APPENDIX 8

TRAFFIC IMPACT ASSESSMENT

REVIOUSLY SUBMITTED FOR THE SECOND PLANNING APPLICATION (A/YL/289)

LIST OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1. INTRODUCTION

1.1 Background

1.1.1 The application site is located at Lots nos. 1695 S.E SS. 1 RP, 1695 S.F SS.1, 1695 S.H RP and adjoining Government Land in D.D. 120, Tai Kei Leng, Yuen Long, New Territories. The site location is shown in **Figure 1.1**.

1.1.2 The applicant intends to develop a proposed Residential Care Home for the Elderly (RCHE) and convert an existing Grade 3 historic building, called “Siu Lo” for "House" use. A planning application proposed minor relaxation of building height restriction from 3 to 5 storeys [Planning application no. A/YL/256] had been submitted and approved in year 2020. The applicant intends to apply a new minor relaxation of building height restriction from 3 to 6 storeys.

1.1.3 In support of the aforesaid application, a traffic impact assessment is required to review and appraise any possible traffic impact induced by the proposed development on the adjacent road network.

1.1.4 CTA Consultants Limited (CTA) was therefore commissioned as the traffic consultant to prepare the Traffic Impact Assessment (TIA) and provide technical justifications in supporting the application from traffic engineering point of view.

1.2 Study Objectives

1.2.1 Main objectives of this study are listed below:

- To assess the existing and proposed traffic arrangement & provision of internal transport facilities at the subject site;
- To assess the existing traffic condition in the vicinity of the proposed development;
- To estimate traffic trips related to the proposed development;
- To carry out forecasts about traffic demand of the adjacent road network in design year 2028;
- To appraise any possible traffic impact induced by the proposed development

on the adjacent road network;

- To recommend traffic improvement measures to alleviate any foreseeable traffic problem to the surrounding road network, if any.

Conservation of a Grade 3 Historic Building in Yuen Long Siu Lo
Traffic Impact Assessment
Revised Final Report (July 2022)
We commit We deliver
用心以誠

2. THE PROPOSED DEVELOPMENT

2.1 Site Location

2.1.1 The application site is located at Lots nos. 1695 S.E SS. 1 RP, 1695 S.F SS.1, 1695 S.H RP and adjoining Government Land in D.D. 120, Tai Kei Leng, Yuen Long, New Territories. The site location is shown in **Figure 1.1**.

2.2 Development Proposal

2.2.1 Parameters of the proposed development are listed in **Table 2.1**.

Table 2.1 Parameters of the Proposed Development

	Proposed Scheme	Approved scheme (A/YL/256)
Proposed Use	Residential Care Home for the Elderly (RCHE)	Residential Care Home for the Elderly (RCHE)
Site Area	About 1,953 m^2	About 1,714.229 m^2
Total Accountable GFA	About 5,768 m^2 (excluding car park GFA)	About 4,267 m^2
No. of Storeys	6	5 (include 1 basement)
No. of Beds	281 (or within a range of 260 – 300)	170

2.2.2 It is anticipated that the proposed development will be commissioned in year 2025. Therefore, design year 2028 (i.e. 3 years after the planned commencement year of the proposed development) is adopted for the Traffic Impact Assessment.

2.2.3 The proposed RCHE will operate 24 hours a day with 3 shifts of workers, the working hour hours are:

(i) 7am to 3pm,
(ii) 3pm to 10pm, and
(iii) 10pm to 7am.

Thus, trips by the staffs actually would not occur at the morning peak hour

2.2.4 It is understood that Hong Kong workers mainly go to works by public transport. Bus stops are provided near the proposed development which is convenience for the staff to travel by public transport. Moreover, staffs will not be allowed to use the parking spaces unless authorization is obtained from the management. Thus, most of the staff would be controlled to use public transport for their mode of transport.

2.3 Provision of Internal Transport Facilities

2.3.1 It is revealed that there is no parking standard for "Residential Home for Elderly" in HKPSG, therefore, the parking provision of other existing RCHEs has been referenced and are summarized in **Table 2.2** below:

Table 2.2 Examples of Existing RCHE

Name of RCHE	Location	No. of beds	No. of Staff	Observed no. of Parking Provision	Parking Facilities[(1)(2)(3)] (Category 1/2/3)
Assemblies of God Holy Light Church Aged Home	91 Sung Ching Sun Tsuen, Tai Tong Road, Yuen Long	60	19	Nil	Category 1
Chinese Christian Worker's Fellowship Wah Hei Elderly Home (Comet Mansion	G/F & M/F, Shop 27, Comet Mansion, 45-67 Fung Cheung Road, Yuen Long	105	29	Nil	Category 1
Pok Oil Hospital Jockey Club Care and Attention Home	Lot 1392 & 837 R.P. in D.D. 115, Au Tau, Yuen Long	213	124	Nil	Category 2
Po Leung Kuk Tin Yan Home for the Elderly cum Green Joy Day Care Centre for the Elderly	3/F and 4/F, Ancillary Facilities Block, Tin Yan Estate, Tin Shui Wai	106	74	Nil	Category 2
Yan Oi Tong Tin Ka Ping Care and Attention Home	G/F & 1/F, Wah Ping House, Long Ping Estate, Yuen Long	85	51	Nil	Category 2
T.W.G.Hs. Y. C. Liang Memorial Home for the Elderly	G/F & 1/F, Yiu Yat House, Tin Yiu Estate, Tin Shui Wai	88	47	Nil	Category 1
Caritas Ying Shui Home	3/F, Ying Shui House, Shui Pin Wai Estate, Yuen Long	75	47	Nil	Category 2
Salvation Army Kam Tin Residence for Senior Citizens (The)	103 Kam Tin Road, Yuen Long	150	81	1 car parking space + 1 light bus parking spaces	Category 3
Pok Oi Hospital Yeung Chun Pui Care and Attention Home	58 Sha Chau Lei Tsuen, Ha Tsuen, Yuen Long	143	92	2 car parking spaces + 1 light bus parking spaces	Category 3
Pok Oi Hospital Tai	G/F-3/F & KW307,	109	75	Nil	Category 2

Conservation of a Grade 3 Historic Building in Yuen Long Siu Lo
Traffic Impact Assessment
Revised Final Report (July 2022)
We commit We deliver
用心以誠

Name of RCHE	Location	No. of beds	No. of Staff	Observed no. of Parking Provision	Parking Facilities[(1)(2)(3)] (Category 1/2/3)
Kwan Care & Attention Home	Shui Kwok House, Tin Shui Estate, Tin Shui Wai, Yuen Long				
Ching Chung Taoist Association of Hong Kong Limited Ching Chung Care and Attention Home for the Aged	57 Sha Chau Lei Chuen, Ping Ha Road, Yuen Long	120	61	1 car parking space + 1 light bus parking spaces	Category 3

Note: (1) Category 1 refers to homes with nil provision of car parking spaces within the Site and no public car parking spaces can be found in the close proximity.

(2) Category 2 refers to homes with nil provision of car parking spaces within the Site but may use the public car parking spaces of nearby car park.

(3) Category 3 refers to homes with provision of car parking spaces within the Site.

Proposed Internal Transport Facilities Provision

2.3.2 With reference to **Table 2.2** above, only one to two private parking spaces are provided by other RCHE. Taking reference to Salvation Army Kam Tin Residence for Senior Citizens (The), it has 1 car parking space and 1 light bus parking spaces for 150 beds are sufficient for their daily operation needs. Taking into consideration that 260 to 300 beds will be provided in our proposed development, double the parking provision should be sufficient for the daily operation needs of the proposed development. The internal transport facilities provisions are proposed and summarized as **Table 2.3** below:

Table 2.3 Proposed Provisions of Internal Transport Facilities

Type	Proposed Dimensions	Proposed Number of Spaces
Private Cars	5m(L) x 2.5m(W) x min.2.4m(H)	1
Private Cars for Disabilities	5m(L) x 3.5m(W) x min.2.4m(H)	1
Light bus	8m(L) x 3m(W) x min.3.3m(H)	2

Note: The provision of PV parking space for disabilities is determined by referring to "Parking for persons with disabilities" stipulated in the latest HKPSG that 1 accessible parking space should be provided for 1-50 parking spaces

2.3.3 The ground floor layout plans of the proposed development showing the proposed internal transport provision is shown in **Figures 2.1**.

Conservation of a Grade 3 Historic Building in Yuen Long Siu Lo
Traffic Impact Assessment
Revised Final Report (July 2022)
We commit We deliver
用心以誠

3. EXISTING TRAFFIC CONDITION

3.1 Existing Road Network

3.1.1 Shap Pat Heung Road is a duel two-lane two-way primary distributor. It is the major road connecting Shap Pat Heung Interchange and Yuen Long Highway.

3.1.2 Tai Tong Road is a two-lane two-way district distributor connecting Man Tong Road and Shap Pat Heung Road. It is the only access road connecting the proposed development. It serves for the traffic travelling North and South in vicinity.

3.1.3 Yuen Long Highway is expressway connecting which form as a section of New Territories Circular Road. It is the major road connects Yuen Long with other area in New Territories.

3.2 Critical Junctions

3.2.1 Five junctions are identified to be critical for the Traffic Impact Assessment due to the proposed development. Relevant details are listed in **Table 3.1** and shown in **Figure 3.1**. Existing junction layouts are tabulated in **Figures 3.2** to **Figure 3.6** respectively.

Table 3.1 Identified Critical Junctions

Ref.	Junction	Type	Figure No.
A	Ma Tong Road / Tai Tong Road	Signalized	3.2
B	Tai Tong Road / Shap Pat Heung Road	Signalized	3.3
C	Shap Pat Heung Road / Fung Ki Road	Signalized	3.4
D	Shap Pat Heung Road / Tai Kei Leung Road	Signalized	3.5
E	Shap Pat Heung Interchange	Roundabout	3.6

3.2.2 It is revealed that people would visit RCHE mainly during off-peak from 10 am to 5 pm rather than at peak hours. The assessment of the impact due to the proposed development will therefore base on the traffic flow determine from off-peak.

3.2.3 In order to study the existing traffic condition of the above critical junctions, traffic survey in the form of manual-classified count was conducted for the critical junctions during the off-peak periods on a typical weekday on 16 December 2021 from 10:00 AM to 12:00 noon and 15:00 PM to 17:00 PM respectively. The survey provides most up-to-date details of the traffic condition within the study area under normal operation. Based on the observed traffic flows, it reveals that peak of Off-peak hour occurred from 11:00 AM to 12:00 noon, 16:00 PM to 17:00 PM respectively.

3.2.4 The 2021 traffic flows are presented in **Figure 3.7**. The operational performances of the critical junctions are listed in **Table 3.2** below.

Table 3.2 Operational Performances of Critical Junctions in 2021

Ref.	Junction	Method of Control	Year 2021 RC/DFC (1)	
			AM Off-Peak	PM Off-Peak
A	Ma Tong Road / Tai Tong Road	Signalized	+40%	+39%
B	Tai Tong Road / Shap Pat Heung Road	Signalized	+55%	+44%
C	Shap Pat Heung Road / Fung Ki Road	Signalized	>+100%	+98%
D	Shap Pat Heung Road / Tai Kei Leung Road	Signalized	+98%	>+100%
E	Shap Pat Heung Interchange	Roundabout	0.62	0.69

Notes: (1) RC = Reserve Capacity for Signal Junction;
DFC = Design Ratio of Flow to Capacity for Priority Junction/Roundabout

3.2.5 The assessment results in **Table 3.2** indicate that all critical junctions are at present operating with ample capacities during the off-peak hours.

3.2.6 Queue length assessment has been carried out shown in **Figures 3.8** and **3.9** and summarized in **Table 3.3** below.

Conservation of a Grade 3 Historic Building in Yuen Long Siu Lo
Traffic Impact Assessment
Revised Final Report (July 2022)
We commit We deliver
用心以誠

Table 3.3 Queue Length Analysis of Identified Junctions in 2021

Ref.	Junction	Method of Control	Direction	Length of Road Segment (m)	Observed Queue Length (m)	
					Existing Scenario	
					AM Off-Peak	PM Off-Peak
A	Shap Pat Heung Road / Tai Shu Ha Road East	Priority	Ma Tong Road (WB)	260	30	24
			Tai Tong Road (NB)	290	42	42
			Ma Tong Road (EB)	350	18	18
			Tai Tong Road (SB)	240	36	36
B	Tai Tong Road / Shap Pat Heung Road	Signalized	Shap Pat Heung Road (WB)	150	30	36
			Tai Tong Road (NB)	160	24	18
			Shap Pat Heung Road (EB)	230	18	24
			Tai Tong Road (SB)	290	36	36
C	Shap Pat Heung Road / Fung Ki Road	Signalized	Shap Pat Heung Road (WB)	230	30	36
			The Access Road of The Reach (NB)	40	0	0
			Shap Pat Heung Road (EB)	250	18	24
			Fung Ki Road (SB)	180	30	48
D	Shap Pat Heung Road / Tai Kei Leung Road	Signalized	Shap Pat Heung Road (SB)	280	36	24
			Shap Pat Heung Road (NB)	90	30	24
			Tai Kei Leng Road (EB) (RT)	400	48	18
E	Shap Pat Heung Interchange	Roundabout	Yuen Long Highway (WB)	770	12	12
			Yuen Long Highway (EB)	590	30	30
			Shap Pat Heung Road (SB)	90	30	30

3.2.7 The assessment results in **Table 3.3** indicate that all queues are queuing within the allowable road segments during the peak hours.

3.3 Public Transport Services in the Vicinity

3.3.1 Numerous road-based public transport services, for instance, franchised buses and GMB are also provided in vicinity of the proposed development. Details of the current services of franchised buses and GMB routes within the catchment area of 500 meters are listed in **Table 3.5** and shown in **Figure 3.8**.

Table 3.5 Public Transport Services in the Vicinity of the Proposed Development

Service	Route	Origin - Destination	Frequency (mins)
Franchised Bus	68E	Yuen Long Park – Tsing Yi Railway Station Bus Terminus	15 - 30
	68F	Yuen Long Park – Park Yoho (Circular)	30
	K66	Tai Tong – Long Ping	4 - 15
GMB	39	Kung Um - Yuen Long (Fung Cheung Road)	5 - 8
	73(1)	Long Ping Station (Ma Wang Road) – Sung Shan San Tsuen	10 - 15

Note: (1) Morning peak hour service

Conservation of a Grade 3 Historic Building in Yuen Long Siu Lo
Traffic Impact Assessment
Revised Final Report (July 2022)
We commit We deliver
用心以誠

4. FUTURE TRAFFIC CONDITION & TRAFFIC IMPACT ASSESSMENT

4.1 Design Year

4.1.1 It is anticipated that the proposed development would be completed in 2025 tentatively with full intended operation. In order to assess the possible traffic impacts to the local road network due to the proposed development, year 2028 (i.e. 3 years after completion) has been adopted as the design year for this study.

4.2 Traffic Forecast

4.2.1 To estimate the reference traffic flow in year 2028 (without the proposed development) in the local road network, an appropriate growth factor has to be identified for the area in the first instance. The following approaches have been adopted to derive the growth factor for the Area of Influence.

Historical Trend

4.2.2 Numerous traffic-count stations are located in the vicinity of the proposed development. The traffic counts reported in the Annual Traffic Census (ATC), which is published by Transport Department, over a period of five years, i.e. 2015 to 2019 are summarized in **Table 4.1**.

Table 4.1 Historical Traffic Data from Annual Traffic Census (ATC)

ATC Stn	Road Name	Annual Average Daily Traffic (AADT)					Avg. Annual Growth Rate
		2015	2016	2017	2018	2019	
5711	Shap Pat Heung Rd (From Shap Pat Heung INT to Tai Tong Rd)	23,020	21,960	21,810*	22,500*	23,400*	0.41%
Total		**23,020**	**21,960**	**21,810**	**22,500**	**23,400**	**+0.41%**

*Note: *AADT estimated by Growth factor*

Planning Data

4.2.3 Reference has also been made to the latest 2016-Based Territorial Population Employment Data Matrices (TPEDM) planning data published by the Planning Department in December 2019 for projection of population and employment within the study district. The average annual growth rates in terms of population and employment from 2021 to 2026 are tabulated in **Table 4.2**.

Table 4.2 2016-Based Planning Data from 2021 to 2026

Yuen Long District			
Data	Year		Average Annual Growth Rate
	2021	2026	
Population	175,200	180,000	+0.54%
Employment	68,000	69,100	+0.32%
Total	**243,200**	**249,100**	**+0.48%**

Adopted Growth Rate

4.2.4 A.A.D.T. of ATC indicates that the traffic flow of the local road network has an average annual growth rate of +0.41% from year 2015 to year 2019.

4.2.5 Whilst, the planning data indicates that the population and employment of the study area are expected to grow with an average annual growth rate of +0.48%.

4.2.6 As a conservative approach, annual growth rate **+1% p.a.** which is used in previous TIA is adopted. It is deemed sufficient to allow for any unexpected future growth as a result of some changes in land use or development in the study area.

4.3 Reference Traffic Flow in Year 2028

4.3.1 The year 2028 reference traffic flow is estimated by applying the adopted growth rate to the year 2021 adopted traffic flow.

Adjacent New Developments

4.3.2 Additional traffic generation and attraction of major committed/planned developments in the vicinity have been estimated and superimposed onto the road network to derive the year 2028 reference traffic flow. The committed/planned developments in the vicinity are summarized and illustrated in **Table 4.3** and **Figure 4.1**.

Table 4.3 Major Planned/ Committed Development in the Vicinity

Application No.	Proposed Use	Development Parameters
A/YL/252 (Yuen Long Baptist Church Redevelopment)	Kindergarten and Church	16 classrooms for Kindergarten 1 for Special Education 680 seats for Church
Youth Hostel Development at Ma Tin Pok	Youth Hostel	1,248 Units
Lot 4041 in DD120 (A/YL/185)	Residential	16 Units
Atrium (Lot 4056 in DD120)	Residential	313 Units
A/YL/263	RCHE	380 beds
A/YL/276	RCHE	197 beds

4.3.3 Based on the TIA reports of the vicinity developments, the trip generated and attracted by the proposed development in vicinity are summarized in the **Table 4.4**.

Table 4.4 – Estimated Traffic Trips of the Proposed Development

Application No.		Traffic Trips			
		AM Peak		PM Peak	
		Gen.	Att.	Gen.	Att.
A/YL/252 (Yuen Long Baptist Church Redevelopment) (1)		42	53	45	13
Youth Hostel at Ma Tin Pok(2)		31	29	23	26
Lot 4041 in DD120 (A/YL/185) (2)		5	3	3	4
Atrium (Lot 4056 in DD120)(3)	Trip Rate (60 m^2)	0.08633	0.06835	0.04317	0.05755
	Traffic Trips	22	13	9	12
A/YL/263(1)		33	26	16	22
A/YL/276(1)		17	13	9	11

1) According its TIA

2) According to TIA of A/YL/261

3) Trip rate of 60m^2 flat size in TPDM is used as conservative approach

4.3.4 Besides, Yuen Long South (YLS) Development has also been considered. The population intake year of YLS Development will be in stages. The design year of our development is Year 2028, therefore only Stage 1 of YLS Development would be consider in our assessment as other stages are beyond our design year.

Table 4.5 Planned Population under the Yuen Long South Development

Development Stage	Population Intake year	Population		Employment Places
		Public	Private	
Stage 1	**2028**	**13,222**	**35(VRT)**	**780**
Existing population		-	2,400	-

Note: (1) VRT – Village Removal Terms

(2) Source: Yuen Long District Council Committees Meetings Discussion Papers 14/2020 and "Planning and Engineering Study for Housing Sites in Yuen Long South – Investigation Final Traffic and Transport Impact Assessment Report (June 2020)"

4.3.5 Based on the DC paper and TIA reports of the YLS developments, the trip generated and attracted by the YLS developments (Stage 1) are estimated and summarized in the **Table 4.6**.

Table 4.6 – Estimated Traffic Trips of the YLS Development (Stage 1)

Land Use	Units		Traffic Trip Rate				Trip Rate Unit	Traffic Trips			
			AM Peak		PM Peak			AM Peak		PM Peak	
			Gen.	Att.	Gen.	Att.		Gen.	Att.	Gen.	Att.
Residential – Public (50sqm)	4,320	flats	0.048	0.028	0.024	0.035	pcu/hr/flat	207	121	104	151
Commercial	16,620	GFA (m^2)	0.129	0.153	0.236	0.262	pcu/hr/ 100m^2 GFA	21	25	39	44
Kindergarten	12	classroom	2.2	2.4	2.3	2.1	pcu/hr/ classroom	27	29	28	26
GIC	14,210	GFA (m^2)	0.235	0.235	0.115	0.115	pcu/hr/ 100m^2 GFA	34	34	17	17
Total								**289**	**209**	**188**	**238**

Note: (1) Reference to Yuen Long District Council Committees Meetings Discussion Papers 14/2020 and "Planning and Engineering Study for Housing Sites in Yuen Long South – Investigation Final Traffic and Transport Impact Assessment Report (June 2020)"

4.3.6 The 2028 reference traffic flows are presented in **Figure 4.2**.

2028 Reference Flows (without proposed development) = **2021 Adopted Flows** x **Adopted Growth Factor i.e. +1 % p.a. for 7 years** + **Adjacent Developments**

Conservation of a Grade 3 Historic Building in Yuen Long Siu Lo
Traffic Impact Assessment
Revised Final Report (July 2022)
We commit We deliver
用心以誠

4.4 Traffic Trips of the Proposed Development

4.4.1 It is noted that traffic rates of both generation and attraction for proposed development uses are not specified in the latest Transport Planning & Design Manual (TPDM).

4.4.2 The estimation of traffic trips related to the proposed development is based on in-house surveys carried out at Tung Wah Group of Hospitals - Wong Cho Tong Social Service Building and summarized in the **Table 4.7**.

Table 4.7 In-house Traffic Trip Rates of Proposed Development

Use	Units / Parameters	AM Peak		PM Peak	
		Gen.	Att.	Gen.	Att.
Traffic Trip Rate					
TWGHs Wong Cho Tong Social Service Building – IN/OUT of Building	(pcu/hr)	14	11	14	11
TWGHs Wong Cho Tong Social Service Building – Loading/Unloading activities of Building	(pcu/hr)	10	8	10	8
Total Trip	(pcu/hr)	24	19	24	19
Adopted Traffic Trip Rates (278beds)	**(pcu/hr/bed)**	**0.08633**	**0.06835**	**0.04317**	**0.05755**
Traffic Trips					
Estimated Traffic Trips (300 beds)(1)	**(pcu/hr)**	**26**	**21**	**13**	**17**

1) Upper range of no. of beds is adopted as conservative approach.

4.5 Traffic Forecast for Design Year 2028

4.5.1 The net traffic trips of the proposed development , which is shown in **Figure 4.3**, is then superimposed onto the year 2028 reference traffic flow (without the proposed development) as shown in **Figure 4.2** to derive the year 2028 design traffic flow (with the proposed development).

Year 2028 Design Flow (with the Proposed Development) = **Year 2028 Reference Flow (without the Proposed Development)** + **Traffic Trips of the Proposed Development**

4.5.2 The traffic flow during AM and PM peak periods in the design year 2028 (with the proposed development) are shown in **Figure 4.4**.

4.6 Operational Assessment

4.6.1 To assess traffic impacts due to the proposed development, operational assessment of the critical junctions identified in Chapter 3 are carried out for both reference (without the proposed development) and design (with the proposed development) scenarios in year 2028. The results are summarized in **Table 4.8**.

Table 4.8 Operational Performance of Critical Junctions in Year 2028

Ref.	Junction	Method of Control	Year 2028 RC/DFC (1)			
			Reference Scenario (Without the Proposed Development)		Design Scenario (With the Proposed Development)	
			AM Off-Peak	PM Off-Peak	AM Off-Peak	PM Off-Peak
A	Ma Tong Road / Tai Tong Road	Signalized	+29%	+29%	+29%	+28%
B	Tai Tong Road / Shap Pat Heung Road	Signalized	+20%	+16%	+18%	+15%
C	Shap Pat Heung Road / Fung Ki Road	Signalized	+90%	+74%	+85%	+73%
D	Shap Pat Heung Road / Tai Kei Leung Road	Signalized	+67%	+75%	+66%	+74%
E	Shap Pat Heung Interchange	Roundabout	0.73	0.79	0.73	0.79

Notes: (1) RC = Reserve Capacity for Signal Junction;
DFC = Design Ratio of Flow to Capacity for Priority Junction/Roundabout
(2) Junction Improvement scheme would be carried out on Junction E under Yuen Long South Development project (PWP Item Nos. 7817CL and 7827CL (part)). Please refer to ***Figure 4.9***

4.6.2 The assessment result in **Table 4.6** reveals that all Junctions operate with ample capacities in both reference and design scenarios in year 2028.

4.6.3 Queue length assessment has been carried out shown in **Figures 4.5** to **4.8** and summarized in **Table 4.9** below.

Conservation of a Grade 3 Historic Building in Yuen Long Siu Lo
Traffic Impact Assessment
Revised Final Report (July 2022)
We commit We deliver
用心以誠

Table 4.9 Queue Length Analysis of Identified Junctions in 2028

Ref.	Junction	Method of Control	Direction	Length of Road Segment (m)	Calculated Queue Length (m)			
					Reference Scenario (Without the Proposed Development)		Design Scenario (With the Proposed Development)	
					AM Off-Peak	PM Off-Peak	AM Off-Peak	PM Off-Peak
A	Shap Pat Heung Road / Tai Shu Ha Road East	Priority	Ma Tong Road (WB)	260	36	30	36	30
			Tai Tong Road (NB) (STR & LT)	290	42	48	48	48
			Tai Tong Road (NB) (RT)	290	6	6	6	6
			Ma Tong Road (EB) (LT)	350	18	12	18	18
			Ma Tong Road (EB) (STR & RT)	350	18	24	18	24
			Tai Tong Road (SB) (STR & LT)	240	42	42	42	42
			Tai Tong Road (SB) (RT)	240	12	18	12	18
B	Tai Tong Road / Shap Pat Heung Road	Signalized	Shap Pat Heung Road (WB) (STR & RT)	150	48	54	48	54
			Shap Pat Heung Road (WB) (LT)	150	18	18	18	18
			Tai Tong Road (NB) (STR & LT & RT)	160	36	36	36	36
			Shap Pat Heung Road (EB) (STR)	230	36	36	36	36
			Shap Pat Heung Road (EB) (LT)	230	12	18	12	18
			Tai Tong Road (SB) (STR & LT & RT)	290	42	42	42	42
C	Shap Pat Heung Road / Fung Ki Road	Signalized	Shap Pat Heung Road (WB) (RT)	230	36	48	36	48
			Shap Pat Heung Road (WB) (STR & LT)	230	42	42	42	42
			The Access Road of The Reach (NB) (LT)	40	0	0	0	0
			The Access Road of The Reach (NB) (STR & RT)	40	0	6	0	6
			Shap Pat Heung Road (EB) (LT)	250	18	24	18	24
			Shap Pat Heung Road (EB) (STR)	250	36	36	36	36
			Fung Ki Road (SB) (LT)	180	36	42	36	42
			Fung Ki Road (SB) (STR & RT)	180	6	12	6	12
D	Shap Pat Heung Road / Tai Kei Leung Road	Signalized	Shap Pat Heung Road (SB)	280	30	30	30	30
			Shap Pat Heung Road (NB)	90	24	24	24	24
			Tai Kei Leng Road (EB) (RT)	400	24	24	24	24
E	Shap Pat Heung Interchange	Roundabout	Yuen Long Highway (WB)	770	18	24	18	18
			Yuen Long Highway (EB)	590	6	12	6	12
			Shap Pat Heung Road (SB)	90	0	0	0	0

4.6.4 The assessment results in **Table 4.7** indicate that all queues are queuing within the allowable road segments during the peak hours. The traffic generated by the proposed development would induce insignificant impact on the surrounding road network. Therefore, the application is supported from the traffic points of view.

5. SUMMARY AND CONCLUSION

5.1 Summary

5.1.1 The application site intends to develop to Residential Care Home for the Elderly (RCHE).

5.1.2 CTA Consultants Limited (CTA), are therefore commissioned as the traffic consultant to prepare the Traffic Impact Assessment (TIA) and provide technical justifications in supporting the application from traffic engineering point of view.

5.1.3 To appraise the existing traffic condition, a vehicular survey in the form of manual-classified count was conducted at the surrounding road network of the proposed development. Current operational performance of the critical junctions has been assessed with the observed traffic flow. The results reveal that all critical junctions are at present operating within its capacities.

5.1.4 Assessment of operational performance of the critical junctions indicates that all critical junctions will still operate within their capacities in both reference and design scenarios in year 2028.

5.1.5 The traffic generated by the proposed development would induce insignificant impact on the surrounding road network. Therefore, the application is supported from the traffic points of view.

5.2 Conclusion

5.2.1 In conclusion, this Traffic Impact Assessment (TIA) study demonstrated that the related traffic trips related to the proposed development can be absorbed by the nearby road network and no significant traffic impact will be induced.

5.2.2 Therefore, the proposed development of RCHE is reckoned feasible from traffic engineering point of view.

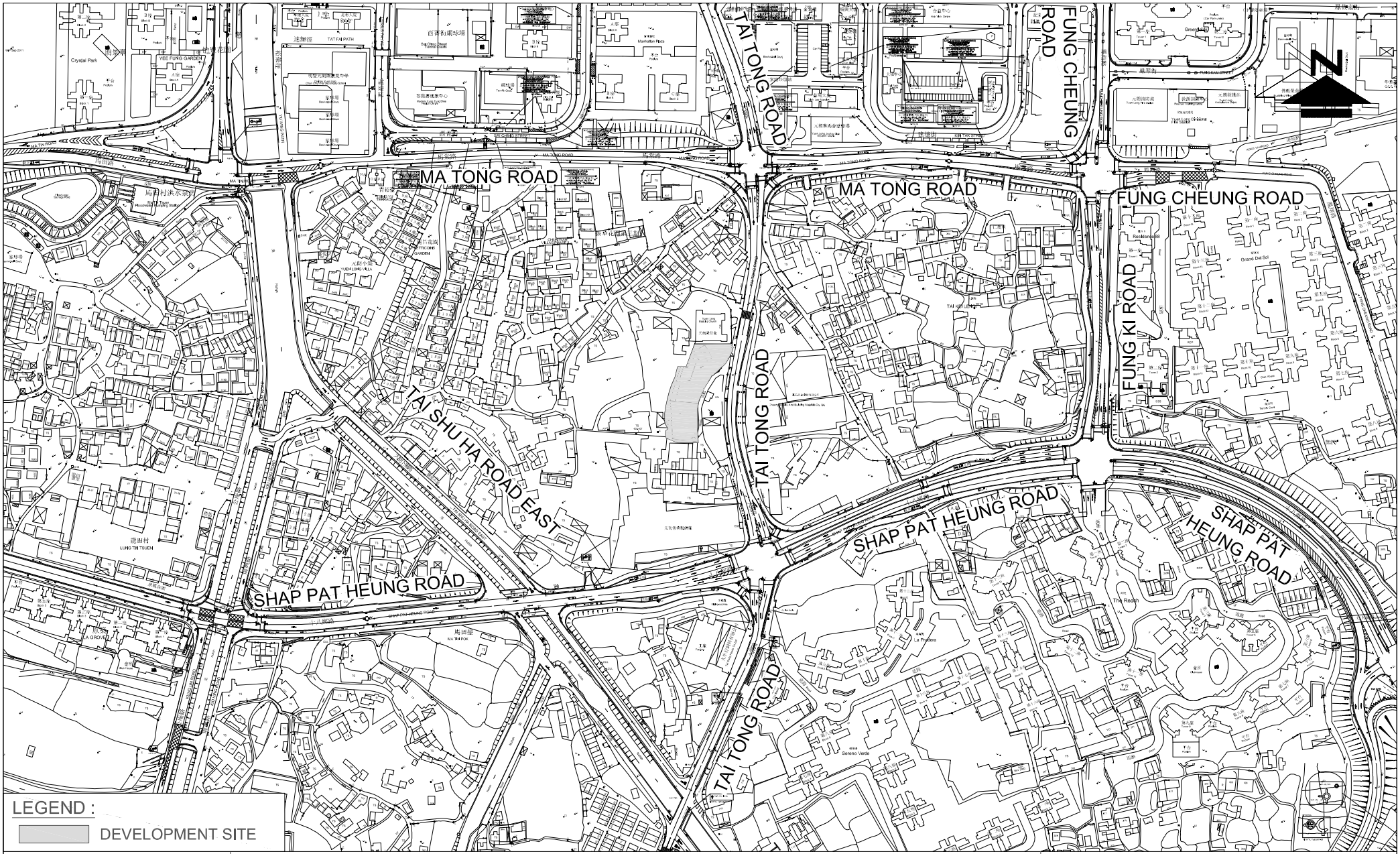


FIGURE NO.: 1.1	PROJECT TITLE: Conservation of a Grade 3 Historic Building in Yuen Long Siu Lo
PROJECT NO.: 21120HK	DRAWING TITLE: SITE LOCATION
SCALE: 1 : 4000 @A4	DATE: 29 SEP 2021

CTA Consultants Limited
志達顧問有限公司

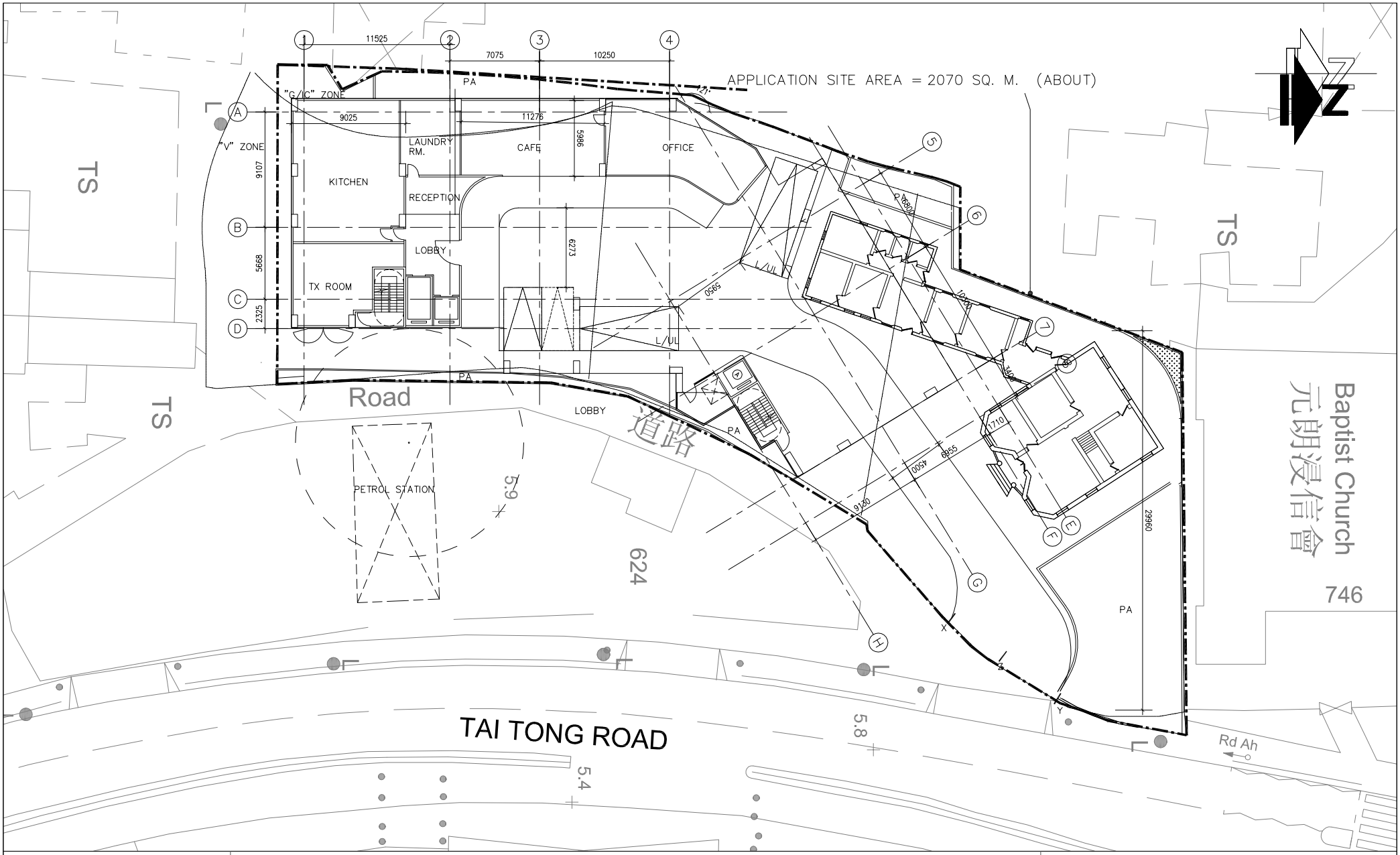


FIGURE NO.: 2.1	PROJECT TITLE: Conservation of a Grade 3 Historic Building in Yuen Long Siu Lo
PROJECT NO.: 21120HK	DRAWING TITLE: G/F PLAN
SCALE: 1 : 400 @A4	DATE: 01 DEC 2021

CTA Consultants Limited
志達顧問有限公司

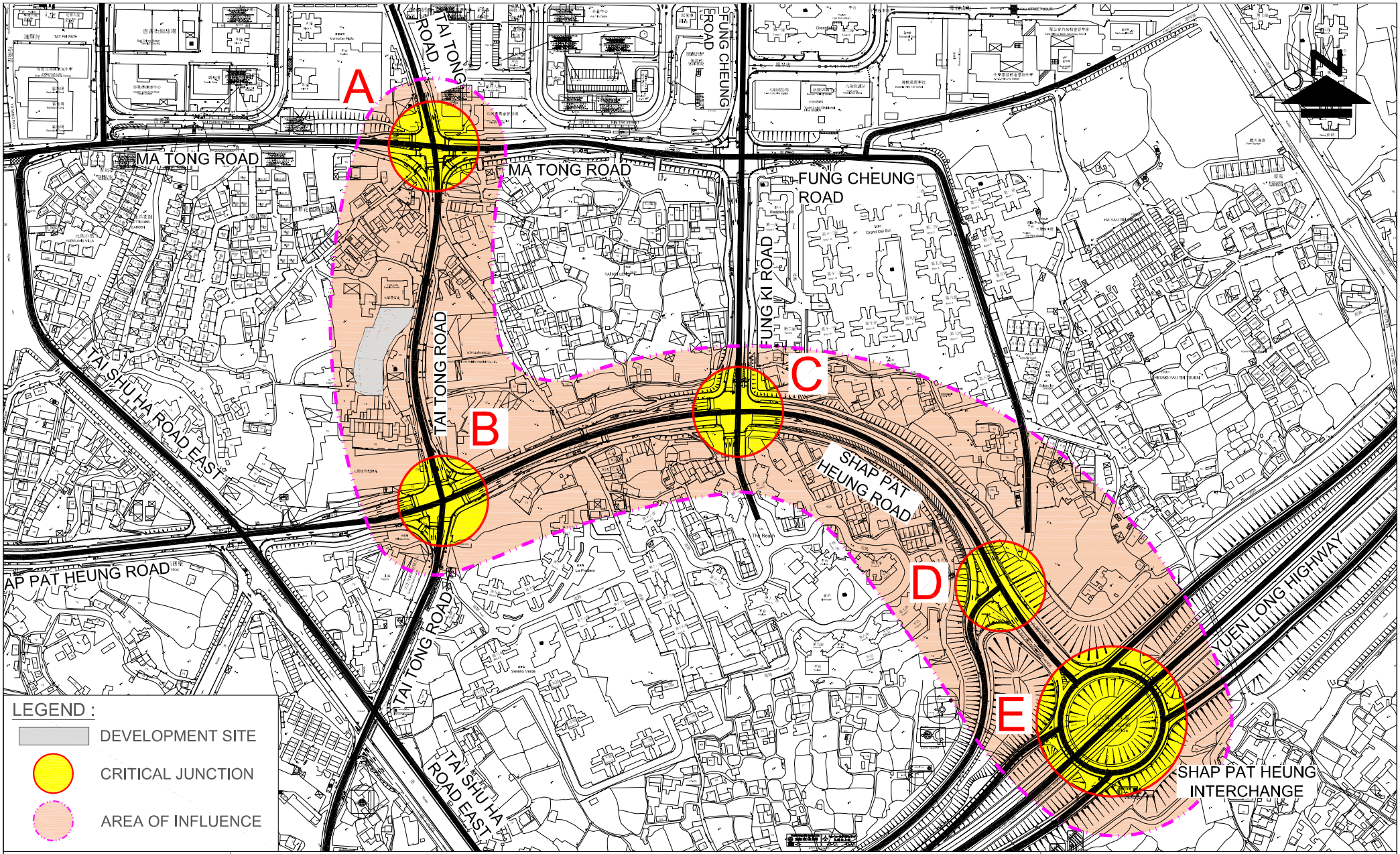


FIGURE NO.: 3.1	PROJECT TITLE: Conservation of a Grade 3 Historic Building in Yuen Long Siu Lo
PROJECT NO.: 21120HK	DRAWING TITLE: KEY JUNCTION & EXISTING ROAD NETWORK
SCALE: 1 : 4500 @A4	DATE: 01 DEC 2021

CTA Consultants Limited
志達顧問有限公司

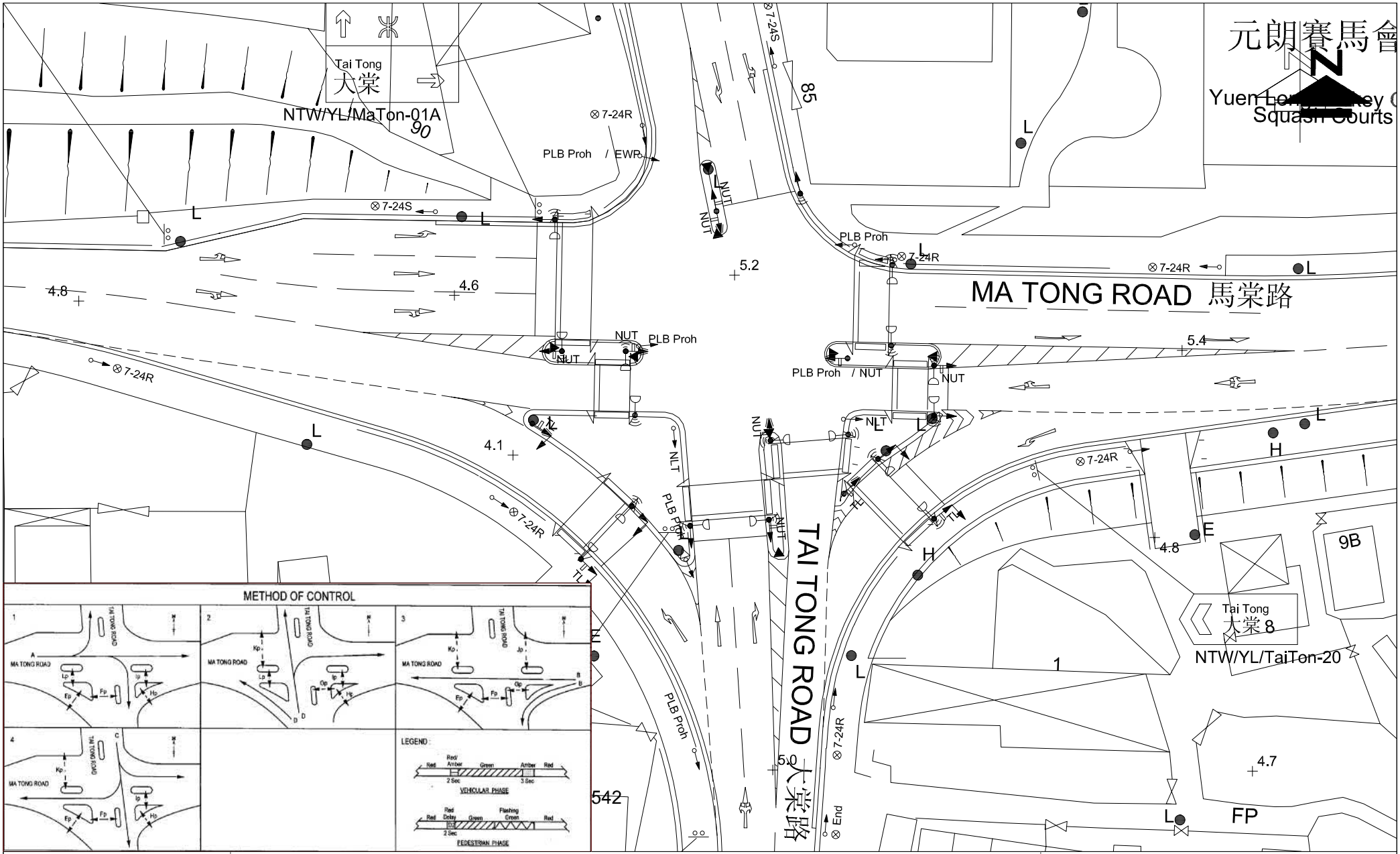


FIGURE NO.: 3.2	PROJECT TITLE: Conservation of a Grade 3 Historic Building in Yuen Long Siu Lo
PROJECT NO.: 21120HK	DRAWING TITLE: EXISTING JUNCTION LAYOUT OF MA TONG ROAD / TAI TONG ROAD (A)
SCALE: 1 : 500@A4	DATE: 01 DEC 2021

CTA Consultants Limited
志達顧問有限公司

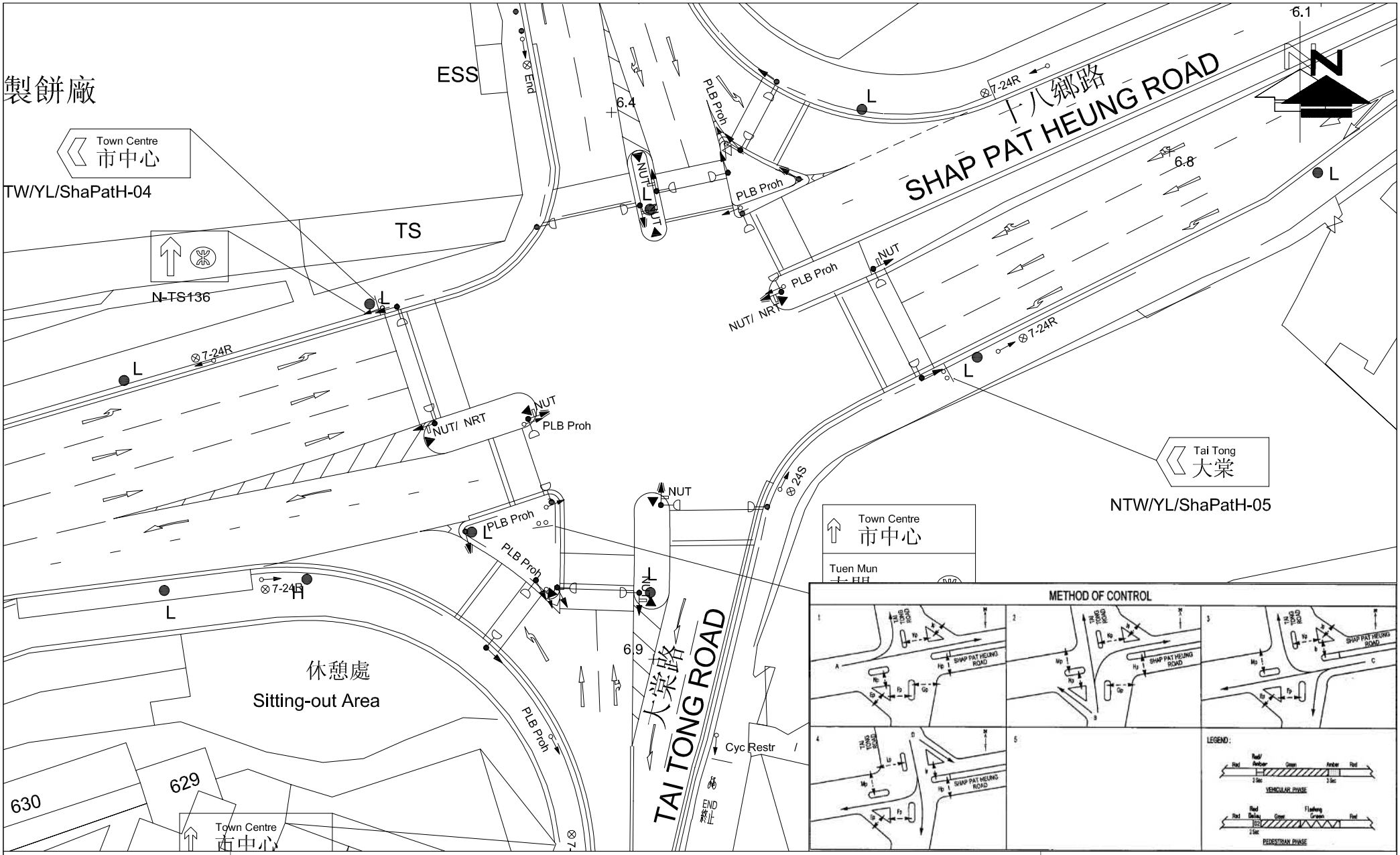


FIGURE NO.: 3.3	PROJECT TITLE: Conservation of a Grade 3 Historic Building in Yuen Long Siu Lo
PROJECT NO.: 21120HK	DRAWING TITLE: EXISTING JUNCTION LAYOUT OF TAI TONG ROAD / SHAP PAT HEUNG ROAD (B)
SCALE: 1 : 500@A4	DATE: 01 DEC 2021

CTA Consultants Limited
志達顧問有限公司

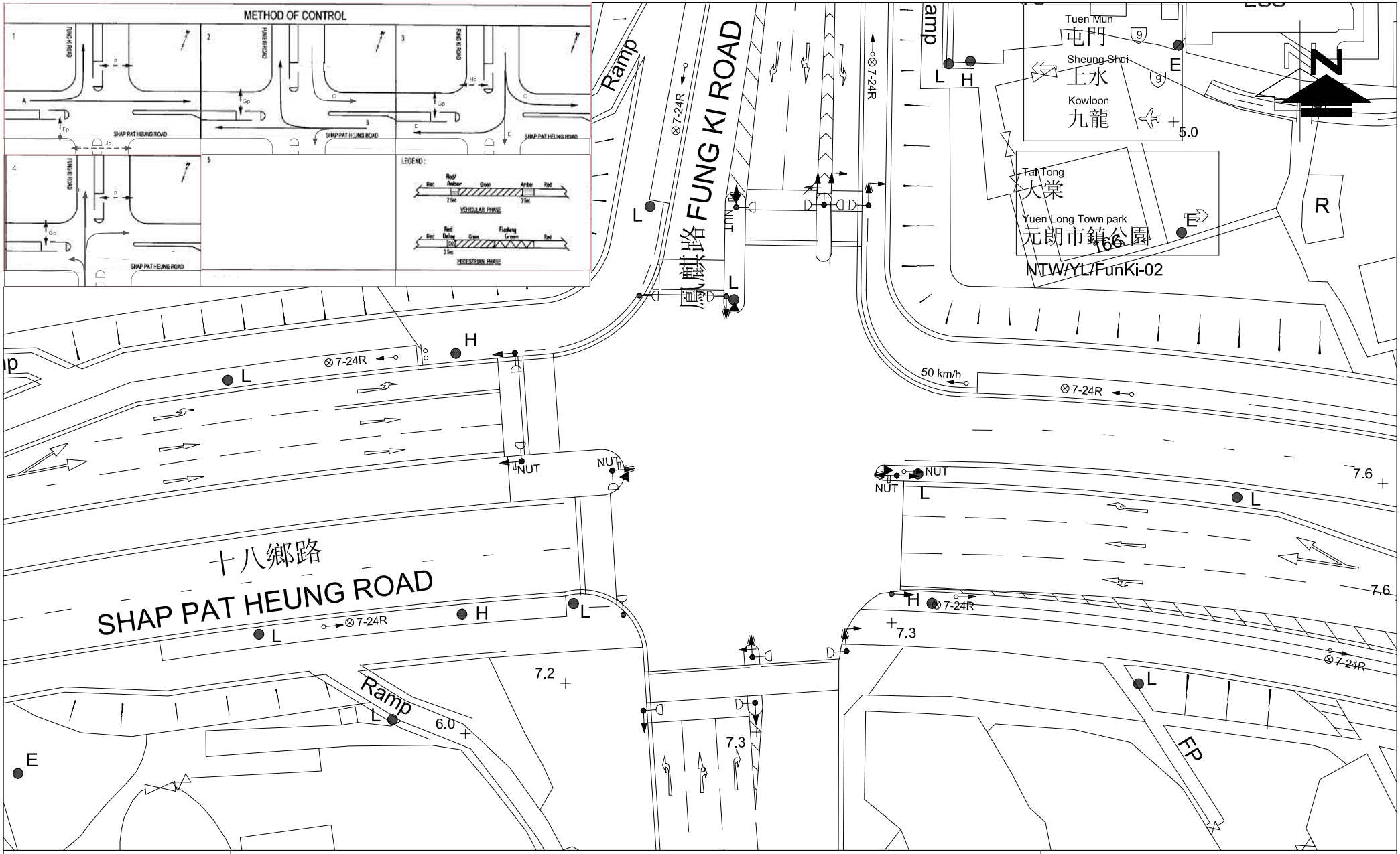


FIGURE NO.: 3.4	PROJECT TITLE: Conservation of a Grade 3 Historic Building in Yuen Long Siu Lo		
PROJECT NO.: 21120HK	DRAWING TITLE: EXISTING JUNCTION LAYOUT OF SHAP PAT HEUNG ROAD / FUNG KI ROAD (C)		
SCALE: 1 : 500@A4	DATE: 01 DEC 2021		

CTA Consultants Limited
志達顧問有限公司

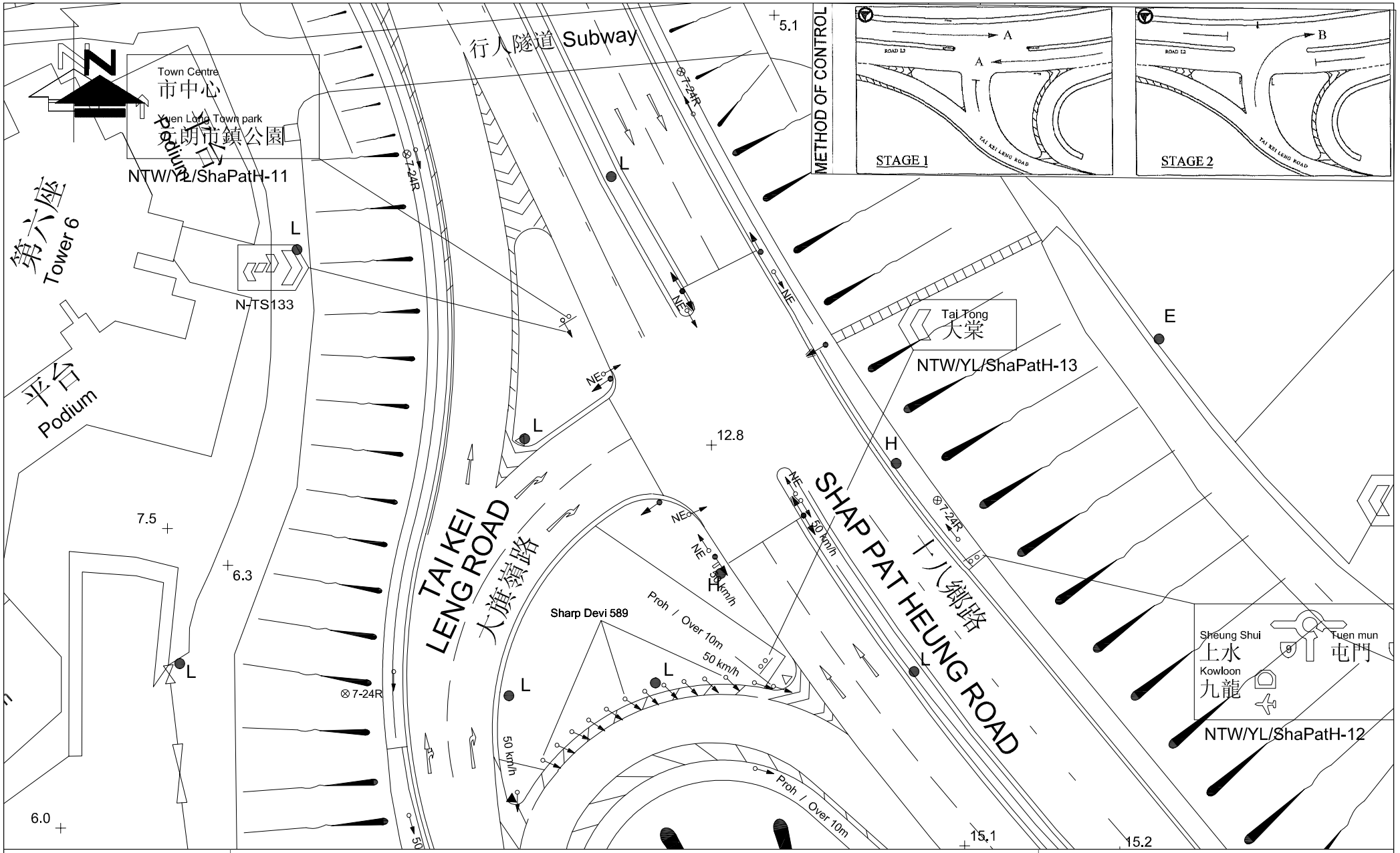


FIGURE NO.: 3.5	PROJECT TITLE: Conservation of a Grade 3 Historic Building in Yuen Long Siu Lo
PROJECT NO.: 21120HK	DRAWING TITLE: EXISTING JUNCTION LAYOUT OF SHAP PAT HEUNG ROAD / TAI KEI LEUNG ROAD (D)
SCALE: 1 : 500@A4	DATE: 01 DEC 2021

CTA Consultants Limited
志達顧問有限公司

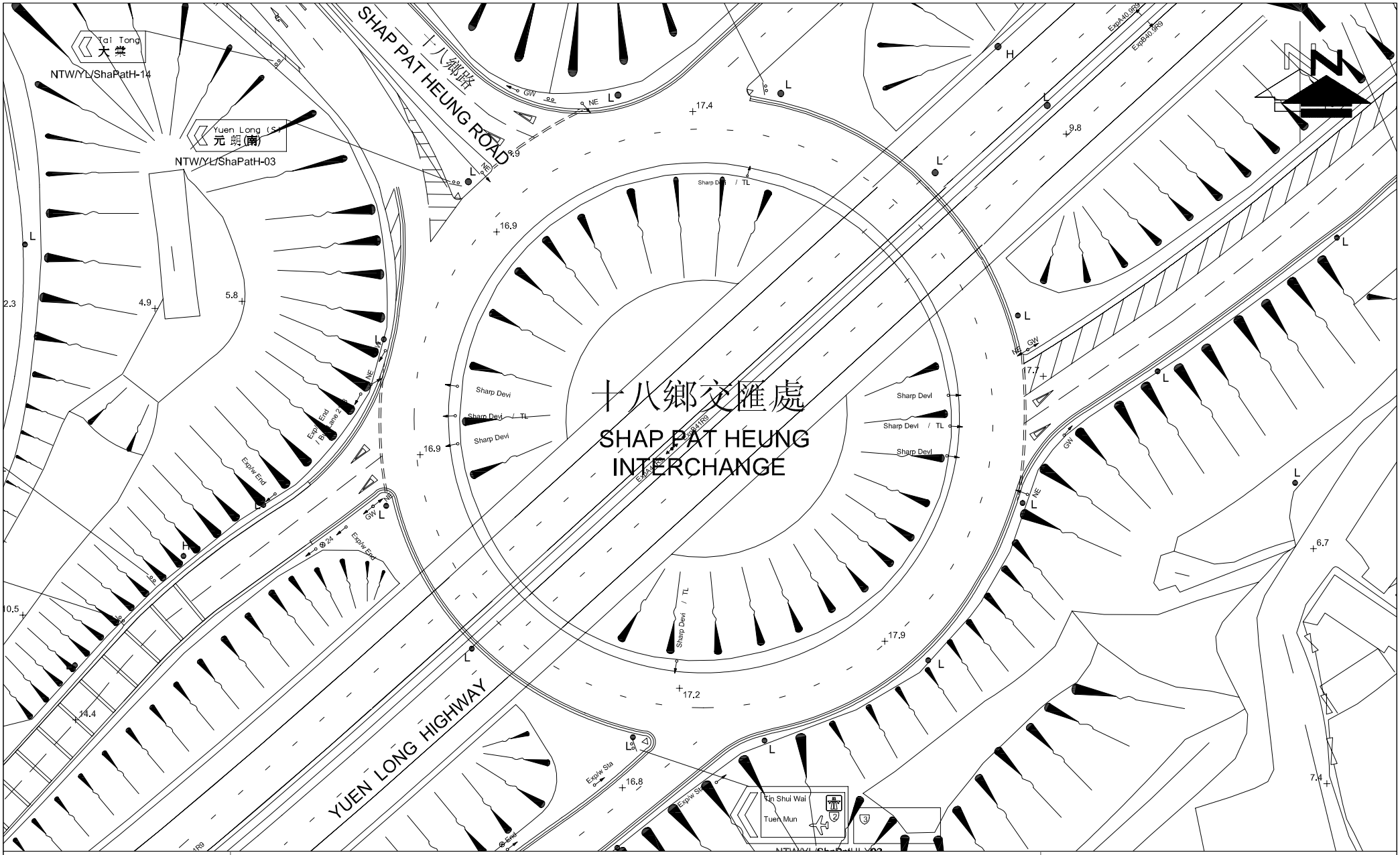


FIGURE NO.: 3.6	PROJECT TITLE: Conservation of a Grade 3 Historic Building in Yuen Long Siu Lo
PROJECT NO.: 21120HK	DRAWING TITLE: EXISTING JUNCTION LAYOUT OF SHAP PAT HEUNG INTERCHANGE (E)
SCALE: 1 : 800@A4	DATE: 01 DEC 2021

CTA Consultants Limited
志達顧問有限公司

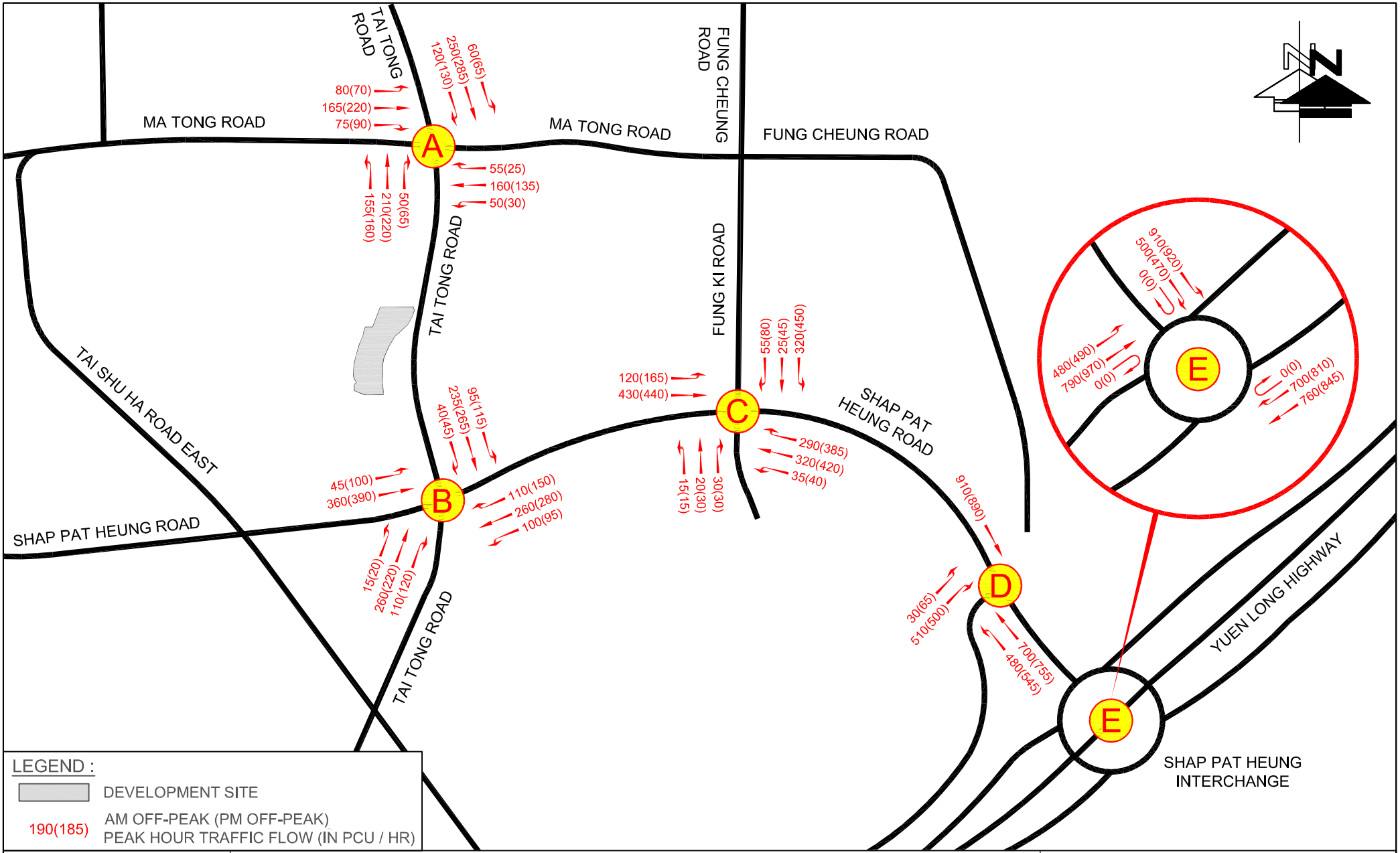


FIGURE NO.: 3.7	PROJECT TITLE: Conservation of a Grade 3 Historic Building in Yuen Long Siu Lo
PROJECT NO.: 21120HK	DRAWING TITLE: 2021 OFF-PEAK TRAFFIC FLOWS
SCALE: 1 : 4500@A4	DATE: 14 APR 2022

CTA Consultants Limited
志達顧問有限公司

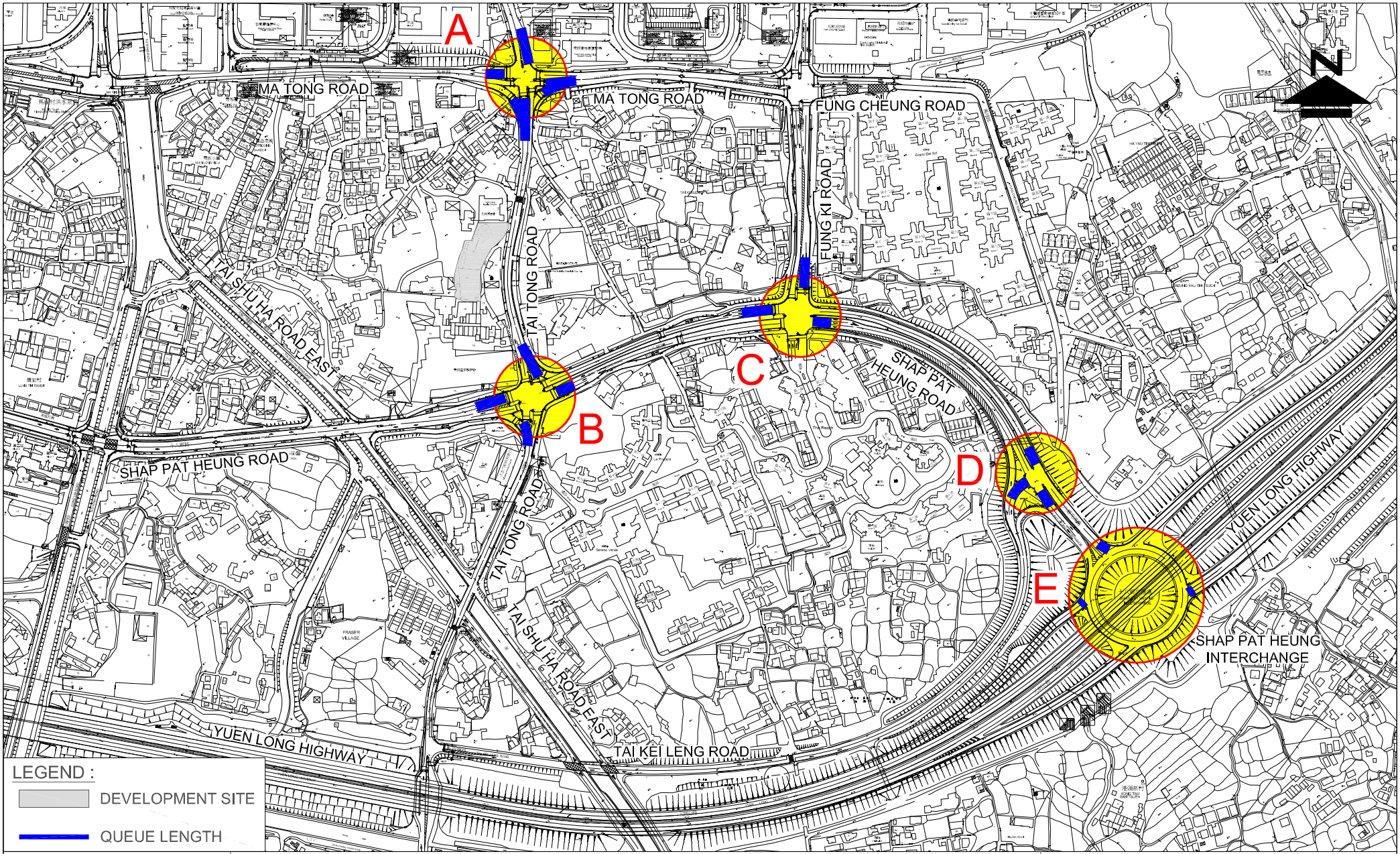


FIGURE NO.: 3.8	PROJECT TITLE: Conservation of a Grade 3 Historic Building in Yuen Long Siu Lo
PROJECT NO.: 21120HK	DRAWING TITLE: 2021 QUEUE LENGTH (AM OFF-PEAK)
SCALE: 1 : 5000 @A4	DATE: 14 APR 2022

CTA Consultants Limited
志達顧問有限公司

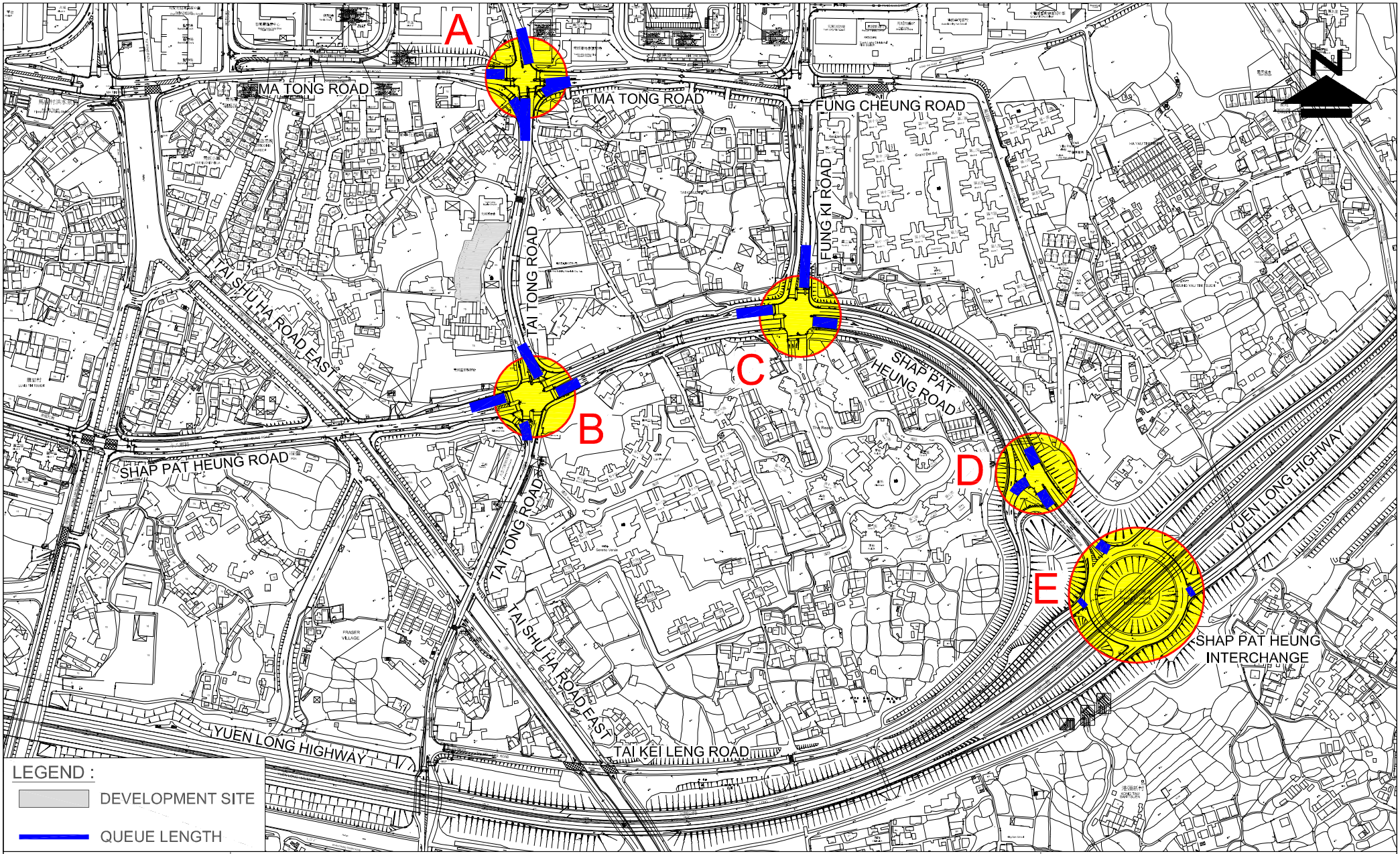


FIGURE NO.: 3.9	PROJECT TITLE: Conservation of a Grade 3 Historic Building in Yuen Long Siu Lo
PROJECT NO.: 21120HK	DRAWING TITLE: 2021 QUEUE LENGTH (PM OFF-PEAK)
SCALE: 1 : 5000 @A4	DATE: 14 APR 2022

CTA Consultants Limited
志達顧問有限公司

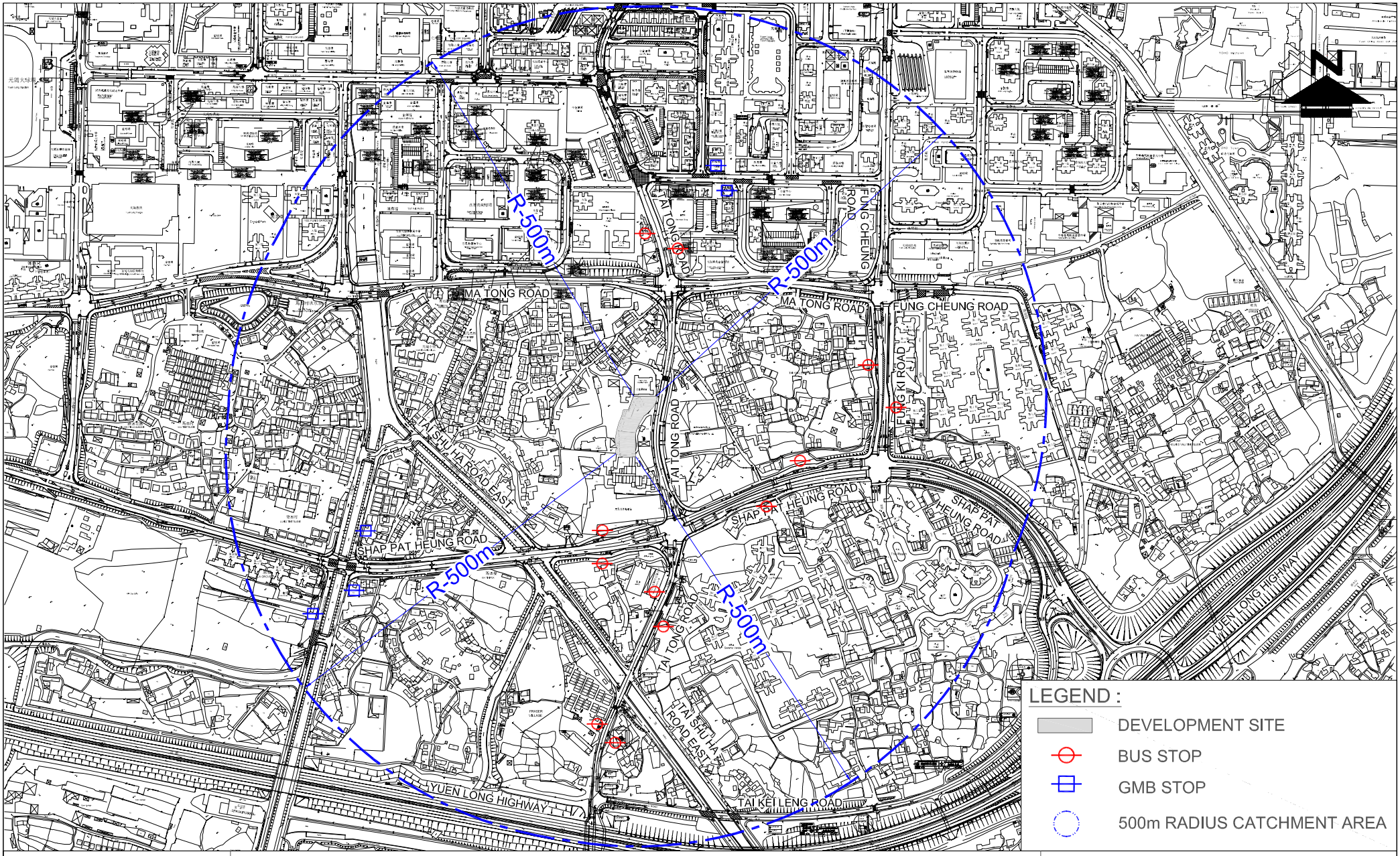


FIGURE NO.: 3.10	PROJECT TITLE:
PROJECT NO.: 21120HK	DRAWING TITLE: EXISTING PUBLIC TRANSPORT IN THE VICINITY
SCALE: 1 : 6000 @A4	DATE: 03 DEC 2021

CTA Consultants Limited
志達顧問有限公司

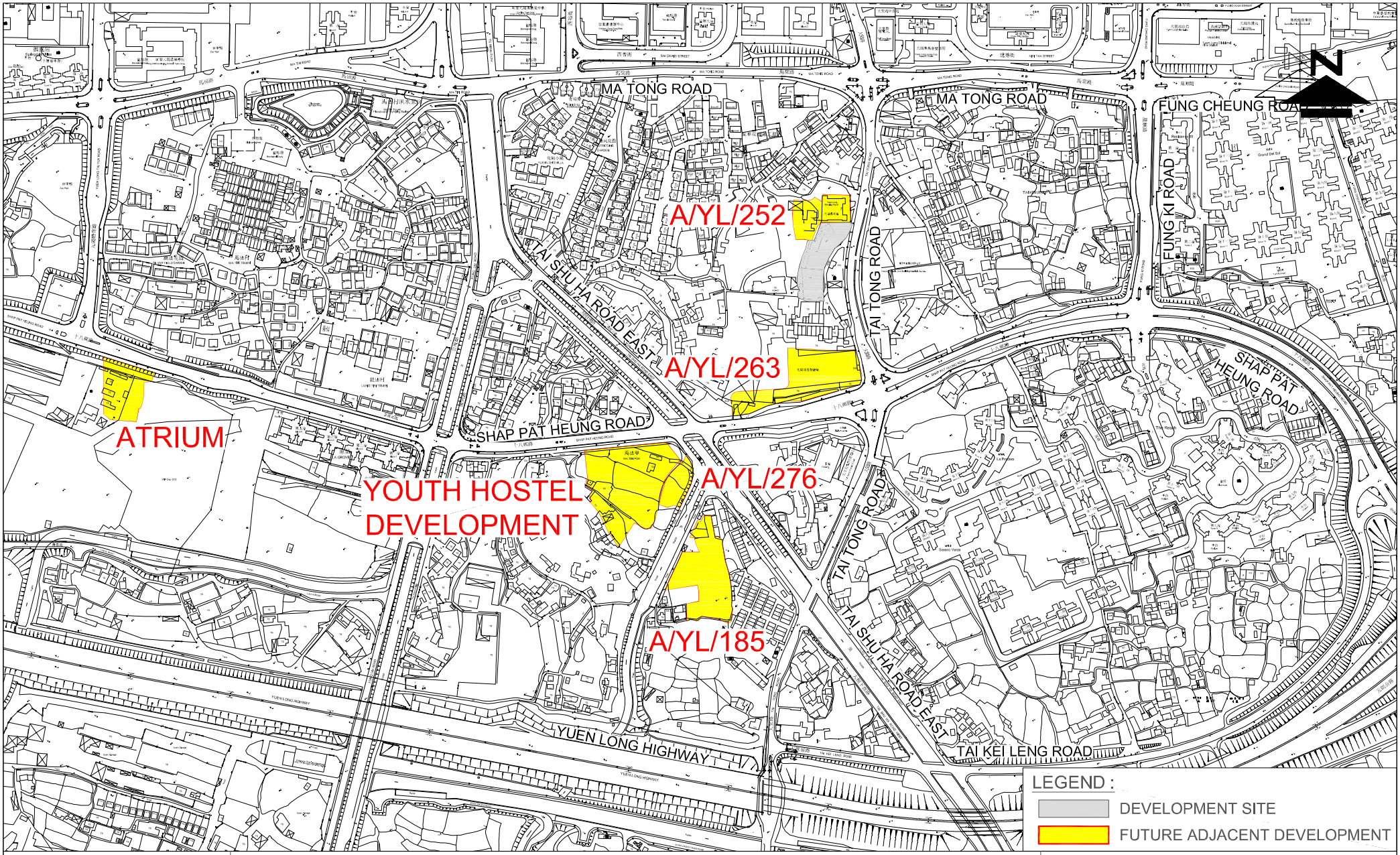


FIGURE NO.: 4.1	PROJECT TITLE: Conservation of a Grade 3 Historic Building in Yuen Long Siu Lo
PROJECT NO.: 21120HK	DRAWING TITLE: FUTURE ADJACENT DEVELOPMENTS
SCALE: 1 : 5000 @A4	DATE: 09 DEC 2021

CTA Consultants Limited
志達顧問有限公司

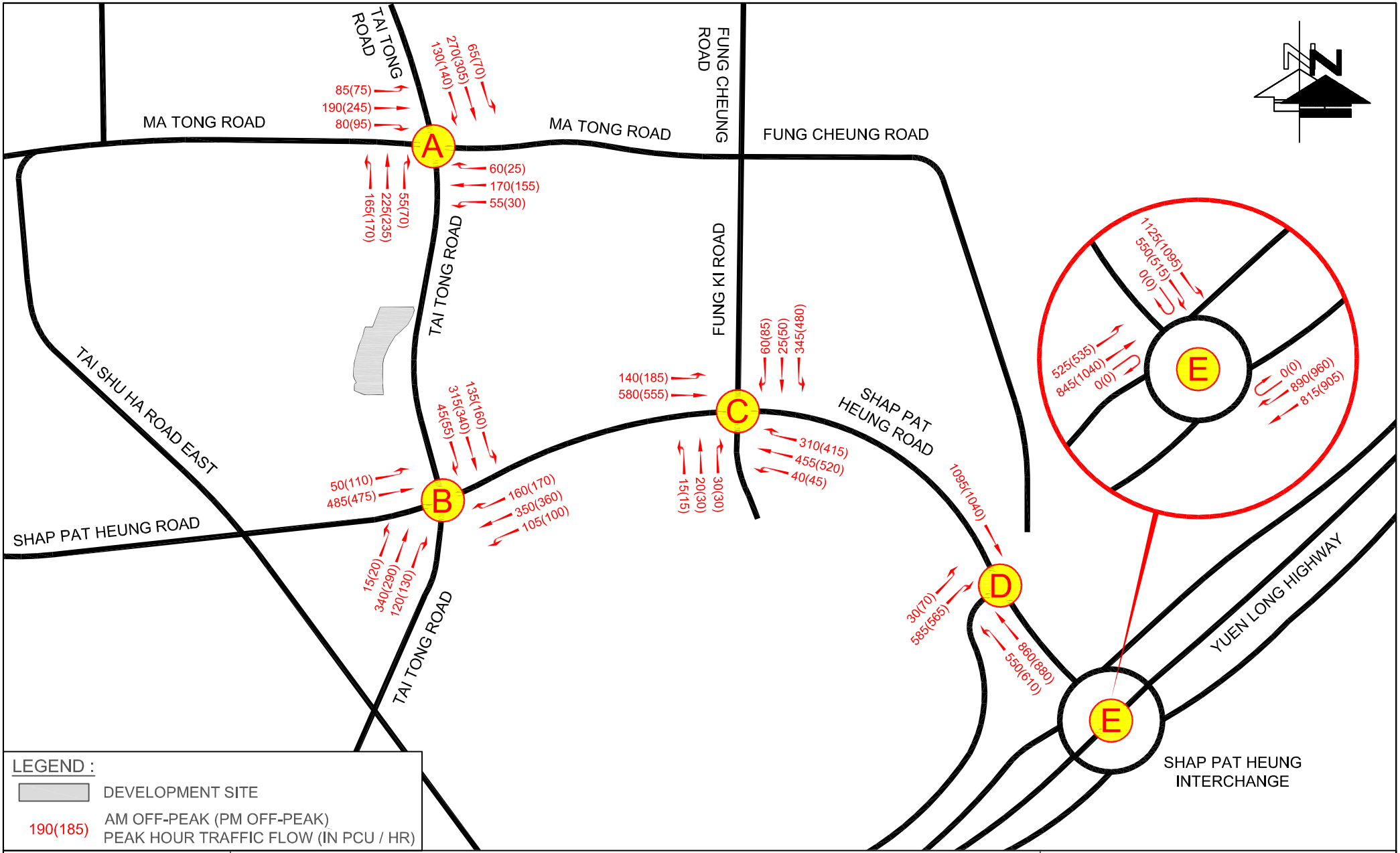


FIGURE NO.: 4.2	PROJECT TITLE: Conservation of a Grade 3 Historic Building in Yuen Long Siu Lo
PROJECT NO.: 21120HK	DRAWING TITLE: 2028 REFERENCE OFF-PEAK TRAFFIC FLOWS
SCALE: 1 : 4500@A4	DATE: 14 APR 2022

CTA Consultants Limited
志達顧問有限公司

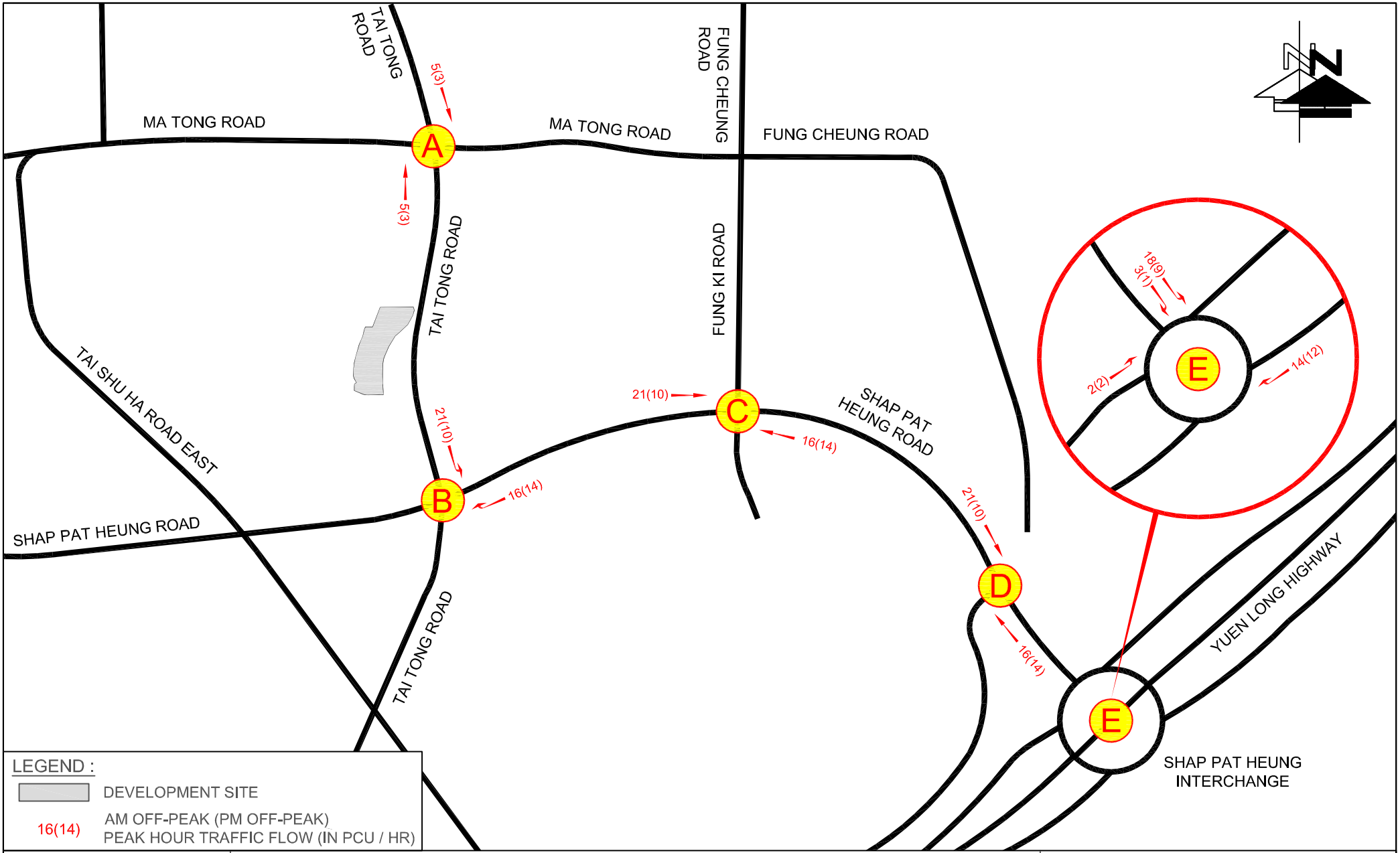
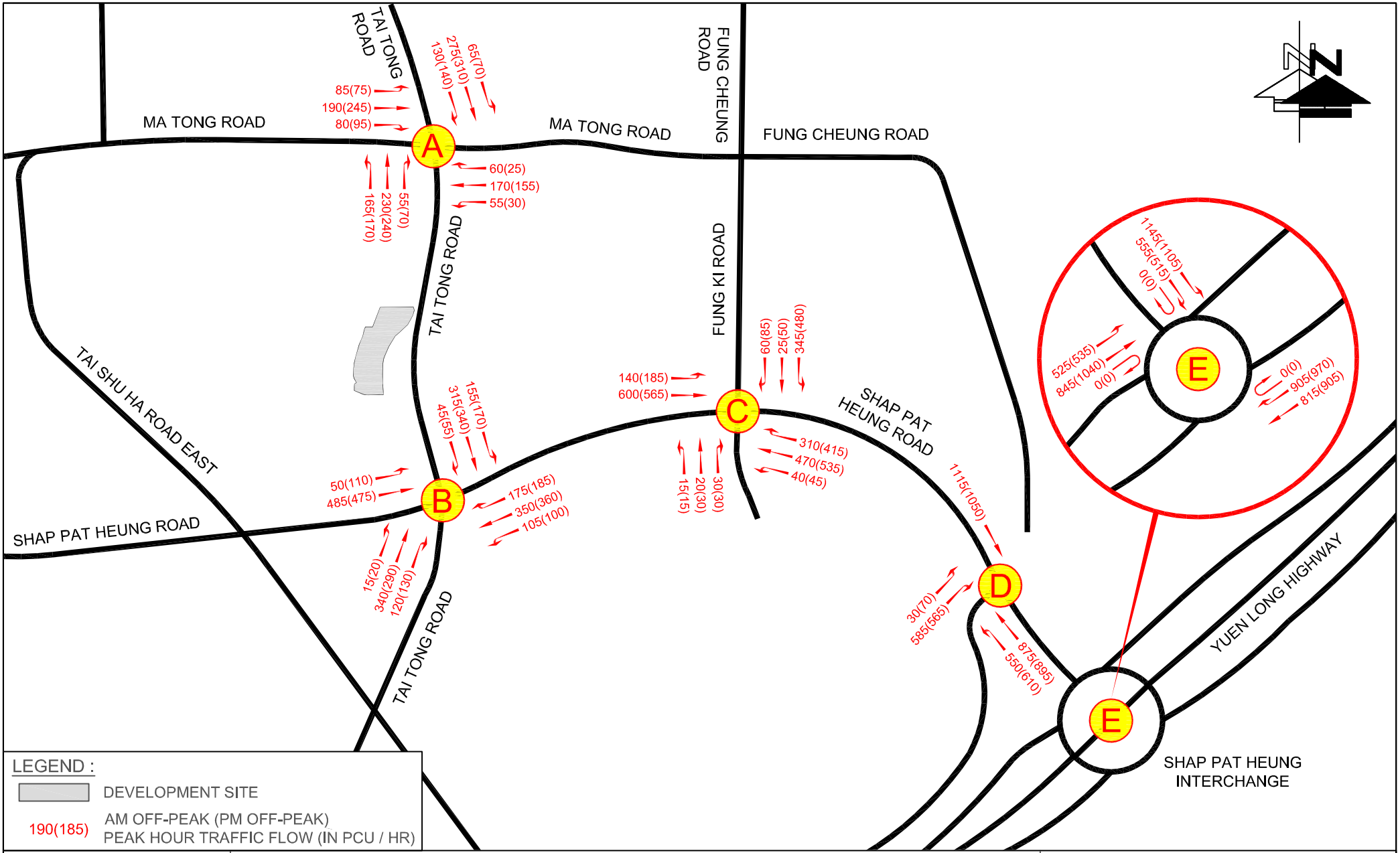


FIGURE NO.: 4.3	PROJECT TITLE: Conservation of a Grade 3 Historic Building in Yuen Long Siu Lo	CTA Consultants Limited 志達顧問有限公司
PROJECT NO.: 21120HK	DRAWING TITLE: 2028 DEVELOPMENT TRAFFIC FLOWS	
SCALE: 1 : 4500@A4 / DATE: 09 DEC 2021		



LEGEND :

DEVELOPMENT SITE

190(185) AM OFF-PEAK (PM OFF-PEAK) PEAK HOUR TRAFFIC FLOW (IN PCU / HR)

FIGURE NO.: 4.4	PROJECT TITLE: Conservation of a Grade 3 Historic Building in Yuen Long Siu Lo
PROJECT NO.: 21120HK	DRAWING TITLE: 2028 DESIGN OFF-PEAK TRAFFIC FLOWS
SCALE: 1 : 4500@A4	DATE: 14 APR 2022

CTA Consultants Limited
志達顧問有限公司

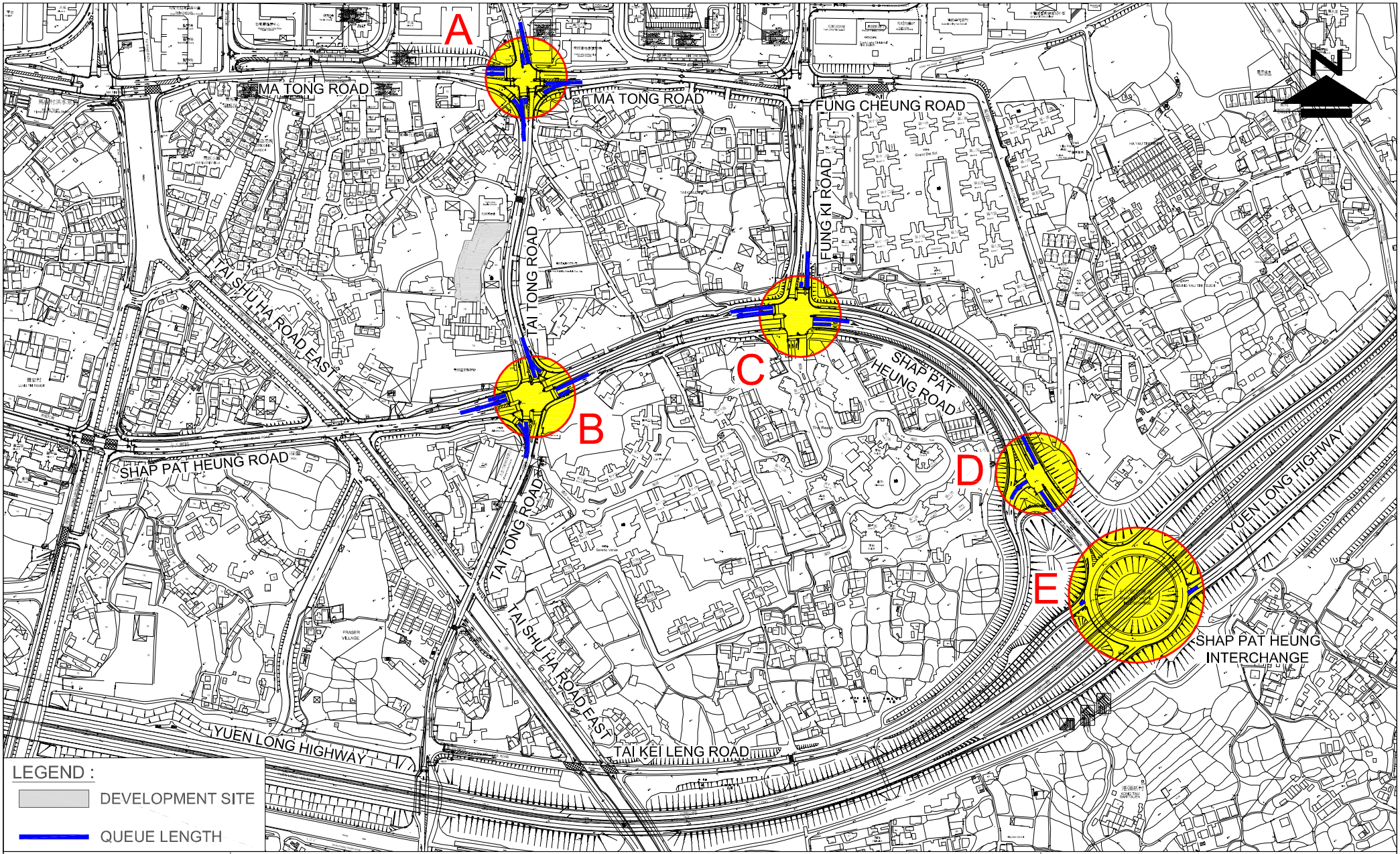


FIGURE NO.: 4.5	PROJECT TITLE: Conservation of a Grade 3 Historic Building in Yuen Long Siu Lo
PROJECT NO.: 21120HK	DRAWING TITLE: 2028 REFERENCE QUEUE LENGTH (AM OFF-PEAK)
SCALE: 1 : 5000 @A4	DATE: 14 APR 2022

CTA Consultants Limited
志達顧問有限公司

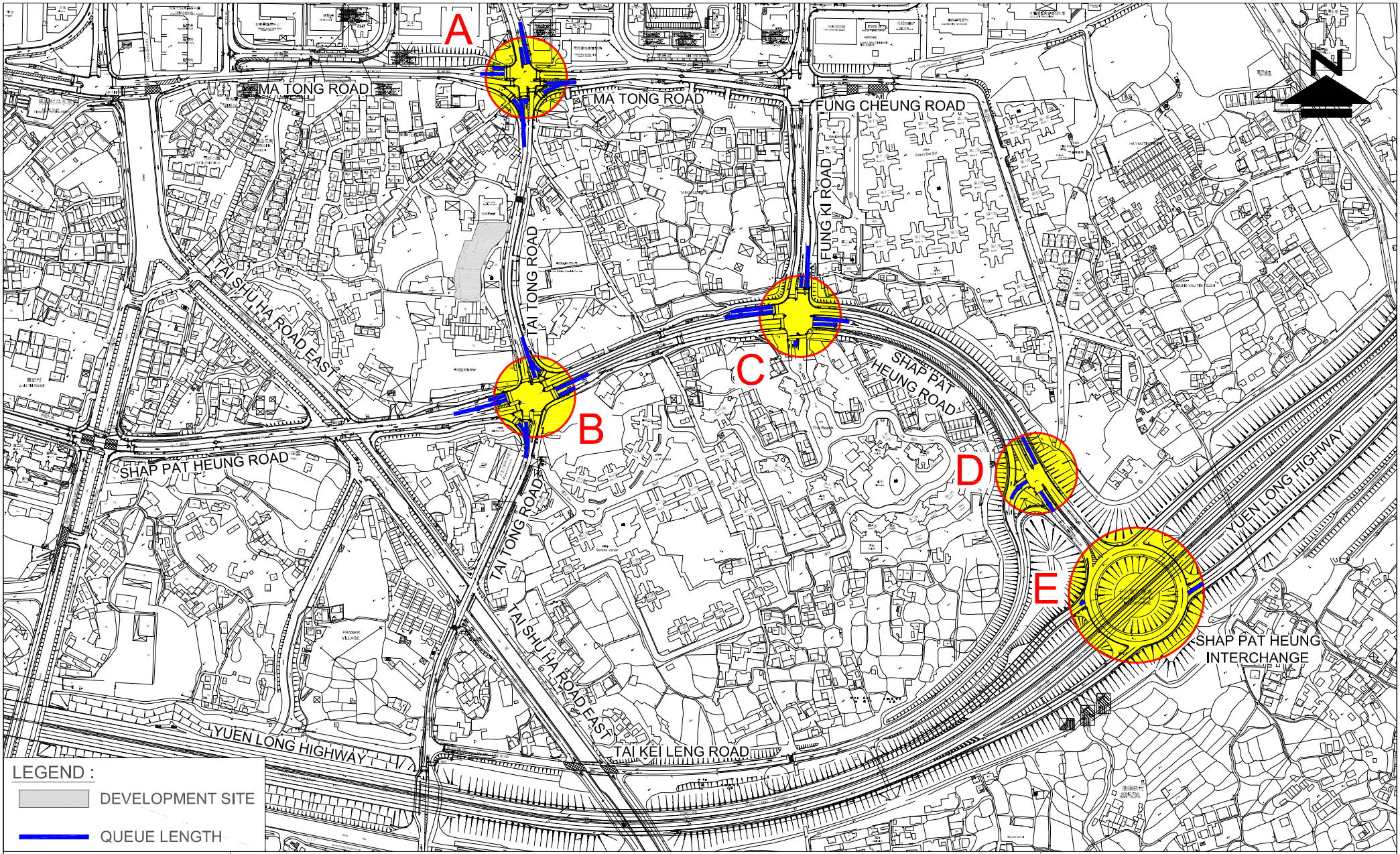


FIGURE NO.: 4.6	PROJECT TITLE: Conservation of a Grade 3 Historic Building in Yuen Long Siu Lo
PROJECT NO.: 21120HK	DRAWING TITLE: 2028 REFERENCE QUEUE LENGTH (PM OFF-PEAK)
SCALE: 1 : 5000 @A4	DATE: 14 APR 2022

CTA Consultants Limited
志達顧問有限公司

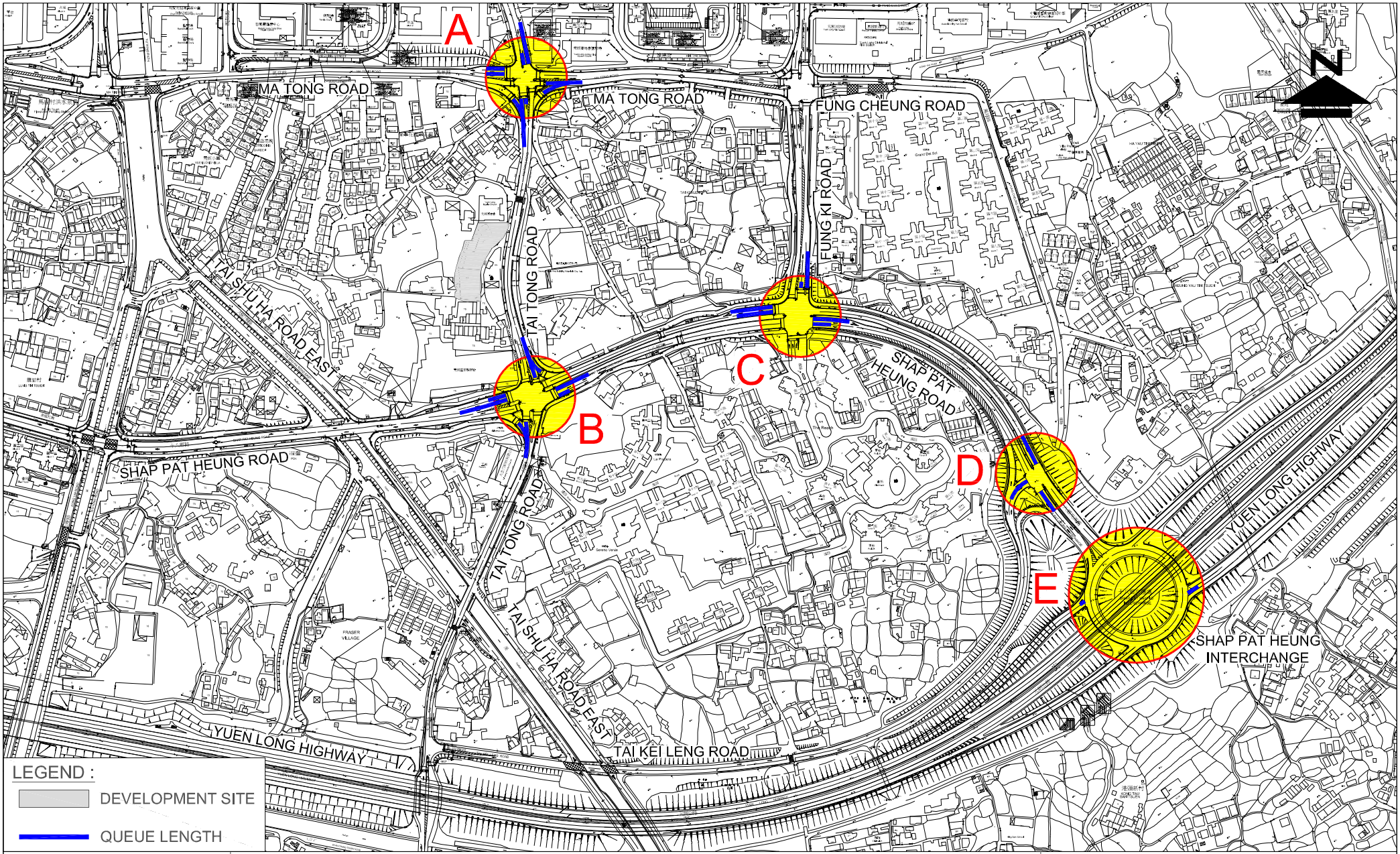


FIGURE NO.: 4.7	PROJECT TITLE: Conservation of a Grade 3 Historic Building in Yuen Long Siu Lo
PROJECT NO.: 21120HK	DRAWING TITLE: 2028 DESIGN QUEUE LENGTH (AM OFF-PEAK)
SCALE: 1 : 5000 @A4	DATE: 14 APR 2022

CTA Consultants Limited
志達顧問有限公司

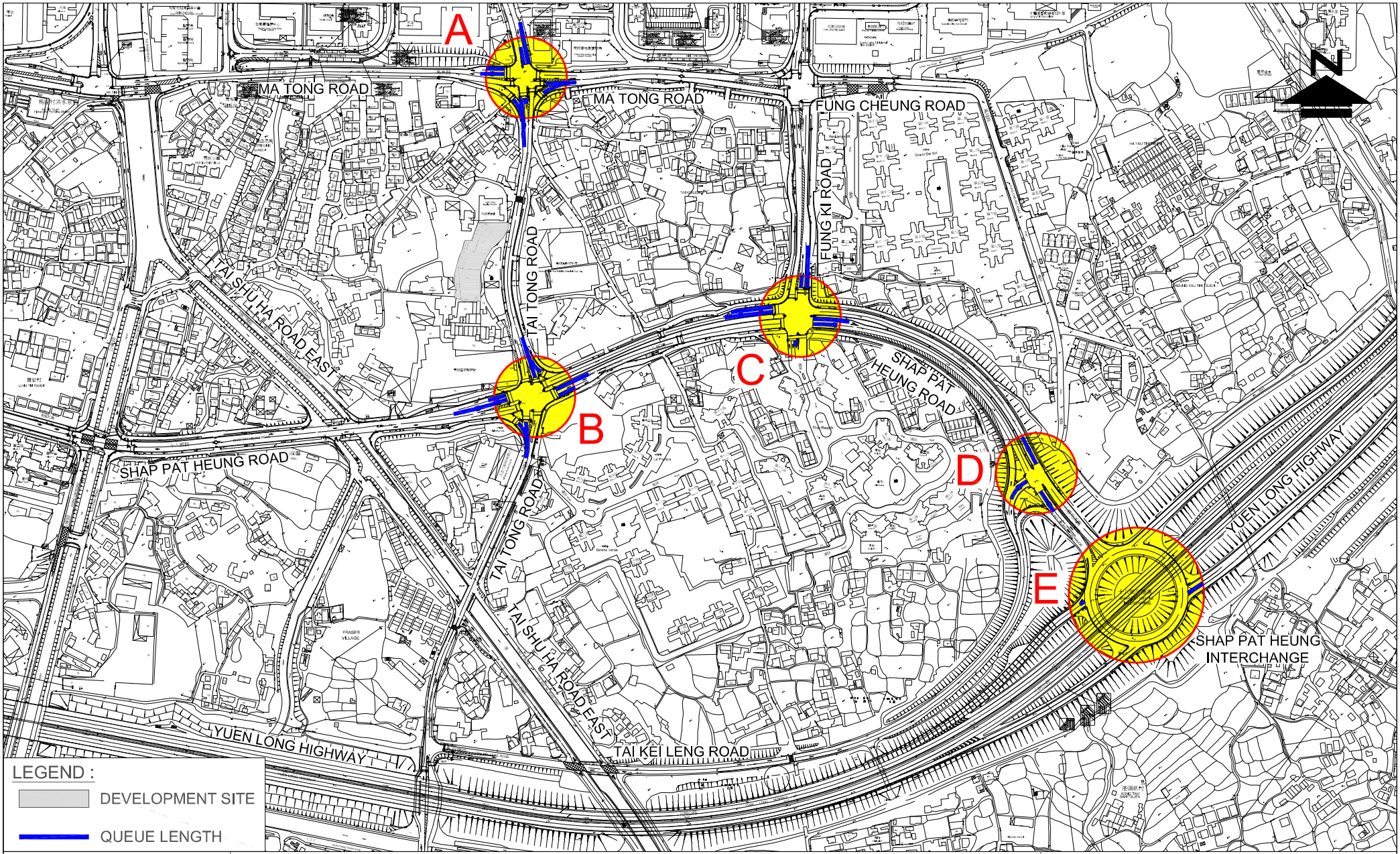


FIGURE NO.: 4.8	PROJECT TITLE: Conservation of a Grade 3 Historic Building in Yuen Long Siu Lo
PROJECT NO.: 21120HK	DRAWING TITLE: 2028 DESIGN QUEUE LENGTH (PM OFF-PEAK)
SCALE: 1 : 5000 @A4	DATE: 14 APR 2022

CTA Consultants Limited
志達顧問有限公司

FIGURE NO.: 4.9	PROJECT TITLE: Conservation of a Grade 3 Historic Building in Yuen Long Siu Lo
PROJECT NO.: 21120HK	DRAWING TITLE: PROPOSED JUNCTION LAYOUT OF SHAP PAT HEUNG INTERCHANGE (E) (CARRIED BY YUEN LONG SOUTH DEVELOPMENT)
SCALE: 1 : 1500@A4	DATE: 14 APR 2022

CTA Consultants Limited
志達顧問有限公司

Appendix 1

Junction Calculation Sheets

TRAFFIC SIGNALS CALCULATION Job No: 21120HK **CTA Consultants Ltd.**

Junction: **(A) Ma Tong Road / Tai Tong Road**
Description: **2021 Off-peak Traffic Flows**

Approach	Direction	Movement notation	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Nearside 0/1	Site Factor	Pro. Turning (%) A.M Off-Peak	Pro. Turning (%) P.M Off-Peak	Revised Saturation Flow (pcu/hr) A.M Off-Peak	Revised Saturation Flow (pcu/hr) P.M Off-Peak	A.M. Off-Peak Flow (pcu/hr)	A.M. Off-Peak y Value	A.M. Off-Peak Critical y	P.M. Off-Peak Flow (pcu/hr)	P.M. Off-Peak y Value	P.M. Off-Peak Critical y
Ma Tong Road (WB)	W		B	3	4.0	0	21	0	1	26%	16%	2235	2250	265	0.119	0.119	190	0.084	0.084
	W		B	3	5.0	15	0	1	0.063	100%	100%								
Tai Tong Road (NB)	N		D	2	3.5	8	0	1	1.11	42%	42%	2140	2140	415	0.194	0.194	445	0.208	0.208
	N		D	2	3.5	0	21	0	0.06	100%	100%								
Ma Tong Road (EB)	E		A	1	3.5	18	0	1	0.9	100%	100%	5360	5365	320	0.060	0.060	380	0.071	0.071
	E		A	1	3.5	0	0	0	0.9	0%	0%								
	E		A	1	3.5	0	30	0	0.9	63%	59%								
Tai Tong Road (SB)	S		C	4	3.5	0	24	0	1	100%	100%	3875	3880	430	0.111	0.111	480	0.124	0.124
	S		C	4	3.5	8	0	1	1	19%	19%								

Pedestrian crossing

Ep	3,4	Min. Crossing Time = 5Gm + 5FGm =10s
Fp	1,3,4	Min. Crossing Time = 6Gm + 6FGm =12s
Gp	1,2	Min. Crossing Time = 5Gm + 5FGm =10s
Hp	1,2,4	Min. Crossing Time = 6Gm + 6FGm =12s
Ip	3,4	Min. Crossing Time = 5Gm + 5FGm =10s
Jp	1,2,3	Min. Crossing Time = 8Gm + 8FGm =16s
Kp	1,2,4	Min. Crossing Time = 10Gm + 10FGm =20s
Lp	4	Min. Crossing Time = 5Gm + 5FGm =10s

Notes:

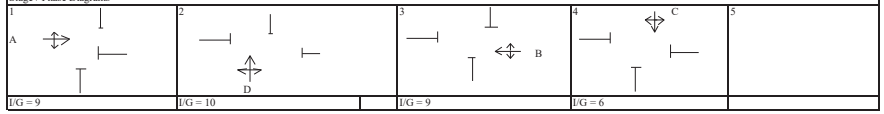
Traffic Flow (pcu / hr) [AM (PM)] N

120(130) 250(285) 60(65)
80(70)
165(220)
75(90)
55(25)
160(135)
50(30)
155(160) 210(220) 50(65)

Check Phase	
Σy	0.483
L (sec)	30
C (sec)	120
y pract.	0.675
R.C. (%)	40%

Check Phase	
Σy	0.487
L (sec)	30
C (sec)	120
y pract.	0.675
R.C. (%)	39%

Stage / Phase Diagrams



I/G = 9 | I/G = 10 | I/G = 9 | I/G = 6

TRAFFIC SIGNALS CALCULATION Job No: 21120HK **CTA Consultants Ltd.**

Junction: **(B) Tai Tong Road / Shap Pat Heung Road**
Description: **2021 Off-peak Traffic Flows**

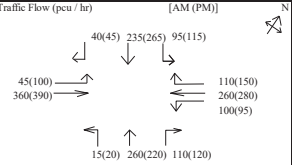
Approach	Direction	Movement notation	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Nearside 0/1	Site Factor	Pro. Turning (%) A.M. Off-Peak	Pro. Turning (%) P.M. Off-Peak	Revised A.M. Off-Peak	Revised P.M. Off-Peak	A.M. Off-Peak Flow (pcu/hr)	A.M. Off-Peak y Value	A.M. Off-Peak Critical y	P.M. Off-Peak Flow (pcu/hr)	P.M. Off-Peak y Value	P.M. Off-Peak Critical y
Shap Pat Heung Road (WB)	W		C	3	3.8	0	30	0	1	59%	69%	4385	4375	470	0.107	0.107	525	0.120	0.120
	W		C	3	3.8	0	0	0	0.95	0%	0%								
	W		C	3	3.5	15	0	1	0.15	100%	100%								
Tai Tong Road (NB)	N		B	2	3.5	15	0	1	0.125	37%	54%	2275	2265	385	0.169	0.169	360	0.159	0.159
	N		B	2	3.5	0	15	0	1	32%	37%								
Shap Pat Heung Road (EB)	E		A	1	3.5	15	0	1	1	100%	100%	6055	6055	405	0.067	0.067	490	0.081	0.081
	E		A	1	3.8	0	0	0	1	0%	0%								
	E		A	1	3.8	0	0	0	1	0%	0%								
Tai Tong Road (SB)	S		D	4	3.5	15	0	1	0.135	100%	100%	2315	2315	370	0.160	0.160	425	0.184	0.184
	S		D	4	3.5	0	15	0	1	15%	15%								

Pedestrian crossing

Ep	3,4	Min. Crossing Time = 6Gm + 6FGm =12s
Fp	1,3,4	Min. Crossing Time = 7Gm + 7FGm =14s
Gp	1,2	Min. Crossing Time = 8Gm + 8FGm =16s
Hp	1,2,4	Min. Crossing Time = 10Gm + 10FGm =20s
Ip	3,4	Min. Crossing Time = 8Gm + 8FGm =16s
Jp	1,2,3	Min. Crossing Time = 6Gm + 8FGm =14s
Kp	1,2,4	Min. Crossing Time = 6Gm + 6FGm =12s
Lp	4	Min. Crossing Time = 9Gm + 9FGm =15s
Mp	2,3,4	Min. Crossing Time = 10Gm + 6FGm =16s
Np	1,2	Min. Crossing Time = 6Gm + 6FGm =12s

Notes:

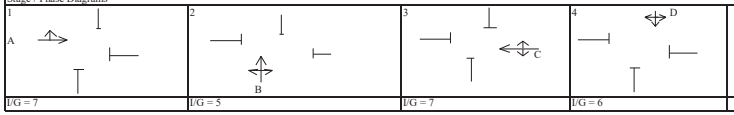
Traffic Flow (pcu / hr) [AM (PM)] N



Check Phase	
Σy	0.503
L (sec)	16
C (sec)	120
y pract.	0.780
R.C. (%)	55%

Check Phase	
Σy	0.543
L (sec)	16
C (sec)	120
y pract.	0.780
R.C. (%)	44%

Stage / Phase Diagrams



I/G = 7 | I/G = 5 | I/G = 7 | I/G = 6

TRAFFIC SIGNALS CALCULATION Job No: 21120HK **CTA Consultants Ltd.**

Junction: **(C)Shap Pat Heung Road / Fung Ki Road**
Description: **2021 Off-peak Traffic Flows**

Approach	Direction	Movement notation	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Nearside 0/1	Site Factor	Pro. Turning (%) A.M. Off-Peak	Pro. Turning (%) P.M. Off-Peak	Revised A.M Off-Peak	Revised P.M Off-Peak	A.M. Off-Peak Flow (pcu/hr)	A.M. Off-Peak y Value	A.M. Off-Peak Critical y	P.M. Off-Peak Flow (pcu/hr)	P.M. Off-Peak y Value	P.M. Off-Peak Critical y
Shap Pat Heung Road (WB)	W		B	2	3.5	0	21	0	0.855	100%	100%	1800	1800	290	0.161	0.161	385	0.214	
	W		B	2	3.5	0	0	0	0.35	0%	0%	735	735	98	0.133		127	0.172	
	W		B	2	3.5	15	0	1	1	14%	12%	1940	1940	257	0.133		333	0.172	
The Access Road of The Reach	N		E	4	3.5	15	0	1	1	100%	100%	1785	1785	15	0.008		15	0.008	
	N		E	4	3.5	0	35	0	1	16%	34%	2090	2075	18	0.009		23	0.011	
	N		E	4	3.5	0	30	0	1	100%	100%	2005	2005	17	0.009		22	0.011	
Shap Pat Heung Road (EB)	E		A	1	3.5	15	0	1	0.9	100%	100%	1610	1610	120	0.075	0.136	165	0.102	
	E		A	1	3.5	0	0	0	0.5	0%	0%	1052.5	1052.5	143	0.136		147	0.139	0.139
	E		A	1	3.5	0	0	0	1	0%	0%	2105	2105	287	0.136		293	0.139	
Fung Ki Road (SB)	S		C	2,3	3.5	18	0	1	1	100%	100%	1815	1815	320	0.176		450	0.248	0.248
	S		D	3	3.5	0	23	0	1	39%	30%	2055	2065	41	0.020		64	0.031	
	S		D	3	3.5	0	21	0	1	100%	100%	1965	1965	39	0.020		61	0.031	

Pedestrian crossing

Fp	Min. Crossing Time = 9Gm + 8FGm =17s
Gp	Min. Crossing Time = 10Gm + 10FGm =20s
Hp	Min. Crossing Time = 7Gm + 7FGm =14s
Ip	Min. Crossing Time = 7Gm + 7FGm =14s
Jp	Min. Crossing Time = 10Gm + 6FGm =16s

Notes:

Site factor are applied due to lane approaches are locally widened to provide an additional lane near the junction:

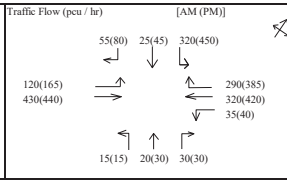
Site Factor of 0.95 is apply to fast lane of Shap Pat Heung Road (WB). Further 10% deduce due to the queue back effect from Fung Ki Road, which give total Site factor of 0.855

Site Factor of 0.35 is apply to middle lane of Shap Pat Heung Road (WB)

Site Factor of 0.95 is apply to near side lane of Shap Pat Heung Road (EB)

Site Factor of 0.5 is apply to middle lane of Shap Pat Heung Road (EB)

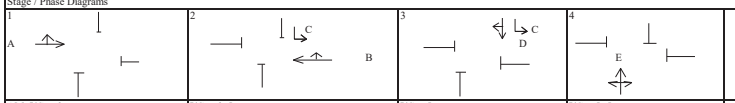
Traffic Flow (pcu / hr) [AM (PM)] N



Check Phase	
Σy	0.297
L (sec)	28
C (sec)	130
y pract.	0.706
R.C. (%)	138%

Check Phase	
Σy	0.387
L (sec)	19
C (sec)	130
y pract.	0.768
R.C. (%)	98%

Stage / Phase Diagrams



AM: I/G = 6 | I/G = 6+5 | I/G = 5 | I/G = 5+5
PM: I/G = 6 | I/G = 6 | I/G = 5 | I/G = 5+5

TRAFFIC SIGNALS CALCULATION Job No: 21120HK **CTA Consultants Ltd.**

Junction: **(D)Shap Pat Heung Road / Tai Kei Leung Road**
Description: **2021 Off-peak Traffic Flows**

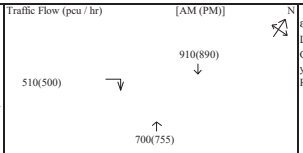
Approach	Direction	Movement notation	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Nearside 0/1	Site Factor	Pro. Turning (%) A.M Off-Peak	Pro. Turning (%) P.M Off-Peak	Revised A.M Off-Peak	Revised P.M Off-Peak	A.M. Off-Peak Flow (pcu/hr)	A.M. Off-Peak y Value	A.M. Off-Peak Critical y	P.M. Off-Peak Flow (pcu/hr)	P.M. Off-Peak y Value	P.M. Off-Peak Critical y
Shap Pat Heung Road (SB)	S	↓	A	1	3.5	0	0	1	0.9	0%	0%	1768.5	1768.5	439	0.248	0.248	430	0.243	0.243
	S	↓	A	1	3.5	0	0	0	0.9	0%	0%	1894.5	1894.5	471	0.248		460	0.243	
Shap Pat Heung Road (NB)	N	↑	A	1	3.5	0	0	1	1	0%	0%	1965	1965	338	0.172		365	0.186	
	N	↑	A	1	3.5	0	0	0	1	0%	0%	2105	2105	362	0.172		390	0.186	
Tai Kei Leng Road (EB)	E	→	B	2	3.5	0	12	1	0.9	100%	100%	1570	1570	244	0.156	0.156	240	0.153	0.153
	E	→	B	2	3.5	0	13.5	0	0.9	100%	100%	1705	1705	266	0.156		260	0.153	

Pedestrian crossing

Notes:

Site factor are applied due to traffic queue extended from Shap Pat Heung Interchange.
Based on site observation, about 10% delay of the effective green right turning from Tai Kei Leng Road to S-bound.
Similar 10% delay is also observed along the S-Bound approach.
Site Factor of 0.9 is apply to Shap Pat Heung Road (SB)
Site Factor of 0.9 is apply to Tai Kei Leng Road (EB)

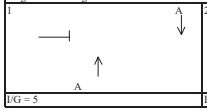
Traffic Flow (pcu / hr) [AM (PM)]

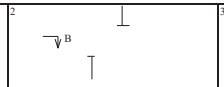


Check Phase	
Σy	0.404
L (sec)	10
C (sec)	90
y pract.	0.800
R.C. (%)	98%

Check Phase	
Σy	0.396
L (sec)	10
C (sec)	90
y pract.	0.800
R.C. (%)	102%

Stage / Phase Diagrams





3

I/G = 5 I/G = 7 I/G =

JUNCTION DELAY CALCULATION Job No: 21120HK **CTA Consultants Ltd.**

Junction: (A) Ma Tong Road / Tai Tong Road

Description: 2021 Off-peak Traffic Flows

TRRL Method (Transport Road Research Laboratory)

$$d = \frac{c(1-\lambda)^2}{2(1-\lambda X)} + \frac{X}{2q(1-X)} - 0.65\left(\frac{c}{q^2}\right)^{\frac{1}{3}} X^{(2+5\lambda)}$$

where d = average delay per vehicle on the particular arm

λ = proportion of the cycle which is effectively green for the phase under consideration i.e.f g/c

x = The degree of saturation. This is the ratio of actual flow to the maximum possible flow under the given setting of signals and equals 3600q/¡Es where S = saturation flow in veh/hour

c = Cycle time in seconds

g = Effective green time in seconds

q should be the flow in vehicles per second to give delay in seconds

Approach:	Ma Tong Road (WB) (LT & STR & RT)		Tai Tong Road (NB) (STR & LT)		Tai Tong Road (NB) (RT)		Ma Tong Road (EB) (LT)		Ma Tong Road (EB) (STR & RT)		Tai Tong Road (SB) (STR & LT)		Tai Tong Road (SB) (RT)	
	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak
q (veh/hr)	196	141	270	281	37	48	59	52	178	230	230	259	89	96
g (sec)	18	13	31	31	31	31	9	7	9	7	29	32	29	32
c (sec)	120	120	120	120	120	120	120	120	120	120	120	120	120	120
s (veh/hr)	1,922	1,933	1,552	1,552	363	363	1,207	1,207	2,763	2,767	1,404	1,407	1,467	1,467
λ	0.15	0.11	0.26	0.26	0.26	0.26	0.07	0.06	0.07	0.06	0.24	0.26	0.24	0.26
x	0.68	0.68	0.68	0.70	0.40	0.51	0.68	0.70	0.89	1.35	0.68	0.70	0.25	0.25
M=qc	6.54	4.69	9.01	9.38	1.23	1.60	1.98	1.73	5.93	7.65	7.65	8.64	2.96	3.21
Delay														
d	53.67	59.32	44.39	45.14	46.15	51.63	77.30	87.68	106.32	-23.32	46.49	45.46	37.92	35.99
Junction Delay (sec)	**58.3**	**34.3**												

From TPDM Vol4 Table 4.2.5

Average Queue N calculated by

N=q(r/2+d) or qr,whichever the greater

where r = effective red time

q = flow (in same units as r and d)

d = average delay per vehicle

Approach:	Shap Pat Heung Road (EB) (LT)		Tai Tong Road (NB) (STR & LT & RT)		Shap Pat Heung Road (EB) (STR)		Shap Pat Heung Road (WB) (STR & RT)		Shap Pat Heung Road (WB) (LT)		Tai Tong Road (SB) (STR & LT & RT)		Tai Tong Road (SB) (STR & LT & RT)	
	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak
r (sec)	102	107	89	89	89	89	111	113	111	113	91	88	91	88
N (veh)	**6**	**4**	**7**	**7**	**1**	**1**	**2**	**2**	**8**	**7**	**6**	**6**	**2**	**2**
Average Queue length (m)	**36.0**	**24.0**	**42.0**	**42.0**	**6.0**	**6.0**	**12.0**	**12.0**	**24.0**	**24.0**	**36.0**	**36.0**	**12.0**	**12.0**

JUNCTION DELAY CALCULATION Job No: 21120HK **CTA Consultants Ltd.**

Junction: (B) Shap Pat Heung Road/ Tai Kei Leng Road
Description: 2021 Off-peak Traffic Flows

TRRL Method (Transport Road Research Laboratory)

$$d = \frac{c(1-\lambda)^2}{2(1-\lambda X)} + \frac{X}{2q(1-X)} - 0.65\left(\frac{c}{q^2}\right)^{\frac{1}{3}} X^{(2+5\lambda)}$$

where d = average delay per vehicle on the particular arm
λ = proportion of the cycle which is effectively green for the phase under consideration i.e.f g/c
x = The degree of saturation. This is the ratio of actual flow to the maximum possible flow under the given setting of signals and equals 3600q/Ès where S = saturation flow in veh/hour
c = Cycle time in seconds
g = Effective green time in seconds
q should be the flow in vehicles per second to give delay in seconds

Approach:	Shap Pat Heung Road (WB) (STR & RT)		Shap Pat Heung Road (WB) (LT)		Tai Tong Road (NB) (STR & LT & RT)		Shap Pat Heung Road (EB) (STR)		Shap Pat Heung Road (EB) (LT)		Tai Tong Road (SB) (STR & LT & RT)	
	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak
q (veh/hr)	296	344	80	76	308	288	288	312	36	80	296	340
g (sec)	24	22	24	22	29	26	18	19	18	19	28	31
c (sec)	120	120	120	120	120	120	120	120	120	120	120	120
s (veh/hr)	3,284	3,276	716	716	2,316	2,304	3,416	3,416	1,428	1,428	2,308	2,304
λ	0.20	0.18	0.20	0.18	0.24	0.22	0.15	0.16	0.15	0.16	0.23	0.26
x	0.45	0.57	0.56	0.58	0.55	0.58	0.56	0.58	0.17	0.35	0.55	0.57
M=qc	9.87	11.47	2.67	2.53	10.27	9.60	9.60	10.40	1.20	2.67	9.87	11.33
Delay												
d	42.90	45.71	52.07	55.10	41.30	43.83	48.31	47.79	45.66	47.15	41.99	40.30
Junction Delay (sec)	**44.1**	**45.1**										

From TPDM Vol4 Table 4.2.5
Average Queue N calculated by
N=q(r/2+d) or qr,whichever the greater

where r = effective red time
q = flow (in same units as r and d)
d = average delay per vehicle

Approach:	Shap Pat Heung Road (WB) (STR & RT)		Shap Pat Heung Road (WB) (LT)		Tai Tong Road (NB) (STR & LT & RT)		Shap Pat Heung Road (EB) (STR)		Shap Pat Heung Road (EB) (LT)		Tai Tong Road (SB) (STR & LT & RT)	
	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak
r (sec)	96	98	96	98	91	94	102	101	102	101	92	89
N (veh)	**8**	**9**	**2**	**2**	**8**	**8**	**8**	**9**	**1**	**2**	**8**	**8**
Average Queue length (m)	**30.0**	**36.0**	**12.0**	**12.0**	**30.0**	**30.0**	**24.0**	**24.0**	**6.0**	**12.0**	**30.0**	**36.0**

JUNCTION DELAY CALCULATION Job No: 21120HK **CTA Consultants Ltd.**

Junction: (C)Shap Pat Heung Road / Fung Ki Road

Description: 2021 Off-peak Traffic Flows

TRRL Method (Transport Road Research Laboratory)

$$d = \frac{c(1-\lambda)^2}{2(1-\lambda X)} + \frac{X}{2q(1-X)} - 0.65\left(\frac{c}{q^2}\right)^{\frac{1}{3}} X^{(2+5\lambda)}$$

where d = average delay per vehicle on the particular arm
λ = proportion of the cycle which is effectively green for the phase under consideration i.e.f g/c
x = The degree of saturation. This is the ratio of actual flow to the maximum possible flow under the given setting of signals and equals 3600q/ĖS where S = saturation flow in veh/hour
c = Cycle time in seconds
g = Effective green time in seconds
q should be the flow in vehicles per second to give delay in seconds

Approach:	Shap Pat Heung Road (WB) (RT)		Shap Pat Heung Road (WB) (STR & LT)		The Access Road of The Reach (NB) (LT)		The Access Road of The Reach (NB) (STR & RT))		Shap Pat Heung Road (EB) (LT)		Shap Pat Heung Road (EB) (STR)		Fung Ki Road (SB) (LT)		Fung Ki Road (SB) (STR & RT)	
	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak
q (veh/hr)	232	308	284	368	12	12	28	36	96	132	344	352	256	360	64	100
g (sec)	40	44	49	55	6	6	6	6	41	36	41	36	60	66	6	6
c (sec)	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130
s (veh/hr)	1,440	1,440	2,140	2,140	1,428	1,428	3,276	3,264	1,288	1,288	2,526	2,526	1,452	1,452	3,216	3,224
λ	0.31	0.34	0.38	0.42	0.05	0.05	0.05	0.05	0.32	0.28	0.32	0.28	0.46	0.51	0.05	0.05
x	0.52	0.63	0.35	0.41	0.18	0.18	0.19	0.24	0.24	0.37	0.43	0.50	0.38	0.49	0.43	0.67
M=qc	8.38	11.12	10.26	13.29	0.43	0.43	1.01	1.30	3.47	4.77	12.42	12.71	9.24	13.00	2.31	3.61
Delay																
d	39.53	39.41	30.00	27.12	62.42	62.42	60.40	60.64	34.08	39.80	36.20	40.58	24.24	22.69	62.13	71.03
Junction Delay (sec)	**36.5**	**34.8**														

From TPDM Vol4 Table 4.2.5
Average Queue N calculated by
N=q(r/2+d) or qr,whichever the greater

where r = effective red time
q = flow (in same units as r and d)
d = average delay per vehicle

Approach:	Shap Pat Heung Road (WB) (RT)		Shap Pat Heung Road (WB) (STR & LT)		The Access Road of The Reach (LT)		The Access Road of The Reach (STR & RT))		Shap Pat Heung Road (EB) (LT)		Shap Pat Heung Road (EB) (STR)		Fung Ki Road (SB) (LT)		Fung Ki Road (SB) (STR & RT)	
	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak
r (sec)	90	86	81	75	124	124	124	124	89	94	89	94	70	64	124	124
N (veh)	**6**	**7**	**6**	**8**	**0**	**0**	**1**	**1**	**2**	**3**	**9**	**9**	**5**	**6**	**2**	**4**
Average Queue length (m)	**36.0**	**42.0**	**24.0**	**30.0**	**0.0**	**0.0**	**0.0**	**6.0**	**12.0**	**18.0**	**24.0**	**30.0**	**30.0**	**36.0**	**6.0**	**12.0**

JUNCTION DELAY CALCULATION Job No: 21120HK **CTA Consultants Ltd.**

Junction: (D)Shap Pat Heung Road / Tai Kei Leung Road
Description: 2021 Off-peak Traffic Flows

TRRL Method (Transport Road Research Laboratory)

$$d = \frac{c(1-\lambda)^2}{2(1-\lambda X)} + \frac{X}{2q(1-X)} - 0.65\left(\frac{c}{q^2}\right)^{\frac{1}{3}} X^{(2+5\lambda)}$$

where d = average delay per vehicle on the particular arm
λ = proportion of the cycle which is effectively green for the phase under consideration i.e.f g/c
x = The degree of saturation. This is the ratio of actual flow to the maximum possible flow under the given setting of signals and equals 3600q/Ès where S = saturation flow in veh/hour
c = Cycle time in seconds
g = Effective green time in seconds
q should be the flow in vehicles per second to give delay in seconds

Approach:	Shap Pat Heung Road (SB) (STR)		Shap Pat Heung Road (NB) (STR)		Tai Kei Leng Road (EB) (RT)	
	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak
q (veh/hr)	728	712	560	604	408	400
g (sec)	49	49	49	49	31	31
c (sec)	90	90	90	90	90	90
s (veh/hr)	2,930	2,930	3,256	3,256	2,620	2,620
λ	0.54	0.54	0.54	0.54	0.34	0.34
x	0.46	0.45	0.32	0.34	0.45	0.44
M=qc	18.20	17.80	14.00	15.10	10.20	10.00
Delay						
d	13.16	13.06	11.70	11.93	23.90	23.80
Junction Delay (sec)	**10.3**	**9.5**				

From TPDM Vol4 Table 4.2.5
Average Queue N calculated by
N=q(r/2+d) or qr,whichever the greater

where r = effective red time
q = flow (in same units as r and d)
d = average delay per vehicle

Approach:	Shap Pat Heung Road (SB) (STR)		Shap Pat Heung Road (NB) (STR)		Tai Kei Leng Road (EB) (RT)	
	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak
r (sec)	41	41	41	41	59	59
N (veh)	**8**	**8**	**6**	**7**	**7**	**7**
Average Queue length (m)	**24.0**	**24.0**	**18.0**	**18.0**	**18.0**	**18.0**

TRAFFIC SIGNALS CALCULATION Job No: 21120HK **CTA Consultants Ltd.**

Junction: **(A) Ma Tong Road / Tai Tong Road**
Description: **2028 Reference Off-peak Traffic Flows**

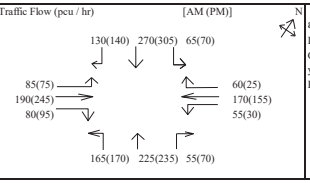
Approach	Direction	Movement notation	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Nearside 0/1	Site Factor	Pro. Turning (%) A.M Off-Peak	Pro. Turning (%) P.M Off-Peak	Revised Saturation Flow (pcu/hr) A.M Off-Peak	Revised Saturation Flow (pcu/hr) P.M Off-Peak	A.M. Off-Peak Flow (pcu/hr)	A.M. Off-Peak y Value	A.M. Off-Peak Critical y	P.M. Off-Peak Flow (pcu/hr)	P.M. Off-Peak y Value	P.M. Off-Peak Critical y
Ma Tong Road (WB)	W		B	3	4.0	0	21	0	1	26%	14%	2235	2255	285	0.128	0.128	210	0.093	0.093
	W		B	3	5.0	15	0	1	0.063	100%	100%								
Tai Tong Road (NB)	N		D	2	3.5	8	0	1	1.11	42%	42%	2140	2140	445	0.208	0.208	475	0.222	0.222
	N		D	2	3.5	0	21	0	0.06	100%	100%								
Ma Tong Road (EB)	E		A	1	3.5	18	0	1	0.9	100%	100%	5365	5365	355	0.066	0.066	415	0.077	0.077
	E		A	1	3.5	0	0	0	0.9	0%	0%								
	E		A	1	3.5	0	30	0	0.9	60%	57%								
Tai Tong Road (SB)	S		C	4	3.5	0	24	0	1	100%	100%	3875	3880	465	0.120	0.120	515	0.133	0.133
	S		C	4	3.5	8	0	1	1	19%	19%								

Pedestrian crossing

Ep	3,4	Min. Crossing Time = 5Gm + 5FGm =10s
Fp	1,3,4	Min. Crossing Time = 6Gm + 6FGm =12s
Gp	1,2	Min. Crossing Time = 5Gm + 5FGm =10s
Hp	1,2,4	Min. Crossing Time = 6Gm + 6FGm =12s
Ip	3,4	Min. Crossing Time = 5Gm + 5FGm =10s
Jp	1,2,3	Min. Crossing Time = 8Gm + 8FGm =16s
Kp	1,2,4	Min. Crossing Time = 10Gm + 10FGm =20s
Lp	4	Min. Crossing Time = 5Gm + 5FGm =10s

Notes:

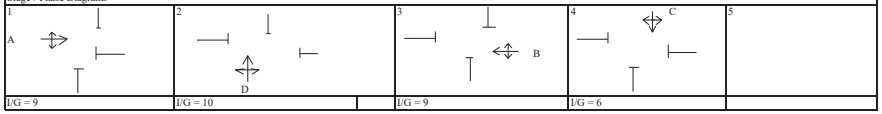
Traffic Flow (pcu / hr) [AM (PM)]



Check Phase	
Σy	0.522
L (sec)	30
C (sec)	120
y pract.	0.675
R.C. (%)	29%

Check Phase	
Σy	0.525
L (sec)	30
C (sec)	120
y pract.	0.675
R.C. (%)	29%

Stage / Phase Diagrams



I/G = 9 | I/G = 10 | I/G = 9 | I/G = 6

TRAFFIC SIGNALS CALCULATION Job No: 21120HK **CTA Consultants Ltd.**

Junction: **(B) Tai Tong Road / Shap Pat Heung Road**
Description: **2028 Reference Off-peak Traffic Flows**

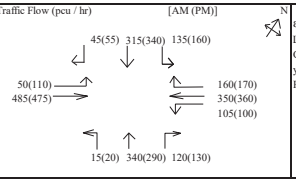
Approach	Direction	Movement notation	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Nearside 0/1	Site Factor	Pro. Turning (%) A.M. Off-Peak	Pro. Turning (%) P.M. Off-Peak	Revised A.M. Off-Peak	Revised P.M. Off-Peak	A.M. Off-Peak Flow (pcu/hr)	A.M. Off-Peak y Value	A.M. Off-Peak Critical y	P.M. Off-Peak Flow (pcu/hr)	P.M. Off-Peak y Value	P.M. Off-Peak Critical y
Shap Pat Heung Road (WB)	W		C	3	3.8	0	30	0	1	62%	64%	4380	4380	615	0.140	0.140	630	0.144	0.144
	W		C	3	3.8	0	0	0	0.95	0%	0%								
	W		C	3	3.5	15	0	1	0.15	100%	100%								
Tai Tong Road (NB)	N		B	2	3.5	15	0	1	0.125	30%	44%	2285	2280	475	0.208	0.208	440	0.193	0.193
	N		B	2	3.5	0	15	0	1	28%	33%								
Shap Pat Heung Road (EB)	E		A	1	3.5	15	0	1	1	100%	100%	6055	6055	535	0.088	0.088	585	0.097	0.097
	E		A	1	3.8	0	0	0	1	0%	0%								
	E		A	1	3.8	0	0	0	1	0%	0%								
Tai Tong Road (SB)	S		D	4	3.5	15	0	1	0.135	100%	100%	2320	2315	495	0.213	0.213	555	0.240	0.240
	S		D	4	3.5	0	15	0	1	13%	14%								

Pedestrian crossing

Ep	3,4	Min. Crossing Time = 6Gm + 6FGm =12s
Fp	1,3,4	Min. Crossing Time = 7Gm + 7FGm =14s
Gp	1,2	Min. Crossing Time = 8Gm + 8FGm =16s
Hp	1,2,4	Min. Crossing Time = 10Gm + 10FGm =20s
Ip	3,4	Min. Crossing Time = 8Gm + 8FGm =16s
Jp	1,2,3	Min. Crossing Time = 6Gm + 8FGm =14s
Kp	1,2,4	Min. Crossing Time = 6Gm + 6FGm =12s
Lp	4	Min. Crossing Time = 9Gm + 9FGm =15s
Mp	2,3,4	Min. Crossing Time = 10Gm + 6FGm =16s
Np	1,2	Min. Crossing Time = 6Gm + 6FGm =12s

Notes:

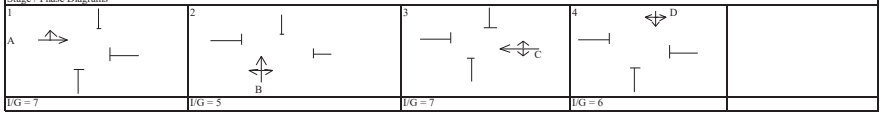
Traffic Flow (pcu / hr) [AM (PM)]



Check Phase	
Σy	0.650
L (sec)	16
C (sec)	120
y pract.	0.780
R.C. (%)	20%

Check Phase	
Σy	0.673
L (sec)	16
C (sec)	120
y pract.	0.780
R.C. (%)	16%

Stage / Phase Diagrams



I/G = 7 | I/G = 5 | I/G = 7 | I/G = 6

TRAFFIC SIGNALS CALCULATION Job No: 21120HK **CTA Consultants Ltd.**

Junction: **(C)Shap Pat Heung Road / Fung Ki Road**
Description: **2028 Reference Off-peak Traffic Flows**

Approach	Direction	Movement notation	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Nearside 0/1	Site Factor	Pro. Turning (%) A.M Off-Peak	Pro. Turning (%) P.M Off-Peak	Revised A.M Off-Peak	Revised P.M Off-Peak	A.M. Off-Peak Flow (pcu/hr)	A.M. Off-Peak y Value	A.M. Off-Peak Critical y	P.M. Off-Peak Flow (pcu/hr)	P.M. Off-Peak y Value	P.M. Off-Peak Critical y
Shap Pat Heung Road (WB)	W		B	2	3.5	0	21	0	0.855	100%	100%	1800	1800	310	0.172	0.185	415	0.231	
	W		B	2	3.5	0	0	0	0.35	0%	0%	735	735	136	0.185		155	0.211	
	W		B	2	3.5	15	0	1	1	11%	11%	1945	1945	359	0.185		410	0.211	
The Access Road of The Reach	N		E	4	3.5	15	0	1	1	100%	100%	1785	1785	15	0.008		15	0.008	
	N		E	4	3.5	0	35	0	1	16%	34%	2090	2075	18	0.009		23	0.011	
	N		E	4	3.5	0	30	0	1	100%	100%	2005	2005	17	0.009		22	0.011	
Shap Pat Heung Road (EB)	E		A	1	3.5	15	0	1	0.9	100%	100%	1610	1610	140	0.087	0.184	185	0.115	
	E		A	1	3.5	0	0	0	0.5	0%	0%	1052.5	1052.5	193	0.184		185	0.176	0.176
	E		A	1	3.5	0	0	0	1	0%	0%	2105	2105	387	0.184		370	0.176	
Fung Ki Road (SB)	S		C	2,3	3.5	18	0	1	1	100%	100%	1815	1815	345	0.190		480	0.264	0.264
	S		D	3	3.5	0	23	0	1	42%	28%	2050	2070	43	0.021		69	0.033	
	S		D	3	3.5	0	21	0	1	100%	100%	1965	1965	42	0.021		66	0.033	
Pedestrian crossing			Fp			Min. Crossing Time = 9Gm + 8FGm =17s													
			Gp			Min. Crossing Time = 10Gm + 10FGm =20s													
			Hp			Min. Crossing Time = 7Gm + 7FGm =14s													
			Ip			Min. Crossing Time = 7Gm + 7FGm =14s													
			Jp			Min. Crossing Time = 10Gm + 6FGm =16s													

Notes:
Site factor are applied due to lane approaches are locally widened to provide an additional lane near the junction:

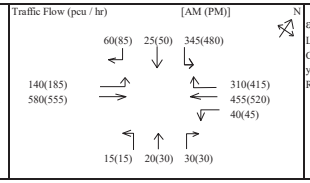
Site Factor of 0.95 is apply to fast lane of Shap Pat Heung Road (WB). Further 10% deduce due to the queue back effect from Fung Ki Road, which give total Site factor of 0.855

Site Factor of 0.35 is apply to middle lane of Shap Pat Heung Road (WB)

Site Factor of 0.95 is apply to near side lane of Shap Pat Heung Road (EB)

Site Factor of 0.5 is apply to middle lane of Shap Pat Heung Road (EB)

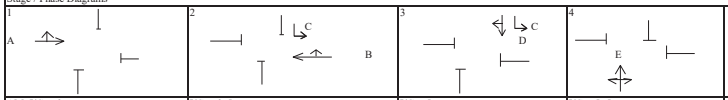
Traffic Flow (pcu / hr) [AM (PM)]



Check Phase	
Σy	0.369
L (sec)	28
C (sec)	130
y pract.	0.706
R.C. (%)	91%

Check Phase	
Σy	0.440
L (sec)	19
C (sec)	130
y pract.	0.768
R.C. (%)	75%

Stage / Phase Diagrams



1	2	3	4	
AM: I/G = 6	I/G = 6+5	I/G = 5	I/G = 5+5	
PM: I/G = 6	I/G = 6	I/G = 5	I/G = 5+5	

TRAFFIC SIGNALS CALCULATION Job No: 21120HK **CTA Consultants Ltd.**

Junction: **(D)Shap Pat Heung Road / Tai Kei Leung Road**
Description: **2028 Reference Off-peak Traffic Flows**

Approach	Direction	Movement notation	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Nearside 0/1	Site Factor	Pro. Turning (%) A.M Off-Peak	Pro. Turning (%) P.M Off-Peak	Revised A.M Off-Peak	Revised P.M Off-Peak	A.M. Off-Peak Flow (pcu/hr)	A.M. Off-Peak y Value	A.M. Off-Peak Critical y	P.M. Off-Peak Flow (pcu/hr)	P.M. Off-Peak y Value	P.M. Off-Peak Critical y
Shap Pat Heung Road (SB)	S		A	1	3.5	0	0	1	0.9	0%	0%	1768.5	1768.5	529	0.299	0.299	502	0.284	0.284
	S		A	1	3.5	0	0	0	0.9	0%	0%	1894.5	1894.5	566	0.299		538	0.284	
Shap Pat Heung Road (NB)	N		A	1	3.5	0	0	1	1	0%	0%	1965	1965	415	0.211		425	0.216	
	N		A	1	3.5	0	0	0	1	0%	0%	2105	2105	445	0.211		455	0.216	
Tai Kei Leng Road (EB)	E		B	2	3.5	0	12	1	0.9	100%	100%	1570	1570	280	0.179	0.179	271	0.173	0.173
	E		B	2	3.5	0	13.5	0	0.9	100%	100%	1705	1705	305	0.179		294	0.173	
Pedestrian crossing																			

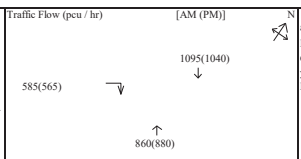
Notes:
Site factor are applied due to traffic queue extended from Shap Pat Heung Interchange.

Based on site observation, about 10% delay of the effective green right turning from Tai Kei Leng Road to S-bound.

Similar 10% delay is also observed along the S-Bound approach.

Site Factor of 0.9 is apply to Shap Pat Heung Road (SB)
Site Factor of 0.9 is apply to Tai Kei Leng Road (EB)

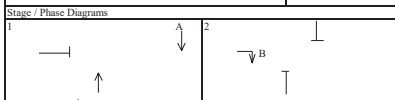
Traffic Flow (pcu / hr) [AM (PM)]



Check Phase	
Σy	0.478
L (sec)	10
C (sec)	90
y pract.	0.800
R.C. (%)	68%

Check Phase	
Σy	0.456
L (sec)	10
C (sec)	90
y pract.	0.800
R.C. (%)	75%

Stage / Phase Diagrams



1	2	3		
I/G = 5	I/G = 7	I/G =		

JUNCTION DELAY CALCULATION Job No: 21120HK **CTA Consultants Ltd.**

Junction: (A) Ma Tong Road / Tai Tong Road
Description: 2028 Reference Off-peak Traffic Flows

TRRL Method (Transport Road Research Laboratory)

$$d = \frac{c(1-\lambda)^2}{2(1-\lambda X)} + \frac{X}{2q(1-X)} - 0.65\left(\frac{c}{q^2}\right)^{\frac{1}{3}} X^{(2+5\lambda)}$$

where d = average delay per vehicle on the particular arm
λ = proportion of the cycle which is effectively green for the phase under consideration i.e.f g/c
x = The degree of saturation. This is the ratio of actual flow to the maximum possible flow under the given setting of signals and equals 3600q/ΣEs where S = saturation flow in veh/hour
c = Cycle time in seconds
g = Effective green time in seconds

q should be the flow in vehicles per second to give delay in seconds

Approach:	Ma Tong Road (WB) (LT & STR & RT)		Tai Tong Road (NB) (STR & LT)		Tai Tong Road (NB) (RT)		Ma Tong Road (EB) (LT)		Ma Tong Road (EB) (STR & RT)		Tai Tong Road (SB) (STR & LT)		Tai Tong Road (SB) (RT)	
	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak
q (veh/hr)	211	156	289	300	41	52	63	56	200	252	248	278	96	104
g (sec)	18	13	30	31	30	31	9	7	9	7	29	31	29	31
c (sec)	120	120	120	120	120	120	120	120	120	120	120	120	120	120
s (veh/hr)	1,922	1,937	1,552	1,552	363	363	1,207	1,207	2,767	2,767	1,404	1,407	1,467	1,467
λ	0.15	0.11	0.25	0.26	0.25	0.26	0.07	0.06	0.07	0.06	0.24	0.26	0.24	0.26
x	0.74	0.72	0.73	0.75	0.44	0.56	0.73	0.75	1.02	1.49	0.73	0.75	0.27	0.27
M=qc	7.04	5.19	9.63	10.00	1.36	1.73	2.10	1.85	6.67	8.40	8.27	9.26	3.21	3.46
Delay														
d	57.57	61.57	47.34	48.42	48.68	55.18	89.28	103.69	-539.19	-21.68	49.53	48.85	38.33	36.50
Junction Delay (sec)	**-50.9**	**37.3**												

From TPDM Vol4 Table 4.2.5
Average Queue N calculated by
N=q(r/2+d) or qr,whichever the greater

where r = effective red time
q = flow (in same units as r and d)
d = average delay per vehicle

Approach:	Shap Pat Heung Road (EB) (LT)		Tai Tong Road (NB) (STR & LT & RT)		Shap Pat Heung Road (EB) (STR)		Shap Pat Heung Road (WB) (STR & RT)		Shap Pat Heung Road (WB) (LT)		Tai Tong Road (SB) (STR & LT & RT)		Tai Tong Road (SB) (STR & LT & RT)	
	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak
r (sec)	102	107	90	89	90	89	111	113	111	113	91	89	91	89
N (veh)	**6**	**5**	**7**	**8**	**1**	**1**	**3**	**2**	**6**	**8**	**7**	**7**	**2**	**3**
Average Queue length (m)	**36.0**	**30.0**	**42.0**	**48.0**	**6.0**	**6.0**	**18.0**	**12.0**	**18.0**	**24.0**	**42.0**	**42.0**	**12.0**	**18.0**

JUNCTION DELAY CALCULATION Job No: 21120HK **CTA Consultants Ltd.**

Junction: (B) Shap Pat Heung Road/ Tai Kei Leng Road
Description: 2028 Reference Off-peak Traffic Flows

TRRL Method (Transport Road Research Laboratory)

$$d = \frac{c(1-\lambda)^2}{2(1-\lambda X)} + \frac{X}{2q(1-X)} - 0.65\left(\frac{c}{q^2}\right)^{\frac{1}{3}} X^{(2+5\lambda)}$$

where d = average delay per vehicle on the particular arm
λ = proportion of the cycle which is effectively green for the phase under consideration i.e.f g/c
x = The degree of saturation. This is the ratio of actual flow to the maximum possible flow under the given setting of signals and equals 3600q/Ès where S = saturation flow in veh/hour
c = Cycle time in seconds
g = Effective green time in seconds
q should be the flow in vehicles per second to give delay in seconds

Approach:	Shap Pat Heung Road (WB) (STR & RT)		Shap Pat Heung Road (WB) (LT)		Tai Tong Road (NB) (STR & LT & RT)		Shap Pat Heung Road (EB) (STR)		Shap Pat Heung Road (EB) (LT)		Tai Tong Road (SB) (STR & LT & RT)	
	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak
q (veh/hr)	408	424	84	80	380	352	388	380	40	88	396	444
g (sec)	20	19	20	19	28	25	20	19	20	19	30	33
c (sec)	120	120	120	120	120	120	120	120	120	120	120	120
s (veh/hr)	3,280	3,280	716	716	2,324	2,312	3,416	3,416	1,428	1,428	2,308	2,304
λ	0.17	0.16	0.17	0.16	0.23	0.21	0.17	0.16	0.17	0.16	0.25	0.28
x	0.75	0.82	0.70	0.71	0.70	0.73	0.68	0.70	0.17	0.39	0.69	0.70
M=qc	13.60	14.13	2.80	2.67	12.67	11.73	12.93	12.67	1.33	2.93	13.20	14.80
Delay												
d	51.30	56.65	68.54	70.59	45.28	48.68	48.99	50.33	43.98	47.64	43.46	41.82
Junction Delay (sec)	**48.3**	**50.2**										

From TPDM Vol4 Table 4.2.5
Average Queue N calculated by
N=q(r/2+d) or qr,whichever the greater

where r = effective red time
q = flow (in same units as r and d)
d = average delay per vehicle

Approach:	Shap Pat Heung Road (WB) (STR & RT)		Shap Pat Heung Road (WB) (LT)		Tai Tong Road (NB) (STR & LT & RT)		Shap Pat Heung Road (EB) (STR)		Shap Pat Heung Road (EB) (LT)		Tai Tong Road (SB) (STR & LT & RT)	
	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak
r (sec)	100	101	100	101	92	95	100	101	100	101	90	87
N (veh)	**11**	**13**	**3**	**3**	**10**	**9**	**11**	**11**	**1**	**2**	**10**	**11**
Average Queue length (m)	**48.0**	**48.0**	**18.0**	**18.0**	**36.0**	**36.0**	**30.0**	**30.0**	**6.0**	**12.0**	**42.0**	**42.0**

JUNCTION DELAY CALCULATION Job No: 21120HK **CTA Consultants Ltd.**

Junction: (C)Shap Pat Heung Road / Fung Ki Road
Description: 2028 Reference Off-peak Traffic Flows

TRRL Method (Transport Road Research Laboratory)

$$d = \frac{c(1-\lambda)^2}{2(1-\lambda X)} + \frac{X}{2q(1-X)} - 0.65\left(\frac{c}{q^2}\right)^{\frac{1}{3}} X^{(2+5\lambda)}$$

where d = average delay per vehicle on the particular arm
λ = proportion of the cycle which is effectively green for the phase under consideration i.e.f g/c
x = The degree of saturation. This is the ratio of actual flow to the maximum possible flow under the given setting of signals and equals 3600q/ĖS where S = saturation flow in veh/hour
c = Cycle time in seconds
g = Effective green time in seconds
q should be the flow in vehicles per second to give delay in seconds

Approach:	Shap Pat Heung Road (WB) (RT)		Shap Pat Heung Road (WB) (STR & LT)		The Access Road of The Reach (NB) (LT)		The Access Road of The Reach (NB) (STR & RT))		Shap Pat Heung Road (EB) (LT)		Shap Pat Heung Road (EB) (STR)		Fung Ki Road (SB) (LT)		Fung Ki Road (SB) (STR & RT)	
	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak
q (veh/hr)	248	332	396	452	12	12	28	36	112	148	464	444	276	384	68	108
g (sec)	45	48	42	52	6	6	6	6	45	40	45	40	53	63	6	6
c (sec)	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130
s (veh/hr)	1,440	1,440	2,144	2,144	1,428	1,428	3,276	3,264	1,288	1,288	2,526	2,526	1,452	1,452	3,212	3,228
λ	0.35	0.37	0.32	0.40	0.05	0.05	0.05	0.05	0.35	0.31	0.35	0.31	0.41	0.48	0.05	0.05
x	0.50	0.62	0.57	0.53	0.18	0.18	0.19	0.24	0.25	0.37	0.53	0.57	0.47	0.55	0.46	0.72
M=qc	8.96	11.99	14.30	16.32	0.43	0.43	1.01	1.30	4.04	5.34	16.76	16.03	9.97	13.87	2.46	3.90
Delay																
d	35.70	36.60	38.10	30.98	62.42	62.42	60.40	60.64	31.60	37.06	35.16	39.05	29.97	25.54	62.55	76.38
Junction Delay (sec)	**36.6**	**36.0**														

From TPDM Vol4 Table 4.2.5
Average Queue N calculated by
N=q(r/2+d) or qr,whichever the greater

where r = effective red time
q = flow (in same units as r and d)
d = average delay per vehicle

Approach:	Shap Pat Heung Road (WB) (RT)		Shap Pat Heung Road (WB) (STR & LT)		The Access Road of The Reach (LT)		The Access Road of The Reach (STR & RT))		Shap Pat Heung Road (EB) (LT)		Shap Pat Heung Road (EB) (STR)		Fung Ki Road (SB) (LT)		Fung Ki Road (SB) (STR & RT)	
	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak
r (sec)	85	82	88	78	124	124	124	124	85	90	85	90	77	67	124	124
N (veh)	**6**	**8**	**10**	**10**	**0**	**0**	**1**	**1**	**3**	**4**	**11**	**11**	**6**	**7**	**2**	**4**
Average Queue length (m)	**36.0**	**48.0**	**36.0**	**42.0**	**0.0**	**0.0**	**0.0**	**6.0**	**18.0**	**24.0**	**30.0**	**36.0**	**36.0**	**42.0**	**6.0**	**12.0**

JUNCTION DELAY CALCULATION Job No: 21120HK **CTA Consultants Ltd.**

Junction: (D)Shap Pat Heung Road / Tai Kei Leung Road

Description: 2028 Reference Off-peak Traffic Flows

TRRL Method (Transport Road Research Laboratory)

$$d = \frac{c(1-\lambda)^2}{2(1-\lambda X)} + \frac{X}{2q(1-X)} - 0.65\left(\frac{c}{q^2}\right)^{\frac{1}{3}} X^{(2+5\lambda)}$$

where d = average delay per vehicle on the particular arm

λ = proportion of the cycle which is effectively green for the phase under consideration i.e.f g/c

x = The degree of saturation. This is the ratio of actual flow to the maximum possible flow under the given setting of signals and equals 3600q/Ès where S = saturation flow in veh/hour

c = Cycle time in seconds

g = Effective green time in seconds

q should be the flow in vehicles per second to give delay in seconds

Approach:	Shap Pat Heung Road (SB) (STR)		Shap Pat Heung Road (NB) (STR)		Tai Kei Leng Road (EB) (RT)	
	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak
q (veh/hr)	876	832	688	704	468	452
g (sec)	50	50	50	50	30	30
c (sec)	90	90	90	90	90	90
s (veh/hr)	2,930	2,930	3,256	3,256	2,620	2,620
λ	0.56	0.56	0.56	0.56	0.33	0.33
x	0.54	0.51	0.38	0.39	0.54	0.52
M=qc	21.90	20.80	17.20	17.60	11.70	11.30
Delay						
d	13.58	13.26	11.79	11.88	25.58	25.34
Junction Delay (sec)	**10.7**	**9.9**				

From TPDM Vol4 Table 4.2.5

Average Queue N calculated by

N=q(r/2+d) or qr,whichever the greater

where r = effective red time
q = flow (in same units as r and d)
d = average delay per vehicle

Approach:	Shap Pat Heung Road (SB) (STR)		Shap Pat Heung Road (NB) (STR)		Tai Kei Leng Road (EB) (RT)	
	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak
r (sec)	40	40	40	40	60	60
N (veh)	**10**	**9**	**8**	**8**	**8**	**8**
Average Queue length (m)	**30.0**	**30.0**	**24.0**	**24.0**	**24.0**	**24.0**

TRAFFIC SIGNALS CALCULATION Job No: 21120HK **CTA Consultants Ltd.**

Junction: **(A) Ma Tong Road / Tai Tong Road**
Description: **2028 Design Off-peak Traffic Flows**

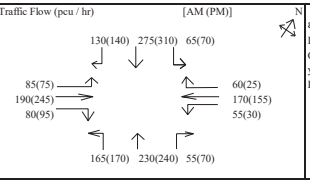
Approach	Direction	Movement notation	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Nearside 0/1	Site Factor	Pro. Turning (%) A.M. Off-Peak	Pro. Turning (%) P.M Off-Peak	Revised Saturation Flow (pcu/hr) A.M Off-Peak	Revised Saturation Flow (pcu/hr) P.M Off-Peak	A.M. Off-Peak Flow (pcu/hr)	A.M. Off-Peak y Value	A.M. Off-Peak Critical y	P.M. Off-Peak Flow (pcu/hr)	P.M. Off-Peak y Value	P.M. Off-Peak Critical y
Ma Tong Road (WB)	W		B	3	4.0	0	21	0	1	26%	14%	2235	2255	285	0.128	0.128	210	0.093	0.093
	W		B	3	5.0	15	0	1	0.063	100%	100%								
Tai Tong Road (NB)	N		D	2	3.5	8	0	1	1.11	42%	41%	2145	2145	450	0.210	0.210	480	0.224	0.224
	N		D	2	3.5	0	21	0	0.06	100%	100%								
Ma Tong Road (EB)	E		A	1	3.5	18	0	1	0.9	100%	100%	5365	5365	355	0.066	0.066	415	0.077	0.077
	E		A	1	3.5	0	0	0	0.9	0%	0%								
	E		A	1	3.5	0	30	0	0.9	60%	57%								
Tai Tong Road (SB)	S		C	4	3.5	0	24	0	1	100%	100%	3875	3880	470	0.121	0.121	520	0.134	0.134
	S		C	4	3.5	8	0	1	1	19%	18%								

Pedestrian crossing

Ep	3,4	Min. Crossing Time = 5Gm + 5FGm =10s
Fp	1,3,4	Min. Crossing Time = 6Gm + 6FGm =12s
Gp	1,2	Min. Crossing Time = 5Gm + 5FGm =10s
Hp	1,2,4	Min. Crossing Time = 6Gm + 6FGm =12s
Ip	3,4	Min. Crossing Time = 5Gm + 5FGm =10s
Jp	1,2,3	Min. Crossing Time = 8Gm + 8FGm =16s
Kp	1,2,4	Min. Crossing Time = 10Gm + 10FGm =20s
Lp	4	Min. Crossing Time = 5Gm + 5FGm =10s

Notes:

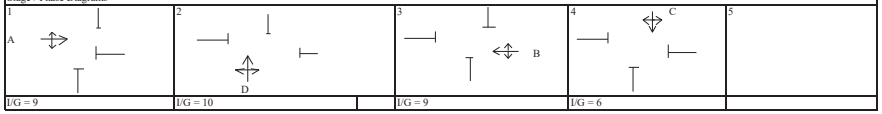
Traffic Flow (pcu / hr) [AM (PM)]



Check Phase	
Σy	0.525
L (sec)	30
C (sec)	120
y pract.	0.675
R.C. (%)	29%

Check Phase	
Σy	0.528
L (sec)	30
C (sec)	120
y pract.	0.675
R.C. (%)	28%

Stage / Phase Diagrams



I/G = 9 | I/G = 10 | I/G = 9 | I/G = 6

TRAFFIC SIGNALS CALCULATION Job No: 21120HK **CTA Consultants Ltd.**

Junction: **(B) Tai Tong Road / Shap Pat Heung Road**
Description: **2028 Design Off-peak Traffic Flows**

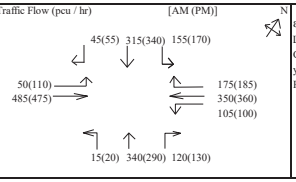
Approach	Direction	Movement notation	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Nearside 0/1	Site Factor	Pro. Turning (%) A.M. Off-Peak	Pro. Turning (%) P.M. Off-Peak	Revised A.M. Off-Peak	Revised P.M. Off-Peak	A.M. Off-Peak Flow (pcu/hr)	A.M. Off-Peak y Value	A.M. Off-Peak Critical y	P.M. Off-Peak Flow (pcu/hr)	P.M. Off-Peak y Value	P.M. Off-Peak Critical y
Shap Pat Heung Road (WB)	W		C	3	3.8	0	30	0	1	66%	67%	4375	4375	630	0.144	0.144	645	0.147	0.147
	W		C	3	3.8	0	0	0	0.95	0%	0%								
	W		C	3	3.5	15	0	1	0.15	100%	100%								
Tai Tong Road (NB)	N		B	2	3.5	15	0	1	0.125	30%	44%	2285	2280	475	0.208	0.208	440	0.193	0.193
	N		B	2	3.5	0	15	0	1	28%	33%								
Shap Pat Heung Road (EB)	E		A	1	3.5	15	0	1	1	100%	100%	6055	6055	535	0.088	0.088	585	0.097	0.097
	E		A	1	3.8	0	0	0	1	0%	0%								
	E		A	1	3.8	0	0	0	1	0%	0%								
Tai Tong Road (SB)	S		D	4	3.5	15	0	1	0.135	100%	100%	2320	2315	515	0.222	0.222	565	0.244	0.244
	S		D	4	3.5	0	15	0	1	13%	14%								

Pedestrian crossing

Ep	3,4	Min. Crossing Time = 6Gm + 6FGm =12s
Fp	1,3,4	Min. Crossing Time = 7Gm + 7FGm =14s
Gp	1,2	Min. Crossing Time = 8Gm + 8FGm =16s
Hp	1,2,4	Min. Crossing Time = 10Gm + 10FGm =20s
Ip	3,4	Min. Crossing Time = 8Gm + 8FGm =16s
Jp	1,2,3	Min. Crossing Time = 6Gm + 8FGm =14s
Kp	1,2,4	Min. Crossing Time = 6Gm + 6FGm =12s
Lp	4	Min. Crossing Time = 9Gm + 9FGm =15s
Mp	2,3,4	Min. Crossing Time = 10Gm + 6FGm =16s
Np	1,2	Min. Crossing Time = 6Gm + 6FGm =12s

Notes:

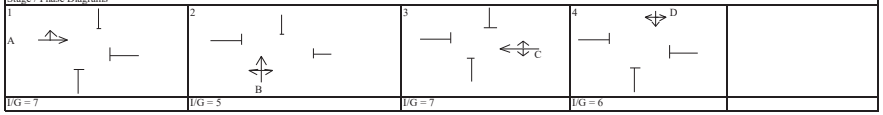
Traffic Flow (pcu / hr) [AM (PM)]



Check Phase	
Σy	0.662
L (sec)	16
C (sec)	120
y pract.	0.780
R.C. (%)	18%

Check Phase	
Σy	0.681
L (sec)	16
C (sec)	120
y pract.	0.780
R.C. (%)	15%

Stage / Phase Diagrams



I/G = 7 | I/G = 5 | I/G = 7 | I/G = 6

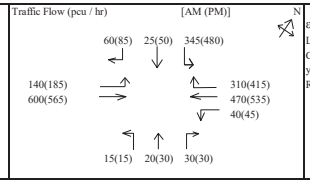
TRAFFIC SIGNALS CALCULATION Job No: 21120HK **CTA Consultants Ltd.**

Junction: **(C)Shap Pat Heung Road / Fung Ki Road**
Description: **2028 Design Off-peak Traffic Flows**

Approach	Direction	Movement notation	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Nearside 0/1	Site Factor	Pro. Turning (%) A.M Off-Peak	Pro. Turning (%) P.M Off-Peak	Revised A.M Off-Peak	Revised P.M Off-Peak	A.M. Off-Peak Flow (pcu/hr)	A.M. Off-Peak y Value	A.M. Off-Peak Critical y	P.M. Off-Peak Flow (pcu/hr)	P.M. Off-Peak y Value	P.M. Off-Peak Critical y
Shap Pat Heung Road (WB)	W		B	2	3.5	0	21	0	0.855	100%	100%	1800	1800	310	0.172	0.191	415	0.231	
	W		B	2	3.5	0	0	0	0.35	0%	0%	735	735	140	0.191		159	0.217	
	W		B	2	3.5	15	0	1	1	11%	11%	1945	1945	370	0.190		421	0.216	
The Access Road of The Reach	N		E	4	3.5	15	0	1	1	100%	100%	1785	1785	15	0.008		15	0.008	
	N		E	4	3.5	0	35	0	1	16%	34%	2090	2075	18	0.009		23	0.011	
	N		E	4	3.5	0	30	0	1	100%	100%	2005	2005	17	0.009		22	0.011	
Shap Pat Heung Road (EB)	E		A	1	3.5	15	0	1	0.9	100%	100%	1610	1610	140	0.087	0.190	185	0.115	
	E		A	1	3.5	0	0	0	0.5	0%	0%	1052.5	1052.5	200	0.190		188	0.179	0.179
	E		A	1	3.5	0	0	0	1	0%	0%	2105	2105	400	0.190		377	0.179	
Fung Ki Road (SB)	S		C	2,3	3.5	18	0	1	1	100%	100%	1815	1815	345	0.190		480	0.264	0.264
	S		D	3	3.5	0	23	0	1	42%	28%	2050	2070	43	0.021		69	0.033	
	S		D	3	3.5	0	21	0	1	100%	100%	1965	1965	42	0.021		66	0.033	
Pedestrian crossing			Fp			Min. Crossing Time = 9Gm + 8FGm =17s													
			Gp			Min. Crossing Time = 10Gm + 10FGm =20s													
			Hp			Min. Crossing Time = 7Gm + 7FGm =14s													
			Ip			Min. Crossing Time = 7Gm + 7FGm =14s													
			Jp			Min. Crossing Time = 10Gm + 6FGm =16s													

Notes:
Site factor are applied due to lane approaches are locally widened to provide an additional lane near the junction:
Site Factor of 0.95 is apply to fast lane of Shap Pat Heung Road (WB). Further 10% deduce due to the queue back effect from Fung Ki Road, which give total Site factor of 0.855
Site Factor of 0.35 is apply to middle lane of Shap Pat Heung Road (WB)
Site Factor of 0.95 is apply to near side lane of Shap Pat Heung Road (EB)
Site Factor of 0.5 is apply to middle lane of Shap Pat Heung Road (EB)

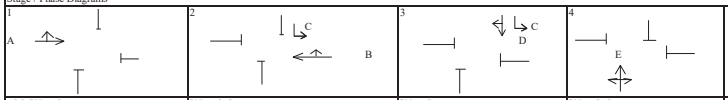
Traffic Flow (pcu / hr) [AM (PM)]



Check Phase	
εy	0.381
L (sec)	28
C (sec)	130
y pract.	0.706
R.C. (%)	85%

Check Phase	
εy	0.443
L (sec)	19
C (sec)	130
y pract.	0.768
R.C. (%)	73%

Stage / Phase Diagrams



AM: I/G = 6	I/G = 6+5	I/G = 5	I/G = 5+5
PM: I/G = 6	I/G = 6	I/G = 5	I/G = 5+5

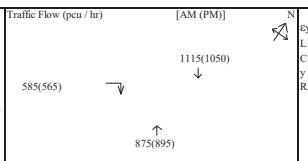
TRAFFIC SIGNALS CALCULATION Job No: 21120HK **CTA Consultants Ltd.**

Junction: **(D)Shap Pat Heung Road / Tai Kei Leung Road**
Description: **2028 Design Off-peak Traffic Flows**

Approach	Direction	Movement notation	Phase	Stage	Width (m)	Radius (m) Left	Radius (m) Right	Nearside 0/1	Site Factor	Pro. Turning (%) A.M Off-Peak	Pro. Turning (%) P.M Off-Peak	Revised A.M Off-Peak	Revised P.M Off-Peak	A.M. Off-Peak Flow (pcu/hr)	A.M. Off-Peak y Value	A.M. Off-Peak Critical y	P.M. Off-Peak Flow (pcu/hr)	P.M. Off-Peak y Value	P.M. Off-Peak Critical y
Shap Pat Heung Road (SB)	S		A	1	3.5	0	0	1	0.9	0%	0%	1768.5	1768.5	538	0.304	0.304	507	0.287	0.287
	S		A	1	3.5	0	0	0	0.9	0%	0%	1894.5	1894.5	577	0.304		543	0.287	
Shap Pat Heung Road (NB)	N		A	1	3.5	0	0	1	1	0%	0%	1965	1965	422	0.215		432	0.220	
	N		A	1	3.5	0	0	0	1	0%	0%	2105	2105	453	0.215		463	0.220	
Tai Kei Leng Road (EB)	E		B	2	3.5	0	12	1	0.9	100%	100%	1570	1570	280	0.179	0.179	271	0.173	0.173
	E		B	2	3.5	0	13.5	0	0.9	100%	100%	1705	1705	305	0.179		294	0.173	
Pedestrian crossing																			

Notes:
Site factor are applied due to traffic queue extended from Shap Pat Heung Interchange.
Based on site observation, about 10% delay of the effective green right turning from Tai Kei Leng Road to S-bound.
Similar 10% delay is also observed along the S-Bound approach.
Site Factor of 0.9 is apply to Shap Pat Heung Road (SB)
Site Factor of 0.9 is apply to Tai Kei Leng Road (EB)

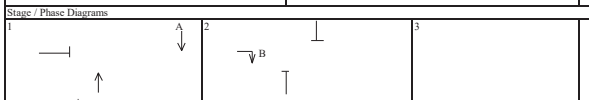
Traffic Flow (pcu / hr) [AM (PM)]



Check Phase	
εy	0.483
L (sec)	10
C (sec)	90
y pract.	0.800
R.C. (%)	66%

Check Phase	
εy	0.459
L (sec)	10
C (sec)	90
y pract.	0.800
R.C. (%)	74%

Stage / Phase Diagrams



I/G = 5	I/G = 7	I/G =

JUNCTION DELAY CALCULATION Job No: 21120HK **CTA Consultants Ltd.**

Junction: (A) Ma Tong Road / Tai Tong Road
Description: 2028 Design Off-peak Traffic Flows

TRRL Method (Transport Road Research Laboratory)

$$d = \frac{c(1-\lambda)^2}{2(1-\lambda X)} + \frac{X}{2q(1-X)} - 0.65\left(\frac{c}{q^2}\right)^{\frac{1}{3}} X^{(2+5\lambda)}$$

where d = average delay per vehicle on the particular arm
λ = proportion of the cycle which is effectively green for the phase under consideration i.e.f g/c
x = The degree of saturation. This is the ratio of actual flow to the maximum possible flow under the given setting of signals and equals 3600q/sE where S = saturation flow in veh/hour
c = Cycle time in seconds
g = Effective green time in seconds
q should be the flow in vehicles per second to give delay in seconds

Approach:	Ma Tong Road (WB) (LT & STR & RT)		Tai Tong Road (NB) (STR & LT)		Tai Tong Road (NB) (RT)		Ma Tong Road (EB) (LT)		Ma Tong Road (EB) (STR & RT)		Tai Tong Road (SB) (STR & LT)		Tai Tong Road (SB) (RT)	
	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak
q (veh/hr)	211	156	293	304	41	52	63	56	200	252	252	281	96	104
g (sec)	18	13	31	31	31	31	8	7	8	7	29	32	29	32
c (sec)	120	120	120	120	120	120	120	120	120	120	120	120	120	120
s (veh/hr)	1,922	1,937	1,552	1,552	363	363	1,207	1,207	2,767	2,767	1,404	1,407	1,467	1,467
λ	0.15	0.11	0.25	0.26	0.25	0.26	0.07	0.06	0.07	0.06	0.24	0.26	0.24	0.26
x	0.75	0.73	0.74	0.76	0.44	0.56	0.74	0.76	1.03	1.51	0.74	0.76	0.27	0.27
M=qc	7.04	5.19	9.75	10.12	1.36	1.73	2.10	1.85	6.67	8.40	8.40	9.38	3.21	3.46
Delay														
d	58.30	62.29	47.62	48.78	48.50	54.92	91.40	106.67	-338.18	-22.26	49.81	49.21	38.18	36.38
Junction Delay (sec)	**-15.1**	**37.6**												

From TPDM Vol4 Table 4.2.5
Average Queue N calculated by
N=q(r/2+d) or qr,whichever the greater

where r = effective red time
q = flow (in same units as r and d)
d = average delay per vehicle

Approach:	Shap Pat Heung Road (EB) (LT)		Tai Tong Road (NB) (STR & LT & RT)		Shap Pat Heung Road (EB) (STR)		Shap Pat Heung Road (WB) (STR & RT)		Shap Pat Heung Road (WB) (LT)		Tai Tong Road (SB) (STR & LT & RT)		Tai Tong Road (SB) (STR & LT & RT)	
	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak
r (sec)	102	107	89	89	89	89	112	113	112	113	91	88	91	88
N (veh)	**6**	**5**	**8**	**8**	**1**	**1**	**3**	**3**	**6**	**8**	**7**	**7**	**2**	**3**
Average Queue length (m)	**36.0**	**30.0**	**48.0**	**48.0**	**6.0**	**6.0**	**18.0**	**18.0**	**18.0**	**24.0**	**42.0**	**42.0**	**12.0**	**18.0**

JUNCTION DELAY CALCULATION Job No: 21120HK **CTA Consultants Ltd.**

Junction: (B) Shap Pat Heung Road/ Tai Kei Leng Road

Description: 2028 Design Off-peak Traffic Flows

TRRL Method (Transport Road Research Laboratory)

$$d = \frac{c(1-\lambda)^2}{2(1-\lambda X)} + \frac{X}{2q(1-X)} - 0.65\left(\frac{c}{q^2}\right)^{\frac{1}{3}} X^{(2+5\lambda)}$$

where d = average delay per vehicle on the particular arm

λ = proportion of the cycle which is effectively green for the phase under consideration i.e.f g/c

x = The degree of saturation. This is the ratio of actual flow to the maximum possible flow under the given setting of signals and equals 3600q/Ès where S = saturation flow in veh/hour

c = Cycle time in seconds

g = Effective green time in seconds

q should be the flow in vehicles per second to give delay in seconds

Approach:	Shap Pat Heung Road (WB) (STR & RT)		Shap Pat Heung Road (WB) (LT)		Tai Tong Road (NB) (STR & LT & RT)		Shap Pat Heung Road (EB) (STR)		Shap Pat Heung Road (EB) (LT)		Tai Tong Road (SB) (STR & LT & RT)	
	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak
q (veh/hr)	420	436	84	80	380	352	388	380	40	88	412	452
g (sec)	19	18	19	18	27	25	19	18	19	18	32	34
c (sec)	120	120	120	120	120	120	120	120	120	120	120	120
s (veh/hr)	3,276	3,276	716	716	2,324	2,312	3,416	3,416	1,428	1,428	2,308	2,304
λ	0.16	0.15	0.16	0.15	0.23	0.21	0.16	0.15	0.16	0.15	0.27	0.28
x	0.81	0.89	0.74	0.74	0.73	0.73	0.72	0.74	0.18	0.41	0.67	0.69
M=qc	14.00	14.53	2.80	2.67	12.67	11.73	12.93	12.67	1.33	2.93	13.73	15.07
Delay												
d	56.07	69.41	76.57	79.69	46.94	48.68	50.80	52.55	44.93	48.76	41.63	40.90
Junction Delay (sec)	**50.2**	**54.0**										

From TPDM Vol4 Table 4.2.5

Average Queue N calculated by

N=q(r/2+d) or qr,whichever the greater

where r = effective red time

q = flow (in same units as r and d)

d = average delay per vehicle

Approach:	Shap Pat Heung Road (WB) (STR & RT)		Shap Pat Heung Road (WB) (LT)		Tai Tong Road (NB) (STR & LT & RT)		Shap Pat Heung Road (EB) (STR)		Shap Pat Heung Road (EB) (LT)		Tai Tong Road (SB) (STR & LT & RT)	
	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak
r (sec)	101	102	101	102	93	95	101	102	101	102	88	86
N (veh)	**12**	**15**	**3**	**3**	**10**	**9**	**11**	**11**	**1**	**2**	**10**	**11**
Average Queue length (m)	**48.0**	**60.0**	**18.0**	**18.0**	**42.0**	**36.0**	**30.0**	**30.0**	**6.0**	**12.0**	**42.0**	**42.0**

JUNCTION DELAY CALCULATION Job No: 21120HK **CTA Consultants Ltd.**

Junction: (C)Shap Pat Heung Road / Fung Ki Road
Description: 2028 Design Off-peak Traffic Flows

TRRL Method (Transport Road Research Laboratory)

$$d = \frac{c(1-\lambda)^2}{2(1-\lambda X)} + \frac{X}{2q(1-X)} - 0.65\left(\frac{c}{q^2}\right)^{\frac{1}{3}} X^{(2+5\lambda)}$$

where d = average delay per vehicle on the particular arm
λ = proportion of the cycle which is effectively green for the phase under consideration i.e.f g/c
x = The degree of saturation. This is the ratio of actual flow to the maximum possible flow under the given setting of signals and equals 3600q/ĖS where S = saturation flow in veh/hour
c = Cycle time in seconds
g = Effective green time in seconds
q should be the flow in vehicles per second to give delay in seconds

Approach:	Shap Pat Heung Road (WB) (RT)		Shap Pat Heung Road (WB) (STR & LT)		The Access Road of The Reach (NB) (LT)		The Access Road of The Reach (NB) (STR & RT))		Shap Pat Heung Road (EB) (LT)		Shap Pat Heung Road (EB) (STR)		Fung Ki Road (SB) (LT)		Fung Ki Road (SB) (STR & RT)	
	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak
q (veh/hr)	248	332	408	464	12	12	28	36	112	148	480	452	276	384	68	108
g (sec)	45	48	41	51	6	6	6	6	45	40	45	40	52	62	6	6
c (sec)	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130
s (veh/hr)	1,440	1,440	2,144	2,144	1,428	1,428	3,276	3,264	1,288	1,288	2,526	2,526	1,452	1,452	3,212	3,228
λ	0.35	0.37	0.32	0.39	0.05	0.05	0.05	0.05	0.35	0.31	0.35	0.31	0.40	0.48	0.05	0.05
x	0.50	0.62	0.60	0.55	0.18	0.18	0.19	0.24	0.25	0.37	0.55	0.58	0.48	0.55	0.46	0.72
M=qc	8.96	11.99	14.73	16.76	0.43	0.43	1.01	1.30	4.04	5.34	17.33	16.32	9.97	13.87	2.46	3.90
Delay																
d	35.70	36.60	39.37	32.04	62.42	62.42	60.40	60.64	31.60	37.06	35.47	39.23	30.77	26.31	62.55	76.38
Junction Delay (sec)	**37.0**	**36.5**														

From TPDM Vol4 Table 4.2.5
Average Queue N calculated by
N=q(r/2+d) or qr,whichever the greater

where r = effective red time
q = flow (in same units as r and d)
d = average delay per vehicle

Approach:	Shap Pat Heung Road (WB) (RT)		Shap Pat Heung Road (WB) (STR & LT)		The Access Road of The Reach (LT)		The Access Road of The Reach (STR & RT))		Shap Pat Heung Road (EB) (LT)		Shap Pat Heung Road (EB) (STR)		Fung Ki Road (SB) (LT)		Fung Ki Road (SB) (STR & RT)	
	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak
r (sec)	85	82	89	79	124	124	124	124	85	90	85	90	78	68	124	124
N (veh)	**6**	**8**	**10**	**10**	**0**	**0**	**1**	**1**	**3**	**4**	**11**	**11**	**6**	**7**	**2**	**4**
Average Queue length (m)	**36.0**	**48.0**	**42.0**	**42.0**	**0.0**	**0.0**	**0.0**	**6.0**	**18.0**	**24.0**	**36.0**	**36.0**	**36.0**	**42.0**	**6.0**	**12.0**

JUNCTION DELAY CALCULATION Job No: 21120HK **CTA Consultants Ltd.**

Junction: (D)Shap Pat Heung Road / Tai Kei Leung Road

Description: 2028 Design Off-peak Traffic Flows

TRRL Method (Transport Road Research Laboratory)

$$d = \frac{c(1-\lambda)^2}{2(1-\lambda X)} + \frac{X}{2q(1-X)} - 0.65\left(\frac{c}{q^2}\right)^{\frac{1}{3}} X^{(2+5\lambda)}$$

where d = average delay per vehicle on the particular arm

λ = proportion of the cycle which is effectively green for the phase under consideration i.e.f g/c

x = The degree of saturation. This is the ratio of actual flow to the maximum possible flow under the given setting of signals and equals 3600q/Ès where S = saturation flow in veh/hour

c = Cycle time in seconds

g = Effective green time in seconds

q should be the flow in vehicles per second to give delay in seconds

Approach:	Shap Pat Heung Road (SB) (STR)		Shap Pat Heung Road (NB) (STR)		Tai Kei Leng Road (EB) (RT)	
	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak
q (veh/hr)	892	840	700	716	468	452
g (sec)	50	50	50	50	30	30
c (sec)	90	90	90	90	90	90
s (veh/hr)	2,930	2,930	3,256	3,256	2,620	2,620
λ	0.56	0.56	0.56	0.56	0.33	0.33
x	0.55	0.52	0.39	0.40	0.54	0.52
M=qc	22.30	21.00	17.50	17.90	11.70	11.30
Delay						
d	13.70	13.31	11.86	11.94	25.58	25.34
Junction Delay (sec)	**10.7**	**9.9**				

From TPDM Vol4 Table 4.2.5

Average Queue N calculated by

N=q(r/2+d) or qr,whichever the greater

where r = effective red time

q = flow (in same units as r and d)

d = average delay per vehicle

Approach:	Shap Pat Heung Road (SB) (STR)		Shap Pat Heung Road (NB) (STR)		Tai Kei Leng Road (EB) (RT)	
	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak	A.M. Off-Peak	P.M. Off-Peak
r (sec)	40	40	40	40	60	60
N (veh)	**10**	**9**	**8**	**8**	**8**	**8**
Average Queue length (m)	**30.0**	**30.0**	**24.0**	**24.0**	**24.0**	**24.0**

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.5.523 [19102,19/06/2015]

Filename: 21076HK Jn E.arc8
Path: \\PROJSRV\Project\CTA Consultants Limited\CTA - Project\21076HK (wkk) - Town planning application of Ma Tin Pok RCHE\Cal\2022-04-12
Report generation date: 12/4/2022 15:05:33

Summary of junction performance

	AM Off-Peak				PM Off-Peak			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
	Shap Pat Heung Interchange - 2021 Existing							
Arm 1	0.47	2.23	0.32	A	2.23	4.88	0.69	A
Arm 2	0.72	2.06	0.42	A	1.40	3.46	0.58	A
Arm 3	1.63	4.19	0.62	A	1.79	4.64	0.64	A
	Shap Pat Heung Interchange - 2028 Design							
Arm 1	2.73	5.74	0.73	A	3.82	7.39	0.79	A
Arm 2	1.28	3.37	0.56	A	1.92	4.40	0.66	A
Arm 3	0.33	2.13	0.25	A	0.32	2.24	0.24	A
	Shap Pat Heung Interchange - 2028 Reference							
Arm 1	2.67	5.65	0.73	A	3.73	7.24	0.79	A
Arm 2	1.27	3.35	0.56	A	1.90	4.36	0.66	A
Arm 3	0.33	2.13	0.25	A	0.32	2.24	0.24	A

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle.

"D1 - 2021 Existing, AM Off-Peak " model duration: 11:00 - 12:00
"D2 - 2021 Existing, PM Off-Peak" model duration: 16:00 - 17:00
"D3 - 2028 Reference, AM Off-Peak" model duration: 11:00 - 12:00
"D4 - 2028 Reference, PM Off-Peak" model duration: 16:00 - 17:00
"D5 - 2028 Design, AM Off-Peak" model duration: 11:00 - 12:00
"D6 - 2028 Design, PM Off-Peak" model duration: 16:00 - 17:00

Run using Junctions 8.0.5.523 at 12/4/2022 15:05:30

Generated on 12/4/2022 15:05:40 using Junctions 8 (8.0.5.523)

File summary

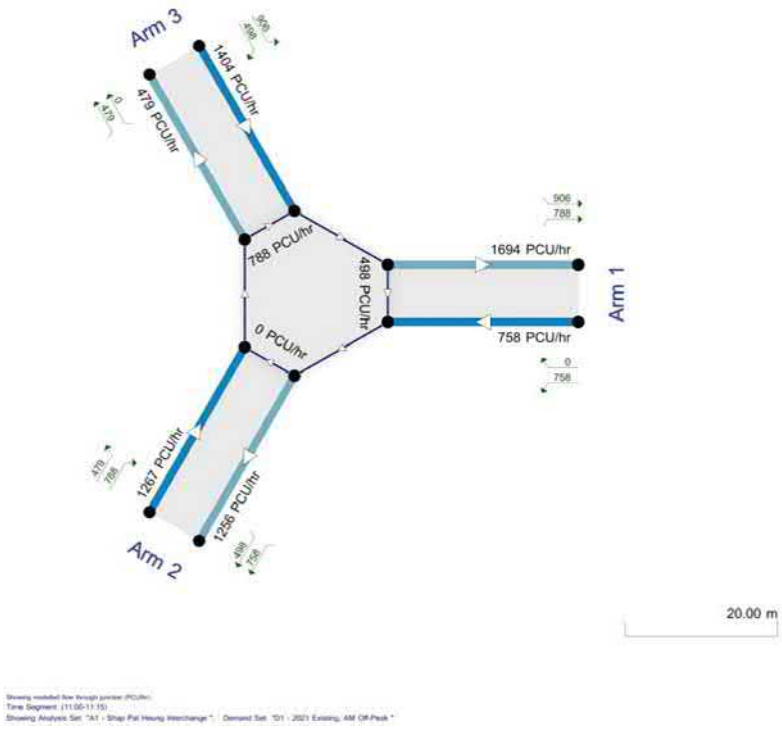
Title	(untitled)
Location	
Site Number	
Date	11/10/2018
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	ITADMIN
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	RFC Threshold	Average Delay Threshold (s)	Queue Threshold (PCU)
5.75			N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCU	PCU	perHour	s	-Min	perMin



The junction diagram reflects the last run of ARCADY.

Shap Pat Heung Interchange - 2021 Existing, AM Off-Peak

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Locked	Network Flow Scaling Factor (%)	Reason For Scaling Factors
Shap Pat Heung Interchange	ARCADY			100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Single Time Segment Only	Locked
2021 Existing, AM Off-Peak	2021 Existing	AM Off-Peak		FLAT	11:00	12:00	60	15		

Junction Network

Junctions

Junction	Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Junction Delay (s)	Junction LOS
E	Shap Pat Heung Interchange	Roundabout	1,2,3			2.97	A

Junction Network Options

Driving Side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Arm	Name	Description
1	1	Yuen Long Highway west bound	
2	2	Yuen Long Highway east bound	
3	3	Shap Pat Heung road	

Capacity Options

Arm	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)
1	0.00	99999.00
2	0.00	99999.00
3	0.00	99999.00

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
1	7.30	9.70	20.00	26.36	100.00	41.00	
2	7.30	10.50	25.00	40.00	100.00	25.00	
3	7.30	10.20	30.00	30.00	100.00	50.00	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
1		(calculated)	(calculated)	0.579	2665.145
2		(calculated)	(calculated)	0.643	3020.964
3		(calculated)	(calculated)	0.582	2729.917

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	HV Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Arm	Profile Type	Use Turning Counts	Average Demand Flow (PCU/hr)	Flow Scaling Factor (%)
1	FLAT	✓	760.00	100.000
2	FLAT	✓	1270.00	100.000
3	FLAT	✓	1410.00	100.000

Direct/Resultant Flows

Direct Flows Data

Time Segment	Arm	Direct Demand Entry Flow (PCU/hr)	DirectDemandEntryFlowInPCU (PCU/hr)	Direct Demand Exit Flow (PCU/hr)	Direct Demand Pedestrian Flow (Ped/hr)
11:00-11:15	1	760.00	760.00		
11:00-11:15	2	1270.00	1270.00		
11:00-11:15	3	1410.00	1410.00		
11:15-11:30	1	760.00	760.00		
11:15-11:30	2	1270.00	1270.00		
11:15-11:30	3	1410.00	1410.00		
11:30-11:45	1	760.00	760.00		
11:30-11:45	2	1270.00	1270.00		
11:30-11:45	3	1410.00	1410.00		
11:45-12:00	1	760.00	760.00		
11:45-12:00	2	1270.00	1270.00		
11:45-12:00	3	1410.00	1410.00		

Turning Proportions

Turning Counts / Proportions (PCU/hr) - Junction E (for whole period)

		To		
		1	2	3
From	1	0.000	760.000	0.000
	2	790.000	0.000	480.000
	3	910.000	500.000	0.000

Turning Proportions (PCU) - Junction E (for whole period)

		To		
		1	2	3
From	1	0.00	1.00	0.00
	2	0.62	0.00	0.38
	3	0.65	0.35	0.00

Vehicle Mix

Average PCU Per Vehicle - Junction E (for whole period)

		To		
		1	2	3
From	1	1.000	1.000	1.000
	2	1.000	1.000	1.000
	3	1.000	1.000	1.000

Heavy Vehicle Percentages - Junction E (for whole period)

		To		
		1	2	3
From	1	0.0	0.0	0.0
	2	0.0	0.0	0.0
	3	0.0	0.0	0.0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.32	2.23	0.47	A
2	0.42	2.06	0.72	A
3	0.62	4.19	1.63	A

Main Results for each time segment

Main results: (11:00-11:15)

Arm	Total Demand (PCU/hr)	Entry Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	RFC	End Queue (PCU)	Delay (s)	LOS
1	760.00	758.13	497.70	0.00	2376.95	0.320	0.47	2.222	A
2	1270.00	1267.11	0.00	0.00	3020.96	0.420	0.72	2.049	A
3	1410.00	1403.53	788.20	0.00	2270.84	0.621	1.62	4.121	A

Main results: (11:15-11:30)

Arm	Total Demand (PCU/hr)	Entry Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	RFC	End Queue (PCU)	Delay (s)	LOS
1	760.00	760.00	499.98	0.00	2375.63	0.320	0.47	2.227	A
2	1270.00	1269.99	0.00	0.00	3020.96	0.420	0.72	2.055	A
3	1410.00	1409.96	790.00	0.00	2269.79	0.621	1.63	4.186	A

Main results: (11:30-11:45)

Arm	Total Demand (PCU/hr)	Entry Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	RFC	End Queue (PCU)	Delay (s)	LOS
1	760.00	760.00	499.99	0.00	2375.62	0.320	0.47	2.227	A
2	1270.00	1270.00	0.00	0.00	3020.96	0.420	0.72	2.055	A
3	1410.00	1409.99	790.00	0.00	2269.79	0.621	1.63	4.186	A

Main results: (11:45-12:00)

Arm	Total Demand (PCU/hr)	Entry Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	RFC	End Queue (PCU)	Delay (s)	LOS
1	760.00	760.00	500.00	0.00	2375.62	0.320	0.47	2.227	A
2	1270.00	1270.00	0.00	0.00	3020.96	0.420	0.72	2.055	A
3	1410.00	1409.99	790.00	0.00	2269.79	0.621	1.63	4.186	A

Shap Pat Heung Interchange - 2021 Existing, PM Off-Peak

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Locked	Network Flow Scaling Factor (%)	Reason For Scaling Factors
Shap Pat Heung Interchange	ARCADY			100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Single Time Segment Only	Locked
2021 Existing, PM Off-Peak	2021 Existing	PM Off-Peak		FLAT	16:00	17:00	60	15		

Junction Network

Junctions

Junction	Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Junction Delay (s)	Junction LOS
E	Shap Pat Heung Interchange	Roundabout	1,2,3			4.35	A

Junction Network Options

Driving Side	Lighting
Left	Normal/unknown

Generated on 12/4/2022 15:05:40 using Junctions 8 (8.0.5.523)

Arms

Arms

Arm	Arm	Name	Description
1	1	Yuen Long Highway west bound	
2	2	Yuen Long Highway east bound	
3	3	Shap Pat Heung road	

Capacity Options

Arm	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)
1	0.00	99999.00
2	0.00	99999.00
3	0.00	99999.00

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
1	7.30	9.70	20.00	26.36	100.00	41.00	
2	7.30	10.50	25.00	40.00	100.00	25.00	
3	7.30	10.20	30.00	30.00	100.00	50.00	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
1		(calculated)	(calculated)	0.579	2665.145
2		(calculated)	(calculated)	0.643	3020.964
3		(calculated)	(calculated)	0.582	2729.917

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	HV Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Arm	Profile Type	Use Turning Counts	Average Demand Flow (PCU/hr)	Flow Scaling Factor (%)
1	FLAT	✓	1655.00	100.000
2	FLAT	✓	1460.00	100.000
3	FLAT	✓	1390.00	100.000

Direct/Resultant Flows

Direct Flows Data

Time Segment	Arm	Direct Demand Entry Flow (PCU/hr)	DirectDemandEntryFlowInPCU (PCU/hr)	Direct Demand Exit Flow (PCU/hr)	Direct Demand Pedestrian Flow (Ped/hr)
16:00-16:15	1	1655.00	1655.00		
16:00-16:15	2	1460.00	1460.00		
16:00-16:15	3	1390.00	1390.00		
16:15-16:30	1	1655.00	1655.00		
16:15-16:30	2	1460.00	1460.00		
16:15-16:30	3	1390.00	1390.00		
16:30-16:45	1	1655.00	1655.00		
16:30-16:45	2	1460.00	1460.00		
16:30-16:45	3	1390.00	1390.00		
16:45-17:00	1	1655.00	1655.00		
16:45-17:00	2	1460.00	1460.00		
16:45-17:00	3	1390.00	1390.00		

Turning Proportions

Turning Counts / Proportions (PCU/hr) - Junction E (for whole period)

		To		
		1	2	3
From	1	0.000	845.000	810.000
	2	970.000	0.000	490.000
	3	920.000	470.000	0.000

Turning Proportions (PCU) - Junction E (for whole period)

		To		
		1	2	3
From	1	0.00	0.51	0.49
	2	0.66	0.00	0.34
	3	0.66	0.34	0.00

Vehicle Mix

Average PCU Per Vehicle - Junction E (for whole period)

		To		
		1	2	3
From	1	1.000	1.000	1.000
	2	1.000	1.000	1.000
	3	1.000	1.000	1.000

Generated on 12/4/2022 15:05:40 using Junctions 8 (8.0.5.523)

Heavy Vehicle Percentages - Junction E (for whole period)

		To		
		1	2	3
From	1	0.0	0.0	0.0
	2	0.0	0.0	0.0
	3	0.0	0.0	0.0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.69	4.88	2.23	A
2	0.58	3.46	1.40	A
3	0.64	4.64	1.79	A

Main Results for each time segment

Main results: (16:00-16:15)

Arm	Total Demand (PCU/hr)	Entry Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	RFC	End Queue (PCU)	Delay (s)	LOS
1	1655.00	1646.20	467.61	0.00	2394.37	0.691	2.20	4.758	A
2	1460.00	1454.45	805.69	0.00	2502.69	0.583	1.39	3.416	A
3	1390.00	1382.95	966.31	0.00	2167.10	0.641	1.76	4.550	A

Main results: (16:15-16:30)

Arm	Total Demand (PCU/hr)	Entry Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	RFC	End Queue (PCU)	Delay (s)	LOS
1	1655.00	1654.91	469.98	0.00	2393.00	0.692	2.22	4.875	A
2	1460.00	1459.96	809.96	0.00	2499.95	0.584	1.40	3.460	A
3	1390.00	1389.94	969.98	0.00	2164.96	0.642	1.78	4.644	A

Main results: (16:30-16:45)

Arm	Total Demand (PCU/hr)	Entry Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	RFC	End Queue (PCU)	Delay (s)	LOS
1	1655.00	1654.97	469.99	0.00	2393.00	0.692	2.23	4.877	A
2	1460.00	1459.99	809.99	0.00	2499.93	0.584	1.40	3.460	A
3	1390.00	1389.98	969.99	0.00	2164.95	0.642	1.78	4.645	A

Main results: (16:45-17:00)

Arm	Total Demand (PCU/hr)	Entry Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	RFC	End Queue (PCU)	Delay (s)	LOS
1	1655.00	1654.99	470.00	0.00	2392.99	0.692	2.23	4.877	A
2	1460.00	1460.00	809.99	0.00	2499.93	0.584	1.40	3.460	A
3	1390.00	1389.99	970.00	0.00	2164.95	0.642	1.79	4.645	A

Shap Pat Heung Interchange - 2028 Reference, AM Off-Peak

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Locked	Network Flow Scaling Factor (%)	Reason For Scaling Factors
Shap Pat Heung Interchange	ARCADY			100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Single Time Segment Only	Locked
2028 Reference, AM Off-Peak	2028 Reference	AM Off-Peak		FLAT	11:00	12:00	60	15		

Junction Network

Junctions

Junction	Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Junction Delay (s)	Junction LOS
E	Shap Pat Heung Interchange	Roundabout	1,2,3			4.25	A

Junction Network Options

Driving Side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Arm	Name	Description
1	1	Yuen Long Highway west bound	
2	2	Yuen Long Highway east bound	
3	3	Shap Pat Heung road	

Capacity Options

Arm	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)
1	0.00	99999.00
2	0.00	99999.00
3	0.00	99999.00

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
1	7.30	9.70	20.00	26.36	100.00	41.00	
2	7.30	10.50	25.00	40.00	100.00	25.00	
3	7.30	10.20	30.00	30.00	100.00	50.00	

Generated on 12/4/2022 15:05:40 using Junctions 8 (8.0.5.523)

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
1		(calculated)	(calculated)	0.579	2665.145
2		(calculated)	(calculated)	0.643	3020.964
3		(calculated)	(calculated)	0.582	2729.917

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	HV Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Arm	Profile Type	Use Turning Counts	Average Demand Flow (PCU/hr)	Flow Scaling Factor (%)
1	FLAT	✓	1710.00	100.000
2	FLAT	✓	1370.00	100.000
3	FLAT	✓	550.00	100.000

Direct/Resultant Flows

Direct Flows Data

Time Segment	Arm	Direct Demand Entry Flow (PCU/hr)	DirectDemandEntryFlowInPCU (PCU/hr)	Direct Demand Exit Flow (PCU/hr)	Direct Demand Pedestrian Flow (Ped/hr)
11:00-11:15	1	1710.00	1710.00		
11:00-11:15	2	1370.00	1370.00		
11:00-11:15	3	550.00	550.00		
11:15-11:30	1	1710.00	1710.00		
11:15-11:30	2	1370.00	1370.00		
11:15-11:30	3	550.00	550.00		
11:30-11:45	1	1710.00	1710.00		
11:30-11:45	2	1370.00	1370.00		
11:30-11:45	3	550.00	550.00		
11:45-12:00	1	1710.00	1710.00		
11:45-12:00	2	1370.00	1370.00		
11:45-12:00	3	550.00	550.00		

Turning Proportions

Turning Counts / Proportions (PCU/hr) - Junction E (for whole period)

		To		
		1	2	3
From	1	0.000	815.000	895.000
	2	845.000	0.000	525.000
	3	0.000	550.000	0.000

Turning Proportions (PCU) - Junction E (for whole period)

		To		
		1	2	3
From	1	0.00	0.48	0.52
	2	0.62	0.00	0.38
	3	0.00	1.00	0.00

Vehicle Mix

Average PCU Per Vehicle - Junction E (for whole period)

		To		
		1	2	3
From	1	1.000	1.000	1.000
	2	1.000	1.000	1.000
	3	1.000	1.000	1.000

Heavy Vehicle Percentages - Junction E (for whole period)

		To		
		1	2	3
From	1	0.0	0.0	0.0
	2	0.0	0.0	0.0
	3	0.0	0.0	0.0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.73	5.65	2.67	A
2	0.56	3.35	1.27	A
3	0.25	2.13	0.33	A

Generated on 12/4/2022 15:05:40 using Junctions 8 (8.0.5.523)

Main Results for each time segment

Main results: (11:00-11:15)

Arm	Total Demand (PCU/hr)	Entry Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	RFC	End Queue (PCU)	Delay (s)	LOS
1	1710.00	1699.51	548.70	0.00	2347.42	0.728	2.62	5.472	A
2	1370.00	1364.96	889.51	0.00	2448.78	0.559	1.26	3.307	A
3	550.00	548.70	841.89	0.00	2239.57	0.246	0.32	2.128	A

Main results: (11:15-11:30)

Arm	Total Demand (PCU/hr)	Entry Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	RFC	End Queue (PCU)	Delay (s)	LOS
1	1710.00	1709.87	550.00	0.00	2346.67	0.729	2.65	5.651	A
2	1370.00	1369.97	894.93	0.00	2445.29	0.560	1.27	3.347	A
3	550.00	550.00	844.98	0.00	2237.77	0.246	0.33	2.132	A

Main results: (11:30-11:45)

Arm	Total Demand (PCU/hr)	Entry Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	RFC	End Queue (PCU)	Delay (s)	LOS
1	1710.00	1709.96	550.00	0.00	2346.67	0.729	2.67	5.653	A
2	1370.00	1369.99	894.98	0.00	2445.26	0.560	1.27	3.347	A
3	550.00	550.00	844.99	0.00	2237.76	0.246	0.33	2.132	A

Main results: (11:45-12:00)

Arm	Total Demand (PCU/hr)	Entry Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	RFC	End Queue (PCU)	Delay (s)	LOS
1	1710.00	1709.98	550.00	0.00	2346.67	0.729	2.67	5.653	A
2	1370.00	1370.00	894.99	0.00	2445.25	0.560	1.27	3.347	A
3	550.00	550.00	845.00	0.00	2237.76	0.246	0.33	2.132	A

Shap Pat Heung Interchange - 2028 Reference, PM Off-Peak

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Locked	Network Flow Scaling Factor (%)	Reason For Scaling Factors
Shap Pat Heung Interchange	ARCADY			100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Single Time Segment Only	Locked
2028 Reference, PM Off-Peak	2028 Reference	PM Off-Peak		FLAT	16:00	17:00	60	15		

Junction Network

Junctions

Junction	Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Junction Delay (s)	Junction LOS
E	Shap Pat Heung Interchange	Roundabout	1,2,3			5.44	A

Junction Network Options

Driving Side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Arm	Name	Description
1	1	Yuen Long Highway west bound	
2	2	Yuen Long Highway east bound	
3	3	Shap Pat Heung road	

Capacity Options

Arm	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)
1	0.00	99999.00
2	0.00	99999.00
3	0.00	99999.00

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
1	7.30	9.70	20.00	26.36	100.00	41.00	
2	7.30	10.50	25.00	40.00	100.00	25.00	
3	7.30	10.20	30.00	30.00	100.00	50.00	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
1		(calculated)	(calculated)	0.579	2665.145
2		(calculated)	(calculated)	0.643	3020.964
3		(calculated)	(calculated)	0.582	2729.917

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	HV Percentages	2.00				✓	✓

Generated on 12/4/2022 15:05:40 using Junctions 8 (8.0.5.523)

Entry Flows

General Flows Data

Arm	Profile Type	Use Turning Counts	Average Demand Flow (PCU/hr)	Flow Scaling Factor (%)
1	FLAT	✓	1870.00	100.000
2	FLAT	✓	1575.00	100.000
3	FLAT	✓	515.00	100.000

Direct/Resultant Flows

Direct Flows Data

Time Segment	Arm	Direct Demand Entry Flow (PCU/hr)	DirectDemandEntryFlowInPCU (PCU/hr)	Direct Demand Exit Flow (PCU/hr)	Direct Demand Pedestrian Flow (Ped/hr)
16:00-16:15	1	1870.00	1870.00		
16:00-16:15	2	1575.00	1575.00		
16:00-16:15	3	515.00	515.00		
16:15-16:30	1	1870.00	1870.00		
16:15-16:30	2	1575.00	1575.00		
16:15-16:30	3	515.00	515.00		
16:30-16:45	1	1870.00	1870.00		
16:30-16:45	2	1575.00	1575.00		
16:30-16:45	3	515.00	515.00		
16:45-17:00	1	1870.00	1870.00		
16:45-17:00	2	1575.00	1575.00		
16:45-17:00	3	515.00	515.00		

Turning Proportions

Turning Counts / Proportions (PCU/hr) - Junction E (for whole period)

		To		
		1	2	3
From	1	0.000	905.000	965.000
	2	1040.000	0.000	535.000
	3	0.000	515.000	0.000

Turning Proportions (PCU) - Junction E (for whole period)

		To		
		1	2	3
From	1	0.00	0.48	0.52
	2	0.66	0.00	0.34
	3	0.00	1.00	0.00

Vehicle Mix

Average PCU Per Vehicle - Junction E (for whole period)

		To		
		1	2	3
From	1	1.000	1.000	1.000
	2	1.000	1.000	1.000
	3	1.000	1.000	1.000

Heavy Vehicle Percentages - Junction E (for whole period)

		To		
		1	2	3
From	1	0.0	0.0	0.0
	2	0.0	0.0	0.0
	3	0.0	0.0	0.0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.79	7.24	3.73	A
2	0.66	4.36	1.90	A
3	0.24	2.24	0.32	A

Main Results for each time segment

Main results: (16:00-16:15)

Arm	Total Demand (PCU/hr)	Entry Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	RFC	End Queue (PCU)	Delay (s)	LOS
1	1870.00	1855.51	513.73	0.00	2367.67	0.790	3.62	6.848	A
2	1575.00	1567.51	957.52	0.00	2405.03	0.655	1.87	4.262	A
3	515.00	513.73	1035.06	0.00	2127.06	0.242	0.32	2.228	A

Main results: (16:15-16:30)

Arm	Total Demand (PCU/hr)	Entry Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	RFC	End Queue (PCU)	Delay (s)	LOS
1	1870.00	1869.72	515.00	0.00	2366.94	0.790	3.69	7.229	A
2	1575.00	1574.92	964.86	0.00	2400.31	0.656	1.89	4.361	A
3	515.00	515.00	1039.94	0.00	2124.21	0.242	0.32	2.236	A

Main results: (16:30-16:45)

Arm	Total Demand (PCU/hr)	Entry Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	RFC	End Queue (PCU)	Delay (s)	LOS
1	1870.00	1869.91	515.00	0.00	2366.94	0.790	3.72	7.237	A
2	1575.00	1574.98	964.95	0.00	2400.25	0.656	1.90	4.361	A
3	515.00	515.00	1039.98	0.00	2124.19	0.242	0.32	2.236	A

Main results: (16:45-17:00)

Arm	Total Demand (PCU/hr)	Entry Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	RFC	End Queue (PCU)	Delay (s)	LOS
1	1870.00	1869.95	515.00	0.00	2366.93	0.790	3.73	7.240	A
2	1575.00	1574.99	964.98	0.00	2400.23	0.656	1.90	4.362	A
3	515.00	515.00	1039.99	0.00	2124.18	0.242	0.32	2.236	A

Shap Pat Heung Interchange - 2028 Design, AM Off-Peak

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Locked	Network Flow Scaling Factor (%)	Reason For Scaling Factors
Shap Pat Heung Interchange	ARCADY			100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Single Time Segment Only	Locked
2028 Design, AM Off-Peak	2028 Design	AM Off-Peak		FLAT	11:00	12:00	60	15		

Junction Network

Junctions

Junction	Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Junction Delay (s)	Junction LOS
E	Shap Pat Heung Interchange	Roundabout	1,2,3			4.30	A

Junction Network Options

Driving Side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Arm	Name	Description
1	1	Yuen Long Highway west bound	
2	2	Yuen Long Highway east bound	
3	3	Shap Pat Heung road	

Capacity Options

Arm	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)
1	0.00	99999.00
2	0.00	99999.00
3	0.00	99999.00

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
1	7.30	9.70	20.00	26.36	100.00	41.00	
2	7.30	10.50	25.00	40.00	100.00	25.00	
3	7.30	10.20	30.00	30.00	100.00	50.00	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
1		(calculated)	(calculated)	0.579	2665.145
2		(calculated)	(calculated)	0.643	3020.964
3		(calculated)	(calculated)	0.582	2729.917

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	HV Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Arm	Profile Type	Use Turning Counts	Average Demand Flow (PCU/hr)	Flow Scaling Factor (%)
1	FLAT	✓	1720.00	100.000
2	FLAT	✓	1370.00	100.000
3	FLAT	✓	550.00	100.000

Generated on 12/4/2022 15:05:40 using Junctions 8 (8.0.5.523)

Direct/Resultant Flows

Direct Flows Data

Time Segment	Arm	Direct Demand Entry Flow (PCU/hr)	DirectDemandEntryFlowInPCU (PCU/hr)	Direct Demand Exit Flow (PCU/hr)	Direct Demand Pedestrian Flow (Ped/hr)
11:00-11:15	1	1720.00	1720.00		
11:00-11:15	2	1370.00	1370.00		
11:00-11:15	3	550.00	550.00		
11:15-11:30	1	1720.00	1720.00		
11:15-11:30	2	1370.00	1370.00		
11:15-11:30	3	550.00	550.00		
11:30-11:45	1	1720.00	1720.00		
11:30-11:45	2	1370.00	1370.00		
11:30-11:45	3	550.00	550.00		
11:45-12:00	1	1720.00	1720.00		
11:45-12:00	2	1370.00	1370.00		
11:45-12:00	3	550.00	550.00		

Turning Proportions

Turning Counts / Proportions (PCU/hr) - Junction E (for whole period)

		To		
		1	2	3
From	1	0.000	815.000	905.000
	2	845.000	0.000	525.000
	3	0.000	550.000	0.000

Turning Proportions (PCU) - Junction E (for whole period)

		To		
		1	2	3
From	1	0.00	0.47	0.53
	2	0.62	0.00	0.38
	3	0.00	1.00	0.00

Vehicle Mix

Average PCU Per Vehicle - Junction E (for whole period)

		To		
		1	2	3
From	1	1.000	1.000	1.000
	2	1.000	1.000	1.000
	3	1.000	1.000	1.000

Heavy Vehicle Percentages - Junction E (for whole period)

		To		
		1	2	3
From	1	0.0	0.0	0.0
	2	0.0	0.0	0.0
	3	0.0	0.0	0.0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.73	5.74	2.73	A
2	0.56	3.37	1.28	A
3	0.25	2.13	0.33	A

Main Results for each time segment

Main results: (11:00-11:15)

Arm	Total Demand (PCU/hr)	Entry Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	RFC	End Queue (PCU)	Delay (s)	LOS
1	1720.00	1709.29	548.70	0.00	2347.42	0.733	2.68	5.553	A
2	1370.00	1364.93	899.36	0.00	2442.44	0.561	1.27	3.327	A
3	550.00	548.70	841.87	0.00	2239.58	0.246	0.32	2.128	A

Main results: (11:15-11:30)

Arm	Total Demand (PCU/hr)	Entry Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	RFC	End Queue (PCU)	Delay (s)	LOS
1	1720.00	1719.87	550.00	0.00	2346.67	0.733	2.71	5.739	A
2	1370.00	1369.97	904.93	0.00	2438.86	0.562	1.28	3.367	A
3	550.00	550.00	844.98	0.00	2237.77	0.246	0.33	2.132	A

Main results: (11:30-11:45)

Arm	Total Demand (PCU/hr)	Entry Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	RFC	End Queue (PCU)	Delay (s)	LOS
1	1720.00	1719.96	550.00	0.00	2346.67	0.733	2.72	5.741	A
2	1370.00	1369.99	904.98	0.00	2438.83	0.562	1.28	3.367	A
3	550.00	550.00	844.99	0.00	2237.76	0.246	0.33	2.132	A

Main results: (11:45-12:00)

Arm	Total Demand (PCU/hr)	Entry Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	RFC	End Queue (PCU)	Delay (s)	LOS
1	1720.00	1719.98	550.00	0.00	2346.67	0.733	2.73	5.744	A
2	1370.00	1370.00	904.99	0.00	2438.82	0.562	1.28	3.367	A
3	550.00	550.00	845.00	0.00	2237.76	0.246	0.33	2.132	A

Generated on 12/4/2022 15:05:40 using Junctions 8 (8.0.5.523)

Shap Pat Heung Interchange - 2028 Design, PM Off-Peak

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Locked	Network Flow Scaling Factor (%)	Reason For Scaling Factors
Shap Pat Heung Interchange	ARCADY			100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Single Time Segment Only	Locked
2028 Design, PM Off-Peak	2028 Design	PM Off-Peak		FLAT	16:00	17:00	60	15		

Junction Network

Junctions

Junction	Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Junction Delay (s)	Junction LOS
E	Shap Pat Heung Interchange	Roundabout	1,2,3			5.53	A

Junction Network Options

Driving Side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Arm	Name	Description
1	1	Yuen Long Highway west bound	
2	2	Yuen Long Highway east bound	
3	3	Shap Pat Heung road	

Capacity Options

Arm	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)
1	0.00	99999.00
2	0.00	99999.00
3	0.00	99999.00

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
1	7.30	9.70	20.00	26.36	100.00	41.00	
2	7.30	10.50	25.00	40.00	100.00	25.00	
3	7.30	10.20	30.00	30.00	100.00	50.00	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
1		(calculated)	(calculated)	0.579	2665.145
2		(calculated)	(calculated)	0.643	3020.964
3		(calculated)	(calculated)	0.582	2729.917

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	HV Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Arm	Profile Type	Use Turning Counts	Average Demand Flow (PCU/hr)	Flow Scaling Factor (%)
1	FLAT	✓	1880.00	100.000
2	FLAT	✓	1575.00	100.000
3	FLAT	✓	515.00	100.000

Direct/Resultant Flows

Direct Flows Data

Time Segment	Arm	Direct Demand Entry Flow (PCU/hr)	DirectDemandEntryFlowInPCU (PCU/hr)	Direct Demand Exit Flow (PCU/hr)	Direct Demand Pedestrian Flow (Ped/hr)
16:00-16:15	1	1880.00	1880.00		
16:00-16:15	2	1575.00	1575.00		
16:00-16:15	3	515.00	515.00		
16:15-16:30	1	1880.00	1880.00		
16:15-16:30	2	1575.00	1575.00		
16:15-16:30	3	515.00	515.00		
16:30-16:45	1	1880.00	1880.00		
16:30-16:45	2	1575.00	1575.00		
16:30-16:45	3	515.00	515.00		
16:45-17:00	1	1880.00	1880.00		
16:45-17:00	2	1575.00	1575.00		
16:45-17:00	3	515.00	515.00		

Generated on 12/4/2022 15:05:40 using Junctions 8 (8.0.5.523)

Turning Proportions

Turning Counts / Proportions (PCU/hr) - Junction E (for whole period)

		To		
		1	2	3
From	1	0.000	905.000	975.000
	2	1040.000	0.000	535.000
	3	0.000	515.000	0.000

Turning Proportions (PCU) - Junction E (for whole period)

		To		
		1	2	3
From	1	0.00	0.48	0.52
	2	0.66	0.00	0.34
	3	0.00	1.00	0.00

Vehicle Mix

Average PCU Per Vehicle - Junction E (for whole period)

		To		
		1	2	3
From	1	1.000	1.000	1.000
	2	1.000	1.000	1.000
	3	1.000	1.000	1.000

Heavy Vehicle Percentages - Junction E (for whole period)

		To		
		1	2	3
From	1	0.0	0.0	0.0
	2	0.0	0.0	0.0
	3	0.0	0.0	0.0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.79	7.39	3.82	A
2	0.66	4.40	1.92	A
3	0.24	2.24	0.32	A

Main Results for each time segment

Main results: (16:00-16:15)

Arm	Total Demand (PCU/hr)	Entry Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	RFC	End Queue (PCU)	Delay (s)	LOS
1	1880.00	1865.15	513.73	0.00	2367.67	0.794	3.71	6.971	A
2	1575.00	1567.46	967.30	0.00	2398.74	0.657	1.89	4.293	A
3	515.00	513.73	1035.02	0.00	2127.08	0.242	0.32	2.228	A

Main results: (16:15-16:30)

Arm	Total Demand (PCU/hr)	Entry Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	RFC	End Queue (PCU)	Delay (s)	LOS
1	1880.00	1879.71	515.00	0.00	2366.94	0.794	3.79	7.377	A
2	1575.00	1574.91	974.85	0.00	2393.88	0.658	1.91	4.395	A
3	515.00	515.00	1039.94	0.00	2124.21	0.242	0.32	2.236	A

Main results: (16:30-16:45)

Arm	Total Demand (PCU/hr)	Entry Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	RFC	End Queue (PCU)	Delay (s)	LOS
1	1880.00	1879.90	515.00	0.00	2366.94	0.794	3.81	7.386	A
2	1575.00	1574.98	974.95	0.00	2393.82	0.658	1.91	4.396	A
3	515.00	515.00	1039.98	0.00	2124.19	0.242	0.32	2.236	A

Main results: (16:45-17:00)

Arm	Total Demand (PCU/hr)	Entry Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	RFC	End Queue (PCU)	Delay (s)	LOS
1	1880.00	1879.95	515.00	0.00	2366.93	0.794	3.82	7.389	A
2	1575.00	1574.99	974.97	0.00	2393.80	0.658	1.92	4.396	A
3	515.00	515.00	1039.99	0.00	2124.18	0.242	0.32	2.236	A

APPENDIX 8A

TRAFFIC STATEMENT

Proposed Minor Relaxation of Building Height Restriction for Permitted Social Welfare Facility (Residential Care Home for the Elderly) and Proposed House Use with Conservation Proposal at Lot nos. 1695 S.E ss.1 RP, 1695 S.F ss.1 and 1695 S.H RP (Part) in D.D. 120 and Adjoining Government Land, Tai Kei Leng, Yuen Long

Traffic Statement

1. INTRODUCTION

1.1 This Traffic Statement is to support the Section 16 (S16) planning application for Proposed Minor Relaxation of Building Height Restriction for Permitted Social Welfare Facility (Residential Care Home for the Elderly) and Proposed House Use with Conservation Proposal at Lot nos. 1695 S.E ss.1 RP, 1695 S.F ss.1 and 1695 S.H RP (Part) in D.D. 120 and Adjoining Government Land, Tai Kei Leng, Yuen Long.

1.2 The applicant has put forward a conservation-cum-development proposal on the Site. A S16 planning application (Planning Application No. A/YL/289) was approved in July 2022. A new S16 planning application with new development parameters is now applying.

1.3 The tentative development parameters for the Proposals are shown below:

Table 1.1 Development Parameters for the Approved Scheme (Planning Application No. A/YL/289)

Site Area	About 1,953 m^2
GFA	About 5,930 m^2
No. of Beds	281 (or within a range of 260 – 300)

Table 1.2 Development Parameters for the This Application

Site Area	About 1,877.1 m^2
GFA	About 5,756 m^2
No. of Beds	241 beds (or within a range of 220 – 260)

1.4 This Traffic Statement is therefore prepared to identify the magnitude of the change in traffic volume generated from the proposed development, and its impact due to this minor change.

2. THE FINDINGS

2.1 **Table 2.1** gives a detail calculation on the estimated traffic trips induced by the proposed development.

Table 2.1 Derivation of the Traffic Trips on the Scenarios

	Approved Scheme (Planning Application No. A/YL/289)				**This Application**			
Site Area	About 1,953 m^2				About 1,877.1 m^2			
GFA	About 5,930 m^2				About 5,756 m^2			
No. of Beds	281 beds (or within a range of 260 – 300)				241 beds (or within a range of 220 – 260)			
	AM Peak		**PM Peak**		**AM Peak**		**PM Peak**	
	Gen.	**Attn.**	**Gen.**	**Attn.**	**Gen.**	**Attn.**	**Gen.**	**Attn.**
Trip Rates (pcu/hr/flat)	0.08633	0.08633	0.08633	0.08633	0.08633	0.08633	0.08633	0.08633
Trips (pcu/hr)	**26**	**21**	**13**	**17**	**22**	**18**	**11**	**15**

Note:

1) Upper range of no. of beds is adopted as conservative approach.

2.2 **Table 2.2** gives a comparison of the traffic generated by the development with 300 beds and 260 beds.

Table 2.2 Comparison of the Traffic Trips

	Peak Hour Trips (pcu/hr)			
	AM Peak		**PM Peak**	
	Gen.	**Attn.**	**Gen.**	**Attn.**
This Application (260 beds)	22	18	11	15
Approved Scheme (300 beds)	26	21	13	17
Difference	**-4**	**-3**	**-2**	**-2**

2.3 From **Table 2.2**, it is revealed that the decrease of no. of beds from 300 to 260 will generate lesser traffic trips in the peak hours.

3. CONCLUSION

3.1 With the decrease of no. of beds from 300 to 260, the proposed development will generate lesser traffic trips in the peak hours. The traffic impact by the proposed development to road network under the new application will be even smaller than the approved scheme.

3.2 Therefore, the assessment in the TIA (Planning Application No. A/YL/289) approved in July 2022 is already in conservative approach and could be adopted for this new application. The proposed change is therefore considered acceptable from traffic engineering point of view.