  B-C       3.21     10.12    0.317                 0.4    0.5        6.7                      I
I  B-A       0.75      7.64    0.098                 0.1    0.1        1.6                      I
I  C-A       8.28                                                                               I
I  C-B       2.46     10.18    0.242                 0.2    0.3        4.6                      I
I  A-B       1.27                                                                               I
I  A-C       4.63                                                                               I
I                                                                                               I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                   I
I      CHANGE:      (.1M)       (.1M)       (.1M)         (M)            (M)                    I
I                                                                                               I
I       B-C          0.100      0.006                                 0.010                     I
I       B-A          0.076      0.015       0.019       0.005         0.007                     I
I       C-B          0.102      0.007                   0.010                                   I
------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/   I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.30-08.45                                                                                   I
I  B-C       3.93      9.90    0.397                 0.5    0.6        9.4                      I
I  B-A       0.91      7.26    0.126                 0.1    0.1        2.1                      I
I  C-A      10.15                                                                               I
I  C-B       3.02     10.01    0.301                 0.3    0.4        6.2                      I
I  A-B       1.55                                                                               I
I  A-C       5.67                                                                               I
I                                                                                               I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                   I
I      CHANGE:      (.1M)       (.1M)       (.1M)         (M)            (M)                    I
I                                                                                               I
I       B-C          0.098      0.007                                 0.010                     I
I       B-A          0.072      0.018       0.019       0.005         0.007                     I
I       C-B          0.100      0.008                   0.010                                   I
------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/   I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.45-09.00                                                                                   I
I  B-C       3.93      9.90    0.397                 0.6    0.7        9.7                      I
I  B-A       0.91      7.26    0.126                 0.1    0.1        2.1                      I
I  C-A      10.15                                                                               I
I  C-B       3.02     10.01    0.301                 0.4    0.4        6.4                      I
I  A-B       1.55                                                                               I
I  A-C       5.67                                                                               I
I                                                                                               I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                   I
I      CHANGE:      (.1M)       (.1M)       (.1M)         (M)            (M)                    I
I                                                                                               I
I       B-C          0.098      0.007                                 0.010                     I
I       B-A          0.072      0.018       0.019       0.005         0.007                     I
I       C-B          0.100      0.008                   0.010                                   I
------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/   I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 09.00-09.15                                                                                   I
I  B-C       3.21     10.12    0.317                 0.7    0.5        7.3                      I
I  B-A       0.75      7.64    0.098                 0.1    0.1        1.7                      I
I  C-A       8.28                                                                               I
I  C-B       2.46     10.18    0.242                 0.4    0.3        5.0                      I
I  A-B       1.27                                                                               I
I  A-C       4.63                                                                               I
```

```
I                                                                                                 I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I      MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I       CHANGE:     (.1M)       (.1M)       (.1M)         (M)           (M)                      I
I                                                                                                 I
I        B-C         0.100      0.006                                  0.010                     I
I        B-A         0.076      0.015       0.019      0.005           0.007                     I
I        C-B         0.102      0.007                  0.010                                     I
---------------------------------------------------------------------------------------------------

.--------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY      GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/   I
I                              (RFC)    (PEDS/MIN) (VEHS)  (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 09.15-09.30                                                                                     I
I  B-C       2.69     10.27    0.262                  0.5    0.4        5.5                      I
I  B-A       0.63      7.91    0.079                  0.1    0.1        1.3                      I
I  C-A       6.94                                                                                 I
I  C-B       2.06     10.30    0.200                  0.3    0.3        3.9                      I
I  A-B       1.06                                                                                 I
I  A-C       3.88                                                                                 I
I                                                                                                 I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I      MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I       CHANGE:     (.1M)       (.1M)       (.1M)         (M)           (M)                      I
I                                                                                                 I
I        B-C         0.102      0.005                                  0.010                     I
I        B-A         0.078      0.012       0.019      0.005           0.008                     I
I        C-B         0.103      0.005                  0.010                                     I
---------------------------------------------------------------------------------------------------
.
QUEUE FOR STREAM   B-C
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  08.15           0.4
  08.30           0.5
  08.45           0.6    *
  09.00           0.7    *
  09.15           0.5
  09.30           0.4
.
QUEUE FOR STREAM   B-A
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  08.15           0.1
  08.30           0.1
  08.45           0.1
  09.00           0.1
  09.15           0.1
  09.30           0.1
.
QUEUE FOR STREAM   C-B
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  08.15           0.2
  08.30           0.3
  08.45           0.4
  09.00           0.4
  09.15           0.3
  09.30           0.3
.
                QUEUEING DELAY INFORMATION OVER WHOLE PERIOD
                --------------------------------------------

---------------------------------------------------------------------------
I STREAM I   TOTAL DEMAND  I   * QUEUEING *       I * INCLUSIVE QUEUEING * I
I        I                 I    * DELAY *         I       * DELAY *        I
I        I---------------------------------------------------------------I
I        I  (VEH)  (VEH/H) I  (MIN)    (MIN/VEH)  I    (MIN)     (MIN/VEH) I
---------------------------------------------------------------------------
I  B-C   I  294.8 I  196.5 I    43.6 I    0.15    I      43.6  I    0.15   I
I  B-A   I   68.6 I   45.7 I    10.0 I    0.15    I      10.0  I    0.15   I
I  C-A   I  761.0 I  507.3 I         I            I            I           I
I  C-B   I  226.2 I  150.8 I    29.7 I    0.13    I      29.7  I    0.13   I
I  A-B   I  116.6 I   77.7 I         I            I            I           I
I  A-C   I  425.1 I  283.4 I         I            I            I           I
---------------------------------------------------------------------------
I  ALL   I 1892.3 I 1261.5 I    83.4 I    0.04    I      83.4  I    0.04   I
---------------------------------------------------------------------------


* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.


END OF JOB
```

TRANSPORT RESEARCH LABORATORY

CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

Visual PICADY 4 ANALYSIS PROGRAM
RELEASE 2.1 (DEC 1998)

THE USER OF THIS COMPUTER PROGRAM FOR THE SOLUTION OF AN ENGINEERING PROBLEM IS
IN NO WAY RELIEVED OF HIS RESPONSIBILITY FOR THE CORRECTNESS OF THE SOLUTION

Run with file:- "o:\hkh\Junctions 2031 (CTIA)\Road Widening\JE Chai Wan Road_Wan Tsui Road (Road Widening)\JE_2031DESPM.vpi"
at 13:20:36 on Tuesday, 4 December 2018

RUN TITLE
****
JE - Chai Wan Road / Wan Tsui Road (Road Widening) (2031DESPM)

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA

```
MAJOR ROAD (ARM C) --------------------- MAJOR ROAD (ARM A)
                             I
                             I
                             I
                             I
                             I
                             I
                      MINOR ROAD (ARM B)
```

ARM A IS Chai Wan Rd (WB)
ARM B IS Wan Tsui Rd (NB)
ARM C IS Chai Wan Rd (EB)

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

ETC.

.GEOMETRIC DATA

DATA ITEM		MINOR ROAD B
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	(W)	17.50 M.
CENTRAL RESERVE WIDTH	(WCR)	3.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B)	3.00 M.
- VISIBILITY	(VC-B)	50.0 M.
- BLOCKS TRAFFIC		NO
MINOR ROAD - VISIBILITY TO LEFT	(VB-C)	50.0 M.
- VISIBILITY TO RIGHT	(VB-A)	50.0 M.
- LANE 1 WIDTH	(WB-C)	3.10 M.
- LANE 2 WIDTH	(WB-A)	3.10 M.

.

.TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 16.45 AND ENDS 18.15

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN: FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN): BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	4.88	7.31	4.88
ARM B	15.00	45.00	75.00	3.19	4.78	3.19
ARM C	15.00	45.00	75.00	7.94	11.91	7.94

.

TIME	FROM/TO	ARM A	ARM B	ARM C
		TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) / (PERCENTAGE OF H.V.S)		
16.45 - 18.15				
	ARM A	0.000	0.282	0.718
		0.0	110.0	280.0
		(0.0)	(0.0)	(0.0)

```
I                    I         I         I         I         I
I                    I  ARM B  I  0.157 I  0.000 I  0.843 I
I                    I         I   40.0 I    0.0 I  215.0 I
I                    I         I (  0.0)I (  0.0)I (  0.0)I
I                    I         I        I        I        I
I                    I  ARM C  I  0.709 I  0.291 I  0.000 I
I                    I         I  450.0 I  185.0 I    0.0 I
I                    I         I (  0.0)I (  0.0)I (  0.0)I
I                    I         I        I        I        I
----------------------------------------------------------

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

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I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 16.45-17.00                                                                                   I
I  B-C       2.69     10.35    0.260                 0.0    0.3        5.0                      I
I  B-A       0.50      8.00    0.062                 0.0    0.1        1.0                      I
I  C-A       5.63                                                                               I
I  C-B       2.31     10.30    0.224                 0.0    0.3        4.1                      I
I  A-B       1.38                                                                               I
I  A-C       3.50                                                                               I
I                                                                                               I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                   I
I      CHANGE:      (.1M)      (.1M)       (.1M)         (M)           (M)                      I
I                                                                                               I
I       B-C         0.103     0.004                                  0.010                      I
I       B-A         0.079     0.011       0.019      0.005           0.008                      I
I       C-B         0.103     0.005                  0.010                                      I
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I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.00-17.15                                                                                   I
I  B-C       3.21     10.21    0.314                 0.3    0.5        6.6                      I
I  B-A       0.60      7.74    0.077                 0.1    0.1        1.2                      I
I  C-A       6.72                                                                               I
I  C-B       2.76     10.18    0.271                 0.3    0.4        5.4                      I
I  A-B       1.64                                                                               I
I  A-C       4.18                                                                               I
I                                                                                               I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                   I
I      CHANGE:      (.1M)      (.1M)       (.1M)         (M)           (M)                      I
I                                                                                               I
I       B-C         0.101     0.005                                  0.010                      I
I       B-A         0.077     0.014       0.019      0.005           0.007                      I
I       C-B         0.102     0.006                  0.010                                      I
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I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.15-17.30                                                                                   I
I  B-C       3.93     10.02    0.392                 0.5    0.6        9.2                      I
I  B-A       0.73      7.39    0.099                 0.1    0.1        1.6                      I
I  C-A       8.23                                                                               I
I  C-B       3.38     10.02    0.338                 0.4    0.5        7.3                      I
I  A-B       2.01                                                                               I
I  A-C       5.12                                                                               I
I                                                                                               I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                   I
I      CHANGE:      (.1M)      (.1M)       (.1M)         (M)           (M)                      I
I                                                                                               I
I       B-C         0.099     0.006                                  0.010                      I
I       B-A         0.073     0.017       0.019      0.005           0.007                      I
I       C-B         0.100     0.008                  0.010                                      I
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I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.30-17.45                                                                                   I
I  B-C       3.93     10.02    0.392                 0.6    0.6        9.6                      I
I  B-A       0.73      7.39    0.099                 0.1    0.1        1.6                      I
I  C-A       8.23                                                                               I
I  C-B       3.38     10.02    0.338                 0.5    0.5        7.6                      I
I  A-B       2.01                                                                               I
I  A-C       5.12                                                                               I
I                                                                                               I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                   I
I      CHANGE:      (.1M)      (.1M)       (.1M)         (M)           (M)                      I
I                                                                                               I
I       B-C         0.099     0.006                                  0.010                      I
I       B-A         0.073     0.017       0.019      0.005           0.007                      I
I       C-B         0.100     0.008                  0.010                                      I
-------------------------------------------------------------------------------------------------

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I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.45-18.00                                                                                   I
I  B-C       3.21     10.21    0.314                 0.6    0.5        7.2                      I
I  B-A       0.60      7.74    0.077                 0.1    0.1        1.3                      I
I  C-A       6.72                                                                               I
I  C-B       2.76     10.18    0.271                 0.5    0.4        5.8                      I
I  A-B       1.64                                                                               I
I  A-C       4.18                                                                               I
```

EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:

MARGINAL CHANGE:	LANE WIDTH (.1M)	MAJOR RD. WIDTH (.1M)	CENT RES WIDTH (.1M)	VIS TO LEFT (AHEAD FOR MAJOR) (M)	VISIBILITY TO RIGHT (M)
B-C	0.101	0.005			0.010
B-A	0.077	0.014	0.019	0.005	0.007
C-B	0.102	0.006		0.010	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
18.00-18.15								
B-C	2.69	10.35	0.260		0.5	0.4	5.5	
B-A	0.50	8.00	0.063		0.1	0.1	1.0	
C-A	5.63							
C-B	2.31	10.30	0.224		0.4	0.3	4.5	
A-B	1.38							
A-C	3.50							

EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:

MARGINAL CHANGE:	LANE WIDTH (.1M)	MAJOR RD. WIDTH (.1M)	CENT RES WIDTH (.1M)	VIS TO LEFT (AHEAD FOR MAJOR) (M)	VISIBILITY TO RIGHT (M)
B-C	0.103	0.004			0.010
B-A	0.079	0.011	0.019	0.005	0.008
C-B	0.103	0.005		0.010	

QUEUE FOR STREAM B-C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.00	0.3	
17.15	0.5	
17.30	0.6	*
17.45	0.6	*
18.00	0.5	
18.15	0.4	

QUEUE FOR STREAM B-A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
17.00	0.1
17.15	0.1
17.30	0.1
17.45	0.1
18.00	0.1
18.15	0.1

QUEUE FOR STREAM C-B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.00	0.3	
17.15	0.4	
17.30	0.5	*
17.45	0.5	*
18.00	0.4	
18.15	0.3	

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND (VEH)	TOTAL DEMAND (VEH/H)	* QUEUEING * * DELAY * (MIN)	* QUEUEING * * DELAY * (MIN/VEH)	* INCLUSIVE QUEUEING * * DELAY * (MIN)	* INCLUSIVE QUEUEING * * DELAY * (MIN/VEH)
B-C	294.8	196.5	43.0	0.15	43.0	0.15
B-A	54.8	36.6	7.7	0.14	7.7	0.14
C-A	617.0	411.4				
C-B	253.7	169.1	34.7	0.14	34.7	0.14
A-B	150.8	100.6				
A-C	383.9	256.0				
ALL	1755.2	1170.1	85.4	0.05	85.4	0.05

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

TRANSPORT RESEARCH LABORATORY

CAPACITIES, QUEUES AND DELAYS AT ROUNDABOUTS

Visual ARCADY 4 ANALYSIS PROGRAM
RELEASE 2.1 (OCT 1998)

THE USER OF THIS COMPUTER PROGRAM FOR THE SOLUTION OF AN ENGINEERING PROBLEM IS IN NO WAY RELIEVED OF HIS RESPONSIBILITY FOR THE CORRECTNESS OF THE SOLUTION

Run with file:- "o:\hkh\Junctions 2031 (CTIA)\Road Widening\JF Chai Wan Road Roundabout (Road Widening)\JF_2031DESAM.vai" at 13:21:23 on Tuesday, 4 December 2018

.ROUNDABOUT CAPACITY AND DELAY
****

RUN TITLE
****
JF- Chai Wan Road / Island Eastern Corridor / Wan Tsui Road (Road Widening) (203

.INPUT DATA
****
ARM A - Island Eastern Corrodor
ARM B - Chai Wan Road (east of roundabout)
ARM C - Wan Tsui Road
ARM D - Chai Wan Road (west of roundabout)

.GEOMETRIC DATA

ARM	V (M)	E (M)	L (M)	R (M)	D (M)	PHI (DEG)	SLOPE	INTERCEPT (PCU/MIN)
ARM A	7.30	7.30	1.00	100.00	80.00	0.0	0.626	42.145
ARM B	7.30	7.30	1.00	50.00	80.00	0.0	0.620	41.784
ARM C	7.00	7.00	1.00	25.00	80.00	3.0	0.589	39.008
ARM D	10.50	10.50	1.00	50.00	80.00	0.0	0.782	60.101

.TRAFFIC DEMAND DATA

.TIME PERIOD BEGINS 08.00 AND ENDS 09.30
.LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

.DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN: FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN): BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	10.50	15.75	10.50
ARM B	15.00	45.00	75.00	10.69	16.03	10.69
ARM C	15.00	45.00	75.00	4.88	7.31	4.88
ARM D	15.00	45.00	75.00	17.25	25.88	17.25

TIME	FROM/TO	ARM A	ARM B	ARM C	ARM D
		TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) / (PERCENTAGE OF H.V.S)			
08.00 - 09.30					
	ARM A	0.298	0.268	0.250	0.185
		250.0	225.0	210.0	155.0
		(0.1)	(0.1)	(0.1)	(0.1)
	ARM B	0.444	0.111	0.251	0.193
		380.0	95.0	215.0	165.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM C	0.385	0.564	0.000	0.051
		150.0	220.0	0.0	20.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM D	0.533	0.301	0.098	0.069
		735.0	415.0	135.0	95.0
		(0.0)	(0.0)	(0.0)	(0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

. QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.00-08.15								
ARM A	10.50	34.62	0.303		0.0	0.4	6.4	
ARM B	10.69	35.24	0.303		0.0	0.4	6.4	
ARM C	4.88	30.63	0.159		0.0	0.2	2.8	
ARM D	17.25	49.43	0.349		0.0	0.5	7.9	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.15-08.30								
ARM A	12.54	33.15	0.378		0.4	0.6	8.9	
ARM B	12.76	33.96	0.376		0.4	0.6	8.8	
ARM C	5.82	28.99	0.201		0.2	0.3	3.7	
ARM D	20.60	47.33	0.435		0.5	0.8	11.3	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.30-08.45								
ARM A	15.36	31.15	0.493		0.6	1.0	14.1	
ARM B	15.63	32.21	0.485		0.6	0.9	13.7	
ARM C	7.13	26.74	0.267		0.3	0.4	5.3	
ARM D	25.23	44.47	0.567		0.8	1.3	19.1	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.45-09.00								
ARM A	15.36	31.13	0.493		1.0	1.0	14.5	
ARM B	15.63	32.19	0.486		0.9	0.9	14.1	
ARM C	7.13	26.72	0.267		0.4	0.4	5.4	
ARM D	25.23	44.45	0.568		1.3	1.3	19.6	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
09.00-09.15								
ARM A	12.54	33.13	0.378		1.0	0.6	9.4	
ARM B	12.76	33.94	0.376		0.9	0.6	9.3	
ARM C	5.82	28.96	0.201		0.4	0.3	3.8	
ARM D	20.60	47.30	0.435		1.3	0.8	11.8	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
09.15-09.30								
ARM A	10.50	34.59	0.304		0.6	0.4	6.7	
ARM B	10.69	35.22	0.303		0.6	0.4	6.7	
ARM C	4.88	30.60	0.159		0.3	0.2	2.9	
ARM D	17.25	49.39	0.349		0.8	0.5	8.2	

.QUEUE AT ARM A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.15	0.4	
08.30	0.6	*
08.45	1.0	*
09.00	1.0	*
09.15	0.6	*
09.30	0.4	

.QUEUE AT ARM B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.15	0.4	
08.30	0.6	*
08.45	0.9	*
09.00	0.9	*
09.15	0.6	*
09.30	0.4	

.QUEUE AT ARM C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
08.15	0.2
08.30	0.3
08.45	0.4
09.00	0.4
09.15	0.3
09.30	0.2

.QUEUE AT ARM D

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.15	0.5	*
08.30	0.8	*
08.45	1.3	*

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  09.00           1.3  *
  09.15           0.8  *
  09.30           0.5  *
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QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

ARM	TOTAL DEMAND		* QUEUEING * * DELAY *		* INCLUSIVE QUEUEING * * DELAY *	
	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
A	1151.8	767.9	60.0	0.05	60.0	0.05
B	1172.4	781.6	58.9	0.05	58.9	0.05
C	534.8	356.5	24.0	0.04	24.0	0.04
D	1892.3	1261.5	77.9	0.04	77.9	0.04
ALL	4751.2	3167.5	220.8	0.05	220.8	0.05

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD.
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

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.ROUNDABOUT CAPACITY AND DELAY
****

RUN TITLE
****
JF- Chai Wan Road / Island Eastern Corridor / Wan Tsui Road (Road Widening) (203

.INPUT DATA
****
ARM A - Island Eastern Corrodor
ARM B - Chai Wan Road (east of roundabout)
ARM C - Wan Tsui Road
ARM D - Chai Wan Road (west of roundabout)

.GEOMETRIC DATA

ARM	V (M)	E (M)	L (M)	R (M)	D (M)	PHI (DEG)	SLOPE	INTERCEPT (PCU/MIN)
ARM A	7.30	7.30	1.00	100.00	80.00	0.0	0.626	42.145
ARM B	7.30	7.30	1.00	50.00	80.00	0.0	0.620	41.784
ARM C	7.00	7.00	1.00	25.00	80.00	3.0	0.589	39.008
ARM D	10.50	10.50	1.00	50.00	80.00	0.0	0.782	60.101

.TRAFFIC DEMAND DATA

.TIME PERIOD BEGINS 16.45 AND ENDS 18.15
.LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

.DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	12.19	18.28	12.19
ARM B	15.00	45.00	75.00	11.38	17.06	11.38
ARM C	15.00	45.00	75.00	5.38	8.06	5.38
ARM D	15.00	45.00	75.00	16.19	24.28	16.19

TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) / (PERCENTAGE OF H.V.S)

TIME	FROM/TO	ARM A	ARM B	ARM C	ARM D
16.45 - 18.15					
	ARM A	0.215	0.354	0.226	0.205
		210.0	345.0	220.0	200.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM B	0.451	0.082	0.313	0.154
		410.0	75.0	285.0	140.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM C	0.314	0.640	0.012	0.035
		135.0	275.0	5.0	15.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM D	0.502	0.317	0.097	0.085
		650.0	410.0	125.0	110.0
		(0.0)	(0.0)	(0.0)	(0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

. QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
16.45-17.00								
ARM A	12.19	34.34	0.355		0.0	0.5	8.1	
ARM B	11.38	35.06	0.324		0.0	0.5	7.0	
ARM C	5.38	30.60	0.176		0.0	0.2	3.1	
ARM D	16.19	49.28	0.328		0.0	0.5	7.2	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
17.00-17.15								
ARM A	14.55	32.81	0.444		0.5	0.8	11.7	
ARM B	13.58	33.74	0.403		0.5	0.7	9.9	
ARM C	6.42	28.95	0.222		0.2	0.3	4.2	
ARM D	19.33	47.16	0.410		0.5	0.7	10.2	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
17.15-17.30								
ARM A	17.82	30.72	0.580		0.8	1.4	19.8	
ARM B	16.64	31.94	0.521		0.7	1.1	15.8	
ARM C	7.86	26.69	0.294		0.3	0.4	6.1	
ARM D	23.67	44.26	0.535		0.7	1.1	16.8	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
17.30-17.45								
ARM A	17.82	30.71	0.580		1.4	1.4	20.6	
ARM B	16.64	31.92	0.521		1.1	1.1	16.2	
ARM C	7.86	26.67	0.295		0.4	0.4	6.2	
ARM D	23.67	44.24	0.535		1.1	1.1	17.2	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
17.45-18.00								
ARM A	14.55	32.79	0.444		1.4	0.8	12.3	
ARM B	13.58	33.71	0.403		1.1	0.7	10.4	
ARM C	6.42	28.91	0.222		0.4	0.3	4.4	
ARM D	19.33	47.12	0.410		1.1	0.7	10.6	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
18.00-18.15								
ARM A	12.19	34.32	0.355		0.8	0.6	8.4	
ARM B	11.38	35.03	0.325		0.7	0.5	7.4	
ARM C	5.38	30.56	0.176		0.3	0.2	3.2	
ARM D	16.19	49.24	0.329		0.7	0.5	7.5	

.QUEUE AT ARM A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.00	0.5	*
17.15	0.8	*
17.30	1.4	*
17.45	1.4	*
18.00	0.8	*
18.15	0.6	*

.QUEUE AT ARM B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.00	0.5	
17.15	0.7	*
17.30	1.1	*
17.45	1.1	*
18.00	0.7	*
18.15	0.5	

.QUEUE AT ARM C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
17.00	0.2
17.15	0.3
17.30	0.4
17.45	0.4
18.00	0.3
18.15	0.2

.QUEUE AT ARM D

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.00	0.5	
17.15	0.7	*
17.30	1.1	*

```
  17.45           1.1  *
  18.00           0.7  *
  18.15           0.5
```

. QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

ARM	TOTAL DEMAND (VEH)	TOTAL DEMAND (VEH/H)	* QUEUEING * * DELAY * (MIN)	* QUEUEING * * DELAY * (MIN/VEH)	* INCLUSIVE QUEUEING * * DELAY * (MIN)	* INCLUSIVE QUEUEING * * DELAY * (MIN/VEH)
A	1336.9	891.3	80.9	0.06	80.9	0.06
B	1247.8	831.9	66.6	0.05	66.6	0.05
C	589.6	393.1	27.3	0.05	27.3	0.05
D	1775.7	1183.8	69.5	0.04	69.5	0.04
ALL	4950.1	3300.0	244.3	0.05	244.3	0.05

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD.
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

TRAFFIC SIGNALS CALCULATION

Job No.: HK501522 **MVA HONG KONG LIMITED**

Junction: Chai Wan Road / Tai Tam Road | Design Year: 2031

Description: 2031 Design Traffic Flows (Construction) | Designed By: LAU | Checked By: GPH

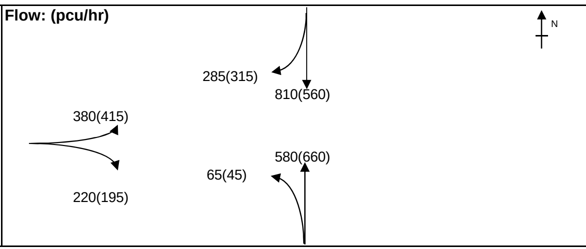
Approach	Movements	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Gradient (%)	Pro. Turning (%) AM	Pro. Turning (%) PM	Revised Saturation Flow (pcu/hr) AM	Revised Saturation Flow (pcu/hr) PM	AM Peak Flow (pcu/hr)	AM Peak y Value	AM Peak Critical y	PM Peak Flow (pcu/hr)	PM Peak y Value	PM Peak Critical y
Chai Wan Road (SB)		A	1	3.650			3.5			1835	1835	390	0.213		270	0.147	
		A	1	3.650			3.5			1975	1975	420	0.213	0.213	290	0.147	
		A	1	3.650		15	3.5			1795	1795	285	0.159		315	0.175	0.175
Chai Wan Road (NB)		B	2	3.650	15		3.5			1665	1665	65	0.039		45	0.027	
		B	2	3.650			3.5			1975	1975	290	0.147	0.147	330	0.167	0.167
		B	2	3.650			3.5			1975	1975	290	0.147		330	0.167	
Tai Tam Road (EB)*		C	3	3.500	20	25		63% / 37%	68% / 32%	1835	1835	600	0.327	0.327	610	0.332	0.332

Pedestrian Crossing	Phase	Stage						
Pedestrian Crossing	Dp	1	MIN GREEN + FLASH =	7	+	8	=	15
	Ep	2,3	MIN GREEN + FLASH =	21	+	10	=	31
	Fp	3	MIN GREEN + FLASH =	7	+	8	=	15
	Gp	1,2	MIN GREEN + FLASH =	21	+	12	=	33

Notes:

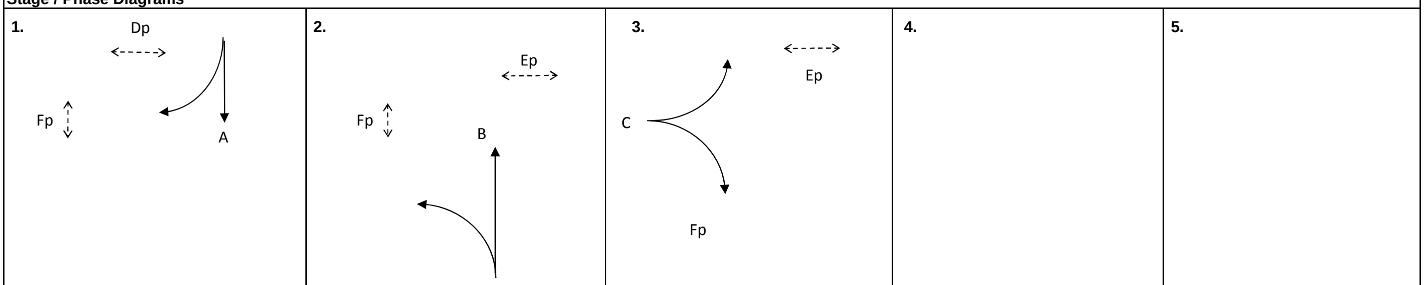
* 20m flare lane, 135pcu/hr deduction of left turning flow

Flow: (pcu/hr)



Group	Dp,B,C	A,B,C	Group	Dp,B,C	A,B,C
y	0.474	0.686	y	0.500	0.675
L (sec)	33	16	L (sec)	33	16
C (sec)	110	110	C (sec)	110	110
y pract.	0.630	0.769	y pract.	0.630	0.769
R.C. (%)	33%	12%	R.C. (%)	26%	14%

Stage / Phase Diagrams



I/G= 6		I/G= 6		I/G= 7		I/G=		I/G=	
I/G= 6		I/G= 6		I/G= 7		I/G=		I/G=	

Date: MAY, 2019 | **Junction:** Chai Wan Road / Tai Tam Road (A)

TRAFFIC SIGNALS CALCULATION

Job No.: HK501522 **MVA HONG KONG LIMITED**

Junction: Chai Wan Road / Tai Tam Road — Design Year: 2031

Description: 2031 Design Traffic Flows (Construction) (improvement) — Designed By: LAU — Checked By: GPH

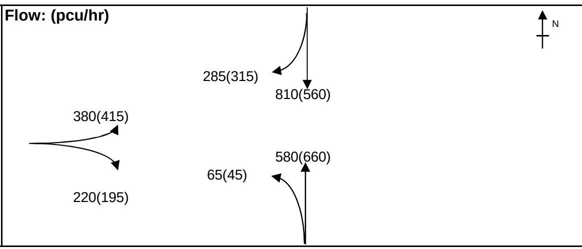
Approach	Movements	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Gradient (%)	Pro. Turning (%) AM	Pro. Turning (%) PM	Revised Saturation Flow (pcu/hr) AM	Revised Saturation Flow (pcu/hr) PM	AM Peak Flow (pcu/hr)	AM Peak y Value	AM Peak Critical y	PM Peak Flow (pcu/hr)	PM Peak y Value	PM Peak Critical y
Chai Wan Road (SB)		A1	1,2	3.500			3.5			1820	1820	390	0.214		270	0.148	
		A1	1,2	3.500			3.5			1960	1960	420	0.214		290	0.148	
		A2	2	3.500		15	3.5			1780	1780	285	0.160	0.160	315	0.177	0.177
Chai Wan Road (NB)		B	1	3.650	15		3.5			1665	1665	65	0.039		45	0.027	
		B	1	3.650			3.5			1975	1975	290	0.147	0.147	330	0.167	0.167
		B	1	3.650			3.5			1975	1975	290	0.147		330	0.167	
Tai Tam Road (EB)*		C	3	3.500	20	25		63% / 37%	68% / 32%	1835	1835	600	0.327	0.327	610	0.332	0.332

Pedestrian Crossing	Phase	Stage							
Pedestrian Crossing	Dp	2	MIN GREEN + FLASH =	7	+	8	=	15
	Ep	3	MIN GREEN + FLASH =	8	+	6	=	14
	Fp	3	MIN GREEN + FLASH =	7	+	8	=	15
	Gp	1,2	MIN GREEN + FLASH =	21	+	12	=	33

Notes:

* 20m flare lane, 135pcu/hr deduction of left turning flow

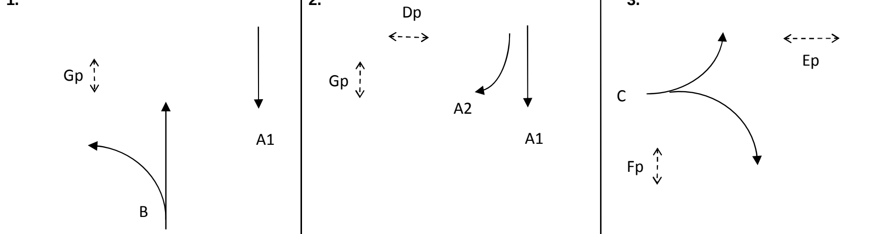
Flow: (pcu/hr)



Group	B,Dp,C	B,A2,C	Group	B,Dp,C	B,A2,C
y	0.474	0.634	y	0.500	0.676
L (sec)	36	12	L (sec)	36	12
C (sec)	110	110	C (sec)	110	110
y pract.	0.605	0.802	y pract.	0.605	0.802
R.C. (%)	28%	26%	R.C. (%)	21%	19%

Stage / Phase Diagrams

1. **2.** **3.** **4.** **5.**



I/G= 5		I/G= 5		I/G= 5		I/G=		I/G=	
I/G= 5		I/G= 5		I/G= 5		I/G=		I/G=	

Date: MAY, 2019 **Junction:** Chai Wan Road / Tai Tam Road (A)

TRAFFIC SIGNALS CALCULATION

Job No.: HK501522 **MVA HONG KONG LIMITED**

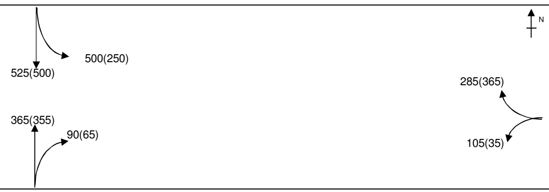
Junction: Chai Wan Road / Lok Man Road | Design Year: 2031

Description: 2031 Design Traffic Flows (Construction) | Designed By: LAU | Checked By: GPH

Approach	Movements	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Gradient (%)	Pro. Turning (%) AM	Pro. Turning (%) PM	Nearside 0/1	Opposing 0/1	Site Factor	Add Saturation Flow (pcu/hr)	Saturation Flow (pcu/hr)	Total Saturation Flow (pcu/hr)	Revised Saturation Flow (pcu/hr) AM	Revised Saturation Flow (pcu/hr) PM	AM Peak Flow (pcu/hr)	AM Peak y Value	AM Peak Critical y	PM Peak Flow (pcu/hr)	PM Peak y Value	PM Peak Critical y
Chai Wan Road (SB)		A	1	3.500	15					1		1	0	1965	1965	1785	1785	500	0.280	0.280	250	0.140	0.140
		A	1	3.500						0		1	0	2105	4210	2105	2105	263	0.125		250	0.119	
		A	1	3.500						0		1	0	2105		2105	2105	262	0.124		250	0.119	
Chai Wan Road (NB)		B	1	3.000						1		1	0	1915	6025	1915	1915	116	0.061		113	0.059	
		B	1	3.000						0		1	0	2055		2055	2055	125	0.061		121	0.059	
		B	1	3.000						0		1	0	2055		2055	2055	124	0.060		121	0.059	
		C	2	3.000		17				0	0	1	0	2055	2055	1890	1890	90	0.048	0.048	65	0.034	0.034
Lok Man Road (WB)		D	4	4.000	15	20		27% / 73%	9% / 91%	1	0	1	0	2015	2015	1865	1870	390	0.209	0.209	400	0.214	0.214
Pedestrian Crossing		Ep	2,3,4	MIN GREEN + FLASH =			6	+	9							=	15						
		Fp	2,3	MIN GREEN + FLASH =			5	+	9							=	14						
		Gp	3	MIN GREEN + FLASH =			7	+	12							=	19			*			*

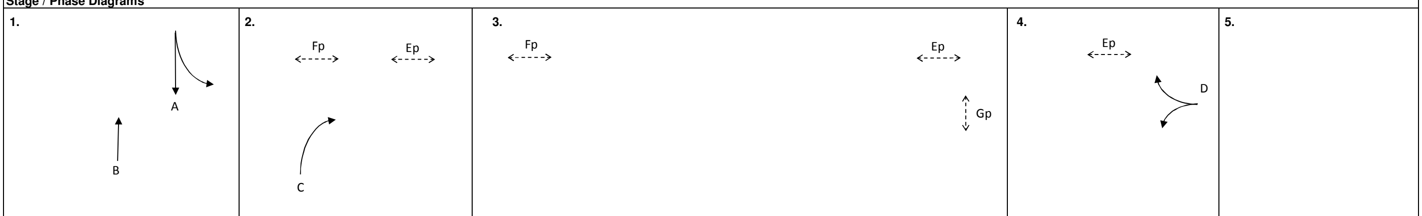
Notes:

Flow: (pcu/hr)



	AM Peak			PM Peak	
Group	B,C,Gp,D	A,C,Gp,D	**Group**	B,C,Gp,D	A,C,Gp,D
y	0.318	0.537	**y**	0.307	0.388
L (sec)	41	39	**L (sec)**	41	39
C (sec)	110	110	**C (sec)**	110	110
y pract.	0.565	0.581	**y pract.**	0.565	0.581
R.C. (%)	78%	8%	**R.C. (%)**	84%	50%

Stage / Phase Diagrams



I/G= 5		I/G= 5		I/G= 9	19	I/G= 4		I/G=	
I/G= 5		I/G= 5		I/G= 9	19	I/G= 4		I/G=	

Date: MAY, 2019 | **Junction:** Chai Wan Road / Lok Man Road | B

TRAFFIC SIGNALS CALCULATION

Job No.: HK501522 **MVA HONG KONG LIMITED**

Junction: Chai Wan Road / Lok Man Road Design Year: 2034

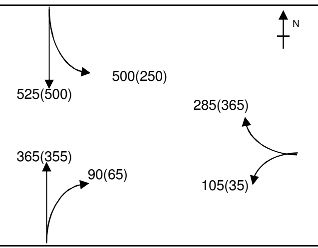
Description: 2031 Design Traffic Flows (Construction) (Pedestrian Green) (IMP) Designed By: LAU Checked By: GPH

Approach	Movements	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Gradient (%)	Pro. Turning (%) AM	Pro. Turning (%) PM	Revised Saturation Flow (pcu/hr) AM	Revised Saturation Flow (pcu/hr) PM	AM Peak Flow (pcu/hr)	AM Peak y Value	AM Peak Critical y	PM Peak Flow (pcu/hr)	PM Peak y Value	PM Peak Critical y
Chai Wan Road (SB)		A2	1,4	3.500	15					1785	1785	500	0.280		250	0.140	
		A1	1	3.500						2105	2105	263	0.125	0.125	250	0.119	0.119
		A1	1	3.500						2105	2105	262	0.124		250	0.119	
Chai Wan Road (NB)		B	1	3.000						1915	1915	116	0.061		113	0.059	
		B	1	3.000						2055	2055	125	0.061		121	0.059	
		B	1	3.000						2055	2055	124	0.060		121	0.059	
		C	2	3.000		17				1890	1890	90	0.048	0.048	65	0.034	0.034
Lok Man Street (WB)		D	4	4.000	15	20		27% / 73%	9% / 91%	1865	1870	390	0.209	0.209	400	0.214	0.214

Pedestrian Crossing	Phase	Stage							AM Critical y	PM Critical y
	Ep	2,3	MIN GREEN + FLASH =	6	+	10	=	16		
	Fp	2,3	MIN GREEN + FLASH =	5	+	9	=	14		
	Gp	3	MIN GREEN + FLASH =	7	+	12	=	19	*	*

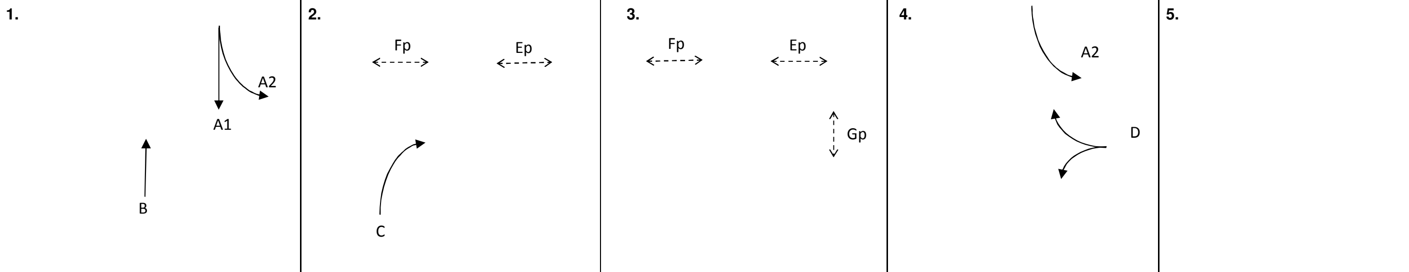
Notes:

Flow: (pcu/hr)



Group	B,C,Gp,D	A1,C,Gp,D	Group	B,C,Gp,D	A1,C,Gp,D
y	0.318	0.382	y	0.307	0.367
L (sec)	42	40	L (sec)	42	40
C (sec)	110	110	C (sec)	110	110
y pract.	0.556	0.573	y pract.	0.556	0.573
R.C. (%)	75%	50%	R.C. (%)	81%	56%

Stage / Phase Diagrams



I/G= 5		I/G= 5		I/G= 9	20	I/G= 4		I/G=	
I/G= 5		I/G= 5		I/G= 9	20	I/G= 4		I/G=	

Date: MAY, 2019 **Junction:** Chai Wan Road / Lok Man Road (B)

TRANSPORT RESEARCH LABORATORY

CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

Visual PICADY 4 ANALYSIS PROGRAM
RELEASE 2.1 (DEC 1998)

THE USER OF THIS COMPUTER PROGRAM FOR THE SOLUTION OF AN ENGINEERING PROBLEM IS IN NO WAY RELIEVED OF HIS RESPONSIBILITY FOR THE CORRECTNESS OF THE SOLUTION

Run with file:- "o:\jtc\Construction Stage\JC Hong Man Street_Tai Man Street\JC_2031DESAM.vpi" at 15:17:12 on Monday, 20 May 2019

RUN TITLE
****
JC - Hong Man St / Tai Man St (2031DESAM)

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA

```
                    MAJOR ROAD (ARM C) --------------------- MAJOR ROAD (ARM A)
                                                 I
                                                 I
                                                 I
                                                 I
                                                 I
                                                 I
                                            MINOR ROAD (ARM B)
```

ARM A IS Hong Man St (NB)
ARM B IS Tai Man St (SB)
ARM C IS Hong Man St (WB)

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

ETC.

.GEOMETRIC DATA

DATA ITEM		MINOR ROAD B
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	(W)	10.30 M.
CENTRAL RESERVE WIDTH	(WCR)	0.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B)	3.50 M.
- VISIBILITY	(VC-B)	50.0 M.
- BLOCKS TRAFFIC		NO
MINOR ROAD - VISIBILITY TO LEFT	(VB-C)	50.0 M.
- VISIBILITY TO RIGHT	(VB-A)	50.0 M.
- LANE 1 WIDTH	(WB-C)	2.20 M.
- LANE 2 WIDTH	(WB-A)	2.20 M.

.

.TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 08.00 AND ENDS 09.30

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	3.19	4.78	3.19
ARM B	15.00	45.00	75.00	4.31	6.47	4.31
ARM C	15.00	45.00	75.00	3.00	4.50	3.00

.

TIME	FROM/TO	TURNING PROPORTIONS TURNING COUNTS (VEH/HR) (PERCENTAGE OF H.V.S) ARM A	ARM B	ARM C
08.00 - 09.30				
	ARM A	0.000	0.549	0.451
		0.0	140.0	115.0
		(0.0)	(0.1)	(0.1)

```
I                   I        I        I        I        I
I                   I  ARM B  I  0.507 I  0.000 I  0.493 I
I                   I        I  175.0 I    0.0 I  170.0 I
I                   I        I (  0.0)I (  0.0)I (  0.0)I
I                   I        I        I        I        I
I                   I  ARM C  I  0.375 I  0.625 I  0.000 I
I                   I        I   90.0 I  150.0 I    0.0 I
I                   I        I (  0.0)I (  0.0)I (  0.0)I
I                   I        I        I        I        I
-----------------------------------------------------------

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.00-08.15                                                                                  I
I  B-C       2.13      8.89    0.239                 0.0    0.3        4.5                     I
I  B-A       2.19      6.96    0.314                 0.0    0.4        6.3                     I
I  C-A       1.13                                                                              I
I  C-B       1.88     10.78    0.174                 0.0    0.2        3.0                     I
I  A-B       1.75                                                                              I
I  A-C       1.44                                                                              I
I                                                                                              I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I    MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I     CHANGE:      (.1M)       (.1M)       (.1M)         (M)           (M)                     I
I                                                                                              I
I      B-C          0.097      0.002                                 0.009                     I
I      B-A          0.076      0.005       0.018       0.004         0.007                     I
I      C-B          0.103      0.004                   0.010                                   I
------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.15-08.30                                                                                  I
I  B-C       2.54      8.63    0.294                 0.3    0.4        6.0                     I
I  B-A       2.61      6.77    0.386                 0.4    0.6        8.8                     I
I  C-A       1.34                                                                              I
I  C-B       2.24     10.64    0.210                 0.2    0.3        3.9                     I
I  A-B       2.09                                                                              I
I  A-C       1.72                                                                              I
I                                                                                              I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I    MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I     CHANGE:      (.1M)       (.1M)       (.1M)         (M)           (M)                     I
I                                                                                              I
I      B-C          0.094      0.002                                 0.008                     I
I      B-A          0.074      0.006       0.018       0.004         0.007                     I
I      C-B          0.101      0.004                   0.010                                   I
------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.30-08.45                                                                                  I
I  B-C       3.11      8.28    0.375                 0.4    0.6        8.5                     I
I  B-A       3.20      6.50    0.492                 0.6    0.9       13.2                     I
I  C-A       1.65                                                                              I
I  C-B       2.74     10.46    0.262                 0.3    0.4        5.1                     I
I  A-B       2.56                                                                              I
I  A-C       2.10                                                                              I
I                                                                                              I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I    MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I     CHANGE:      (.1M)       (.1M)       (.1M)         (M)           (M)                     I
I                                                                                              I
I      B-C          0.090      0.003                                 0.008                     I
I      B-A          0.071      0.008       0.018       0.004         0.006                     I
I      C-B          0.100      0.005                   0.010                                   I
------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.45-09.00                                                                                  I
I  B-C       3.11      8.27    0.376                 0.6    0.6        8.9                     I
I  B-A       3.20      6.50    0.492                 0.9    0.9       14.2                     I
I  C-A       1.65                                                                              I
I  C-B       2.74     10.46    0.262                 0.4    0.4        5.3                     I
I  A-B       2.56                                                                              I
I  A-C       2.10                                                                              I
I                                                                                              I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I    MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I     CHANGE:      (.1M)       (.1M)       (.1M)         (M)           (M)                     I
I                                                                                              I
I      B-C          0.090      0.003                                 0.008                     I
I      B-A          0.071      0.008       0.018       0.004         0.006                     I
I      C-B          0.100      0.005                   0.010                                   I
------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 09.00-09.15                                                                                  I
I  B-C       2.54      8.62    0.294                 0.6    0.4        6.6                     I
I  B-A       2.61      6.77    0.386                 0.9    0.6       10.2                     I
I  C-A       1.34                                                                              I
I  C-B       2.24     10.64    0.210                 0.4    0.3        4.1                     I
I  A-B       2.09                                                                              I
I  A-C       1.72                                                                              I
```

```
I                                                                                               I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)           (M)                      I
I                                                                                               I
I       B-C         0.094      0.002                                   0.008                    I
I       B-A         0.074      0.006       0.018       0.004           0.006                    I
I       C-B         0.101      0.004                   0.010                                    I
-------------------------------------------------------------------------------------------------

.------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I        (VEH/MIN) (VEH/MIN) CAPACITY       FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS)  (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 09.15-09.30                                                                                   I
I  B-C       2.13      8.87    0.240                 0.4    0.3        4.9                      I
I  B-A       2.19      6.96    0.314                 0.6    0.5        7.3                      I
I  C-A       1.13                                                                               I
I  C-B       1.88     10.78    0.174                 0.3    0.2        3.3                      I
I  A-B       1.75                                                                               I
I  A-C       1.44                                                                               I
I                                                                                               I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)           (M)                      I
I                                                                                               I
I       B-C         0.096      0.002                                   0.009                    I
I       B-A         0.076      0.005       0.018       0.004           0.007                    I
I       C-B         0.103      0.004                   0.010                                    I
-------------------------------------------------------------------------------------------------
.
QUEUE FOR STREAM   B-C
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  08.15           0.3
  08.30           0.4
  08.45           0.6    *
  09.00           0.6    *
  09.15           0.4
  09.30           0.3
.
QUEUE FOR STREAM   B-A
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  08.15           0.4
  08.30           0.6    *
  08.45           0.9    *
  09.00           0.9    *
  09.15           0.6    *
  09.30           0.5
.
QUEUE FOR STREAM   C-B
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  08.15           0.2
  08.30           0.3
  08.45           0.4
  09.00           0.4
  09.15           0.3
  09.30           0.2
.
                QUEUEING DELAY INFORMATION OVER WHOLE PERIOD
                --------------------------------------------

---------------------------------------------------------------------------
I STREAM I   TOTAL DEMAND  I   * QUEUEING *      I * INCLUSIVE QUEUEING * I
I        I                 I    * DELAY *        I       * DELAY *        I
I        I--------------------------------------------------------------- I
I        I  (VEH)  (VEH/H) I  (MIN)    (MIN/VEH) I    (MIN)     (MIN/VEH) I
---------------------------------------------------------------------------
I  B-C   I  233.1 I  155.4 I    39.3 I    0.17   I      39.3  I    0.17   I
I  B-A   I  240.0 I  160.0 I    60.0 I    0.25   I      60.0  I    0.25   I
I  C-A   I  123.4 I   82.3 I         I           I            I           I
I  C-B   I  205.7 I  137.1 I    24.7 I    0.12   I      24.7  I    0.12   I
I  A-B   I  192.0 I  128.0 I         I           I            I           I
I  A-C   I  157.7 I  105.1 I         I           I            I           I
---------------------------------------------------------------------------
I  ALL   I 1151.8 I  767.9 I   124.0 I    0.11   I     124.0  I    0.11   I
---------------------------------------------------------------------------


* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.


END OF JOB
```

TRANSPORT RESEARCH LABORATORY

CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

Visual PICADY 4 ANALYSIS PROGRAM
RELEASE 2.1 (DEC 1998)

THE USER OF THIS COMPUTER PROGRAM FOR THE SOLUTION OF AN ENGINEERING PROBLEM IS IN NO WAY RELIEVED OF HIS RESPONSIBILITY FOR THE CORRECTNESS OF THE SOLUTION

Run with file:- "o:\jtc\Construction Stage\JC Hong Man Street_Tai Man Street\JC_2031DESPM.vpi" at 15:17:19 on Monday, 20 May 2019

RUN TITLE
****
JC - Hong Man St / Tai Man St (2031DESPM)

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA

```
MAJOR ROAD (ARM C) --------------------- MAJOR ROAD (ARM A)
                          I
                          I
                          I
                          I
                          I
                          I
                   MINOR ROAD (ARM B)
```

ARM A IS Hong Man St (NB)
ARM B IS Tai Man St (SB)
ARM C IS Hong Man St (WB)

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

ETC.

.GEOMETRIC DATA

DATA ITEM		MINOR ROAD B
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	(W)	10.30 M.
CENTRAL RESERVE WIDTH	(WCR)	0.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B)	3.50 M.
- VISIBILITY	(VC-B)	50.0 M.
- BLOCKS TRAFFIC		NO
MINOR ROAD - VISIBILITY TO LEFT	(VB-C)	50.0 M.
- VISIBILITY TO RIGHT	(VB-A)	50.0 M.
- LANE 1 WIDTH	(WB-C)	2.20 M.
- LANE 2 WIDTH	(WB-A)	2.20 M.

.

.TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 16.45 AND ENDS 18.15

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	2.75	4.13	2.75
ARM B	15.00	45.00	75.00	2.38	3.56	2.38
ARM C	15.00	45.00	75.00	2.81	4.22	2.81

.

TIME	TURNING PROPORTIONS TURNING COUNTS (VEH/HR) (PERCENTAGE OF H.V.S) FROM/TO	ARM A	ARM B	ARM C
16.45 - 18.15				
	ARM A	0.000	0.432	0.568
		0.0	95.0	125.0
		(0.0)	(0.1)	(0.1)

```
I                    I        I        I        I        I
I                    I  ARM B  I  0.421 I  0.000 I  0.579 I
I                    I        I   80.0 I    0.0 I  110.0 I
I                    I        I (  0.0)I (  0.0)I (  0.0)I
I                    I        I        I        I        I
I                    I  ARM C  I  0.644 I  0.356 I  0.000 I
I                    I        I  145.0 I   80.0 I    0.0 I
I                    I        I (  0.0)I (  0.0)I (  0.0)I
I                    I        I        I        I        I
-----------------------------------------------------------
```

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

```
.-------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 16.45-17.00                                                                                   I
I   B-C       1.38      9.32    0.147                0.0    0.2        2.5                      I
I   B-A       1.00      7.13    0.140                0.0    0.2        2.3                      I
I   C-A       1.81                                                                              I
I   C-B       1.00     10.87    0.092                0.0    0.1        1.5                      I
I   A-B       1.19                                                                              I
I   A-C       1.56                                                                              I
I                                                                                               I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I      CHANGE:      (.1M)       (.1M)       (.1M)         (M)             (M)                   I
I                                                                                               I
I       B-C          0.101      0.002                                  0.009                    I
I       B-A          0.078      0.004       0.018      0.005           0.007                    I
I       C-B          0.104      0.003                  0.010                                    I
-------------------------------------------------------------------------------------------------

.-------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.00-17.15                                                                                   I
I   B-C       1.64      9.17    0.179                0.2    0.2        3.2                      I
I   B-A       1.19      6.97    0.171                0.2    0.2        3.0                      I
I   C-A       2.16                                                                              I
I   C-B       1.19     10.76    0.111                0.1    0.1        1.8                      I
I   A-B       1.42                                                                              I
I   A-C       1.87                                                                              I
I                                                                                               I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I      CHANGE:      (.1M)       (.1M)       (.1M)         (M)             (M)                   I
I                                                                                               I
I       B-C          0.100      0.002                                  0.009                    I
I       B-A          0.076      0.005       0.018      0.004           0.007                    I
I       C-B          0.103      0.004                  0.010                                    I
-------------------------------------------------------------------------------------------------

.-------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.15-17.30                                                                                   I
I   B-C       2.01      8.96    0.224                0.2    0.3        4.2                      I
I   B-A       1.46      6.75    0.217                0.2    0.3        4.0                      I
I   C-A       2.65                                                                              I
I   C-B       1.46     10.60    0.138                0.1    0.2        2.3                      I
I   A-B       1.74                                                                              I
I   A-C       2.29                                                                              I
I                                                                                               I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I      CHANGE:      (.1M)       (.1M)       (.1M)         (M)             (M)                   I
I                                                                                               I
I       B-C          0.098      0.003                                  0.009                    I
I       B-A          0.073      0.006       0.018      0.004           0.006                    I
I       C-B          0.101      0.005                  0.010                                    I
-------------------------------------------------------------------------------------------------

.-------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.30-17.45                                                                                   I
I   B-C       2.01      8.96    0.224                0.3    0.3        4.3                      I
I   B-A       1.46      6.75    0.217                0.3    0.3        4.1                      I
I   C-A       2.65                                                                              I
I   C-B       1.46     10.60    0.138                0.2    0.2        2.4                      I
I   A-B       1.74                                                                              I
I   A-C       2.29                                                                              I
I                                                                                               I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I      CHANGE:      (.1M)       (.1M)       (.1M)         (M)             (M)                   I
I                                                                                               I
I       B-C          0.097      0.003                                  0.009                    I
I       B-A          0.073      0.006       0.018      0.004           0.006                    I
I       C-B          0.101      0.005                  0.010                                    I
-------------------------------------------------------------------------------------------------

.-------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.45-18.00                                                                                   I
I   B-C       1.64      9.17    0.179                0.3    0.2        3.4                      I
I   B-A       1.19      6.97    0.171                0.3    0.2        3.2                      I
I   C-A       2.16                                                                              I
I   C-B       1.19     10.76    0.111                0.2    0.1        1.9                      I
I   A-B       1.42                                                                              I
I   A-C       1.87                                                                              I
```

```
I                                                                                                  I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                            I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                    I
I     MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                      I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)           (M)                         I
I                                                                                                  I
I       B-C         0.100      0.002                                 0.009                         I
I       B-A         0.076      0.005        0.018       0.004        0.007                         I
I       C-B         0.103      0.004                    0.010                                      I
----------------------------------------------------------------------------------------------------

.----------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                               (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 18.00-18.15                                                                                    I
I   B-C       1.38      9.32    0.148                  0.2    0.2        2.7                     I
I   B-A       1.00      7.13    0.140                  0.2    0.2        2.5                     I
I   C-A       1.81                                                                               I
I   C-B       1.00     10.87    0.092                  0.1    0.1        1.6                     I
I   A-B       1.19                                                                               I
I   A-C       1.56                                                                               I
I                                                                                                I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                          I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                  I
I     MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                    I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)           (M)                       I
I                                                                                                I
I       B-C         0.101      0.002                                 0.009                       I
I       B-A         0.078      0.004        0.018       0.005        0.007                       I
I       C-B         0.104      0.003                    0.010                                    I
--------------------------------------------------------------------------------------------------
.
QUEUE FOR STREAM   B-C
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  17.00           0.2
  17.15           0.2
  17.30           0.3
  17.45           0.3
  18.00           0.2
  18.15           0.2
.
QUEUE FOR STREAM   B-A
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  17.00           0.2
  17.15           0.2
  17.30           0.3
  17.45           0.3
  18.00           0.2
  18.15           0.2
.
QUEUE FOR STREAM   C-B
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  17.00           0.1
  17.15           0.1
  17.30           0.2
  17.45           0.2
  18.00           0.1
  18.15           0.1
.
                QUEUEING DELAY INFORMATION OVER WHOLE PERIOD
                --------------------------------------------

---------------------------------------------------------------------------
I STREAM I   TOTAL DEMAND  I   * QUEUEING *      I * INCLUSIVE QUEUEING * I
I        I                 I    * DELAY *        I       * DELAY *        I
I        I--------------------------------------------------------------I
I        I  (VEH)  (VEH/H) I  (MIN)    (MIN/VEH) I    (MIN)     (MIN/VEH) I
---------------------------------------------------------------------------
I  B-C   I  150.8 I  100.6 I    20.2 I    0.13   I      20.2  I    0.13   I
I  B-A   I  109.7 I   73.1 I    19.2 I    0.17   I      19.2  I    0.17   I
I  C-A   I  198.8 I  132.6 I         I           I            I           I
I  C-B   I  109.7 I   73.1 I    11.5 I    0.10   I      11.5  I    0.10   I
I  A-B   I  130.3 I   86.8 I         I           I            I           I
I  A-C   I  171.4 I  114.3 I         I           I            I           I
---------------------------------------------------------------------------
I  ALL   I  870.7 I  580.5 I    50.8 I    0.06   I      50.8  I    0.06   I
---------------------------------------------------------------------------


* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.


END OF JOB
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TRAFFIC SIGNALS CALCULATION

Job No.: HK501522 **MVA HONG KONG LIMITED**

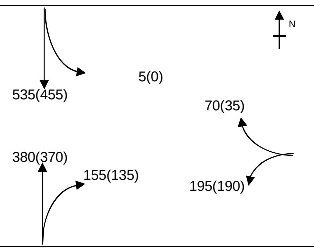
Junction: Chai Wan Road / Hong Man Street Design Year: 2031

Description: 2031 Design Traffic Flows (Construction)(imp) Designed By: LAU Checked By: GPH

Approach	Movements	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Gradient (%)	Pro. Turning (%) AM	Pro. Turning (%) PM	Revised Saturation Flow (pcu/hr) AM	Revised Saturation Flow (pcu/hr) PM	AM Peak Flow (pcu/hr)	AM Peak y Value	AM Peak Critical y	PM Peak Flow (pcu/hr)	PM Peak y Value	PM Peak Critical y
Chai Wan Road (SB)		A	1	3.000	15			2%	0%	1910	1915	260	0.136		219	0.114	
		A	1	3.000						2055	2055	280	0.136	0.136	236	0.115	0.115
Chai Wan Road (NB)		B	1,2	3.500						1965	1965	183	0.093		179	0.091	
		B	1,2	3.500						2105	2105	197	0.094		191	0.091	
		C	2	3.500		15				1915	1915	155	0.081	0.081	135	0.070	0.070
Hong Man Road (WB)		D	4	3.500	25	25		74% / 26%	84% / 16%	1855	1855	265	0.143	0.143	225	0.121	0.121
Pedestrian Crossing		Ep	3	MIN GREEN + FLASH =			36	+	10	=	46			*			*
		Fp	3	MIN GREEN + FLASH =			8	+	7	=	15						

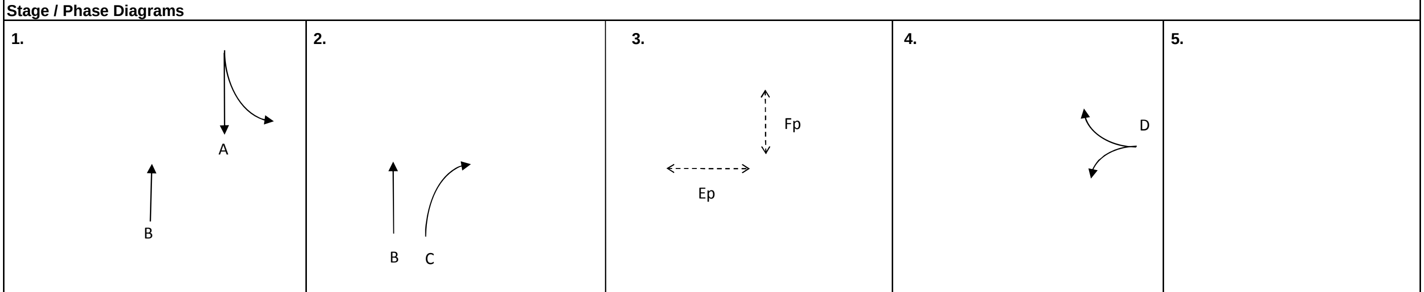
Notes:

Flow: (pcu/hr)



Group	A,C,Fp,D	A,C,Ep,D	Group	A,C,Fp,D	A,C,Ep,D
y	0.360	0.360	y	0.307	0.307
L (sec)	37	62	L (sec)	37	62
C (sec)	110	110	C (sec)	110	110
y pract.	0.597	0.393	y pract.	0.597	0.393
R.C. (%)	66%	9%	R.C. (%)	95%	28%

Stage / Phase Diagrams



I/G= 5		I/G= 5		I/G= 5	46	I/G= 4		I/G=	
I/G= 5		I/G= 5		I/G= 5	46	I/G= 4		I/G=	

Date: MAY, 2019 **Junction:** D Chai Wan Road / Hong Man Street

TRAFFIC SIGNALS CALCULATION

Job No.: HK501522 **MVA HONG KONG LIMITED**

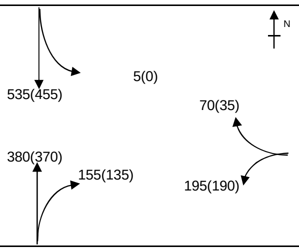
Junction: Chai Wan Road / Hong Man Street Design Year: 2031

Description: 2031 Design Traffic Flows (Construction)(imp) Designed By: LAU Checked By: GPH

Approach	Movements	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Gradient (%)	Pro. Turning (%) AM	Pro. Turning (%) PM	Revised Saturation Flow (pcu/hr) AM	Revised Saturation Flow (pcu/hr) PM	AM Peak Flow (pcu/hr)	AM Peak y Value	AM Peak Critical y	PM Peak Flow (pcu/hr)	PM Peak y Value	PM Peak Critical y
Chai Wan Road (SB)		A	1	3.000	15			2%	0%	1910	1915	260	0.136		219	0.114	
		A	1	3.000						2055	2055	280	0.136	0.136	236	0.115	0.115
Chai Wan Road (NB)		B	1,2	3.500						1965	1965	183	0.093		179	0.091	
		B	1,2	3.500						2105	2105	197	0.094		191	0.091	
		C	2	3.500		15				1915	1915	155	0.081	0.081	135	0.070	0.070
Hong Man Road (WB)		D	4	3.500	25	25		74% / 26%	84% / 16%	1855	1855	265	0.143	0.143	225	0.121	0.121
Pedestrian Crossing		Ep	3	MIN GREEN + FLASH =			32	+	10	=	42			*			*
		Fp	3	MIN GREEN + FLASH =			8	+	7	=	15						

Notes:

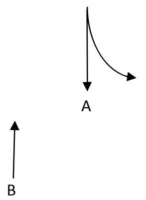
Flow: (pcu/hr)



Group	A,C,Fp,D	A,C,Ep,D	Group	A,C,Fp,D	A,C,Ep,D
y	0.360	0.360	y	0.307	0.307
L (sec)	37	58	L (sec)	37	58
C (sec)	110	110	C (sec)	110	110
y pract.	0.597	0.425	y pract.	0.597	0.425
R.C. (%)	66%	18%	R.C. (%)	95%	39%

Stage / Phase Diagrams

1.



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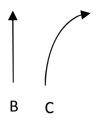
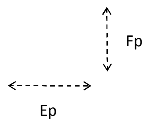
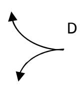


3.



4.



5.

I/G= 5		I/G= 5		I/G= 5	42	I/G= 4		I/G=	
I/G= 5		I/G= 5		I/G= 5	42	I/G= 4		I/G=	

Date: MAY, 2019 **Junction:** Chai Wan Road / Hong Man Street D

TRANSPORT RESEARCH LABORATORY

CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

Visual PICADY 4 ANALYSIS PROGRAM
RELEASE 2.1 (DEC 1998)

THE USER OF THIS COMPUTER PROGRAM FOR THE SOLUTION OF AN ENGINEERING PROBLEM IS IN NO WAY RELIEVED OF HIS RESPONSIBILITY FOR THE CORRECTNESS OF THE SOLUTION

Run with file:- "o:\jtc\Construction Stage\JE Chai Wan Road_Wan Tsui Road\JE_2031DESAM.vpi" at 15:20:01 on Monday, 20 May 2019

RUN TITLE
****
JE - Chai Wan Road / Wan Tsui Road (2031DESAM)

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA

```
                    MAJOR ROAD (ARM C) --------------------- MAJOR ROAD (ARM A)
                                                 I
                                                 I
                                                 I
                                                 I
                                                 I
                                                 I
                                            MINOR ROAD (ARM B)
```

ARM A IS Chai Wan Rd (WB)
ARM B IS Wan Tsui Rd (NB)
ARM C IS Chai Wan Rd (EB)

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

ETC.

.GEOMETRIC DATA

DATA ITEM		MINOR ROAD B
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	(W)	17.50 M.
CENTRAL RESERVE WIDTH	(WCR)	3.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B)	3.00 M.
- VISIBILITY	(VC-B)	50.0 M.
- BLOCKS TRAFFIC		NO
MINOR ROAD - VISIBILITY TO LEFT	(VB-C)	50.0 M.
- VISIBILITY TO RIGHT	(VB-A)	50.0 M.
- LANE 1 WIDTH	(WB-C)	3.10 M.
- LANE 2 WIDTH	(WB-A)	3.10 M.

.

.TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 08.00 AND ENDS 09.30

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	5.00	7.50	5.00
ARM B	15.00	45.00	75.00	3.31	4.97	3.31
ARM C	15.00	45.00	75.00	9.06	13.59	9.06

.

TIME	FROM/TO	TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) / (PERCENTAGE OF H.V.S) ARM A	ARM B	ARM C
08.00 - 09.30				
	ARM A	0.000	0.213	0.788
		0.0	85.0	315.0
		(0.0)	(0.0)	(0.0)

```
I                   I        I        I        I        I
I                   I  ARM B  I  0.189 I  0.000 I  0.811 I
I                   I        I   50.0 I    0.0 I  215.0 I
I                   I        I (  0.0)I (  0.0)I (  0.0)I
I                   I        I        I        I        I
I                   I  ARM C  I  0.772 I  0.228 I  0.000 I
I                   I        I  560.0 I  165.0 I    0.0 I
I                   I        I (  0.0)I (  0.0)I (  0.0)I
I                   I        I        I        I        I
-----------------------------------------------------------
```

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

```
.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.00-08.15                                                                                  I
I  B-C      2.69     10.27    0.262                  0.0    0.4        5.0                     I
I  B-A      0.63      7.90    0.079                  0.0    0.1        1.2                     I
I  C-A      7.00                                                                               I
I  C-B      2.06     10.29    0.200                  0.0    0.2        3.6                     I
I  A-B      1.06                                                                               I
I  A-C      3.94                                                                               I
I                                                                                              I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I    MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I     CHANGE:      (.1M)       (.1M)       (.1M)        (M)            (M)                     I
I                                                                                              I
I      B-C         0.102      0.005                                  0.010                     I
I      B-A         0.078      0.012       0.019      0.005           0.008                     I
I      C-B         0.103      0.006                  0.010                                     I
------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.15-08.30                                                                                  I
I  B-C      3.21     10.11    0.317                  0.4    0.5        6.7                     I
I  B-A      0.75      7.63    0.098                  0.1    0.1        1.6                     I
I  C-A      8.36                                                                               I
I  C-B      2.46     10.17    0.242                  0.2    0.3        4.6                     I
I  A-B      1.27                                                                               I
I  A-C      4.70                                                                               I
I                                                                                              I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I    MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I     CHANGE:      (.1M)       (.1M)       (.1M)        (M)            (M)                     I
I                                                                                              I
I      B-C         0.100      0.006                                  0.010                     I
I      B-A         0.076      0.015       0.019      0.005           0.007                     I
I      C-B         0.102      0.007                  0.010                                     I
------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.30-08.45                                                                                  I
I  B-C      3.93      9.89    0.397                  0.5    0.6        9.4                     I
I  B-A      0.91      7.25    0.126                  0.1    0.1        2.1                     I
I  C-A     10.24                                                                               I
I  C-B      3.02     10.00    0.302                  0.3    0.4        6.2                     I
I  A-B      1.55                                                                               I
I  A-C      5.76                                                                               I
I                                                                                              I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I    MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I     CHANGE:      (.1M)       (.1M)       (.1M)        (M)            (M)                     I
I                                                                                              I
I      B-C         0.098      0.007                                  0.009                     I
I      B-A         0.072      0.018       0.019      0.005           0.007                     I
I      C-B         0.100      0.008                  0.010                                     I
------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.45-09.00                                                                                  I
I  B-C      3.93      9.89    0.397                  0.6    0.7        9.8                     I
I  B-A      0.91      7.25    0.126                  0.1    0.1        2.1                     I
I  C-A     10.24                                                                               I
I  C-B      3.02     10.00    0.302                  0.4    0.4        6.4                     I
I  A-B      1.55                                                                               I
I  A-C      5.76                                                                               I
I                                                                                              I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I    MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I     CHANGE:      (.1M)       (.1M)       (.1M)        (M)            (M)                     I
I                                                                                              I
I      B-C         0.098      0.007                                  0.009                     I
I      B-A         0.072      0.018       0.019      0.005           0.007                     I
I      C-B         0.100      0.008                  0.010                                     I
------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 09.00-09.15                                                                                  I
I  B-C      3.21     10.11    0.317                  0.7    0.5        7.3                     I
I  B-A      0.75      7.62    0.098                  0.1    0.1        1.7                     I
I  C-A      8.36                                                                               I
I  C-B      2.46     10.17    0.242                  0.4    0.3        5.0                     I
I  A-B      1.27                                                                               I
I  A-C      4.70                                                                               I
```

```
I                                                                                                  I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                           I
I                             MAJOR RD.    CENT RES  VIS TO LEFT     VISIBILITY                    I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                     I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)           (M)                         I
I                                                                                                  I
I       B-C         0.100      0.006                                 0.010                         I
I       B-A         0.076      0.015       0.019      0.005          0.007                         I
I       C-B         0.102      0.007                  0.010                                        I
----------------------------------------------------------------------------------------------------

.---------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START  END       DELAY     GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                               (RFC)    (PEDS/MIN)  (VEHS)  (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 09.15-09.30                                                                                      I
I   B-C       2.69     10.26    0.262                  0.5    0.4        5.5                       I
I   B-A       0.63      7.90    0.079                  0.1    0.1        1.3                       I
I   C-A       7.00                                                                                 I
I   C-B       2.06     10.29    0.200                  0.3    0.3        3.9                       I
I   A-B       1.06                                                                                 I
I   A-C       3.94                                                                                 I
I                                                                                                  I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                           I
I                             MAJOR RD.    CENT RES  VIS TO LEFT     VISIBILITY                    I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                     I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)           (M)                         I
I                                                                                                  I
I       B-C         0.102      0.005                                 0.010                         I
I       B-A         0.078      0.012       0.019      0.005          0.008                         I
I       C-B         0.103      0.006                  0.010                                        I
----------------------------------------------------------------------------------------------------
.
QUEUE FOR STREAM   B-C
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  08.15           0.4
  08.30           0.5
  08.45           0.6    *
  09.00           0.7    *
  09.15           0.5
  09.30           0.4
.
QUEUE FOR STREAM   B-A
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  08.15           0.1
  08.30           0.1
  08.45           0.1
  09.00           0.1
  09.15           0.1
  09.30           0.1
.
QUEUE FOR STREAM   C-B
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  08.15           0.2
  08.30           0.3
  08.45           0.4
  09.00           0.4
  09.15           0.3
  09.30           0.3
.
                QUEUEING DELAY INFORMATION OVER WHOLE PERIOD
                --------------------------------------------

---------------------------------------------------------------------------
I STREAM I   TOTAL DEMAND  I   * QUEUEING *      I * INCLUSIVE QUEUEING * I
I        I                 I    * DELAY *        I       * DELAY *        I
I        I---------------------------------------------------------------I
I        I  (VEH)  (VEH/H) I  (MIN)    (MIN/VEH) I    (MIN)     (MIN/VEH) I
---------------------------------------------------------------------------
I  B-C   I  294.8 I  196.5 I    43.7 I    0.15   I      43.7  I    0.15   I
I  B-A   I   68.6 I   45.7 I    10.1 I    0.15   I      10.1  I    0.15   I
I  C-A   I  767.9 I  511.9 I         I           I            I           I
I  C-B   I  226.2 I  150.8 I    29.7 I    0.13   I      29.7  I    0.13   I
I  A-B   I  116.6 I   77.7 I         I           I            I           I
I  A-C   I  431.9 I  288.0 I         I           I            I           I
---------------------------------------------------------------------------
I  ALL   I 1906.0 I 1270.7 I    83.5 I    0.04   I      83.5  I    0.04   I
---------------------------------------------------------------------------


* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.


END OF JOB
```

TRANSPORT RESEARCH LABORATORY

CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

Visual PICADY 4 ANALYSIS PROGRAM
RELEASE 2.1 (DEC 1998)

THE USER OF THIS COMPUTER PROGRAM FOR THE SOLUTION OF AN ENGINEERING PROBLEM IS
IN NO WAY RELIEVED OF HIS RESPONSIBILITY FOR THE CORRECTNESS OF THE SOLUTION

Run with file:- "o:\jtc\Construction Stage\JE Chai Wan Road_Wan Tsui Road\JE_2031DESPM.vpi" at 15:20:04 on Monday, 20 May 2019

RUN TITLE
****
JE - Chai Wan Road / Wan Tsui Road (2031DESPM)

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA

```
                  MAJOR ROAD (ARM C) --------------------- MAJOR ROAD (ARM A)
                                                 I
                                                 I
                                                 I
                                                 I
                                                 I
                                                 I
                                          MINOR ROAD (ARM B)
```

ARM A IS Chai Wan Rd (WB)
ARM B IS Wan Tsui Rd (NB)
ARM C IS Chai Wan Rd (EB)

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

ETC.

.GEOMETRIC DATA

DATA ITEM		MINOR ROAD B
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	(W)	17.50 M.
CENTRAL RESERVE WIDTH	(WCR)	3.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B)	3.00 M.
- VISIBILITY	(VC-B)	50.0 M.
- BLOCKS TRAFFIC		NO
MINOR ROAD - VISIBILITY TO LEFT	(VB-C)	50.0 M.
- VISIBILITY TO RIGHT	(VB-A)	50.0 M.
- LANE 1 WIDTH	(WB-C)	3.10 M.
- LANE 2 WIDTH	(WB-A)	3.10 M.

.

.TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 16.45 AND ENDS 18.15

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	4.94	7.41	4.94
ARM B	15.00	45.00	75.00	3.19	4.78	3.19
ARM C	15.00	45.00	75.00	8.00	12.00	8.00

.

TIME	FROM/TO	ARM A	ARM B	ARM C
		TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) / (PERCENTAGE OF H.V.S)		
16.45 - 18.15				
	ARM A	0.000	0.278	0.722
		0.0	110.0	285.0
		(0.0)	(0.0)	(0.0)

```
I                    I        I        I        I        I
I                    I  ARM B  I  0.157 I  0.000 I  0.843 I
I                    I        I   40.0 I    0.0 I  215.0 I
I                    I        I (  0.0)I (  0.0)I (  0.0)I
I                    I        I        I        I        I
I                    I  ARM C  I  0.711 I  0.289 I  0.000 I
I                    I        I  455.0 I  185.0 I    0.0 I
I                    I        I (  0.0)I (  0.0)I (  0.0)I
I                    I        I        I        I        I
-----------------------------------------------------------
```

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

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.-------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)     (PEDS/MIN)  (VEHS)  (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 16.45-17.00                                                                                    I
I   B-C       2.69     10.34    0.260                 0.0    0.3        5.0                      I
I   B-A       0.50      7.99    0.063                 0.0    0.1        1.0                      I
I   C-A       5.69                                                                               I
I   C-B       2.31     10.30    0.225                 0.0    0.3        4.1                      I
I   A-B       1.38                                                                               I
I   A-C       3.56                                                                               I
I                                                                                                I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                          I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                  I
I      MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                   I
I       CHANGE:     (.1M)       (.1M)      (.1M)         (M)           (M)                       I
I                                                                                                I
I        B-C         0.102      0.005                                 0.010                      I
I        B-A         0.079      0.012       0.019       0.005         0.008                      I
I        C-B         0.103      0.005                   0.010                                    I
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.-------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)     (PEDS/MIN)  (VEHS)  (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.00-17.15                                                                                    I
I   B-C       3.21     10.20    0.315                 0.3    0.5        6.6                      I
I   B-A       0.60      7.73    0.077                 0.1    0.1        1.2                      I
I   C-A       6.79                                                                               I
I   C-B       2.76     10.18    0.271                 0.3    0.4        5.4                      I
I   A-B       1.64                                                                               I
I   A-C       4.25                                                                               I
I                                                                                                I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                          I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                  I
I      MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                   I
I       CHANGE:     (.1M)       (.1M)      (.1M)         (M)           (M)                       I
I                                                                                                I
I        B-C         0.101      0.005                                 0.010                      I
I        B-A         0.077      0.014       0.019       0.005         0.007                      I
I        C-B         0.102      0.007                   0.010                                    I
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.-------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)     (PEDS/MIN)  (VEHS)  (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.15-17.30                                                                                    I
I   B-C       3.93     10.01    0.393                 0.5    0.6        9.2                      I
I   B-A       0.73      7.37    0.099                 0.1    0.1        1.6                      I
I   C-A       8.32                                                                               I
I   C-B       3.38     10.01    0.338                 0.4    0.5        7.3                      I
I   A-B       2.01                                                                               I
I   A-C       5.21                                                                               I
I                                                                                                I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                          I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                  I
I      MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                   I
I       CHANGE:     (.1M)       (.1M)      (.1M)         (M)           (M)                       I
I                                                                                                I
I        B-C         0.099      0.007                                 0.010                      I
I        B-A         0.073      0.017       0.019       0.005         0.007                      I
I        C-B         0.100      0.008                   0.010                                    I
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I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)     (PEDS/MIN)  (VEHS)  (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.30-17.45                                                                                    I
I   B-C       3.93     10.01    0.393                 0.6    0.6        9.6                      I
I   B-A       0.73      7.37    0.099                 0.1    0.1        1.6                      I
I   C-A       8.32                                                                               I
I   C-B       3.38     10.01    0.338                 0.5    0.5        7.6                      I
I   A-B       2.01                                                                               I
I   A-C       5.21                                                                               I
I                                                                                                I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                          I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                  I
I      MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                   I
I       CHANGE:     (.1M)       (.1M)      (.1M)         (M)           (M)                       I
I                                                                                                I
I        B-C         0.099      0.007                                 0.010                      I
I        B-A         0.073      0.017       0.019       0.005         0.007                      I
I        C-B         0.100      0.008                   0.010                                    I
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.-------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)     (PEDS/MIN)  (VEHS)  (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.45-18.00                                                                                    I
I   B-C       3.21     10.20    0.315                 0.6    0.5        7.2                      I
I   B-A       0.60      7.73    0.077                 0.1    0.1        1.3                      I
I   C-A       6.79                                                                               I
I   C-B       2.76     10.18    0.271                 0.5    0.4        5.8                      I
I   A-B       1.64                                                                               I
I   A-C       4.25                                                                               I
```

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I                                                                                              I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I      CHANGE:     (.1M)       (.1M)       (.1M)        (M)            (M)                      I
I                                                                                              I
I       B-C         0.101      0.005                                  0.010                    I
I       B-A         0.077      0.014       0.019      0.005           0.007                    I
I       C-B         0.102      0.007                  0.010                                    I
------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/  I
I                             (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 18.00-18.15                                                                                  I
I  B-C       2.69     10.34    0.260                0.5    0.4        5.5                      I
I  B-A       0.50      7.98    0.063                0.1    0.1        1.0                      I
I  C-A       5.69                                                                              I
I  C-B       2.31     10.30    0.225                0.4    0.3        4.5                      I
I  A-B       1.38                                                                              I
I  A-C       3.56                                                                              I
I                                                                                              I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I      CHANGE:     (.1M)       (.1M)       (.1M)        (M)            (M)                      I
I                                                                                              I
I       B-C         0.102      0.005                                  0.010                    I
I       B-A         0.079      0.012       0.019      0.005           0.008                    I
I       C-B         0.103      0.005                  0.010                                    I
------------------------------------------------------------------------------------------------
.
QUEUE FOR STREAM   B-C
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  17.00           0.3
  17.15           0.5
  17.30           0.6    *
  17.45           0.6    *
  18.00           0.5
  18.15           0.4
.
QUEUE FOR STREAM   B-A
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  17.00           0.1
  17.15           0.1
  17.30           0.1
  17.45           0.1
  18.00           0.1
  18.15           0.1
.
QUEUE FOR STREAM   C-B
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  17.00           0.3
  17.15           0.4
  17.30           0.5    *
  17.45           0.5    *
  18.00           0.4
  18.15           0.3
.
                QUEUEING DELAY INFORMATION OVER WHOLE PERIOD
                --------------------------------------------

---------------------------------------------------------------------------
I STREAM I   TOTAL DEMAND  I   * QUEUEING *      I * INCLUSIVE QUEUEING * I
I        I                 I    * DELAY *        I       * DELAY *        I
I        I------------------------------------------------------------------I
I        I  (VEH)  (VEH/H) I  (MIN)     (MIN/VEH) I    (MIN)     (MIN/VEH) I
---------------------------------------------------------------------------
I  B-C   I  294.8 I  196.5 I    43.1 I    0.15   I      43.1  I    0.15   I
I  B-A   I   54.8 I   36.6 I     7.7 I    0.14   I       7.7  I    0.14   I
I  C-A   I  623.9 I  415.9 I         I           I            I           I
I  C-B   I  253.7 I  169.1 I    34.7 I    0.14   I      34.7  I    0.14   I
I  A-B   I  150.8 I  100.6 I         I           I            I           I
I  A-C   I  390.8 I  260.5 I         I           I            I           I
---------------------------------------------------------------------------
I  ALL   I 1768.9 I 1179.2 I    85.5 I    0.05   I      85.6  I    0.05   I
---------------------------------------------------------------------------


* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.


END OF JOB
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TRANSPORT RESEARCH LABORATORY

CAPACITIES, QUEUES AND DELAYS AT ROUNDABOUTS

Visual ARCADY 4 ANALYSIS PROGRAM
RELEASE 2.1 (OCT 1998)

THE USER OF THIS COMPUTER PROGRAM FOR THE SOLUTION OF AN ENGINEERING PROBLEM IS IN NO WAY RELIEVED OF HIS RESPONSIBILITY FOR THE CORRECTNESS OF THE SOLUTION

Run with file:- "o:\jtc\Construction Stage\JF Chai Wan Road Roundabout\JF_2031DESAM.vai" at 15:17:42 on Monday, 20 May 2019

.ROUNDABOUT CAPACITY AND DELAY
****

RUN TITLE
****
JF- Chai Wan Road / Island Eastern Corridor / Wan Tsui Road (2031DESAM)

.INPUT DATA
****
ARM A - Island Eastern Corrodor
ARM B - Chai Wan Road (east of roundabout)
ARM C - Wan Tsui Road
ARM D - Chai Wan Road (west of roundabout)

.GEOMETRIC DATA

ARM	V (M)	E (M)	L (M)	R (M)	D (M)	PHI (DEG)	SLOPE	INTERCEPT (PCU/MIN)
ARM A	7.30	7.30	1.00	100.00	80.00	0.0	0.626	42.145
ARM B	7.30	7.30	1.00	50.00	80.00	0.0	0.620	41.784
ARM C	7.00	7.00	1.00	25.00	80.00	3.0	0.589	39.008
ARM D	10.50	10.50	1.00	50.00	80.00	0.0	0.782	60.101

.TRAFFIC DEMAND DATA

.TIME PERIOD BEGINS 08.00 AND ENDS 09.30
.LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

.DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN: FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN): BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	10.56	15.84	10.56
ARM B	15.00	45.00	75.00	10.75	16.13	10.75
ARM C	15.00	45.00	75.00	4.88	7.31	4.88
ARM D	15.00	45.00	75.00	17.31	25.97	17.31

TIME	FROM/TO	ARM A	ARM B	ARM C	ARM D
		TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) / (PERCENTAGE OF H.V.S)			
08.00 - 09.30					
	ARM A	0.296	0.266	0.249	0.189
		250.0	225.0	210.0	160.0
		(0.1)	(0.1)	(0.1)	(0.1)
	ARM B	0.442	0.110	0.250	0.198
		380.0	95.0	215.0	170.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM C	0.385	0.564	0.000	0.051
		150.0	220.0	0.0	20.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM D	0.534	0.300	0.097	0.069
		740.0	415.0	135.0	95.0
		(0.0)	(0.0)	(0.0)	(0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

. QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.00-08.15								
ARM A	10.56	34.62	0.305		0.0	0.4	6.4	
ARM B	10.75	35.20	0.305		0.0	0.4	6.5	
ARM C	4.88	30.56	0.160		0.0	0.2	2.8	
ARM D	17.31	49.43	0.350		0.0	0.5	7.9	

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 I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY      GEOMETRIC DELAYI
 I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/   I
 I                               (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
 I 08.15-08.30                                                                                     I
 I ARM A      12.61     33.15   0.380                  0.4    0.6        9.0                       I
 I ARM B      12.84     33.91   0.379                  0.4    0.6        8.9                       I
 I ARM C       5.82     28.90   0.201                  0.2    0.3        3.7                       I
 I ARM D      20.67     47.33   0.437                  0.5    0.8       11.4                       I
 I                                                                                                 I
 -----------------------------------------------------------------------------------------------------
.-----------------------------------------------------------------------------------------------------
 I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY      GEOMETRIC DELAYI
 I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/   I
 I                               (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
 I 08.30-08.45                                                                                     I
 I ARM A      15.45     31.15   0.496                  0.6    1.0       14.3                       I
 I ARM B      15.72     32.15   0.489                  0.6    0.9       13.9                       I
 I ARM C       7.13     26.63   0.268                  0.3    0.4        5.4                       I
 I ARM D      25.32     44.47   0.569                  0.8    1.3       19.2                       I
 I                                                                                                 I
 -----------------------------------------------------------------------------------------------------
.-----------------------------------------------------------------------------------------------------
 I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY      GEOMETRIC DELAYI
 I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/   I
 I                               (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
 I 08.45-09.00                                                                                     I
 I ARM A      15.45     31.13   0.496                  1.0    1.0       14.7                       I
 I ARM B      15.72     32.14   0.489                  0.9    1.0       14.3                       I
 I ARM C       7.13     26.61   0.268                  0.4    0.4        5.5                       I
 I ARM D      25.32     44.45   0.570                  1.3    1.3       19.7                       I
 I                                                                                                 I
 -----------------------------------------------------------------------------------------------------
.-----------------------------------------------------------------------------------------------------
 I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY      GEOMETRIC DELAYI
 I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/   I
 I                               (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
 I 09.00-09.15                                                                                     I
 I ARM A      12.61     33.13   0.381                  1.0    0.6        9.4                       I
 I ARM B      12.84     33.89   0.379                  1.0    0.6        9.4                       I
 I ARM C       5.82     28.87   0.202                  0.4    0.3        3.9                       I
 I ARM D      20.67     47.30   0.437                  1.3    0.8       11.9                       I
 I                                                                                                 I
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.-----------------------------------------------------------------------------------------------------
 I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY      GEOMETRIC DELAYI
 I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/   I
 I                               (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
 I 09.15-09.30                                                                                     I
 I ARM A      10.56     34.59   0.305                  0.6    0.4        6.7                       I
 I ARM B      10.75     35.18   0.306                  0.6    0.4        6.7                       I
 I ARM C       4.88     30.52   0.160                  0.3    0.2        2.9                       I
 I ARM D      17.31     49.39   0.351                  0.8    0.5        8.2                       I
 I                                                                                                 I
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.QUEUE AT ARM A
 -------------

  TIME SEGMENT   NO. OF
   ENDING      VEHICLES
               IN QUEUE

   08.15           0.4
   08.30           0.6  *
   08.45           1.0  *
   09.00           1.0  *
   09.15           0.6  *
   09.30           0.4

.QUEUE AT ARM B
 -------------

  TIME SEGMENT   NO. OF
   ENDING      VEHICLES
               IN QUEUE

   08.15           0.4
   08.30           0.6  *
   08.45           0.9  *
   09.00           1.0  *
   09.15           0.6  *
   09.30           0.4

.QUEUE AT ARM C
 -------------

  TIME SEGMENT   NO. OF
   ENDING      VEHICLES
               IN QUEUE

   08.15           0.2
   08.30           0.3
   08.45           0.4
   09.00           0.4
   09.15           0.3
   09.30           0.2

.QUEUE AT ARM D
 -------------

  TIME SEGMENT   NO. OF
   ENDING      VEHICLES
               IN QUEUE

   08.15           0.5  *
   08.30           0.8  *
   08.45           1.3  *
   09.00           1.3  *
```

09.15	0.8 *
09.30	0.5 *

. QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

ARM	TOTAL DEMAND		* QUEUEING * * DELAY *		* INCLUSIVE QUEUEING * * DELAY *	
	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
A	1158.7	772.4	60.6	0.05	60.6	0.05
B	1179.2	786.2	59.7	0.05	59.7	0.05
C	534.8	356.5	24.1	0.05	24.1	0.05
D	1899.1	1266.1	78.4	0.04	78.4	0.04
ALL	4771.8	3181.2	222.8	0.05	222.8	0.05

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD.
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

TRANSPORT RESEARCH LABORATORY

CAPACITIES, QUEUES AND DELAYS AT ROUNDABOUTS

Visual ARCADY 4 ANALYSIS PROGRAM
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Run with file:- "o:\jtc\Construction Stage\JF Chai Wan Road Roundabout\JF_2031DESPM.vai" at 15:17:45 on Monday, 20 May 2019

.ROUNDABOUT CAPACITY AND DELAY
****

RUN TITLE
****
JF- Chai Wan Road / Island Eastern Corridor / Wan Tsui Road (2031DESPM)

.INPUT DATA
****
ARM A - Island Eastern Corrodor
ARM B - Chai Wan Road (east of roundabout)
ARM C - Wan Tsui Road
ARM D - Chai Wan Road (west of roundabout)

.GEOMETRIC DATA

ARM	V (M)	E (M)	L (M)	R (M)	D (M)	PHI (DEG)	SLOPE	INTERCEPT (PCU/MIN)
ARM A	7.30	7.30	1.00	100.00	80.00	0.0	0.626	42.145
ARM B	7.30	7.30	1.00	50.00	80.00	0.0	0.620	41.784
ARM C	7.00	7.00	1.00	25.00	80.00	3.0	0.589	39.008
ARM D	10.50	10.50	1.00	50.00	80.00	0.0	0.782	60.101

.TRAFFIC DEMAND DATA

.TIME PERIOD BEGINS 16.45 AND ENDS 18.15
.LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

.DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN: FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN): BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	12.25	18.38	12.25
ARM B	15.00	45.00	75.00	11.44	17.16	11.44
ARM C	15.00	45.00	75.00	5.38	8.06	5.38
ARM D	15.00	45.00	75.00	16.25	24.38	16.25

TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) / (PERCENTAGE OF H.V.S)

TIME	FROM/TO	ARM A	ARM B	ARM C	ARM D
16.45 - 18.15					
	ARM A	0.214	0.352	0.224	0.209
		210.0	345.0	220.0	205.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM B	0.448	0.082	0.311	0.158
		410.0	75.0	285.0	145.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM C	0.314	0.640	0.012	0.035
		135.0	275.0	5.0	15.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM D	0.504	0.315	0.096	0.085
		655.0	410.0	125.0	110.0
		(0.0)	(0.0)	(0.0)	(0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

. QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
16.45-17.00								
ARM A	12.25	34.34	0.357		0.0	0.6	8.1	
ARM B	11.44	35.02	0.327		0.0	0.5	7.1	
ARM C	5.38	30.52	0.176		0.0	0.2	3.1	
ARM D	16.25	49.28	0.330		0.0	0.5	7.3	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
17.00-17.15								
ARM A	14.63	32.81	0.446		0.6	0.8	11.8	
ARM B	13.66	33.69	0.405		0.5	0.7	10.0	
ARM C	6.42	28.86	0.222		0.2	0.3	4.2	
ARM D	19.40	47.16	0.411		0.5	0.7	10.3	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
17.15-17.30								
ARM A	17.92	30.72	0.583		0.8	1.4	20.1	
ARM B	16.73	31.88	0.525		0.7	1.1	16.0	
ARM C	7.86	26.59	0.296		0.3	0.4	6.2	
ARM D	23.77	44.26	0.537		0.7	1.2	16.9	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
17.30-17.45								
ARM A	17.92	30.71	0.583		1.4	1.4	20.8	
ARM B	16.73	31.86	0.525		1.1	1.1	16.5	
ARM C	7.86	26.57	0.296		0.4	0.4	6.3	
ARM D	23.77	44.24	0.537		1.2	1.2	17.3	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
17.45-18.00								
ARM A	14.63	32.79	0.446		1.4	0.8	12.4	
ARM B	13.66	33.66	0.406		1.1	0.7	10.5	
ARM C	6.42	28.83	0.223		0.4	0.3	4.4	
ARM D	19.40	47.12	0.412		1.2	0.7	10.7	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
18.00-18.15								
ARM A	12.25	34.32	0.357		0.8	0.6	8.5	
ARM B	11.44	34.99	0.327		0.7	0.5	7.4	
ARM C	5.38	30.49	0.176		0.3	0.2	3.3	
ARM D	16.25	49.24	0.330		0.7	0.5	7.5	

.QUEUE AT ARM A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.00	0.6	*
17.15	0.8	*
17.30	1.4	*
17.45	1.4	*
18.00	0.8	*
18.15	0.6	*

.QUEUE AT ARM B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.00	0.5	
17.15	0.7	*
17.30	1.1	*
17.45	1.1	*
18.00	0.7	*
18.15	0.5	

.QUEUE AT ARM C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
17.00	0.2
17.15	0.3
17.30	0.4
17.45	0.4
18.00	0.3
18.15	0.2

.QUEUE AT ARM D

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.00	0.5	
17.15	0.7	*
17.30	1.2	*
17.45	1.2	*

```
  18.00          0.7  *
  18.15          0.5
```

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

ARM	TOTAL DEMAND (VEH)	TOTAL DEMAND (VEH/H)	* QUEUEING * * DELAY * (MIN)	* QUEUEING * * DELAY * (MIN/VEH)	* INCLUSIVE QUEUEING * * DELAY * (MIN)	* INCLUSIVE QUEUEING * * DELAY * (MIN/VEH)
A	1343.8	895.9	81.7	0.06	81.7	0.06
B	1254.7	836.4	67.5	0.05	67.5	0.05
C	589.6	393.1	27.4	0.05	27.4	0.05
D	1782.6	1188.4	70.0	0.04	70.0	0.04
ALL	4970.6	3313.8	246.7	0.05	246.7	0.05

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD.
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

2034 Reference Flows

TRAFFIC SIGNALS CALCULATION

Job No.: HK501522 **MVA HONG KONG LIMITED**

Junction: Chai Wan Road / Tai Tam Road Design Year: 2034

Description: 2034 Reference Traffic Flows Designed By: LAU Checked By: GPH

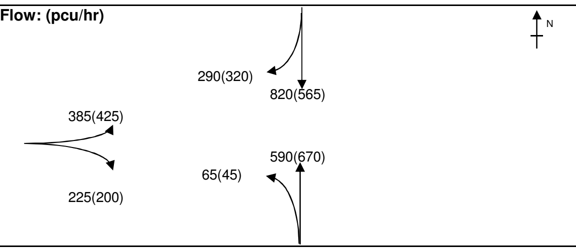
Approach	Movements	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Gradient (%)	Pro. Turning (%) AM	Pro. Turning (%) PM	Revised Saturation Flow (pcu/hr) AM	Revised Saturation Flow (pcu/hr) PM	AM Peak Flow (pcu/hr)	AM Peak y Value	AM Peak Critical y	PM Peak Flow (pcu/hr)	PM Peak y Value	PM Peak Critical y
Chai Wan Road (SB)		A	1	3.650			3.5			1835	1835	395	0.215	0.215	272	0.148	
		A	1	3.650			3.5			1975	1975	425	0.215		293	0.148	
		A	1	3.650		15	3.5			1795	1795	290	0.162		320	0.178	0.178
Chai Wan Road (NB)		B	2	3.650	15		3.5			1665	1665	65	0.039		45	0.027	
		B	2	3.650			3.5			1975	1975	295	0.149	0.149	335	0.170	0.170
		B	2	3.650			3.5			1975	1975	295	0.149		335	0.170	
ai Tam Road (EB)*		C	3	3.500	20	25		63% / 37%	68% / 32%	1835	1835	610	0.332	0.332	625	0.341	0.341

Pedestrian Crossing	Phase	Stage						
	Dp	1	MIN GREEN + FLASH =	7	+	8	=	15
	Ep	2,3	MIN GREEN + FLASH =	21	+	10	=	31
	Fp	3	MIN GREEN + FLASH =	7	+	8	=	15
	Gp	1,2	MIN GREEN + FLASH =	21	+	12	=	33

Notes:

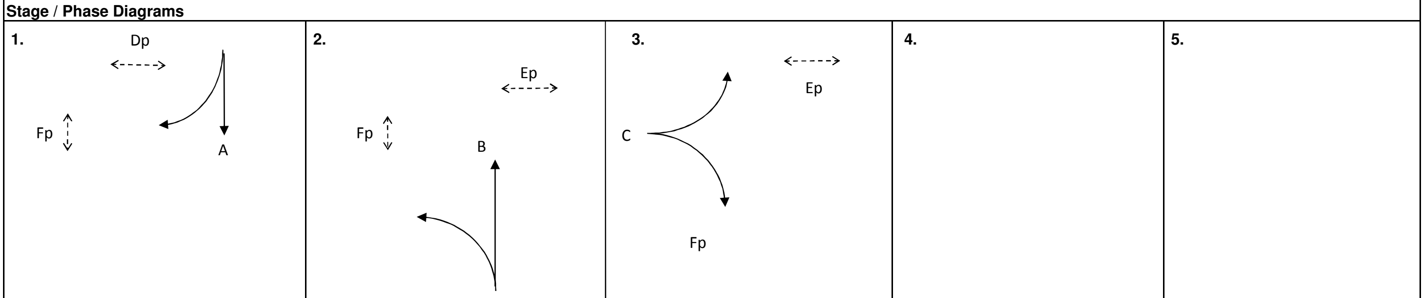
* 20m flare lane, 135pcu/hr deduction of left turning flow

Flow: (pcu/hr)



Group	Dp,B,C	A,B,C	Group	Dp,B,C	A,B,C
y	0.482	0.697	y	0.510	0.688
L (sec)	33	16	L (sec)	33	16
C (sec)	110	110	C (sec)	110	110
y pract.	0.630	0.769	y pract.	0.630	0.769
R.C. (%)	31%	10%	R.C. (%)	23%	12%

Stage / Phase Diagrams



I/G= 6		I/G= 6		I/G= 7		I/G=		I/G=	
I/G= 6		I/G= 6		I/G= 7		I/G=		I/G=	

Date: APR, 2019 **Junction:** Chai Wan Road / Tai Tam Road (A)

TRAFFIC SIGNALS CALCULATION

Job No.: HK501522 **MVA HONG KONG LIMITED**

Junction: Chai Wan Road / Tai Tam Road   Design Year: 2034

Description: 2034 Reference Traffic Flows (With Improvement)   Designed By: LAU   Checked By: GPH

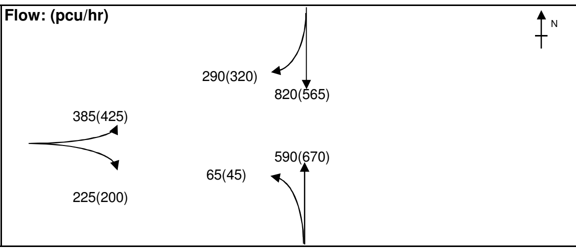
Approach	Movements	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Gradient (%)	Pro. Turning (%) AM	Pro. Turning (%) PM	Revised Saturation Flow (pcu/hr) AM	Revised Saturation Flow (pcu/hr) PM	AM Peak Flow (pcu/hr)	AM Peak y Value	AM Peak Critical y	PM Peak Flow (pcu/hr)	PM Peak y Value	PM Peak Critical y
Chai Wan Road (SB)	↓	A1	1,2	3.500			3.5			1820	1820	395	0.217		272	0.149	
	↓	A1	1,2	3.500			3.5			1960	1960	425	0.217		293	0.149	
	↲	A2	2	3.500		15	3.5			1780	1780	290	0.163	0.163	320	0.180	0.180
Chai Wan Road (NB)	↰	B	1	3.650	15		3.5			1665	1665	65	0.039		45	0.027	
	↑	B	1	3.650			3.5			1975	1975	295	0.149	0.149	335	0.170	0.170
	↑	B	1	3.650			3.5			1975	1975	295	0.149		335	0.170	
Tai Tam Road (EB)*	↰↱	C	3	3.500	20	25		63% / 37%	68% / 32%	1835	1835	610	0.332	0.332	625	0.341	0.341

Pedestrian Crossing	Phase	Stage						
	Dp	2	MIN GREEN + FLASH =	7	+	8	=	15
	Ep	3	MIN GREEN + FLASH =	8	+	6	=	14
	Fp	3	MIN GREEN + FLASH =	7	+	8	=	15
	Gp	1,2	MIN GREEN + FLASH =	21	+	12	=	33

Notes:

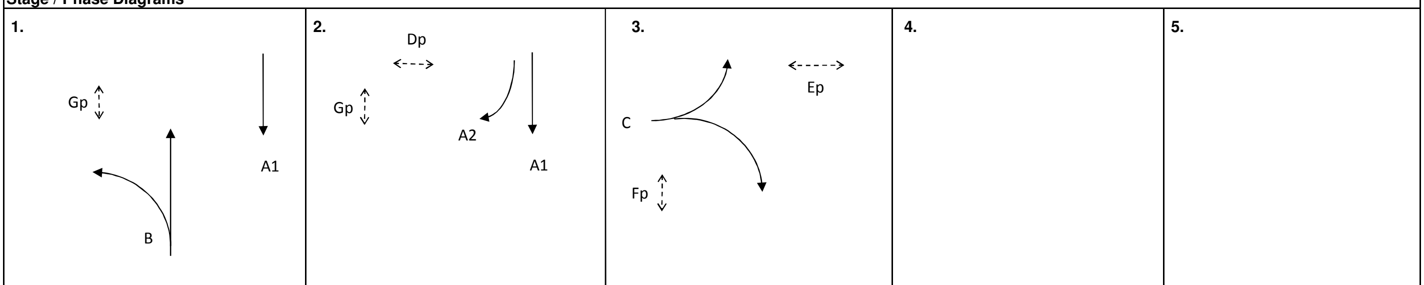
* 20m flare lane, 135pcu/hr deduction of left turning flow

Flow: (pcu/hr)



	AM Peak			PM Peak	
Group	B,Dp,C	B,A2,C	**Group**	B,Dp,C	B,A2,C
y	0.482	0.645	**y**	0.510	0.690
L (sec)	36	12	**L (sec)**	36	12
C (sec)	110	110	**C (sec)**	110	110
y pract.	0.605	0.802	**y pract.**	0.605	0.802
R.C. (%)	26%	24%	**R.C. (%)**	19%	16%

Stage / Phase Diagrams



I/G= 5	I/G= 5	I/G= 5	I/G=	I/G=	
I/G= 5	I/G= 5	I/G= 5	I/G=	I/G=	

Date: APR, 2019   **Junction:** Chai Wan Road / Tai Tam Road A

TRAFFIC SIGNALS CALCULATION

Job No.: HK501522 **MVA HONG KONG LIMITED**

Junction: Chai Wan Road / Lok Man Road Design Year: 2034

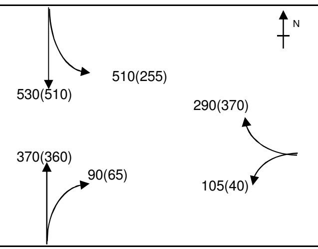
Description: 2034 Reference Traffic Flows Designed By: LAU Checked By: GPH

Approach	Movements	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Gradient (%)	Pro. Turning (%) AM	Pro. Turning (%) PM	Revised Saturation Flow (pcu/hr) AM	Revised Saturation Flow (pcu/hr) PM	AM Peak Flow (pcu/hr)	AM Peak y Value	AM Peak Critical y	PM Peak Flow (pcu/hr)	PM Peak y Value	PM Peak Critical y
Chai Wan Road (SB)		A	1	3.500	15					1785	1785	510	0.286	0.286	255	0.143	0.143
		A	1	3.500						2105	2105	265	0.126		255	0.121	
		A	1	3.500						2105	2105	265	0.126		255	0.121	
Chai Wan Road (NB)		B	1	3.000						1915	1915	118	0.062		114	0.060	
		B	1	3.000						2055	2055	126	0.061		123	0.060	
		B	1	3.000						2055	2055	126	0.061		123	0.060	
		C	2	4.000		17				1980	1980	90	0.045		65	0.033	
Lok Man Road (WB)		D	4	4.000	15	20		27% / 73%	10% / 90%	1865	1870	395	0.212	0.212	410	0.219	0.219

Pedestrian Crossing	Ep	2,3,4	MIN GREEN + FLASH =	6	+	9	=	15		
	Fp	2,3	MIN GREEN + FLASH =	5	+	9	=	14		
	Gp	3	MIN GREEN + FLASH =	7	+	12	=	19	*	*

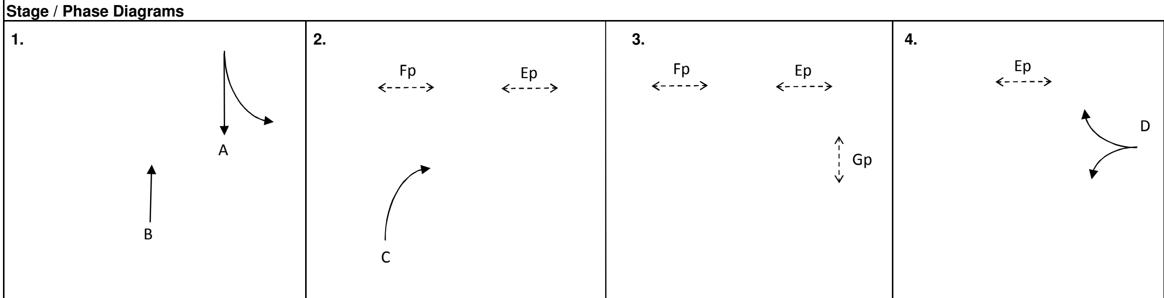
Notes:

Flow: (pcu/hr)



Group	B,C,Gp,D	A,C,Gp,D	Group	B,C,Gp,D	A,C,Gp,D
y	0.319	0.498	y	0.312	0.362
L (sec)	41	45	L (sec)	41	45
C (sec)	110	110	C (sec)	110	110
y pract.	0.565	0.532	y pract.	0.565	0.532
R.C. (%)	77%	7%	R.C. (%)	81%	47%

Stage / Phase Diagrams



I/G= 5		I/G= 5	5	I/G= 9	19	I/G= 4		I/G=	
I/G= 5		I/G= 5	5	I/G= 9	19	I/G= 4		I/G=	

Date: APR, 2019 **Junction:** Chai Wan Road / Lok Man Road (B)

TRAFFIC SIGNALS CALCULATION

Job No.: HK501522 MVA HONG KONG LIMITED

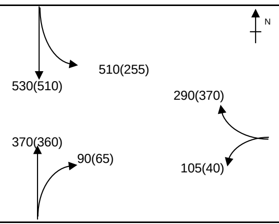
Junction: Chai Wan Road / Lok Man Road Design Year: 2034

Description: 2034 Reference Traffic Flows (With Pedestrian Crossing)(Imp) Designed By: LAU Checked By: GPH

Approach	Movements	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Gradient (%)	Pro. Turning (%) AM	Pro. Turning (%) PM	Revised Saturation Flow (pcu/hr) AM	Revised Saturation Flow (pcu/hr) PM	AM Peak Flow (pcu/hr)	AM Peak y Value	AM Peak Critical y	PM Peak Flow (pcu/hr)	PM Peak y Value	PM Peak Critical y
Chai Wan Road (SB)		A2	1,4	3.500	15					1785	1785	510	0.286		255	0.143	
		A1	1	3.500						2105	2105	265	0.126	0.126	255	0.121	0.121
		A1	1	3.500						2105	2105	265	0.126		255	0.121	
Chai Wan Road (NB)		B	1	3.000						1915	1915	118	0.062		114	0.060	
		B	1	3.000						2055	2055	126	0.061		123	0.060	
		B	1	3.000						2055	2055	126	0.061		123	0.060	
		C	2	3.000		17				1890	1890	90	0.048	0.048	65	0.034	0.034
Lok Man Street (WB)		D	4	4.000	15	20		27% / 73%	10% / 90%	1865	1870	395	0.212	0.212	410	0.219	0.219
Pedestrian Crossing		Ep	2,3	MIN GREEN + FLASH =			6	+	10	=	16						
		Fp	2,3	MIN GREEN + FLASH =			5	+	9	=	14						
		Gp	3	MIN GREEN + FLASH =			7	+	12	=	19			*			*

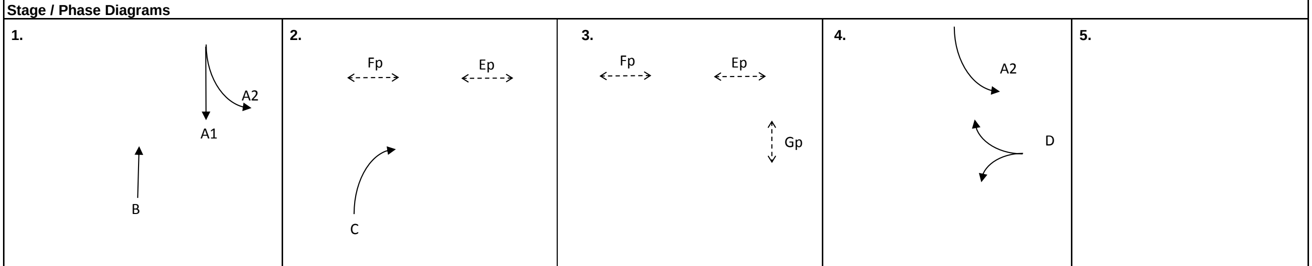
Notes:

Flow: (pcu/hr)



Group	B,C,Gp,D	A1,C,Gp,D	Group	B,C,Gp,D	A1,C,Gp,D
y	0.321	0.385	y	0.313	0.375
L (sec)	41	39	L (sec)	41	39
C (sec)	110	110	C (sec)	110	110
y pract.	0.565	0.581	y pract.	0.565	0.581
R.C. (%)	76%	51%	R.C. (%)	80%	55%

Stage / Phase Diagrams



I/G= 5		I/G= 5		I/G= 9	19	I/G= 4		I/G=	
I/G= 5		I/G= 5		I/G= 9	19	I/G= 4		I/G=	

Date: MAY, 2019 Junction: B Chai Wan Road / Lok Man Road

CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

Visual PICADY 4 ANALYSIS PROGRAM
RELEASE 2.1 (DEC 1998)

Run with file:- "o:\JTC\JC Hong Man Street_Tai Man Street\JC_2034REFAM.vpi" at 18:29:43 on Thursday, 25 April 2019

RUN TITLE
****
JC - Hong Man St / Tai Man St (2034REFAM)

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA

```
                 MAJOR ROAD (ARM C) --------------------- MAJOR ROAD (ARM A)
                                            I
                                            I
                                            I
                                            I
                                            I
                                            I
                                      MINOR ROAD (ARM B)
```

ARM A IS Hong Man St (NB)
ARM B IS Tai Man St (SB)
ARM C IS Hong Man St (WB)

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

ETC.

.GEOMETRIC DATA

DATA ITEM		MINOR ROAD B
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	(W)	10.30 M.
CENTRAL RESERVE WIDTH	(WCR)	0.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B)	3.50 M.
- VISIBILITY	(VC-B)	50.0 M.
- BLOCKS TRAFFIC		NO
MINOR ROAD - VISIBILITY TO LEFT	(VB-C)	50.0 M.
- VISIBILITY TO RIGHT	(VB-A)	50.0 M.
- LANE 1 WIDTH	(WB-C)	2.20 M.
- LANE 2 WIDTH	(WB-A)	2.20 M.

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.TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 08.00 AND ENDS 09.30

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	3.13	4.69	3.13
ARM B	15.00	45.00	75.00	4.13	6.19	4.13
ARM C	15.00	45.00	75.00	3.06	4.59	3.06

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TIME	FROM/TO	TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) / (PERCENTAGE OF H.V.S) ARM A	ARM B	ARM C
08.00 - 09.30				
	ARM A	0.000	0.520	0.480
		0.0	130.0	120.0
		(0.0)	(0.1)	(0.1)

```
I                    I  ARM B  I  0.485 I  0.000 I  0.515 I
I                    I         I  160.0 I    0.0 I  170.0 I
I                    I         I (  0.0)I (  0.0)I (  0.0)I
I                    I         I        I        I        I
I                    I  ARM C  I  0.367 I  0.633 I  0.000 I
I                    I         I   90.0 I  155.0 I    0.0 I
I                    I         I (  0.0)I (  0.0)I (  0.0)I
I                    I         I        I        I        I
-----------------------------------------------------------

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

.-----------------------------------------------------------------------------------------------
I  TIME       DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/   I
I                              (RFC)    (PEDS/MIN) (VEHS)  (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.00-08.15                                                                                    I
I   B-C       2.13      8.95    0.238                0.0    0.3        4.4                       I
I   B-A       2.00      6.95    0.288                0.0    0.4        5.6                       I
I   C-A       1.13                                                                               I
I   C-B       1.94     10.79    0.180                0.0    0.2        3.1                       I
I   A-B       1.63                                                                               I
I   A-C       1.50                                                                               I
I                                                                                                I
I                    EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                              MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                   I
I      CHANGE:      (.1M)       (.1M)       (.1M)         (M)           (M)                      I
I                                                                                                I
I       B-C          0.097      0.002                                 0.009                      I
I       B-A          0.076      0.005       0.018      0.004          0.007                      I
I       C-B          0.103      0.004                  0.010                                     I
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I  TIME       DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/   I
I                              (RFC)    (PEDS/MIN) (VEHS)  (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.15-08.30                                                                                    I
I   B-C       2.54      8.71    0.291                0.3    0.4        5.9                       I
I   B-A       2.39      6.75    0.354                0.4    0.5        7.7                       I
I   C-A       1.34                                                                               I
I   C-B       2.31     10.66    0.217                0.2    0.3        4.0                       I
I   A-B       1.94                                                                               I
I   A-C       1.79                                                                               I
I                                                                                                I
I                    EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                              MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                   I
I      CHANGE:      (.1M)       (.1M)       (.1M)         (M)           (M)                      I
I                                                                                                I
I       B-C          0.095      0.002                                 0.008                      I
I       B-A          0.073      0.006       0.018      0.004          0.006                      I
I       C-B          0.102      0.004                  0.010                                     I
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I  TIME       DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/   I
I                              (RFC)    (PEDS/MIN) (VEHS)  (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.30-08.45                                                                                    I
I   B-C       3.11      8.37    0.371                0.4    0.6        8.4                       I
I   B-A       2.92      6.48    0.452                0.5    0.8       11.3                       I
I   C-A       1.65                                                                               I
I   C-B       2.83     10.48    0.270                0.3    0.4        5.4                       I
I   A-B       2.38                                                                               I
I   A-C       2.19                                                                               I
I                                                                                                I
I                    EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                              MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                   I
I      CHANGE:      (.1M)       (.1M)       (.1M)         (M)           (M)                      I
I                                                                                                I
I       B-C          0.091      0.003                                 0.008                      I
I       B-A          0.070      0.008       0.018      0.004          0.006                      I
I       C-B          0.100      0.005                  0.010                                     I
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I  TIME       DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/   I
I                              (RFC)    (PEDS/MIN) (VEHS)  (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.45-09.00                                                                                    I
I   B-C       3.11      8.37    0.371                0.6    0.6        8.7                       I
I   B-A       2.92      6.48    0.452                0.8    0.8       12.1                       I
I   C-A       1.65                                                                               I
I   C-B       2.83     10.48    0.270                0.4    0.4        5.5                       I
I   A-B       2.38                                                                               I
I   A-C       2.19                                                                               I
I                                                                                                I
I                    EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                              MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                   I
I      CHANGE:      (.1M)       (.1M)       (.1M)         (M)           (M)                      I
I                                                                                                I
I       B-C          0.091      0.003                                 0.008                      I
I       B-A          0.070      0.008       0.018      0.004          0.006                      I
I       C-B          0.100      0.005                  0.010                                     I
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I  TIME       DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/   I
I                              (RFC)    (PEDS/MIN) (VEHS)  (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 09.00-09.15                                                                                    I
I   B-C       2.54      8.70    0.292                0.6    0.4        6.5                       I
I   B-A       2.39      6.75    0.354                0.8    0.6        8.8                       I
I   C-A       1.34                                                                               I
I   C-B       2.31     10.66    0.217                0.4    0.3        4.3                       I
I   A-B       1.94                                                                               I
I   A-C       1.79                                                                               I
I                                                                                                I
```

EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:

MARGINAL CHANGE:	LANE WIDTH (.1M)	MAJOR RD. WIDTH (.1M)	CENT RES WIDTH (.1M)	VIS TO LEFT (AHEAD FOR MAJOR) (M)	VISIBILITY TO RIGHT (M)
B-C	0.095	0.002			0.008
B-A	0.073	0.006	0.018	0.004	0.006
C-B	0.102	0.004		0.010	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
09.15-09.30								
B-C	2.13	8.93	0.238		0.4	0.3	4.9	
B-A	2.00	6.94	0.288		0.6	0.4	6.4	
C-A	1.13							
C-B	1.94	10.79	0.180		0.3	0.2	3.4	
A-B	1.63							
A-C	1.50							

EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:

MARGINAL CHANGE:	LANE WIDTH (.1M)	MAJOR RD. WIDTH (.1M)	CENT RES WIDTH (.1M)	VIS TO LEFT (AHEAD FOR MAJOR) (M)	VISIBILITY TO RIGHT (M)
B-C	0.097	0.002			0.009
B-A	0.076	0.005	0.018	0.004	0.007
C-B	0.103	0.004		0.010	

QUEUE FOR STREAM B-C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.15	0.3	
08.30	0.4	
08.45	0.6	*
09.00	0.6	*
09.15	0.4	
09.30	0.3	

QUEUE FOR STREAM B-A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.15	0.4	
08.30	0.5	*
08.45	0.8	*
09.00	0.8	*
09.15	0.6	*
09.30	0.4	

QUEUE FOR STREAM C-B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
08.15	0.2
08.30	0.3
08.45	0.4
09.00	0.4
09.15	0.3
09.30	0.2

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND		* QUEUEING * * DELAY *		* INCLUSIVE QUEUEING * * DELAY *	
	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
B-C	233.1	155.4	38.8	0.17	38.8	0.17
B-A	219.4	146.3	52.0	0.24	52.0	0.24
C-A	123.4	82.3				
C-B	212.5	141.7	25.7	0.12	25.7	0.12
A-B	178.3	118.8				
A-C	164.5	109.7				
ALL	1131.2	754.2	116.5	0.10	116.5	0.10

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

TRANSPORT RESEARCH LABORATORY

CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

Visual PICADY 4 ANALYSIS PROGRAM
RELEASE 2.1 (DEC 1998)

THE USER OF THIS COMPUTER PROGRAM FOR THE SOLUTION OF AN ENGINEERING PROBLEM IS
IN NO WAY RELIEVED OF HIS RESPONSIBILITY FOR THE CORRECTNESS OF THE SOLUTION

Run with file:- "o:\JTC\JC Hong Man Street_Tai Man Street\JC_2034REFPM.vpi" at 18:29:49 on Thursday, 25 April 2019

RUN TITLE
****
JC - Hong Man St / Tai Man St (2034REFPM)

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA

```
MAJOR ROAD (ARM C) --------------------- MAJOR ROAD (ARM A)
                             I
                             I
                             I
                             I
                             I
                             I
                      MINOR ROAD (ARM B)
```

ARM A IS Hong Man St (NB)
ARM B IS Tai Man St (SB)
ARM C IS Hong Man St (WB)

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

ETC.

.GEOMETRIC DATA

DATA ITEM	MINOR ROAD B
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	(W) 10.30 M.
CENTRAL RESERVE WIDTH	(WCR) 0.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B) 3.50 M.
- VISIBILITY	(VC-B) 50.0 M.
- BLOCKS TRAFFIC	NO
MINOR ROAD - VISIBILITY TO LEFT	(VB-C) 50.0 M.
- VISIBILITY TO RIGHT	(VB-A) 50.0 M.
- LANE 1 WIDTH	(WB-C) 2.20 M.
- LANE 2 WIDTH	(WB-A) 2.20 M.

.

.TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 17.15 AND ENDS 18.45

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	2.63	3.94	2.63
ARM B	15.00	45.00	75.00	2.31	3.47	2.31
ARM C	15.00	45.00	75.00	2.94	4.41	2.94

.

TIME	TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) / (PERCENTAGE OF H.V.S) FROM/TO	ARM A	ARM B	ARM C
17.15 - 18.45				
	ARM A	0.000	0.381	0.619
		0.0	80.0	130.0
		(0.0)	(0.1)	(0.1)

```
I                    I  ARM B  I  0.378 I  0.000 I  0.622 I
I                    I         I   70.0 I    0.0 I  115.0 I
I                    I         I (  0.0)I (  0.0)I (  0.0)I
I                    I         I        I        I        I
I                    I  ARM C  I  0.617 I  0.383 I  0.000 I
I                    I         I  145.0 I   90.0 I    0.0 I
I                    I         I (  0.0)I (  0.0)I (  0.0)I
I                    I         I        I        I        I
-----------------------------------------------------------

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

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I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/   I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.15-17.30                                                                                   I
I   B-C       1.44      9.37    0.153                0.0    0.2        2.6                      I
I   B-A       0.88      7.10    0.123                0.0    0.1        2.0                      I
I   C-A       1.81                                                                              I
I   C-B       1.13     10.90    0.103                0.0    0.1        1.7                      I
I   A-B       1.00                                                                              I
I   A-C       1.63                                                                              I
I                                                                                               I
I                    EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                       I
I                              MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY               I
I      MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                 I
I       CHANGE:      (.1M)       (.1M)       (.1M)         (M)          (M)                     I
I                                                                                               I
I       B-C          0.102      0.002                                  0.009                    I
I       B-A          0.077      0.005       0.018       0.005          0.007                    I
I       C-B          0.104      0.003                   0.010                                   I
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I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/   I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.30-17.45                                                                                   I
I   B-C       1.72      9.23    0.186                0.2    0.2        3.3                      I
I   B-A       1.04      6.93    0.151                0.1    0.2        2.6                      I
I   C-A       2.16                                                                              I
I   C-B       1.34     10.79    0.124                0.1    0.1        2.1                      I
I   A-B       1.19                                                                              I
I   A-C       1.94                                                                              I
I                                                                                               I
I                    EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                       I
I                              MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY               I
I      MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                 I
I       CHANGE:      (.1M)       (.1M)       (.1M)         (M)          (M)                     I
I                                                                                               I
I       B-C          0.100      0.002                                  0.009                    I
I       B-A          0.075      0.005       0.018       0.004          0.007                    I
I       C-B          0.103      0.004                   0.010                                   I
-------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/   I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.45-18.00                                                                                   I
I   B-C       2.10      9.03    0.233                0.2    0.3        4.4                      I
I   B-A       1.28      6.70    0.191                0.2    0.2        3.4                      I
I   C-A       2.65                                                                              I
I   C-B       1.65     10.64    0.155                0.1    0.2        2.7                      I
I   A-B       1.46                                                                              I
I   A-C       2.38                                                                              I
I                                                                                               I
I                    EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                       I
I                              MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY               I
I      MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                 I
I       CHANGE:      (.1M)       (.1M)       (.1M)         (M)          (M)                     I
I                                                                                               I
I       B-C          0.098      0.003                                  0.009                    I
I       B-A          0.073      0.007       0.018       0.004          0.006                    I
I       C-B          0.101      0.004                   0.010                                   I
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I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/   I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 18.00-18.15                                                                                   I
I   B-C       2.10      9.03    0.233                0.3    0.3        4.5                      I
I   B-A       1.28      6.70    0.191                0.2    0.2        3.5                      I
I   C-A       2.65                                                                              I
I   C-B       1.65     10.64    0.155                0.2    0.2        2.7                      I
I   A-B       1.46                                                                              I
I   A-C       2.38                                                                              I
I                                                                                               I
I                    EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                       I
I                              MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY               I
I      MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                 I
I       CHANGE:      (.1M)       (.1M)       (.1M)         (M)          (M)                     I
I                                                                                               I
I       B-C          0.098      0.003                                  0.009                    I
I       B-A          0.073      0.007       0.018       0.004          0.006                    I
I       C-B          0.101      0.004                   0.010                                   I
-------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/   I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 18.15-18.30                                                                                   I
I   B-C       1.72      9.22    0.186                0.3    0.2        3.6                      I
I   B-A       1.04      6.93    0.151                0.2    0.2        2.8                      I
I   C-A       2.16                                                                              I
I   C-B       1.34     10.79    0.124                0.2    0.1        2.2                      I
I   A-B       1.19                                                                              I
I   A-C       1.94                                                                              I
I                                                                                               I
```

MARGINAL CHANGE:	LANE WIDTH (.1M)	MAJOR RD. WIDTH (.1M)	CENT RES WIDTH (.1M)	VIS TO LEFT (AHEAD FOR MAJOR) (M)	VISIBILITY TO RIGHT (M)
EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:					
B-C	0.100	0.002			0.009
B-A	0.075	0.005	0.018	0.004	0.007
C-B	0.103	0.004		0.010	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
18.30-18.45								
B-C	1.44	9.36	0.154		0.2	0.2	2.8	
B-A	0.88	7.10	0.123		0.2	0.1	2.2	
C-A	1.81							
C-B	1.13	10.90	0.103		0.1	0.1	1.8	
A-B	1.00							
A-C	1.63							

MARGINAL CHANGE:	LANE WIDTH (.1M)	MAJOR RD. WIDTH (.1M)	CENT RES WIDTH (.1M)	VIS TO LEFT (AHEAD FOR MAJOR) (M)	VISIBILITY TO RIGHT (M)
EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:					
B-C	0.102	0.002			0.009
B-A	0.077	0.005	0.018	0.005	0.007
C-B	0.104	0.003		0.010	

QUEUE FOR STREAM B-C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
17.30	0.2
17.45	0.2
18.00	0.3
18.15	0.3
18.30	0.2
18.45	0.2

QUEUE FOR STREAM B-A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
17.30	0.1
17.45	0.2
18.00	0.2
18.15	0.2
18.30	0.2
18.45	0.1

QUEUE FOR STREAM C-B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
17.30	0.1
17.45	0.1
18.00	0.2
18.15	0.2
18.30	0.1
18.45	0.1

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND		* QUEUEING * * DELAY *		* INCLUSIVE QUEUEING * * DELAY *	
	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
B-C	157.7	105.1	21.2	0.13	21.2	0.13
B-A	96.0	64.0	16.4	0.17	16.4	0.17
C-A	198.8	132.6				
C-B	123.4	82.3	13.1	0.11	13.1	0.11
A-B	109.7	73.1				
A-C	178.3	118.8				
ALL	863.9	575.9	50.7	0.06	50.7	0.06

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

TRAFFIC SIGNALS CALCULATION

Job No.: HK501522 **MVA HONG KONG LIMITED**

Junction: Chai Wan Road / Hong Man Street Design Year: 2034

Description: 2034 Reference Traffic Flows (imp) Designed By: LAU Checked By: GPH

Approach	Movements	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Gradient (%)	Pro. Turning (%) AM	Pro. Turning (%) PM	Nearside 0/1	Opposing 0/1	Site Factor	Add Saturation Flow (pcu/hr)	Saturation Flow (pcu/hr)	Total Saturation Flow (pcu/hr)	Revised Saturation Flow (pcu/hr) AM	Revised Saturation Flow (pcu/hr) PM	AM Peak Flow (pcu/hr)	AM Peak y Value	AM Peak Critical y	PM Peak Flow (pcu/hr)	PM Peak y Value	PM Peak Critical y
Chai Wan Road (SB)		A	1	3.000	15			2%	0%	1		1	0	1915	3970	1910	1915	265	0.139	0.139	224	0.117	
		A	1	3.000						0		1	0	2055		2055	2055	285	0.139		241	0.117	0.117
Chai Wan Road (NB)		B	1,2	3.500						1		1	0	1965	4070	1965	1965	186	0.095		181	0.092	
		B	1,2	3.500						0		1	0	2105		2105	2105	199	0.095		194	0.092	
		C	2	3.500		15				0	0	1	0	2105	2105	1915	1915	145	0.076	0.076	125	0.065	0.065
Hong Man Street (WB)		D	4	3.500	25	25		73% / 27%	85% / 15%	1	0	1	0	1965	1965	1855	1855	255	0.137	0.137	205	0.111	0.111
Pedestrian Crossing		Ep	3	MIN GREEN + FLASH =			36	+	10							=	46			*			*
		Fp	3	MIN GREEN + FLASH =			8	+	7							=	15						

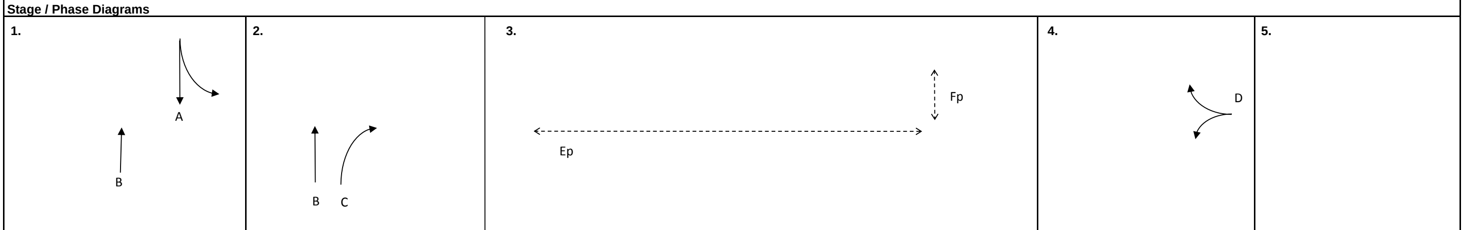
Notes:

*Three lanes on Chai Wan Road (SB), 100pcu/hr deduction of left turning flow

Flow: (pcu/hr)

Group	A,C,Fp,D	A,C,Ep,D	Group	A,C,Fp,D	A,C,Ep,D
y	0.352	0.352	y	0.293	0.293
L (sec)	37	62	L (sec)	37	62
C (sec)	110	110	C (sec)	110	110
y pract.	0.597	0.393	y pract.	0.597	0.393
R.C. (%)	70%	12%	R.C. (%)	104%	34%

Stage / Phase Diagrams



I/G= 5		I/G= 5		I/G= 5		46	I/G= 4		I/G=	
I/G= 5		I/G= 5		I/G= 5		46	I/G= 4		I/G=	

Date: MAY, 2019 **Junction:** Chai Wan Road / Hong Man Street D

TRAFFIC SIGNALS CALCULATION

Job No.: HK501522 **MVA HONG KONG LIMITED**

Junction: Chai Wan Road / Hong Man Street

Design Year: 2034

Description: 2034 Reference Traffic Flows (imp)

Designed By: LAU

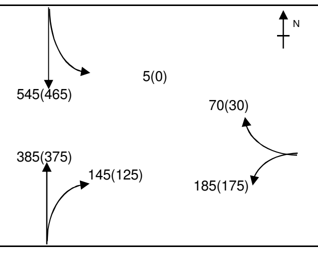
Checked By: GPH

Approach	Movements	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Gradient (%)	Pro. Turning (%) AM	Pro. Turning (%) PM	Revised Saturation Flow (pcu/hr) AM	Revised Saturation Flow (pcu/hr) PM	AM Peak Flow (pcu/hr)	AM Peak y Value	AM Peak Critical y	PM Peak Flow (pcu/hr)	PM Peak y Value	PM Peak Critical y
Chai Wan Road (SB)		A	1	3.000	15			2%	0%	1910	1915	265	0.139	0.139	224	0.117	
		A	1	3.000						2055	2055	285	0.139		241	0.117	0.117
Chai Wan Road (NB)		B	1,2	3.500						1965	1965	186	0.095		181	0.092	
		B	1,2	3.500						2105	2105	199	0.095		194	0.092	
		C	2	3.500		15				1915	1915	145	0.076	0.076	125	0.065	0.065
Hong Man Street (WB)		D	4	3.500	25	25		73% / 27%	85% / 15%	1855	1855	255	0.137	0.137	205	0.111	0.111
Pedestrian Crossing		Ep	3	MIN GREEN + FLASH =			32	+	10	=	42			*			*
		Fp	3	MIN GREEN + FLASH =			8	+	7	=	15						

Notes:

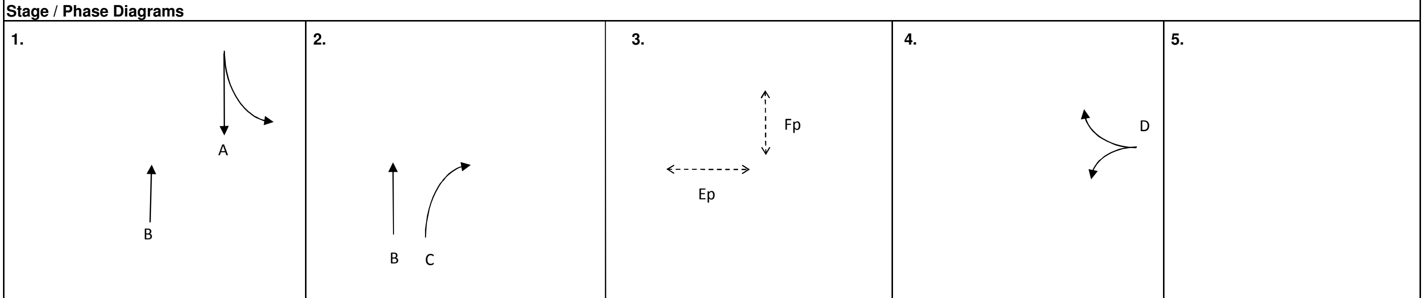
*Three lanes on Chai Wan Road (SB), 100pcu/hr deduction of left turning flow

Flow: (pcu/hr)



Group	A,C,Fp,D	A,C,Ep,D	Group	A,C,Fp,D	A,C,Ep,D
y	0.352	0.352	y	0.293	0.293
L (sec)	37	58	L (sec)	37	58
C (sec)	110	110	C (sec)	110	110
y pract.	0.597	0.425	y pract.	0.597	0.425
R.C. (%)	70%	21%	R.C. (%)	104%	45%

Stage / Phase Diagrams



I/G= 5		I/G= 5		I/G= 5	42	I/G= 4		I/G=	
I/G= 5		I/G= 5		I/G= 5	42	I/G= 4		I/G=	

Date: APR, 2019 **Junction:** Chai Wan Road / Hong Man Street (D)

TRANSPORT RESEARCH LABORATORY

CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

Visual PICADY 4 ANALYSIS PROGRAM
RELEASE 2.1 (DEC 1998)

Run with file:- "o:\JTC\JE Chai Wan Road_Wan Tsui Road\JE_2034REFAM.vpi" at 18:30:04 on Thursday, 25 April 2019

RUN TITLE
****
JE - Chai Wan Road / Wan Tsui Road (2034REFAM)

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA

```
                   MAJOR ROAD (ARM C) --------------------- MAJOR ROAD (ARM A)
                                                 I
                                                 I
                                                 I
                                                 I
                                                 I
                                                 I
                                         MINOR ROAD (ARM B)
```

ARM A IS Chai Wan Rd (WB)
ARM B IS Wan Tsui Rd (NB)
ARM C IS Chai Wan Rd (EB)

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

ETC.

.GEOMETRIC DATA

DATA ITEM		MINOR ROAD B
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	(W)	17.50 M.
CENTRAL RESERVE WIDTH	(WCR)	3.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B)	3.00 M.
- VISIBILITY	(VC-B)	50.0 M.
- BLOCKS TRAFFIC		NO
MINOR ROAD - VISIBILITY TO LEFT	(VB-C)	50.0 M.
- VISIBILITY TO RIGHT	(VB-A)	50.0 M.
- LANE 1 WIDTH	(WB-C)	3.10 M.
- LANE 2 WIDTH	(WB-A)	3.10 M.

.

.TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 08.00 AND ENDS 09.30

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	4.88	7.31	4.88
ARM B	15.00	45.00	75.00	3.38	5.06	3.38
ARM C	15.00	45.00	75.00	9.00	13.50	9.00

.

TIME	FROM/TO	ARM A	ARM B	ARM C
		TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) / (PERCENTAGE OF H.V.S)		
08.00 - 09.30				
	ARM A	0.000	0.218	0.782
		0.0	85.0	305.0
		(0.0)	(0.0)	(0.0)

```
I                    I  ARM B  I  0.185 I  0.000 I  0.815 I
I                    I         I   50.0 I    0.0 I  220.0 I
I                    I         I (  0.0)I (  0.0)I (  0.0)I
I                    I         I        I        I        I
I                    I  ARM C  I  0.771 I  0.229 I  0.000 I
I                    I         I  555.0 I  165.0 I    0.0 I
I                    I         I (  0.0)I (  0.0)I (  0.0)I
I                    I         I        I        I        I
-----------------------------------------------------------

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

.-------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY      GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/   I
I                               (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.00-08.15                                                                                    I
I  B-C       2.75     10.28    0.267                 0.0    0.4        5.2                       I
I  B-A       0.63      7.92    0.079                 0.0    0.1        1.2                       I
I  C-A       6.94                                                                                I
I  C-B       2.06     10.30    0.200                 0.0    0.2        3.6                       I
I  A-B       1.06                                                                                I
I  A-C       3.81                                                                                I
I                                                                                                I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                   I
I      CHANGE:      (.1M)       (.1M)       (.1M)         (M)           (M)                      I
I                                                                                                I
I        B-C         0.102      0.005                                  0.010                     I
I        B-A         0.078      0.012       0.019       0.005          0.008                     I
I        C-B         0.103      0.005                   0.010                                    I
--------------------------------------------------------------------------------------------------

.-------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY      GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/   I
I                               (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.15-08.30                                                                                    I
I  B-C       3.28     10.13    0.324                 0.4    0.5        6.9                       I
I  B-A       0.75      7.65    0.098                 0.1    0.1        1.6                       I
I  C-A       8.28                                                                                I
I  C-B       2.46     10.18    0.242                 0.2    0.3        4.6                       I
I  A-B       1.27                                                                                I
I  A-C       4.55                                                                                I
I                                                                                                I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                   I
I      CHANGE:      (.1M)       (.1M)       (.1M)         (M)           (M)                      I
I                                                                                                I
I        B-C         0.100      0.006                                  0.010                     I
I        B-A         0.076      0.014       0.019       0.005          0.007                     I
I        C-B         0.102      0.006                   0.010                                    I
--------------------------------------------------------------------------------------------------

.-------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY      GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/   I
I                               (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.30-08.45                                                                                    I
I  B-C       4.02      9.92    0.406                 0.5    0.7        9.7                       I
I  B-A       0.91      7.28    0.126                 0.1    0.1        2.1                       I
I  C-A      10.15                                                                                I
I  C-B       3.02     10.02    0.301                 0.3    0.4        6.2                       I
I  A-B       1.55                                                                                I
I  A-C       5.58                                                                                I
I                                                                                                I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                   I
I      CHANGE:      (.1M)       (.1M)       (.1M)         (M)           (M)                      I
I                                                                                                I
I        B-C         0.098      0.007                                  0.010                     I
I        B-A         0.072      0.018       0.019       0.005          0.007                     I
I        C-B         0.100      0.008                   0.010                                    I
--------------------------------------------------------------------------------------------------

.-------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY      GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/   I
I                               (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.45-09.00                                                                                    I
I  B-C       4.02      9.91    0.406                 0.7    0.7       10.1                       I
I  B-A       0.91      7.27    0.126                 0.1    0.1        2.1                       I
I  C-A      10.15                                                                                I
I  C-B       3.02     10.02    0.301                 0.4    0.4        6.4                       I
I  A-B       1.55                                                                                I
I  A-C       5.58                                                                                I
I                                                                                                I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                   I
I      CHANGE:      (.1M)       (.1M)       (.1M)         (M)           (M)                      I
I                                                                                                I
I        B-C         0.098      0.007                                  0.010                     I
I        B-A         0.072      0.018       0.019       0.005          0.007                     I
I        C-B         0.100      0.008                   0.010                                    I
--------------------------------------------------------------------------------------------------

.-------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY      GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/   I
I                               (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 09.00-09.15                                                                                    I
I  B-C       3.28     10.13    0.324                 0.7    0.5        7.5                       I
I  B-A       0.75      7.65    0.098                 0.1    0.1        1.7                       I
I  C-A       8.28                                                                                I
I  C-B       2.46     10.18    0.242                 0.4    0.3        5.0                       I
I  A-B       1.27                                                                                I
I  A-C       4.55                                                                                I
I                                                                                                I
```

```
I                    EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                              I
I                              MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                      I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                         I
I      CHANGE:      (.1M)       (.1M)       (.1M)         (M)            (M)                           I
I                                                                                                      I
I       B-C          0.100      0.006                                   0.010                          I
I       B-A          0.076      0.015       0.019       0.005           0.007                          I
I       C-B          0.102      0.006                   0.010                                          I
--------------------------------------------------------------------------------------------------------

.-------------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 09.15-09.30                                                                                  I
I   B-C       2.75     10.28    0.267              0.5    0.4        5.7                        I
I   B-A       0.63      7.92    0.079              0.1    0.1        1.3                        I
I   C-A       6.94                                                                             I
I   C-B       2.06     10.30    0.200              0.3    0.3        3.9                        I
I   A-B       1.06                                                                             I
I   A-C       3.81                                                                             I
I                                                                                              I
I                    EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                      I
I                              MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY              I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                 I
I      CHANGE:      (.1M)       (.1M)       (.1M)         (M)            (M)                   I
I                                                                                              I
I       B-C          0.102      0.005                                   0.010                  I
I       B-A          0.078      0.012       0.019       0.005           0.008                  I
I       C-B          0.103      0.005                   0.010                                  I
------------------------------------------------------------------------------------------------
.
QUEUE FOR STREAM   B-C
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  08.15          0.4
  08.30          0.5
  08.45          0.7    *
  09.00          0.7    *
  09.15          0.5
  09.30          0.4
.
QUEUE FOR STREAM   B-A
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  08.15          0.1
  08.30          0.1
  08.45          0.1
  09.00          0.1
  09.15          0.1
  09.30          0.1
.
QUEUE FOR STREAM   C-B
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  08.15          0.2
  08.30          0.3
  08.45          0.4
  09.00          0.4
  09.15          0.3
  09.30          0.3
.
                QUEUEING DELAY INFORMATION OVER WHOLE PERIOD
                --------------------------------------------

---------------------------------------------------------------------------
I STREAM I   TOTAL DEMAND  I   * QUEUEING *      I * INCLUSIVE QUEUEING * I
I        I                 I    * DELAY *        I       * DELAY *        I
I        I-----------------------------------------------------------------I
I        I  (VEH)  (VEH/H) I  (MIN)    (MIN/VEH) I    (MIN)     (MIN/VEH) I
---------------------------------------------------------------------------
I  B-C   I  301.7 I  201.1 I    45.1 I    0.15   I      45.1  I    0.15   I
I  B-A   I   68.6 I   45.7 I    10.0 I    0.15   I      10.0  I    0.15   I
I  C-A   I  761.0 I  507.3 I         I           I            I           I
I  C-B   I  226.2 I  150.8 I    29.7 I    0.13   I      29.7  I    0.13   I
I  A-B   I  116.6 I   77.7 I         I           I            I           I
I  A-C   I  418.2 I  278.8 I         I           I            I           I
---------------------------------------------------------------------------
I  ALL   I 1892.3 I 1261.5 I    84.8 I    0.04   I      84.8  I    0.04   I
---------------------------------------------------------------------------


* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.


END OF JOB
```

TRANSPORT RESEARCH LABORATORY

CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

Visual PICADY 4 ANALYSIS PROGRAM
RELEASE 2.1 (DEC 1998)

THE USER OF THIS COMPUTER PROGRAM FOR THE SOLUTION OF AN ENGINEERING PROBLEM IS
IN NO WAY RELIEVED OF HIS RESPONSIBILITY FOR THE CORRECTNESS OF THE SOLUTION

Run with file:- "o:\JTC\JE Chai Wan Road_Wan Tsui Road\JE_2034REFPM.vpi" at 18:30:07 on Thursday, 25 April 2019

RUN TITLE
****
JE - Chai Wan Road / Wan Tsui Road (2034REFPM)

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA

```
                   MAJOR ROAD (ARM C) --------------------- MAJOR ROAD (ARM A)
                                                I
                                                I
                                                I
                                                I
                                                I
                                                I
                                       MINOR ROAD (ARM B)
```

ARM A IS Chai Wan Rd (WB)
ARM B IS Wan Tsui Rd (NB)
ARM C IS Chai Wan Rd (EB)

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

ETC.

.GEOMETRIC DATA

DATA ITEM		MINOR ROAD B
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	(W)	17.50 M.
CENTRAL RESERVE WIDTH	(WCR)	3.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B)	3.00 M.
- VISIBILITY	(VC-B)	50.0 M.
- BLOCKS TRAFFIC		NO
MINOR ROAD - VISIBILITY TO LEFT	(VB-C)	50.0 M.
- VISIBILITY TO RIGHT	(VB-A)	50.0 M.
- LANE 1 WIDTH	(WB-C)	3.10 M.
- LANE 2 WIDTH	(WB-A)	3.10 M.

.

.TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 17.15 AND ENDS 18.45

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

	NUMBER OF MINUTES FROM START WHEN			RATE OF FLOW (VEH/MIN)		
ARM	FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	4.88	7.31	4.88
ARM B	15.00	45.00	75.00	3.25	4.88	3.25
ARM C	15.00	45.00	75.00	8.00	12.00	8.00

.

TIME	TURNING PROPORTIONS TURNING COUNTS (VEH/HR) (PERCENTAGE OF H.V.S) FROM/TO	ARM A	ARM B	ARM C
17.15 - 18.45				
	ARM A	0.000	0.295	0.705
		0.0	115.0	275.0
		(0.0)	(0.0)	(0.0)

```
I                    I  ARM B  I  0.154 I  0.000 I  0.846 I
I                    I         I   40.0 I    0.0 I  220.0 I
I                    I         I (  0.0)I (  0.0)I (  0.0)I
I                    I         I        I        I        I
I                    I  ARM C  I  0.703 I  0.297 I  0.000 I
I                    I         I  450.0 I  190.0 I    0.0 I
I                    I         I (  0.0)I (  0.0)I (  0.0)I
I                    I         I        I        I        I
-----------------------------------------------------------

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.15-17.30                                                                                  I
I  B-C       2.75     10.36    0.266                 0.0    0.4        5.1                     I
I  B-A       0.50      8.00    0.063                 0.0    0.1        1.0                     I
I  C-A       5.63                                                                              I
I  C-B       2.38     10.30    0.230                 0.0    0.3        4.3                     I
I  A-B       1.44                                                                              I
I  A-C       3.44                                                                              I
I                                                                                              I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                       I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY               I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR)  TO RIGHT                I
I      CHANGE:      (.1M)       (.1M)       (.1M)        (M)             (M)                   I
I                                                                                              I
I       B-C         0.103      0.004                                   0.010                   I
I       B-A         0.079      0.011       0.019       0.005           0.008                   I
I       C-B         0.103      0.005                   0.010                                   I
------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.30-17.45                                                                                  I
I  B-C       3.28     10.22    0.321                 0.4    0.5        6.8                     I
I  B-A       0.60      7.74    0.077                 0.1    0.1        1.2                     I
I  C-A       6.72                                                                              I
I  C-B       2.84     10.18    0.278                 0.3    0.4        5.6                     I
I  A-B       1.72                                                                              I
I  A-C       4.10                                                                              I
I                                                                                              I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                       I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY               I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR)  TO RIGHT                I
I      CHANGE:      (.1M)       (.1M)       (.1M)        (M)             (M)                   I
I                                                                                              I
I       B-C         0.101      0.005                                   0.010                   I
I       B-A         0.077      0.014       0.019       0.005           0.007                   I
I       C-B         0.102      0.006                   0.010                                   I
------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.45-18.00                                                                                  I
I  B-C       4.02     10.03    0.401                 0.5    0.7        9.5                     I
I  B-A       0.73      7.38    0.099                 0.1    0.1        1.6                     I
I  C-A       8.23                                                                              I
I  C-B       3.47     10.02    0.347                 0.4    0.5        7.6                     I
I  A-B       2.10                                                                              I
I  A-C       5.03                                                                              I
I                                                                                              I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                       I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY               I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR)  TO RIGHT                I
I      CHANGE:      (.1M)       (.1M)       (.1M)        (M)             (M)                   I
I                                                                                              I
I       B-C         0.099      0.006                                   0.010                   I
I       B-A         0.073      0.017       0.019       0.005           0.007                   I
I       C-B         0.100      0.008                   0.010                                   I
------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 18.00-18.15                                                                                  I
I  B-C       4.02     10.02    0.401                 0.7    0.7        9.9                     I
I  B-A       0.73      7.38    0.099                 0.1    0.1        1.6                     I
I  C-A       8.23                                                                              I
I  C-B       3.47     10.02    0.347                 0.5    0.5        7.9                     I
I  A-B       2.10                                                                              I
I  A-C       5.03                                                                              I
I                                                                                              I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                       I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY               I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR)  TO RIGHT                I
I      CHANGE:      (.1M)       (.1M)       (.1M)        (M)             (M)                   I
I                                                                                              I
I       B-C         0.099      0.006                                   0.010                   I
I       B-A         0.073      0.017       0.019       0.005           0.007                   I
I       C-B         0.100      0.008                   0.010                                   I
------------------------------------------------------------------------------------------------

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I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 18.15-18.30                                                                                  I
I  B-C       3.28     10.22    0.321                 0.7    0.5        7.4                     I
I  B-A       0.60      7.73    0.077                 0.1    0.1        1.3                     I
I  C-A       6.72                                                                              I
I  C-B       2.84     10.18    0.278                 0.5    0.4        6.0                     I
I  A-B       1.72                                                                              I
I  A-C       4.10                                                                              I
I                                                                                              I
```

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I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                          I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)           (M)                       I
I                                                                                                I
I       B-C         0.101      0.005                                  0.010                      I
I       B-A         0.077      0.014       0.019       0.005          0.007                      I
I       C-B         0.102      0.006                   0.010                                     I
--------------------------------------------------------------------------------------------------

.-------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/  I
I                             (RFC)     (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 18.30-18.45                                                                                    I
I   B-C      2.75     10.35    0.266                 0.5    0.4        5.6                       I
I   B-A      0.50      7.99    0.063                 0.1    0.1        1.0                       I
I   C-A      5.63                                                                                I
I   C-B      2.38     10.30    0.230                 0.4    0.3        4.7                       I
I   A-B      1.44                                                                                I
I   A-C      3.44                                                                                I
I                                                                                                I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                          I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)           (M)                       I
I                                                                                                I
I       B-C         0.103      0.004                                  0.010                      I
I       B-A         0.079      0.012       0.019       0.005          0.008                      I
I       C-B         0.103      0.005                   0.010                                     I
--------------------------------------------------------------------------------------------------
.
QUEUE FOR STREAM   B-C
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  17.30          0.4
  17.45          0.5
  18.00          0.7    *
  18.15          0.7    *
  18.30          0.5
  18.45          0.4
.
QUEUE FOR STREAM   B-A
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  17.30          0.1
  17.45          0.1
  18.00          0.1
  18.15          0.1
  18.30          0.1
  18.45          0.1
.
QUEUE FOR STREAM   C-B
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  17.30          0.3
  17.45          0.4
  18.00          0.5    *
  18.15          0.5    *
  18.30          0.4
  18.45          0.3
.
                QUEUEING DELAY INFORMATION OVER WHOLE PERIOD
                --------------------------------------------

---------------------------------------------------------------------------
I STREAM I   TOTAL DEMAND  I   * QUEUEING *       I * INCLUSIVE QUEUEING * I
I        I                 I    * DELAY *         I       * DELAY *        I
I        I-----------------------------------------------------------------I
I        I  (VEH)   (VEH/H) I  (MIN)    (MIN/VEH) I    (MIN)     (MIN/VEH) I
---------------------------------------------------------------------------
I  B-C   I  301.7 I  201.1 I    44.5 I    0.15   I      44.5  I    0.15   I
I  B-A   I   54.8 I   36.6 I     7.7 I    0.14   I       7.7  I    0.14   I
I  C-A   I  617.0 I  411.4 I         I           I            I           I
I  C-B   I  260.5 I  173.7 I    36.0 I    0.14   I      36.0  I    0.14   I
I  A-B   I  157.7 I  105.1 I         I           I            I           I
I  A-C   I  377.1 I  251.4 I         I           I            I           I
---------------------------------------------------------------------------
I  ALL   I 1768.9 I 1179.2 I    88.2 I    0.05   I      88.2  I    0.05   I
---------------------------------------------------------------------------


* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.


END OF JOB
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TRANSPORT RESEARCH LABORATORY

CAPACITIES, QUEUES AND DELAYS AT ROUNDABOUTS

Visual ARCADY 4 ANALYSIS PROGRAM
RELEASE 2.1 (OCT 1998)

THE USER OF THIS COMPUTER PROGRAM FOR THE SOLUTION OF AN ENGINEERING PROBLEM IS
IN NO WAY RELIEVED OF HIS RESPONSIBILITY FOR THE CORRECTNESS OF THE SOLUTION

Run with file:- "o:\JTC\JF Chai Wan Road Roundabout\JF_2034REFAM.vai" at 18:30:43 on Thursday, 25 April 2019

.ROUNDABOUT CAPACITY AND DELAY
****

RUN TITLE
****
JF- Chai Wan Road / Island Eastern Corridor / Wan Tsui Road (2034REFAM)

.INPUT DATA
****
ARM A - Island Eastern Corrodor
ARM B - Chai Wan Road (east of roundabout)
ARM C - Wan Tsui Road
ARM D - Chai Wan Road (west of roundabout)

.GEOMETRIC DATA

ARM	V (M)	E (M)	L (M)	R (M)	D (M)	PHI (DEG)	SLOPE	INTERCEPT (PCU/MIN)
ARM A	7.30	7.30	1.00	100.00	80.00	0.0	0.626	42.145
ARM B	7.30	7.30	1.00	50.00	80.00	0.0	0.620	41.784
ARM C	7.00	7.00	1.00	25.00	80.00	3.0	0.589	39.008
ARM D	10.50	10.50	1.00	50.00	80.00	0.0	0.782	60.101

.TRAFFIC DEMAND DATA

.TIME PERIOD BEGINS 08.00 AND ENDS 09.30
.LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

.DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN: FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN): BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	10.44	15.66	10.44
ARM B	15.00	45.00	75.00	10.75	16.13	10.75
ARM C	15.00	45.00	75.00	4.88	7.31	4.88
ARM D	15.00	45.00	75.00	17.13	25.69	17.13

TURNING PROPORTIONS
TURNING COUNTS (VEH/HR)
(PERCENTAGE OF H.V.S)

TIME	FROM/TO	ARM A	ARM B	ARM C	ARM D
08.00 - 09.30					
	ARM A	0.299	0.275	0.251	0.174
		250.0	230.0	210.0	145.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM B	0.442	0.110	0.256	0.192
		380.0	95.0	220.0	165.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM C	0.385	0.564	0.000	0.051
		150.0	220.0	0.0	20.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM D	0.529	0.303	0.099	0.069
		725.0	415.0	135.0	95.0
		(0.0)	(0.0)	(0.0)	(0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

. QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.00-08.15								
ARM A	10.44	34.65	0.301		0.0	0.4	6.3	
ARM B	10.75	35.33	0.304		0.0	0.4	6.4	
ARM C	4.88	30.71	0.159		0.0	0.2	2.8	
ARM D	17.13	49.43	0.346		0.0	0.5	7.8	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.15-08.30								
ARM A	12.46	33.18	0.376		0.4	0.6	8.8	
ARM B	12.84	34.06	0.377		0.4	0.6	8.9	
ARM C	5.82	29.08	0.200		0.2	0.2	3.7	
ARM D	20.45	47.33	0.432		0.5	0.8	11.2	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.30-08.45								
ARM A	15.26	31.18	0.490		0.6	1.0	13.9	
ARM B	15.72	32.33	0.486		0.6	0.9	13.8	
ARM C	7.13	26.85	0.266		0.2	0.4	5.3	
ARM D	25.04	44.47	0.563		0.8	1.3	18.7	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.45-09.00								
ARM A	15.26	31.16	0.490		1.0	1.0	14.3	
ARM B	15.72	32.31	0.487		0.9	0.9	14.1	
ARM C	7.13	26.83	0.266		0.4	0.4	5.4	
ARM D	25.04	44.45	0.563		1.3	1.3	19.2	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
09.00-09.15								
ARM A	12.46	33.16	0.376		1.0	0.6	9.2	
ARM B	12.84	34.04	0.377		0.9	0.6	9.3	
ARM C	5.82	29.05	0.200		0.4	0.3	3.8	
ARM D	20.45	47.30	0.432		1.3	0.8	11.7	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
09.15-09.30								
ARM A	10.44	34.63	0.301		0.6	0.4	6.6	
ARM B	10.75	35.30	0.305		0.6	0.4	6.7	
ARM C	4.88	30.68	0.159		0.3	0.2	2.9	
ARM D	17.13	49.39	0.347		0.8	0.5	8.1	

.QUEUE AT ARM A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.15	0.4	
08.30	0.6	*
08.45	1.0	*
09.00	1.0	*
09.15	0.6	*
09.30	0.4	

.QUEUE AT ARM B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.15	0.4	
08.30	0.6	*
08.45	0.9	*
09.00	0.9	*
09.15	0.6	*
09.30	0.4	

.QUEUE AT ARM C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
08.15	0.2
08.30	0.2
08.45	0.4
09.00	0.4
09.15	0.3
09.30	0.2

.QUEUE AT ARM D

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.15	0.5	*
08.30	0.8	*
08.45	1.3	*
09.00	1.3	*

09.15	0.8	*
09.30	0.5	*

.

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

ARM	TOTAL DEMAND (VEH)	TOTAL DEMAND (VEH/H)	* QUEUEING * * DELAY * (MIN)	* QUEUEING * * DELAY * (MIN/VEH)	* INCLUSIVE QUEUEING * * DELAY * (MIN)	* INCLUSIVE QUEUEING * * DELAY * (MIN/VEH)
A	1145.0	763.3	59.3	0.05	59.3	0.05
B	1179.2	786.2	59.2	0.05	59.2	0.05
C	534.8	356.5	23.9	0.04	23.9	0.04
D	1878.6	1252.4	76.8	0.04	76.8	0.04
ALL	4737.5	3158.4	219.1	0.05	219.1	0.05

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD.
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

TRANSPORT RESEARCH LABORATORY

CAPACITIES, QUEUES AND DELAYS AT ROUNDABOUTS

Visual ARCADY 4 ANALYSIS PROGRAM
RELEASE 2.1 (OCT 1998)

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Run with file:- "o:\JTC\JF Chai Wan Road Roundabout\JF_2034REFPM.vai" at 18:30:46 on Thursday, 25 April 2019

.ROUNDABOUT CAPACITY AND DELAY
****

RUN TITLE
****
JF- Chai Wan Road / Island Eastern Corridor / Wan Tsui Road (2034REFPM)

.INPUT DATA
****
ARM A - Island Eastern Corrodor
ARM B - Chai Wan Road (east of roundabout)
ARM C - Wan Tsui Road
ARM D - Chai Wan Road (west of roundabout)

.GEOMETRIC DATA

ARM	V (M)	E (M)	L (M)	R (M)	D (M)	PHI (DEG)	SLOPE	INTERCEPT (PCU/MIN)
ARM A	7.30	7.30	1.00	100.00	80.00	0.0	0.626	42.145
ARM B	7.30	7.30	1.00	50.00	80.00	0.0	0.620	41.784
ARM C	7.00	7.00	1.00	25.00	80.00	3.0	0.589	39.008
ARM D	10.50	10.50	1.00	50.00	80.00	0.0	0.782	60.101

.TRAFFIC DEMAND DATA

.TIME PERIOD BEGINS 17.15 AND ENDS 18.45
.LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

.DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN: FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN): BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	12.13	18.19	12.13
ARM B	15.00	45.00	75.00	11.44	17.16	11.44
ARM C	15.00	45.00	75.00	5.38	8.06	5.38
ARM D	15.00	45.00	75.00	16.06	24.09	16.06

TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) / (PERCENTAGE OF H.V.S)

TIME	FROM/TO	ARM A	ARM B	ARM C	ARM D
17.15 - 18.45					
	ARM A	0.216	0.361	0.227	0.196
		210.0	350.0	220.0	190.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM B	0.448	0.082	0.317	0.153
		410.0	75.0	290.0	140.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM C	0.314	0.640	0.012	0.035
		135.0	275.0	5.0	15.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM D	0.498	0.319	0.097	0.086
		640.0	410.0	125.0	110.0
		(0.0)	(0.0)	(0.0)	(0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

. QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
17.15-17.30								
ARM A	12.13	34.34	0.353		0.0	0.5	8.0	
ARM B	11.44	35.13	0.326		0.0	0.5	7.1	
ARM C	5.38	30.67	0.175		0.0	0.2	3.1	
ARM D	16.06	49.28	0.326		0.0	0.5	7.1	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
17.30-17.45								
ARM A	14.48	32.81	0.441		0.5	0.8	11.5	
ARM B	13.66	33.83	0.404		0.5	0.7	9.9	
ARM C	6.42	29.03	0.221		0.2	0.3	4.2	
ARM D	19.18	47.16	0.407		0.5	0.7	10.1	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
17.45-18.00								
ARM A	17.73	30.72	0.577		0.8	1.3	19.6	
ARM B	16.73	32.05	0.522		0.7	1.1	15.8	
ARM C	7.86	26.80	0.293		0.3	0.4	6.1	
ARM D	23.49	44.26	0.531		0.7	1.1	16.5	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
18.00-18.15								
ARM A	17.73	30.71	0.578		1.3	1.4	20.3	
ARM B	16.73	32.03	0.522		1.1	1.1	16.3	
ARM C	7.86	26.78	0.294		0.4	0.4	6.2	
ARM D	23.49	44.24	0.531		1.1	1.1	16.9	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
18.15-18.30								
ARM A	14.48	32.79	0.442		1.4	0.8	12.2	
ARM B	13.66	33.80	0.404		1.1	0.7	10.4	
ARM C	6.42	29.00	0.221		0.4	0.3	4.3	
ARM D	19.18	47.12	0.407		1.1	0.7	10.5	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
18.30-18.45								
ARM A	12.13	34.32	0.353		0.8	0.5	8.4	
ARM B	11.44	35.11	0.326		0.7	0.5	7.4	
ARM C	5.38	30.64	0.175		0.3	0.2	3.2	
ARM D	16.06	49.24	0.326		0.7	0.5	7.4	

.QUEUE AT ARM A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.30	0.5	*
17.45	0.8	*
18.00	1.3	*
18.15	1.4	*
18.30	0.8	*
18.45	0.5	*

.QUEUE AT ARM B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.30	0.5	
17.45	0.7	*
18.00	1.1	*
18.15	1.1	*
18.30	0.7	*
18.45	0.5	

.QUEUE AT ARM C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
17.30	0.2
17.45	0.3
18.00	0.4
18.15	0.4
18.30	0.3
18.45	0.2

.QUEUE AT ARM D

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.30	0.5	
17.45	0.7	*
18.00	1.1	*
18.15	1.1	*

18.30	0.7 *
18.45	0.5

.

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

ARM	TOTAL DEMAND (VEH)	TOTAL DEMAND (VEH/H)	* QUEUEING * * DELAY * (MIN)	* QUEUEING * * DELAY * (MIN/VEH)	* INCLUSIVE QUEUEING * * DELAY * (MIN)	* INCLUSIVE QUEUEING * * DELAY * (MIN/VEH)
A	1330.1	886.7	80.0	0.06	80.1	0.06
B	1254.7	836.4	66.9	0.05	66.9	0.05
C	589.6	393.1	27.2	0.05	27.2	0.05
D	1762.0	1174.7	68.5	0.04	68.5	0.04
ALL	4936.4	3290.9	242.7	0.05	242.7	0.05

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD.
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

TRANSPORT RESEARCH LABORATORY

CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

Visual PICADY 4 ANALYSIS PROGRAM
RELEASE 2.1 (DEC 1998)

THE USER OF THIS COMPUTER PROGRAM FOR THE SOLUTION OF AN ENGINEERING PROBLEM IS
IN NO WAY RELIEVED OF HIS RESPONSIBILITY FOR THE CORRECTNESS OF THE SOLUTION

Run with file:- "o:\jtc\Junction 2034\JG Hong Man Street_Lee Chung Street\JG_2034REFAM.vpi" at 11:56:27 on Monday, 25 February 2019

RUN TITLE
****
JG - Hong Man St / Lee Chung St (2034REFAM)

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA

```
MAJOR ROAD (ARM C) --------------------- MAJOR ROAD (ARM A)
                              I
                              I
                              I
                              I
                              I
                              I
                       MINOR ROAD (ARM B)
```

ARM A IS Hong Man St (NB)
ARM B IS Lee Chung St (SB)
ARM C IS Hong Man St (WB)

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

ETC.

.GEOMETRIC DATA

DATA ITEM	MINOR ROAD B
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	(W) 20.00 M.
CENTRAL RESERVE WIDTH	(WCR) 0.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B) 2.20 M.
- VISIBILITY	(VC-B) 250.0 M.
- BLOCKS TRAFFIC	NO
MINOR ROAD - VISIBILITY TO LEFT	(VB-C) 75.0 M.
- VISIBILITY TO RIGHT	(VB-A) 250.0 M.
- LANE 1 WIDTH	(WB-C) 5.00 M.
- LANE 2 WIDTH	(WB-A) 5.00 M.

.

.TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 08.00 AND ENDS 09.30

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	0.00	0.00	0.00
ARM B	15.00	45.00	75.00	0.50	0.75	0.50
ARM C	15.00	45.00	75.00	4.31	6.47	4.31

.

TIME	FROM/TO	TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) / (PERCENTAGE OF H.V.S) ARM A	ARM B	ARM C
08.00 - 09.30				
	ARM A	0.000	0.000	0.000
		???????	???????	???????
		(0.0)	(0.0)	(0.0)

```
I                    I        I        I        I        I
I                    I  ARM B  I  1.000 I  0.000 I  0.000 I
I                    I        I   40.0 I    0.0 I    0.0 I
I                    I        I (  0.0)I (  0.0)I (  0.0)I
I                    I        I        I        I        I
I                    I  ARM C  I  1.000 I  0.000 I  0.000 I
I                    I        I  345.0 I    0.0 I    0.0 I
I                    I        I (  0.0)I (  0.0)I (  0.0)I
I                    I        I        I        I        I
----------------------------------------------------------

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                                (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.00-08.15                                                                                   I
I   B-C       0.00     14.06    0.000                 0.0    0.0        0.0                     I
I   B-A       0.50     12.19    0.041                 0.0    0.0        0.6                     I
I   C-A       4.31                                                                              I
I   C-B       0.00     10.89    0.000                 0.0    0.0        0.0                     I
I   A-B       0.00                                                                              I
I   A-C       0.00                                                                              I
I                                                                                               I
I                    EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                       I
I                              MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY               I
I      MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                 I
I       CHANGE:      (.1M)       (.1M)       (.1M)        (M)            (M)                    I
I                                                                                               I
I        B-C          0.129      0.000                                 0.012                    I
I        B-A          0.102      0.004       0.028      0.008          0.010                    I
I        C-B          0.130      0.000                  0.010                                   I
-------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                                (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.15-08.30                                                                                   I
I   B-C       0.00     14.03    0.000                 0.0    0.0        0.0                     I
I   B-A       0.60     12.12    0.049                 0.0    0.1        0.8                     I
I   C-A       5.15                                                                              I
I   C-B       0.00     10.89    0.000                 0.0    0.0        0.0                     I
I   A-B       0.00                                                                              I
I   A-C       0.00                                                                              I
I                                                                                               I
I                    EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                       I
I                              MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY               I
I      MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                 I
I       CHANGE:      (.1M)       (.1M)       (.1M)        (M)            (M)                    I
I                                                                                               I
I        B-C          0.129      0.000                                 0.012                    I
I        B-A          0.101      0.005       0.028      0.008          0.010                    I
I        C-B          0.130      0.000                  0.010                                   I
-------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                                (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.30-08.45                                                                                   I
I   B-C       0.00     13.99    0.000                 0.0    0.0        0.0                     I
I   B-A       0.73     12.02    0.061                 0.1    0.1        0.9                     I
I   C-A       6.31                                                                              I
I   C-B       0.00     10.89    0.000                 0.0    0.0        0.0                     I
I   A-B       0.00                                                                              I
I   A-C       0.00                                                                              I
I                                                                                               I
I                    EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                       I
I                              MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY               I
I      MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                 I
I       CHANGE:      (.1M)       (.1M)       (.1M)        (M)            (M)                    I
I                                                                                               I
I        B-C          0.128      0.000                                 0.012                    I
I        B-A          0.100      0.006       0.028      0.008          0.010                    I
I        C-B          0.130      0.000                  0.010                                   I
-------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                                (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.45-09.00                                                                                   I
I   B-C       0.00     13.99    0.000                 0.0    0.0        0.0                     I
I   B-A       0.73     12.02    0.061                 0.1    0.1        1.0                     I
I   C-A       6.31                                                                              I
I   C-B       0.00     10.89    0.000                 0.0    0.0        0.0                     I
I   A-B       0.00                                                                              I
I   A-C       0.00                                                                              I
I                                                                                               I
I                    EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                       I
I                              MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY               I
I      MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                 I
I       CHANGE:      (.1M)       (.1M)       (.1M)        (M)            (M)                    I
I                                                                                               I
I        B-C          0.128      0.000                                 0.012                    I
I        B-A          0.100      0.006       0.028      0.008          0.010                    I
I        C-B          0.130      0.000                  0.010                                   I
-------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                                (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 09.00-09.15                                                                                   I
I   B-C       0.00     14.03    0.000                 0.0    0.0        0.0                     I
I   B-A       0.60     12.12    0.049                 0.1    0.1        0.8                     I
I   C-A       5.15                                                                              I
I   C-B       0.00     10.89    0.000                 0.0    0.0        0.0                     I
I   A-B       0.00                                                                              I
I   A-C       0.00                                                                              I
```

```
I                                                                                               I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I      MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I       CHANGE:     (.1M)       (.1M)       (.1M)         (M)           (M)                     I
I                                                                                               I
I         B-C         0.129     0.000                                   0.012                   I
I         B-A         0.101     0.005       0.028      0.008            0.010                   I
I         C-B         0.130     0.000                  0.010                                    I
-------------------------------------------------------------------------------------------------

-------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/  I
I                               (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 09.15-09.30                                                                                   I
I  B-C       0.00     14.06    0.000                  0.0    0.0        0.0                     I
I  B-A       0.50     12.19    0.041                  0.1    0.0        0.7                     I
I  C-A       4.31                                                                               I
I  C-B       0.00     10.89    0.000                  0.0    0.0        0.0                     I
I  A-B       0.00                                                                               I
I  A-C       0.00                                                                               I
I                                                                                               I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I      MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I       CHANGE:     (.1M)       (.1M)       (.1M)         (M)           (M)                     I
I                                                                                               I
I         B-C         0.129     0.000                                   0.012                   I
I         B-A         0.102     0.004       0.028      0.008            0.010                   I
I         C-B         0.130     0.000                  0.010                                    I
-------------------------------------------------------------------------------------------------

QUEUE FOR STREAM   B-C
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  08.15           0.0
  08.30           0.0
  08.45           0.0
  09.00           0.0
  09.15           0.0
  09.30           0.0

QUEUE FOR STREAM   B-A
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  08.15           0.0
  08.30           0.1
  08.45           0.1
  09.00           0.1
  09.15           0.1
  09.30           0.0

QUEUE FOR STREAM   C-B
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  08.15           0.0
  08.30           0.0
  08.45           0.0
  09.00           0.0
  09.15           0.0
  09.30           0.0

                QUEUEING DELAY INFORMATION OVER WHOLE PERIOD
                --------------------------------------------

---------------------------------------------------------------------------
I STREAM I   TOTAL DEMAND  I   * QUEUEING *      I * INCLUSIVE QUEUEING * I
I        I                 I    * DELAY *        I       * DELAY *        I
I        I--------------------------------------------------------------I
I        I  (VEH)   (VEH/H) I  (MIN)     (MIN/VEH) I    (MIN)     (MIN/VEH) I
---------------------------------------------------------------------------
I  B-C   I    0.0 I    0.0 I     0.0 I    0.00   I       0.0  I    0.00   I
I  B-A   I   54.8 I   36.6 I     4.7 I    0.09   I       4.7  I    0.09   I
I  C-A   I  473.1 I  315.4 I         I           I            I           I
I  C-B   I    0.0 I    0.0 I     0.0 I    0.00   I       0.0  I    0.00   I
I  A-B   I    0.0 I    0.0 I         I           I            I           I
I  A-C   I    0.0 I    0.0 I         I           I            I           I
---------------------------------------------------------------------------
I  ALL   I  527.9 I  351.9 I     4.7 I    0.01   I       4.7  I    0.01   I
---------------------------------------------------------------------------


* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.


END OF JOB
```

TRANSPORT RESEARCH LABORATORY

CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

Visual PICADY 4 ANALYSIS PROGRAM
RELEASE 2.1 (DEC 1998)

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Run with file:- "o:\jtc\Junction 2034\JG Hong Man Street_Lee Chung Street\JG_2034REFPM.vpi" at 11:56:30 on Monday, 25 February 2019

RUN TITLE
****
JG - Hong Man St / Lee Chung St (2034REFPM)

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA

```
                    MAJOR ROAD (ARM C) --------------------- MAJOR ROAD (ARM A)
                                                 I
                                                 I
                                                 I
                                                 I
                                                 I
                                                 I
                                            MINOR ROAD (ARM B)
```

ARM A IS Hong Man St (NB)
ARM B IS Lee Chung St (SB)
ARM C IS Hong Man St (WB)

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

ETC.

.GEOMETRIC DATA

DATA ITEM	MINOR ROAD B
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	(W) 20.00 M.
CENTRAL RESERVE WIDTH	(WCR) 0.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B) 2.20 M.
- VISIBILITY	(VC-B) 250.0 M.
- BLOCKS TRAFFIC	NO
MINOR ROAD - VISIBILITY TO LEFT	(VB-C) 75.0 M.
- VISIBILITY TO RIGHT	(VB-A) 250.0 M.
- LANE 1 WIDTH	(WB-C) 5.00 M.
- LANE 2 WIDTH	(WB-A) 5.00 M.

.

.TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 17.15 AND ENDS 18.45

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	0.00	0.00	0.00
ARM B	15.00	45.00	75.00	0.44	0.66	0.44
ARM C	15.00	45.00	75.00	4.63	6.94	4.63

.

TIME	FROM/TO	ARM A	ARM B	ARM C
		TURNING PROPORTIONS TURNING COUNTS (VEH/HR) (PERCENTAGE OF H.V.S)		
17.15 - 18.45				
	ARM A	0.000	0.000	0.000
		???????	???????	???????
		(0.0)	(0.0)	(0.0)

```
I                    I         I        I        I        I
I                    I  ARM B  I  1.000 I  0.000 I  0.000 I
I                    I         I   35.0 I    0.0 I    0.0 I
I                    I         I (  0.0)I (  0.0)I (  0.0)I
I                    I         I        I        I        I
I                    I  ARM C  I  1.000 I  0.000 I  0.000 I
I                    I         I  370.0 I    0.0 I    0.0 I
I                    I         I (  0.0)I (  0.0)I (  0.0)I
I                    I         I        I        I        I
-----------------------------------------------------------

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.15-17.30                                                                                   I
I  B-C       0.00     14.08    0.000                0.0    0.0        0.0                       I
I  B-A       0.44     12.17    0.036                0.0    0.0        0.5                       I
I  C-A       4.63                                                                               I
I  C-B       0.00     10.89    0.000                0.0    0.0        0.0                       I
I  A-B       0.00                                                                               I
I  A-C       0.00                                                                               I
I                                                                                               I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)            (M)                     I
I                                                                                               I
I       B-C          0.129      0.000                                  0.012                    I
I       B-A          0.101      0.004       0.028       0.008          0.010                    I
I       C-B          0.130      0.000                   0.010                                   I
------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.30-17.45                                                                                   I
I  B-C       0.00     14.05    0.000                0.0    0.0        0.0                       I
I  B-A       0.52     12.09    0.043                0.0    0.0        0.7                       I
I  C-A       5.52                                                                               I
I  C-B       0.00     10.89    0.000                0.0    0.0        0.0                       I
I  A-B       0.00                                                                               I
I  A-C       0.00                                                                               I
I                                                                                               I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)            (M)                     I
I                                                                                               I
I       B-C          0.129      0.000                                  0.012                    I
I       B-A          0.101      0.005       0.028       0.008          0.010                    I
I       C-B          0.130      0.000                   0.010                                   I
------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.45-18.00                                                                                   I
I  B-C       0.00     14.02    0.000                0.0    0.0        0.0                       I
I  B-A       0.64     11.98    0.053                0.0    0.1        0.8                       I
I  C-A       6.76                                                                               I
I  C-B       0.00     10.89    0.000                0.0    0.0        0.0                       I
I  A-B       0.00                                                                               I
I  A-C       0.00                                                                               I
I                                                                                               I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)            (M)                     I
I                                                                                               I
I       B-C          0.129      0.000                                  0.012                    I
I       B-A          0.100      0.006       0.028       0.008          0.010                    I
I       C-B          0.130      0.000                   0.010                                   I
------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 18.00-18.15                                                                                   I
I  B-C       0.00     14.02    0.000                0.0    0.0        0.0                       I
I  B-A       0.64     11.98    0.053                0.1    0.1        0.8                       I
I  C-A       6.76                                                                               I
I  C-B       0.00     10.89    0.000                0.0    0.0        0.0                       I
I  A-B       0.00                                                                               I
I  A-C       0.00                                                                               I
I                                                                                               I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)            (M)                     I
I                                                                                               I
I       B-C          0.129      0.000                                  0.012                    I
I       B-A          0.100      0.006       0.028       0.008          0.010                    I
I       C-B          0.130      0.000                   0.010                                   I
------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 18.15-18.30                                                                                   I
I  B-C       0.00     14.05    0.000                0.0    0.0        0.0                       I
I  B-A       0.52     12.09    0.043                0.1    0.0        0.7                       I
I  C-A       5.52                                                                               I
I  C-B       0.00     10.89    0.000                0.0    0.0        0.0                       I
I  A-B       0.00                                                                               I
I  A-C       0.00                                                                               I
```

```
I                                                                                               I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I      CHANGE:     (.1M)       (.1M)       (.1M)        (M)           (M)                       I
I                                                                                               I
I       B-C         0.129      0.000                                  0.012                     I
I       B-A         0.101      0.005       0.028      0.008           0.010                     I
I       C-B         0.130      0.000                  0.010                                     I
-------------------------------------------------------------------------------------------------

.-------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START  END       DELAY     GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                               (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 18.30-18.45                                                                                   I
I   B-C      0.00     14.08    0.000                 0.0    0.0        0.0                      I
I   B-A      0.44     12.17    0.036                 0.0    0.0        0.6                      I
I   C-A      4.63                                                                               I
I   C-B      0.00     10.89    0.000                 0.0    0.0        0.0                      I
I   A-B      0.00                                                                               I
I   A-C      0.00                                                                               I
I                                                                                               I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I      CHANGE:     (.1M)       (.1M)       (.1M)        (M)           (M)                       I
I                                                                                               I
I       B-C         0.129      0.000                                  0.012                     I
I       B-A         0.101      0.004       0.028      0.008           0.010                     I
I       C-B         0.130      0.000                  0.010                                     I
-------------------------------------------------------------------------------------------------
.
QUEUE FOR STREAM   B-C
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  17.30           0.0
  17.45           0.0
  18.00           0.0
  18.15           0.0
  18.30           0.0
  18.45           0.0
.
QUEUE FOR STREAM   B-A
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  17.30           0.0
  17.45           0.0
  18.00           0.1
  18.15           0.1
  18.30           0.0
  18.45           0.0
.
QUEUE FOR STREAM   C-B
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  17.30           0.0
  17.45           0.0
  18.00           0.0
  18.15           0.0
  18.30           0.0
  18.45           0.0
.
                QUEUEING DELAY INFORMATION OVER WHOLE PERIOD
                --------------------------------------------

---------------------------------------------------------------------------
I STREAM I   TOTAL DEMAND  I   * QUEUEING *      I * INCLUSIVE QUEUEING * I
I        I                 I    * DELAY *        I       * DELAY *        I
I        I--------------------------------------------------------------I
I        I  (VEH)  (VEH/H) I  (MIN)    (MIN/VEH) I    (MIN)     (MIN/VEH) I
---------------------------------------------------------------------------
I  B-C   I    0.0 I    0.0 I     0.0 I    0.00   I       0.0  I    0.00   I
I  B-A   I   48.0 I   32.0 I     4.1 I    0.09   I       4.1  I    0.09   I
I  C-A   I  507.3 I  338.2 I         I           I            I           I
I  C-B   I    0.0 I    0.0 I     0.0 I    0.00   I       0.0  I    0.00   I
I  A-B   I    0.0 I    0.0 I         I           I            I           I
I  A-C   I    0.0 I    0.0 I         I           I            I           I
---------------------------------------------------------------------------
I  ALL   I  555.3 I  370.2 I     4.1 I    0.01   I       4.1  I    0.01   I
---------------------------------------------------------------------------


* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.


END OF JOB
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TRAFFIC SIGNALS CALCULATION

Job No.: CHK50196317 **MVA HONG KONG LIMITED**

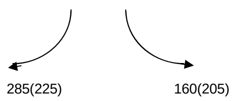
Junction: Ning Foo St/ Lee Chung St Design Year: 2034

Description: 2034 Reference Flow Designed By: HKH Checked By: GPH

Approach	Movements	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Gradient (%)	Pro. Turning (%) AM	Pro. Turning (%) PM	Revised Saturation Flow (pcu/hr) AM	Revised Saturation Flow (pcu/hr) PM	AM Peak Flow (pcu/hr)	AM Peak y Value	AM Peak Critical y	PM Peak Flow (pcu/hr)	PM Peak y Value	PM Peak Critical y
Ning Foo St (WB)		A	1	5.000		20				1965	1965	285	0.145		225	0.115	
Ning Foo St (WB)		A	1	5.000	15					1925	1925	160	0.083	0.083	205	0.106	0.106
Pedestrian Crossing		Bp	2	MIN GREEN + FLASH =			5	+	5	=	10			*			*
		Cp	2	MIN GREEN + FLASH =			5	+	5	=	10						

Notes:

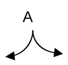
Flow: (pcu/hr)



Group	A,Bp	A,Bp	Group	A,Bp	A,Bp
y	0.083	0.083	y	0.106	0.106
L (sec)	16	16	L (sec)	16	16
C (sec)	60	60	C (sec)	60	60
y pract.	0.660	0.660	y pract.	0.660	0.660
R.C. (%)	694.1%	694.1%	R.C. (%)	520%	520%

Stage / Phase Diagrams

1.



2.

3.

4.

5.

I/G= 3		I/G= 4	10	I/G=		I/G=		I/G=	
I/G= 3		I/G= 4	10	I/G=		I/G=		I/G=	

Date:	Junction:
FEB, 2019	Ning Foo St/ Lee Chung St (H)

2034 Design Flows

TRAFFIC SIGNALS CALCULATION

Job No.: HK501522 **MVA HONG KONG LIMITED**

Junction: Chai Wan Road / Tai Tam Road Design Year: 2034

Description: 2034 Design Traffic Flows Designed By: LAU Checked By: GPH

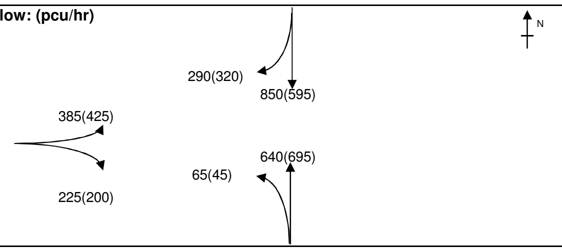
Approach	Movements	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Gradient (%)	Pro. Turning (%) AM	Pro. Turning (%) PM	Revised Saturation Flow (pcu/hr) AM	Revised Saturation Flow (pcu/hr) PM	AM Peak Flow (pcu/hr)	AM Peak y Value	AM Peak Critical y	PM Peak Flow (pcu/hr)	PM Peak y Value	PM Peak Critical y
Chai Wan Road (SB)		A	1	3.650			3.5			1835	1835	409	0.223		287	0.156	
		A	1	3.650			3.5			1975	1975	441	0.223	0.223	308	0.156	
		A	1	3.650		15	3.5			1795	1795	290	0.162		320	0.178	0.178
Chai Wan Road (NB)		B	2	3.650	15		3.5			1665	1665	65	0.039		45	0.027	
		B	2	3.650			3.5			1975	1975	320	0.162	0.162	348	0.176	0.176
		B	2	3.650			3.5			1975	1975	320	0.162		347	0.176	
ai Tam Road (EB)*		C	3	3.500	20	25		63% / 37%	68% / 32%	1835	1835	610	0.332	0.332	625	0.341	0.341

Pedestrian Crossing	Phase	Stage		Min Green		Flash		Total
Pedestrian Crossing	Dp	1	MIN GREEN + FLASH =	7	+	8	=	15
	Ep	2,3	MIN GREEN + FLASH =	21	+	10	=	31
	Fp	3	MIN GREEN + FLASH =	7	+	8	=	15
	Gp	1,2	MIN GREEN + FLASH =	21	+	12	=	33

Notes:

* 20m flare lane, 135pcu/hr deduction of left turning flow

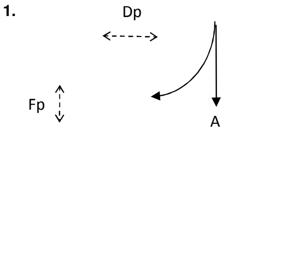
Flow: (pcu/hr)



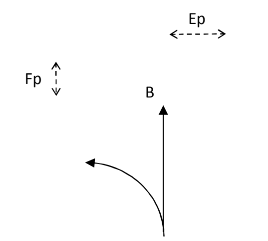
Group	Dp,B,C	A,B,C	Group	Dp,B,C	A,B,C
y	0.494	0.718	y	0.517	0.695
L (sec)	33	16	L (sec)	33	16
C (sec)	110	110	C (sec)	110	110
y pract.	0.630	0.769	y pract.	0.630	0.769
R.C. (%)	27%	7%	R.C. (%)	22%	11%

Stage / Phase Diagrams

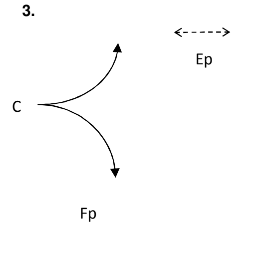
1.



2.



3.



4.

5.

I/G= 6		I/G= 6		I/G= 7		I/G=		I/G=	
I/G= 6		I/G= 6		I/G= 7		I/G=		I/G=	

Date: APR, 2019 **Junction:** Chai Wan Road / Tai Tam Road A

TRAFFIC SIGNALS CALCULATION

Job No.: HK501522 **MVA HONG KONG LIMITED**

Junction: Chai Wan Road / Tai Tam Road | Design Year: 2034

Description: 2034 Reference Traffic Flows (With Improvement) | Designed By: LAU | Checked By: GPH

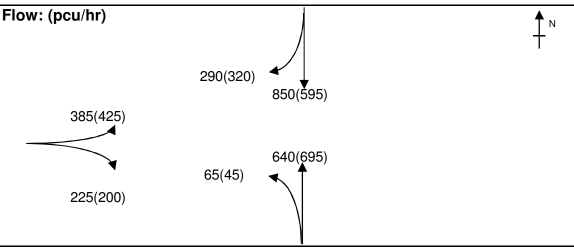
Approach	Movements	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Gradient (%)	Pro. Turning (%) AM	Pro. Turning (%) PM	Revised Saturation Flow (pcu/hr) AM	Revised Saturation Flow (pcu/hr) PM	AM Peak Flow (pcu/hr)	AM Peak y Value	AM Peak Critical y	PM Peak Flow (pcu/hr)	PM Peak y Value	PM Peak Critical y
Chai Wan Road (SB)	↓	A1	1,2	3.500			3.5			1820	1820	409	0.225		286	0.157	
	↓	A1	1,2	3.500			3.5			1960	1960	441	0.225		309	0.158	
	↲	A2	2	3.500		15	3.5			1780	1780	290	0.163	0.163	320	0.180	0.180
Chai Wan Road (NB)	↰	B	1	3.650	15		3.5			1665	1665	65	0.039		45	0.027	
	↑	B	1	3.650			3.5			1975	1975	320	0.162	0.162	348	0.176	0.176
	↑	B	1	3.650			3.5			1975	1975	320	0.162		347	0.176	
Tai Tam Road (EB)*	↰↱	C	3	3.500	20	25		63% / 37%	68% / 32%	1835	1835	610	0.332	0.332	625	0.341	0.341

Pedestrian Crossing	Phase	Stage							
	Dp	2	MIN GREEN + FLASH =	7	+	8	=	15
	Ep	3	MIN GREEN + FLASH =	8	+	6	=	14
	Fp	3	MIN GREEN + FLASH =	7	+	8	=	15
	Gp	1,2	MIN GREEN + FLASH =	21	+	12	=	33

Notes:

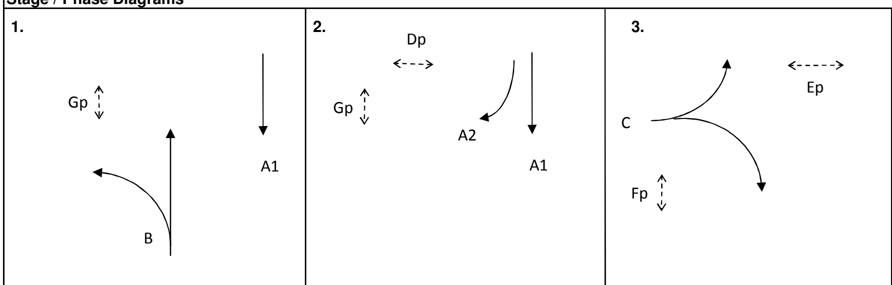
* 20m flare lane, 135pcu/hr deduction of left turning flow

Flow: (pcu/hr)



Group	B,Dp,C	B,A2,C	Group	B,Dp,C	B,A2,C
y	0.494	0.657	y	0.517	0.697
L (sec)	36	12	L (sec)	36	12
C (sec)	110	110	C (sec)	110	110
y pract.	0.605	0.802	y pract.	0.605	0.802
R.C. (%)	22%	22%	R.C. (%)	17%	15%

Stage / Phase Diagrams



I/G= 5		I/G= 5		I/G= 5		I/G=		I/G=	
I/G= 5		I/G= 5		I/G= 5		I/G=		I/G=	

Date: APR, 2019 | **Junction:** A Chai Wan Road / Tai Tam Road

TRAFFIC SIGNALS CALCULATION **Job No.: HK501522** **MVA HONG KONG LIMITED**

Junction: Chai Wan Road / Lok Man Road

Design Year: 2031

Description: 2034 Design Traffic Flows (Existing Base)

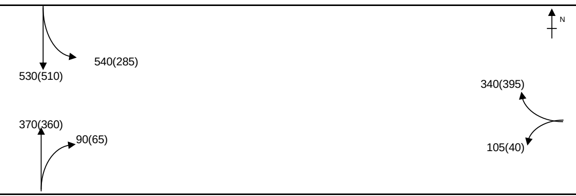
Designed By: LAU

Checked By: GPH

Approach	Movements	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Gradient (%)	Pro. Turning (%) AM	Pro. Turning (%) PM	Nearside 0/1	Opposing 0/1	Site Factor	Add Saturation Flow (pcu/hr)	Saturation Flow (pcu/hr)	Total Saturation Flow (pcu/hr)	Revised Saturation Flow (pcu/hr) AM	Revised Saturation Flow (pcu/hr) PM	AM Peak Flow (pcu/hr)	AM Peak y Value	AM Peak Critical y	PM Peak Flow (pcu/hr)	PM Peak y Value	PM Peak Critical y
Chai Wan Road (SB)		A	1	3.500	15					1		1	0	1965	1965	1785	1785	540	0.303	0.303	285	0.160	0.160
		A	1	3.500						0		1	0	2105	4210	2105	2105	265	0.126		255	0.121	
		A	1	3.500						0		1	0	2105		2105	2105	265	0.126		255	0.121	
Chai Wan Road (NB)		B	1	3.000						1		1	0	1915	6025	1915	1915	118	0.062		114	0.060	
		B	1	3.000						0		1	0	2055		2055	2055	126	0.061		123	0.060	
		B	1	3.000						0		1	0	2055		2055	2055	126	0.061		123	0.060	
		C	2	3.000		17				0	0	1	0	2055	2055	1890	1890	90	0.048		65	0.034	
Lok Man Road (WB)		D	4	4.000	15	20		24% / 76%	9% / 91%	1	0	1	0	2015	2015	1865	1870	445	0.239	0.239	435	0.233	0.233
Pedestrian Crossing		Ep	2,3,4	MIN GREEN + FLASH =			6	+	9							=	15						
		Fp	2,3	MIN GREEN + FLASH =			5	+	9							=	14						
		Gp	3	MIN GREEN + FLASH =			7	+	12							=	19			*			*

Notes:

Flow: (pcu/hr)



Group	B,C,Gp,D	A,C,Gp,D	Group	B,C,Gp,D	A,C,Gp,D
y	0.348	0.541	y	0.327	0.392
L (sec)	41	45	L (sec)	41	45
C (sec)	110	110	C (sec)	110	110
y pract.	0.565	0.532	y pract.	0.565	0.532
R.C. (%)	62%	-2%	R.C. (%)	73%	36%

Stage / Phase Diagrams

I/G= 5		I/G= 5	5	I/G= 9		19	I/G= 4		I/G=	
I/G= 5		I/G= 5	5	I/G= 9		19	I/G= 4		I/G=	

Date: MAY, 2019

Junction: Chai Wan Road / Lok Man Road B

TRAFFIC SIGNALS CALCULATION

Job No.: HK501522 **MVA HONG KONG LIMITED**

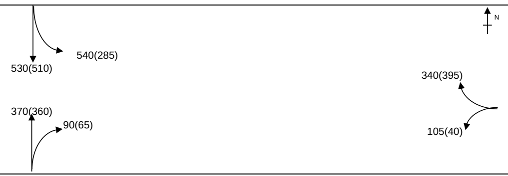
Junction: Chai Wan Road / Lok Man Road Design Year: 2034

Description: 2034 Reference Traffic Flows (Road Widening - With Improvement) Designed By: LAU Checked By: GPH

Approach	Movements	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Gradient (%)	Pro. Turning (%) AM	Pro. Turning (%) PM	Nearside 0/1	Opposing 0/1	Site Factor	Add Saturation Flow (pcu/hr)	Saturation Flow (pcu/hr)	Total Saturation Flow (pcu/hr)	Revised Saturation Flow (pcu/hr) AM	Revised Saturation Flow (pcu/hr) PM	AM Peak Flow (pcu/hr)	AM Peak y Value	AM Peak Critical y	PM Peak Flow (pcu/hr)	PM Peak y Value	PM Peak Critical y
Chai Wan Road (SB)		A2	1,4	3.500	15					1		1	0	1965	1965	1785	1785	540	0.303		285	0.160	
		A1	1	3.500						0		1	0	2105	4210	2105	2105	265	0.126	0.126	255	0.121	0.121
		A1	1	3.500						0		1	0	2105		2105	2105	265	0.126		255	0.121	
Chai Wan Road (NB)		B	1	3.000						1		1	0	1915	6025	1915	1915	118	0.062		114	0.060	
		B	1	3.000						0		1	0	2055		2055	2055	126	0.061		123	0.060	
		B	1	3.000						0		1	0	2055		2055	2055	126	0.061		123	0.060	
		C	2	3.000		17				0	0	1	0	2055	2055	1890	1890	90	0.048	0.048	65	0.034	0.034
Lok Man Street (WB)		D	4	4.000	15	20		24% / 76%	9% / 91%	1	0	1	0	2015	2015	1865	1870	445	0.239	0.239	435	0.233	0.233
Pedestrian Crossing		Ep	2,3	MIN GREEN + FLASH =			6	+	10							=	16						
		Fp	2,3	MIN GREEN + FLASH =			5	+	9							=	14						
		Gp	3	MIN GREEN + FLASH =			7	+	12							=	19			*			*

Notes:

Flow: (pcu/hr)



Group	B,C,Gp,D	A1,C,Gp,D	Group	B,C,Gp,D	A1,C,Gp,D
y	0.348	0.412	y	0.327	0.388
L (sec)	41	39	L (sec)	41	39
C (sec)	110	110	C (sec)	110	110
y pract.	0.565	0.581	y pract.	0.565	0.581
R.C. (%)	62%	41%	R.C. (%)	73%	50%

Stage / Phase Diagrams

I/G= 5	I/G= 5	I/G= 9	19	I/G= 4	I/G=	
I/G= 5	I/G= 5	I/G= 9	19	I/G= 4	I/G=	

Date: MAY, 2019 **Junction:** Chai Wan Road / Lok Man Road B

TRANSPORT RESEARCH LABORATORY

CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

Visual PICADY 4 ANALYSIS PROGRAM
RELEASE 2.1 (DEC 1998)

THE USER OF THIS COMPUTER PROGRAM FOR THE SOLUTION OF AN ENGINEERING PROBLEM IS
IN NO WAY RELIEVED OF HIS RESPONSIBILITY FOR THE CORRECTNESS OF THE SOLUTION

Run with file:- "o:\JTC\JC Hong Man Street_Tai Man Street\JC_2034DESAM.vpi" at 18:29:36 on Thursday, 25 April 2019

RUN TITLE
****
JC - Hong Man St / Tai Man St (2034DESAM)

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA

```
MAJOR ROAD (ARM C) --------------------- MAJOR ROAD (ARM A)
                              I
                              I
                              I
                              I
                              I
                              I
                       MINOR ROAD (ARM B)
```

ARM A IS Hong Man St (NB)
ARM B IS Tai Man St (SB)
ARM C IS Hong Man St (WB)

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

ETC.

.GEOMETRIC DATA

DATA ITEM		MINOR ROAD B
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	(W)	10.30 M.
CENTRAL RESERVE WIDTH	(WCR)	0.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B)	3.50 M.
- VISIBILITY	(VC-B)	50.0 M.
- BLOCKS TRAFFIC		NO
MINOR ROAD - VISIBILITY TO LEFT	(VB-C)	50.0 M.
- VISIBILITY TO RIGHT	(VB-A)	50.0 M.
- LANE 1 WIDTH	(WB-C)	2.20 M.
- LANE 2 WIDTH	(WB-A)	2.20 M.

.

.TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 08.00 AND ENDS 09.30

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	3.13	4.69	3.13
ARM B	15.00	45.00	75.00	4.38	6.56	4.38
ARM C	15.00	45.00	75.00	3.00	4.50	3.00

.

TIME	TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) / (PERCENTAGE OF H.V.S) FROM/TO	ARM A	ARM B	ARM C
08.00 - 09.30				
	ARM A	0.000	0.520	0.480
		0.0	130.0	120.0
		(0.0)	(0.1)	(0.1)

```
I                    I  ARM B  I  0.514 I  0.000 I  0.486 I
I                    I         I  180.0 I    0.0 I  170.0 I
I                    I         I (  0.0)I (  0.0)I (  0.0)I
I                    I         I        I        I        I
I                    I  ARM C  I  0.375 I  0.625 I  0.000 I
I                    I         I   90.0 I  150.0 I    0.0 I
I                    I         I (  0.0)I (  0.0)I (  0.0)I
I                    I         I        I        I        I
-----------------------------------------------------------

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN)  (VEHS)  (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.00-08.15                                                                                   I
I  B-C       2.13      8.86    0.240               0.0    0.3       4.5                        I
I  B-A       2.25      6.96    0.323               0.0    0.5       6.6                        I
I  C-A       1.13                                                                               I
I  C-B       1.88     10.79    0.174               0.0    0.2       3.0                        I
I  A-B       1.63                                                                               I
I  A-C       1.50                                                                               I
I                                                                                               I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I      CHANGE:      (.1M)       (.1M)       (.1M)         (M)           (M)                     I
I                                                                                               I
I       B-C          0.096     0.002                                 0.009                     I
I       B-A          0.076     0.005       0.018       0.004         0.007                     I
I       C-B          0.103     0.004                   0.010                                   I
-------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN)  (VEHS)  (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.15-08.30                                                                                   I
I  B-C       2.54      8.60    0.295               0.3    0.4       6.0                        I
I  B-A       2.69      6.77    0.397               0.5    0.6       9.2                        I
I  C-A       1.34                                                                               I
I  C-B       2.24     10.66    0.210               0.2    0.3       3.9                        I
I  A-B       1.94                                                                               I
I  A-C       1.79                                                                               I
I                                                                                               I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I      CHANGE:      (.1M)       (.1M)       (.1M)         (M)           (M)                     I
I                                                                                               I
I       B-C          0.094     0.002                                 0.008                     I
I       B-A          0.074     0.006       0.018       0.004         0.006                     I
I       C-B          0.102     0.004                   0.010                                   I
-------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN)  (VEHS)  (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.30-08.45                                                                                   I
I  B-C       3.11      8.24    0.377               0.4    0.6       8.6                        I
I  B-A       3.29      6.50    0.506               0.6    1.0      13.9                        I
I  C-A       1.65                                                                               I
I  C-B       2.74     10.48    0.262               0.3    0.4       5.1                        I
I  A-B       2.38                                                                               I
I  A-C       2.19                                                                               I
I                                                                                               I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I      CHANGE:      (.1M)       (.1M)       (.1M)         (M)           (M)                     I
I                                                                                               I
I       B-C          0.090     0.003                                 0.008                     I
I       B-A          0.071     0.008       0.018       0.004         0.006                     I
I       C-B          0.100     0.005                   0.010                                   I
-------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN)  (VEHS)  (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.45-09.00                                                                                   I
I  B-C       3.11      8.23    0.377               0.6    0.6       9.0                        I
I  B-A       3.29      6.50    0.506               1.0    1.0      15.0                        I
I  C-A       1.65                                                                               I
I  C-B       2.74     10.48    0.262               0.4    0.4       5.3                        I
I  A-B       2.38                                                                               I
I  A-C       2.19                                                                               I
I                                                                                               I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I      CHANGE:      (.1M)       (.1M)       (.1M)         (M)           (M)                     I
I                                                                                               I
I       B-C          0.090     0.003                                 0.008                     I
I       B-A          0.071     0.008       0.018       0.004         0.006                     I
I       C-B          0.100     0.005                   0.010                                   I
-------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                              (RFC)    (PEDS/MIN)  (VEHS)  (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 09.00-09.15                                                                                   I
I  B-C       2.54      8.59    0.295               0.6    0.4       6.6                        I
I  B-A       2.69      6.76    0.397               1.0    0.7      10.7                        I
I  C-A       1.34                                                                               I
I  C-B       2.24     10.66    0.210               0.4    0.3       4.1                        I
I  A-B       1.94                                                                               I
I  A-C       1.79                                                                               I
I                                                                                               I
```

```
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                            I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                    I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                      I
I      CHANGE:      (.1M)       (.1M)       (.1M)         (M)           (M)                         I
I                                                                                                   I
I       B-C          0.093      0.002                                  0.008                        I
I       B-A          0.074      0.006        0.018       0.004         0.006                        I
I       C-B          0.102      0.004                    0.010                                      I
-----------------------------------------------------------------------------------------------------

.----------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/   I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 09.15-09.30                                                                                       I
I   B-C       2.13      8.85   0.240                 0.4    0.3        4.9                          I
I   B-A       2.25      6.96   0.323                 0.7    0.5        7.6                          I
I   C-A       1.13                                                                                  I
I   C-B       1.88     10.79   0.174                 0.3    0.2        3.3                          I
I   A-B       1.63                                                                                  I
I   A-C       1.50                                                                                  I
I                                                                                                   I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                            I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                    I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                      I
I      CHANGE:      (.1M)       (.1M)       (.1M)         (M)           (M)                         I
I                                                                                                   I
I       B-C          0.096      0.002                                  0.008                        I
I       B-A          0.076      0.005        0.018       0.004         0.007                        I
I       C-B          0.103      0.004                    0.010                                      I
-----------------------------------------------------------------------------------------------------
.
QUEUE FOR STREAM   B-C
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  08.15          0.3
  08.30          0.4
  08.45          0.6    *
  09.00          0.6    *
  09.15          0.4
  09.30          0.3
.
QUEUE FOR STREAM   B-A
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  08.15          0.5
  08.30          0.6    *
  08.45          1.0    *
  09.00          1.0    *
  09.15          0.7    *
  09.30          0.5
.
QUEUE FOR STREAM   C-B
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  08.15          0.2
  08.30          0.3
  08.45          0.4
  09.00          0.4
  09.15          0.3
  09.30          0.2
.
                QUEUEING DELAY INFORMATION OVER WHOLE PERIOD
                --------------------------------------------

---------------------------------------------------------------------------
I STREAM I   TOTAL DEMAND  I   * QUEUEING *      I * INCLUSIVE QUEUEING * I
I        I                 I    * DELAY *        I       * DELAY *        I
I        I-----------------------------------------------------------------I
I        I  (VEH)  (VEH/H) I  (MIN)    (MIN/VEH) I    (MIN)     (MIN/VEH) I
---------------------------------------------------------------------------
I  B-C   I  233.1 I  155.4 I    39.5 I    0.17   I      39.6  I    0.17   I
I  B-A   I  246.8 I  164.5 I    63.0 I    0.26   I      63.0  I    0.26   I
I  C-A   I  123.4 I   82.3 I         I           I            I           I
I  C-B   I  205.7 I  137.1 I    24.7 I    0.12   I      24.7  I    0.12   I
I  A-B   I  178.3 I  118.8 I         I           I            I           I
I  A-C   I  164.5 I  109.7 I         I           I            I           I
---------------------------------------------------------------------------
I  ALL   I 1151.8 I  767.9 I   127.2 I    0.11   I     127.2  I    0.11   I
---------------------------------------------------------------------------


* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.


END OF JOB
```

TRANSPORT RESEARCH LABORATORY

CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

Visual PICADY 4 ANALYSIS PROGRAM
RELEASE 2.1 (DEC 1998)

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IN NO WAY RELIEVED OF HIS RESPONSIBILITY FOR THE CORRECTNESS OF THE SOLUTION

Run with file:- "o:\JTC\JC Hong Man Street_Tai Man Street\JC_2034DESPM.vpi" at 18:29:40 on Thursday, 25 April 2019

RUN TITLE
****
JC - Hong Man St / Tai Man St (2034DESPM)

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA

```
                   MAJOR ROAD (ARM C) --------------------- MAJOR ROAD (ARM A)
                                                  I
                                                  I
                                                  I
                                                  I
                                                  I
                                                  I
                                            MINOR ROAD (ARM B)
```

ARM A IS Hong Man St (NB)
ARM B IS Tai Man St (SB)
ARM C IS Hong Man St (WB)

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

ETC.

.GEOMETRIC DATA

DATA ITEM		MINOR ROAD B
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	(W)	10.30 M.
CENTRAL RESERVE WIDTH	(WCR)	0.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B)	3.50 M.
- VISIBILITY	(VC-B)	50.0 M.
- BLOCKS TRAFFIC		NO
MINOR ROAD - VISIBILITY TO LEFT	(VB-C)	50.0 M.
- VISIBILITY TO RIGHT	(VB-A)	50.0 M.
- LANE 1 WIDTH	(WB-C)	2.20 M.
- LANE 2 WIDTH	(WB-A)	2.20 M.

.

.TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 17.15 AND ENDS 18.45

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	2.63	3.94	2.63
ARM B	15.00	45.00	75.00	2.56	3.84	2.56
ARM C	15.00	45.00	75.00	2.88	4.31	2.88

.

TIME	FROM/TO	ARM A	ARM B	ARM C
	TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) / (PERCENTAGE OF H.V.S)			
17.15 - 18.45				
	ARM A	0.000	0.381	0.619
		0.0	80.0	130.0
		(0.0)	(0.1)	(0.1)

```
I                    I  ARM B  I  0.439 I  0.000 I  0.561 I
I                    I         I   90.0 I    0.0 I  115.0 I
I                    I         I (  0.0)I (  0.0)I (  0.0)I
I                    I         I        I        I        I
I                    I  ARM C  I  0.630 I  0.370 I  0.000 I
I                    I         I  145.0 I   85.0 I    0.0 I
I                    I         I (  0.0)I (  0.0)I (  0.0)I
I                    I         I        I        I        I
-----------------------------------------------------------

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/  I
I                               (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.15-17.30                                                                                  I
I  B-C       1.44      9.28    0.155                 0.0    0.2        2.6                     I
I  B-A       1.13      7.11    0.158                 0.0    0.2        2.7                     I
I  C-A       1.81                                                                              I
I  C-B       1.06     10.90    0.097                 0.0    0.1        1.6                     I
I  A-B       1.00                                                                              I
I  A-C       1.63                                                                              I
I                                                                                              I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I    MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I     CHANGE:     (.1M)       (.1M)       (.1M)         (M)           (M)                      I
I                                                                                              I
I      B-C         0.101      0.002                                 0.009                      I
I      B-A         0.077      0.004       0.018       0.005         0.007                      I
I      C-B         0.104      0.003                   0.010                                    I
------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/  I
I                               (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.30-17.45                                                                                  I
I  B-C       1.72      9.12    0.188                 0.2    0.2        3.4                     I
I  B-A       1.34      6.95    0.193                 0.2    0.2        3.4                     I
I  C-A       2.16                                                                              I
I  C-B       1.27     10.79    0.118                 0.1    0.1        1.9                     I
I  A-B       1.19                                                                              I
I  A-C       1.94                                                                              I
I                                                                                              I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I    MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I     CHANGE:     (.1M)       (.1M)       (.1M)         (M)           (M)                      I
I                                                                                              I
I      B-C         0.099      0.002                                 0.009                      I
I      B-A         0.076      0.005       0.018       0.004         0.007                      I
I      C-B         0.103      0.004                   0.010                                    I
------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/  I
I                               (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.45-18.00                                                                                  I
I  B-C       2.10      8.90    0.236                 0.2    0.3        4.5                     I
I  B-A       1.65      6.73    0.245                 0.2    0.3        4.6                     I
I  C-A       2.65                                                                              I
I  C-B       1.55     10.64    0.146                 0.1    0.2        2.5                     I
I  A-B       1.46                                                                              I
I  A-C       2.38                                                                              I
I                                                                                              I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I    MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I     CHANGE:     (.1M)       (.1M)       (.1M)         (M)           (M)                      I
I                                                                                              I
I      B-C         0.097      0.003                                 0.009                      I
I      B-A         0.073      0.007       0.018       0.004         0.006                      I
I      C-B         0.101      0.004                   0.010                                    I
------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/  I
I                               (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 18.00-18.15                                                                                  I
I  B-C       2.10      8.90    0.236                 0.3    0.3        4.6                     I
I  B-A       1.65      6.72    0.245                 0.3    0.3        4.8                     I
I  C-A       2.65                                                                              I
I  C-B       1.55     10.64    0.146                 0.2    0.2        2.6                     I
I  A-B       1.46                                                                              I
I  A-C       2.38                                                                              I
I                                                                                              I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I    MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I     CHANGE:     (.1M)       (.1M)       (.1M)         (M)           (M)                      I
I                                                                                              I
I      B-C         0.097      0.003                                 0.009                      I
I      B-A         0.073      0.007       0.018       0.004         0.006                      I
I      C-B         0.101      0.004                   0.010                                    I
------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/  I
I                               (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 18.15-18.30                                                                                  I
I  B-C       1.72      9.12    0.188                 0.3    0.2        3.6                     I
I  B-A       1.34      6.95    0.193                 0.3    0.2        3.8                     I
I  C-A       2.16                                                                              I
I  C-B       1.27     10.79    0.118                 0.2    0.1        2.1                     I
I  A-B       1.19                                                                              I
I  A-C       1.94                                                                              I
I                                                                                              I
```

```
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                       I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY               I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                 I
I      CHANGE:      (.1M)       (.1M)       (.1M)        (M)           (M)                     I
I                                                                                              I
I       B-C          0.099      0.002                                 0.009                    I
I       B-A          0.076      0.005       0.018       0.004         0.007                    I
I       C-B          0.103      0.004                   0.010                                  I
------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME       DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/      (VEH.MIN/  I
I                               (RFC)     (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 18.30-18.45                                                                                  I
I   B-C      1.44      9.28    0.155                 0.2    0.2        2.8                     I
I   B-A      1.13      7.11    0.158                 0.2    0.2        2.9                     I
I   C-A      1.81                                                                              I
I   C-B      1.06     10.90    0.097                 0.1    0.1        1.7                     I
I   A-B      1.00                                                                              I
I   A-C      1.63                                                                              I
I                                                                                              I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                       I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY               I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                 I
I      CHANGE:      (.1M)       (.1M)       (.1M)        (M)           (M)                     I
I                                                                                              I
I       B-C          0.101      0.002                                 0.009                    I
I       B-A          0.077      0.004       0.018       0.005         0.007                    I
I       C-B          0.104      0.003                   0.010                                  I
------------------------------------------------------------------------------------------------
.
QUEUE FOR STREAM   B-C
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  17.30          0.2
  17.45          0.2
  18.00          0.3
  18.15          0.3
  18.30          0.2
  18.45          0.2
.
QUEUE FOR STREAM   B-A
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  17.30          0.2
  17.45          0.2
  18.00          0.3
  18.15          0.3
  18.30          0.2
  18.45          0.2
.
QUEUE FOR STREAM   C-B
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  17.30          0.1
  17.45          0.1
  18.00          0.2
  18.15          0.2
  18.30          0.1
  18.45          0.1
.
                QUEUEING DELAY INFORMATION OVER WHOLE PERIOD
                --------------------------------------------

---------------------------------------------------------------------------
I STREAM I   TOTAL DEMAND  I   * QUEUEING *      I * INCLUSIVE QUEUEING * I
I        I                 I    * DELAY *        I       * DELAY *        I
I        I-----------------------------------------------------------------I
I        I  (VEH)  (VEH/H) I  (MIN)    (MIN/VEH) I    (MIN)     (MIN/VEH) I
---------------------------------------------------------------------------
I  B-C   I  157.7 I  105.1 I    21.5 I    0.14   I      21.5  I    0.14   I
I  B-A   I  123.4 I   82.3 I    22.2 I    0.18   I      22.2  I    0.18   I
I  C-A   I  198.8 I  132.6 I         I           I            I           I
I  C-B   I  116.6 I   77.7 I    12.3 I    0.11   I      12.3  I    0.11   I
I  A-B   I  109.7 I   73.1 I         I           I            I           I
I  A-C   I  178.3 I  118.8 I         I           I            I           I
---------------------------------------------------------------------------
I  ALL   I  884.4 I  589.6 I    56.0 I    0.06   I      56.0  I    0.06   I
---------------------------------------------------------------------------


* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.


END OF JOB
```

TRAFFIC SIGNALS CALCULATION

Job No.: HK501522 **MVA HONG KONG LIMITED**

Junction: Chai Wan Road / Hong Man Street — Design Year: 2034

Description: 2034 Design Traffic Flows (imp) — Designed By: LAU — Checked By: GPH

Approach	Movements	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Gradient (%)	Pro. Turning (%) AM	Pro. Turning (%) PM	Nearside 0/1	Opposing 0/1	Site Factor	Add Saturation Flow (pcu/hr)	Saturation Flow (pcu/hr)	Total Saturation Flow (pcu/hr)	Revised Saturation Flow (pcu/hr) AM	Revised Saturation Flow (pcu/hr) PM	AM Peak Flow (pcu/hr)	AM Peak y Value	AM Peak Critical y	PM Peak Flow (pcu/hr)	PM Peak y Value	PM Peak Critical y
Chai Wan Road (SB)		A	1	3.000	15			2%	0%	1		1	0	1915	3970	1910	1915	265	0.139	0.139	224	0.117	
		A	1	3.000						0		1	0	2055		2055	2055	285	0.139		241	0.117	0.117
Chai Wan Road (NB)		B	1,2	3.500						1		1	0	1965	4070	1965	1965	186	0.095		181	0.092	
		B	1,2	3.500						0		1	0	2105		2105	2105	199	0.095		194	0.092	
		C	2	3.500		15				0	0	1	0	2105	2105	1915	1915	150	0.078	0.078	130	0.068	0.068
Hong Man Street (WB)		D	4	3.500	25	25		74% / 26%	84% / 16%	1	0	1	0	1965	1965	1855	1855	265	0.143	0.143	215	0.116	0.116
Pedestrian Crossing		Ep	3	MIN GREEN + FLASH =			36	+	10							=	46			*			*
		Fp	3	MIN GREEN + FLASH =			8	+	7							=	15						

Notes:

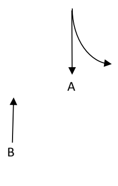
*Three lanes on Chai Wan Road (SB), 100pcu/hr deduction of left turning flow

Flow: (pcu/hr)

Group	A,C,Fp,D	A,C,Ep,D	Group	A,C,Fp,D	A,C,Ep,D
y	0.360	0.360	y	0.301	0.301
L (sec)	37	62	L (sec)	37	62
C (sec)	110	110	C (sec)	110	110
y pract.	0.597	0.393	y pract.	0.597	0.393
R.C. (%)	66%	9%	R.C. (%)	98%	30%

Stage / Phase Diagrams

1.



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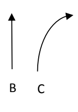
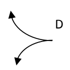


3.

4.



5.

I/G= 5	I/G= 5	I/G= 5	46	I/G= 4	I/G=
I/G= 5	I/G= 5	I/G= 5	46	I/G= 4	I/G=

Date: MAY, 2019

Junction: Chai Wan Road / Hong Man Street (D)

TRAFFIC SIGNALS CALCULATION

Job No.: HK501522

MVA HONG KONG LIMITED

Junction: Chai Wan Road / Hong Man Street

Design Year: 2034

Description: 2034 Design Traffic Flows (imp)

Designed By: LAU

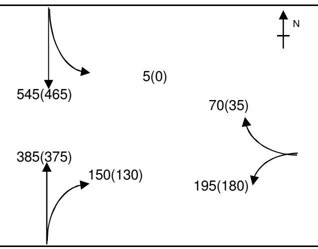
Checked By: GPH

Approach	Movements	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Gradient (%)	Pro. Turning (%) AM	Pro. Turning (%) PM	Revised Saturation Flow (pcu/hr) AM	Revised Saturation Flow (pcu/hr) PM	AM Peak Flow (pcu/hr)	AM Peak y Value	AM Peak Critical y	PM Peak Flow (pcu/hr)	PM Peak y Value	PM Peak Critical y
Chai Wan Road (SB)		A	1	3.000	15			2%	0%	1910	1915	265	0.139	0.139	224	0.117	
		A	1	3.000						2055	2055	285	0.139		241	0.117	0.117
Chai Wan Road (NB)		B	1,2	3.500						1965	1965	186	0.095		181	0.092	
		B	1,2	3.500						2105	2105	199	0.095		194	0.092	
		C	2	3.500		15				1915	1915	150	0.078	0.078	130	0.068	0.068
Hong Man Street (WB)		D	4	3.500	25	25		74% / 26%	84% / 16%	1855	1855	265	0.143	0.143	215	0.116	0.116
Pedestrian Crossing		Ep	3	MIN GREEN + FLASH =			32	+	10	=	42			*			*
		Fp	3	MIN GREEN + FLASH =			8	+	7	=	15						

Notes:

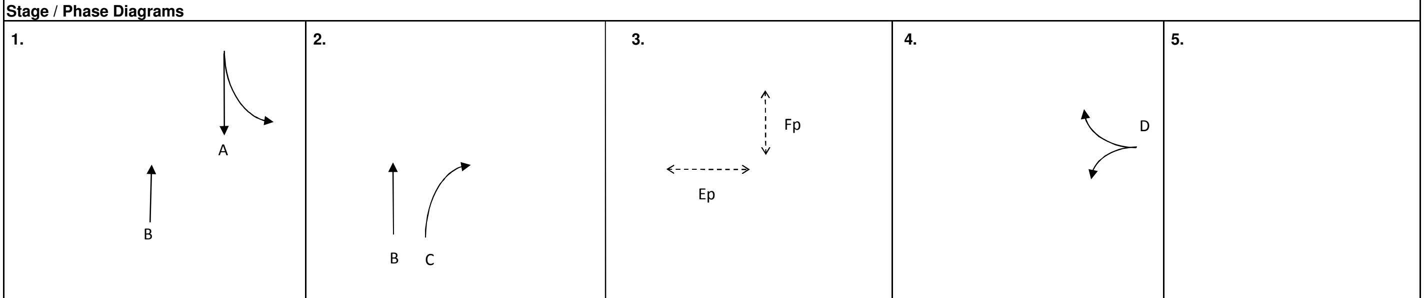
*Three lanes on Chai Wan Road (SB), 100pcu/hr deduction of left turning flow

Flow: (pcu/hr)



Group	A,C,Fp,D	A,C,Ep,D	Group	A,C,Fp,D	A,C,Ep,D
y	0.360	0.360	y	0.301	0.301
L (sec)	37	58	L (sec)	37	58
C (sec)	110	110	C (sec)	110	110
y pract.	0.597	0.425	y pract.	0.597	0.425
R.C. (%)	66%	18%	R.C. (%)	98%	41%

Stage / Phase Diagrams



I/G= 5		I/G= 5		I/G= 5	42	I/G= 4		I/G=	
I/G= 5		I/G= 5		I/G= 5	42	I/G= 4		I/G=	

Date: APR, 2019

Junction: D Chai Wan Road / Hong Man Street

```
                         TRANSPORT RESEARCH LABORATORY

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  CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

                        Visual PICADY 4 ANALYSIS PROGRAM
                             RELEASE 2.1 (DEC 1998)

                 ADAPTED FROM PICADY/3 WHICH IS CROWN COPYRIGHT
                    BY PERMISSION OF THE CONTROLLER OF HMSO
              --------------------------------------------------------

 THE USER OF THIS COMPUTER PROGRAM FOR THE SOLUTION OF AN ENGINEERING PROBLEM IS
 IN NO WAY  RELIEVED OF HIS RESPONSIBILITY  FOR THE CORRECTNESS  OF THE SOLUTION

 Run with file:- "o:\JTC\JE Chai Wan Road_Wan Tsui Road\JE_2034DESAM.vpi" at 18:29:57 on Thursday, 25 April 2019

  RUN TITLE
  *********
  JE - Chai Wan Road / Wan Tsui Road (2034DESAM)


 .MAJOR/MINOR JUNCTION CAPACITY AND DELAY
  ***************************************

  INPUT DATA
  ----------

                    MAJOR ROAD (ARM C) ---------------------- MAJOR ROAD (ARM A)
                                                 I
                                                 I
                                                 I
                                                 I
                                                 I
                                                 I
                                            MINOR ROAD (ARM B)

 ARM A IS Chai Wan Rd (WB)
 ARM B IS Wan Tsui Rd (NB)
 ARM C IS Chai Wan Rd (EB)


 STREAM LABELLING CONVENTION
 ---------------------------

       STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

       ETC.



.GEOMETRIC DATA
 --------------


 ----------------------------------------------------------------
 I                DATA ITEM                I   MINOR ROAD B    I
 ----------------------------------------------------------------
 I  TOTAL MAJOR ROAD CARRIAGEWAY WIDTH      I ( W  ) 17.50 M.   I
 I  CENTRAL RESERVE WIDTH                   I (WCR )  3.00 M.   I
 I                                          I                   I
 I  MAJOR ROAD RIGHT TURN - WIDTH           I (WC-B)  3.00 M.   I
 I                        - VISIBILITY      I (VC-B)  50.0 M.   I
 I                        - BLOCKS TRAFFIC  I          NO       I
 I                                          I                   I
 I  MINOR ROAD - VISIBILITY TO LEFT         I (VB-C)  50.0 M.   I
 I             - VISIBILITY TO RIGHT        I (VB-A)  50.0 M.   I
 I             - LANE 1 WIDTH               I (WB-C)  3.10 M.   I
 I             - LANE 2 WIDTH               I (WB-A)  3.10 M.   I
 ----------------------------------------------------------------


.
.TRAFFIC DEMAND DATA
 -------------------



 TIME PERIOD BEGINS 08.00 AND ENDS 09.30

 LENGTH OF TIME PERIOD  -  90   MINUTES.
 LENGTH OF TIME SEGMENT -  15   MINUTES.

 DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA


 -----------------------------------------------------------------------------
 I       I   NUMBER OF MINUTES FROM START WHEN    I   RATE OF FLOW (VEH/MIN) I
 I  ARM  I FLOW STARTS I TOP OF PEAK I FLOW STOPS I BEFORE I AT TOP  I AFTER I
 I       I   TO RISE   I  IS REACHED I  FALLING   I  PEAK  I OF PEAK I PEAK  I
 -----------------------------------------------------------------------------
 I ARM A I     15.00   I     45.00   I    75.00   I  4.94  I   7.41  I  4.94 I
 I ARM B I     15.00   I     45.00   I    75.00   I  3.38  I   5.06  I  3.38 I
 I ARM C I     15.00   I     45.00   I    75.00   I  9.13  I  13.69  I  9.13 I
 -----------------------------------------------------------------------------

.
 ----------------------------------------------------------
 I                    I          TURNING PROPORTIONS        I
 I                    I          TURNING COUNTS (VEH/HR)    I
 I                    I         (PERCENTAGE OF H.V.S)       I
 I                    -------------------------------------
 I        TIME        I FROM/TO I  ARM A I  ARM B I  ARM C I
 ----------------------------------------------------------
 I   08.00 - 09.30    I         I        I        I        I
 I                    I  ARM A  I  0.000 I  0.215 I  0.785 I
 I                    I         I    0.0 I   85.0 I  310.0 I
 I                    I         I (  0.0)I (  0.0)I (  0.0)I
 I                    I         I        I        I        I
```

```
I                    I  ARM B  I  0.185 I  0.000 I  0.815 I
I                    I         I   50.0 I    0.0 I  220.0 I
I                    I         I (  0.0)I (  0.0)I (  0.0)I
I                    I         I        I        I        I
I                    I  ARM C  I  0.774 I  0.226 I  0.000 I
I                    I         I  565.0 I  165.0 I    0.0 I
I                    I         I (  0.0)I (  0.0)I (  0.0)I
I                    I         I        I        I        I
-----------------------------------------------------------

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                                (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.00-08.15                                                                                   I
I  B-C       2.75     10.28    0.268                  0.0    0.4        5.2                     I
I  B-A       0.63      7.91    0.079                  0.0    0.1        1.2                     I
I  C-A       7.06                                                                               I
I  C-B       2.06     10.30    0.200                  0.0    0.2        3.6                     I
I  A-B       1.06                                                                               I
I  A-C       3.88                                                                               I
I                                                                                               I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR)  TO RIGHT                  I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)           (M)                      I
I                                                                                               I
I       B-C         0.102      0.005                                 0.010                      I
I       B-A         0.078      0.012       0.019       0.005         0.008                      I
I       C-B         0.103      0.005                   0.010                                    I
-------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                                (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.15-08.30                                                                                   I
I  B-C       3.28     10.12    0.324                  0.4    0.5        6.9                     I
I  B-A       0.75      7.63    0.098                  0.1    0.1        1.6                     I
I  C-A       8.43                                                                               I
I  C-B       2.46     10.18    0.242                  0.2    0.3        4.6                     I
I  A-B       1.27                                                                               I
I  A-C       4.63                                                                               I
I                                                                                               I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR)  TO RIGHT                  I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)           (M)                      I
I                                                                                               I
I       B-C         0.100      0.006                                 0.010                      I
I       B-A         0.076      0.015       0.019       0.005         0.007                      I
I       C-B         0.102      0.007                   0.010                                    I
-------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                                (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.30-08.45                                                                                   I
I  B-C       4.02      9.90    0.406                  0.5    0.7        9.7                     I
I  B-A       0.91      7.25    0.126                  0.1    0.1        2.1                     I
I  C-A      10.33                                                                               I
I  C-B       3.02     10.01    0.301                  0.3    0.4        6.2                     I
I  A-B       1.55                                                                               I
I  A-C       5.67                                                                               I
I                                                                                               I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR)  TO RIGHT                  I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)           (M)                      I
I                                                                                               I
I       B-C         0.098      0.007                                 0.010                      I
I       B-A         0.072      0.018       0.019       0.005         0.007                      I
I       C-B         0.100      0.008                   0.010                                    I
-------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                                (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.45-09.00                                                                                   I
I  B-C       4.02      9.90    0.406                  0.7    0.7       10.1                     I
I  B-A       0.91      7.25    0.126                  0.1    0.1        2.1                     I
I  C-A      10.33                                                                               I
I  C-B       3.02     10.01    0.301                  0.4    0.4        6.4                     I
I  A-B       1.55                                                                               I
I  A-C       5.67                                                                               I
I                                                                                               I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR)  TO RIGHT                  I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)           (M)                      I
I                                                                                               I
I       B-C         0.098      0.007                                 0.010                      I
I       B-A         0.072      0.018       0.019       0.005         0.007                      I
I       C-B         0.100      0.008                   0.010                                    I
-------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                                (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 09.00-09.15                                                                                   I
I  B-C       3.28     10.12    0.325                  0.7    0.5        7.6                     I
I  B-A       0.75      7.63    0.098                  0.1    0.1        1.7                     I
I  C-A       8.43                                                                               I
I  C-B       2.46     10.18    0.242                  0.4    0.3        5.0                     I
I  A-B       1.27                                                                               I
I  A-C       4.63                                                                               I
I                                                                                               I
```

EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:

MARGINAL CHANGE:	LANE WIDTH (.1M)	MAJOR RD. WIDTH (.1M)	CENT RES WIDTH (.1M)	VIS TO LEFT (AHEAD FOR MAJOR) (M)	VISIBILITY TO RIGHT (M)
B-C	0.100	0.006			0.010
B-A	0.076	0.015	0.019	0.005	0.007
C-B	0.102	0.007		0.010	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
09.15-09.30								
B-C	2.75	10.27	0.268		0.5	0.4	5.7	
B-A	0.63	7.90	0.079		0.1	0.1	1.3	
C-A	7.06							
C-B	2.06	10.30	0.200		0.3	0.3	3.9	
A-B	1.06							
A-C	3.88							

EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:

MARGINAL CHANGE:	LANE WIDTH (.1M)	MAJOR RD. WIDTH (.1M)	CENT RES WIDTH (.1M)	VIS TO LEFT (AHEAD FOR MAJOR) (M)	VISIBILITY TO RIGHT (M)
B-C	0.102	0.005			0.010
B-A	0.078	0.012	0.019	0.005	0.008
C-B	0.103	0.005		0.010	

QUEUE FOR STREAM B-C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.15	0.4	
08.30	0.5	
08.45	0.7	*
09.00	0.7	*
09.15	0.5	
09.30	0.4	

QUEUE FOR STREAM B-A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
08.15	0.1
08.30	0.1
08.45	0.1
09.00	0.1
09.15	0.1
09.30	0.1

QUEUE FOR STREAM C-B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
08.15	0.2
08.30	0.3
08.45	0.4
09.00	0.4
09.15	0.3
09.30	0.3

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND		* QUEUEING * * DELAY *		* INCLUSIVE QUEUEING * * DELAY *	
	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
B-C	301.7	201.1	45.2	0.15	45.2	0.15
B-A	68.6	45.7	10.0	0.15	10.1	0.15
C-A	774.7	516.5				
C-B	226.2	150.8	29.7	0.13	29.7	0.13
A-B	116.6	77.7				
A-C	425.1	283.4				
ALL	1912.8	1275.2	84.9	0.04	84.9	0.04

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

TRANSPORT RESEARCH LABORATORY

CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

Visual PICADY 4 ANALYSIS PROGRAM
RELEASE 2.1 (DEC 1998)

THE USER OF THIS COMPUTER PROGRAM FOR THE SOLUTION OF AN ENGINEERING PROBLEM IS
IN NO WAY RELIEVED OF HIS RESPONSIBILITY FOR THE CORRECTNESS OF THE SOLUTION

Run with file:- "o:\JTC\JE Chai Wan Road_Wan Tsui Road\JE_2034DESPM.vpi" at 18:30:01 on Thursday, 25 April 2019

RUN TITLE
****
JE - Chai Wan Road / Wan Tsui Road (2034DESPM)

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA

```
MAJOR ROAD (ARM C) --------------------- MAJOR ROAD (ARM A)
                            I
                            I
                            I
                            I
                            I
                            I
                      MINOR ROAD (ARM B)
```

ARM A IS Chai Wan Rd (WB)
ARM B IS Wan Tsui Rd (NB)
ARM C IS Chai Wan Rd (EB)

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

ETC.

.GEOMETRIC DATA

DATA ITEM	MINOR ROAD B
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	(W) 17.50 M.
CENTRAL RESERVE WIDTH	(WCR) 3.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B) 3.00 M.
- VISIBILITY	(VC-B) 50.0 M.
- BLOCKS TRAFFIC	NO
MINOR ROAD - VISIBILITY TO LEFT	(VB-C) 50.0 M.
- VISIBILITY TO RIGHT	(VB-A) 50.0 M.
- LANE 1 WIDTH	(WB-C) 3.10 M.
- LANE 2 WIDTH	(WB-A) 3.10 M.

.

.TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 17.15 AND ENDS 18.45

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	4.94	7.41	4.94
ARM B	15.00	45.00	75.00	3.25	4.88	3.25
ARM C	15.00	45.00	75.00	8.06	12.09	8.06

.

TIME	FROM/TO	ARM A	ARM B	ARM C
		TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) / (PERCENTAGE OF H.V.S)		
17.15 - 18.45				
	ARM A	0.000	0.291	0.709
		0.0	115.0	280.0
		(0.0)	(0.0)	(0.0)

```
I                    I  ARM B  I  0.154 I  0.000 I  0.846 I
I                    I         I   40.0 I    0.0 I  220.0 I
I                    I         I (  0.0)I (  0.0)I (  0.0)I
I                    I         I        I        I        I
I                    I  ARM C  I  0.705 I  0.295 I  0.000 I
I                    I         I  455.0 I  190.0 I    0.0 I
I                    I         I (  0.0)I (  0.0)I (  0.0)I
I                    I         I        I        I        I
-----------------------------------------------------------

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

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I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                               (RFC)    (PEDS/MIN) (VEHS)  (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.15-17.30                                                                                   I
I   B-C       2.75     10.35    0.266                0.0    0.4        5.2                      I
I   B-A       0.50      7.98    0.063                0.0    0.1        1.0                      I
I   C-A       5.69                                                                              I
I   C-B       2.38     10.30    0.231                0.0    0.3        4.3                      I
I   A-B       1.44                                                                              I
I   A-C       3.50                                                                              I
I                                                                                               I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I      CHANGE:      (.1M)       (.1M)       (.1M)        (M)            (M)                     I
I                                                                                               I
I       B-C          0.103     0.004                                  0.010                     I
I       B-A          0.079     0.012       0.019       0.005          0.008                     I
I       C-B          0.103     0.005                   0.010                                    I
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.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                               (RFC)    (PEDS/MIN) (VEHS)  (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.30-17.45                                                                                   I
I   B-C       3.28     10.21    0.322                0.4    0.5        6.8                      I
I   B-A       0.60      7.72    0.077                0.1    0.1        1.2                      I
I   C-A       6.79                                                                              I
I   C-B       2.84     10.18    0.279                0.3    0.4        5.6                      I
I   A-B       1.72                                                                              I
I   A-C       4.18                                                                              I
I                                                                                               I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I      CHANGE:      (.1M)       (.1M)       (.1M)        (M)            (M)                     I
I                                                                                               I
I       B-C          0.101     0.005                                  0.010                     I
I       B-A          0.076     0.014       0.019       0.005          0.007                     I
I       C-B          0.102     0.007                   0.010                                    I
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I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                               (RFC)    (PEDS/MIN) (VEHS)  (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.45-18.00                                                                                   I
I   B-C       4.02     10.01    0.402                0.5    0.7        9.5                      I
I   B-A       0.73      7.36    0.099                0.1    0.1        1.6                      I
I   C-A       8.32                                                                              I
I   C-B       3.47     10.01    0.347                0.4    0.5        7.6                      I
I   A-B       2.10                                                                              I
I   A-C       5.12                                                                              I
I                                                                                               I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I      CHANGE:      (.1M)       (.1M)       (.1M)        (M)            (M)                     I
I                                                                                               I
I       B-C          0.099     0.006                                  0.010                     I
I       B-A          0.073     0.017       0.019       0.005          0.007                     I
I       C-B          0.100     0.008                   0.010                                    I
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I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                               (RFC)    (PEDS/MIN) (VEHS)  (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 18.00-18.15                                                                                   I
I   B-C       4.02     10.01    0.402                0.7    0.7        9.9                      I
I   B-A       0.73      7.36    0.099                0.1    0.1        1.6                      I
I   C-A       8.32                                                                              I
I   C-B       3.47     10.01    0.347                0.5    0.5        7.9                      I
I   A-B       2.10                                                                              I
I   A-C       5.12                                                                              I
I                                                                                               I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I      CHANGE:      (.1M)       (.1M)       (.1M)        (M)            (M)                     I
I                                                                                               I
I       B-C          0.099     0.006                                  0.010                     I
I       B-A          0.073     0.017       0.019       0.005          0.007                     I
I       C-B          0.100     0.008                   0.010                                    I
-------------------------------------------------------------------------------------------------

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I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                               (RFC)    (PEDS/MIN) (VEHS)  (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 18.15-18.30                                                                                   I
I   B-C       3.28     10.21    0.322                0.7    0.5        7.5                      I
I   B-A       0.60      7.72    0.077                0.1    0.1        1.3                      I
I   C-A       6.79                                                                              I
I   C-B       2.84     10.18    0.279                0.5    0.4        6.0                      I
I   A-B       1.72                                                                              I
I   A-C       4.18                                                                              I
I                                                                                               I
```

EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:					
MARGINAL CHANGE:	LANE WIDTH (.1M)	MAJOR RD. WIDTH (.1M)	CENT RES WIDTH (.1M)	VIS TO LEFT (AHEAD FOR MAJOR) (M)	VISIBILITY TO RIGHT (M)
B-C	0.101	0.005			0.010
B-A	0.076	0.014	0.019	0.005	0.007
C-B	0.102	0.007		0.010	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
18.30-18.45								
B-C	2.75	10.34	0.266		0.5	0.4	5.6	
B-A	0.50	7.98	0.063		0.1	0.1	1.0	
C-A	5.69							
C-B	2.38	10.30	0.231		0.4	0.3	4.7	
A-B	1.44							
A-C	3.50							

EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:					
MARGINAL CHANGE:	LANE WIDTH (.1M)	MAJOR RD. WIDTH (.1M)	CENT RES WIDTH (.1M)	VIS TO LEFT (AHEAD FOR MAJOR) (M)	VISIBILITY TO RIGHT (M)
B-C	0.102	0.004			0.010
B-A	0.079	0.012	0.019	0.005	0.008
C-B	0.103	0.005		0.010	

QUEUE FOR STREAM B-C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.30	0.4	
17.45	0.5	
18.00	0.7	*
18.15	0.7	*
18.30	0.5	
18.45	0.4	

QUEUE FOR STREAM B-A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
17.30	0.1
17.45	0.1
18.00	0.1
18.15	0.1
18.30	0.1
18.45	0.1

QUEUE FOR STREAM C-B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.30	0.3	
17.45	0.4	
18.00	0.5	*
18.15	0.5	*
18.30	0.4	
18.45	0.3	

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND		* QUEUEING * * DELAY *		* INCLUSIVE QUEUEING * * DELAY *	
	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
B-C	301.7	201.1	44.6	0.15	44.6	0.15
B-A	54.8	36.6	7.7	0.14	7.8	0.14
C-A	623.9	415.9				
C-B	260.5	173.7	36.1	0.14	36.1	0.14
A-B	157.7	105.1				
A-C	383.9	256.0				
ALL	1782.6	1188.4	88.4	0.05	88.4	0.05

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

TRANSPORT RESEARCH LABORATORY

CAPACITIES, QUEUES AND DELAYS AT ROUNDABOUTS

Visual ARCADY 4 ANALYSIS PROGRAM
RELEASE 2.1 (OCT 1998)

THE USER OF THIS COMPUTER PROGRAM FOR THE SOLUTION OF AN ENGINEERING PROBLEM IS IN NO WAY RELIEVED OF HIS RESPONSIBILITY FOR THE CORRECTNESS OF THE SOLUTION

Run with file:- "o:\JTC\JF Chai Wan Road Roundabout\JF_2034DESAM.vai" at 18:30:36 on Thursday, 25 April 2019

.ROUNDABOUT CAPACITY AND DELAY
****

RUN TITLE
****
JF- Chai Wan Road / Island Eastern Corridor / Wan Tsui Road (2034DESAM)

.INPUT DATA
****
ARM A - Island Eastern Corrodor
ARM B - Chai Wan Road (east of roundabout)
ARM C - Wan Tsui Road
ARM D - Chai Wan Road (west of roundabout)

.GEOMETRIC DATA

ARM	V (M)	E (M)	L (M)	R (M)	D (M)	PHI (DEG)	SLOPE	INTERCEPT (PCU/MIN)
ARM A	7.30	7.30	1.00	100.00	80.00	0.0	0.626	42.145
ARM B	7.30	7.30	1.00	50.00	80.00	0.0	0.620	41.784
ARM C	7.00	7.00	1.00	25.00	80.00	3.0	0.589	39.008
ARM D	10.50	10.50	1.00	50.00	80.00	0.0	0.782	60.101

.TRAFFIC DEMAND DATA

.TIME PERIOD BEGINS 08.00 AND ENDS 09.30
.LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

.DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN: FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN): BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	10.56	15.84	10.56
ARM B	15.00	45.00	75.00	10.75	16.13	10.75
ARM C	15.00	45.00	75.00	4.88	7.31	4.88
ARM D	15.00	45.00	75.00	17.25	25.88	17.25

TIME	FROM/TO	TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) / (PERCENTAGE OF H.V.S): ARM A	ARM B	ARM C	ARM D
08.00 - 09.30					
	ARM A	0.302	0.272	0.249	0.178
		255.0	230.0	210.0	150.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM B	0.442	0.110	0.256	0.192
		380.0	95.0	220.0	165.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM C	0.385	0.564	0.000	0.051
		150.0	220.0	0.0	20.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM D	0.533	0.301	0.098	0.069
		735.0	415.0	135.0	95.0
		(0.0)	(0.0)	(0.0)	(0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

. QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
08.00-08.15								
ARM A	10.56	34.65	0.305		0.0	0.4	6.4	
ARM B	10.75	35.25	0.305		0.0	0.4	6.4	
ARM C	4.88	30.63	0.159		0.0	0.2	2.8	
ARM D	17.25	49.38	0.349		0.0	0.5	7.9	

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I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY      GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/   I
I                               (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.15-08.30                                                                                    I
I ARM A      12.61     33.18   0.380                  0.4    0.6        9.0                      I
I ARM B      12.84     33.97   0.378                  0.4    0.6        8.9                      I
I ARM C       5.82     28.99   0.201                  0.2    0.3        3.7                      I
I ARM D      20.60     47.27   0.436                  0.5    0.8       11.4                      I
I                                                                                                I
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.---------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY      GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/   I
I                               (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.30-08.45                                                                                    I
I ARM A      15.45     31.18   0.495                  0.6    1.0       14.3                      I
I ARM B      15.72     32.22   0.488                  0.6    0.9       13.9                      I
I ARM C       7.13     26.75   0.267                  0.3    0.4        5.3                      I
I ARM D      25.23     44.40   0.568                  0.8    1.3       19.1                      I
I                                                                                                I
 ---------------------------------------------------------------------------------------------------
.---------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY      GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/   I
I                               (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.45-09.00                                                                                    I
I ARM A      15.45     31.16   0.496                  1.0    1.0       14.7                      I
I ARM B      15.72     32.20   0.488                  0.9    1.0       14.2                      I
I ARM C       7.13     26.73   0.267                  0.4    0.4        5.4                      I
I ARM D      25.23     44.38   0.568                  1.3    1.3       19.6                      I
I                                                                                                I
 ---------------------------------------------------------------------------------------------------
.---------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY      GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/   I
I                               (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 09.00-09.15                                                                                    I
I ARM A      12.61     33.16   0.380                  1.0    0.6        9.4                      I
I ARM B      12.84     33.94   0.378                  1.0    0.6        9.3                      I
I ARM C       5.82     28.96   0.201                  0.4    0.3        3.8                      I
I ARM D      20.60     47.24   0.436                  1.3    0.8       11.9                      I
I                                                                                                I
 ---------------------------------------------------------------------------------------------------
.---------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY      GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/   I
I                               (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 09.15-09.30                                                                                    I
I ARM A      10.56     34.63   0.305                  0.6    0.4        6.7                      I
I ARM B      10.75     35.22   0.305                  0.6    0.4        6.7                      I
I ARM C       4.88     30.60   0.159                  0.3    0.2        2.9                      I
I ARM D      17.25     49.34   0.350                  0.8    0.5        8.2                      I
I                                                                                                I
 ---------------------------------------------------------------------------------------------------

.QUEUE AT ARM A
 --------------

  TIME SEGMENT   NO. OF
   ENDING      VEHICLES
               IN QUEUE

   08.15           0.4
   08.30           0.6  *
   08.45           1.0  *
   09.00           1.0  *
   09.15           0.6  *
   09.30           0.4

.QUEUE AT ARM B
 --------------

  TIME SEGMENT   NO. OF
   ENDING      VEHICLES
               IN QUEUE

   08.15           0.4
   08.30           0.6  *
   08.45           0.9  *
   09.00           1.0  *
   09.15           0.6  *
   09.30           0.4

.QUEUE AT ARM C
 --------------

  TIME SEGMENT   NO. OF
   ENDING      VEHICLES
               IN QUEUE

   08.15           0.2
   08.30           0.3
   08.45           0.4
   09.00           0.4
   09.15           0.3
   09.30           0.2

.QUEUE AT ARM D
 --------------

  TIME SEGMENT   NO. OF
   ENDING      VEHICLES
               IN QUEUE

   08.15           0.5  *
   08.30           0.8  *
   08.45           1.3  *
   09.00           1.3  *
```

09.15	0.8	*
09.30	0.5	*

. QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

ARM	TOTAL DEMAND		* QUEUEING * * DELAY *		* INCLUSIVE QUEUEING * * DELAY *	
	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
A	1158.7	772.4	60.5	0.05	60.5	0.05
B	1179.2	786.2	59.5	0.05	59.5	0.05
C	534.8	356.5	24.0	0.04	24.0	0.04
D	1892.3	1261.5	78.1	0.04	78.1	0.04
ALL	4765.0	3176.6	222.1	0.05	222.1	0.05

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD.
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

TRANSPORT RESEARCH LABORATORY

CAPACITIES, QUEUES AND DELAYS AT ROUNDABOUTS

Visual ARCADY 4 ANALYSIS PROGRAM
RELEASE 2.1 (OCT 1998)

THE USER OF THIS COMPUTER PROGRAM FOR THE SOLUTION OF AN ENGINEERING PROBLEM IS IN NO WAY RELIEVED OF HIS RESPONSIBILITY FOR THE CORRECTNESS OF THE SOLUTION

Run with file:- "o:\JTC\JF Chai Wan Road Roundabout\JF_2034DESPM.vai" at 18:30:39 on Thursday, 25 April 2019

.ROUNDABOUT CAPACITY AND DELAY
****

RUN TITLE
****
JF- Chai Wan Road / Island Eastern Corridor / Wan Tsui Road (2034DESPM)

.INPUT DATA
****
ARM A - Island Eastern Corrodor
ARM B - Chai Wan Road (east of roundabout)
ARM C - Wan Tsui Road
ARM D - Chai Wan Road (west of roundabout)

.GEOMETRIC DATA

ARM	V (M)	E (M)	L (M)	R (M)	D (M)	PHI (DEG)	SLOPE	INTERCEPT (PCU/MIN)
ARM A	7.30	7.30	1.00	100.00	80.00	0.0	0.626	42.145
ARM B	7.30	7.30	1.00	50.00	80.00	0.0	0.620	41.784
ARM C	7.00	7.00	1.00	25.00	80.00	3.0	0.589	39.008
ARM D	10.50	10.50	1.00	50.00	80.00	0.0	0.782	60.101

.TRAFFIC DEMAND DATA

.TIME PERIOD BEGINS 17.15 AND ENDS 18.45
.LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

.DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN: FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN): BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	12.25	18.38	12.25
ARM B	15.00	45.00	75.00	11.44	17.16	11.44
ARM C	15.00	45.00	75.00	5.38	8.06	5.38
ARM D	15.00	45.00	75.00	16.19	24.28	16.19

TIME	FROM/TO	TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) / (PERCENTAGE OF H.V.S) ARM A	ARM B	ARM C	ARM D
17.15 - 18.45					
	ARM A	0.219	0.357	0.224	0.199
		215.0	350.0	220.0	195.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM B	0.448	0.082	0.317	0.153
		410.0	75.0	290.0	140.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM C	0.314	0.640	0.012	0.035
		135.0	275.0	5.0	15.0
		(0.0)	(0.0)	(0.0)	(0.0)
	ARM D	0.502	0.317	0.097	0.085
		650.0	410.0	125.0	110.0
		(0.0)	(0.0)	(0.0)	(0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

. QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
17.15-17.30								
ARM A	12.25	34.34	0.357		0.0	0.6	8.1	
ARM B	11.44	35.06	0.326		0.0	0.5	7.1	
ARM C	5.38	30.60	0.176		0.0	0.2	3.1	
ARM D	16.19	49.23	0.329		0.0	0.5	7.2	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
17.30-17.45								
ARM A	14.63	32.81	0.446		0.6	0.8	11.8	
ARM B	13.66	33.74	0.405		0.5	0.7	10.0	
ARM C	6.42	28.95	0.222		0.2	0.3	4.2	
ARM D	19.33	47.10	0.410		0.5	0.7	10.3	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
17.45-18.00								
ARM A	17.92	30.72	0.583		0.8	1.4	20.1	
ARM B	16.73	31.94	0.524		0.7	1.1	15.9	
ARM C	7.86	26.70	0.294		0.3	0.4	6.1	
ARM D	23.67	44.19	0.536		0.7	1.1	16.8	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
18.00-18.15								
ARM A	17.92	30.71	0.583		1.4	1.4	20.8	
ARM B	16.73	31.92	0.524		1.1	1.1	16.4	
ARM C	7.86	26.67	0.295		0.4	0.4	6.2	
ARM D	23.67	44.16	0.536		1.1	1.2	17.2	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
18.15-18.30								
ARM A	14.63	32.79	0.446		1.4	0.8	12.4	
ARM B	13.66	33.71	0.405		1.1	0.7	10.5	
ARM C	6.42	28.91	0.222		0.4	0.3	4.4	
ARM D	19.33	47.06	0.411		1.2	0.7	10.7	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
18.30-18.45								
ARM A	12.25	34.32	0.357		0.8	0.6	8.5	
ARM B	11.44	35.03	0.327		0.7	0.5	7.4	
ARM C	5.38	30.56	0.176		0.3	0.2	3.2	
ARM D	16.19	49.19	0.329		0.7	0.5	7.5	

.QUEUE AT ARM A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.30	0.6	*
17.45	0.8	*
18.00	1.4	*
18.15	1.4	*
18.30	0.8	*
18.45	0.6	*

.QUEUE AT ARM B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.30	0.5	
17.45	0.7	*
18.00	1.1	*
18.15	1.1	*
18.30	0.7	*
18.45	0.5	

.QUEUE AT ARM C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
17.30	0.2
17.45	0.3
18.00	0.4
18.15	0.4
18.30	0.3
18.45	0.2

.QUEUE AT ARM D

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.30	0.5	
17.45	0.7	*
18.00	1.1	*
18.15	1.2	*

18.30 0.7 *
18.45 0.5

.

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

ARM	TOTAL DEMAND (VEH)	TOTAL DEMAND (VEH/H)	* QUEUEING * * DELAY * (MIN)	* QUEUEING * * DELAY * (MIN/VEH)	* INCLUSIVE QUEUEING * * DELAY * (MIN)	* INCLUSIVE QUEUEING * * DELAY * (MIN/VEH)
A	1343.8	895.9	81.7	0.06	81.7	0.06
B	1254.7	836.4	67.3	0.05	67.3	0.05
C	589.6	393.1	27.3	0.05	27.3	0.05
D	1775.7	1183.8	69.7	0.04	69.7	0.04
ALL	4963.8	3309.2	246.0	0.05	246.0	0.05

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD.
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

TRANSPORT RESEARCH LABORATORY

CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

Visual PICADY 4 ANALYSIS PROGRAM
RELEASE 2.1 (DEC 1998)

THE USER OF THIS COMPUTER PROGRAM FOR THE SOLUTION OF AN ENGINEERING PROBLEM IS IN NO WAY RELIEVED OF HIS RESPONSIBILITY FOR THE CORRECTNESS OF THE SOLUTION

Run with file:- "o:\jtc\Junction 2034\JG Hong Man Street_Lee Chung Street\JG_2034DESAM.vpi" at 11:56:19 on Monday, 25 February 2019

RUN TITLE
****
JG - Hong Man St / Lee Chung St (2034DESAM)

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA

```
                    MAJOR ROAD (ARM C) --------------------- MAJOR ROAD (ARM A)
                                                 I
                                                 I
                                                 I
                                                 I
                                                 I
                                                 I
                                            MINOR ROAD (ARM B)
```

ARM A IS Hong Man St (NB)
ARM B IS Lee Chung St (SB)
ARM C IS Hong Man St (WB)

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

ETC.

.GEOMETRIC DATA

DATA ITEM	MINOR ROAD B
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	(W) 20.00 M.
CENTRAL RESERVE WIDTH	(WCR) 0.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B) 2.20 M.
- VISIBILITY	(VC-B) 250.0 M.
- BLOCKS TRAFFIC	NO
MINOR ROAD - VISIBILITY TO LEFT	(VB-C) 75.0 M.
- VISIBILITY TO RIGHT	(VB-A) 250.0 M.
- LANE 1 WIDTH	(WB-C) 5.00 M.
- LANE 2 WIDTH	(WB-A) 5.00 M.

.

.TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 08.00 AND ENDS 09.30

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	0.00	0.00	0.00
ARM B	15.00	45.00	75.00	0.50	0.75	0.50
ARM C	15.00	45.00	75.00	4.38	6.56	4.38

.

TIME	FROM/TO	TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) / (PERCENTAGE OF H.V.S) ARM A	ARM B	ARM C
08.00 - 09.30				
	ARM A	0.000	0.000	0.000
		???????	???????	???????
		(0.0)	(0.0)	(0.0)

```
I                    I         I        I        I        I
I                    I  ARM B  I  1.000 I  0.000 I  0.000 I
I                    I         I   40.0 I    0.0 I    0.0 I
I                    I         I (  0.0)I (  0.0)I (  0.0)I
I                    I         I        I        I        I
I                    I  ARM C  I  1.000 I  0.000 I  0.000 I
I                    I         I  350.0 I    0.0 I    0.0 I
I                    I         I (  0.0)I (  0.0)I (  0.0)I
I                    I         I        I        I        I
-----------------------------------------------------------

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                               (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.00-08.15                                                                                   I
I   B-C       0.00     14.06    0.000                0.0    0.0        0.0                      I
I   B-A       0.50     12.19    0.041                0.0    0.0        0.6                      I
I   C-A       4.38                                                                              I
I   C-B       0.00     10.89    0.000                0.0    0.0        0.0                      I
I   A-B       0.00                                                                              I
I   A-C       0.00                                                                              I
I                                                                                               I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                   I
I      CHANGE:     (.1M)       (.1M)       (.1M)        (M)            (M)                      I
I                                                                                               I
I       B-C         0.129      0.000                                 0.012                      I
I       B-A         0.102      0.004        0.028      0.008         0.010                      I
I       C-B         0.130      0.000                   0.010                                    I
-------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                               (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.15-08.30                                                                                   I
I   B-C       0.00     14.03    0.000                0.0    0.0        0.0                      I
I   B-A       0.60     12.12    0.049                0.0    0.1        0.8                      I
I   C-A       5.22                                                                              I
I   C-B       0.00     10.89    0.000                0.0    0.0        0.0                      I
I   A-B       0.00                                                                              I
I   A-C       0.00                                                                              I
I                                                                                               I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                   I
I      CHANGE:     (.1M)       (.1M)       (.1M)        (M)            (M)                      I
I                                                                                               I
I       B-C         0.129      0.000                                 0.012                      I
I       B-A         0.101      0.005        0.028      0.008         0.010                      I
I       C-B         0.130      0.000                   0.010                                    I
-------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                               (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.30-08.45                                                                                   I
I   B-C       0.00     13.99    0.000                0.0    0.0        0.0                      I
I   B-A       0.73     12.02    0.061                0.1    0.1        1.0                      I
I   C-A       6.40                                                                              I
I   C-B       0.00     10.89    0.000                0.0    0.0        0.0                      I
I   A-B       0.00                                                                              I
I   A-C       0.00                                                                              I
I                                                                                               I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                   I
I      CHANGE:     (.1M)       (.1M)       (.1M)        (M)            (M)                      I
I                                                                                               I
I       B-C         0.128      0.000                                 0.012                      I
I       B-A         0.100      0.006        0.028      0.008         0.010                      I
I       C-B         0.130      0.000                   0.010                                    I
-------------------------------------------------------------------------------------------------

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I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                               (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 08.45-09.00                                                                                   I
I   B-C       0.00     13.99    0.000                0.0    0.0        0.0                      I
I   B-A       0.73     12.02    0.061                0.1    0.1        1.0                      I
I   C-A       6.40                                                                              I
I   C-B       0.00     10.89    0.000                0.0    0.0        0.0                      I
I   A-B       0.00                                                                              I
I   A-C       0.00                                                                              I
I                                                                                               I
I                  EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                         I
I                            MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                 I
I     MARGINAL   LANE WIDTH   WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                   I
I      CHANGE:     (.1M)       (.1M)       (.1M)        (M)            (M)                      I
I                                                                                               I
I       B-C         0.128      0.000                                 0.012                      I
I       B-A         0.100      0.006        0.028      0.008         0.010                      I
I       C-B         0.130      0.000                   0.010                                    I
-------------------------------------------------------------------------------------------------

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I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I          (VEH/MIN) (VEH/MIN) CAPACITY     FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                               (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 09.00-09.15                                                                                   I
I   B-C       0.00     14.03    0.000                0.0    0.0        0.0                      I
I   B-A       0.60     12.12    0.049                0.1    0.1        0.8                      I
I   C-A       5.22                                                                              I
I   C-B       0.00     10.89    0.000                0.0    0.0        0.0                      I
I   A-B       0.00                                                                              I
I   A-C       0.00                                                                              I
```

```
I                                                                                               I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)           (M)                      I
I                                                                                               I
I       B-C         0.129      0.000                                   0.012                    I
I       B-A         0.101      0.005       0.028       0.008           0.010                    I
I       C-B         0.130      0.000                   0.010                                    I
-------------------------------------------------------------------------------------------------

.-------------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/  I
I                               (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 09.15-09.30                                                                                   I
I  B-C       0.00     14.06    0.000                 0.0    0.0        0.0                      I
I  B-A       0.50     12.19    0.041                 0.1    0.0        0.7                      I
I  C-A       4.38                                                                               I
I  C-B       0.00     10.89    0.000                 0.0    0.0        0.0                      I
I  A-B       0.00                                                                               I
I  A-C       0.00                                                                               I
I                                                                                               I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY                I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I      CHANGE:     (.1M)       (.1M)       (.1M)         (M)           (M)                      I
I                                                                                               I
I       B-C         0.129      0.000                                   0.012                    I
I       B-A         0.102      0.004       0.028       0.008           0.010                    I
I       C-B         0.130      0.000                   0.010                                    I
-------------------------------------------------------------------------------------------------
.
QUEUE FOR STREAM   B-C
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  08.15           0.0
  08.30           0.0
  08.45           0.0
  09.00           0.0
  09.15           0.0
  09.30           0.0
.
QUEUE FOR STREAM   B-A
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  08.15           0.0
  08.30           0.1
  08.45           0.1
  09.00           0.1
  09.15           0.1
  09.30           0.0
.
QUEUE FOR STREAM   C-B
-------------------------
TIME SEGMENT    NO. OF
  ENDING      VEHICLES
              IN QUEUE
  08.15           0.0
  08.30           0.0
  08.45           0.0
  09.00           0.0
  09.15           0.0
  09.30           0.0
.
                QUEUEING DELAY INFORMATION OVER WHOLE PERIOD
                --------------------------------------------

---------------------------------------------------------------------------
I STREAM I   TOTAL DEMAND  I   * QUEUEING *      I * INCLUSIVE QUEUEING * I
I        I                 I    * DELAY *        I       * DELAY *        I
I        I---------------------------------------------------------------I
I        I  (VEH)  (VEH/H) I  (MIN)    (MIN/VEH) I    (MIN)     (MIN/VEH) I
---------------------------------------------------------------------------
I  B-C   I    0.0 I    0.0 I     0.0 I   0.00   I       0.0  I    0.00   I
I  B-A   I   54.8 I   36.6 I     4.8 I   0.09   I       4.8  I    0.09   I
I  C-A   I  479.9 I  319.9 I         I          I            I           I
I  C-B   I    0.0 I    0.0 I     0.0 I   0.00   I       0.0  I    0.00   I
I  A-B   I    0.0 I    0.0 I         I          I            I           I
I  A-C   I    0.0 I    0.0 I         I          I            I           I
---------------------------------------------------------------------------
I  ALL   I  534.8 I  356.5 I     4.8 I   0.01   I       4.8  I    0.01   I
---------------------------------------------------------------------------


* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.


END OF JOB
```

TRANSPORT RESEARCH LABORATORY

CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

Visual PICADY 4 ANALYSIS PROGRAM
RELEASE 2.1 (DEC 1998)

THE USER OF THIS COMPUTER PROGRAM FOR THE SOLUTION OF AN ENGINEERING PROBLEM IS
IN NO WAY RELIEVED OF HIS RESPONSIBILITY FOR THE CORRECTNESS OF THE SOLUTION

Run with file:- "o:\jtc\Junction 2034\JG Hong Man Street_Lee Chung Street\JG_2034DESPM.vpi" at 11:56:23 on Monday, 25 February 2019

RUN TITLE
****
JG - Hong Man St / Lee Chung St (2034DESPM)

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA

```
MAJOR ROAD (ARM C) --------------------- MAJOR ROAD (ARM A)
                             I
                             I
                             I
                             I
                             I
                             I
                      MINOR ROAD (ARM B)
```

ARM A IS Hong Man St (NB)
ARM B IS Lee Chung St (SB)
ARM C IS Hong Man St (WB)

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

ETC.

.GEOMETRIC DATA

DATA ITEM		MINOR ROAD B
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	(W)	20.00 M.
CENTRAL RESERVE WIDTH	(WCR)	0.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B)	2.20 M.
- VISIBILITY	(VC-B)	250.0 M.
- BLOCKS TRAFFIC		NO
MINOR ROAD - VISIBILITY TO LEFT	(VB-C)	75.0 M.
- VISIBILITY TO RIGHT	(VB-A)	250.0 M.
- LANE 1 WIDTH	(WB-C)	5.00 M.
- LANE 2 WIDTH	(WB-A)	5.00 M.

.

.TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 17.15 AND ENDS 18.45

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	0.00	0.00	0.00
ARM B	15.00	45.00	75.00	0.44	0.66	0.44
ARM C	15.00	45.00	75.00	4.69	7.03	4.69

.

TIME	FROM/TO	TURNING PROPORTIONS TURNING COUNTS (VEH/HR) (PERCENTAGE OF H.V.S) ARM A	ARM B	ARM C
17.15 - 18.45				
	ARM A	0.000	0.000	0.000
		???????	???????	???????
		(0.0)	(0.0)	(0.0)

```
I                    I        I        I        I        I
I                    I  ARM B  I  1.000 I  0.000 I  0.000 I
I                    I        I   35.0 I    0.0 I    0.0 I
I                    I        I (  0.0)I (  0.0)I (  0.0)I
I                    I        I        I        I        I
I                    I  ARM C  I  1.000 I  0.000 I  0.000 I
I                    I        I  375.0 I    0.0 I    0.0 I
I                    I        I (  0.0)I (  0.0)I (  0.0)I
I                    I        I        I        I        I
----------------------------------------------------------

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/   I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.15-17.30                                                                                  I
I   B-C       0.00     14.08    0.000                0.0    0.0        0.0                      I
I   B-A       0.44     12.16    0.036                0.0    0.0        0.5                      I
I   C-A       4.69                                                                              I
I   C-B       0.00     10.89    0.000                0.0    0.0        0.0                      I
I   A-B       0.00                                                                              I
I   A-C       0.00                                                                              I
I                                                                                               I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY               I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I      CHANGE:      (.1M)       (.1M)       (.1M)         (M)            (M)                    I
I                                                                                               I
I       B-C          0.129      0.000                                 0.012                     I
I       B-A          0.101      0.004       0.028       0.008         0.010                     I
I       C-B          0.130      0.000                   0.010                                   I
------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/   I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.30-17.45                                                                                  I
I   B-C       0.00     14.05    0.000                0.0    0.0        0.0                      I
I   B-A       0.52     12.08    0.043                0.0    0.0        0.7                      I
I   C-A       5.60                                                                              I
I   C-B       0.00     10.89    0.000                0.0    0.0        0.0                      I
I   A-B       0.00                                                                              I
I   A-C       0.00                                                                              I
I                                                                                               I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY               I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I      CHANGE:      (.1M)       (.1M)       (.1M)         (M)            (M)                    I
I                                                                                               I
I       B-C          0.129      0.000                                 0.012                     I
I       B-A          0.101      0.005       0.028       0.008         0.010                     I
I       C-B          0.130      0.000                   0.010                                   I
------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/   I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 17.45-18.00                                                                                  I
I   B-C       0.00     14.02    0.000                0.0    0.0        0.0                      I
I   B-A       0.64     11.98    0.053                0.0    0.1        0.8                      I
I   C-A       6.86                                                                              I
I   C-B       0.00     10.89    0.000                0.0    0.0        0.0                      I
I   A-B       0.00                                                                              I
I   A-C       0.00                                                                              I
I                                                                                               I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY               I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I      CHANGE:      (.1M)       (.1M)       (.1M)         (M)            (M)                    I
I                                                                                               I
I       B-C          0.129      0.000                                 0.012                     I
I       B-A          0.100      0.007       0.028       0.008         0.010                     I
I       C-B          0.130      0.000                   0.010                                   I
------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/   I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 18.00-18.15                                                                                  I
I   B-C       0.00     14.02    0.000                0.0    0.0        0.0                      I
I   B-A       0.64     11.98    0.053                0.1    0.1        0.8                      I
I   C-A       6.86                                                                              I
I   C-B       0.00     10.89    0.000                0.0    0.0        0.0                      I
I   A-B       0.00                                                                              I
I   A-C       0.00                                                                              I
I                                                                                               I
I                   EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:                        I
I                             MAJOR RD.    CENT RES  VIS TO LEFT      VISIBILITY               I
I     MARGINAL   LANE WIDTH    WIDTH       WIDTH    (AHEAD FOR MAJOR) TO RIGHT                  I
I      CHANGE:      (.1M)       (.1M)       (.1M)         (M)            (M)                    I
I                                                                                               I
I       B-C          0.129      0.000                                 0.012                     I
I       B-A          0.100      0.007       0.028       0.008         0.010                     I
I       C-B          0.130      0.000                   0.010                                   I
------------------------------------------------------------------------------------------------

.-----------------------------------------------------------------------------------------------
I  TIME      DEMAND  CAPACITY  DEMAND/   PEDESTRIAN  START   END       DELAY     GEOMETRIC DELAYI
I         (VEH/MIN) (VEH/MIN) CAPACITY      FLOW     QUEUE  QUEUE    (VEH.MIN/       (VEH.MIN/   I
I                              (RFC)    (PEDS/MIN) (VEHS) (VEHS)  TIME SEGMENT)  TIME SEGMENT) I
I 18.15-18.30                                                                                  I
I   B-C       0.00     14.05    0.000                0.0    0.0        0.0                      I
I   B-A       0.52     12.08    0.043                0.1    0.0        0.7                      I
I   C-A       5.60                                                                              I
I   C-B       0.00     10.89    0.000                0.0    0.0        0.0                      I
I   A-B       0.00                                                                              I
I   A-C       0.00                                                                              I
```

EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:

MARGINAL CHANGE:	LANE WIDTH (.1M)	MAJOR RD. WIDTH (.1M)	CENT RES WIDTH (.1M)	VIS TO LEFT (AHEAD FOR MAJOR) (M)	VISIBILITY TO RIGHT (M)
B-C	0.129	0.000			0.012
B-A	0.101	0.005	0.028	0.008	0.010
C-B	0.130	0.000		0.010	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
18.30-18.45								
B-C	0.00	14.08	0.000		0.0	0.0	0.0	
B-A	0.44	12.16	0.036		0.0	0.0	0.6	
C-A	4.69							
C-B	0.00	10.89	0.000		0.0	0.0	0.0	
A-B	0.00							
A-C	0.00							

EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:

MARGINAL CHANGE:	LANE WIDTH (.1M)	MAJOR RD. WIDTH (.1M)	CENT RES WIDTH (.1M)	VIS TO LEFT (AHEAD FOR MAJOR) (M)	VISIBILITY TO RIGHT (M)
B-C	0.129	0.000			0.012
B-A	0.101	0.004	0.028	0.008	0.010
C-B	0.130	0.000		0.010	

QUEUE FOR STREAM B-C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
17.30	0.0
17.45	0.0
18.00	0.0
18.15	0.0
18.30	0.0
18.45	0.0

QUEUE FOR STREAM B-A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
17.30	0.0
17.45	0.0
18.00	0.1
18.15	0.1
18.30	0.0
18.45	0.0

QUEUE FOR STREAM C-B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
17.30	0.0
17.45	0.0
18.00	0.0
18.15	0.0
18.30	0.0
18.45	0.0

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND (VEH)	TOTAL DEMAND (VEH/H)	* QUEUEING * * DELAY * (MIN)	* QUEUEING * * DELAY * (MIN/VEH)	* INCLUSIVE QUEUEING * * DELAY * (MIN)	* INCLUSIVE QUEUEING * * DELAY * (MIN/VEH)
B-C	0.0	0.0	0.0	0.00	0.0	0.00
B-A	48.0	32.0	4.1	0.09	4.1	0.09
C-A	514.2	342.8				
C-B	0.0	0.0	0.0	0.00	0.0	0.00
A-B	0.0	0.0				
A-C	0.0	0.0				
ALL	562.2	374.8	4.1	0.01	4.1	0.01

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

TRAFFIC SIGNALS CALCULATION

Job No.: CHK50196317 **MVA HONG KONG LIMITED**

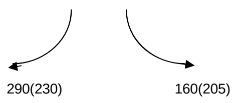
Junction: Ning Foo St/ Lee Chung St   Design Year: 2034

Description: 2034 Design Flow   Designed By: HKH   Checked By: GPH

Approach	Movements	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Gradient (%)	Pro. Turning (%) AM	Pro. Turning (%) PM	Revised Saturation Flow (pcu/hr) AM	Revised Saturation Flow (pcu/hr) PM	AM Peak Flow (pcu/hr)	AM Peak y Value	AM Peak Critical y	PM Peak Flow (pcu/hr)	PM Peak y Value	PM Peak Critical y
Ning Foo St (WB)		A	1	5.000		20				1965	1965	290	0.148		230	0.117	
Ning Foo St (WB)		A	1	5.000	15					1925	1925	160	0.083	0.083	205	0.106	0.106
Pedestrian Crossing		Bp	2	MIN GREEN + FLASH =			5	+	5	=	10			*			*
		Cp	2	MIN GREEN + FLASH =			5	+	5	=	10						

Notes:

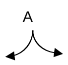
Flow: (pcu/hr)



Group	A,Bp	A,Bp	Group	A,Bp	A,Bp
y	0.083	0.083	y	0.106	0.106
L (sec)	16	16	L (sec)	16	16
C (sec)	60	60	C (sec)	60	60
y pract.	0.660	0.660	y pract.	0.660	0.660
R.C. (%)	694.1%	694.1%	R.C. (%)	520%	520%

Stage / Phase Diagrams

1.



2.

3.

4.

5.

I/G= 3		I/G= 4	10	I/G=		I/G=		I/G=	
I/G= 3		I/G= 4	10	I/G=		I/G=		I/G=	

Date: FEB, 2019   **Junction:** Ning Foo St/ Lee Chung St   H

Landscape Assessment
for the Proposed Public Housing Development at Cheung Man Road,
Chai Wan

Content

List of Annex

1. Introduction

1.1. This Landscape Assessment aims to examine the possible impact of the proposed public housing development (proposed development) at Cheung Man Road (the Project Site), Chai Wan to support the rezoning from “Green Belt”, “Open Space” and “Road” to “Residential (Group A)” use.

1.2. The Landscape Assessment will include preliminary baseline review of the existing landscape resources and landscape character and preliminary tree survey. Important landscape resources will be identified. Likely impact on landscape resources and landscape characters arising from the development and relationship with surrounding landscape of the Site will be evaluated. Recommendation or mitigation measure will also be discussed.

1.3. The Assessment Area for this landscape assessment will include all areas within 500m from the project site boundary.

2. Landscape Baseline

2.1. The Site (about 0.49 ha) is located on a slope, with elevation between +8mPD to +34.1 mPD at Cheung Man Road in the central of Chai Wan district.

2.2. Based on the Chai Wan Outline Zoning Plan No. S/H20/23, the Site is zoned as “Green Belt” (“GB”), “Open Space” (“O”) and “Road”.

2.3. The Site is a government land currently fenced off and vacant with natural terrain covered by dense vegetation, trees and bare soil. A water works reserve is located along the south-western boundary of the Site. A small part of Chai Wan Park managed by Leisure and Cultural Services Department is located along the eastern and southern boundaries of the Site.

2.4. To the north are Cheung Man Road, +34.1 mPD, is a meandering road with narrow footpath and roadside plantation; and The French International School (+51mPD), and Chong Gene Hang College (+47to +51mPD).

2.5. To the south is Chai Wan Park (+5 to +8mPD).

2.6. To the east is Cheung Man Road Rest Garden 9+5mPD to +34.1mPD) linking up the Cheung Man Road at the north and Chai Wan Park at the South.

2.7. To the west are Chai Wan Industrial Centre and Fortune Factory Building.

2.8. The Site is easily accessible from Chai Wan MTR Station through a pedestrian walkway and Chai Wan Park from the South.

2.9. There are no Registered Old and Valuable Trees (OVTs) identified within the Project Site.

3. Landscape Resources (LRs)

5 major landscape resources (LRs) are broadly identified and mapped on Landscape Resources Plan at Annex 1.

3.1. LR1 Woodland

This LR generally refers to the natural hillside of Chai Wan Au at the north, Sai Wan War Cemetery at the South and hillside along Tai Tam Road at the west in the district. Majority of these woodland are densely wooded and regenerating secondary woodland. These woodland, together with the shrubland areas, create a green backdrop to the Chai Wan area, and is an important visual amenity elements. Dominant trees species are *Machilus spp, Acacia confuse, Pinus elliottii* and *Leucaena leucocephala*. Dominat shrub species are Hong Kong Gordonia (*Polyspora axillaris*), *Schefflera arboricola* and *Cemellia hongkongensis, Melastoma malabathricum* and *Rhododendrons spp* and several *orchids spp*. The woodland is locally significant. The landscape quality is relatively high with little tolerance to change. Those vegetation are generally in middle-aged and fair health condition. Therefore, the overall sensitivity of this LR is considered as high.

3.2. LR2 Plantation

There are several patches of plantation found. This resource is found on almost all engineered and roadside slopes, parks and open space of the district and landscaped area of the residential/ commercial/ institutional development. The dominant planted tree species within these areas are *Bauhinia spp, Delonix regia, Ficus spp., Archontophoenix alexandrae, Phoenix robellenii, with both native and* exotic, ranging in height from 2 – 12m. Health condition of this plantation is fair and is relatively mature. Despite the exotic nature of many of these trees within this LR, its coverage is extensive, providing a series of green fingers and often associated with the hills and elevated areas. This plantation resource also extends into the dense Chai Wan urban development and provides visual relief and a green buffer. This LR is mainly planting adjacent to human activities. It is relatively mature and the sensitivity of this landscape resource is medium. The plantation is local significant. Those plantation trees are dense and mature, providing a relatively moderate landscape amenity value and quality. This LR is a man-made resource and is able to be recreated reasonably easily. Base on it has a reasonable capacity to accommodate change, the sensitivity of this LR is considered as medium.

3.3. LR3 Roadside Planting

This LR refers to roadside planting in the Chai Wan area, which provide a reasonable screening and enhance the overall amenity value in the vicinity. These roadside planting strips or median planting of small to medium size trees and palms, with shrubs and groundcovers create a green corridor in the urban area, which provides a landscape / visual buffer between urban development and road. Typical species identified include trees like *Bauhinia spp., Melaleuca spp.* and *Livistona spp*. along Chai Wan Road, Island Eastern Corridor and other roads, etc…which are generally in good forms. Tree size ranging from 3-10m in height. These roadside plantings are locally significant for urban landscape and provide moderate amenity value to the existing environment. The landscape quality is fair with reasonable tolerance to change. The maturity of this LR is relatively lower than the natural hillsides woodland. Therefore, the sensitivity of LR is considered as medium.

3.4. LR4 Water Body

There are water bodies identified within assessment area. These water bodies are man-made recreational water feature inside the Chai Wan Park. They consist of pool/ pond, cascade, water jets, streams, etc… These recreational water bodies are maintained and managed by LCSD. Water flow is constant and in control manner. This LR runs through the park (as well as some plantation), and are often characterized by a series of man-made ponds and streams with rounded boulders on a shallow bed and along the banks. These recreational water bodies are locally significant. Overall amenity value and quality are high with little tolerance to any development change. Therefore, the sensitivity of this LR is considered as high.

3.5. LR5 Old and Valuable Trees

There is one Old and Valuable Trees (OVT) found within the assessment area.

It is *Ficus elastica* 印度榕(印度橡樹), Registration No. ARCHSD E/2, located in LAW UK Folk Museum Rest Garden, Cha Wan Kut Shing Street, Slope No. 11SE-D/F221, maintained by ArchSD. This tree is locally significant. Overall amenity value and quality are high with little tolerance to any development change. Therefore, the sensitivity of this OVT (or LR) is considered as high.

LR1 Woodland

LR2 Plantation

LR3 Roadside Planting

LR4 Water Body

LR5 Old and Valuable Tree

4. Landscape Character Areas (LCAs)

3 major Landscape Character Areas (LCAs) have been broadly identified within the study area and mapped on Landscape Character Areas Plan at Annex 2.

4.1. LCA1 Upland and Countryside Landscape

This Uplands and countryside (hillsides) lie above 40mPD and below 300mPD in the area. The land use is predominantly undeveloped and there is no built form (with occasionally small building). This LCA is composed of mixed woodland habitat, a small area of plantation habitat, surrounded by the urban fridge landscape. It is composed of Tai Tam Country Park, Lei Yue Mun Park and Holiday Village and Sai Wan Shan – Sai Wan Battery at the upland and hillside of Chai Wan.

4.2. LCA2 Urban Fringe Landscape

This Landscape Character Area (LCA) in the area is at hillside, predominantly residential development, institutional landscape and cemetery landscape. Low rise development built form is observed. This LCA is further broken down into 3 district-level landscape character type below:

4.2.1. Comprehensive Residential Development Landscape

This Comprehensive Residential Development Landscape in the area is predominantly residential with limited community and retail. Generally low rise but sometimes mixed with towers at any height, on structured layout. It lies at hillside of the area, surrounded by plantation vegetation.

It is composed of Hing Man shopping Complex, Hing Man Estate, Hing Wah Estate, Bayview Park, Koway Court and Neptune Terrace.

4.2.2. Cemetery Landscape

This Cemetery Landscape in the area is of no specific land use function. It lies at hillside of the area, surrounded by plantation vegetation. Built form of scattered low-rise buildings.

It is composed of Sai Wan War Cemetery and Holy Cross Catholic Cemetery in the area.

4.2.3. Institutional Landscape

Institutional Landscape in the area is of institutional or community land use. It lies at hillside of the area, surrounded by plantation vegetation. Built form of scattered low or medium rise buildings.

It is composed of Chai Wan Police Station, Star of the Sea Church, The Methodist Church Epworth Village Community Centre, Hing Wah Community Hall, Lutheran Philip House Hing Man Nursery School, Epworth Village Methodist Church Kindergarten, Lycée Francais International (Primary Section), Meng Tak Catholic School, Chong Gene Hang College, French International School of Hong Kong Chai Wan Campus, Chai Wan General Out-Patient Clinic, Pamela Youde Nethersole Eastern Hospital, Pamela Youde Nethersole Eastern Hospital Laundry and Chai Wan North Service Reservoir Playground in the area.

4.3. **LCA3 Urban Landscape**

This Landscape Character Area (LCA) in the area is at both plain and low hillside area. It is predominantly residential development, commercial and retail land uses. Mixed height development and orthogonal street layout observed. This LCA is further broken down into 3 district-level landscape character type below:

4.3.1. **City Grid Mixed Urban Landscape**

This City Grid Mixed Urban Landscape in the area is at plain and relative low hillside area. It is predominantly residential with commercial, retail and institutional land uses. Perhaps city grid pattern is not strong in this study area, mixed height development, sometimes late 20C/Early 21C Commercial/Residential Complex Landscape and orthogonal street layout is observed.

It is composed of Tsui Wan Estate, Tsui Wan Shopping Complex, Tsui Lok Estate, Hang Tsui Court, Chai Wan Police Married Quarters, Yue Wan Estate, Yue Wan Community Hall, Goldmine Building, Walton Estate, Yee Tsui Court, Wan Tsui Estate and Lok Hin Terrace.

SKH Li Fook Hing Secondary School, Islamic Kasim Tuet Memorial College, HKUGA Primary School, the Salvation Army Centaline Charity Fund School, Food and Environmental Hygiene Department Chai Wan Municipal Services Building, Chai Wan Public Library, Yu Wan Wet Market, Chai Wan Sports Centre, Winner Centre Wan Tsui Commercial Complex, Hong Kong Institute of Vocational Education (Chai Wan), Technological and Higher Education Institute of Hong Kong (Chai Wan Campus), New Jade Shopping Arcade and Chai Wan MTR Station also fall to this landscape character area.

4.3.2. **Industrial Urban Landscape**

This Industrial Urban Landscape in the area is at plain and relative low hillside area. It is usually of industrial, storage, warehousing or port-related use. It is usually of low or medium rise built form.

It is composed of Chai Wan Factory Estate, Chi Ko Industrial Building, Tak King Industrial Building, Shing King Industrial Building, Sze Hing Industrial Building, Fortune Factory Building, Chai Wan Industrial Centre, Minico Building, Trend Centre and Kantone Centre in the area.

4.3.3. **Park Urban Landscape**

This Park Urban Landscape in the area is at plain and relative low hillside area. It is usually of passive public open space and sometimes with active. A very low rise built form and sometimes no built form is observed.

It is composed of Law Uk Folk Museum, Chai Wan Park, Wing Tai Road Garden, Yee Tai Street Sitting-Out Area, Yee Shing Lane Temporary Sitting-Out Area in the area.

LCA1 Upland and Countryside Landscape

LCA2 Urban Fringe Landscape

LCA3 Urban Landscape

5. Landscape Impact Evaluation

5.1. The major sources of landscape impacts arisen from the proposed development will result in the removal of the existing vegetation, and the temporary presence of construction activities and new building structures.

5.2. Preliminary tree survey reveals approximately 429 trees within the project site area (refer to Annex 3).

5.3. No OVT is identified within project site. All trees are common species in Hong Kong. No flora species of important conservation value are recorded. No protected species, potential OVTS nor significant trees is identified within site.

5.4. Despite of extensive coverage of 429 trees, the health and structural condition of these landscape resource are rated as fair to poor. Dead trees, fallen trees and felled trees are observed. This Plantation area lack of proper management and maintenance by current land owner department.

5.5. Post typhoon tree survey reveals significant tree failure due to super typhoon Mangkhut, typhoon signal T10, hoisted on 16/9/2018. Approximate 50 number of tree collapse were observed.

5.6. Additional footbridge linking the development with the Chai Wan Station Exit D is proposed in future subject to the Traffic Impact Assessment (TIA). Approximate 38 trees owned by LCSD will be affected by this footbridge (refer to Annex 3). No OVT is identified within the area. All trees are common species in Hong Kong. No flora species of important conservation value are recorded. No protected species, potential OVTS nor significant trees is identified within site.

5.7. During construction stage, the potential impacts on landscape originated from construction works (including site clearance, site formation and other construction activities) will be alleviated during the construction stage by various temporary green installations, such as green hoardings with vertical greening/ pot plants and the appropriate screening for construction works.

5.8. As the site is a sloping area, extensive site formation works are anticipated to be conducted. All the existing vegetation would be felled, including 429 number of trees within the proposed development (i.e. LR2) due to site clearance during the construction stage; and 38 number of trees due to proposed footbridge. Most vegetation recorded within the proposed development are common species in Hong Kong. The tree compensation ratio of 1:1 in terms of quantity will be achieved as far as possible in accordance with prevailing DevB guidelines and technical circulars.

5.9. When the development comes into operation, impacts will be mitigated by strategic landscape design and provision of open space:-

A. Amenity planting with trees and palm will be provided at different floor levels of landscaped/ garden/ play area of the development.
B. New planting with native tree species will also be introduced in the future plantings.
C. Other green measures can also be considered to be adopted such as roof and vertical greening for the loss of greenery cover upon completion of the construction.
D. The functional open space with outdoor recreational active and passive activities can also be provided. These open spaces can also be planned with the landscape design and provided at difference floor levels, the provision of open space will follow the guideline as stipulated under the HKPSG.

5.10. The provision of open space and the strategic landscape design will be substantially enhance the landscape and visual value to the neighborhood in future when all landscape becomes mature.

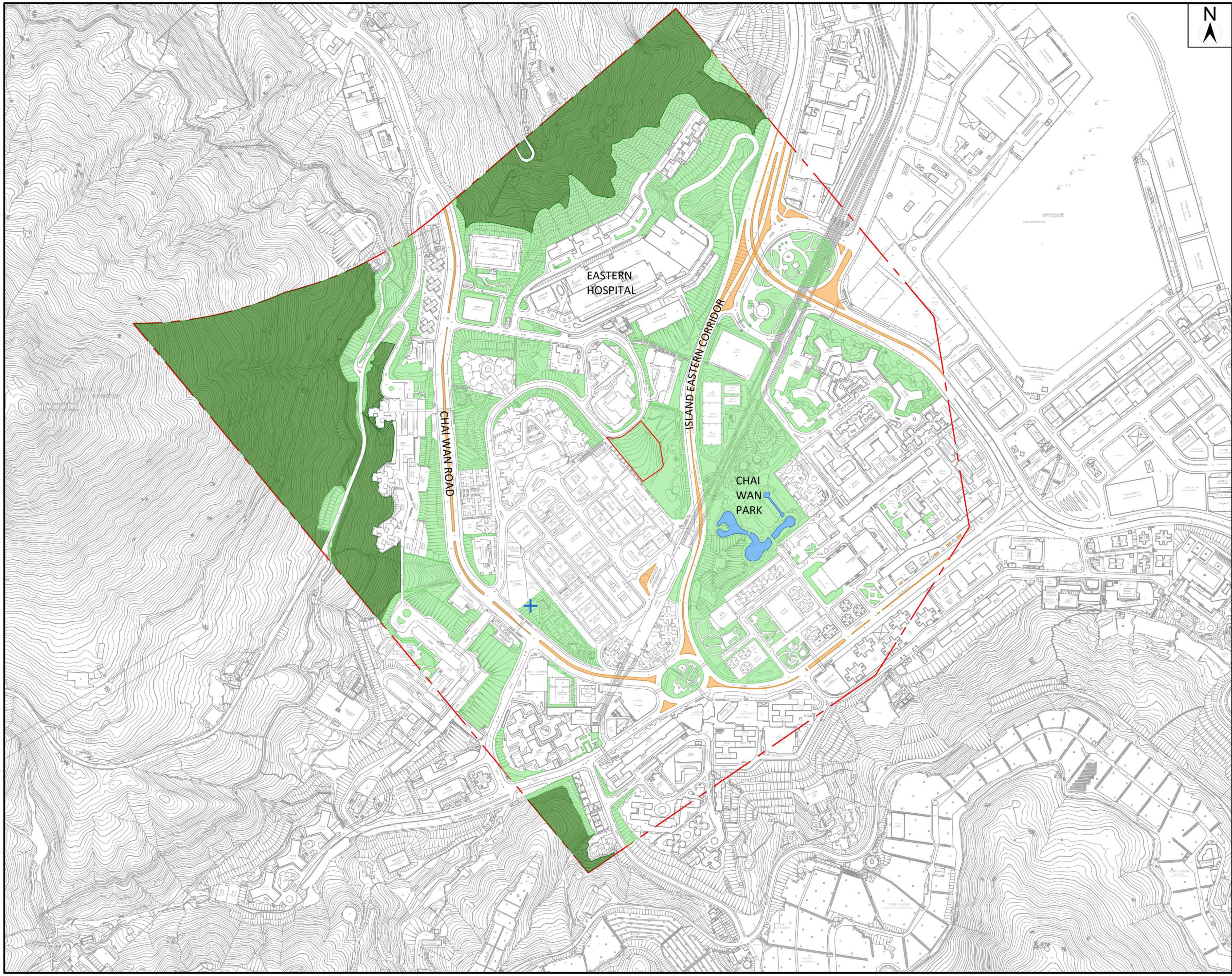
6. **<u>Conclusion</u>**

In conclusion, the major impact anticipated to be caused by the proposed public housing development is the removal of existing vegetation and trees which lies within LR2 - Plantation and LCA3 - Urban Landscape, due to possible temporary presence of construction works including site clearance, site formation and other construction activities.

As no OVTs and flora species of important conservation value are identified, while existing vegetation was severely damaged by recent typhoon in September, the landscape impact to this LR is considered to be low to medium, yet it can be minimized through various mitigation measures. During construction stage, the impact will be alleviated through various temporary green installations, such as green hoardings and appropriate screening. While during operation stage, strategic landscape design including *Para. 5.9(A),(B),(C),(D)* throughout the development and creation of new open spaces will mitigate the impacts.

It is considered that the above-mentioned landscape design will eventually enhance the landscape and visual value of the neighborhood when the landscape becomes mature.

ANNEX 1



NOTES

- 500M ASSESSMENT AREA
- PROJECT SITE
- WOODLAND
- PLANTATION
- ROADSIDE PLANTING
- WATERBODY
- OLD AND VALUABLE TREE

REVISIONS		INITIAL AND DESIGNATION		
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	NAME AND DESIGNATION	INITIAL	DATE
AUTHORISED			
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PROJECT
CHEUNG MAN ROAD LANDSCAPE ASSESSMENT

DRAWING TITLE
LANDSCAPE RESOURCES PLAN

SCALE 1:3000 (A1) , 1:6000 (A3)

DRAWING NO.
ET07/FS/LO-02/A

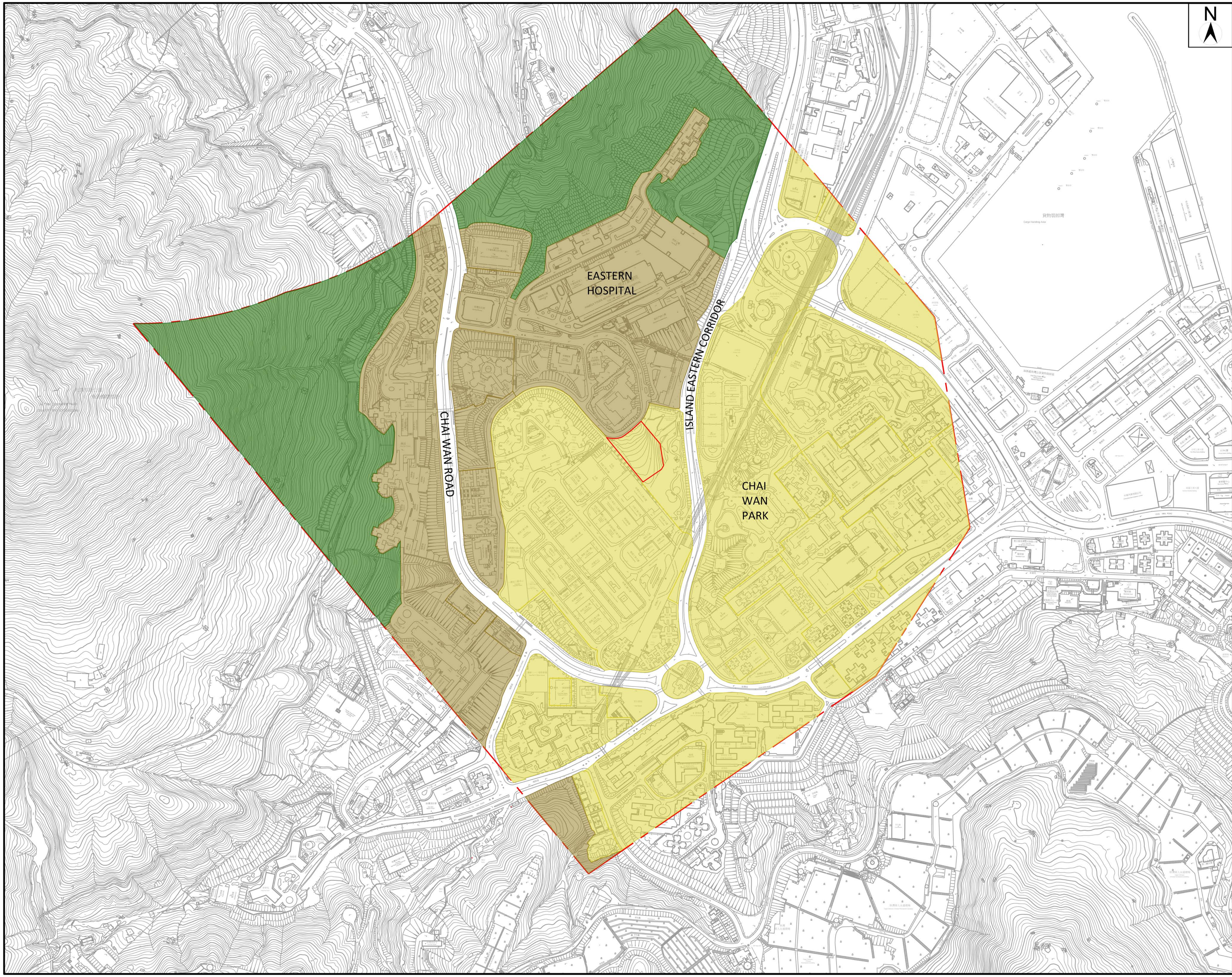
SOURCE

ICU REF.

AutoCAD 2000 A1 594 x 841

HOUSING DEPARTMENT

ANNEX 2



NOTES

- 500M ASSESSMENT AREA
- PROJECT SITE
- UPLAND COUNTRYSIDE LANDSCAPE
- URBAN FRINGE LANDSCAPE
- URBAN LANDSCAPE

REVISIONS

NO	DESCRIPTION AND DATE	INITIAL AND DESIGNATION		
		DWN	CKD	AUTH

	NAME AND DESIGNATION	INITIAL	DATE
AUTHORISED			
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PROJECT
CHEUNG MAN ROAD LANDSCAPE ASSESSMENT

DRAWING TITLE
LANDSCAPE CHARACTER AREAS PLAN

SCALE 1:3000 (A1) , 1:6000 (A3)

DRAWING NO.
ET07/FS/LO-01/A

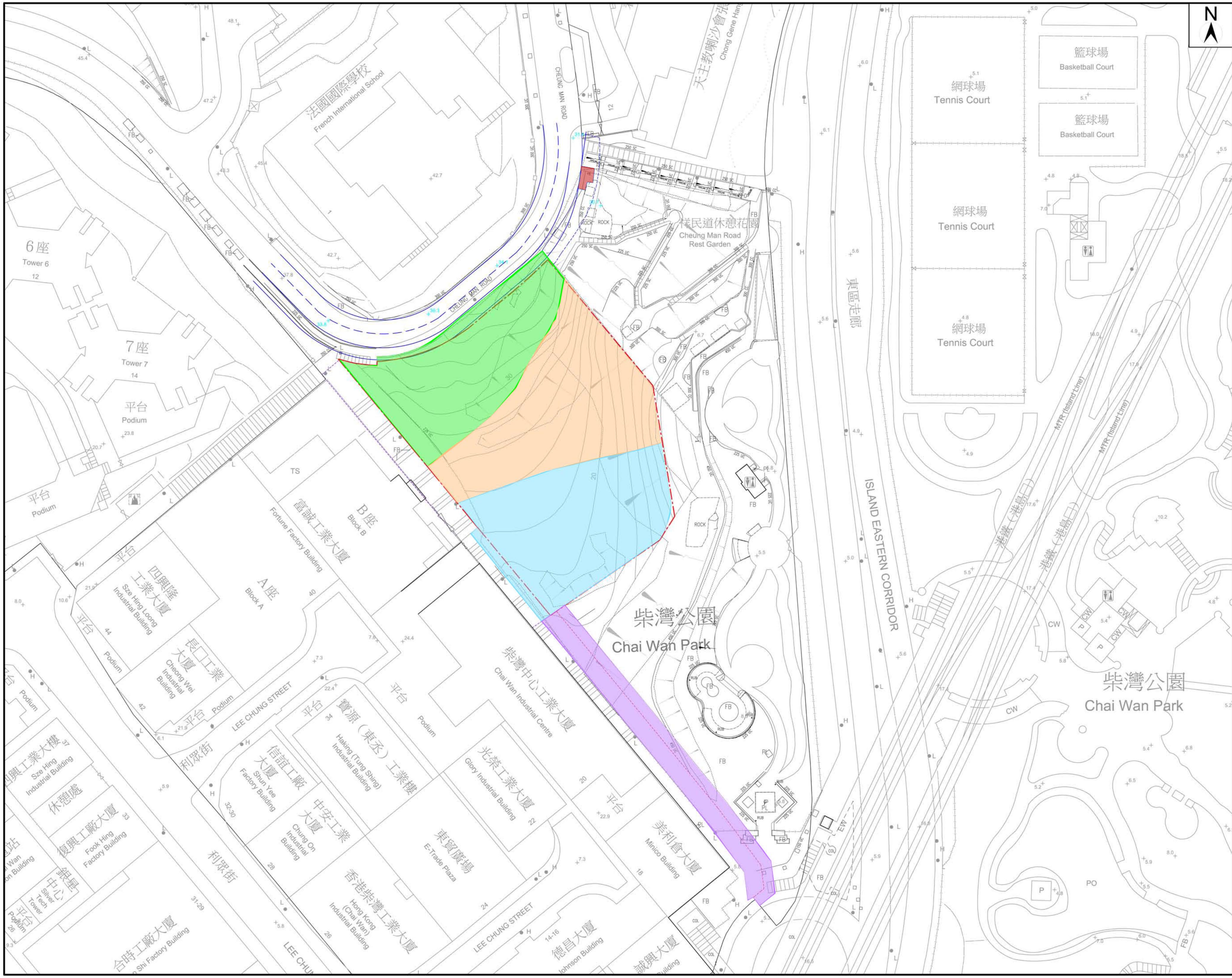
SOURCE

ICU REF.

AutoCAD 2000 A1 594 x 841

HOUSING DEPARTMENT

ANNEX 3



N

NOTES

- PROJECT SITE
- TREE GROUP 1
- TREE GROUP 2
- TREE GROUP 3
- TREE GROUP 4
- TREE GROUP 5

REVISIONS

NO	DESCRIPTION AND DATE	INITIAL AND DESIGNATION		
		DWN	CKD	AUTH

	NAME AND DESIGNATION	INITIAL	DATE
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PROJECT
CHEUNG MAN ROAD LANDSCAPE ASSESSMENT

DRAWING TITLE
TREE GROUP SURVEY PLAN

SCALE 1:3000 (A1) , 1:6000 (A3)

DRAWING NO.
ET07/FS/LO-03/A

SOURCE

ICU NO.

AutoCAD 2000 A1 594 x 841

HOUSING DEPARTMENT

ANNEX 3

Cheung Man Road **Tree Assessment Schedule (Group Survey)**

ROADSIDE

Tree Group No.	Photo No.	Botanical Name	Chinese Common Name	App. Quantity of the group	SIZE (M) Height	SIZE (M) Trunk DBH	SIZE (M) Spread	Structural condition (Good/ Fair/ Poor)	Health (Good/ Fair/ Poor)	Amenity Value (High/ Medium/ Low)
G-01	V1	*Bridelia tomentosa*	土蜜樹	1	6	0.11	3	Poor	Poor	Low
		Ficus microcarpa	細葉榕	1	7	0.18	3.5	Poor	Fair	Low
		Leucaena leucocephala	銀合歡	1	7	0.2	3.5	Poor	Poor	Low
		Macaranga tanarius	血桐	1	7	0.25	3.5	Poor	Poor	Low
				4						

SITE

Tree Group No.	Photo No.	Botanical Name	Chinese Common Name	App. Quantity of the group	Height	Trunk DBH	Spread	Structural condition	Health	Amenity Value
G-02	V2, V3, V4, V5 & V6	*Bridelia tomentosa*	土蜜樹	1	5.5	0.19	5	Fair	Fair	Low
		Caryota maxima	魚尾葵	5	6 – 6.5	0.12 – 0.25	3 – 4	Poor	Fair	Low
		Celtis sinensis	樸樹	8	5 – 11	0.11 – 0.45	3 – 10	Fair	Fair	Medium
		Ficus hispida	對葉榕	7	4 – 6.5	0.1 – 0.18	3 – 4.5	Poor	Fair	Medium
		Ficus variegata	青果榕	4	5.5 – 8	0.11 – 0.34	3 – 8	Fair	Fair	Medium
		Leucaena leucocephala	銀合歡	33	5 – 9	0.1 – 0.38	2.5 – 8	Poor	Fair	Low
		Ligustrum sinense	山指甲	1	5.5	0.11	3.5	Poor	Fair	Medium
		Macaranga tanarius	血桐	33	3.5 – 10	0.1 – 0.54	3 – 8	Poor	Fair	Low
		Mallotus paniculatus	白楸	13	5 – 7	0.11 – 0.23	3 – 6	Poor	Fair	Medium
		Schefflera heptaphylla	鵝掌柴	2	6.5	0.23 – 0.29	5 – 6.5	Poor	Fair	Low
		Sterculia lanceolata	假蘋婆	18	4.5 – 7	0.1 – 0.19	3 – 4.5	Fair	Fair	Medium
		Dead		4						
				129						

SITE

Tree Group No.	Photo No.	Botanical Name	Chinese Common Name	App. Quantity of the group	Height	Trunk DBH	Spread	Structural condition	Health	Amenity Value
G-03	V3, V7, V8 & V9	*Bombax ceiba*	木棉	1	7.5	0.17	4	Poor	Fair	Low
		Bridelia tomentosa	土蜜樹	1	5	0.1	2.5	Poor	Poor	Low
		Caryota maxima	魚尾葵	7	6 – 6.5	0.11 – 0.23	2.5 – 4	Poor	Fair	Low
		Celtis sinensis	樸樹	6	6.5 – 8	0.13 – 0.32	3.5 – 7	Poor	Fair	Low
		Ficus hispida	對葉榕	20	4 – 7.5	0.1 – 0.18	2.5 – 6	Poor	Fair	Low
		Ficus variegata	青果榕	1	9	0.25	6	Poor	Fair	Low
		Ligustrum sinense	山指甲	1	7	0.15	5	Fair	Fair	Medium
		Macaranga tanarius	血桐	95	2.5 – 9.5	0.09 – 0.31	2.5 – 7	Poor	Fair	Low
		Mallotus paniculatus	白楸	13	6 – 8	0.1 – 0.16	3 – 5.5	Poor	Fair	Low
		Morus alba	桑樹	1	5	0.19	4.5	Poor	Poor	Low
		Schefflera heptaphylla	鵝掌柴	7	4.5 – 7	0.11 – 0.22	3 – 4.5	Poor	Fair	Low
		Sterculia lanceolata	假蘋婆	12	4.5 – 6.5	0.1 – 0.18	2.5 – 5	Fair	Fair	Medium
		Dead		2						
				167						

SITE

Tree Group No.	Photo No.	Botanical Name	Chinese Common Name	App. Quantity of the group	Height	Trunk DBH	Spread	Structural condition	Health	Amenity Value
G-04	V9 & V10	*Caryota maxima*	魚尾葵	2	6.5	0.11	2.5 – 3.5	Poor	Fair	Low
		Celtis sinensis	樸樹	2	8.5 – 11	0.49 – 0.77	9 – 12	Poor	Fair	Medium
		Ficus hispida	對葉榕	17	3 – 7	0.1 – 0.28	2.5 – 6	Poor	Fair	Low
		Leucaena leucocephala	銀合歡	3	5.5 – 7	0.13 – 0.27	3.5 – 5	Poor	Fair	Low
		Macaranga tanarius	血桐	71	4 – 9.5	0.1 – 0.93	2.5 – 12	Poor	Fair	Low
		Mallotus paniculatus	白楸	4	5.5 – 8.5	0.11 – 0.24	3 – 7	Poor	Fair	Low
		Mangifera indica	杧果	1	5.5	0.14	4	Poor	Poor	Low
		Schefflera heptaphylla	鵝掌柴	12	5 – 7	0.1 – 0.25	2.5 – 5	Poor	Fair	Medium
		Sterculia lanceolata	假蘋婆	10	4 – 7.5	0.1 – 0.4	3 – 5	Fair	Fair	Medium
		Dead		11						
				133						
		APP. TOTAL QUANTITY OF TREES WITHIN SITE:		**429**						

CHAI WAN PARK

Tree Group No.	Photo No.	Botanical Name	Chinese Common Name	App. Quantity of the group	Height	Trunk DBH	Spread	Structural condition	Health	Amenity Value
G-05	V11, V12 & V13	*Celtis sinensis*	樸樹	1	11	0.43	10.5	Poor	Fair	Low
		Ficus hispida	對葉榕	9	4.5 – 8.5	0.09 – 0.26	2 – 4	Poor	Fair	Medium
		Ficus microcarpa	細葉榕	13	3 – 12	0.09 – 0.68	2 – 11	Poor	Fair	Medium
		Ficus variegata	青果榕	2	6 – 10	0.1 – 0.3	2.5 – 5.5	Fair	Fair	Medium
		Macaranga tanarius	血桐	8	5 – 11	0.1 – 0.46	2.5 – 7.5	Poor	Fair	Low
		Mallotus paniculatus	白楸	2	6.5 – 7	0.12 – 0.13	3.5 – 4	Poor	Fair	Low
		Michelia alba	白蘭	1	7	0.22	5	Fair	Fair	Fair
		Sterculia lanceolata	假蘋婆	1	7.5	0.4	6	Poor	Poor	Low
		Felled		1						
				38						

NOTES

REVISIONS — INITIAL AND DESIGNATION

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NAME AND DESIGNATION | INITIAL | DATE

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PROJECT
CHEUNG MAN ROAD LANDSCAPE ASSESSMENT

DRAWING TITLE
TREE GROUP SURVEY SCHEDULE

SCALE

DRAWING NO.
ET07/FS/LO-04/A

SOURCE

ICU NO.

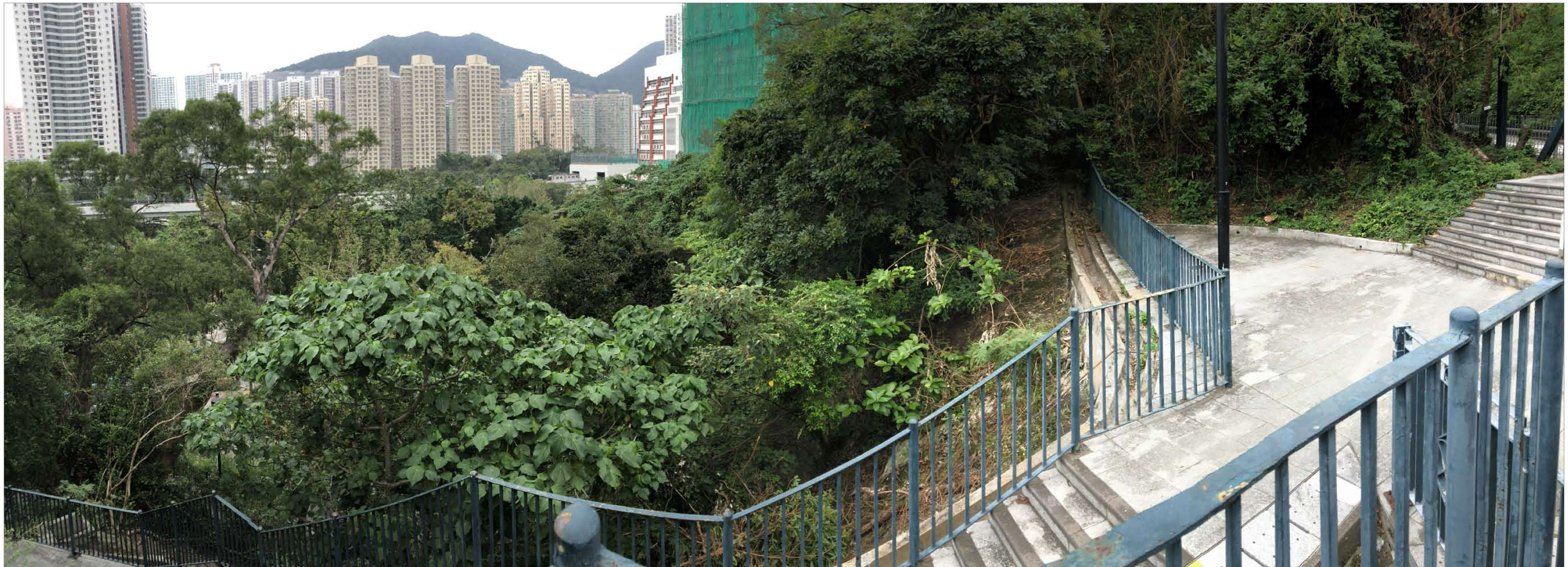
AutoCAD 2000 A1 594 x 841

HOUSING DEPARTMENT

ANNEX 3

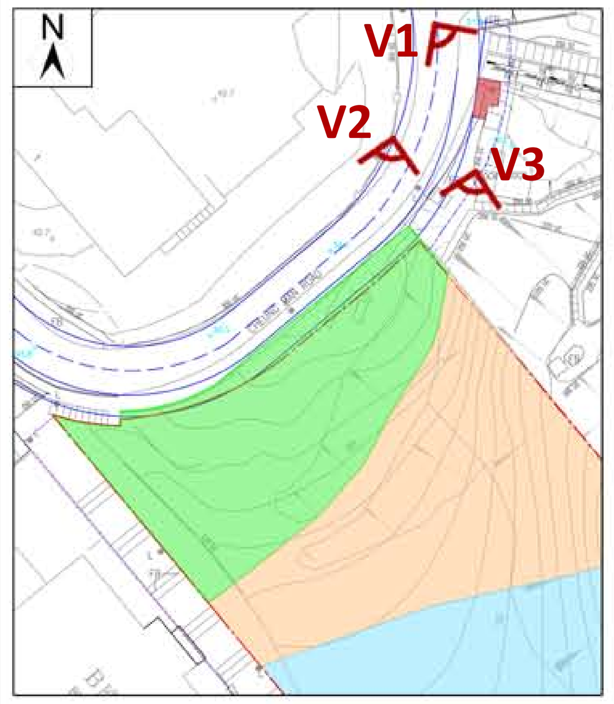
VIEWPOINT 1 (V1) - GROUP 1 (G-01)

VIEWPOINT 2 (V2) - GROUP 2 (G-02)



VIEWPOINT 3 (V3) - GROUP 2 (G-02) & - GROUP 3 (G-03)

LOCATION PLAN



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PROJECT
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DRAWING TITLE
TREE GROUP SURVEY PHOTO RECORD (SHEET 1)

SCALE

DRAWING NO.
ET07/FS/LO-05/A

SOURCE

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AutoCAD 2000 A1 594 x 841

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ANNEX 3

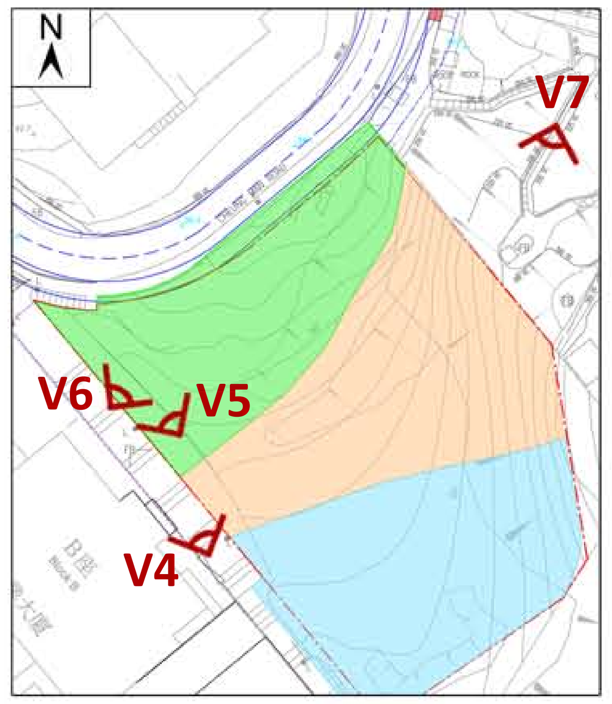
VIEWPOINT 4 (V4) - GROUP 2 (G-02)

VIEWPOINT 5 (V5) - GROUP 2 (G-02)

VIEWPOINT 6 (V6) - GROUP 2 (G-02)

VIEWPOINT 7 (V7) - GROUP 3 (G-03)

LOCATION PLAN



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TREE GROUP SURVEY PHOTO RECORD (SHEET 2)

SCALE

DRAWING NO.
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SOURCE

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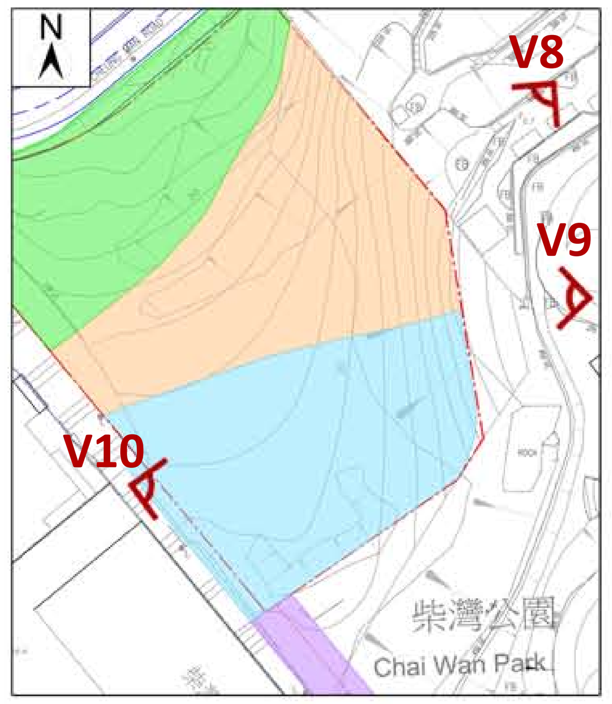
ANNEX 3

VIEWPOINT 8 (V8) - GROUP 3 (G-03)

VIEWPOINT 9 (V9) - GROUP 3 (G-03) & - GROUP 4 (G-04)

VIEWPOINT 10 (V10) - GROUP 4 (G-04)

LOCATION PLAN



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PROJECT
CHEUNG MAN ROAD LANDSCAPE ASSESSMENT

DRAWING TITLE
TREE GROUP SURVEY PHOTO RECORD (SHEET 3)

SCALE

DRAWING NO.
ET07/FS/LO-07/A

SOURCE

ICU NO.

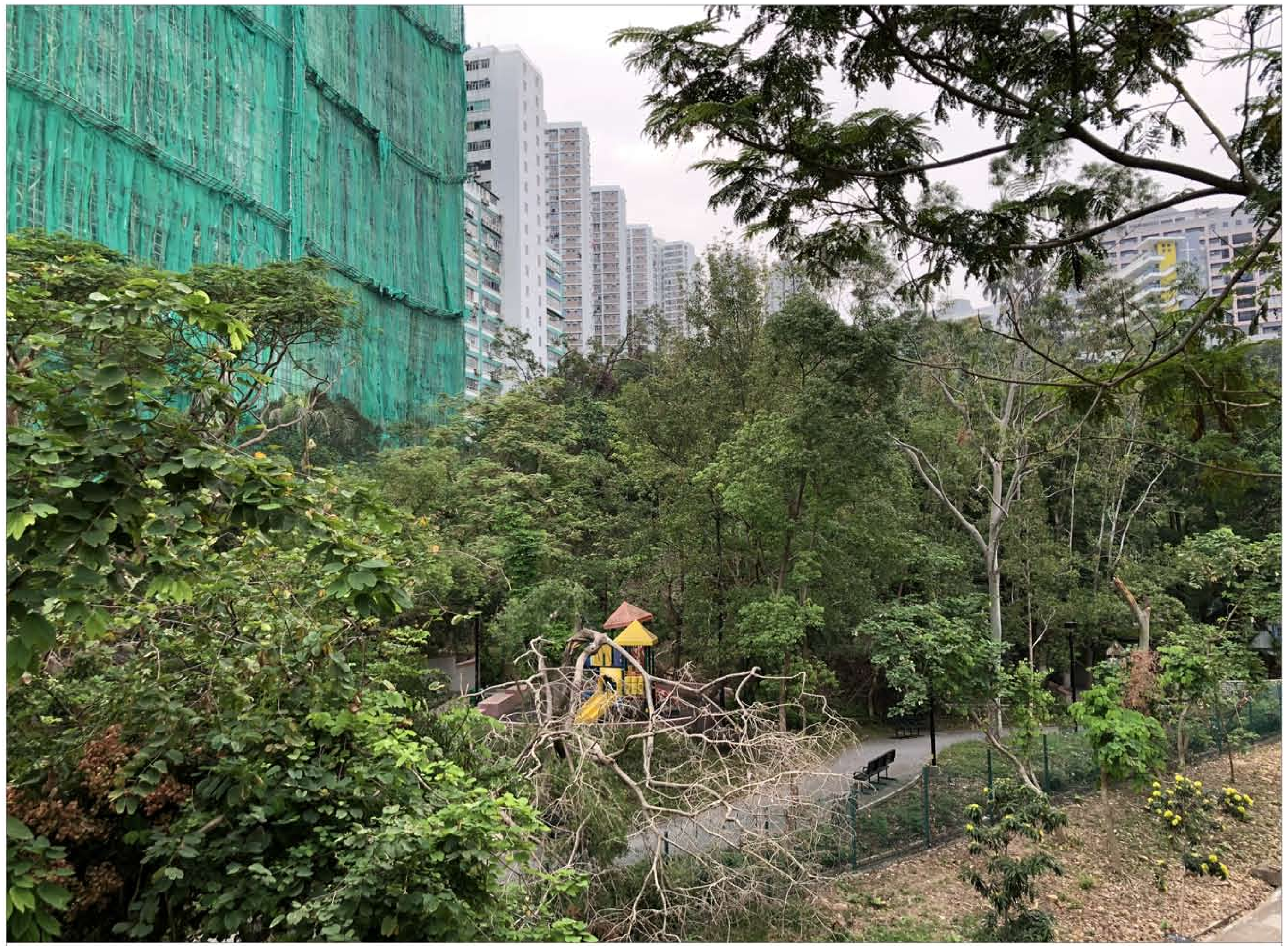
AutoCAD 2000 A1 594 x 841

HOUSING DEPARTMENT

ANNEX 3

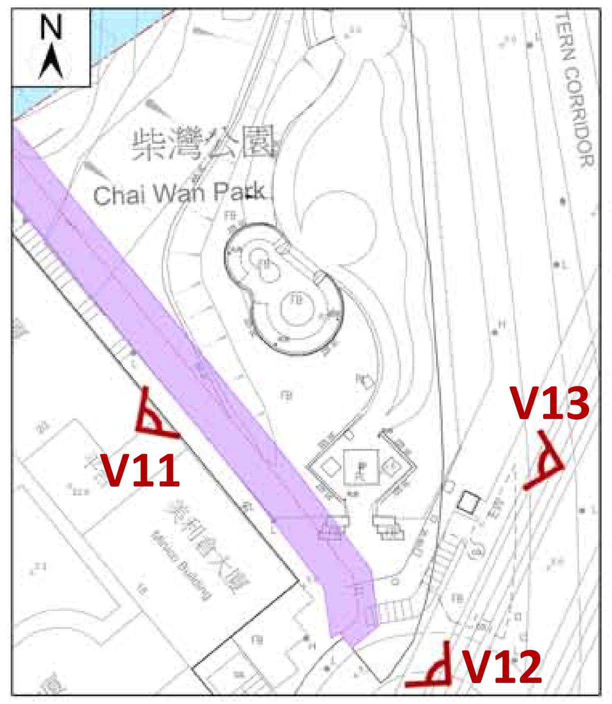
VIEWPOINT 11 (V11) - GROUP 5 (G-05)

VIEWPOINT 12 (V12) - GROUP 5 (G-05)



VIEWPOINT 13 (V13) - GROUP 5 (G-05)

LOCATION PLAN



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PROJECT
CHEUNG MAN ROAD LANDSCAPE ASSESSMENT

DRAWING TITLE
TREE GROUP SURVEY PHOTO RECORD (SHEET 4)

SCALE

DRAWING NO.
ET07/FS/LO-08/A

SOURCE

ICU NO.

AutoCAD 2000 A1 594 x 841

HOUSING DEPARTMENT

Attachment XI of
<u>MPC Paper No. 2/20</u>

Hong Kong Housing Authority

Proposed Public Housing Development at Cheung Man Road, Chai Wan

Quantitative Risk Assessment Report

REP-00-03

Final | December 2018

Job number 261261

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ARUP

Contents

Figures

Appendices

1 Introduction

1.1 Study Background

1.1.1 The Hong Kong Housing Authority (HKHA) has identified a site at Cheung Man Road, Chai Wan for subsidised sale flats development ("Proposed Development"). The site is currently zoned as "Green Belt" (GB) on the approved Chai Wan Outline Zoning Plan (OZP).

1.1.2 The proposed development will consist of one block of Subsidised Sale Flats, an Elderly Day Care Centre and car parking facilities. A LPG storage installation, located near Greenwood Terrace Block 7, is identified in the vicinity of the Proposed Development, which may pose life hazard to the residents. The location of the LPG storage installation and the Proposed Development are shown in **Figure 1.1.**

1.1.3 Arup was commissioned by HKHA on 23 March 2018 to carry out a Quantitative Risk Assessment (QRA) on the LPG storage installation in support of the Proposed Development.

1.2 Objective of the Risk Assessment

1.2.1 The main objectives of the risk assessment are as follows:

- To evaluate and quantify the risks to the occupants of the proposed housing development at the proposed site associated with the operations of LPG storage installation.
- To assess the acceptability of the quantified risk levels mentioned above.
- To identify the main contributors to the risks, and to recommend practicable and cost-effective risk preventive and mitigation measures where appropriate. The risk mitigation measures should aim to make the acceptability of risks to a level which is "as low as reasonably practicable".

1.3 Scope of Work

1.3.1 The scope of work for this risk assessment is summarised below:

- Collect background information on nearby premises in the vicinity of the LPG storage installation;
- Identify all hazardous scenarios, the frequencies or the likelihood of various outcomes associated with the proposed development and LPG storage installation, which have potential to cause fatalities;

- Carry out a quantitative risk assessment (QRA) on the LPG storage installation expressing population risks in both individual and societal terms;
- Compare the individual and societal risks of the proposed development with the Hong Kong Government Risk Guidelines (HKRG); and
- Identify and assess practical and cost effective risk mitigation measures, if necessary.

1.4 Structure of the QRA Report

Chapter 1	Introduction of the Study Background, Objectives of the Risk Assessment, Scope of Work, and Structure of the Report.
Chapter 2	Legislation, standard and guideline on societal and individual risks.
Chapter 3	Assessment baseline of the proposed development, the LPG storage installation, other surrounding population groups together with applicable meteorological conditions.
Chapter 4	Hazard scenarios in relation to the LPG storage installation.
Chapter 5	Frequencies of the outcome events.
Chapter 6	Consequences of different hazardous events.
Chapter 7	Hazard to life assessment result.
Chapter 8	Conclusion.

2 Legislation, Standard and Guidelines

2.1 Introduction

2.1.1 The key guideline which is considered relevant to this risk assessment includes:

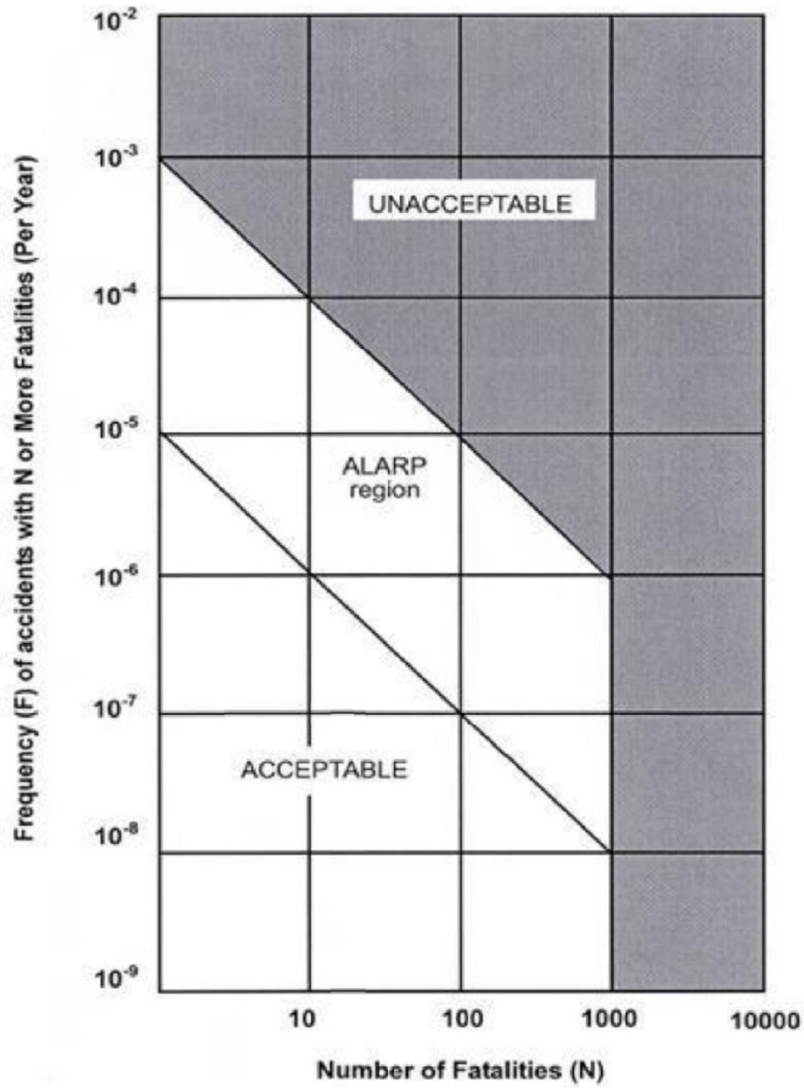
- Hong Kong Planning Standards and Guidelines (HKPSG)

2.1.2 The risk criteria are summarized in **Table 2.1**.

Table 2.1 Risk criteria

Risk	**Criteria**
Individual Risk	The individual risk represents the frequency of an individual dying due to loss of containment events. The maximum level of offsite individual risk should not exceed 10^{-5} /yr.
Societal Risk	It expresses the risks to the whole population near a Potential Hazardous Installation (PHI). With the population increases, the societal risk will be increased. The societal Risk Guidelines (RG) is presented graphically in **Figure 2.1**. It is expressed in terms of lines plotting the cumulative frequency (F) of Number of Fatalities (N) or more deaths in the population from incidents at the installation. Two F-N risk lines are used in the RG that demark “acceptable” or “unacceptable” societal risks. The intermediate region indicates the acceptability of societal risk is borderline and should be reduced to a level which is “as low as is reasonably practicable” (ALARP). It seeks to ensure that all practicable and cost effective measures that can reduce risk will be considered.

Figure 2.1 Societal Risk Guidelines



3 Assessment Baseline

3.1 Proposed Development

3.1.1 The Hong Kong Housing Authority has identified a site at Cheung Man Road, Chai Wan for subsidised sale flats development. The site is currently zoned "Green Belt" (GB) on the approved Chai Wan Outline Zoning Plan (OZP).

3.1.2 The proposed development will consist of one block of Subsidised Sale Flats, a car park and an Elderly Day Care Centre. A footbridge connecting the proposed development and Chai Wan MTR station will be constructed. According to the latest scheme, the residential block consists of 884 flats. The gross floor area (GFA) of the Elderly Day Care Centre is 716m^2 and there would be 76 parking spaces.

3.1.3 The tentative layout plan of the Proposed Development is given in **Appendix 3.1**. The design parameters of the Proposed Development are summarized in **Table 3.1** and **Table 3.2**.

Table 3.1 Design parameters of proposed residential block

Parameter	Value
Base level	35.4mPD
Maximum Building Height	135mPD
Number of Storeys	34
Number of Flats	884
Household size	2.8
Design Population	2723

Note:
Design Population includes a 10% deviation allowance (i.e. 884 x 2.8 x 1.1)

Table 3.2 Design parameters of non-residential facilities

Facility	GFA (m^2)	Population
Elderly Day Care Centre	716	125
Car Park	N/A	15

Note:
Population calculation is summarized in **Appendix 3.3**.

3.1.4 The typical time modes representing the percentages of maximum population at different times of the day for the total unit population are made reference to the approved EIA for Chai Wan Government Complex and Vehicle Depot (AEIAR-191/2015) and summarized in **Table 3.3**. These percentage occupancy rates are adopted in this risk assessment.

Table 3.3 Weekly variations of population at the proposed development

Population Category	**Percentage Occupancy**			
	Weekday Day (07:00 – 19:00 Mon – Fri)	**Weekday Night (19:00 – 07:00 Mon – Fri)**	**Weekend Day (07:00 – 19:00 Sat - Sun)**	**Weekend Night (19:00 – 07:00 Sat – Sun)**
Residential block	25%	100%	70%	100%
Elderly Day Care Centre [1]	100%	1%	100%	1%
Car Park	100%	10%	50%	10%

Note:
[1] The weekly variation for the Elderly Day Care Centre is assumed to be similar to that of Education stated in the EIA for Chai Wan Government Complex and Vehicle Depot

3.1.5 With reference to the approved EIA for Chai Wan Government Complex and Vehicle Depot (AEIAR-191/2015), an indoor ratio of 95% are adopted for the proposed residential block and elderly day care centre while an indoor ratio of 0% is adopted for the car park.

3.1.6 The tentative population intake year of the Proposed Development is at Year 2030/2031. As a conservative assumption, Year 2031 is adopted as the assessment year in this risk assessment.

3.2 Adjacent Hazardous Facilities

3.2.1 The existing LPG storage installation is located near Greenwood Terrace Tower 7, some 60m from the boundary of the Proposed Development.

3.2.2 According to the discussion with DSG Hong Kong Limited (DSG), the operator of the LPG storage installation, the LPG storage installation supplies LPG to Greenwood Terrace. The LPG storage installation layout plan is shown in **Appendix 3.2**. The site consists of Emergency Genset Room, 54m^3 Water Spray System Tank, Transformer Room and Switch Room. The LPG vessels are stored underground.

3.2.3 The process flow diagram for the LPG storage installation provided by DSG is shown in **Appendix 3.2**. In general, LPG is stored in two LPG underground tanks with a capacity of 11kL each. LPG is vaporised in 2 vaporizers. An unloading bay is provided for unloading LPG road tankers.

3.2.4 According to DSG, the LPG road tanker deliveries are made approximately twice per week. The number and capacity of the LPG storage tanks, frequency of LPG deliveries, storage pressure of LPG tanks and road tankers were provided by the operator. A summary of the LPG storage installation is summarized in **Table 3.4**.

Table 3.4 Summary of the LPG storage installation

Description	Number
LPG road tanker deliveries	2 Tankers per week
LPG road tanker size	15 tonnes
LPG storage	2 x 11kL capacity LPG underground tank
Storage Pressure (bar)	4.1
Vaporiser	2

3.3 Surrounding Population

3.3.1 The following population scenario will be considered in this study:

- Scenario 1: Normal operational year with maximum population intake

According to the population intake schedule of the proposed development, the maximum population intake year is at Year 2030/2031 onwards. As a conservative assumption, Year 2031 is adopted as the assessment year in this risk assessment.

3.3.2 In respect of the maximum influence distance of the LPG storage installation, an assessment area of around 200m is adopted for the hazardous scenarios of all stations as shown in **Appendix 6.1**. It is clear that the proposed development is located within the influence zones of the aforementioned LPG storage installation.

3.3.3 The latest population data including residential, industrial, transient population for the area within 200m surrounding LPG storage installation has been collected from a variety of sources including:

- Site Survey
- Planning Department
- Transport Department
- Census and Statistics Department
- Project Proponent (for population in the proposed housing development)

3.3.4 **Figure 3.1** shows the population distribution in the vicinity. The approach to updating the offsite population data, except for the proposed development, is summarized in **Table 3.5**. **Appendix 3.3** summarizes the projected population for this risk assessment.

Table 3.5 Approach to updating the population data in this risk assessment

Population Type	Projection Approach
Off-site Residential	The base population is based on Year 2011 Census data. According to the 2014-based Territorial Population and Employment Data Matrix (TPEDM) (https://www.pland.gov.hk/pland_en/info_serv/statistic/tpedm14/MS1161_2014-based%20TPEDM.pdf) and Census, the residential population growth factor has been decreasing from Year 2011 to 2026. Hence, the population from the 2011 Census is adopted as a conservative assumption.
Industrial / Commercial	The base population is estimated by dividing the total GFA by the worker density stipulated in HKPSG Chapter 5. According to the 2014-based TPEDM (https://www.pland.gov.hk/pland_en/info_serv/statistic/tpedm14/MS1161_2014-based%20TPEDM.pdf), the working population growth factor has been increasing from Year 2014 to 2026. Hence, the growth factor derived from TPEDM has been applied to calculate the population as a conservative assumption.
Education	The population is referenced to the website of each school and the information from the Education Bureau
Transient population	Transient population is estimated by reference to the TD's latest Annual Traffic Census According to the latest Annual Traffic Census, there is a decrease in the annual average daily traffic (AADT) for Cheung Man Street between 2011 and 2016. Hence, the traffic from the latest Annual Traffic Census is adopted as a conservative assumption
Parks / Utilities	The population is made reference to the approved EIA for the Hong Kong Section of Guangzhou – Shenzhen – Hong Kong Express Rail Link

3.3.5 The typical time modes representing the percentages of maximum population at different times of the day for the total unit population are referenced from the approved EIA for Chai Wan Government Complex and Vehicle Depot (AEIAR-191/2015) and summarized in **Table 3.6**. These percentage occupancy rates are adopted in this risk assessment.

Table 3.6 Weekly variations of population categories

Population Category	Percentage Occupancy			
	Weekday Day (07:00 – 19:00 Mon – Fri)	Weekday Night (19:00 – 07:00 Mon – Fri)	Weekend Day (07:00 – 19:00 Sat - Sun)	Weekend Night (19:00 – 07:00 Sat – Sun)
Residential	25%	100%	70%	100%
Commercial / Industrial	100%	10%	40%	5%
Open space / Government Site	100%	10%	40%	5%
Hospital / Fire Station	100%	100%	100%	100%
Education	100%	1%	100%	1%

Population Category	Percentage Occupancy			
	Weekday Day (07:00 – 19:00 Mon – Fri)	Weekday Night (19:00 – 07:00 Mon – Fri)	Weekend Day (07:00 – 19:00 Sat - Sun)	Weekend Night (19:00 – 07:00 Sat – Sun)
Recreational	50%	5%	100%	5%
Road	100%	100%	100%	100%

3.3.6 The indoor / outdoor ratio representing the percentages of population within and outside the building at all times during operation according to different landuses are made reference to the approved EIA for Chai Wan Government Complex and Vehicle Depot (AEIAR-191/2015) and summarized in **Table 3.7**. These ratios are adopted in this risk assessment.

Table 3.7 Indoor/outdoor ratios for different land uses

Landuse Category	Indoor (Outdoor) Population Ratio
Residential / Commercial / Education / Industrial Building	0.95 (0.05)
Open space / Park / Playground	0 (1)
Road	0 (1)
Clinic / Hospital / Fire Station / Government Facilities	0.95 (0.05)

3.4 Meteorological Conditions

3.4.1 Meteorological conditions would affect the dispersion of LPG release. Weather data from North Point Anemometer station (2017) were adopted and rationalized into 6 categories according to The Netherlands Organization (TNO)'s Purple Book to represent the range of weather conditions anticipated at the site. These categories include 3B, 1D, 4D, 7D, 2E and 1F. The probability of occurrence for each combination of wind speed (WS), wind direction (WD) and stability class (PS) are summarized in **Table 3.8a** and **Table 3.8b**.

Table 3.8a Meteorological data at daytime

Direction	3B	1D	4D	7D	2E	1F	Total
0-30	2.25	0.93	0.46	0.05	0.26	1.15	5.10
30-60	0.93	0.22	1.41	0.17	0.26	0.07	3.07
60-90	8.29	1.44	11.40	5.34	0.96	0.46	27.88
90-120	8.50	1.44	17.22	8.02	1.37	1.41	37.96
120-150	0.02	0.05	0.02	0.00	0.00	0.07	0.17
150-180	0.02	0.07	0.02	0.00	0.00	0.00	0.12
180-210	0.00	0.05	0.00	0.00	0.00	0.05	0.10
210-240	0.22	0.07	0.02	0.00	0.00	0.10	0.41

Direction	3B	1D	4D	7D	2E	1F	Total
240-270	5.82	1.10	5.44	1.72	0.34	0.72	15.14
270-300	1.80	0.55	0.86	0.02	0.07	0.12	3.43
300-330	0.14	0.07	0.05	0.00	0.02	0.10	0.38
330-360	2.37	0.65	2.16	0.17	0.38	0.53	6.25
Total	30.37	6.63	39.07	15.50	3.66	4.77	100.00

Table 3.8b Meteorological data at night time

Direction	3B	1D	4D	7D	2E	1F	Total
0-30	0.00	0.10	0.74	0.19	0.82	9.13	10.98
30-60	0.00	0.07	1.37	0.02	1.06	0.94	3.46
60-90	0.00	0.07	9.01	6.01	4.97	6.29	26.35
90-120	0.00	0.07	14.92	6.92	5.79	8.38	36.08
120-150	0.00	0.00	0.00	0.00	0.02	0.62	0.65
150-180	0.00	0.00	0.00	0.00	0.00	0.10	0.10
180-210	0.00	0.00	0.00	0.00	0.00	0.05	0.05
210-240	0.00	0.00	0.00	0.00	0.02	0.19	0.22
240-270	0.00	0.07	4.37	0.43	1.99	4.92	11.79
270-300	0.00	0.05	0.58	0.02	0.31	1.90	2.86
300-330	0.00	0.02	0.02	0.02	0.07	0.19	0.34
330-360	0.00	0.22	3.22	0.07	1.59	2.04	7.13
Total	0.00	0.67	34.23	13.69	16.65	34.76	100.00

3.5 Ignition Sources

3.5.1 The major ignition sources in the vicinity of the proposed development include the population and transportation. In order to estimate the ignition probability of a flammable cloud moving downwind over ignition sources, the following approach was used.

3.5.2 Roads (e.g. Lee Chung Street, Hong Man Street), shown in **Figure 3.1**, are defined as line sources. To estimate the presence factor of the line source and the ignition probability, it is assumed that the probability of ignition for a vehicle is 0.2 in 60 seconds while the traffic density is based in the projected peak traffic flow as adopted for population estimation.

3.5.3 Population area is defined as area sources. The potential ignition sources include activities such as cooking, smoking and electrical appliances. The ignition probability is derived from the population densities in the concerned area.

4 Hazard Identifications and Analysis

4.1 LPG Hazard

4.1.1 LPG is a mixture of butane and propane. The density of LPG is twice larger than that of air. For a release of LPG, the nature of the combustion will depend on the timing of ignition and the amount of release.

4.1.2 If large amount of LPG is released and ignited immediately, fireball will be produced. If not ignited immediately, the LPG will be dispersed and diluted. A flame will propagate to produce a flash fire if the gas concentration is between lower Flammability Limit (LFL) and Upper Flammability Limit (UFL) when ignited. For small releases, immediate ignition will produce a long jet flame and flash fire will be produced when delayed ignition happens.

4.1.3 With reference to "Quantitative Risk Assessment Methodology for LPG Installations" (1997), the hazard events leading to LPG release from LPG storage installation are tabulated in **Table 4.1**

Table 4.1 Hazardous events leading to LPG release

Hazard Event	Potential Cause
Spontaneous failure	• Storage vessel failures • LPG Road Tanker failures • Pipework failures • Vaporizer failures • Flexible hose failures • Flange gasket failures • Valve leak failures
Loading from LPG Road Tanker to vessel	• Hose failure • Hose connection/ disconnection error (during tanker unloading) • LPG Road Tanker drive away • LPG Road Tanker collision during unloading • Loading pipework over pressurisation • Storage vessel overfilling
External event	• Earthquake • Aircraft crash • High wind loading • Landslides • Severe environmental events • Excessive subsidence • Lightning strike • External fire
Escalation	• LPG road tanker boiling liquid expanding vapor explosion (BLEVE) due to fire in filling facilities

4.1.4 The following outcomes could happen from a release of LPG:

- Jet fire;
- Flash fire;
- Vapour Cloud Explosion (VCE);
- Fireball; and
- BLEVE.

4.1.5 Normally, rupture of vessels may result in fireballs, flash fires or vapour cloud explosions (VCE). Leaks may cause jet fires, flash fires or VCE, or even escalate to catastrophic failure of a vessel in a Boiling Liquid Expanding Vapour Explosion (BLEVE). However, for the underground LPG storage vessels, BLEVE outcome due to the flame impingement is considered not possible. Therefore, BLEVE outcome for the LPG storage installation is not taken into consideration in this study. The BLEVE outcome of road tanker resulting from the fire impingement due to the partial failure of road tanker and rupture of the flexible hose will be taken into consideration.

4.1.6 To achieve vapour cloud explosion (VCE), a dispersing vapour cloud must accumulate in a confined and/or congested area and subsequently be ignited. The potential for VCE is not considered significant as there is no confined or congested space in the vicinity. Thus VCE will not be further considered in this study.

4.1.7 Hazard scenarios for LPG releases are summarized in **Table 4.2**.

Table 4.2 Summary of the hazard scenarios of LPG releases

Scenario	Failure Equipment	Event Description	Potential Hazardous Event Outcomes
1	Storage vessel	Catastrophic failure	Fireball, flash fire
2		Partial failure	Jet fire, flash fire
3	LPG road tanker	Catastrophic failure	Fireball, flash fire, BLEVE
4		Partial failure	Jet fire, flash fire
5	Filling line to storage vessel	Guillotine failure	Jet fire, flash fire
6	Filling line to flexible hose	Guillotine failure	Jet fire, flash fire

Scenario	Failure Equipment	Event Description	Potential Hazardous Event Outcomes
7	Filling line to vaporizer	Guillotine failure	Jet fire, flash fire
8	Vaporizer	Guillotine failure	Jet fire, flash fire
9	Flexible hose	Guillotine failure	Jet fire, flash fire

5 Frequency Analysis

5.1.1 The determination of failure frequency consists of two main components: base frequency / generic failure frequencies of the facilities and the likelihood of occurrence due to operational parameters.

5.2 Base Frequencies

5.2.1 The generic failure frequencies of the LPG storage installation are summarized in **Table 5.1**. These generic failure frequencies were based on the "Quantitative Risk Assessment Methodology for LPG Installations" (1997) and other approved EIA studies.

Table 5.1 Generic frequencies adopted for assessment

Item	Failure Type	Failure Rate	Unit	Reference/Remark
Spontaneous Failure				
LPG Storage vessel failure	Catastrophic	3.6×10^{-7}	per vessel per year	[1]
	Partial	1.0×10^{-6}	per vessel per year	[1]
LPG Road Tanker Failure	Catastrophic	2.0×10^{-6}	per vessel per year	[1]
	Partial	5.0×10^{-6}	per vessel per year	[1]
Pipework Failure	Guillotine	1.0×10^{-6}	per metre per year	[1]
Vaporizer Failure	Guillotine	1.0×10^{-6}	per metre per year	[1]
Flexible Hose Failure	Guillotine	9.0×10^{-8}	per hour	[1]
External Events				
Earthquakes up to Modified Mercali Intensity VII		1.0×10^{-5}	per year	[2]
Earthquake failure probability	Pipeline and storage vessel	0.01	per earthquake	[2]
Aircraft Crash		Negligible		Based on methodology from HSE and airline movement in 2016, the frequency of the aircraft crash is estimated as 9.5×10^{-16}
Subsidence		Negligible		Subsidence is usually slow in movement and such movement can be observed and remedial action can be taken in time
External Fire		Negligible		LPG storage is enclosed by a concrete wall and the facilities inside are enclosed by concrete building structures

Item	Failure Type	Failure Rate	Unit	Reference/Remark
Landslide		Not considered		Man-made slope (11SE-D/C 438) has a ranking score of 1 under New Priority Ranking System, which means the risk impact is remote
External vehicle crash		Not considered		LPG storage is enclosed by a concrete wall and the facilities inside are enclosed by concrete building structures
<u>LPG Road Tanker to Vessel Failure / Vehicle Impact</u>				
Hose Misconnection		$3.0x10^{-5}$	per operation	[1]
Hose Disconnection Error		$2.0x10^{-6}$	per operation	[1]
Disconnection with Valve Open		0.5	per operation	[1]
LPG Road Tanker Drive Away		$4.0x10^{-6}$	per operation	[1]
LPG Road Tanker Impact		$1.5x10^{-4}$	per operation	[1]
LPG Road Tanker Collision during Unloading		$1.0x10^{-8}$	per operation	[1]
LPG Storage Tank Overfilling		$2.0x10^{-2}$	per operation	[1]
Breakaway coupling failures		0.013	per demand	[1]
<u>Human Error</u>				
Failure to rectify hose disconnection and misconnection		0.5	per demand	[2]
Failure to activate Emergency Shutdown system		0.1	per demand	[2]
<u>Safety System Failure</u>				
Failure of pressure relief valve		$1.0x10^{-2}$	per demand	[2]
Failure of Emergency Shutdown System		$1.0x10^{-4}$	per demand	[1]
Failure to close valve		$1.0x10^{-4}$	per demand	[1]

Item	Failure Type	Failure Rate	Unit	Reference/Remark
Failure of single non-return valve		0.013	per demand	[1]
Failure of excess flow valve	Vessel	0.13	per demand	[1]
	Tanker	0.013	per demand	[3]
Failure of double–check valve		2.6×10^{-3}	per demand	[1]
Failure of fire services to prevent BLEVE		0.5	per demand	[1]
Failure of coating failures		0.1	per demand	[1]
Failure Probabilities				
Failure of LPG vessel due to overfilling	Catastrophic	0.1		[4]
	Partial	0.5		[4]
Failure of road tanker due to vehicle impact	Catastrophic	5×10^{-3}		[3]
	Partial	0.1		[3]
Guillotine failure of vessel filling line due to vehicle impact		1×10^{-3}		[3]
Guillotine failure of supply line to vaporizer due to vehicle impact		1×10^{-3}		[3]
Guillotine failure of filling line to flexible hose due to vehicle impact		1×10^{-3}		[3]
Guillotine failure of liquid supply vaporizer coil due to overfilling		0.5		[4]

Reference:

[1] Reeves, A.B., Minah, F. CC. and Chow, V.H.K. (1997). "Quantitative Risk Assessment Methodology for LPG installations", Conference on Risk & Safety Management in the Gas Industry, EMSD & HKIE, Hong Kong"

[2] Environmental Impact Assessment Report for South Island Line (East) (AEIAR-155/2010)

[3] Environmental Impact Assessment Report for Chai Wan Government Complex and Vehicle Depot (AEIAR-191/2015)

[4] Environmental Impact Assessment Report for HATS Stage 2A (AEIAR-121/2008)

5.3 Likelihood of Occurrence

5.3.1 The likelihood of occurrence is related to the number of vessels, number of vaporizers, number of filling operation, etc. The fault tree analysis for potential hazardous event outcomes are presented in **Appendix 5.1**.

5.4 Failure Rates

5.4.1 The vessel inventories would be nominally 85% full from maximum capacity for 20% of the time and nominally 60% full for 80% of the time. Similarly, the road tankers inventories would be nominally 100% full for 20% of time and 50% full for 80% of time.

5.4.2 The failure rates of various hazardous outcomes due to LPG releases are summarised in **Table 5.2**.

Table 5.2 Failure rates of LPG releases

Event Description	Failure Rate (per year)		
	Full inventory [2]	**Partial Inventory [2]**	**Total [1]**
Cold Catastrophic Failure of LPG Storage Vessel	1.46E-7	5.84E-7	7.30E-7
Cold Partial Failure of LPG Storage Vessel	4.03E-6	1.61E-5	2.02E-5
Cold Catastrophic Failure of LPG Road Tanker	5.79E-9	2.32E-8	2.89E-8
Cold Partial Failure of LPG Road Tanker	3.27E-8	1.31E-7	1.63E-7
Guillotine Failure of LPG filling line to Vessel (Fed from LPG Storage Vessel)	6.32E-11	2.53E-10	3.16E-10
Guillotine Failure of LPG filling line to Vessel (Fed from LPG Road Tanker)	2.04E-9	8.14E-9	1.02E-8
Guillotine Failure of LPG supply line to vaporizer	6.68E-7	2.67E-6	3.34E-6
Guillotine Failure of LPG filling line to Flexible Hose	3.38E-12	1.35E-11	1.69E-11
Failure of Vaporizer	2.03E-6	8.12E-6	1.02E-5
Guillotine Failure of Flexible Hose (Fed from LPG Storage Vessel)	5.67E-9	2.27E-8	2.84E-8
Guillotine Failure of Flexible Hose (Fed from LPG Road Tanker)	2.19E-7	8.74E-7	1.09E-6

Event Description	**Failure Rate (per year)**		
	Full inventory [2]	**Partial Inventory [2]**	**Total [1]**
LPG Road Tanker BLEVE	2.60E-11	1.04E-10	1.30E-10

Note:
[1] Total failure rate is obtained from fault tree analysis results, shown in **Appendix 5.1**.
[2] It is assumed that storage tanks and road tankers are at full inventory and partial inventory 20% and 80% of the time respectively.

5.5 Event Tree Analysis

5.5.1 Taking into account the base frequencies, likelihood of occurrence failure rates, other safeguard measures, the layout plans of the LPG storage installation and the influencing distances of these failure events, those failure events having potential offsite impact and their possible hazardous outcomes are summarised in **Table 5.3**.

Table 5.3 Hazardous outcomes of different failure cases

Hazardous Chemical	**Failure Events**	**Hazardous Outcomes**
LPG	• Failure of LPG Storage Vessel • Failure of LPG Road Tanker • Guillotine Failure of LPG filling line to Vessel • Guillotine Failure of LPG supply line to vaporizer • Guillotine Failure of LPG filling line to Flexible Hose • Failure of Vaporizer • Guillotine Failure of Flexible Hose • LPG Road Tanker BLEVE	• Flash fire; • Fireball; • BLEVE; • Jet fire.

5.5.2 The event trees for different failure events are shown in **Appendix 5.2**.

6 Consequence Analysis

6.1 Overview

6.1.1 The influencing distance of different hazardous outcomes has been determined by Phast 7.11. The consequence tables are presented in **Appendix 6.1**.

6.2 Physical Effect and Fatality Rate

6.2.1 Hazard scenarios include fireballs, BLEVE, jet fire and flash fire have been modelled in a range of meteorological conditions.

6.2.2 Ignition probability and presence factor had been considered for different ignition sources to determine the likelihood for resulting in hazardous outcomes.

Fireballs and BLEVE

6.2.3 Immediate ignition after the catastrophic failures would produce fireball. Due to its high intensity, short duration, fireball is usually not significantly influenced by the weather conditions. For the people entrapped inside the fireball radius, seriously injured or death would be caused by the thermal radiation, and the fatality rate is taken as 100%. For the people outside the radius, no harm would be caused due to the short duration.

6.2.4 The physical effects of BLEVE is much similar to the fireball. For the people inside the hazardous radius, 100% fatality would be assumed.

Flash fires

6.2.5 The gas would disperse rapidly if not ignited immediately after release. The dispersion is heavily affected by the weather conditions. If ignition sources present in the place where the gas concentration is between the lower flammability limit and upper flammability limit, flash fire would be produced and a fatality rate of 100% inside the fire envelope is assumed. For the people outside the fire envelope, no harm would be produced.

Jet fires

6.2.6 When pressurised LPG released and ignited immediately, jet fire would be produced. If a jet fire impinges on a LPG road tanker, the road tanker would be ruptured due to the over pressurization and caused a BLEVE.

6.2.7 Jet fire would be produced when pressurised LPG are released and ignited immediately. The momentum of the released pressurised LPG would carry the flammable gas forward in a long plume and dive a flammable mixture by entraining the air. The major concern of jet fire is the heat radiation effect generated from the fire. The fatality rate can be obtained from the built-in Probit of PHAST 7.11:

$$Y = -36.38 + 2.56 \ln L$$

where:

Y is the probit;
L is the thermal load = $tI^{4/3}$*;*
t is the exposure time, seconds; and
I is the thermal radiation intensity, kW/m^2*.*

6.2.8 Assuming an exposure time of 30 seconds, the fatality rate of the jet fire of radiation levels 20.9 kW/m^2, 14.4 kW/m^2 and 7.3 kW/m^2 are 0.99, 0.5 and 0.01 respectively.

<u>Hazard impact on offsite population</u>

6.2.9 Population in the vicinity of the LPG storage installation can be potentially affected by different hazardous outcomes. According to the consequence analysis results (**Appendix 6.1**), fireballs and BLEVEs of LPG road tankers have a radius of up to 68m. The lift-off height of fireball and BLEVE would affect all levels of surrounding buildings.

6.2.10 The maximum height of a dispersing vapour cloud was found to be 35m. For flash fires and jet fires, only the lowest 12 floors of population at the same MPD level with LPG storage installation were taken into the modelling. Hazardous scenarios including fireballs, BLEVE, jet fire, flash fire and have been modelled according to meteorological conditions listed in **Section 3.4**.

6.2.11 **Table 6.1** summarizes the fatality rate under different hazardous outcomes. The fatality inside buildings are also shown.

Table 6.1 Summary of the fatality rate

Event	Zone criteria	Outdoor Fatality Rate [1]	Indoor Fatality Rate
Flash fire	0.85LFL	1	0.1[3]
Fireball and BLEVE	Fireball radius	1	0.5[4]
Jet fire[2]	20.9 kW/m^2	0.9	0.09[3]
	14.4 kW/m^2	0.5	0.05[3]
	7.3 kW/m^2	0.01	0.001[3]

Notes:
[1] Based on South Island Line EIA
[2] Based on built-in Probit of PHAST 7.11
[3] Indoor fatality to outdoor fatality ratio based on South Island Line EIA
[4] QRA methodology for LPG installations

7 Assessment Results

7.1 Assessment Scenarios and Model Validation

7.1.1 The following assessment scenarios have been considered in this risk assessment:

Base Case: Year 2031 background population in the vicinity without the population contribution from the proposed development;

Maximum Population in the proposed development: Year 2031 maximum population in the proposed development only; and

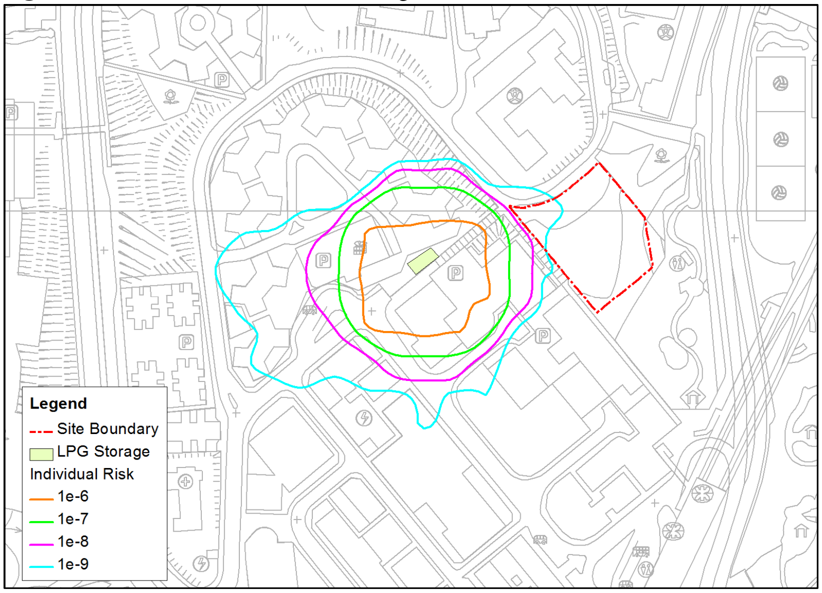
Overall Risk Case: Year 2031 operational year with maximum population in the proposed development.

7.1.2 The risk results have been generated using the in-house ArcGIS based software by incorporating the input data including the frequency of each hazardous scenario, the release location, consequence result, weather frequencies and population distribution.

7.2 Individual and Societal Risk during Operational Phase

7.2.1 **Figure 7.1** shows the individual risk contour of LPG storage installation. The 1 x 10^{-5} /year individual risk contour of LPG storage installation is contained within the site boundary of LPG storage installation and thus the individual risk level of LPG storage installation is considered in compliance with Hong Kong Risk Guidelines. The individual risks within the planned development are less than 2 x 10^{-9} /year.

Figure 7.1 Individual risk of LPG storage installation



7.2.2 The societal risk represents the frequency of having an accident with N or more people being killed simultaneously. The societal risk is presented as an FN curve and the Potential Loss of Life (PLL).

7.2.3 The societal risk plots have been derived for the following cases:

- Base case with background population but without proposed development;
- Maximum population in the proposed development; and
- Overall risk case (including Base Case and maximum population in the proposed development) during operational phase.

7.2.4 They are presented in **Figure 7.2** and tabulated in **Table 7.1**. The results show that the F-N curve falls within the ALARP region. The F-N curves of the base case and the overall risk case are found to be overlapping. The additional risk associated with the proposed development, as shown in **Table 7.1**, is insignificant. Thus the proposed development would not significantly affect societal risk.

Figure 7.2 Societal risk of operational phase

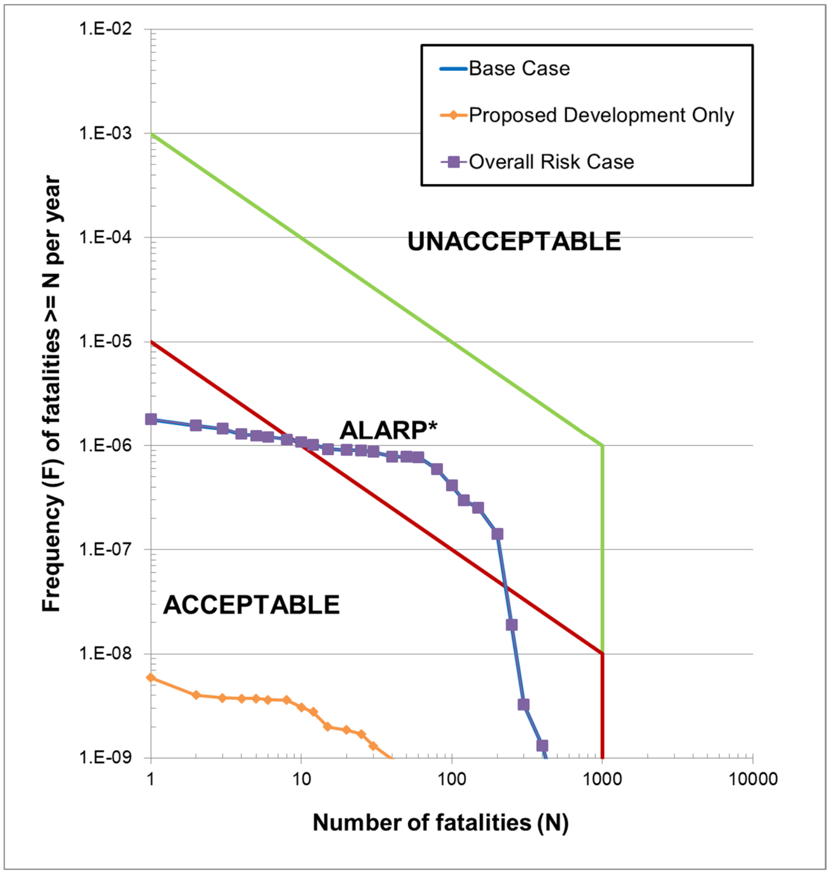


Table 7.1 Frequency and fatality values under different scenarios

Number of Fatalities	Base Case (Year 2031)	Maximum Population in the Proposed Development only (Year 2031)	Overall Risk Case (Year 2031)
1	1.80E-06	5.93E-09	1.81E-06
2	1.58E-06	4.01E-09	1.59E-06
3	1.47E-06	3.79E-09	1.47E-06
4	1.31E-06	3.73E-09	1.32E-06
5	1.27E-06	3.73E-09	1.28E-06
6	1.23E-06	3.63E-09	1.23E-06
8	1.17E-06	3.60E-09	1.18E-06
10	1.10E-06	3.07E-09	1.10E-06
20	9.15E-07	1.87E-09	9.16E-07
30	8.76E-07	1.31E-09	8.77E-07
40	7.87E-07	9.71E-10	7.88E-07
50	7.84E-07	8.70E-10	7.84E-07
60	7.73E-07	6.41E-10	7.74E-07
80	5.89E-07	2.88E-10	5.90E-07
100	4.12E-07	2.45E-10	4.13E-07

Number of Fatalities	Base Case (Year 2031)	Maximum Population in the Proposed Development only (Year 2031)	Overall Risk Case (Year 2031)
150	2.52E-07	6.88E-11	2.52E-07
200	1.42E-07	--	1.42E-07
300	3.29E-09	--	3.32E-09
400	1.38E-09	--	1.41E-09
500	4.02E-10	--	4.07E-10
600	1.96E-11	--	2.06E-11

7.2.5 Societal risk can also be represented in the form of potential Loss of Life (PLL) value. It is expressed as the summation of the product of each F-N pair. The PLL values for each case are summarized in **Table 7.2**.

Table 7.2 Breakdown of PLL values for Year 2031

Case	PLL per year (% of Total PLL)			
	Underground Tank	Piping and Flexible Hose	Road Tanker	Total
Base case	7.33×10^{-5} (75%)	2.14×10^{-5} (22%)	3.13×10^{-6} (3%)	9.78×10^{-5} (100%)
Maximum Population in the proposed development only	9.35×10^{-8} (96%)	3.86×10^{-9} (4%)	0.00×10^{-0} (0%)	9.74×10^{-8} (100%)
Overall Risk Case	7.34×10^{-5} (75%)	2.14×10^{-5} (22%)	3.13×10^{-6} (3%)	9.78×10^{-5} (100%)

8 Conclusion

8.1.1 A QRA was conducted on a LPG storage installation in Chai Wan to assess the individual risk and the increase in societal risk due to the proposed public housing development at Cheung Man Road, Chai Wan.

8.1.2 The 1 x 10^{-5}/ year individual risk contour of LPG storage installation is contained within the site boundary of LPG storage installation and thus the individual risk level of LPG storage installation is considered in compliance with Hong Kong Risk Guidelines.

8.1.3 The additional population from the proposed development would have insignificant effect on the F-N curve and PLL. No mitigation measure is required.

9 Reference

1. Reeves, A.B., Minah, F. CC. and Chow, V.H.K. (1997). "Quantitative Risk Assessment Methodology for LPG installations", Conference on Risk & Safety Management in the Gas Industry, EMSD & HKIE, Hong Kong.
2. HSE, "The Calculation of aircraft crash risk in the UK", 1997.
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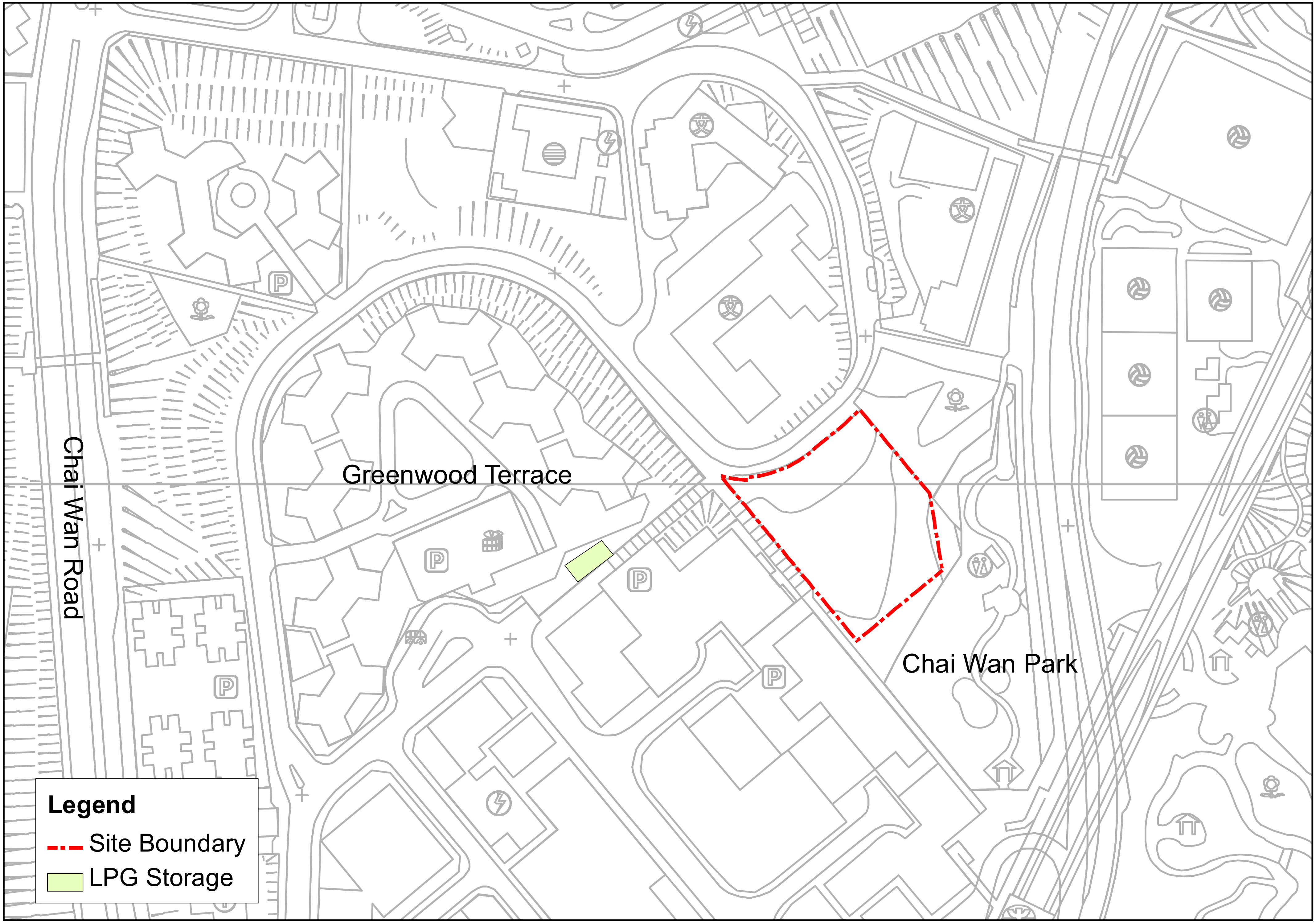
7. Environmental Protection Department, "Environmental Impact Assessment Report for Harbour Area Treatment Scheme (HATS) Stage 2A" (AEIAR-121/2008)
8. Census and Statistics Department, "2011 Hong Kong Population census".
9. Planning Department, "2014-based Territorial Population and Employment Data Matrix (TPEDM)".
10. Transport Department, "The Annual Traffic Census 2016".
11. Ministerie van Verkeer en Waterstaat "Guidelines for Quantitative Assessment" (Purple Book).
12. Cox, A.W., Lees, F.P. & Ang, M.L. (1990) "Classification of Hazardous Locations", Inter-Institutional Group on the Classification of Hazardous Locations, Institution of Chemical Engineers.

Figure 1.1

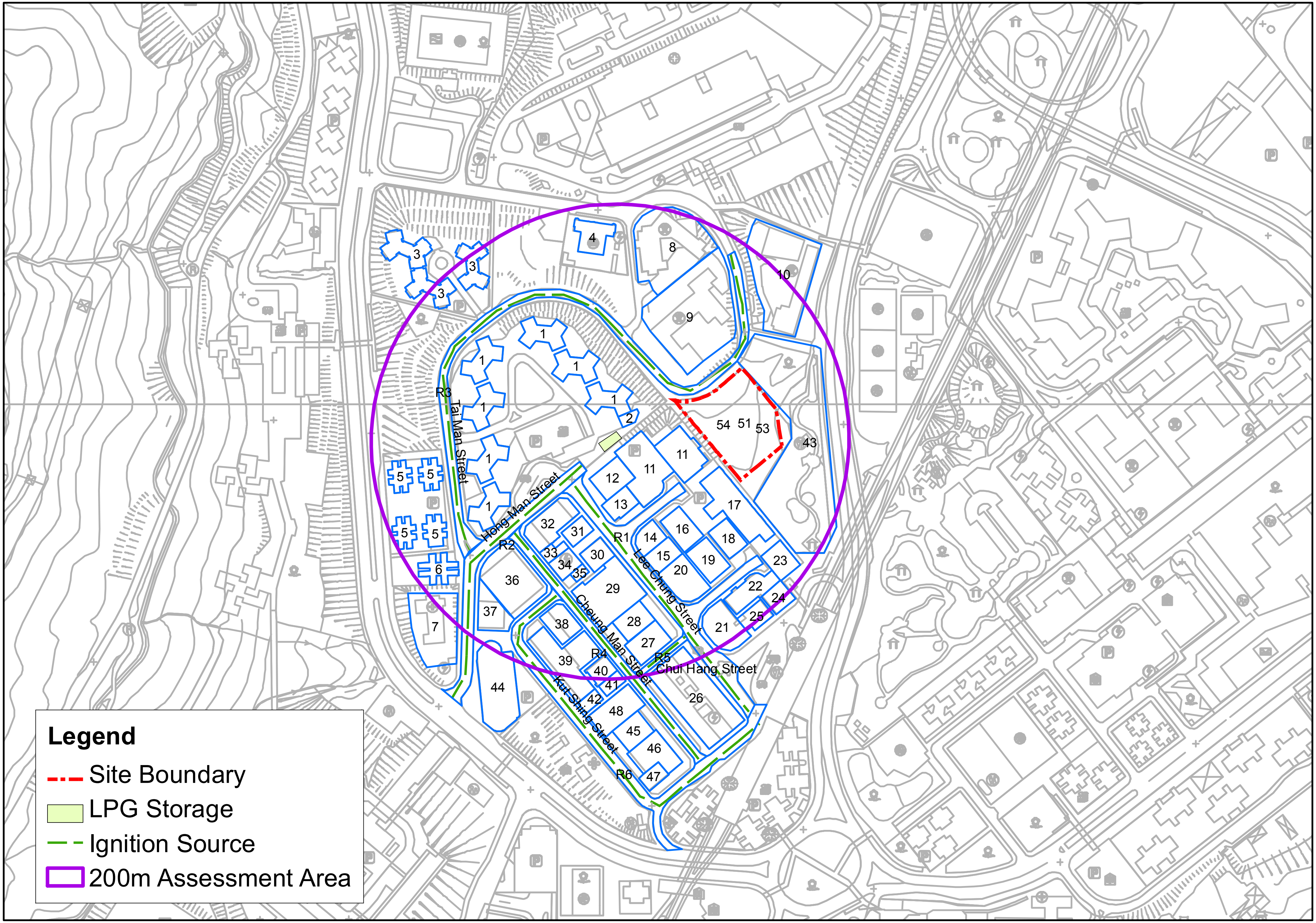
Location of the Proposed Development and LPG Storage installation



Greenwood Terrace
Chai Wan Road
Chai Wan Park
Legend
Site Boundary
LPG Storage

Figure 3.1

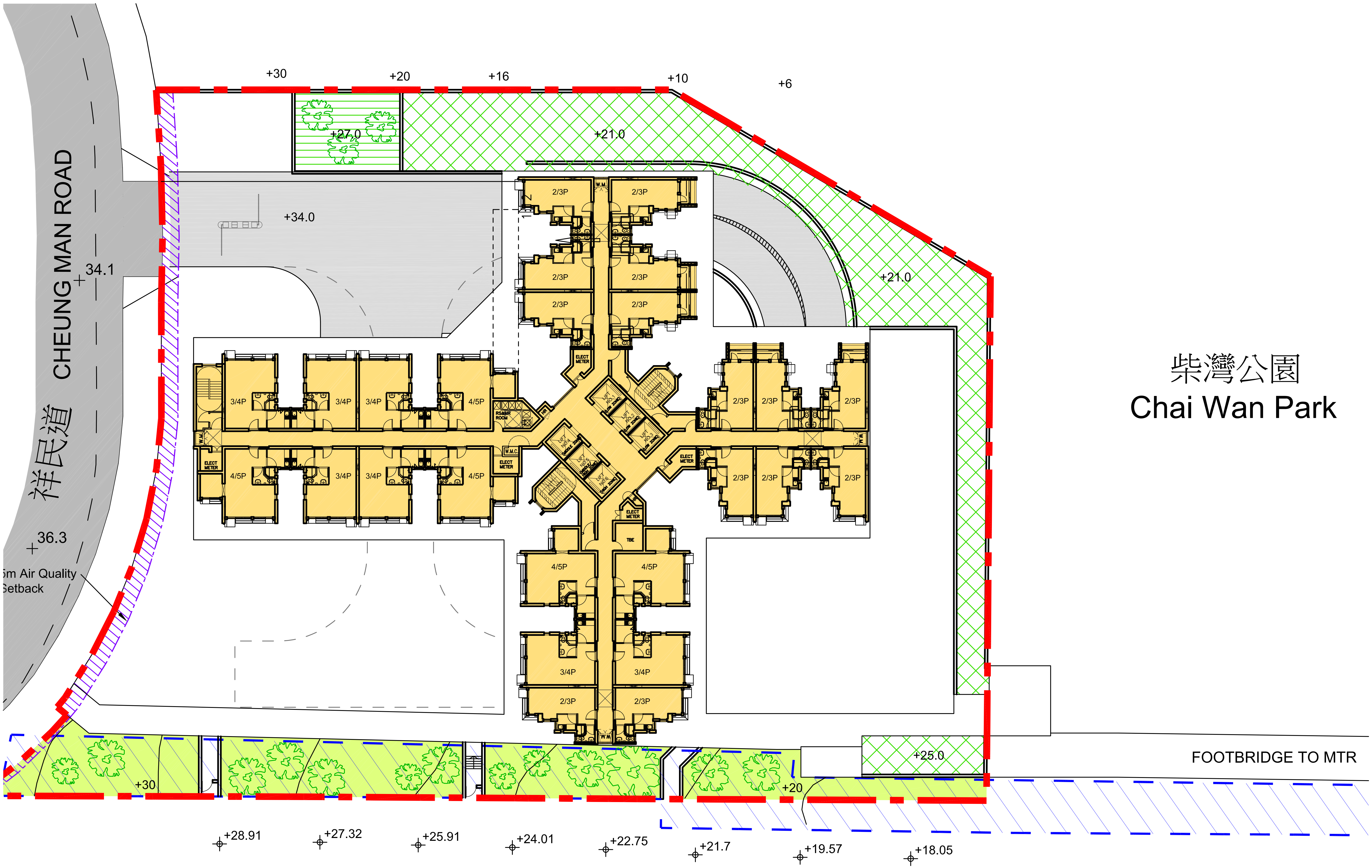
Location Plan for Background Population in the Vicinity of the LPG Storage installation



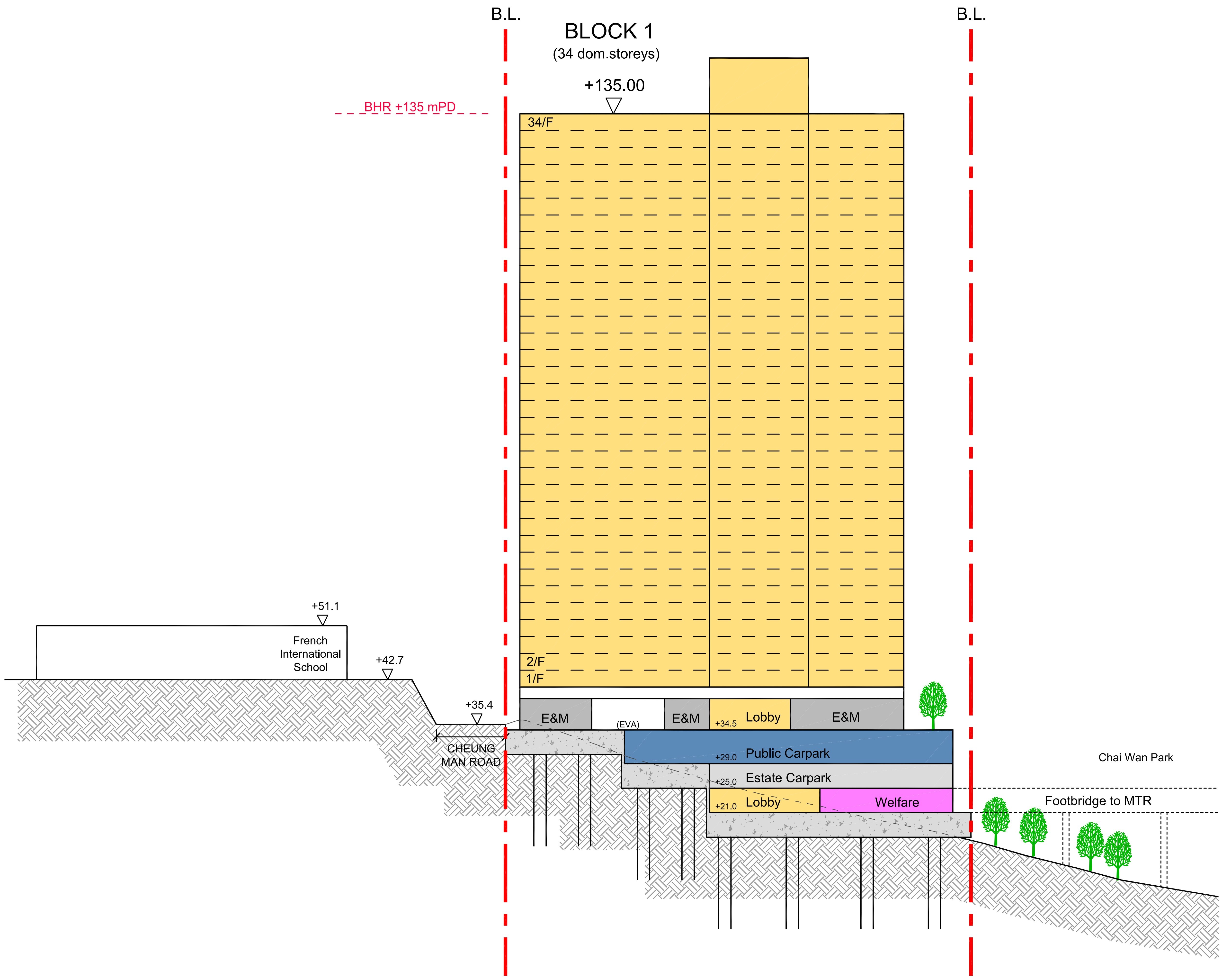
Tai Man Street
Hong Man Street
Lee Chung Street
Cheung Man Street
Chui Hang Street
Kut Shing Street
R1
R2
R3
R4
R5
R6
Legend
Site Boundary
LPG Storage
Ignition Source
200m Assessment Area

Appendix 3.1

Tentative Layout Plan of the Proposed Development

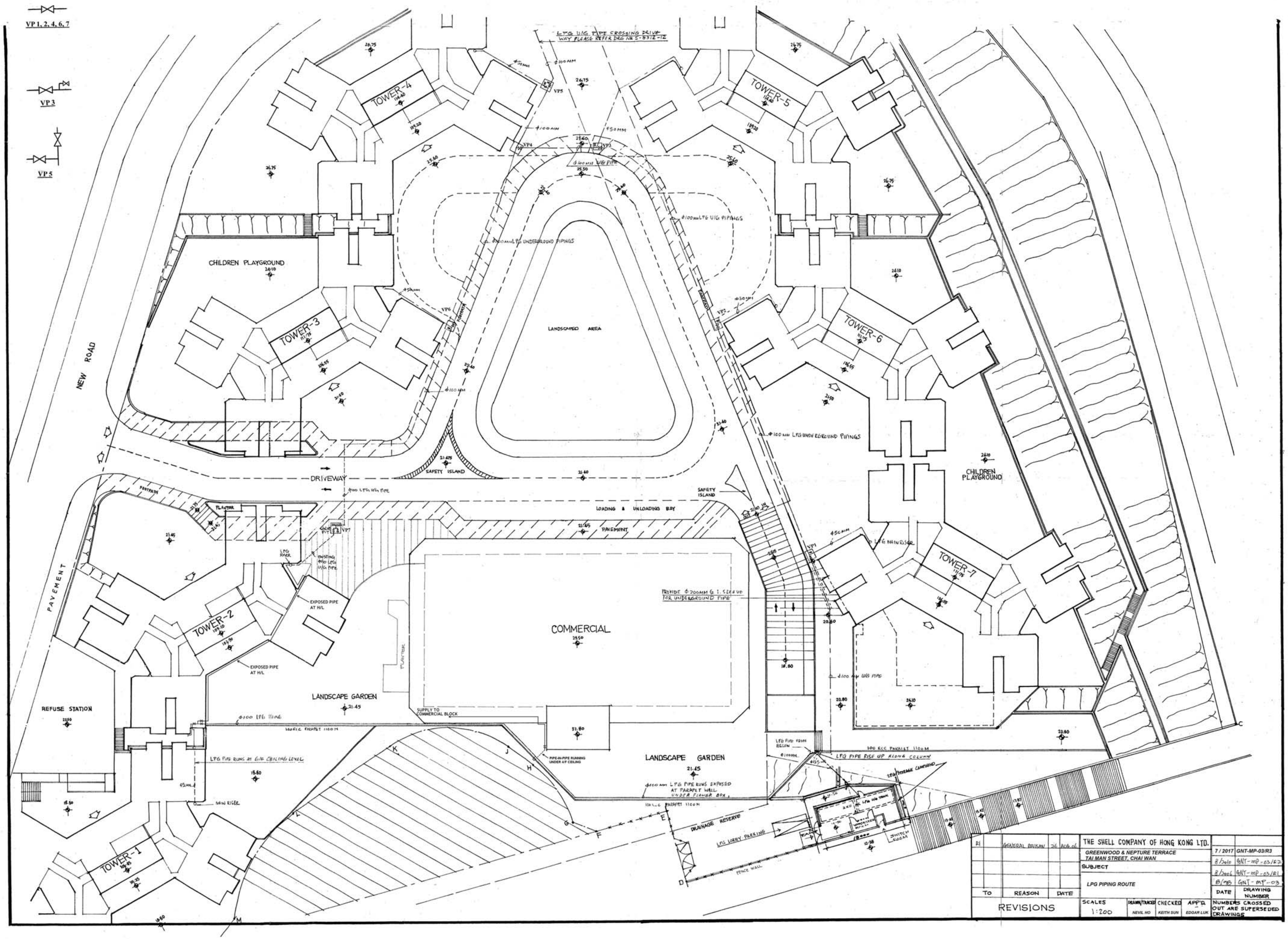


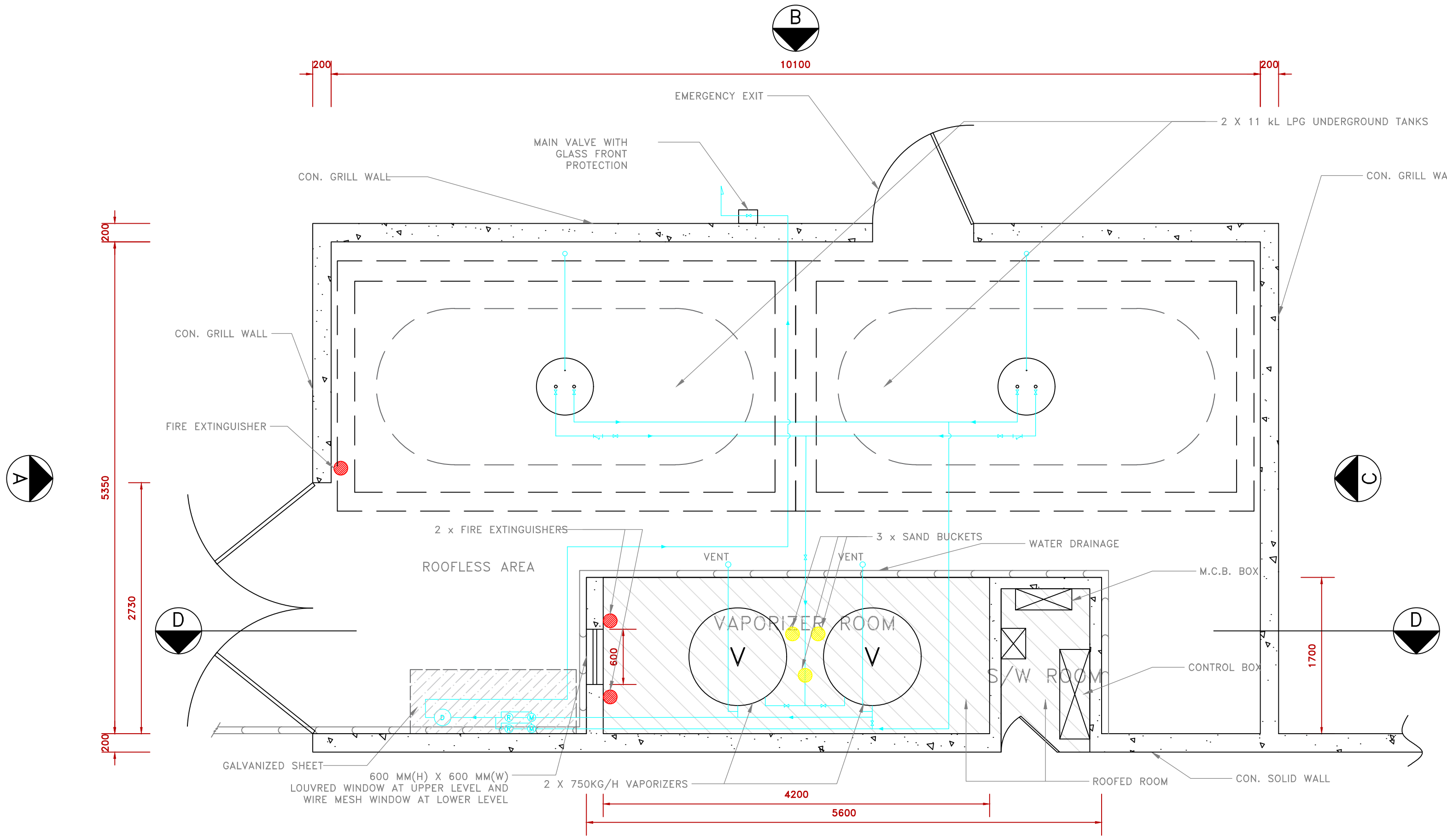
CHEUNG MAN ROAD
祥民道
柴灣公園
Chai Wan Park
FOOTBRIDGE TO MTR
5m Air Quality Setback
+30
+20
+16
+10
+6
+27.0
+21.0
+34.0
34.1
36.3
+25.0
+20
+30
+28.91
+27.32
+25.91
+24.01
+22.75
+21.7
+19.57
+18.05
2/3P
3/4P
4/5P
ELECT METER
W.M.


B.L.
B.L.
BLOCK 1
(34 dom.storeys)
+135.00
BHR +135 mPD
34/F
2/F
1/F
+51.1
French International School
+42.7
+35.4
CHEUNG MAN ROAD
E&M
(EVA)
E&M
+34.5 Lobby
E&M
+29.0 Public Carpark
+25.0 Estate Carpark
+21.0 Lobby
Welfare
Chai Wan Park
Footbridge to MTR

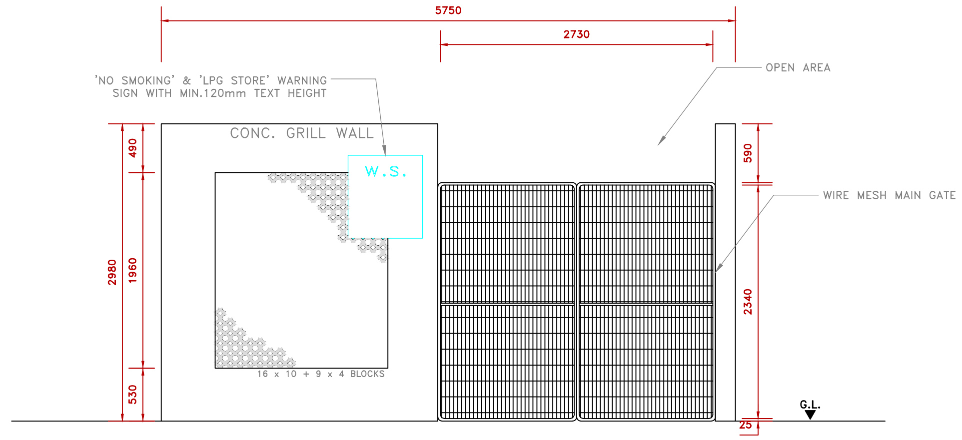
Appendix 3.2

Layout Plan of the LPG Storage Installation

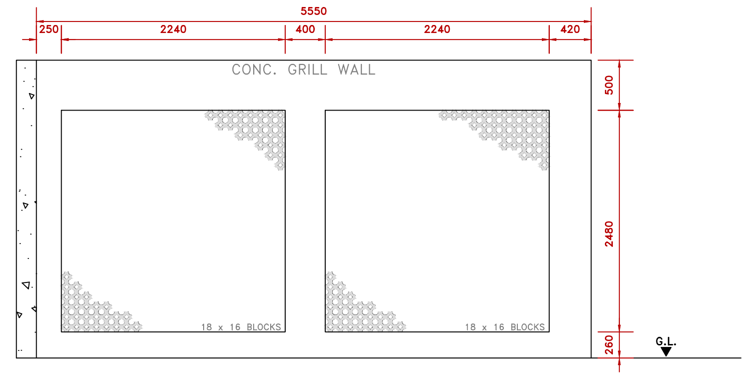

VP 1, 2, 4, 6, 7
VP 3
VP 5
LPG U/G PIPE CROSSING DRIVE WAY PLEASE REFER DRG No. S-8312-12
TOWER-1
TOWER-2
TOWER-3
TOWER-4
TOWER-5
TOWER-6
TOWER-7
NEW ROAD
PAVEMENT
CHILDREN PLAYGROUND
LANDSCAPED AREA
DRIVEWAY
SAFETY ISLAND
LOADING & UNLOADING BAY
COMMERCIAL
LANDSCAPE GARDEN
REFUSE STATION
EXPOSED PIPE AT H/L
SUPPLY TO COMMERCIAL BLOCK
PROVIDE Ø200MM G.I. SLEEVE FOR UNDERGROUND PIPE
LPG PIPE RUNS AT G/F CEILING LEVEL
LPG PIPE RISE UP ALONG COLUMN
DRAINAGE RESERVE
LPG LORRY PARKING
FENCE WALL
R1 | GENERAL REVISION | 26 AUG 06
THE SHELL COMPANY OF HONG KONG LTD.
GREENWOOD & NEPTURE TERRACE
TAI MAN STREET, CHAI WAN
SUBJECT
LPG PIPING ROUTE
TO | REASON | DATE
REVISIONS
SCALES 1:200
DRAWN/TRACED NEVIL HO
CHECKED KEITH SUN
APP'D. EDGAR LUK
7 / 2017 GNT-MP-03/R3
8/2010 GNT-MP-03/R2
8/2006 GNT-MP-03/R1
8/98 GNT-MP-03
DATE
DRAWING NUMBER
NUMBERS CROSSED OUT ARE SUPERSEDED DRAWINGS



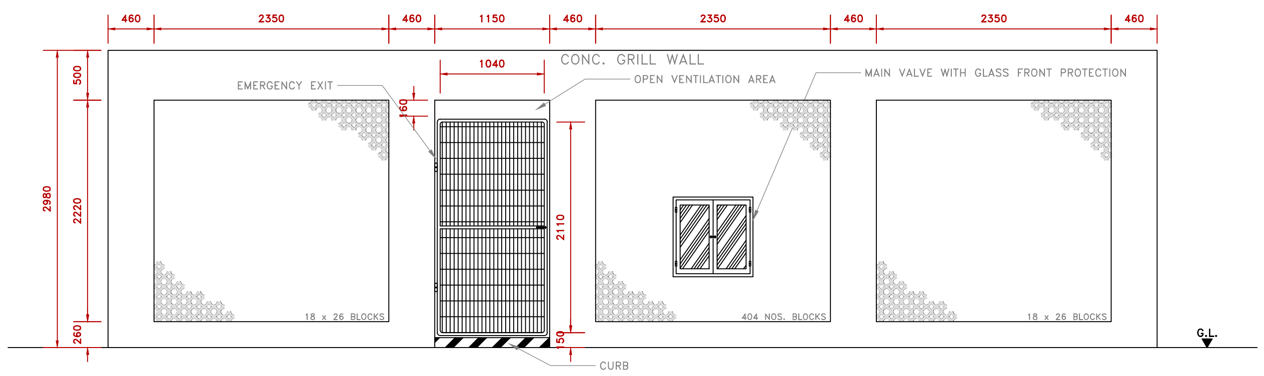
PLAN



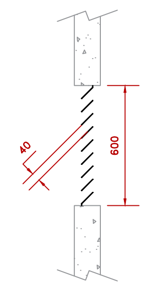
ELEVATION A



ELEVATION C



ELEVATION B



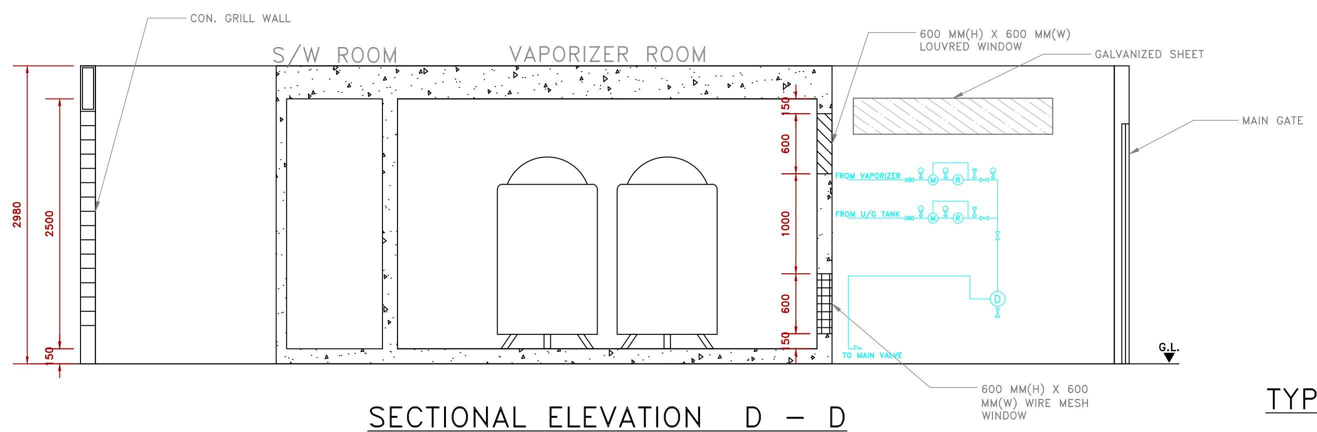
WHERE,

p = UNOBSTRUCTED PITCH BETWEEN LOUVRES = 40 MM

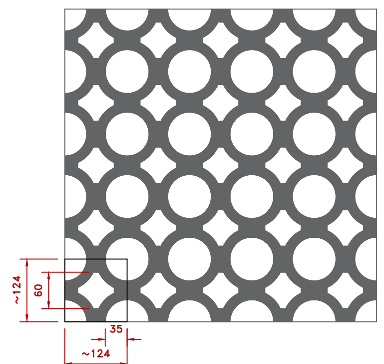
n = NUMBER OF LOUVRED APERTURES = 8 NOS.

w = WIDTH OF LOUVRED OPENING = 600 MM

DETAIL OF LOUVRED WINDOW VENTILATION



SECTIONAL ELEVATION D – D



WHERE,

h = HEIGHT OF EACH SINGLE BLOCK ≈ 124 mm

w = WIDTH OF EACH SINGLE BLOCK ≈ 124 mm

A = VENTILATION AREA OF EACH BLOCK ≈ 5750 mm^2 OR 0.00575 m^2

N = NUMBER OF BLOCKS = 5 X 5 IN THIS EXAMPLE

TYPICAL DETAIL OF CONCRETE GRILL BLOCK VENTILATION

Notes :

Rev.	Description	Date

SHELL HONG KONG LIMITED

Project Title :

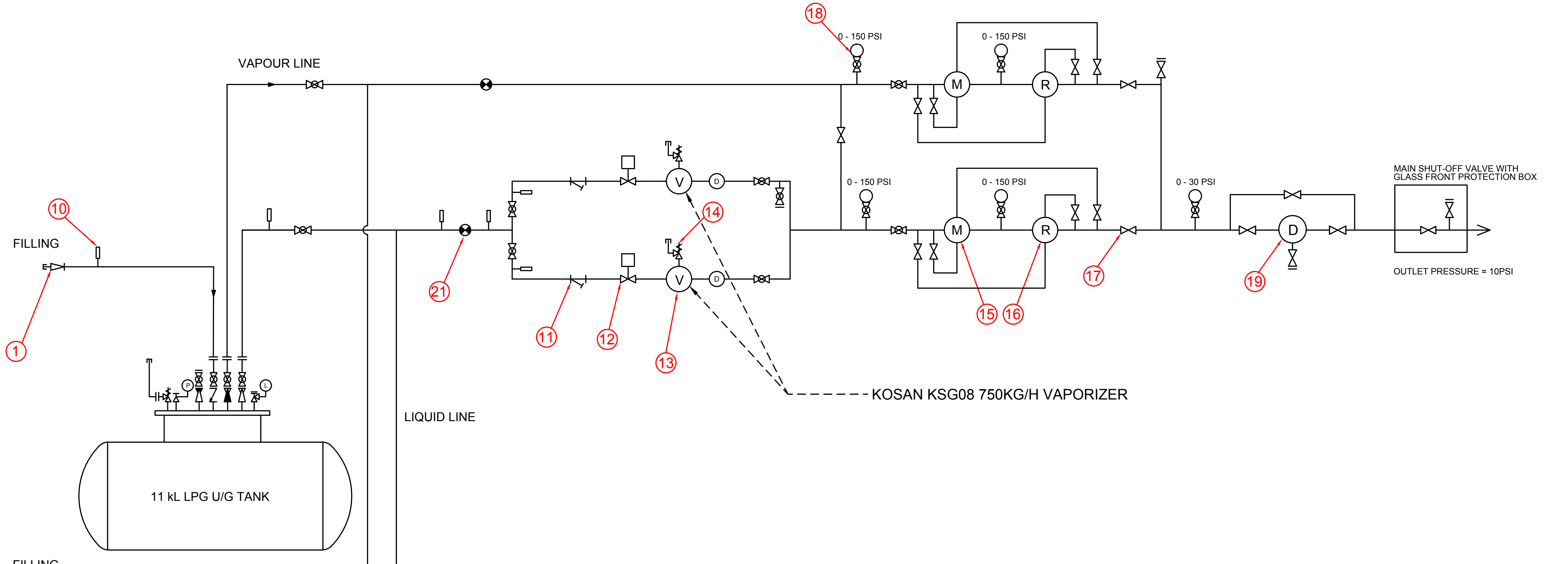
GREENWOOD TERRACE & NEPTUNE TERRACE,

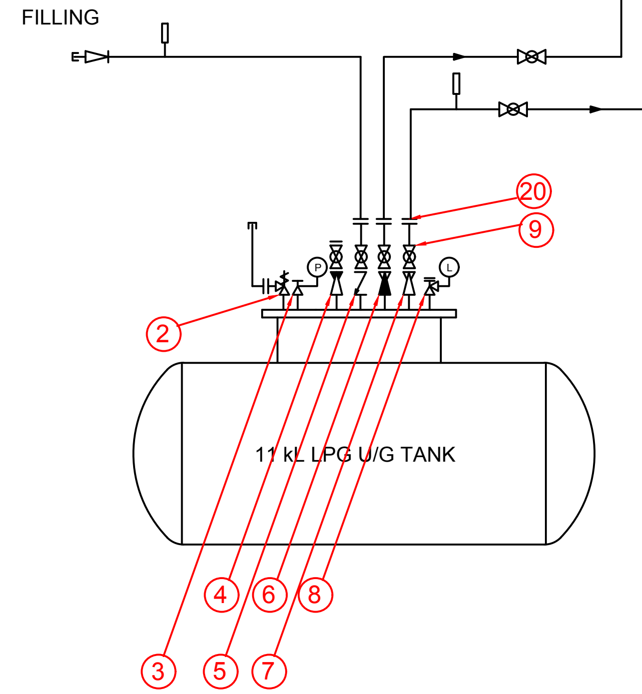
CHAI WAN

Drawing Title :

FLOOR PLAN & ELEVATION VIEW OF LPG COMPOUND

Drg. No. :	GNT-MP-01
Scale :	N. T. S.
Drawn By :	Nevil Ho
Checked By :	Keith Sun
Approved By :	Edgar Luk
Date :	6 NOV 2017
Revision :	R0





EQUIPMENT LIST

ITEM	DESCRIPTION	SYMBOL
1	FILLER VALVE	
2	TANK PRESSURE RELIEF VALVE	
3	PRESSURE GAUGE VALVE (WITH DIP TUBE)	
4	TOP DRAIN VALVE	
5	NON-RETURN VALVE	
6	VAPOUR DRAW-OFF VAVE + EXCESS FLOW VALVE	
7	LIQUID DRAW-OFF VALVE + EXCESS FLOW VALVE	
8	FIXED LIQUID LEVEL GAUGE	
9	HIGH PRESSURE SHUT-OFF VALVE	
10	HYDROSTATIC PRESSURE RELIEF VALVE	

ITEM	DESCRIPTION	SYMBOL
11	STRAINER	
12	SOLENOID VALVE	
13	FLAMEPROOF VAPORIZER	V
14	PRESSURE RELIEF VALVE (VAPORISER)	
15	MONITOR REGULATOR	M
16	ACTIVE REGULATOR	R
17	SHUT-OFF VALVE	
18	PRESSURE GAUGE	
19	DRAIN POT	D
20	INSULATION FLANGE	
21	EMERGENCY SHUT OFF VALVE	

SHELL HONG KONG LIMITED

PROJECT :
GREENWOOD TERRACE& NEPTURE TERRACE
CHAI WAN

TITLE :
SCHEMATIC PIPING DIAGRAM FOR
LPG UNDERGROUND TANK COMPOUND

DESIGNED BY : Nevil Ho	DRAWN BY : Nevil Ho
CHECKED BY : Keith Sun	APPROVED BY : Edgar Luk
SCALE N.T.S.	DATE 19/9/2017
JOB NO. GNT-MP	DRG. NO. 02 / REV. NO. -

Appendix 3.3

Total Projected On-site and Off-site Population in Year 2031

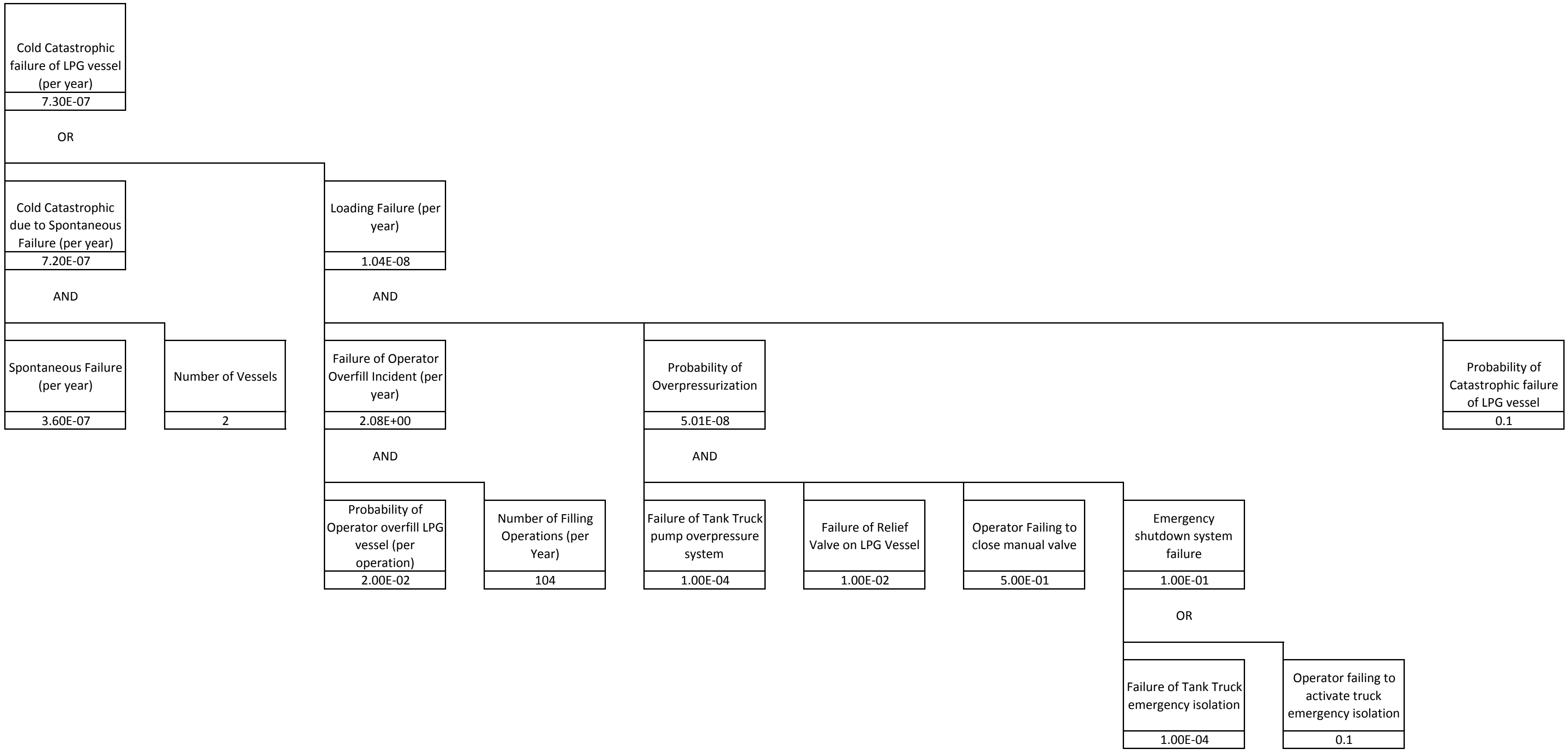
Population ID	Description	Base Population	Updated Population	Indoor Ratio	Reference
1	Greenwood Terrace	6631	6631	0.95	Base population based on 2011 Census. According to 2014-based TPEDM, annual residential population growth rate in Eastern district is -0.8%. Thus base population is adopted as a conservative assumption.
2	Mori Lisa International Kindergarten	41	100	0.95	38 students and 3 teacher & staff according to Education Bureau. (http://kgp2017.highlight.hk/edb/schoolinfo.php?lang=en&schid=6881&district=&category=&voucher=&schoolname=) Total population assumed to be 100 as a conservative estimation
3	Neptune Terrace	2965	2965	0.95	Base population based on 2011 Census. According to 2014-based TPEDM, annual residential population growth rate in Eastern district is -0.8%. Thus base population is adopted as a conservative assumption.
4	Chai Wan Police Station	125	125	0.95	XRL EIA Appendix 13 Table 4.8 (Police Station)
5	Koway Court	2192	2192	0.95	Base population based on 2011 Census. According to 2014-based TPEDM, annual residential population growth rate in Eastern district is -0.8%. Thus base population is adopted as a conservative assumption.
6	Bayview Park	548	548	0.95	Base population based on 2011 Census. According to 2014-based TPEDM, annual residential population growth rate in Eastern district is -0.8%. Thus base population is adopted as a conservative assumption.
7	Chai Wan Health Centre	180	180	0.95	Referenced XRL EIA Appendix 13 Table 4.8 (Clinic - H)
8	Meng Tak Catholic School	778	800	0.95	24 classes and 58 teacher & staff according to school website (http://mengtakps.edu.hk/it-school/php/webcms/public/index.php3?refid=577&mode=published&nocache). Maximum of 30 students per class according to Education Bureau Total population assumed to be 800 as a conservative estimation
9	French International School	381	400	0.95	350 students and 31 teacher & staff according to school website. (https://www.fis.edu.hk/en/chai-wan) Total population assumed to be 400 as a conservative estimation
10	Chong Gene Hang College	562	600	0.95	507 students and 55 teacher & staff according to school website. (http://www.cghc.edu.hk/schoolsite/uploads/documents/schoolReports/annualSchoolReport/ASR%202016-17.pdf) Total population assumed to be 600 as a conservative estimation
11	Fortune Factory Building Block A	2269	2415	0.95	The present population is estimated by dividing total GFA by worker density established in "Guidelines on Worker densities" (Business Use & Warehouse) stipulated in Chapter 5 of HKPSG. According to 2014-based TPEDM, annual employment population growth rate in Eastern district is 0.4%. Thus the growth rate is applied as a conservative assumption.
12	Sze Hing Long Industrial Building	422	449	0.95	
13	Cheong Wei Industrial Building	266	283	0.95	
14	Shun Yee Factory Building	227	242	0.95	
15	Chung On Industrial Building	219	233	0.95	
16	Haking (Tung Shing Industrial Building)	451	480	0.95	
17	Chai Wan Industrial Centre	1781	1896	0.95	
18	Glory Industrial Building	324	345	0.95	
19	E-trade Plaza	1014	1080	0.95	
20	Hong Kong (Chai Wan) Industrial Building	428	455	0.95	
21	Shell Industrial Building	546	581	0.95	
22	Johnson Building	466	495	0.95	
23	PCL Group Building	127	135	0.95	
24	Eltee Building	240	255	0.95	
25	Kantone Centre	222	236	0.95	
26	Wah Ha Estate	700	700	0.95	Authorized maximum population figure from Housing Authority (http://www.housingauthority.gov.hk/en/global-elements/estate-locator/detail.html?propertyType=1&id=15300)
27	Cheung Tat Centre	812	864	0.95	The present population is estimated by dividing total GFA by worker density established in "Guidelines on Worker densities" (Business Use & Warehouse) stipulated in Chapter 5 of HKPSG. According to 2014-based TPEDM, annual employment population growth rate in Eastern district is 0.4%. Thus the growth rate is applied as a conservative assumption.
28	Tak King Industrial Building	675	719	0.95	
29	Hop Shi Factory Building	860	915	0.95	
30	Fook Hing Factory Building	76	81	0.95	
31	Sze Hing Industrial Building	202	215	0.95	
32	Sunrise Industrial Building	643	684	0.95	
33	Refuse Collection Point	5	5	0.95	XRL EIA Appendix 13 Table 4.8
34	Electric Substation	0	0	0.95	

Population ID	Description	Base Population	Updated Population	Indoor Ratio	Reference
35	Silver Tech Tower	126	134	0.95	The present population is estimated by dividing total GFA by worker density established in "Guidelines on Worker densities" (Business Use & Warehouse) stipulated in Chapter 5 of HKPSG. According to 2014-based TPEDM, annual employment population growth rate in Eastern district is 0.4%. Thus the growth rate is applied as a conservative assumption.
36	Shing King Industrial Building	1067	1135	0.95	
37	Kam Man Fung Factory Building	467	497	0.95	
38	Trend Centre	568	605	0.95	
39	Decca Industrial Building	724	771	0.95	
40	Leun Fat Loong Industrial Building	160	171	0.95	
41	Chi Ko Industrial Building	812	864	0.95	
42	Kut Shing Street Cooked Food Market	78	78	0.95	Code of Practice for Fire Safety in Buildings 2011 indicates $3m^2$/person as a minimum requirement
43	Chai Wan Park	100	100	0	XRL EIA Appendix 13 Table 4.8 (Leisure - M)
44	Hong Man Industrial Centre	2036	2167	0.95	The present population is estimated by dividing total GFA by worker density established in "Guidelines on Worker densities" (Business Use & Warehouse) stipulated in Chapter 5 of HKPSG. According to 2014-based TPEDM, annual employment population growth rate in Eastern district is 0.4%. Thus the growth rate is applied as a conservative assumption.
45	Cheung Lee Industrial Building	1108	1179	0.95	
46	Man Foong Industrial Building	720	766	0.95	
47	Kut Shing Building	264	281	0.95	
48	Telephone Exchange	0	0	0.95	XRL EIA Appendix 13 Table 4.8
51	Proposed Development-Residential Block	2723	2723	0.95	Provided by HKHA. 884 units. 2.8 residents per flat. Includes a 10% deviation allowance (i.e. 884 x 2.8 x 1.1)
53	Proposed Development-Elderly Care Facility	125	125	0.95	Population (716 m^2 GFA): The appropriate number of residents in a Residential Care Home for the Elderly (RCHE) is determined by its physical size and the space standard per capita area of 6.5 m2. 1 home manager, 1 care worker for every 20 residents or part thereof.; 1 health worker for every 30 residents or part thereof; 1 ancillary worker for every 40 residents or part thereof; 1 nurse for every 60 residents or part thereof. Calculation: Number of residents = 716/6.5≈110 Number of workers = 1+110/20+110/30+110/40+110/60 ≈ 15 Population = Number of residents + Number of workers = 125
54	Proposed Development-Car Park	15	15	0	Number of parking spaces = 76 From XRL EIA Appendix 13 Table 4.8, 0.2 people/parking space assumed Population = 76 x 0.2 ≈ 15
R1	Lee Chung Street	7	7	0	Estimated from Traffic data for Counting Station 1102 in Annual Traffic Census 2016. According to the Annual Traffic Census, annual averaged daily traffic (AADT) at Cheung Lee Street between 2011 and 2016 has a growth rate of -3.8%. Thus the base population is applied as a conservative assumption.
R2	Hong Man Street	7	7	0	
R3	Tai Man Street	16	16	0	
R4	Cheung Lee Street	7	7	0	
R5	Chui Hang Street	2	2	0	
R6	Kut Shing Street	10	10	0	

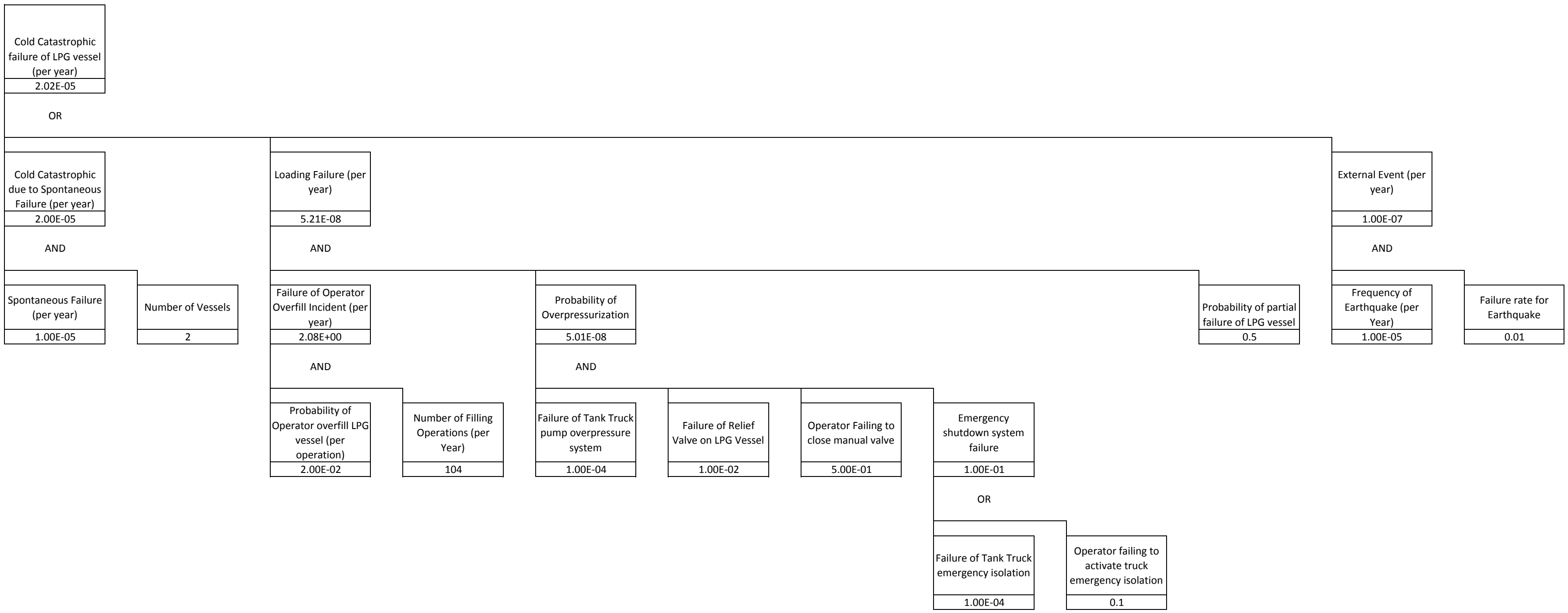
Appendix 5.1

Fault Tree Analysis

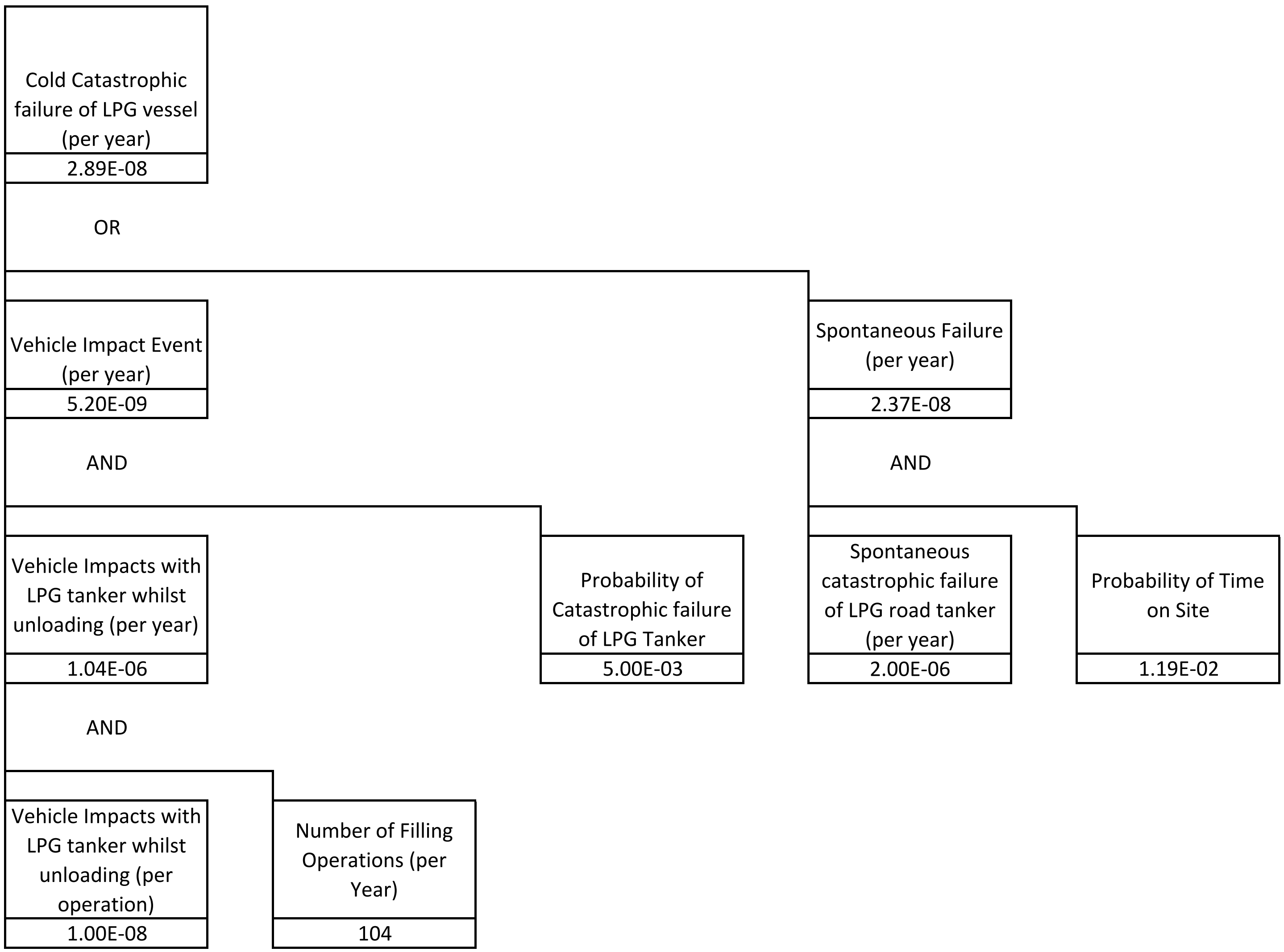
1 Cold Catastrophic Failure of LPG Storage Vessel



2 Cold Partial Failure of LPG Storage Vessel

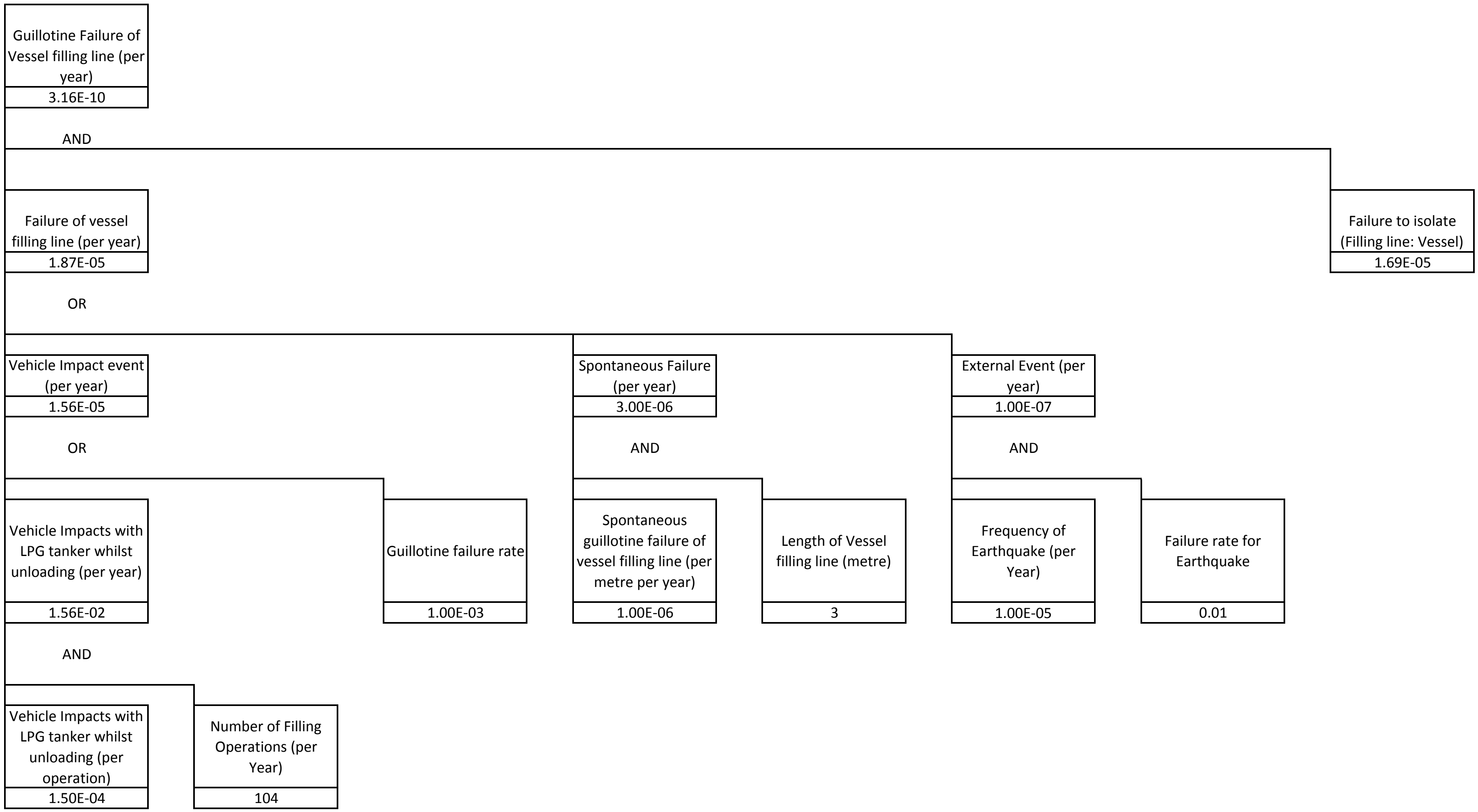


3 Cold Catastrophic Failure of Road Tanker

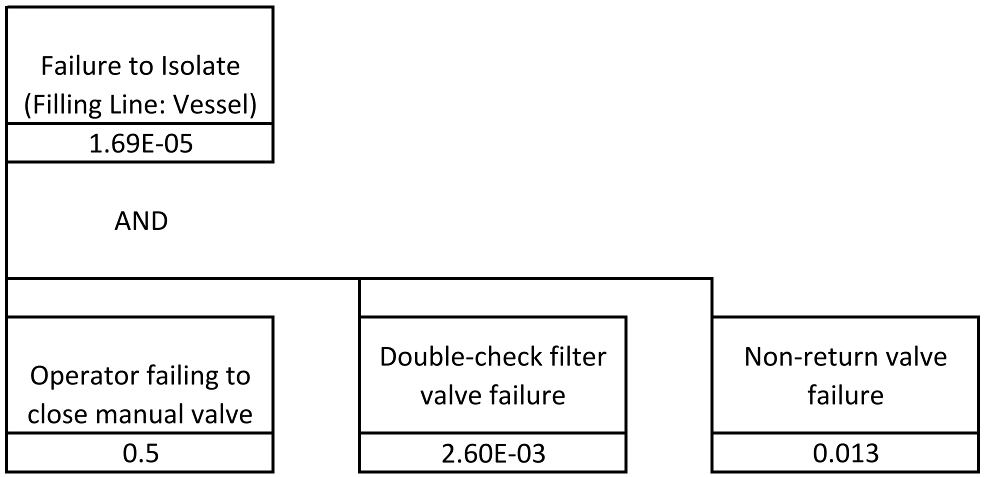


4 Cold Partial Failure of Road Tanker

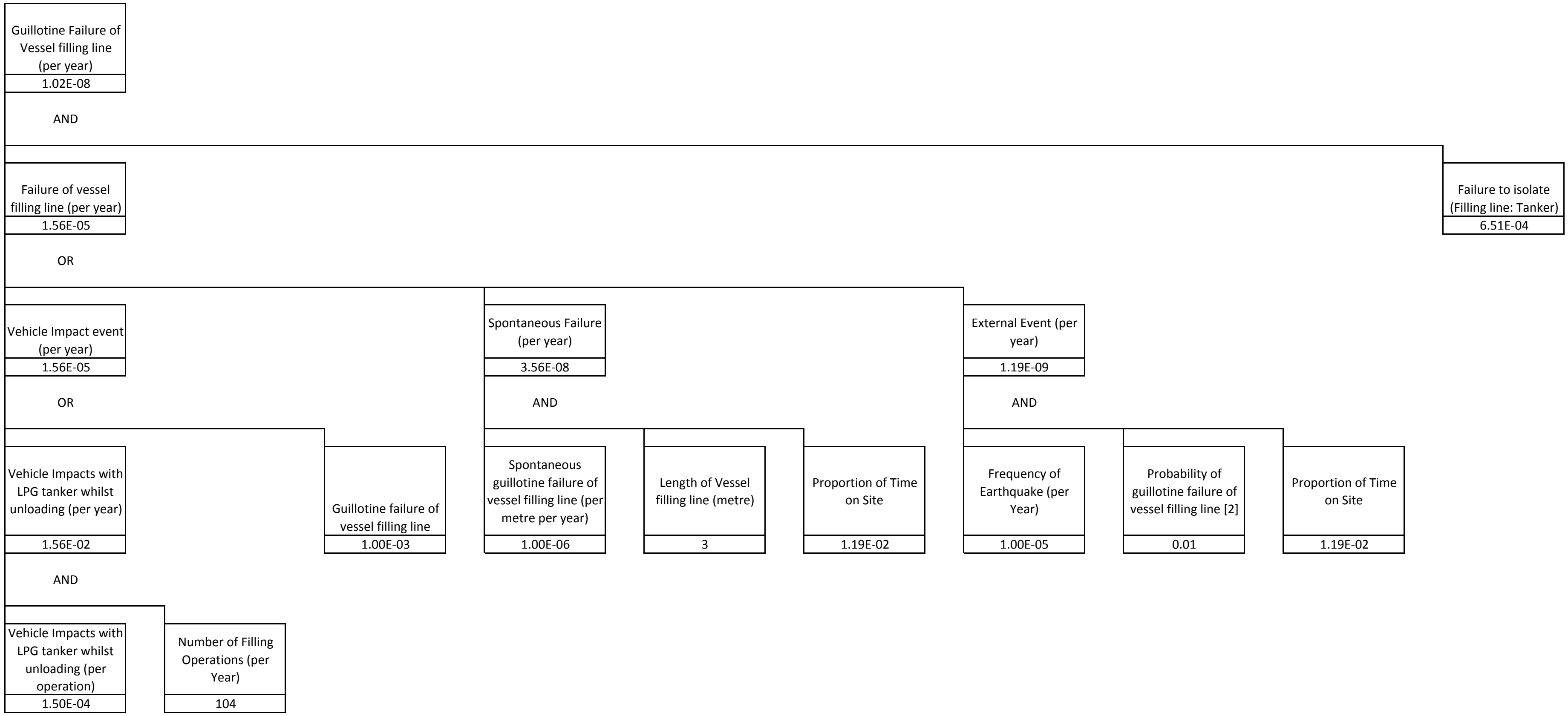
5 Guillotine Failure of LPG filling line to Vessel (fed from LPG storage vessel)



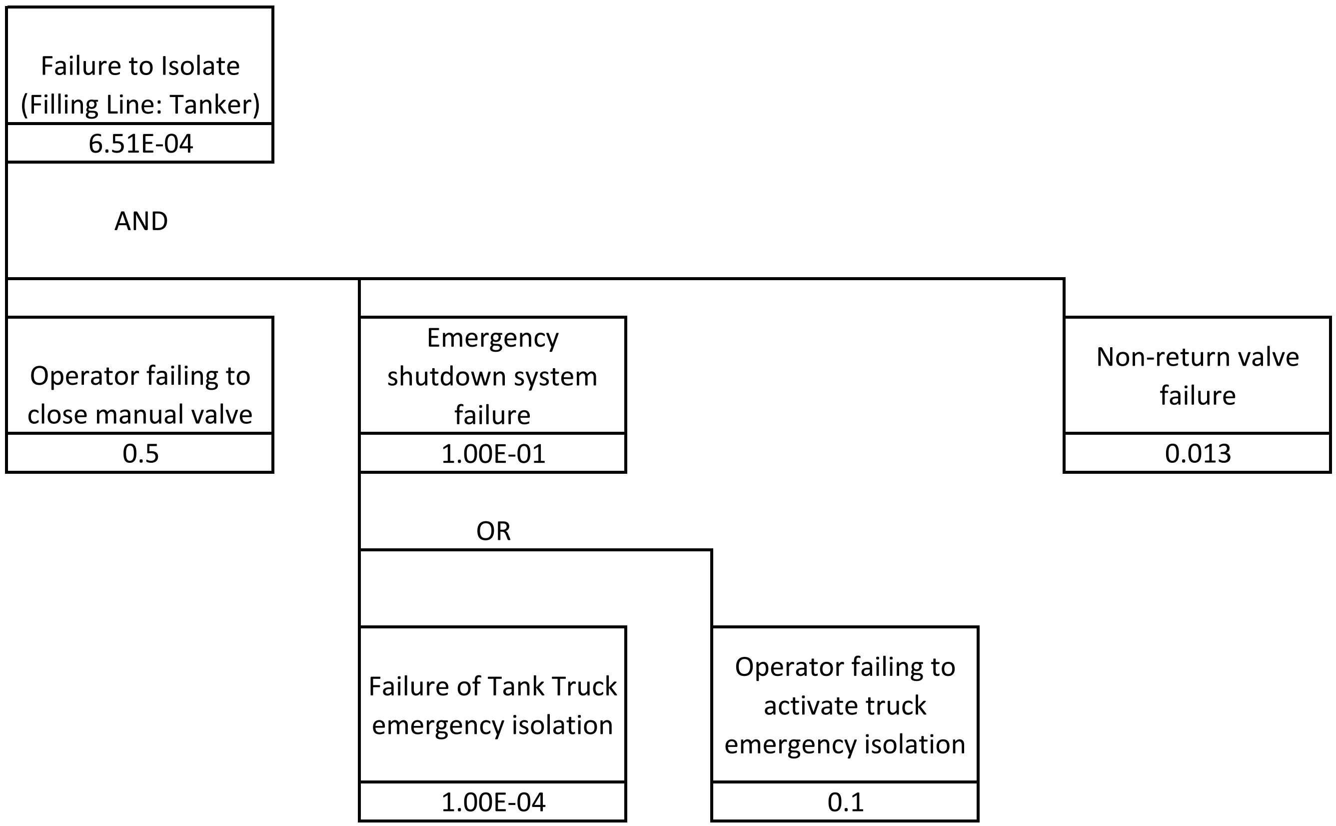
6 Failure to Isolate (Filling Line: LPG Storage Vessel)



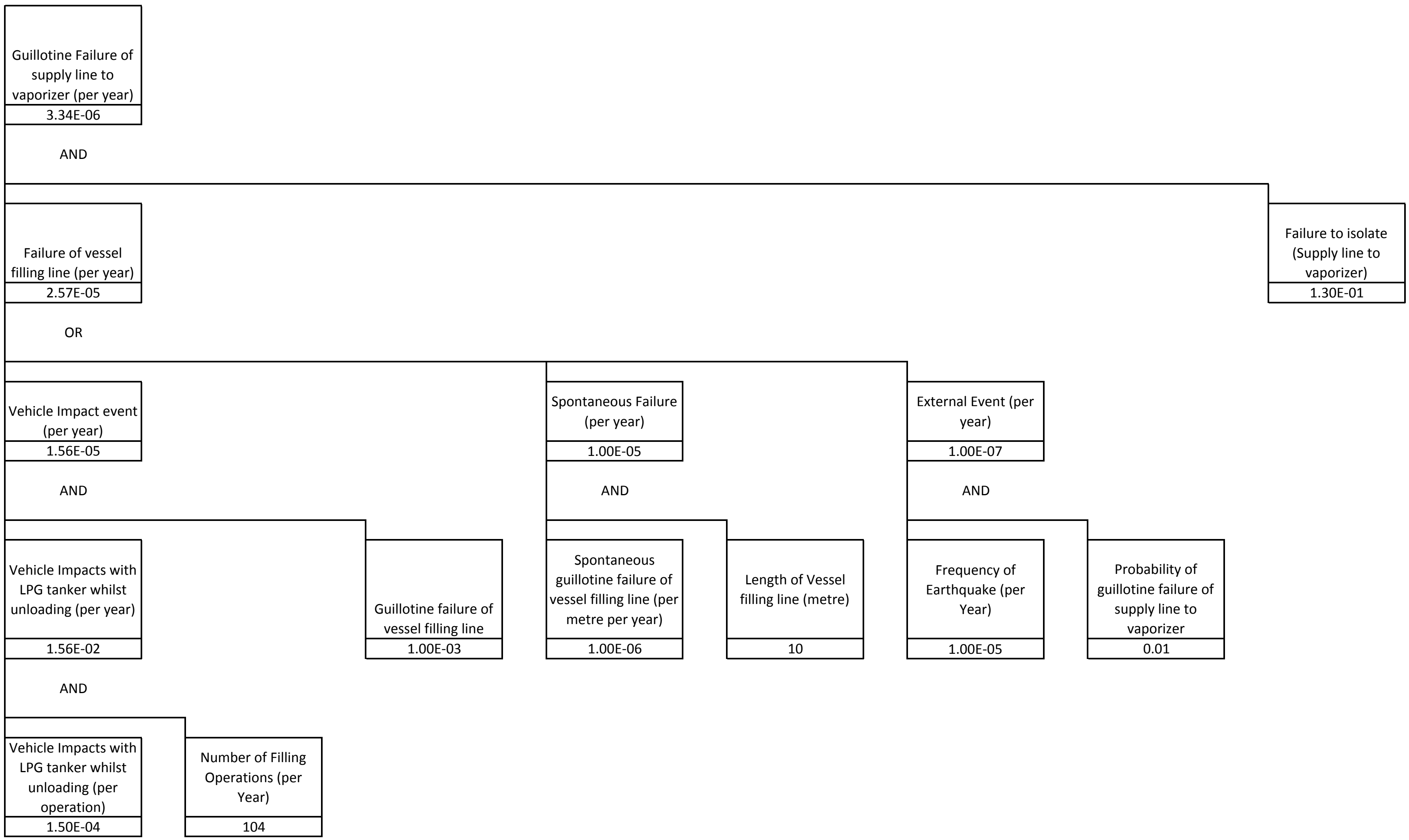
7 Guillotine Failure of LPG filling line to Vessel (fed from LPG Road Tanker



8 Failure to Isolate (Filling Line: LPG Road Tanker)



9 Guillotine Failure of LPG supply line to vaporizer

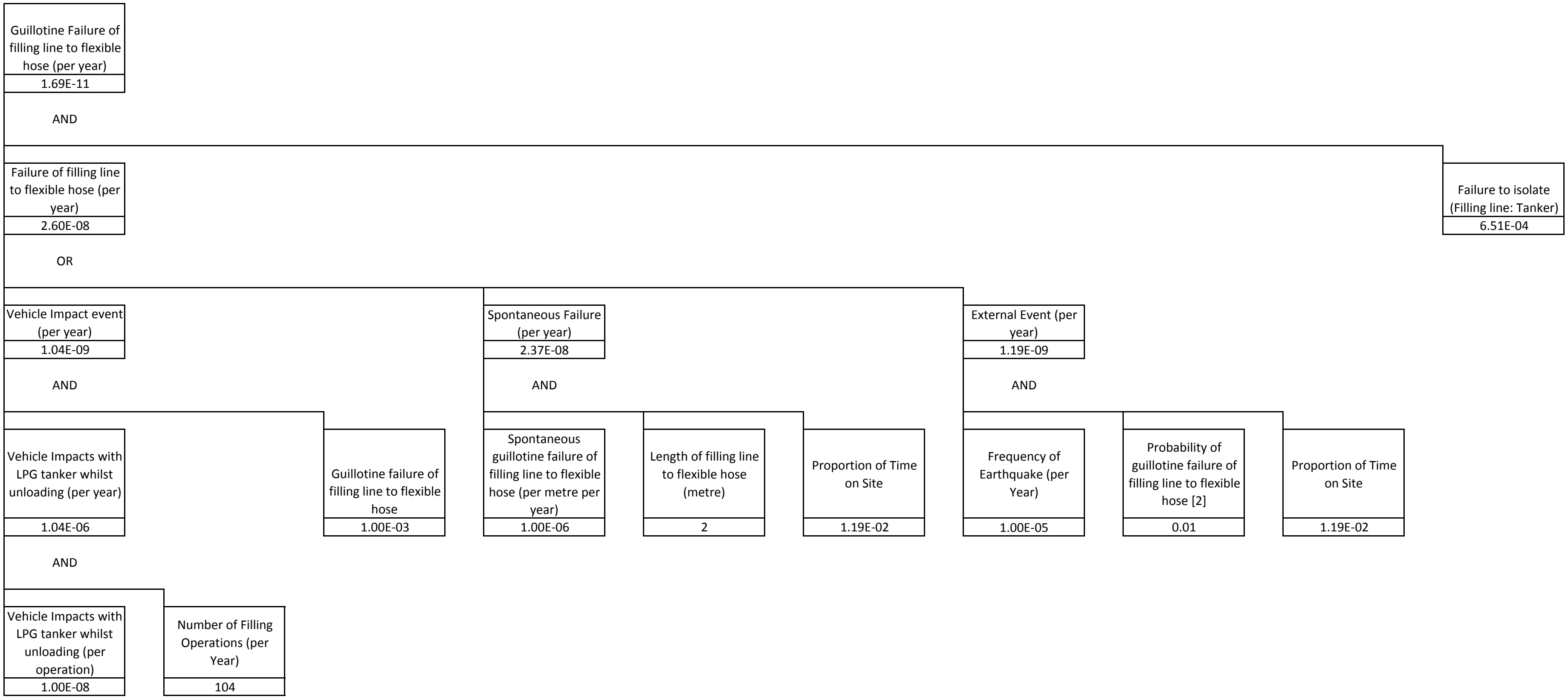


10 Failure to Isolate (Supply line to Vaporizer)

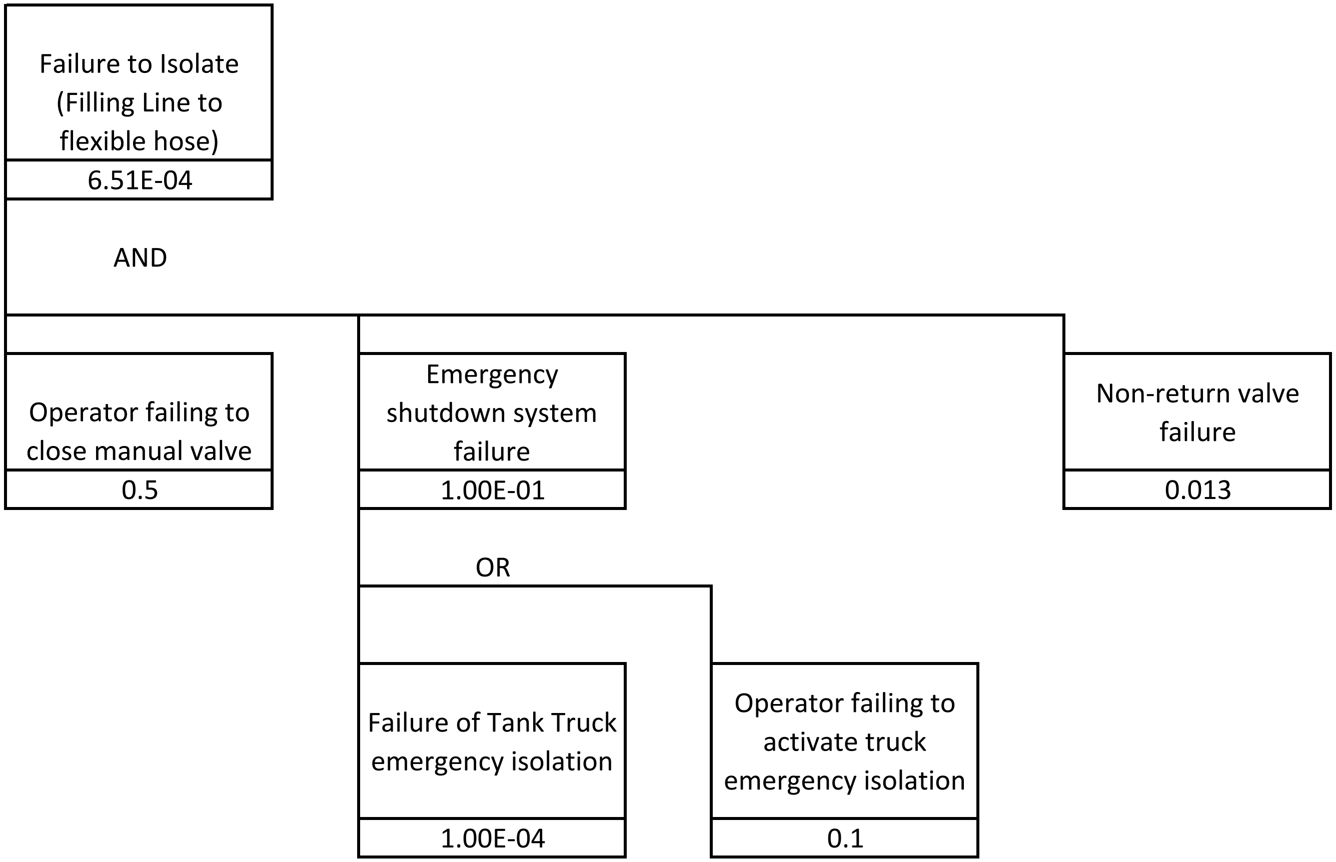
Failure to Isolate (Supply line to vaporizer)
1.30E-01

Excess flow valve failure
0.13

11 Guillotine Failure of LPG filling line to flexible hose

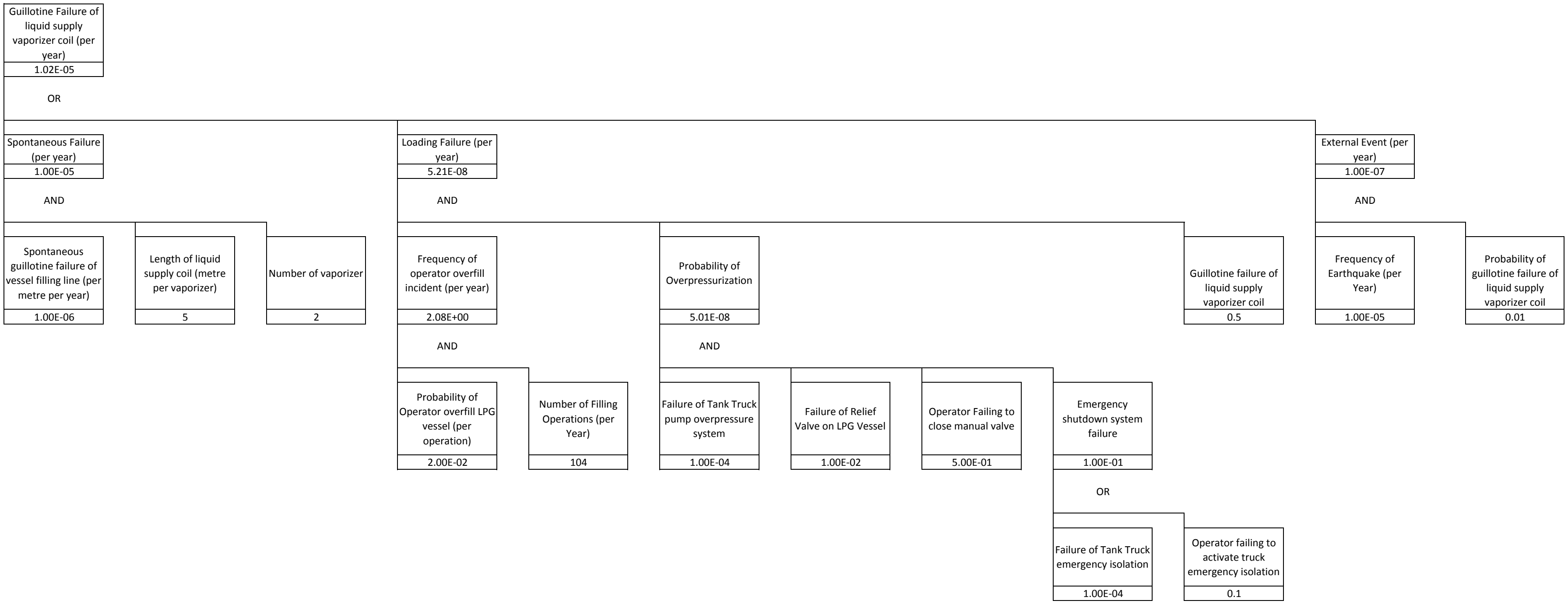


12 Failure to Isolate (Filling line to flexible hose)

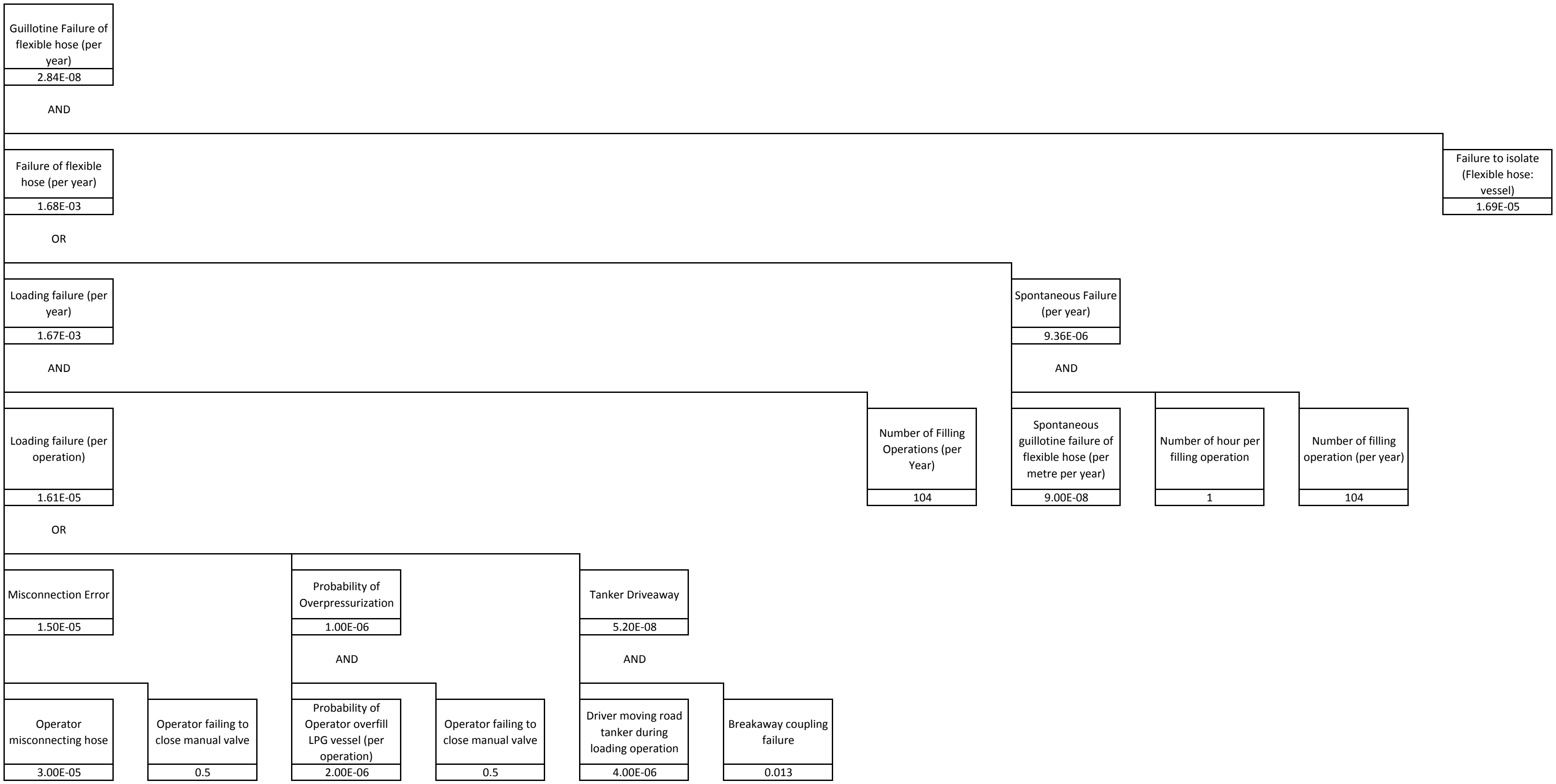


G:\env\project\261261\12 Reports Deliverables\01 Draft QRA Report\Appendix\Fault tree.xlsx

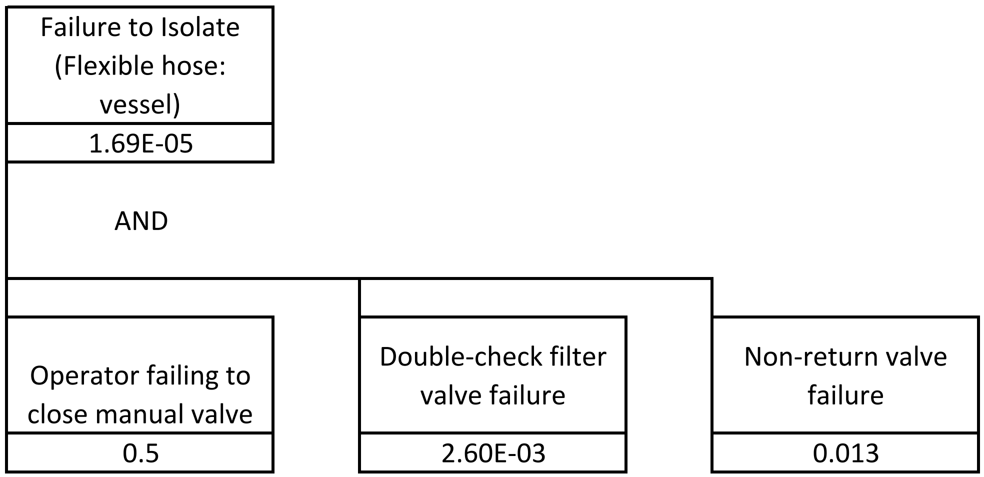
13 Failure of vaporizer



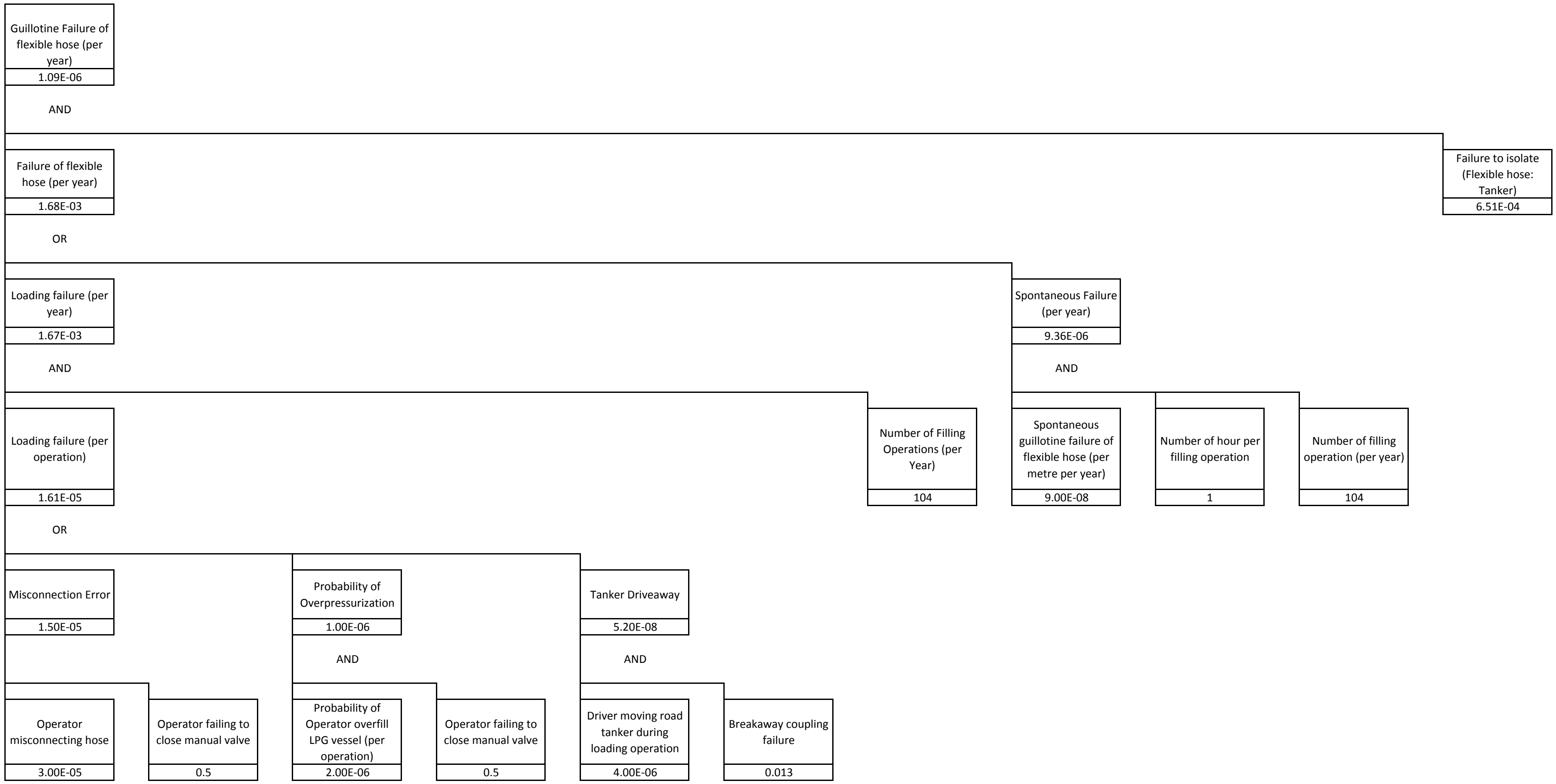
14 Guillotine Failure of flexible hose (fed from LPG storage vessel)



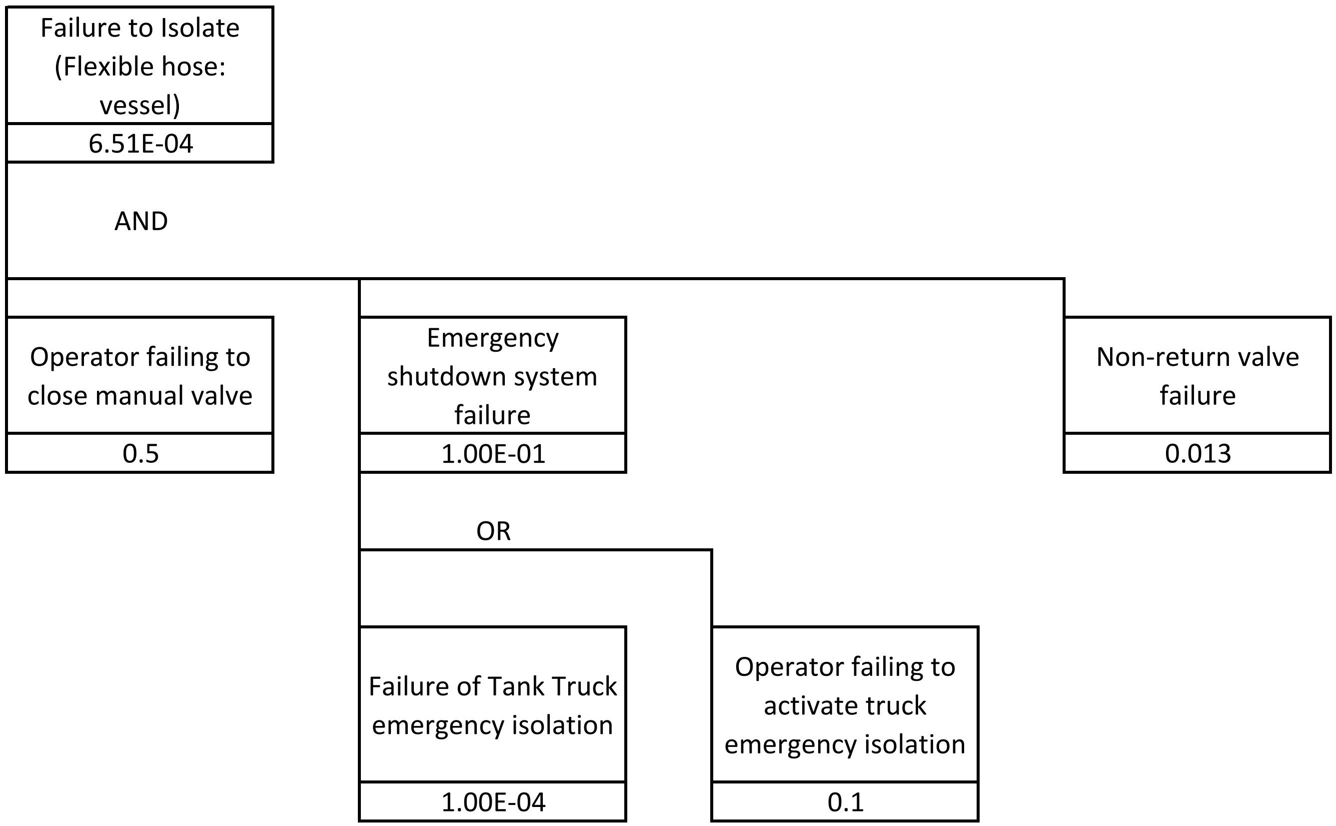
15 Failure to Isolate (Flexible Hose: LPG storage vessel)



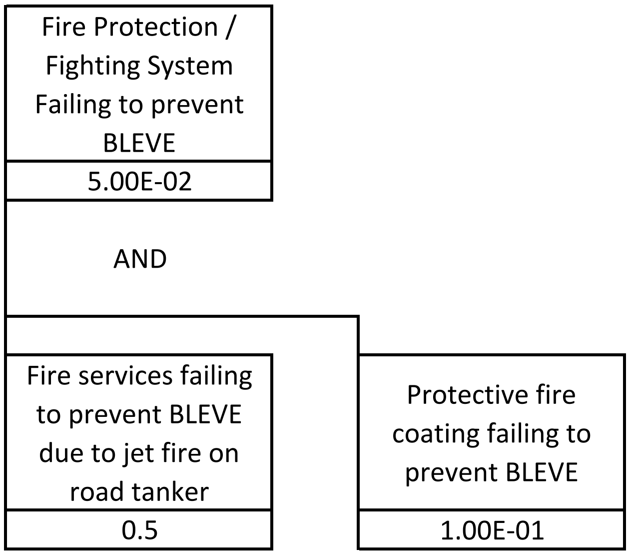
16 Guillotine Failure of flexible hose (fed from LPG road tanker)



17 Failure to Isolate (Flexible Hose: LPG road tanker)



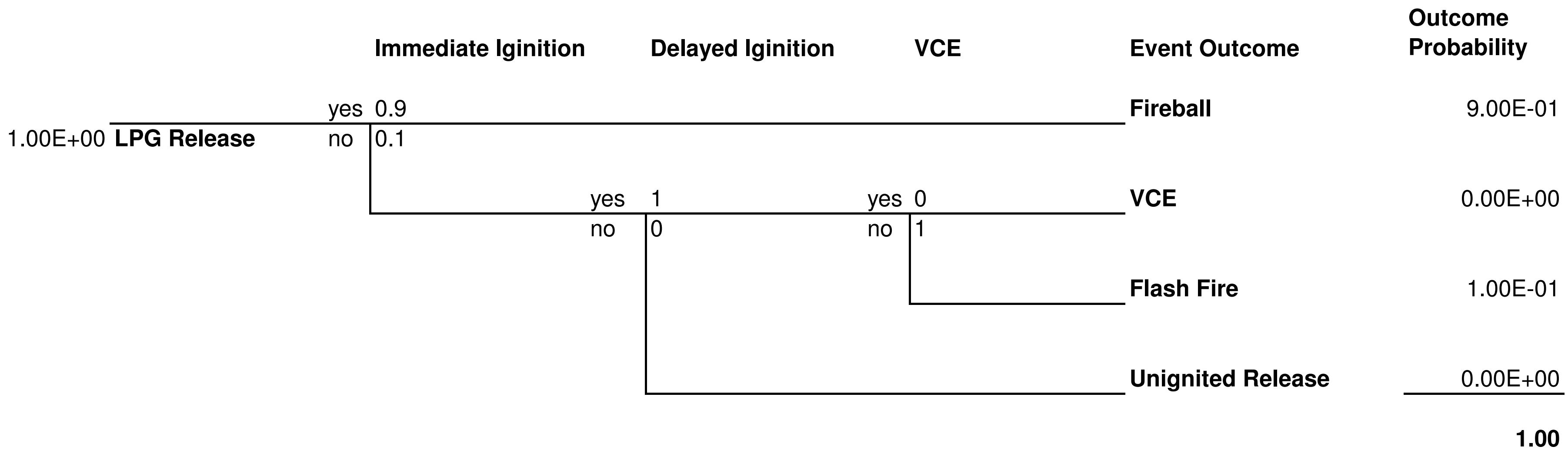
18 Fire Protection/Fighting System Failing to prevent BLEVE



Appendix 5.2

Event Tree Analysis

Scenario 1 Cold Catastrophic Failure of LPG Storage Vessel



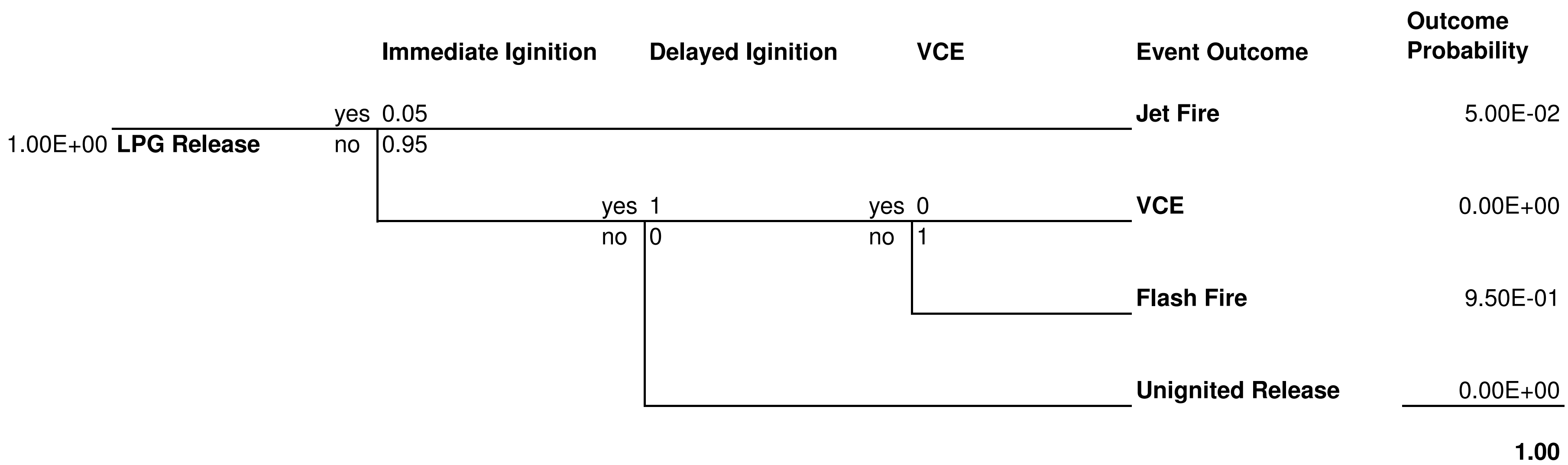
Scenario 2 Cold Partial Failure of LPG Storage Vessel

	Immediate Iginition	Delayed Iginition	VCE	Event Outcome	Outcome Probability
1.00E+00 **LPG Release**	yes 0.05			**Jet Fire**	5.00E-02
	no 0.95	yes 1	yes 0	**VCE**	0.00E+00
			no 1	**Flash Fire**	9.50E-01
		no 0		**Unignited Release**	0.00E+00
					1.00

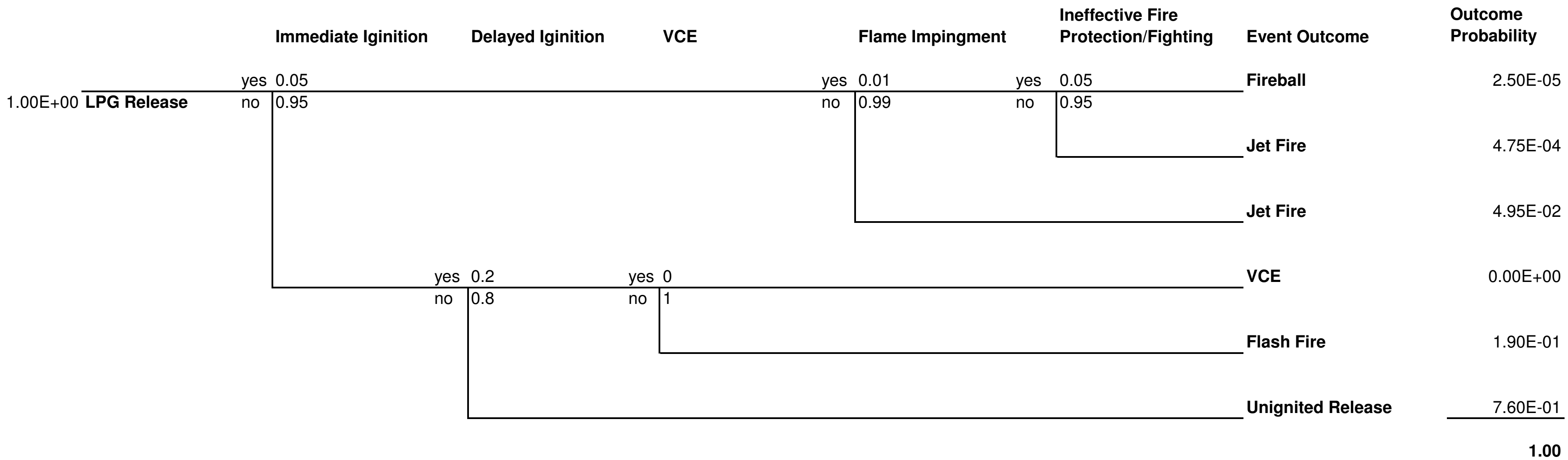
Scenario 3 Cold Catastrophic Failure of LPG Road Tanker

	Immediate Iginition	Delayed Iginition	VCE	Event Outcome	Outcome Probability
1.00E+00 **LPG Release**	yes 0.05			**Fireball**	5.00E-02
	no 0.95	yes 1	yes 0	**VCE**	0.00E+00
			no 1	**Flash Fire**	9.50E-01
		no 0		**Unignited Release**	0.00E+00
					1.00

Scenario 4 Cold Partial Failure of LPG Road Tanker



Scenario 5 Gullotine Failure of LPG Filling Line to Vessel



Scenario 6 Gullotine Failure of LPG Filling Line to Vaporizer

	Immediate Iginition	Delayed Iginition	VCE	Flame Impingment	Ineffective Fire Protection/Fighting	Event Outcome	Outcome Probability
1.00E+00 **LPG Release**	yes 0.05			yes 0.01	yes 0.05	**Fireball**	2.50E-05
					no 0.95	**Jet Fire**	4.75E-04
				no 0.99		**Jet Fire**	4.95E-02
	no 0.95	yes 0.2	yes 0			**VCE**	0.00E+00
			no 1			**Flash Fire**	1.90E-01
		no 0.8				**Unignited Release**	7.60E-01
							1.00

Scenario 7 Gullotine Failure of LPG Filling Line to Flexible Hose

		Immediate Iginition	Delayed Iginition	VCE	Flame Impingment	Ineffective Fire Protection/Fighting	Event Outcome	Outcome Probability
1.00E+00	**LPG Release**	yes 0.05			yes 0.01	yes 0.05	**Fireball**	2.50E-05
						no 0.95	**Jet Fire**	4.75E-04
					no 0.99		**Jet Fire**	4.95E-02
		no 0.95	yes 0.2	yes 0			**VCE**	0.00E+00
				no 1			**Flash Fire**	1.90E-01
			no 0.8				**Unignited Release**	7.60E-01
								1.00

Scenario 8 Failure of Vaporizer

	Immediate Iginition	Delayed Iginition	VCE	Flame Impingment	Ineffective Fire Protection/Fighting	Event Outcome	Outcome Probability
1.00E+00 **LPG Release**	yes 0.05			yes 0.01	yes 0.05	**Fireball**	2.50E-05
					no 0.95	**Jet Fire**	4.75E-04
				no 0.99		**Jet Fire**	4.95E-02
	no 0.95	yes 0.2	yes 0			**VCE**	0.00E+00
			no 1			**Flash Fire**	1.90E-01
		no 0.8				**Unignited Release**	7.60E-01
							1.00

Scenario 9 Gullotine Failure of Flexible Hose

	Immediate Iginition	Delayed Iginition	VCE	Flame Impingment	Ineffective Fire Protection/Fighting	Event Outcome	Outcome Probability
1.00E+00 **LPG Release**	yes 0.05			yes 0.01	yes 0.05	**Fireball**	2.50E-05
	no 0.95			no 0.99	no 0.95		
						Jet Fire	4.75E-04
						Jet Fire	4.95E-02
		yes 0.2	yes 0			**VCE**	0.00E+00
		no 0.8	no 1				
						Flash Fire	1.90E-01
						Unignited Release	7.60E-01
							1.00

Appendix 6.1

Consequence Analysis Results

ID	Description	Outcome	Jetfire radiation level	3B			1D			4D			7D			2E			1F		
				a	b	d	a	b	d	a	b	d	a	b	d	a	b	d	a	b	d
1	Cold Catastrophic Failure of LPG Storage Vessel (Full Inventory)	Fireball	--	68																	
2		Flash Fire	--	35	23	0.8	33	27	0.6	38	23	0.8	45	20	0.9	33	26	0.8	30	27	0.6
3	Cold Catastrophic Failure of LPG Storage Vessel (Partial Inventory)	Fireball	--	58																	
4		Flash Fire	--	27	18	0.8	26	21	0.6	29	18	0.8	35	16	0.9	26	20	0.8	23	21	0.6
5	Cold Partial Failure of LPG Storage Vessel (Full Inventory)	Jet Fire	20.9	21	19	1.0	24	18	1.0	21	19	1.0	20	19	1.0	22	19	1.0	24	18	1.0
			14.4	23	22	1.0	25	23	1.0	23	22	1.0	22	22	1.0	24	23	1.0	25	23	1.0
			7.3	27	30	1.0	29	31	1.0	27	30	1.0	26	30	1.0	28	30	1.0	29	31	1.0
6		Flash Fire	--	11	1	1.7	15	2	1.6	12	1	1.7	7	1	2.1	15	2	1.6	17	3	1.5
7	Cold Partial Failure of LPG Storage Vessel (Partial Inventory)	Jet Fire	20.9	21	19	1.0	24	18	1.0	21	19	1.0	20	19	1.0	22	19	1.0	24	18	1.0
			14.4	23	22	1.0	25	23	1.0	23	22	1.0	22	22	1.0	24	23	1.0	25	23	1.0
			7.3	27	30	1.0	29	31	1.0	27	30	1.0	26	30	1.0	28	30	1.0	29	31	1.0
8		Flash Fire	--	11	1	1.7	15	2	1.6	12	1	1.7	7	1	2.1	15	2	1.6	17	3	1.5
9	Cold Catastrophic Failure of LPG Road Tanker (Full Inventory)	Fireball	--	62																	
10		Flash Fire	--	82	55	0.9	78	64	0.8	90	56	0.9	107	49	0.9	80	62	0.9	72	65	0.7
11	Cold Catastrophic Failure of LPG Road Tanker (Partial Inventory)	Fireball	--	50																	
12		Flash Fire	--	65	42	0.9	62	50	0.8	70	42	0.9	84	38	0.9	62	48	0.9	56	51	0.7
13	Cold Partial Failure of LPG Road Tanker (Full Inventory)	Jet Fire	20.9	13	11	1.0	15	11	1.0	13	11	1.0	12	11	1.0	14	11	1.0	15	11	1.0
			14.4	14	14	1.0	16	14	1.0	14	14	1.0	14	13	1.0	15	14	1.0	16	14	1.0
			7.3	17	19	1.0	19	19	1.0	17	19	1.0	17	19	1.0	18	19	1.0	19	19	1.0
14		Flash Fire	--	22	3	1.0	26	4	1.0	24	3	1.0	23	3	1.0	28	4	1.0	25	7	1.0
15	Cold Partial Failure of LPG Road Tanker (Partial Inventory)	Jet Fire	20.9	13	11	1.0	15	11	1.0	13	11	1.0	12	11	1.0	14	11	1.0	15	11	1.0
			14.4	14	14	1.0	16	14	1.0	14	14	1.0	14	13	1.0	15	14	1.0	16	14	1.0
			7.3	17	19	1.0	19	19	1.0	17	19	1.0	17	19	1.0	18	19	1.0	19	19	1.0
16		Flash Fire	--	20	3	1.0	23	3	1.0	21	3	1.0	20	2	1.0	24	3	1.0	27	6	1.0
17	Guillotine Failure of LPG filling line to Vessel (Full Inventory)	Jet Fire	20.9	21	19	1.0	24	18	1.0	21	19	1.0	20	19	1.0	22	19	1.0	24	18	1.0
			14.4	23	22	1.0	25	23	1.0	23	22	1.0	22	22	1.0	24	23	1.0	25	23	1.0
			7.3	27	30	1.0	29	31	1.0	27	30	1.0	26	30	1.0	28	30	1.0	29	31	1.0
18		Flash Fire	--	68	37	1.0	118	139	1.0	75	31	1.0	62	17	1.0	99	87	1.0	89	74	1.0
19		Fireball	--	68																	
20	Guillotine Failure of LPG filling line to Vessel (Partial Inventory)	Jet Fire	20.9	21	19	1.0	24	18	1.0	21	19	1.0	20	19	1.0	22	19	1.0	24	18	1.0
			14.4	23	22	1.0	25	23	1.0	23	22	1.0	22	22	1.0	24	23	1.0	25	23	1.0
			7.3	27	30	1.0	29	31	1.0	27	30	1.0	26	30	1.0	28	30	1.0	29	31	1.0
21		Flash Fire	--	68	37	1.0	87	110	1.0	75	31	1.0	62	17	1.0	78	19	1.0	68	60	1.0
22		Fireball	--	58																	
23	Guillotine Failure of LPG filling line to Vaporizer (Full Inventory)	Jet Fire	20.9	21	19	1.0	24	18	1.0	21	19	1.0	20	19	1.0	22	19	1.0	24	18	1.0
			14.4	23	22	1.0	25	23	1.0	23	22	1.0	22	22	1.0	24	23	1.0	25	23	1.0
			7.3	27	30	1.0	29	31	1.0	27	30	1.0	26	30	1.0	28	30	1.0	29	31	1.0
24		Flash Fire	--	15	2	1.2	17	3	1.2	16	2	1.2	11	1	1.3	18	3	1.2	20	4	1.2
25		Fireball	--	68																	
26	Guillotine Failure of LPG filling line to Vaporizer (Partial Inventory)	Jet Fire	20.9	21	19	1.0	24	18	1.0	21	19	1.0	20	19	1.0	22	19	1.0	24	18	1.0
			14.4	23	22	1.0	25	23	1.0	23	22	1.0	22	22	1.0	24	23	1.0	25	23	1.0
			7.3	27	30	1.0	29	31	1.0	27	30	1.0	26	30	1.0	28	30	1.0	29	31	1.0
27		Flash Fire	--	15	2	1.2	17	3	1.2	16	2	1.2	11	1	1.3	18	3	1.2	20	4	1.2
28		Fireball	--	58																	
29	Guillotine Failure of LPG filling line to Flexible Hose (Full Inventory)	Jet Fire	20.9	21	19	1.0	24	18	1.0	21	19	1.0	20	19	1.0	22	19	1.0	24	18	1.0
			14.4	23	22	1.0	25	23	1.0	23	22	1.0	22	22	1.0	24	23	1.0	25	23	1.0
			7.3	27	30	1.0	29	31	1.0	27	30	1.0	26	30	1.0	28	30	1.0	29	31	1.0
30		Flash Fire	--	15	2	1.2	17	3	1.2	16	2	1.2	11	1	1.3	18	3	1.2	20	4	1.2
31		Fireball	--	68																	
32	Guillotine Failure of LPG filling line to Flexible Hose (Partial Inventory)	Jet Fire	20.9	21	19	1.0	24	18	1.0	21	19	1.0	20	19	1.0	22	19	1.0	24	18	1.0
			14.4	23	22	1.0	25	23	1.0	23	22	1.0	22	22	1.0	24	23	1.0	25	23	1.0
			7.3	27	30	1.0	29	31	1.0	27	30	1.0	26	30	1.0	28	30	1.0	29	31	1.0
33		Flash Fire	--	15	2	1.2	17	3	1.2	16	2	1.2	11	1	1.3	18	3	1.2	20	4	1.2
34		Fireball	--	58																	
35	Failure of Vaporizer (Full Inventory)	Jet Fire	20.9	13	11	1.0	15	11	1.0	13	11	1.0	12	11	1.0	14	11	1.0	15	11	1.0
			14.4	14	14	1.0	16	14	1.0	14	14	1.0	14	13	1.0	15	14	1.0	16	14	1.0
			7.3	17	19	1.0	19	19	1.0	17	19	1.0	17	19	1.0	18	19	1.0	19	19	1.0
36		Flash Fire	--	15	2	1.2	17	3	1.2	16	2	1.2	11	1	1.3	18	3	1.2	20	4	1.2
37		Fireball	--	68																	
38	Failure of Vaporizer (Partial Inventory)	Jet Fire	20.9	13	11	1.0	15	11	1.0	13	11	1.0	12	11	1.0	14	11	1.0	15	11	1.0
			14.4	14	14	1.0	16	14	1.0	14	14	1.0	14	13	1.0	15	14	1.0	16	14	1.0
			7.3	17	19	1.0	19	19	1.0	17	19	1.0	17	19	1.0	18	19	1.0	19	19	1.0
39		Flash Fire	--	15	2	1.2	17	3	1.2	16	2	1.2	11	1	1.3	18	3	1.2	20	4	1.2
40		Fireball	--	58																	

ID	Description	Outcome	Jetfire radiation level	3B			1D			4D			7D			2E			1F		
				a	b	d	a	b	d	a	b	d	a	b	d	a	b	d	a	b	d
41	Guillotine Failure of Flexible Hose (Full Inventory)	Jet Fire	20.9	21	19	1.0	24	18	1.0	21	19	1.0	20	19	1.0	22	19	1.0	24	18	1.0
			14.4	23	22	1.0	25	23	1.0	23	22	1.0	22	22	1.0	24	23	1.0	25	23	1.0
			7.3	27	30	1.0	29	31	1.0	27	30	1.0	26	30	1.0	28	30	1.0	29	31	1.0
42		Flash Fire	--	15	2	1.2	17	3	1.2	16	2	1.2	11	1	1.3	18	3	1.2	20	4	1.2
43		Fireball	--	68																	
44	Guillotine Failure of Flexible Hose (Partial Inventory)	Jet Fire	20.9	21	19	1.0	24	18	1.0	21	19	1.0	20	19	1.0	22	19	1.0	24	18	1.0
			14.4	23	22	1.0	25	23	1.0	23	22	1.0	22	22	1.0	24	23	1.0	25	23	1.0
			7.3	27	30	1.0	29	31	1.0	27	30	1.0	26	30	1.0	28	30	1.0	29	31	1.0
45		Flash Fire	--	15	2	1.2	17	3	1.2	16	2	1.2	11	1	1.3	18	3	1.2	20	4	1.2
46		Fireball	--	58																	
47	LPG Road Tanker BLEVE (Full Inventory)	Fireball	--	62																	
48	LPG Road Tanker BLEVE (Partial Inventory)	Fireball	--	50																	

Note:
a - Length of semi-major axis of plume (m)
b - Length of semi-minor axis of plume (m)
d - Offset raio between release point and centre of plume

Provision of Major Community Facilities and Open Space in Chai Wan

Type of Facilities	Hong Kong Planning Standards and Guidelines (HKPSG)	HKPSG Requirement (based on planned population)	Provision		Surplus/ Shortfall (against planned provision)
			Existing Provision	Planned Provision (including Existing Provision)	
District Open Space	10 ha per 100,000 persons#	16.90	14.34	15.48	-1.42
Local Open Space	10 ha per 100,000 persons#	16.90	23.46	25.34	+8.44
Secondary School	1 whole-day classroom for 40 persons aged 12-17	193	418	418	+225
Primary School	1 whole-day classroom for 25.5 persons aged 6-11	228	216	192	-36
Kindergarten/ Nursery	34 classrooms for 1,000 children aged 3 to under 6	76	127	127	+51
District Police Station	1 per 200,000 to 500,000 persons	0	0	0	0
Divisional Police Station	1 per 100,000 to 200,000 persons	0	1	1	+1
Hospital	5.5 beds per 1,000 persons^	956 beds	1,829	2,329	+1,373
Clinic/Health Centre	1 per 100,000 persons	1	3	4	+3
Magistracy (with 8 courtrooms)	1 per 660,000 persons	0	0	0	0
Child Care Centre	100 aided places per 25,000 persons#@	675 places	172	172	-503
Integrated Children and Youth Services Centre	1 for 12,000 persons aged 6-24#	2	3	3	+1
Integrated Family Services Centre	1 for 100,000 to 150,000 persons#	1	2	2	+1

Type of Facilities	Hong Kong Planning Standards and Guidelines (HKPSG)	HKPSG Requirement (based on planned population)	Provision		Surplus/ Shortfall (against planned provision)
			Existing Provision	Planned Provision (including Existing Provision)	
District Elderly Community Centres	One in each new development area with a population of around 170,000 or above#	N.A.	1	1	N.A.
Neighbourhood Elderly Centres	One in a cluster of new and redeveloped housing areas with a population of 15,000 to 20,000 persons, including both public and private housing#	N.A.	5	5	N.A.
Community Care Services (CCS) Facilities	17.2 subsidised places per 1,000 elderly persons aged 65 or above#*@	1,045 places	277	337	-708
Residential Care Homes for the Elderly	21.3 subsidised beds per 1,000 elderly persons aged 65 or above#@	1,295 beds	173	233	-1,062
Library	1 district library for every 200,000 persons$^{\pi}$	0	2	2	+2
Sports Centre	1 per 50,000 to 65,000 persons#	2	2	2	0
Sports Ground/ Sport Complex	1 per 200,000 to 250,000 persons#	0	1	1	+1
Swimming Pool Complex – standard	1 complex per 287,000 persons#	0	2	2	+2

Note:
The planned resident population of Chai Wan is about 168,962. If including transients, the overall planned population is about 173,853.

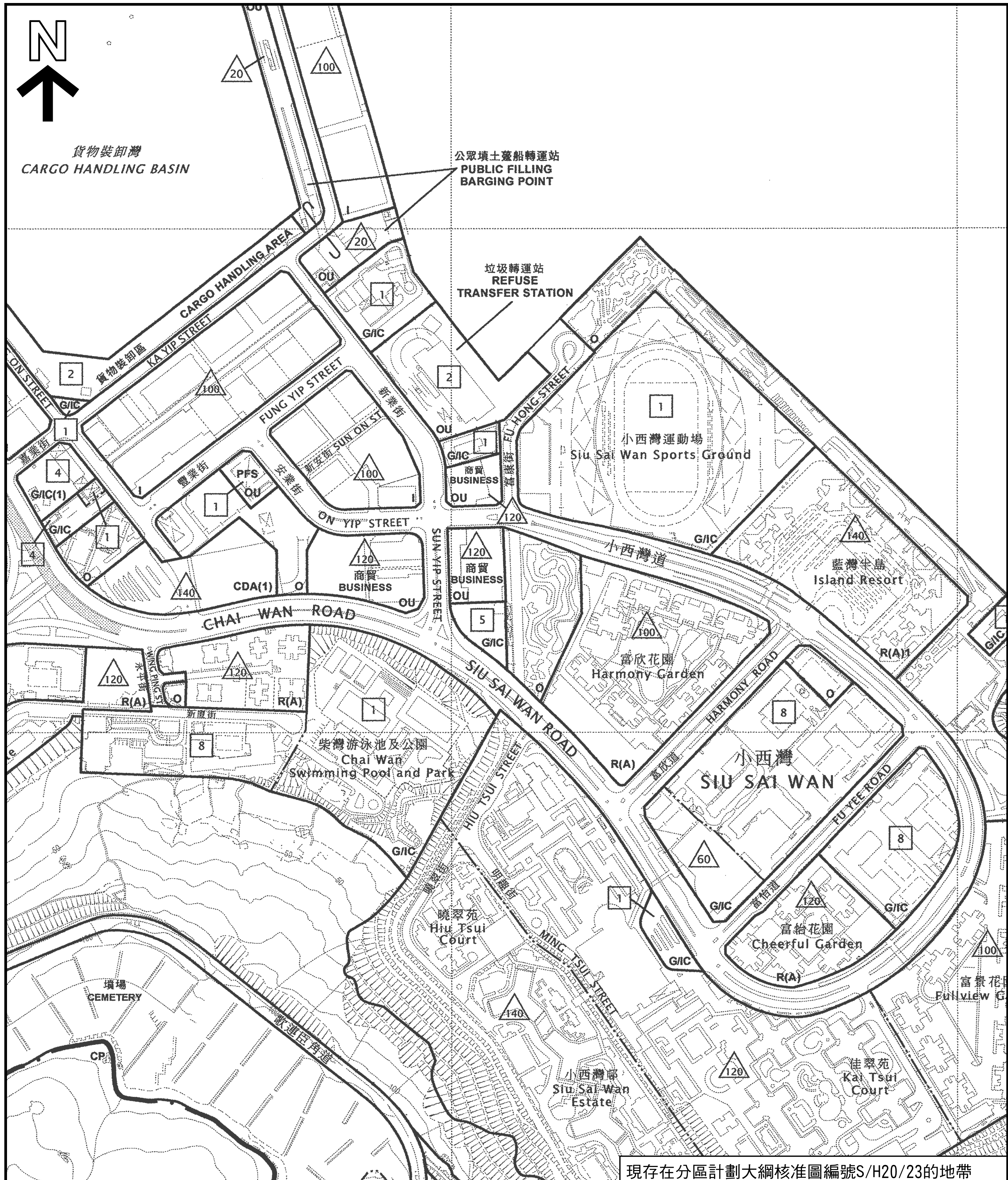
\# The requirements exclude planned population of transients.

^ The provision of hospital beds is to be assessed by the Hospital Authority on a regional basis.

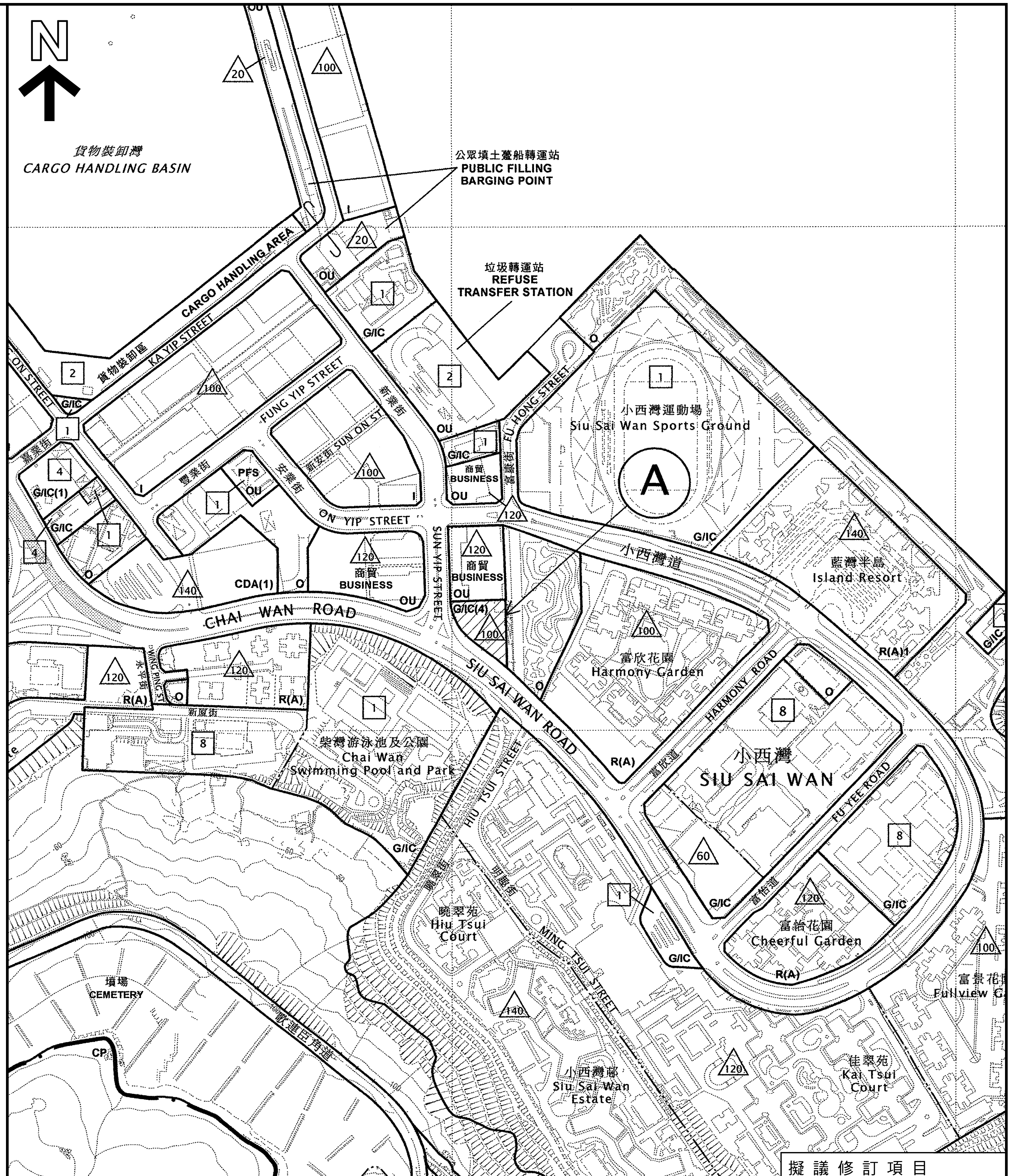
* Consisting of 40% centre-based CCS and 60% home-based CCS.

@ This is a long-term goal and the actual provision would be subject to the consideration of the Social Welfare Department in the planning and development process as appropriate.

π Small libraries are counted towards meeting the HKPSG requirement.



現存在分區計劃大綱核准圖編號S/H20/23的地帶
EXISTING ZONINGS ON OZP PLAN No. S/H20/23



擬 議 修 訂 項 目
PROPOSED AMENDMENTS

本摘要圖於2020年5月25日擬備，
所根據的資料為於2017年9月5日
核准的分區計劃大綱圖編號S/H20/23

EXTRACT PLAN PREPARED ON 25.5.2020
BASED ON OUTLINE ZONING PLAN No. S/H20/23
APPROVED ON 5.9.2017

分區計劃大綱圖上現有與擬議用途地帶的比較
COMPARISON OF EXISTING AND PROPOSED ZONINGS ON THE OZP

柴灣分區計劃大綱核准圖編號S/H20/23的擬議修訂項目
PROPOSED AMENDMENTS TO
THE APPROVED CHAI WAN OZP No. S/H20/23

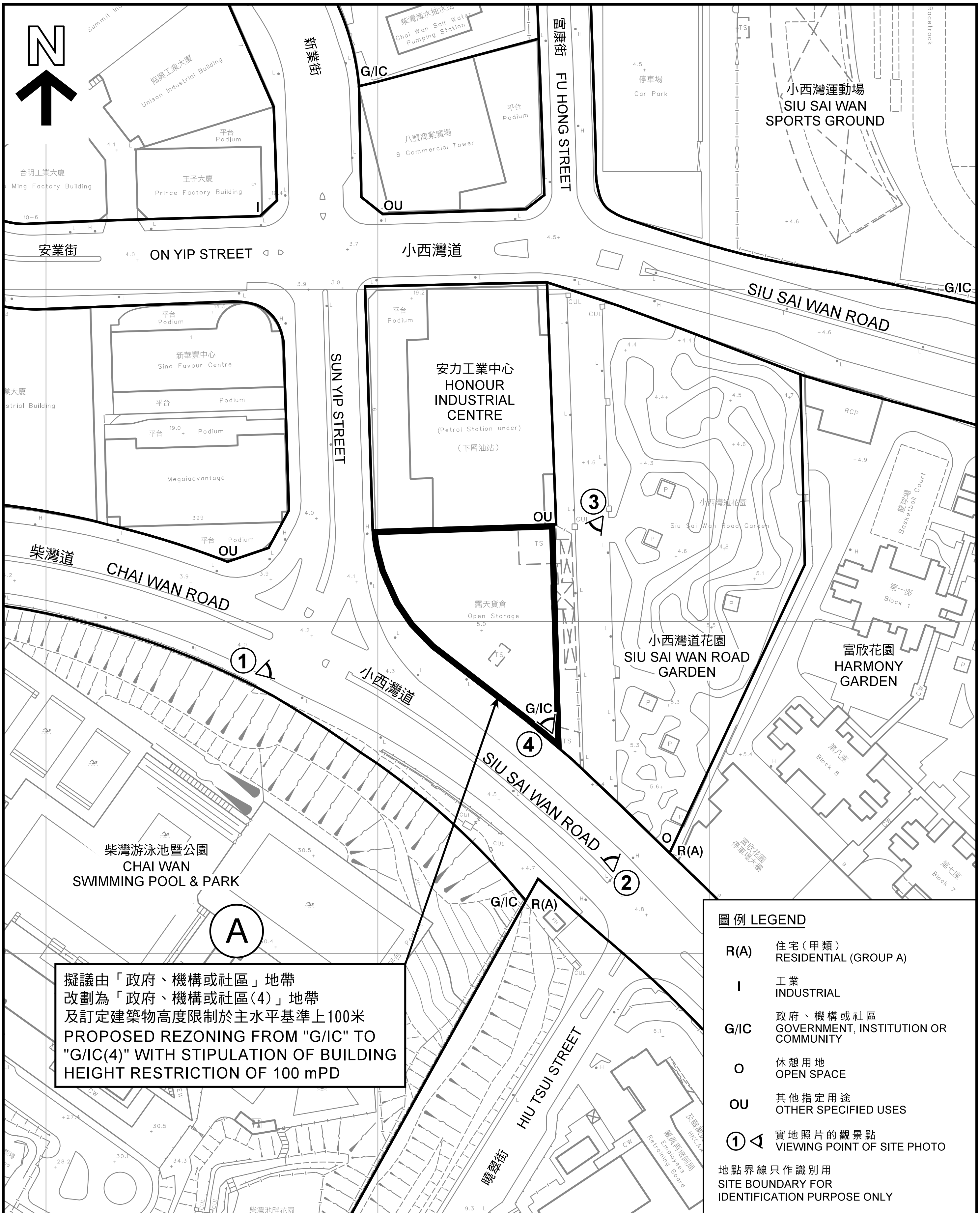
修訂項目A
AMENDMENT ITEM A

SCALE 1 : 5 000 比例尺
米 METRES 100 0 100 200 300 400 米 METRES

規 劃 署
PLANNING DEPARTMENT

參考編號
REFERENCE No.
M/H20/20/1

圖 PLAN
1



本摘要圖於2020年5月25日擬備，所根據的資料為測量圖編號11-SE-19B及20A

EXTRACT PLAN PREPARED ON 25.5.2020 BASED ON SURVEY SHEETS No. 11-SE-19B & 20A

平面圖 SITE PLAN

柴灣分區計劃大綱核准圖編號S/H20/23的擬議修訂項目

PROPOSED AMENDMENTS TO THE APPROVED CHAI WAN OZP No. S/H20/23

修訂項目A

AMENDMENT ITEM A

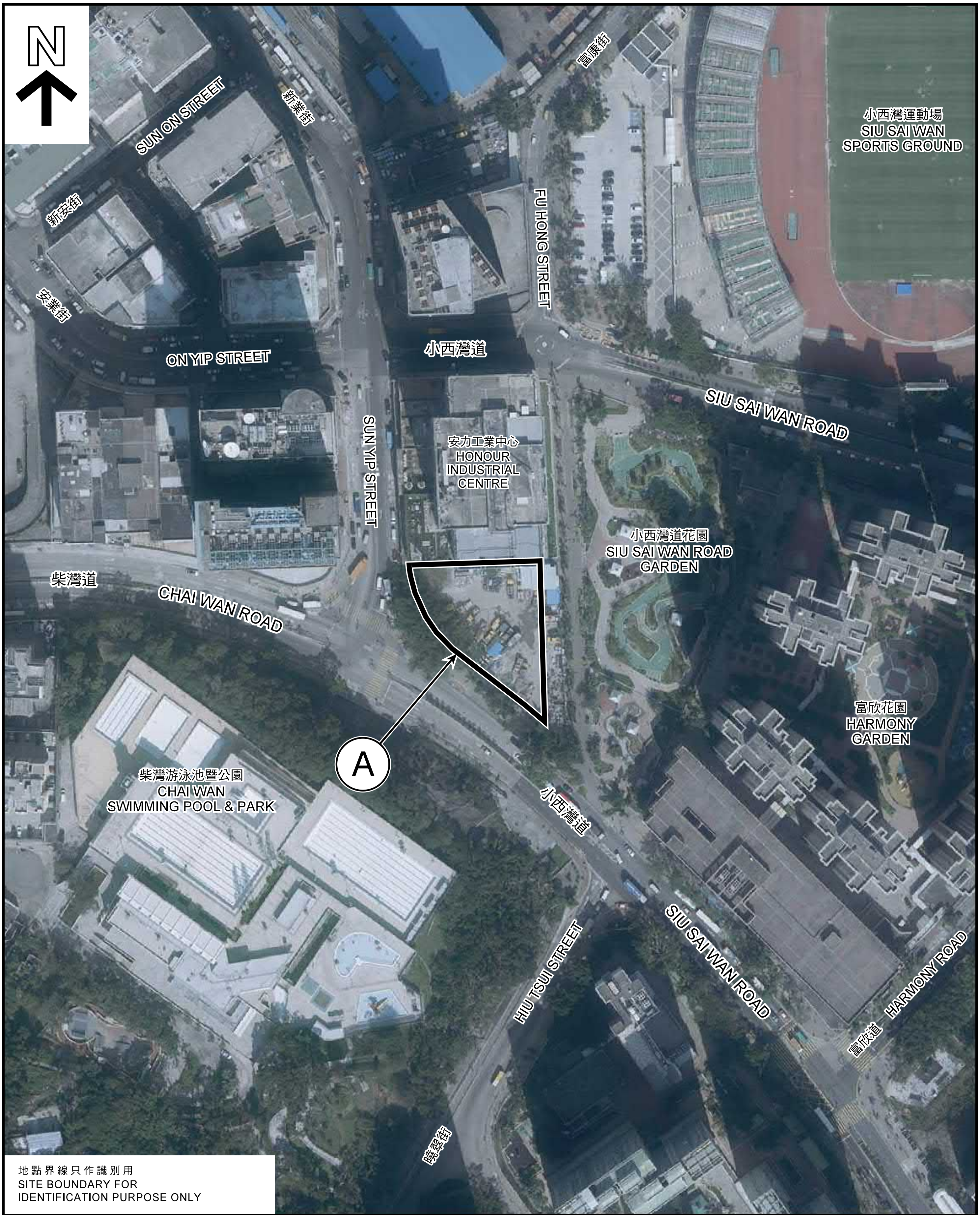
SCALE 1 : 1 500 比例尺

米 METRES 20 0 20 40 60 米 METRES

規劃署 PLANNING DEPARTMENT

參考編號 REFERENCE No. M/H20/20/1

圖 PLAN 2



本摘要圖於2020年5月25日擬備，所根據的資料為地政總署於2019年1月25日拍得的航攝照片編號E056045C

EXTRACT PLAN PREPARED ON 25.5.2020 BASED ON AERIAL PHOTO No.E056045C TAKEN ON 25.1.2019 BY LANDS DEPARTMENT

航攝照片 AERIAL PHOTO

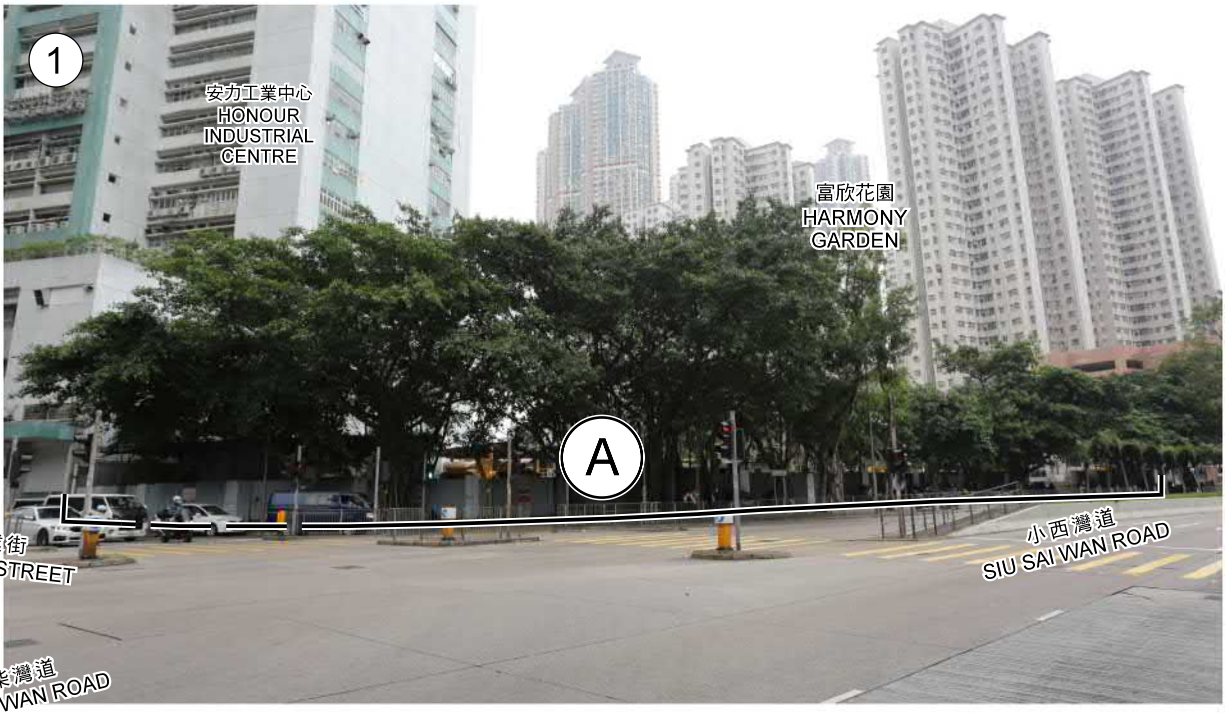
柴灣分區計劃大綱核准圖編號S/H20/23的擬議修訂項目
PROPOSED AMENDMENTS TO
THE APPROVED CHAI WAN OZP No. S/H20/23

修訂項目A
AMENDMENT ITEM A

規劃署
PLANNING
DEPARTMENT

參考編號
REFERENCE No.
M/H20/20/1

圖 PLAN
3



地點界線只作識別用
SITE BOUNDARY FOR IDENTIFICATION PURPOSE ONLY

本圖於2020年5月25日擬備，所根據的資料為攝於2020年3月19日的實地照片 EXTRACT PLAN PREPARED ON 25.5.2020 BASED ON SITE PHOTOS TAKEN ON 19.3.2020	**實地照片 SITE PHOTOS** 柴灣分區計劃大綱核准圖編號S/H20/23的擬議修訂項目 PROPOSED AMENDMENTS TO THE APPROVED CHAI WAN OZP No. S/H20/23 修訂項目A AMENDMENT ITEM A	規劃署 PLANNING DEPARTMENT 參考編號 REFERENCE No. M/H20/20/1	圖 PLAN 4

地點界線只作識別用
SITE BOUNDARY FOR IDENTIFICATION PURPOSE ONLY

本圖於2020年5月25日擬備，所根據的
資料為攝於2020年3月19日的實地照片
EXTRACT PLAN PREPARED ON 25.5.2020
BASED ON SITE PHOTOS TAKEN ON
19.3.2020

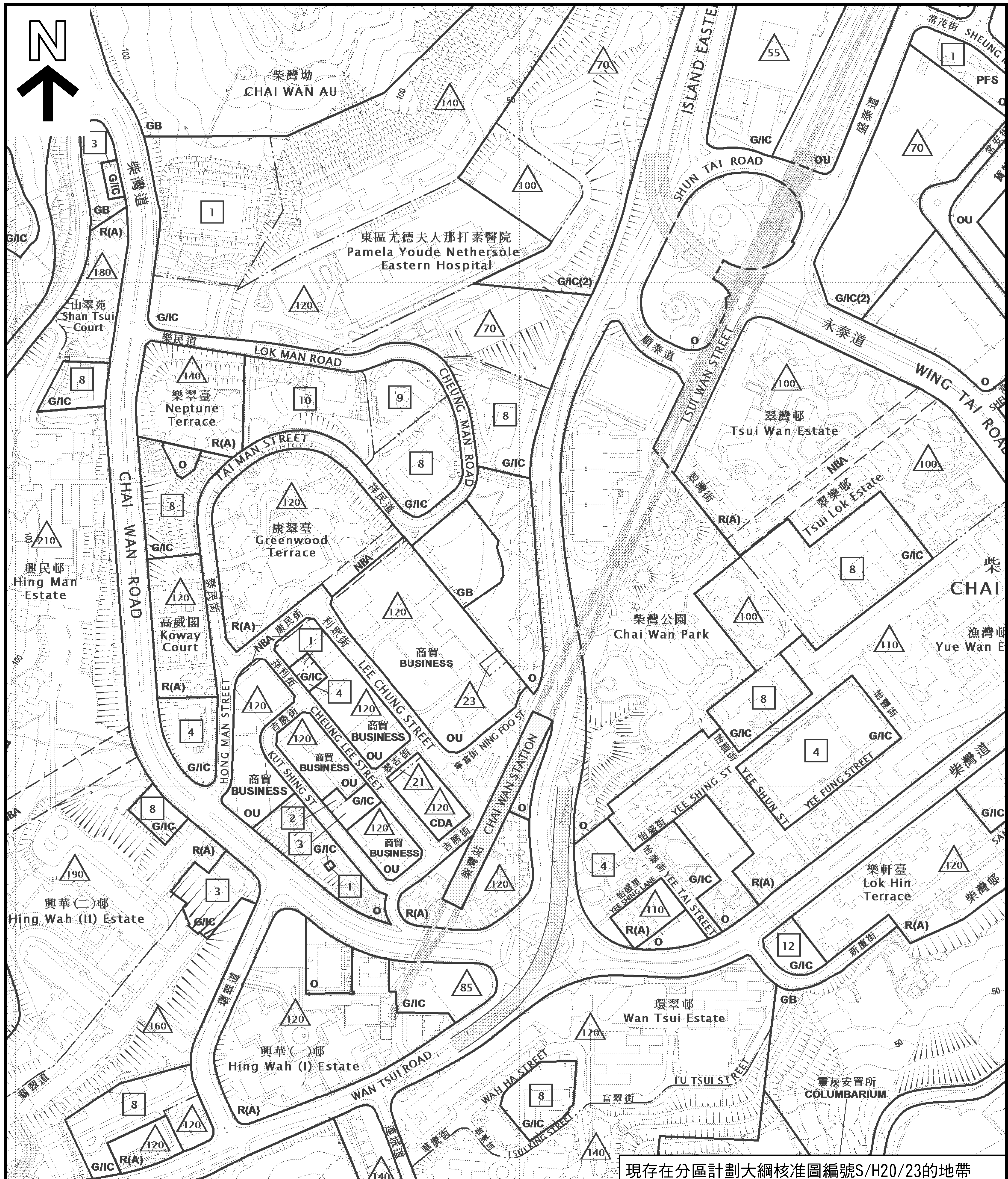
實地照片 SITE PHOTOS

柴灣分區計劃大綱核准圖編號S/H20/23的擬議修訂項目
PROPOSED AMENDMENTS TO
THE APPROVED CHAI WAN OZP No. S/H20/23
修訂項目A
AMENDMENT ITEM A

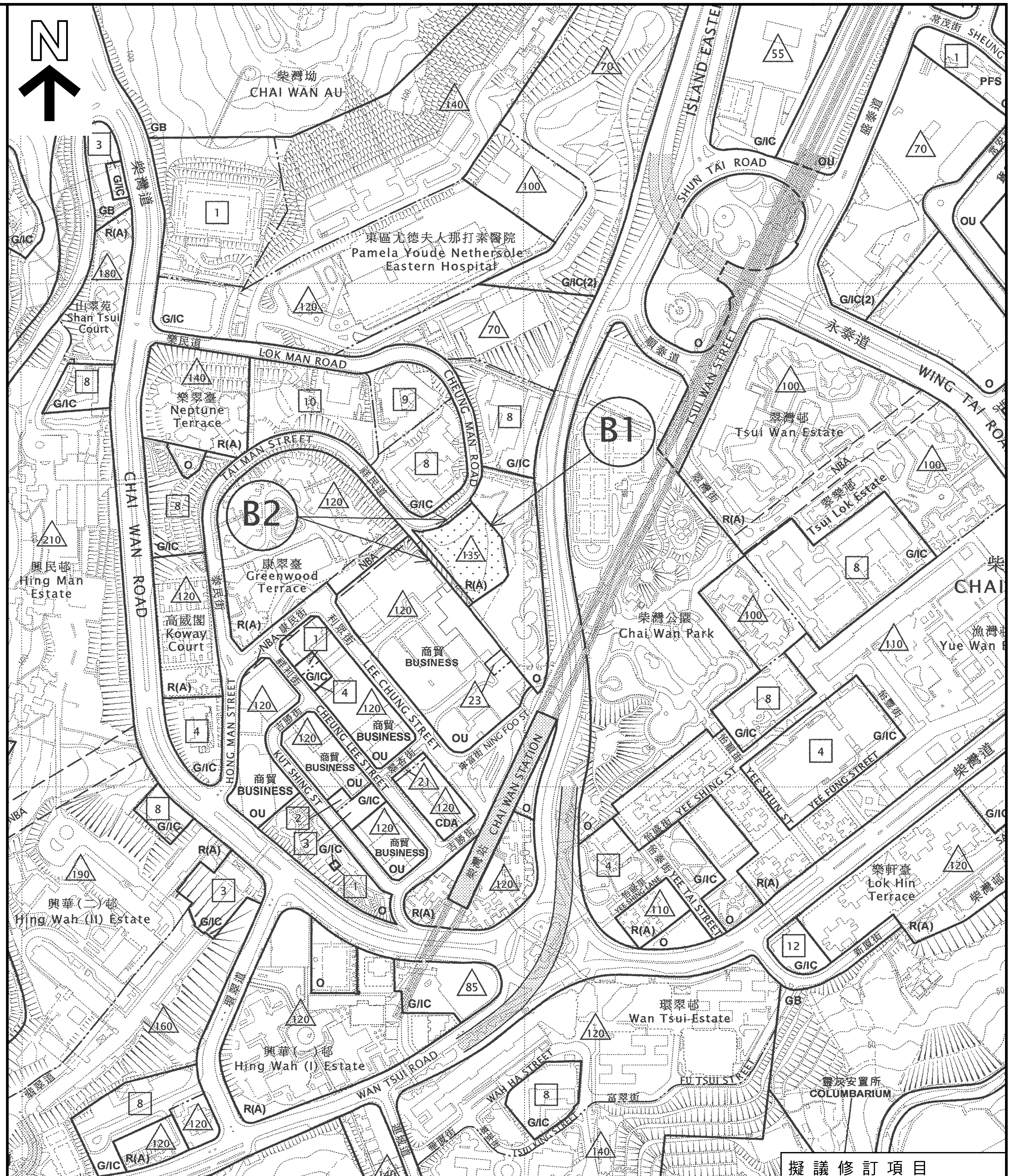
規劃署
PLANNING
DEPARTMENT

參考編號
REFERENCE No.
M/H20/20/1

圖 PLAN
5



現存在分區計劃大綱核准圖編號S/H20/23的地帶
EXISTING ZONINGS ON OZP PLAN No. S/H20/23



擬議修訂項目
PROPOSED AMENDMENTS

本摘要圖於2020年5月25日擬備，
所根據的資料為於2017年9月5日
核准的分區計劃大綱圖編號S/H20/23

EXTRACT PLAN PREPARED ON 25.5.2020
BASED ON OUTLINE ZONING PLAN No. S/H20/23
APPROVED ON 5.9.2017

分區計劃大綱圖上現有與擬議用途地帶的比較
COMPARISON OF EXISTING AND PROPOSED ZONINGS ON THE OZP

柴灣分區計劃大綱核准圖編號S/H20/23的擬議修訂項目
PROPOSED AMENDMENTS TO
THE APPROVED CHAI WAN OZP No. S/H20/23

修訂項目B1及B2
AMENDMENT ITEMS B1 & B2

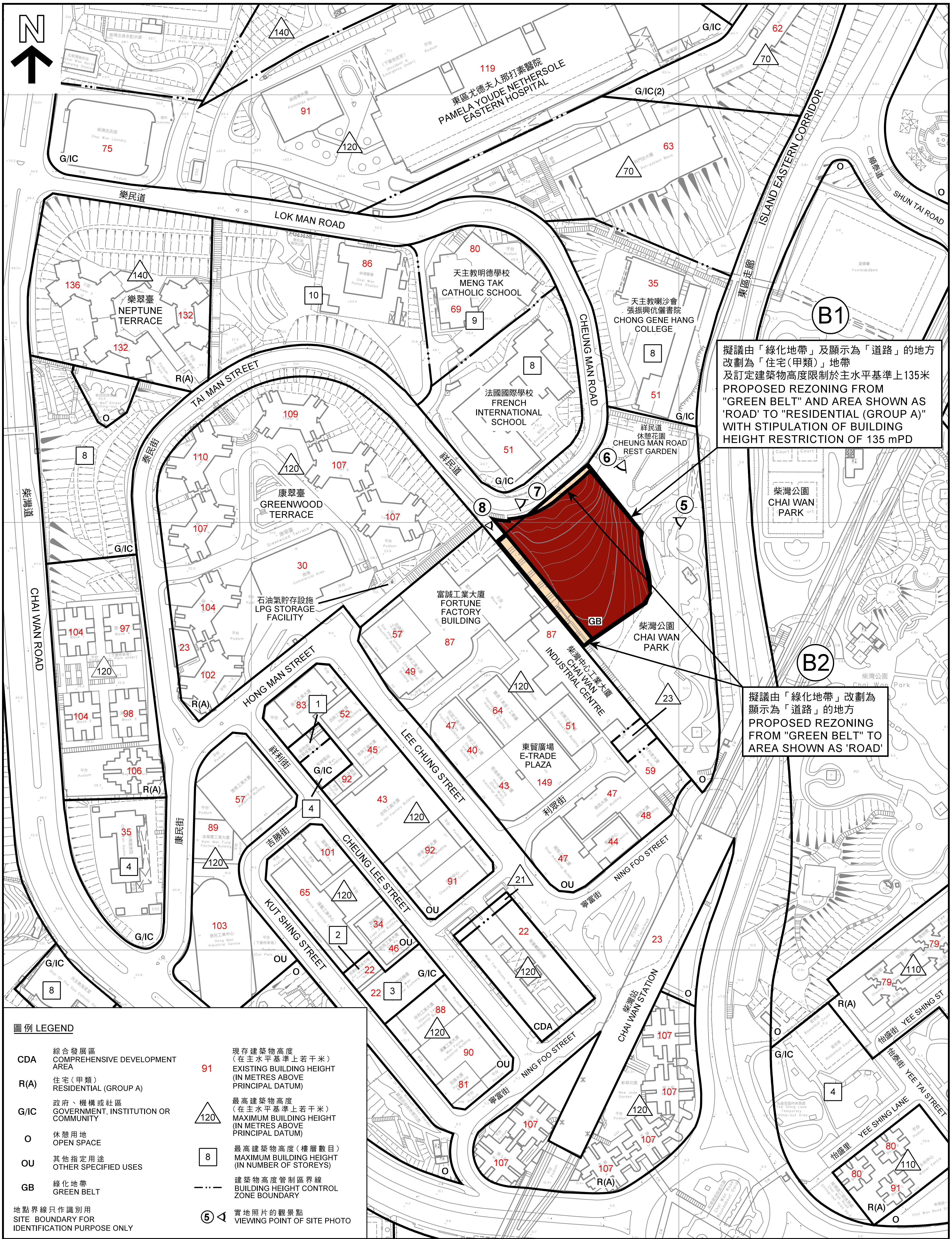
SCALE 1 : 5 000 比例尺

米 METRES 100 0 100 200 300 400 米 METRES

規劃署
PLANNING DEPARTMENT

參考編號
REFERENCE No.
M/H20/20/1

圖 PLAN
6



圖例 LEGEND

CDA	綜合發展區 COMPREHENSIVE DEVELOPMENT AREA	91	現存建築物高度（在主水平基準上若干米） EXISTING BUILDING HEIGHT (IN METRES ABOVE PRINCIPAL DATUM)
R(A)	住宅(甲類) RESIDENTIAL (GROUP A)	120	最高建築物高度（在主水平基準上若干米） MAXIMUM BUILDING HEIGHT (IN METRES ABOVE PRINCIPAL DATUM)
G/IC	政府、機構或社區 GOVERNMENT, INSTITUTION OR COMMUNITY		
O	休憩用地 OPEN SPACE	8	最高建築物高度（樓層數目） MAXIMUM BUILDING HEIGHT (IN NUMBER OF STOREYS)
OU	其他指定用途 OTHER SPECIFIED USES		
GB	綠化地帶 GREEN BELT		建築物高度管制區界線 BUILDING HEIGHT CONTROL ZONE BOUNDARY
	地點界線只作識別用 SITE BOUNDARY FOR IDENTIFICATION PURPOSE ONLY	5	實地照片的觀景點 VIEWING POINT OF SITE PHOTO

本摘要圖於2020年5月25日擬備，所根據的資料為測量圖編號11-SE-14C及19A

EXTRACT PLAN PREPARED ON 25.5.2020 BASED ON SURVEY SHEETS No. 11-SE-14C & 19A

平面圖 SITE PLAN

柴灣分區計劃大綱核准圖編號S/H20/23的擬議修訂項目

PROPOSED AMENDMENTS TO THE APPROVED CHAI WAN OZP No. S/H20/23

修訂項目B1及B2

AMENDMENT ITEMS B1 & B2

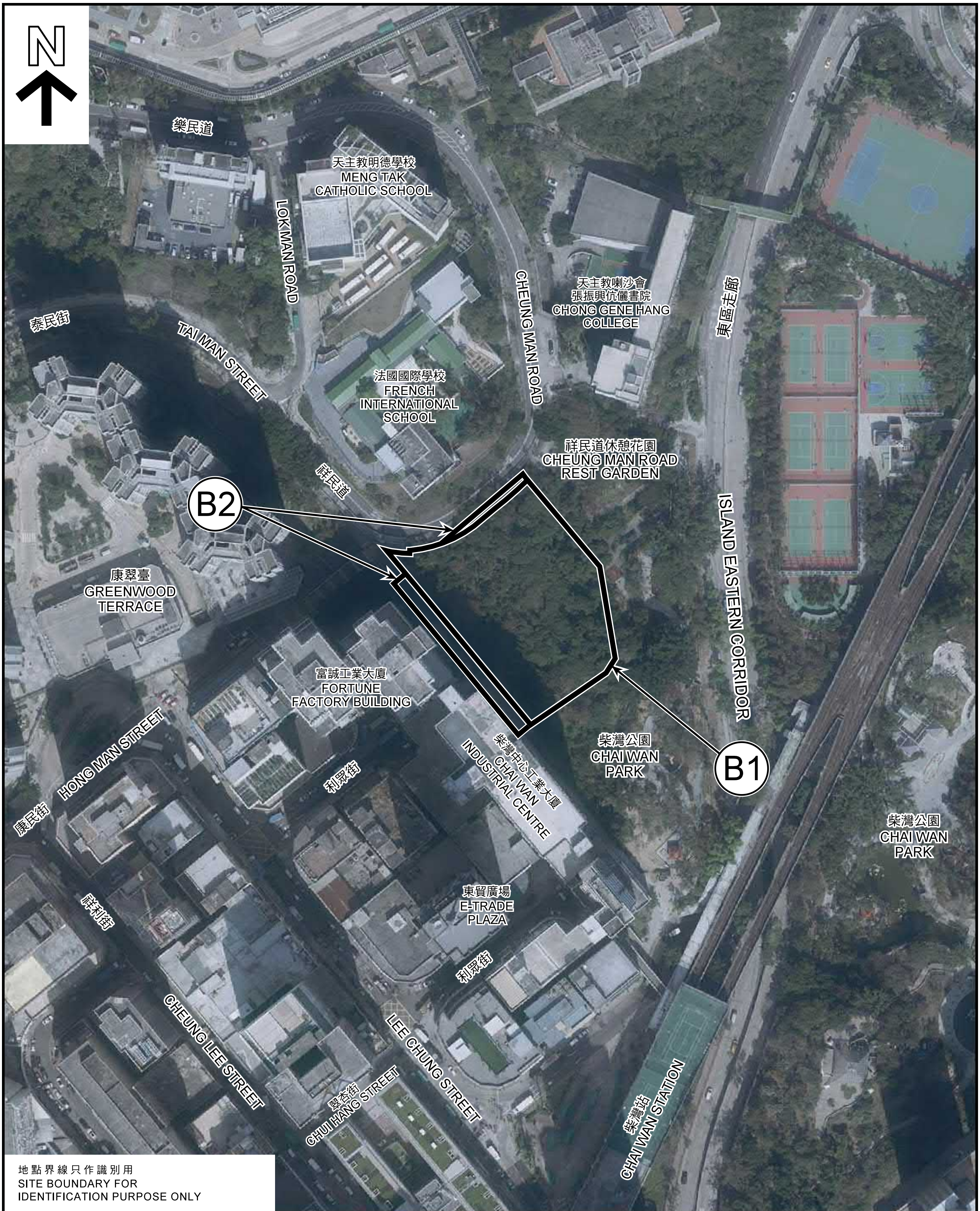
SCALE 1 : 2 000 比例尺

米 METRES 40 0 40 80 120 160 米 METRES

規劃署 PLANNING DEPARTMENT

參考編號 REFERENCE No. M/H20/20/1

圖 PLAN 7



地點界線只作識別用
SITE BOUNDARY FOR
IDENTIFICATION PURPOSE ONLY

本摘要圖於2020年5月25日擬備，所根據的資料為地政總署於2019年1月25日拍得的航攝照片編號E056039C

EXTRACT PLAN PREPARED ON 25.5.2020 BASED ON AERIAL PHOTO No.E056039C TAKEN ON 25.1.2019 BY LANDS DEPARTMENT

航攝照片 AERIAL PHOTO

柴灣分區計劃大綱核准圖編號S/H20/23的擬議修訂項目
PROPOSED AMENDMENTS TO
THE APPROVED CHAI WAN OZP No. S/H20/23
修訂項目B1及B2
AMENDMENT ITEMS B1 & B2

規劃署
PLANNING
DEPARTMENT

參考編號
REFERENCE No.
M/H20/20/1

圖 PLAN
8

地點界線只作識別用
SITE BOUNDARY FOR IDENTIFICATION PURPOSE ONLY

本圖於2020年5月25日擬備，所根據的資料為攝於2020年3月19日的實地照片 EXTRACT PLAN PREPARED ON 25.5.2020 BASED ON SITE PHOTOS TAKEN ON 19.3.2020	**實地照片 SITE PHOTOS** 柴灣分區計劃大綱核准圖編號S/H20/23的擬議修訂項目 PROPOSED AMENDMENTS TO THE APPROVED CHAI WAN OZP No. S/H20/23 修訂項目B1及B2 AMENDMENT ITEMS B1 & B2	規劃署 PLANNING DEPARTMENT 參考編號 REFERENCE No. M/H20/20/1 圖 PLAN 9

地點界線只作識別用
SITE BOUNDARY FOR IDENTIFICATION PURPOSE ONLY

本圖於2020年5月25日擬備，所根據的資料為攝於2020年3月19日的實地照片
EXTRACT PLAN PREPARED ON 25.5.2020 BASED ON SITE PHOTOS TAKEN ON 19.3.2020

實地照片 SITE PHOTOS

柴灣分區計劃大綱核准圖編號S/H20/23的擬議修訂項目
PROPOSED AMENDMENTS TO
THE APPROVED CHAI WAN OZP No. S/H20/23
修訂項目B1及B2
AMENDMENT ITEMS B1 & B2

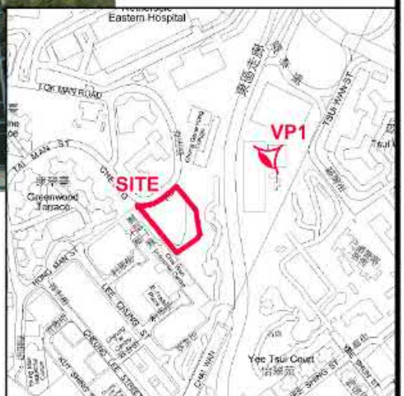
規劃署
PLANNING DEPARTMENT

參考編號
REFERENCE No.
M/H20/20/1

圖 PLAN
10

Existing View

With Proposed Development



LEGEND:

PROPOSED NEW FOOTBRIDGE

PHOTOMONTAGE AT VIEWPOINT 1
(VIEW FROM BASKETBALL COURT,
CHAI WAN PARK)

HOUSING DEPARTMENT
PLANNING SECTIONS

Figure 1

DATE :
04. 12. 2018

本圖於2020年5月25日擬備。
PLAN PREPARED ON 25.5.2020

合成照片 PHOTOMONTAGE

柴灣分區計劃大綱核准圖編號S/H20/23的擬議修訂項目
PROPOSED AMENDMENTS TO
THE APPROVED CHAI WAN OZP No. S/H20/23
修訂項目B1
AMENDMENT ITEMS B1

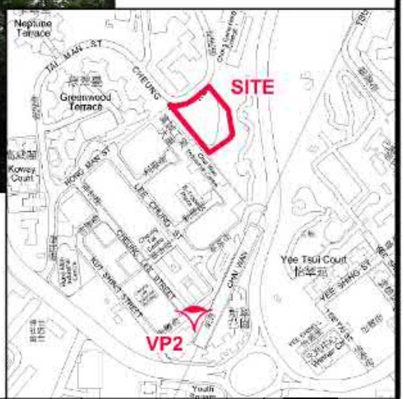
規劃署
PLANNING
DEPARTMENT

參考編號
REFERENCE No.
M/H20/20/1

圖 PLAN
11a

Existing View

With Proposed Development



PHOTOMONTAGE AT VIEWPOINT 2
(VIEW FROM CHAI WAN MTR STATION (EXIT E) AT FOOTBRIDGE LEVEL)

HOUSING DEPARTMENT
PLANNING SECTIONS

Figure 2	DATE : 04. 12. 2018

合成照片 PHOTOMONTAGE

柴灣分區計劃大綱核准圖編號S/H20/23的擬議修訂項目
PROPOSED AMENDMENTS TO
THE APPROVED CHAI WAN OZP No. S/H20/23
修訂項目B1
AMENDMENT ITEMS B1

本圖於2020年5月25日擬備。
PLAN PREPARED ON 25.5.2020

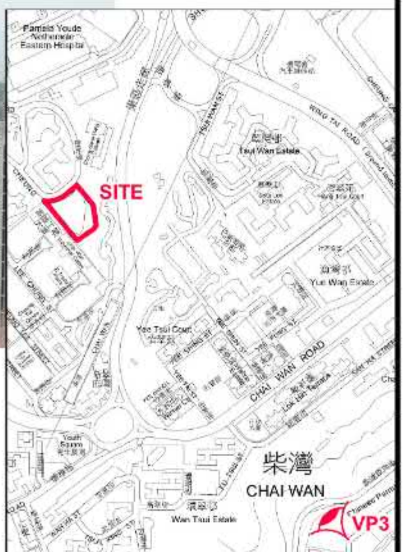
規劃署
PLANNING
DEPARTMENT

參考編號
REFERENCE No.
M/H20/20/1

圖 PLAN
11b

Existing View

With Proposed Development



PHOTOMONTAGE AT VIEWPOINT 3
(VIEW FROM CHINESE PERMANENT CEMETERY)

HOUSING DEPARTMENT
PLANNING SECTIONS

Figure 3

DATE :
04. 12. 2018

本圖於2020年5月25日擬備。
PLAN PREPARED ON 25.5.2020

合成照片 PHOTOMONTAGE

柴灣分區計劃大綱核准圖編號S/H20/23的擬議修訂項目
PROPOSED AMENDMENTS TO
THE APPROVED CHAI WAN OZP No. S/H20/23
修訂項目B1
AMENDMENT ITEMS B1

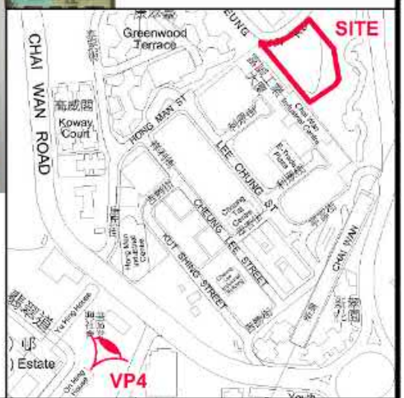
規劃署
PLANNING
DEPARTMENT

參考編號
REFERENCE No.
M/H20/20/1

圖 PLAN
11c

Existing View

With Proposed Development



PHOTOMONTAGE AT VIEWPOINT 4 (VIEW FROM PODIUM OF ON HING HOUSE, HING WAH (II) ESTATE)

HOUSING DEPARTMENT PLANNING SECTIONS

Figure 4

DATE : 04. 12. 2018

合成照片 PHOTOMONTAGE

本圖於2020年5月25日擬備。
PLAN PREPARED ON 25.5.2020

柴灣分區計劃大綱核准圖編號S/H20/23的擬議修訂項目
PROPOSED AMENDMENTS TO
THE APPROVED CHAI WAN OZP No. S/H20/23
修訂項目B1
AMENDMENT ITEMS B1

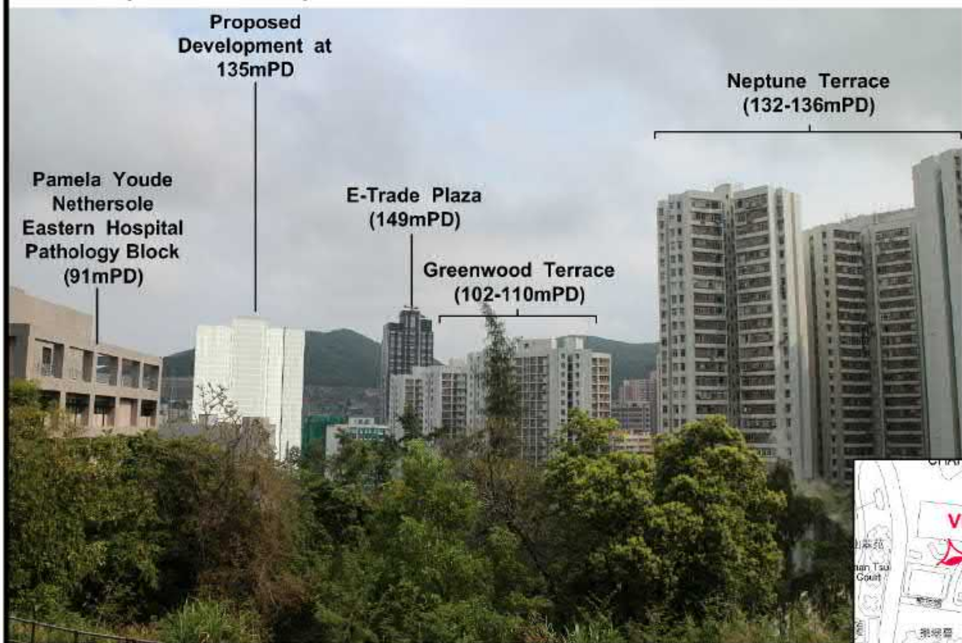
規劃署
PLANNING DEPARTMENT

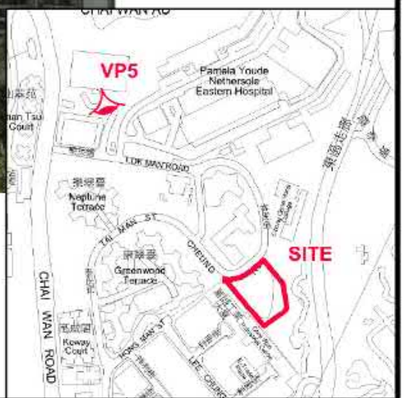
參考編號
REFERENCE No.
M/H20/20/1

圖 PLAN
11d

Existing View

With Proposed Development





PHOTOMONTAGE AT VIEWPOINT 5 (VIEW FROM CHAI WAN NORTH SERVICE RESERVOIR PLAYGROUND)

HOUSING DEPARTMENT
PLANNING SECTIONS

Figure 5

DATE : 04. 12. 2018

合成照片 PHOTOMONTAGE

本圖於2020年5月25日擬備。
PLAN PREPARED ON 25.5.2020

柴灣分區計劃大綱核准圖編號S/H20/23的擬議修訂項目
PROPOSED AMENDMENTS TO
THE APPROVED CHAI WAN OZP No. S/H20/23
修訂項目B1
AMENDMENT ITEMS B1

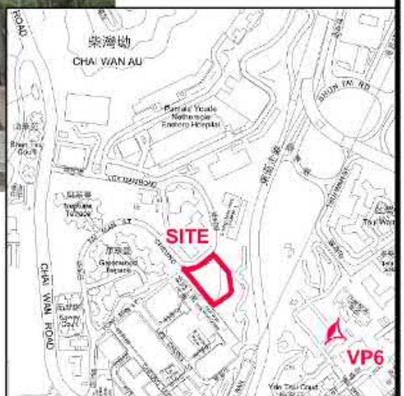
規劃署
PLANNING
DEPARTMENT

參考編號
REFERENCE No.
M/H20/20/1

圖 PLAN
11e

Existing View

With Proposed Development



LEGEND:

PROPOSED NEW FOOTBRIDGE

PHOTOMONTAGE AT VIEWPOINT 6 (VIEW FROM MODEL BOAT POOL, CHAI WAN PARK)

HOUSING DEPARTMENT
PLANNING SECTIONS

Figure 6

DATE :
04. 12. 2018

本圖於2020年5月25日擬備。
PLAN PREPARED ON 25.5.2020

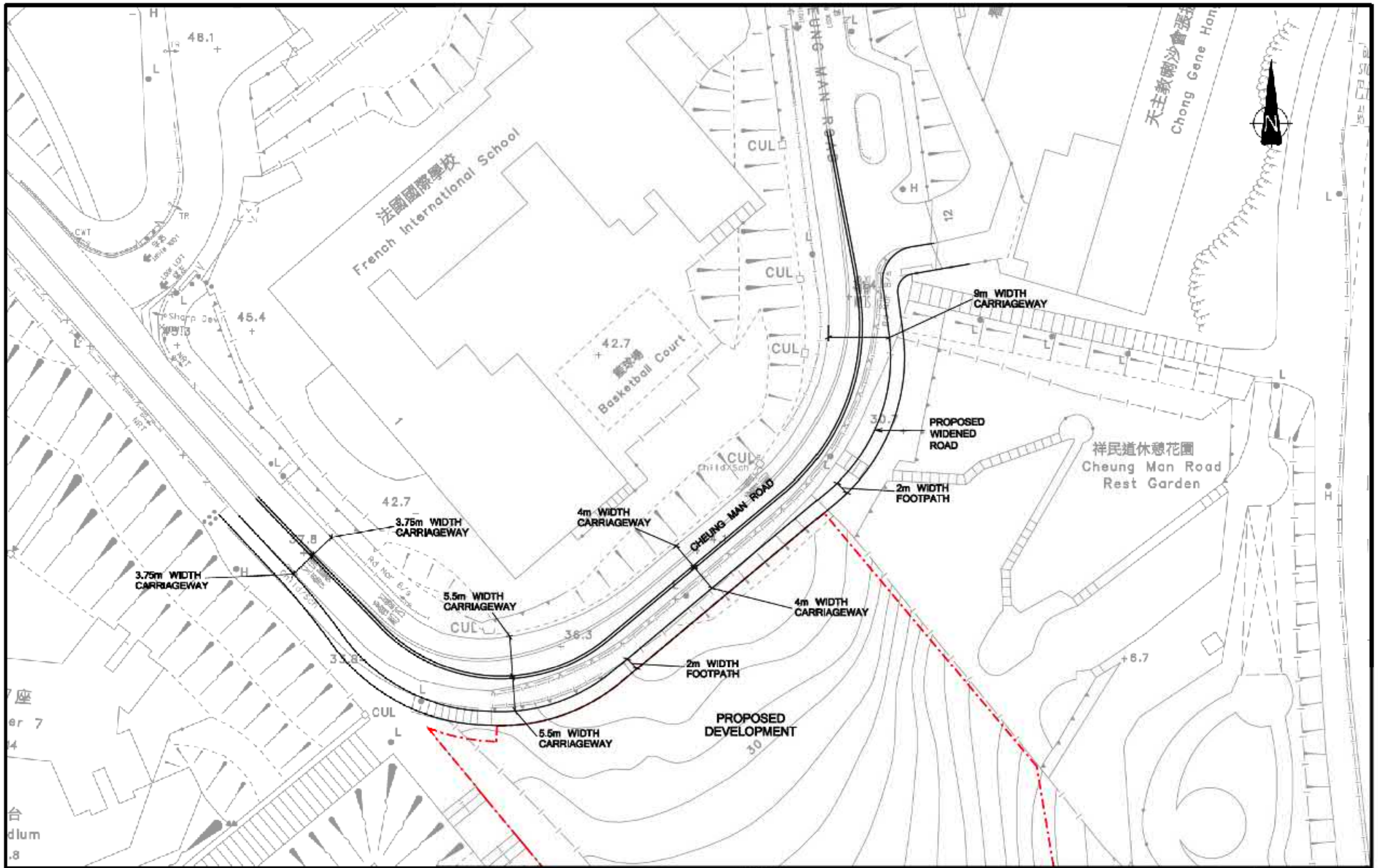
合成照片 PHOTOMONTAGE

柴灣分區計劃大綱核准圖編號S/H20/23的擬議修訂項目
PROPOSED AMENDMENTS TO
THE APPROVED CHAI WAN OZP No. S/H20/23
修訂項目B1
AMENDMENT ITEMS B1

規劃署
PLANNING
DEPARTMENT

參考編號
REFERENCE No.
M/H20/20/1

圖 PLAN
11f



Rev.	Description	Checked	Date
-	-	-	-
-	-	-	-
-	-	-	-
A	MINOR AMENDMENT	GPH	21MAY19

CHK50196317/TIA1/F62-A.DGN/CKC/21MAY19

Project Title: PROPOSED PUBLIC HOUSING DEVELOPMENT AT CHEUNG MAN ROAD, CHAI WAN - TIA

Drawing Title: **PROPOSED ROAD IMPROVEMENT OF CHEUNG MAN ROAD**

Designed	Checked	Scale	Date	Drawing No.	Rev.
LAU	GPH	1:500(A3)	FEB 2019	6.2	A

SYSTRA MVA

本圖於2020年5月25日擬備
PLAN PREPARED ON 25.5.2020

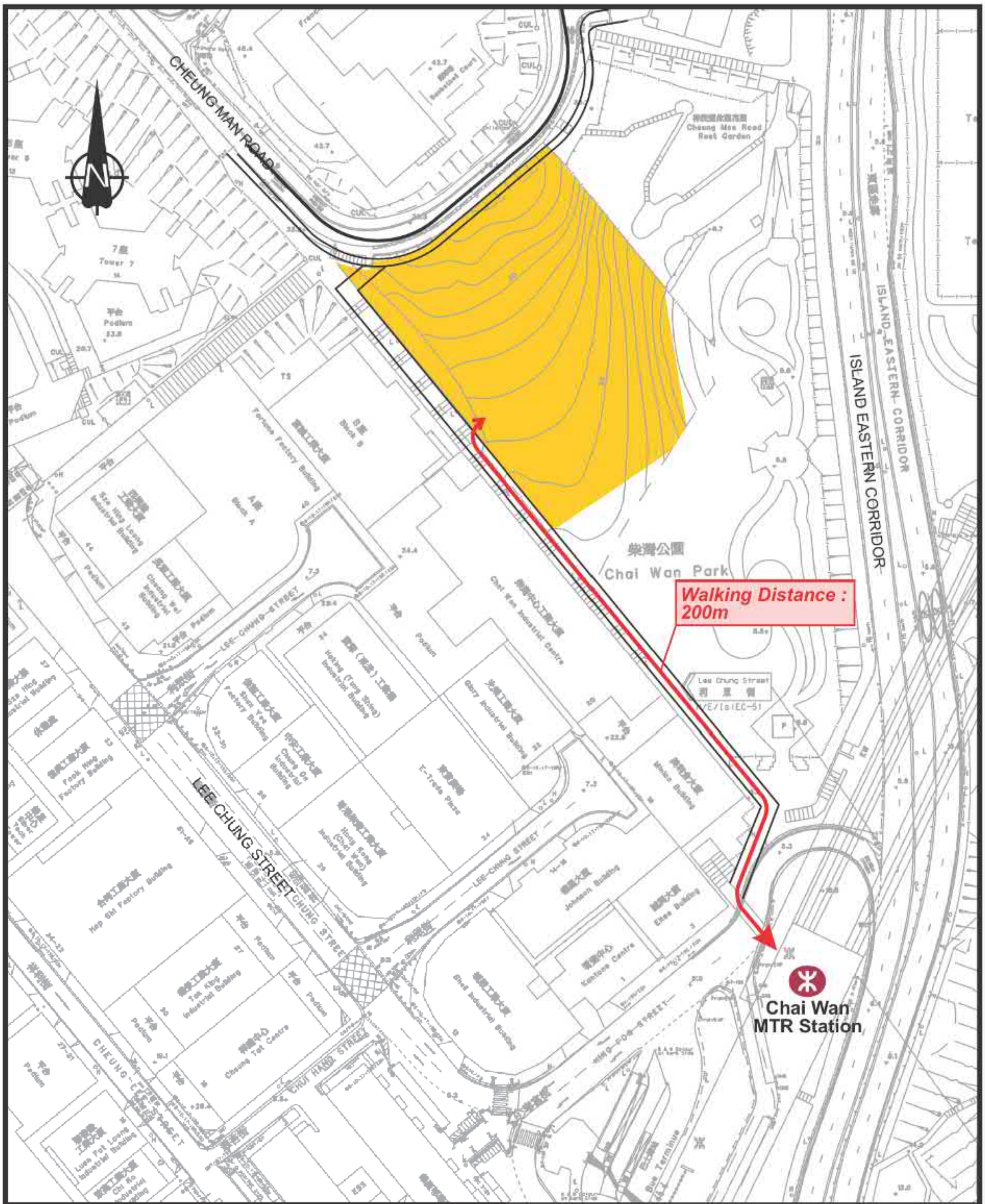
擬議道路改善工程
PROPOSED ROAD IMPROVEMENT

柴灣分區計劃大綱核准圖編號S/H20/23的擬議修訂項目
PROPOSED AMENDMENTS TO
THE APPROVED CHAI WAN OZP No. S/H20/23
修訂項目B1及B2
AMENDMENT ITEMS B1 & B2

規劃署
PLANNING DEPARTMENT

參考編號
REFERENCE No.
M/H20/20/1

圖 PLAN
12a



Rev.	Description	Checked	Date	Rev.	Description	Checked	Date
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-

Project Title

PROPOSED PUBLIC HOUSING DEVELOPMENT AT CHEUNG MAN ROAD, CHAI WAN - TIA

Drawing Title

FUTURE WALKING PATH FROM THE PROPOSED DEVELOPMENT TO CHAI WAN MTR STATION

Designed	Checked	Scale	Date	Drawing No.	Rev.
HKH	GPH	NTS	NOV 2018	7.1	-

SYSTRA MVA

本圖於2020年5月25日擬備。
PLAN PREPARED ON 25.5.2020

擬議行人天橋
PROPOSED PEDESTRIAN FOOTBRIDGE

柴灣分區計劃大綱核准圖編號S/H20/23的擬議修訂項目
PROPOSED AMENDMENTS TO THE APPROVED CHAI WAN OZP No. S/H20/23
修訂項目B1及B2
AMENDMENT ITEMS B1 & B2

規劃署
PLANNING DEPARTMENT

參考編號
REFERENCE No.
M/H20/20/1

圖 PLAN
12b