Appendix 10

Traffic Impact Assessment

Renewal of Section 16 Planning Application for Temporary Asphalt Plant for a Period of 5 Years at Lots 20RP (Part), 21 and 23RP (Part) in D.D. 88 and adjoining Government Land to the East of Man Kam To Road, Sheung Shui, New Territories

Traffic Impact Assessment
Final Report
9th August 2024

Prepared by: CKM Asia Limited

Prepared for: K. Wah Asphalt Limited

Renewal of Section 16 Planning Application
for Temporary Asphalt Plant for a Period of 5 Years
at Lots 20RP (Part), 21 and 23RP (Part) in D.D. 88
and adjoining Government Land
to the East of Man Kam To Road, Sheung Shui, New Territories

CONTENTS

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TABLES

NUMBER

Renewal of Section 16 Planning Application
for Temporary Asphalt Plant for a Period of 5 Years
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and adjoining Government Land
to the East of Man Kam To Road, Sheung Shui, New Territories

FIGURES

NUMBER

1.0 INTRODUCTION

Background

1.1 The Application Site is located to the east of Man Kam To Road in Sheung Shui, and is shown in **Figure 1.1.** It is currently occupied by an asphalt plant operated by the Applicant (the "Existing Temporary Asphalt Plant").

1.2 The Existing Temporary Asphalt Plant was first approved by the Town Planning Board on 12th December 2014 for a period of 5 years until the end of 2019 (A/NE-FTA/148) with a Class B amendment approved on 23rd October 2015 (A/NE-FTA/148-2). Subsequently, the Town Planning Board approved a renewal of the planning permission on 18th October, 2019 (A/NE-FTA/192) for a period of 5 years until the end of 2024.

1.3 This is the 2nd renewal application for 5 years (the "Proposed Temporary Asphalt Plant. The Proposed Temporary Asphalt Plant has **in-principle the same** development parameters as the Existing Temporary Asphalt Plant, i.e. there is no change in the key development parameters including the site area, building bulk, production capacity etc..

1.4 CKM Asia Limited was commissioned by the Applicant to conduct a Traffic Impact Assessment ("TIA") in support of the Proposed Temporary Asphalt Plant.

Scope of Study

1.5 The main objectives of this Study are as follows:

- To assess the existing traffic issues in the vicinity of the Application Site;
- To quantify the amount of traffic generated by the Existing Temporary Asphalt Plant and Proposed Temporary Asphalt Plant;
- To examine the traffic impact on the local road network;
- To identify any deficiencies in the road network in accommodating the traffic generated by the Proposed Temporary Asphalt Plant; and
- To ensure adequate provision of transport facilities.

Contents of the Report

1.6 After this introduction, the remaining chapters contain the following:

Chapter Two – Describes the existing condition;
Chapter Three – Outlines the Proposed Temporary Asphalt Plant;
Chapter Four – Describes the traffic impact analysis; and
Chapter Five – Gives the overall conclusion.

2.0 EXISTING SITUATION

The Application Site

2.1 The Application Site has an area of around 9,056.43 m^2 located to the east of Man Kam To Road between Kong Nga Po Road and Fu Tei Au Road. Existing vehicular access to the Application Site is provided at Man Kam To Road.

Traffic Generation of the Existing Temporary Asphalt Plant

2.2 Traffic generation of the Existing Temporary Asphalt Plant is obtained based on the record provided by the Applicant for the typical operational months of February, March and April 2024.

2.3 Based on the record, the peak hour traffic generation of the Existing Temporary Asphalt Plant for these 3 months are presented in Table 2.1.

TABLE 2.1 PEAK HOUR TRAFFIC GENERATION

Month	Peak Hour Traffic Generation (vehicles / hour)		
	Attraction	Generation	2-Way
February 2024	14	14	28
March 2024	14	14	28
April 2024	15	15	30
Maximum	**15**	**15**	**30**

2.4 Table 2.1 shows the maximum peak hour traffic generation of the existing temporary asphalt plant is 30 vehicles (2-way), which is equivalent to 75 passenger car unit ("pcu").

The Local Road Network

2.5 Man Kam To Road is a rural road linking the Man Kam To Boundary Control Point ("BCP") and continues south as Jockey Club Road towards Sheung Shui and Fanling. The section of Man Kam To Road between Po Wan Road and Kong Nga Po Road is mostly of single carriageway standard with 2 northbound traffic lanes towards the Man Kam To BCP and 1 southbound traffic lane towards Sheung Shui.

2.6 Lo Wu Station Road is a single carriageway 2-lane local road connecting Man Kam To Road and Lo Wu MTR Station.

2.7 Kong Nga Po Road is local road connecting Man Kam To Road and Kong Nga Po, where upgrading work is being carried out by the Civil Engineering and Development Department to form a 7.3m wide single carriageway 2-lane standard.

2.8 Fu Tei Au Road is a single carriageway 2-lane local road. It connects Man Kam To Road and Sheung Shui Treatment Works and Fresh Water Pumping Station.

2.9 Po Wan Road is a single carriageway 2-lane district distributor. It provides an alternative route between Man Kam To Road / Jockey Club Road, and Po Shek Wu Road bypassing the roundabout of Jockey Club Road / Po Shek Wu Road.

Pedestrian Facilities

2.10 Footpaths are provided along both sides of Man Kam To Road in vicinity of the Application Site. It was observed that few pedestrians use these footpaths.

Public Transport Facilities

2.11 One franchised bus and one GMB route operate close to the Application Site, and the bus stops are located on both sides of Man Kam To Road which are some 180m to the south of the Junction of Man Kam To Road / Application Site Access Road. Details of the public transport services are presented in Table 2.2.

TABLE 2.2 PUBLIC TRANSPORT SERVICES OPERATING CLOSE TO THE APPLICATION SITE

Route	Routing	Frequency (min)
KMB 73K	Sheung Shui – Man Kam To	10 - 30
GMB 59K	Sheung Shui Station - Lin Ma Hang	15 - 30
GMB 59S	Heung Yuen Wai Boundary Control Point -Sheung Shui Station	3 - 8

Note: KMB - Kowloon Motor Bus GMB - Green Minibus

Traffic Survey

2.12 To quantify the existing traffic flows in the vicinity of the Application Site, manual classified counts were conducted on Monday, 6th May 2024 during the AM and PM peak periods at the following junctions:

J01 – Junction of Man Kam To Road / Lo Wu Station Road;
J02 – Junction of Man Kam To Road / Kong Nga Po Road;
J03 – Junction of Man Kam To Road / Access Road to Open Storage Site No.7;
J04 – Junction of Man Kam To Road / Access Road to Application Site;
J05 – Junction of Man Kam To Road / Fu Tei Au Road;
J06 – Junction of Man Kam To Road / Access Road to Hung Kiu San Tsuen; and
J07 – Junction of Jockey Club Road / Po Wan Road.

2.13 Locations of the surveyed junctions are shown in **Figure 2.1**, and the layouts of these junctions are shown in **Figures 2.2 – 2.8**.

2.14 The traffic counts are classified by vehicle type to enable traffic flows in passenger car unit ("pcu") to be calculated. The AM and PM peak hours identified from the surveys are found to be between 0800 and 0900 hours, and 1700 and 1800 hours respectively.

2.15 **Figure 2.9** presents the existing AM and PM peak hour traffic flows, which includes the traffic generated by the Existing Temporary Asphalt Plant.

Existing Pedestrian Activities at J05 and J07

2.16 The signalised Junction of Man Kam To Road / Fu Tei Au Road (J05) and the Junction of Jockey Club Road / Po Wan Road (J07) operate with a pedestrian demand-dependant phase; hence, the pedestrian phase is only called if the pedestrian push button is activated by pedestrians. Observations were made at the pedestrian crossings and the results are summarized in Table 2.3.

TABLE 2.3 OBSERVED PEDESTRIAN PATTERNS AT J05 AND J07

	J/O Man Kam To Road / Fu Tei Au Road (J05)		J/O Jockey Club Road / Po Wan Road (J07)	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Number of Cycles **with** pedestrian stage	3 (9%)	3 (9%)	2 (5%)	3 (8%)
Number of Cycles **without** pedestrian stage	32 (91%)	31 (91%)	37 (95%)	37 (92%)
Total	**34 (100%)**	**34 (100%)**	**40 (100%)**	**40 (100%)**

2.17 Table 2.3 shows that the pedestrian demand-dependant phase is activated only 2 to 3 times during the AM and PM peak hour respectively, i.e. less than 10% of time.

Existing Performance of the Surveyed Junctions

2.18 The existing performance of the surveyed junctions are calculated based on the observed traffic counts, and the analysis was undertaken using the methods outlined in Volume 2 of Transport Planning and Design Manual ("TPDM"), and the signal information obtained from the Traffic Control Division ("TCD") of Transport Department ("TD").

2.19 Similar to the previous renewal application, due to the presence of the demand dependant pedestrian phase, and to better determine the performance of the Junction of Man Kam To Road / Fu Tei Au Road (J05) and the Junction of Jockey Club Road / Po Wan Road (J07), the capacity analysis is conducted for 3 cases:

- Case 1 - Worst case operation with pedestrian phase activated every cycle, which is unrealistic because there are few pedestrians at these locations;
- Case 2 - Optimal case operation without pedestrian phase activated; and
- Case 3 - Sensitivity test assuming the pedestrian phase is activated 20% of time.

2.20 The junction capacity analysis results are summarised in Table 2.4 and the detailed calculations are found in Appendix A.

TABLE 2.4 EXISTING JUNCTION PERFORMANCE

Junction			Type of Control	Para-meter	AM Peak Hour	PM Peak Hour
J01	J/O Man Kam To Road / Lo Wu Station Road		Priority	RFC	0.102	0.098
J02	J/O Man Kam To Road / Kong Nga Po Road		Priority	RFC	0.427	0.320
J03	J/O Man Kam To Road / Access Road to Open Storage Site No.7		Signal	RC	85%	94%
J04	J/O Man Kam To Road / Access Road to Application Site		Priority	RFC	0.047	0.080
J05	J/O Man Kam To Road / Fu Tei Au Road	Case 1	Signal	RC	40%	45%
		Case 2	Signal	RC	90%	96%
		Case 3	Signal	RC	80%	86%
J06	J/O Man Kam To Road / Access Road to Hung Kiu San Tsuen		Priority	RFC	0.080	0.104
J07	J/O Jockey Club Road / Po Wan Road	Case 1	Signal	RC	90%	114%
		Case 2	Signal	RC	>100%	>100%
		Case 3	Signal	RC	>100%	>100%

Note: RC – Reserve Capacity RFC – Ratio of Flow to Capacity

2.21 The above results indicate the surveyed junctions currently operate with capacities.

Existing Performance of the Surveyed Road Link

2.22 The existing performance, in terms of Peak Hourly Flows / Design Flow Ratio ("P/Df") of the surveyed road links is calculated based on the observed traffic flows, and the analysis results are summarized in Table 2.5.

TABLE 2.5 EXISTING ROAD LINK PERFORMANCE

Road Link		Road Type	Direction	Config-uration	Design Flow (pcu/hr)	Peak Hour Flows / Design Flow Ratio (P/Df)	
						AM Peak Hour	PM Peak Hour
L01	Man Kam To Road	Rural Road	Northbound	Single-2	2,500	0.418	0.347
			Southbound	Single-1	1,500	0.635	0.623
L02	Po Wan Road	District Distributor	Eastbound	Single-1	1,350	0.229	0.152
			Westbound	Single-1	1,350	0.222	0.123
L03	Fu Tei Au Road	Rural Road	Eastbound	Single-1	1,040	0.039	0.040
			Westbound	Single-1	1,040	0.027	0.043
L04	Lo Wu Station Road	Rural Road	Eastbound	Single-1	1,040	0.038	0.041
			Westbound	Single-1	1,040	0.028	0.014

2.23 The above results indicate the surveyed road links also currently operate with capacities.

3.0 THE PROPOSED TEMPORARY ASPHALT PLANT

Development Parameters

3.1 Development parameters of the Proposed Temporary Asphalt Plant are in-principle the same as the Existing Temporary Asphalt Plant, of which the maximum production capacity remains at 160 tonnes / hour.

3.2 The following are found at the Application Site:
(i) an Administrative Block with ancillary offices, laboratory and storage,
(ii) an Operation Block with ancillary equipment / machines including mixing towers, emergency generator, a bituminous emulsion plant, various bitumen tanks, aggregate storage bins and stock piles etc. for asphalt production; and
(iii) Existing Ancillary Structures (i.e. staircases and platforms for maintenance and emergency access)

3.3 Table 3.1 compares the development parameters between the Existing Temporary Asphalt Plant, and the Proposed Temporary Asphalt Plant.

TABLE 3.1 SUMMARIES OF DEVELOPMENT PARAMETERS

Major Parameters	Existing Temporary Asphalt Plant (A/NE-FTA/192)	Proposed Temporary Asphalt Plant	Difference
Administrative Block (Ancillary Office and Storage)	279.60 m^2	279.60 m^2	No Change
Operation Block (Asphalt Plant, Ancillary Equipment / Machines)	2,093.72 m^2	2,093.72 m^2	No Change
Existing Ancillary Structures (i.e. staircases and platforms for maintenance and emergency access)(Note 1)	n/a	430.87 m^2	+430.87 m^2
TOTAL GFA	**2,373.32** m^2	**2,804.19 m^2**	+430.87 m^2

Note 1: Existing GFA accountable in building plan submission.

Provision of Internal Transport Facilities

3.4 The existing internal transport facilities are sufficient to serve the Existing Temporary Asphalt Plant, and also the Proposed Temporary Asphalt Plant in view there is no change in the development parameters as well as the maximum production capacity. Table 3.2 summarises the internal transport facilities provided.

TABLE 3.2 PROVISION OF INTERNAL TRANSPORT FACILITIES

Facility	Approved / Proposed Provision
Car Parking Spaces	6 nos. @ 5.0m (L) x 2.5m (W) x Min. 2.4m (H)
Goods Vehicle Loading / Unloading Bay	1 no. @ 11.0m (L) x 3.5m (W) x Min. 4.7m (H)
Pick-up / Drop-off Lay-by for Taxis and Private Cars	1 no. @ 5.0m (L) x 2.5m (W) x Min. 2.4m (H)
Asphalt Plant loading / unloading bay	9 nos. @ 9.5m (L) x 3.5m (W)

4.0 TRAFFIC IMPACT

Design Year

4.1 If the Proposed Temporary Asphalt Plant is approved by the TPB by, says late-2024, with permission to operate and cease in 5 years, i.e. by late-2029. Hence, the design year adopted for capacity analysis is 2029.

Traffic Forecast

4.2 The design year traffic flows are estimated with reference to:

(i) Expected traffic growth from 2024 to 2029;

(ii) Traffic generated by other known planned / committed developments located in the vicinity; and

(iii) Traffic generation of the Proposed Temporary Asphalt Plant.

4.3 Details of the above are presented in below paragraphs.

(i) Traffic Growth Rate

4.4 To produce the 2029 traffic flows, a growth factor is used to project from the 2024 traffic flow. This factor is obtained with reference to the "*Projections of Population Distribution 2023-2031*" published by Planning Department ("PlanD") for Tertiary Planning Unit ("TPU") covering the study area, which is presented in Table 4.1.

TABLE 4.1 POPULATION PROJECTIONS IN TERTIARY PLANNING UNIT

Tertiary Planning Unit	Projected Population (in Thousands)		
	2024	2027 (Note 1)	Change
620, 622 & 641	5,700	5,600	-100
624 & 629	52,200	53,200	+1,000
TOTAL	**57,900**	**58,800**	**+900**
Average Annual Growth (2024 – 2027)			**+0.5%**

Note 1: Annual population projections by TPU are available up to 2027.

4.5 Table 4.1 shows the projected population change from 2024 to 2027 is +0.5% per annum. In view that the annual population projection by TPU is only available up to 2027, the same growth rate between 2024 to 2027, is assumed for the growth between 2027 and 2029. To be conservative, an annual growth rate of 1% is adopted to produce the future traffic flow from 2024 to 2029.

(ii) Other Known Planned / Committed Developments

4.6 Information on other known major planned / committed developments are obtained from the available public domains including the Town Planning Board's Statutory Planning Portal 3 by Planning Department, website of District Council, Legislative Council, EPD, Civil Engineering and Development Department etc. are summarised in Table 4.2.

TABLE 4.2 DETAILS OF OTHER KNOWN MAJOR PLANNED / COMMITTED DEVELOPMENTS IDENTIFIED

Ref.	Location	Location	Expected Completion
A.	Organic Resources Recovery Centre Phase 2 (O.PARK2)	Kong Nga Po Road	Within 2024
B.	Kong Nga Po Police Training Facilities	Kong Nga Po Road	2026 – 2027

4.7 Traffic generated by the above other known major planned / committed developments is included in the design year.

(iii) Traffic Generation of the Proposed Temporary Asphalt Plant

4.8 The Temporary Asphalt Plant has been in operation since 2017, and since there is no change in the maximum production capacity, the traffic generation remains unchanged as shown in Table 2.1. The existing traffic flows obtained from the traffic survey has already included the traffic generated by the Existing Temporary Asphalt Plant, which is the same as the Proposed Temporary Asphalt Plant, hence, additional traffic generation need not be added to the 2029 traffic flow.

Traffic Growth

4.9 The future traffic flows are derived as follow:

2029 Traffic Flow = 2024 Existing Traffic Flows +
Total Traffic Growth from 2024 to 2029 +
Traffic Generated by Other Developments "A" & "B"

4.10 **Figure 4.1** shows Year 2029 peak hour traffic flows with the Proposed Temporary Asphalt Plant.

2029 Junction Capacity Analysis

4.11 Year 2029 capacity analysis for the case with the Proposed Temporary Asphalt Plant are summarised in Table 4.3, and detailed calculations are presented in Appendix A.

TABLE 4.3 2029 JUNCTION PERFORMANCE

Junction			Type of Control	Para -meter	AM Peak Hour	PM Peak Hour
J01	J/O Man Kam To Road / Lo Wu Station Road		Priority	RFC	0.103	0.098
J02	J/O Man Kam To Road / Kong Nga Po Road		Priority	RFC	0.788	0.659
J03	J/O Man Kam To Road / Access Road to Open Storage Site No.7		Signal	RC	45%	56%
J04	J/O Man Kam To Road / Access Road to Application Site		Priority	RFC	0.054	0.093
J05	J/O Man Kam To Road / Fu Tei Au Road	Case 1	Signal	RC	18%	23%
		Case 2	Signal	RC	59%	66%
		Case 3	Signal	RC	51%	57%
J06	J/O Man Kam To Road / Access Road to Hung Kiu San Tsuen		Priority	RFC	0.093	0.119
J07	J/O Jockey Club Road / Po Wan Road	Case 1	Signal	RC	58%	77%
		Case 2	Signal	RC	100%	>100%
		Case 3	Signal	RC	92%	>100%

Note: RC – Reserve Capacity RFC – Ratio of Flow to Capacity
Case 1 - Worst case operation with pedestrian phase activated every cycle;
Case 2 - Optimal case operation without pedestrian phase activated; and
Case 3 - Sensitivity operation performance assuming the pedestrian phase activated 20% of time.

4.12 Table 4.3 shows that the junctions analyzed have capacity to accommodate the expected traffic growth to 2029 including the traffic generated by the Proposed Temporary Asphalt Plant, which has no adverse impact to the surrounding road junctions.

2029 Road Link Capacity Analysis

4.13 Year 2029 road link analysis for the case with the Proposed Temporary Asphalt Plant are summarised in Table 4.4.

TABLE 4.4 2029 ROAD LINK PERFORMANCE

Road Link		Road Type	Direction	Config-uration	Design Flow (pcu/hr)	Peak Hour Flows / Design Flow Ratio (P/Df)	
						AM Peak Hour	PM Peak Hour
L01	Man Kam To Road	Rural Road	Northbound	Single-2	2,500	0.517	0.437
			Southbound	Single-1	1,500	0.779	0.777
L02	Po Wan Road	District Distributor	Eastbound	Single-1	1,350	0.241	0.160
			Westbound	Single-1	1,350	0.233	0.130
L03	Fu Tei Au Road	Rural Road	Eastbound	Single-1	1,040	0.043	0.065
			Westbound	Single-1	1,040	0.063	0.044
L04	Lo Wu Station Road	Rural Road	Eastbound	Single-1	1,040	0.040	0.043
			Westbound	Single-1	1,040	0.029	0.015

4.14 Table 4.4 shows that the road links analyzed have capacity to accommodate the expected traffic growth to 2029 including the traffic generated by the Proposed Temporary Asphalt Plant, which has no adverse impact.

5.0 SUMMARY

5.1 The Application Site is located to the east of Man Kam To Road in Sheung Shui, and is currently occupied by the Existing Temporary Asphalt Plant, which was first approved for a period of 5 years (A/NE-FTA/148) by the Town Planning Board on 12th December 2014, with a Class B amendment approved on 23rd October 2015 (A/NE-FTA/148-2). A renewal for another period of 5 years was approved on 18th October, 2019 (A/NE-FTA/192) until the end of 2024.

5.2 This is the 2nd renewal application for 5 years, i.e. up to 2029. The Proposed Temporary Asphalt Plant has **in-principle the same** development parameters and same maximum production rate as the Existing Temporary Asphalt Plant.

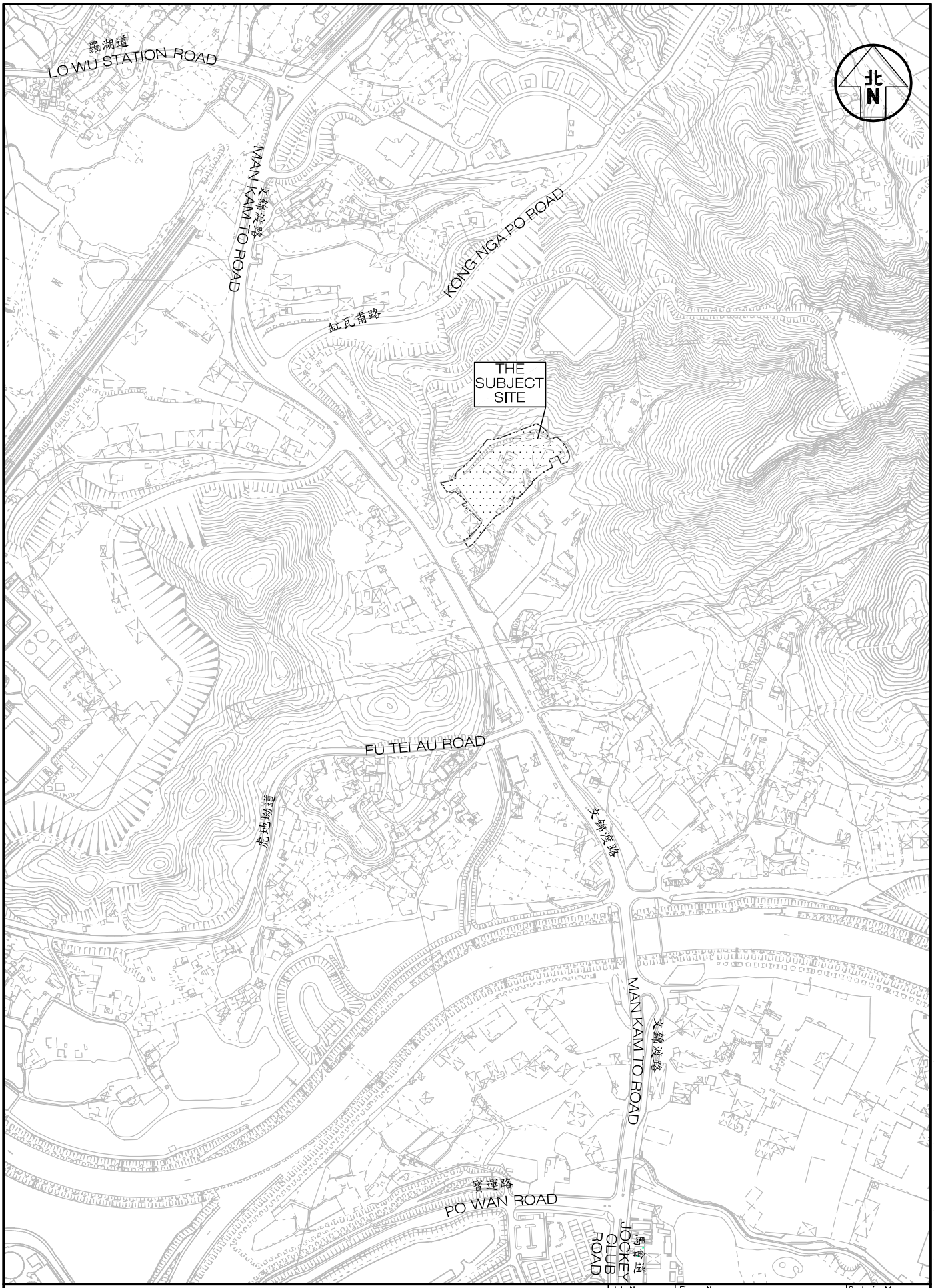
5.3 The internal transport facilities of the Proposed Temporary Asphalt Plant, which could serve its operation needs, are maintained. The existing vehicular access at Man Kam To Road is also maintained.

5.4 Manual classified counts were conducted at the selected key junctions and road links located in the vicinity of the Application Site to establish the existing traffic flows during the AM and PM peak hours. The future year traffic data for the junction analysis is estimated with reference to the population projection, and traffic generation of other known planned / committed developments.

5.5 The maximum traffic generation of the Proposed Temporary Asphalt Plant is 30 vehicles / hour (2-way), or equivalent to 75 pcu/hour, which is the same as the Existing Temporary Asphalt Plant.

5.6 All junctions and road links analysed have sufficient capacity to accommodate the expected traffic growth to 2029 including the traffic generated by the Proposed Temporary Asphalt Plant. Hence, it can be concluded that the Proposed Temporary Asphalt Plant would not have adverse traffic impact to the surrounding road network.

Figures



Project Title: RENEWAL OF SECTION 16 PLANNING APPLICATION FOR TEMPORARY ASPHALT PLANT FOR A PERIOD OF 5 YEARS AT LOTS 20RP (PART), 21 AND 23RP (PART) IN D.D. 88 AND ADJOINING GOVERNMENT LAND TO THE EAST OF MAN KAM TO ROAD, SHEUNG SHUI, NEW TERRITORIES	Job No. J7343	Figure No. 1.1			Scale in A4 1 : 6,000
	Designed by W C H	Drawn by S C Y	Checked by K C	Revision A	Date 07 JUN 2024
Figure Title: LOCATION OF THE APPLICATION SITE	CKM Asia Limited Traffic and Transportation Planning Consultants 21st Floor, Methodist House, 36 Hennessy Road, Wan Chai, Hong Kong Tel : (852) 2520 5990 Fax : (852) 2528 6343 Email : mail@ckmasia.com.hk				

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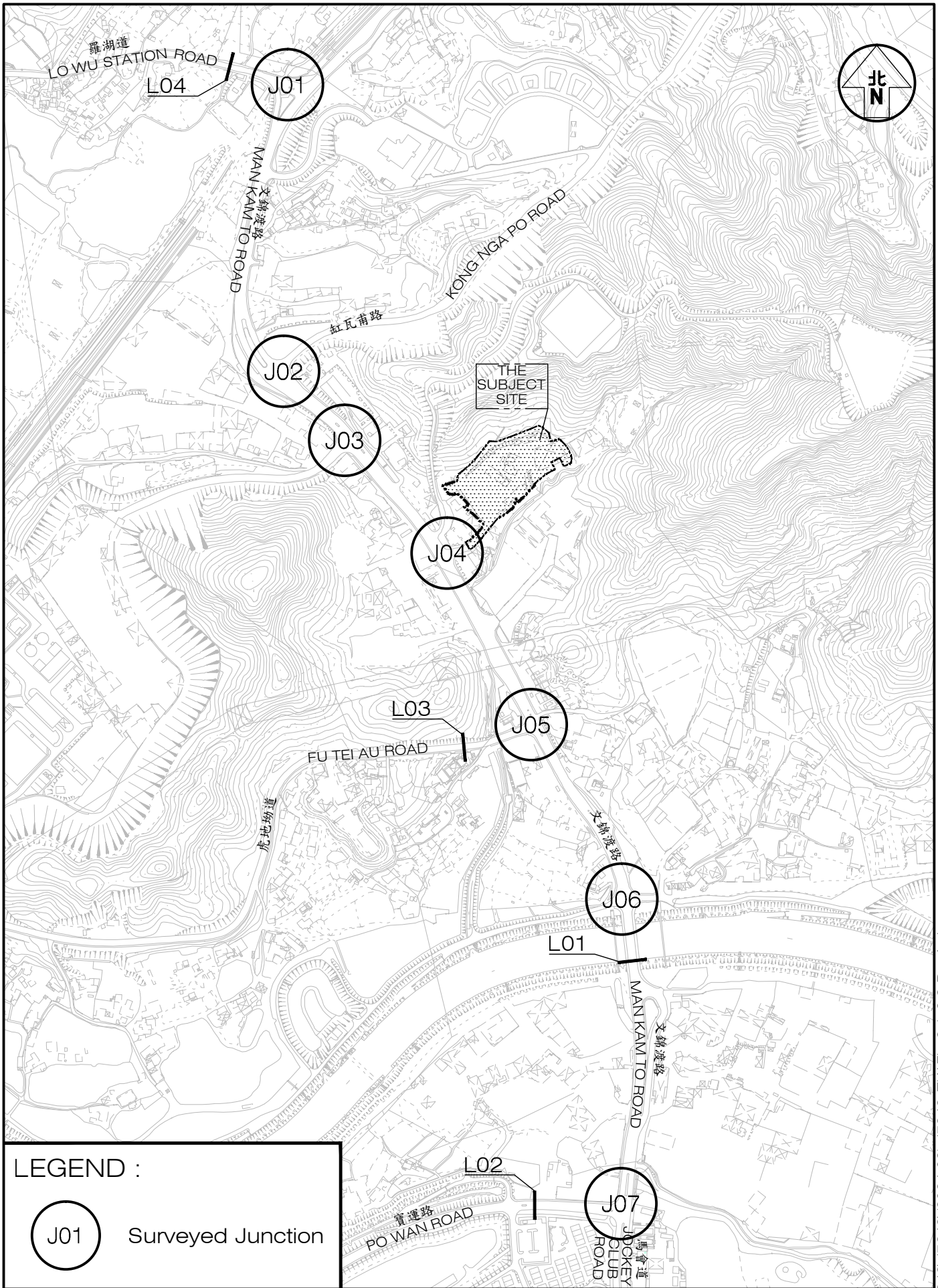

LEGEND :

J01 Surveyed Junction

Project Title	RENEWAL OF SECTION 16 PLANNING APPLICATION FOR TEMPORARY ASPHALT PLANT FOR A PERIOD OF 5 YEARS AT LOTS 20RP (PART), 21 AND 23RP (PART) IN D.D. 88 AND ADJOINING GOVERNMENT LAND TO THE EAST OF MAN KAM TO ROAD, SHEUNG SHUI, NEW TERRITORIES
Figure Title	LOCATION OF SURVEYED JUNCTIONS

Job No.	Figure No.	Scale in A4
J7343	2.1	1 : 6,000

Designed by	Drawn by	Checked by	Revision	Date
W C H	S C Y	K C	A	14 JUN 2024

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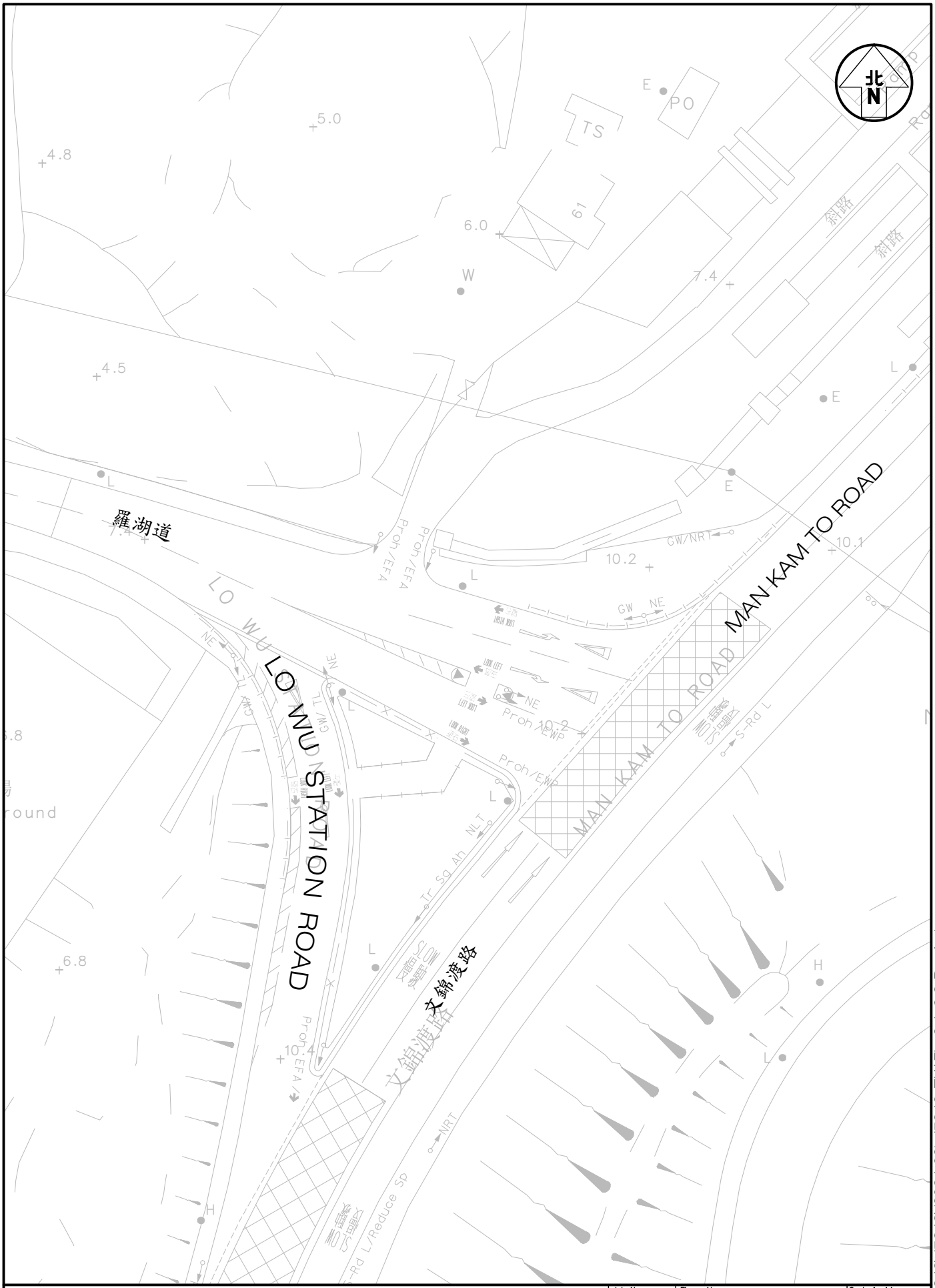

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		Designed by W C H	Drawn by S C Y	Checked by K C	Revision A	Date 14 JUN 2024
Figure Title	JUNCTION OF MAN KAM TO ROAD / LO WU STATION ROAD	CKM Asia Limited Traffic and Transportation Planning Consultants 21st Floor, Methodist House, 36 Hennessy Road, Wan Chai, Hong Kong Tel : (852) 2520 5990 Fax : (852) 2528 6343 Email : mail@ckmasia.com.hk			

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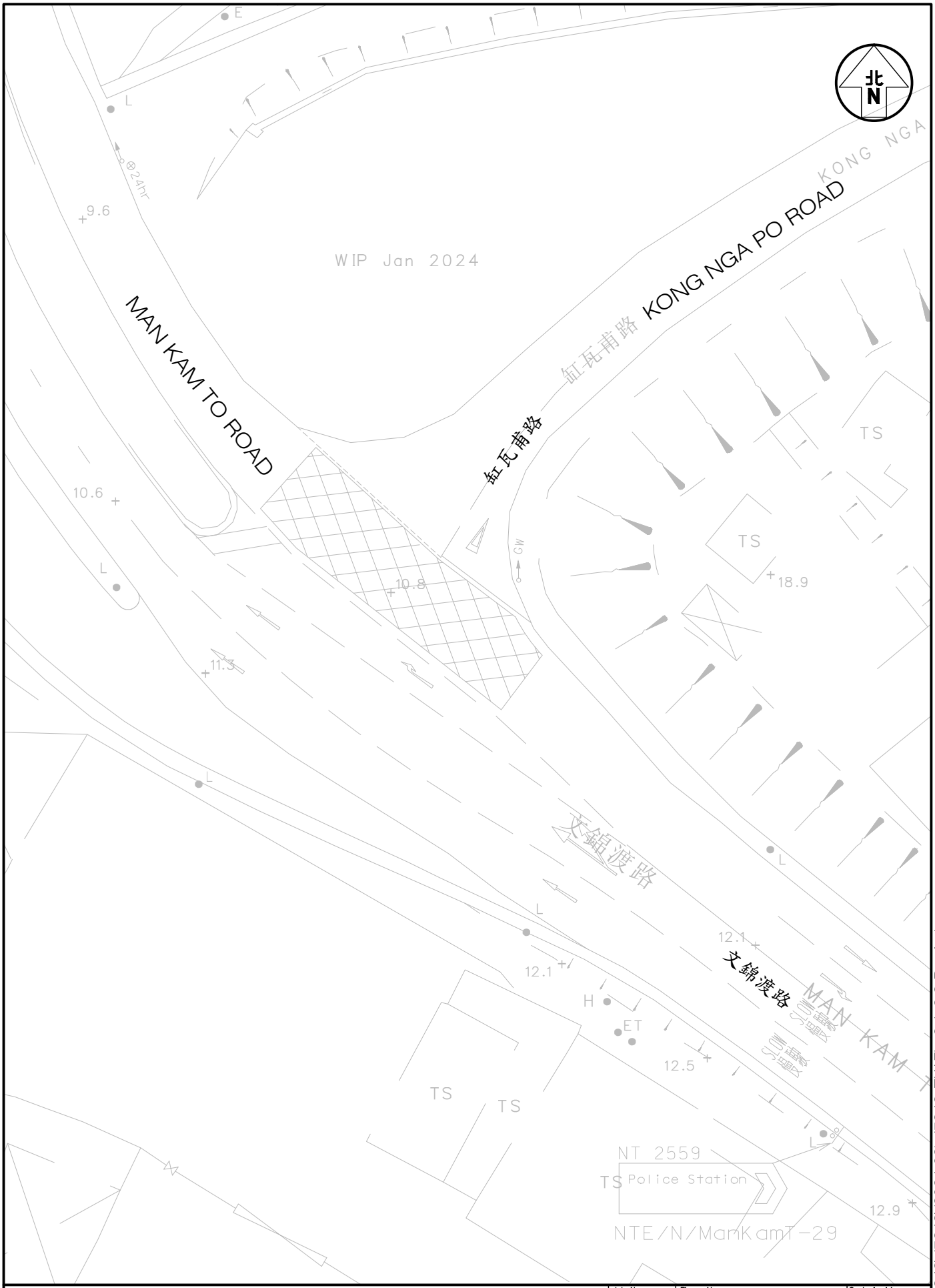

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	Designed by W C H	Drawn by S C Y	Checked by K C	Revision A	Date 14 JUN 2024
Figure Title: JUNCTION OF MAN KAM TO ROAD / KONG NGA PO ROAD	CKM Asia Limited Traffic and Transportation Planning Consultants 21st Floor, Methodist House, 36 Hennessy Road, Wan Chai, Hong Kong Tel : (852) 2520 5990 Fax : (852) 2528 6343 Email : mail@ckmasia.com.hk				

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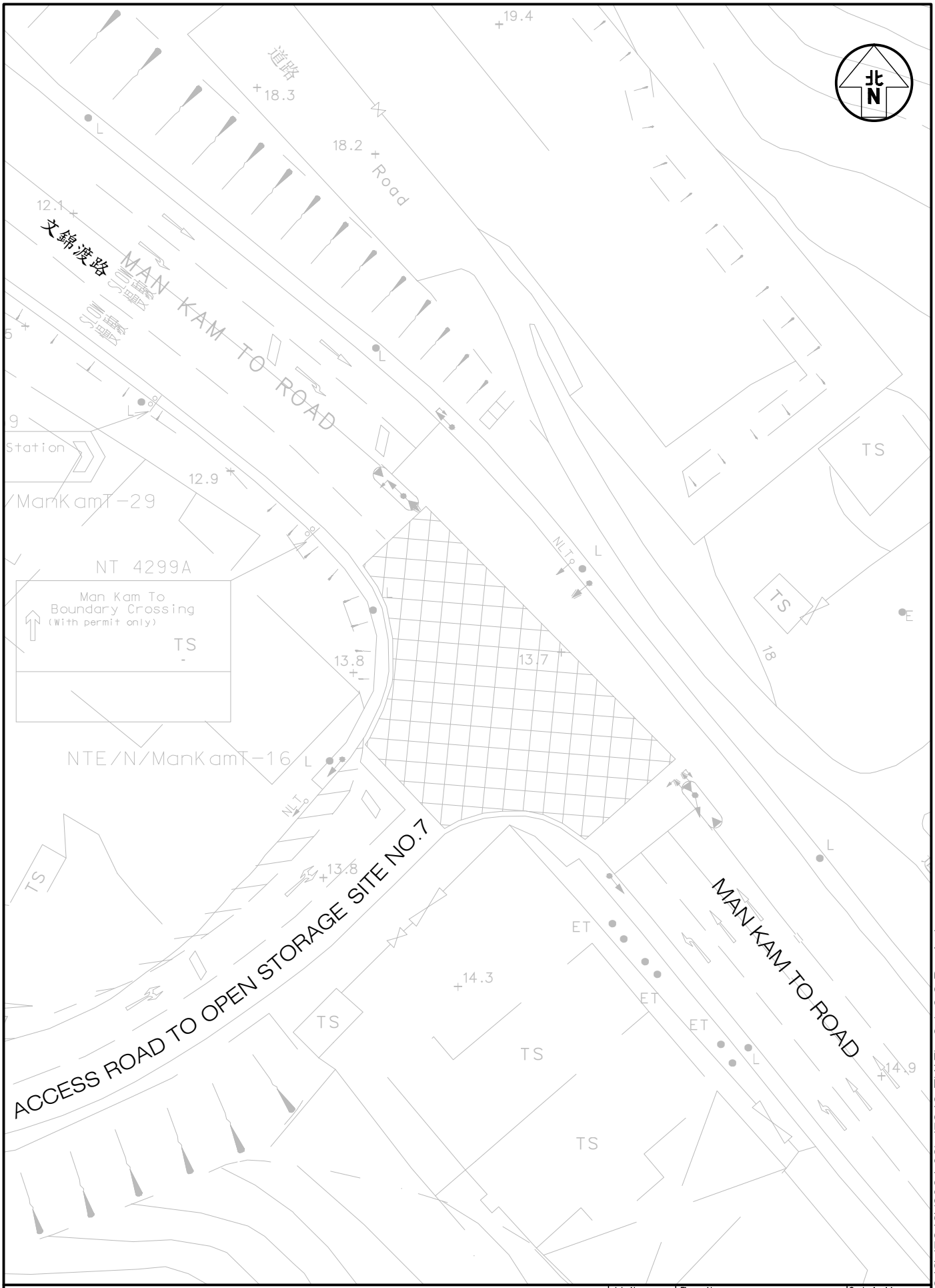

Project Title	RENEWAL OF SECTION 16 PLANNING APPLICATION FOR TEMPORARY ASPHALT PLANT FOR A PERIOD OF 5 YEARS AT LOTS 20RP (PART), 21 AND 23RP (PART) IN D.D. 88 AND ADJOINING GOVERNMENT LAND TO THE EAST OF MAN KAM TO ROAD, SHEUNG SHUI, NEW TERRITORIES	Job No. J7343	Figure No. 2.4		Scale in A4 1 : 500
		Designed by W C H	Drawn by S C Y	Checked by K C	Revision A	Date 14 JUN 2024
Figure Title	JUNCTION OF MAN KAM TO ROAD / ACCESS ROAD TO OPEN STORAGE SITE NO.7	CKM Asia Limited Traffic and Transportation Planning Consultants 21st Floor, Methodist House, 36 Hennessy Road, Wan Chai, Hong Kong Tel : (852) 2520 5990 Fax : (852) 2528 6343 Email : mail@ckmasia.com.hk			

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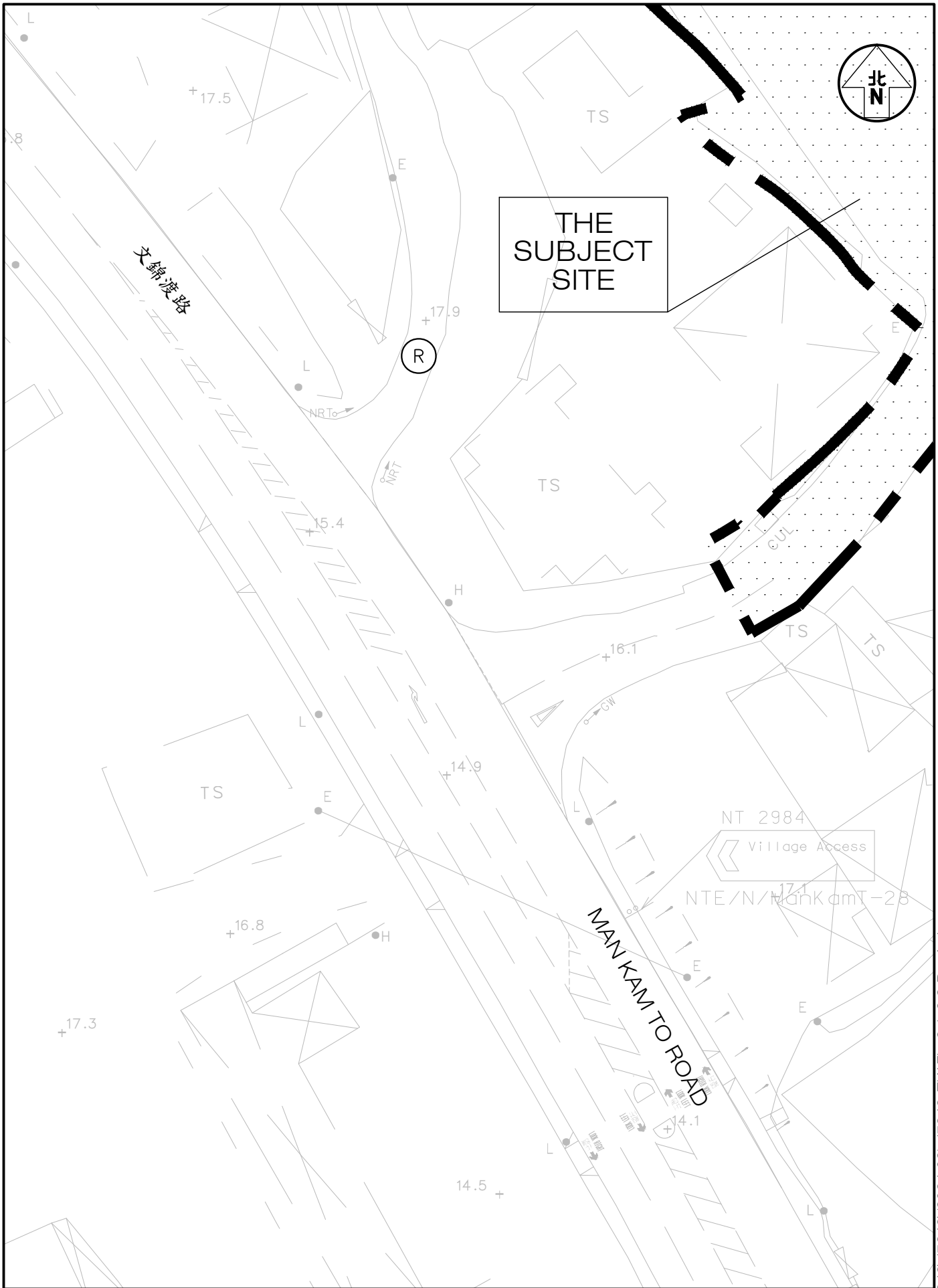

Project Title	RENEWAL OF SECTION 16 PLANNING APPLICATION FOR TEMPORARY ASPHALT PLANT FOR A PERIOD OF 5 YEARS AT LOTS 20RP (PART), 21 AND 23RP (PART) IN D.D. 88 AND ADJOINING GOVERNMENT LAND TO THE EAST OF MAN KAM TO ROAD, SHEUNG SHUI, NEW TERRITORIES	Job No. J7343	Figure No. 2.5		Scale in A4 1 : 500
		Designed by W C H	Drawn by S C Y	Checked by K C	Revision A	Date 14 JUN 2024
Figure Title	JUNCTION OF MAN KAM TO ROAD / ACCESS ROAD TO APPLICATION SITE				

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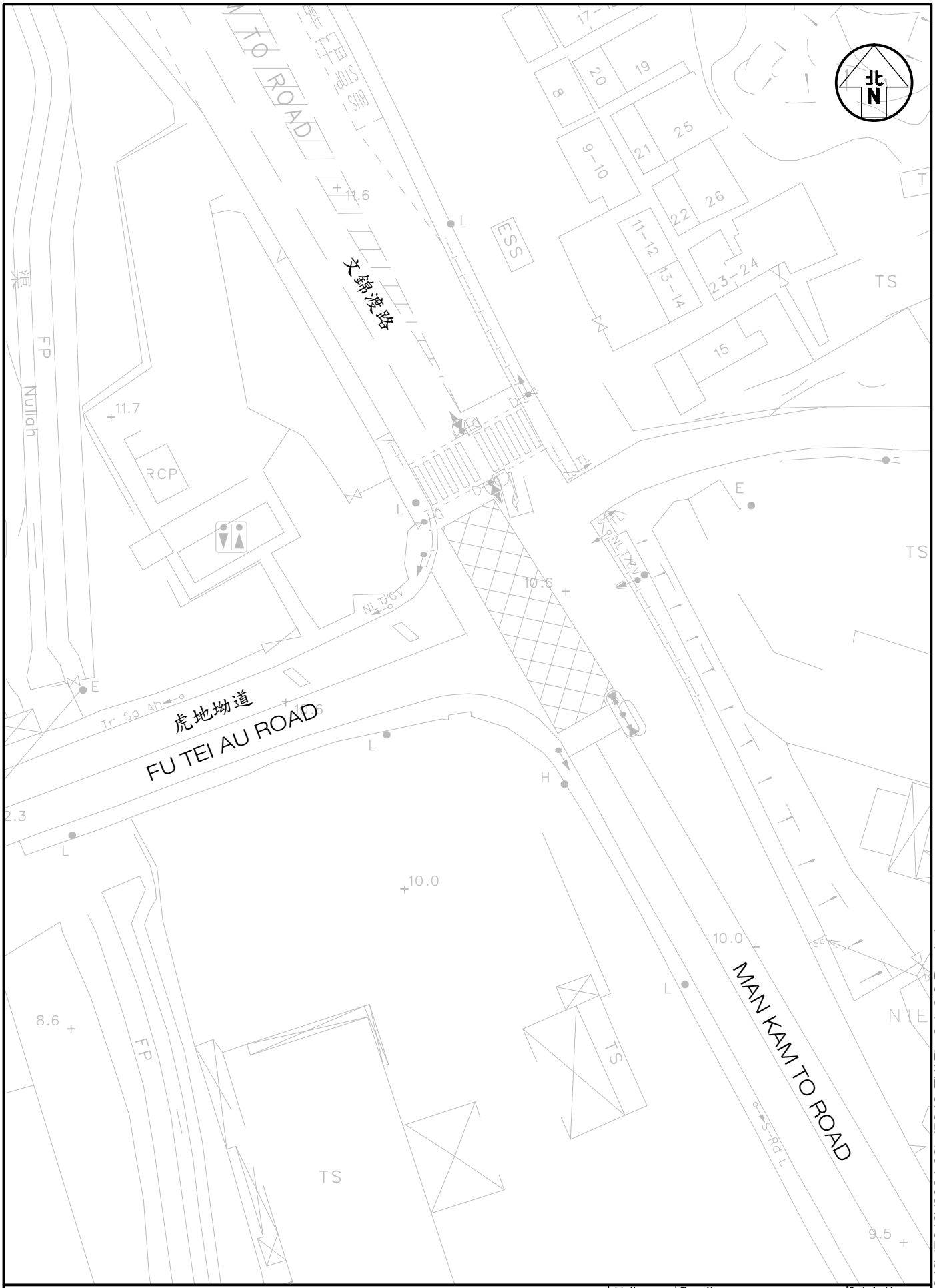
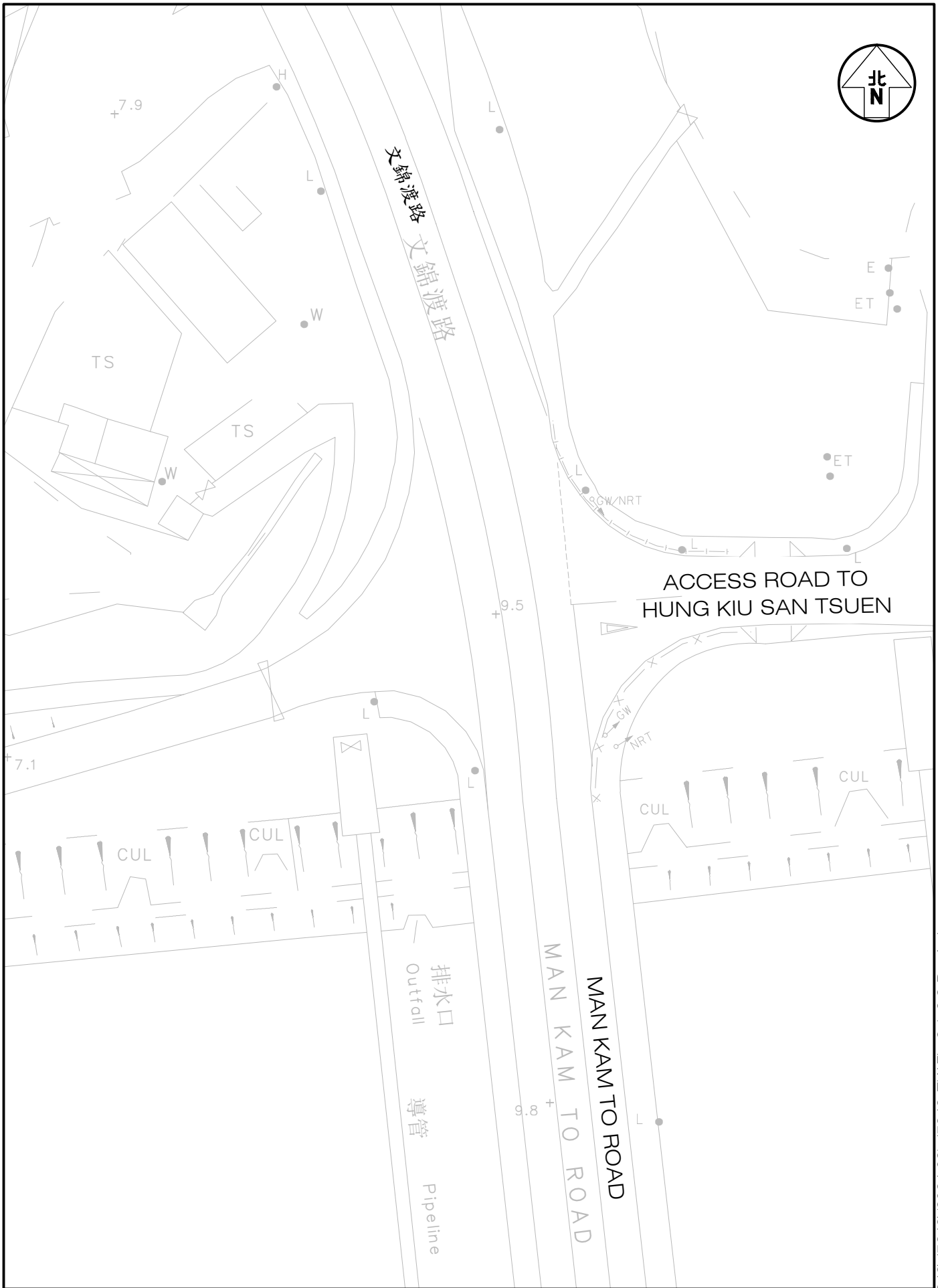
T:\JOB\J7300-J7349\J7343\(2024 06) J7343_TIA\Fig 2.1-2.8 RevA.dwg



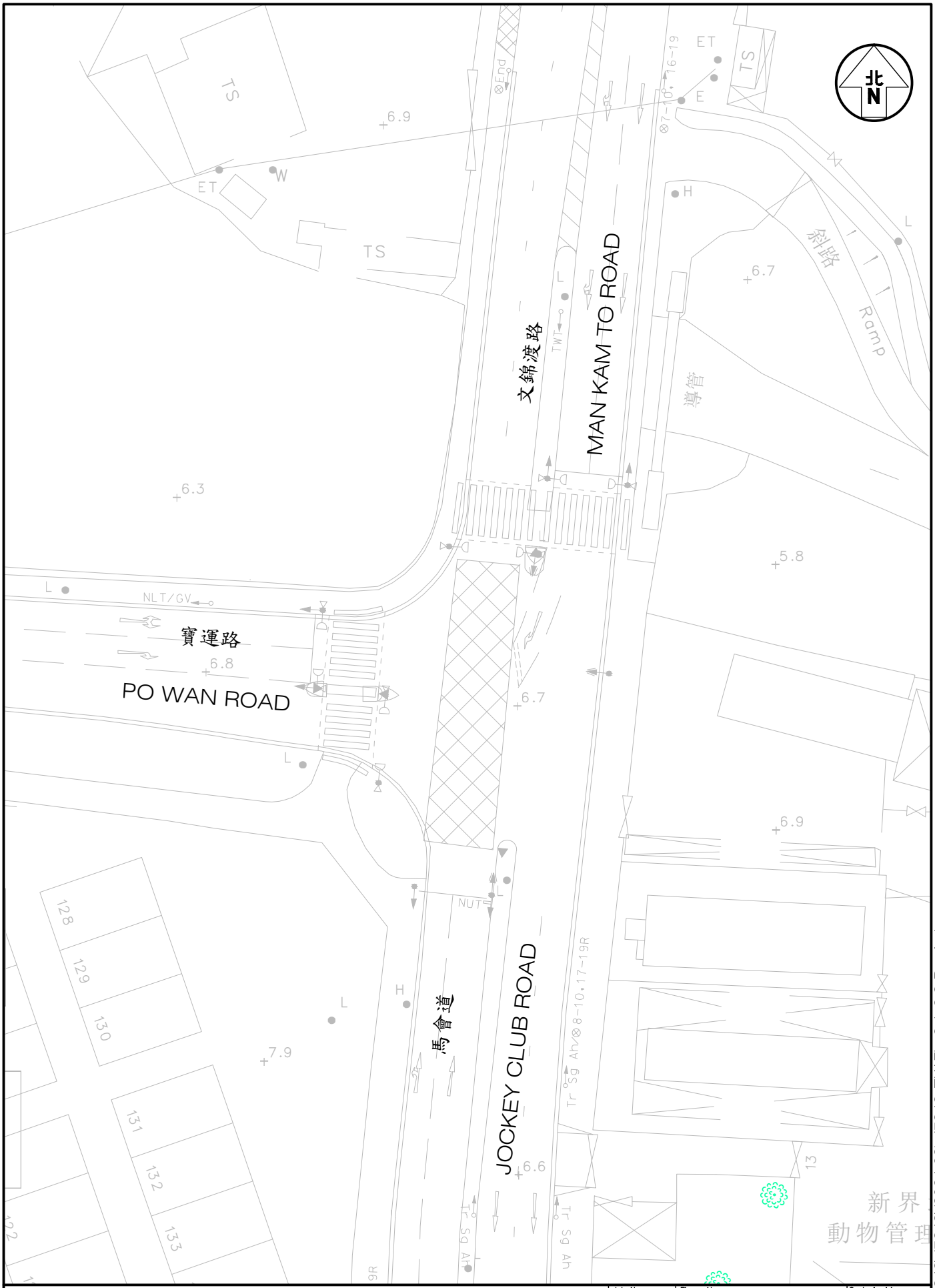
Project Title	RENEWAL OF SECTION 16 PLANNING APPLICATION FOR TEMPORARY ASPHALT PLANT FOR A PERIOD OF 5 YEARS AT LOTS 20RP (PART), 21 AND 23RP (PART) IN D.D. 88 AND ADJOINING GOVERNMENT LAND TO THE EAST OF MAN KAM TO ROAD, SHEUNG SHUI, NEW TERRITORIES	Job No. J7343	Figure No. 2.6		Scale in A4 1 : 500
		Designed by W C H	Drawn by S C Y	Checked by K C	Revision A	Date 14 JUN 2024
Figure Title	JUNCTION OF MAN KAM TO ROAD / FU TEI AU ROAD	CKM Asia Limited Traffic and Transportation Planning Consultants 21st Floor, Methodist House, 36 Hennessy Road, Wan Chai, Hong Kong Tel : (852) 2520 5990 Fax : (852) 2528 6343 Email : mail@ckmasia.com.hk			

T:\JOB\J7300-J7349\J7343\(2024 06) J7343_TIA\Fig 2.1-2.8 RevA.dwg



Project Title	RENEWAL OF SECTION 16 PLANNING APPLICATION FOR TEMPORARY ASPHALT PLANT FOR A PERIOD OF 5 YEARS AT LOTS 20RP (PART), 21 AND 23RP (PART) IN D.D. 88 AND ADJOINING GOVERNMENT LAND TO THE EAST OF MAN KAM TO ROAD, SHEUNG SHUI, NEW TERRITORIES	Job No. J7343	Figure No. 2.7		Scale in A4 1 : 500
		Designed by W C H	Drawn by S C Y	Checked by K C	Revision A	Date 14 JUN 2024
Figure Title	JUNCTION OF MAN KAM TO ROAD / ACCESS ROAD TO HUNG KIU SAN TSUEN	CKM Asia Limited Traffic and Transportation Planning Consultants 21st Floor, Methodist House, 36 Hennessy Road, Wan Chai, Hong Kong Tel : (852) 2520 5990 Fax : (852) 2528 6343 Email : mail@ckmasia.com.hk			

T:\JOB\J7300-J7349\J7343\(2024 06) J7343_TIA\Fig 2.1-2.8 RevA.dwg



Project Title	RENEWAL OF SECTION 16 PLANNING APPLICATION FOR TEMPORARY ASPHALT PLANT FOR A PERIOD OF 5 YEARS AT LOTS 20RP (PART), 21 AND 23RP (PART) IN D.D. 88 AND ADJOINING GOVERNMENT LAND TO THE EAST OF MAN KAM TO ROAD, SHEUNG SHUI, NEW TERRITORIES	Job No. J7343	Figure No. 2.8		Scale in A4 1 : 500
		Designed by W C H	Drawn by S C Y	Checked by K C	Revision A	Date 14 JUN 2024
Figure Title	JUNCTION OF MAN KAM TO ROAD / JOCKEY CLUB ROAD / PO WAN ROAD	CKM Asia Limited Traffic and Transportation Planning Consultants 21st Floor, Methodist House, 36 Hennessy Road, Wan Chai, Hong Kong Tel : (852) 2520 5990 Fax : (852) 2528 6343 Email : mail@ckmasia.com.hk			

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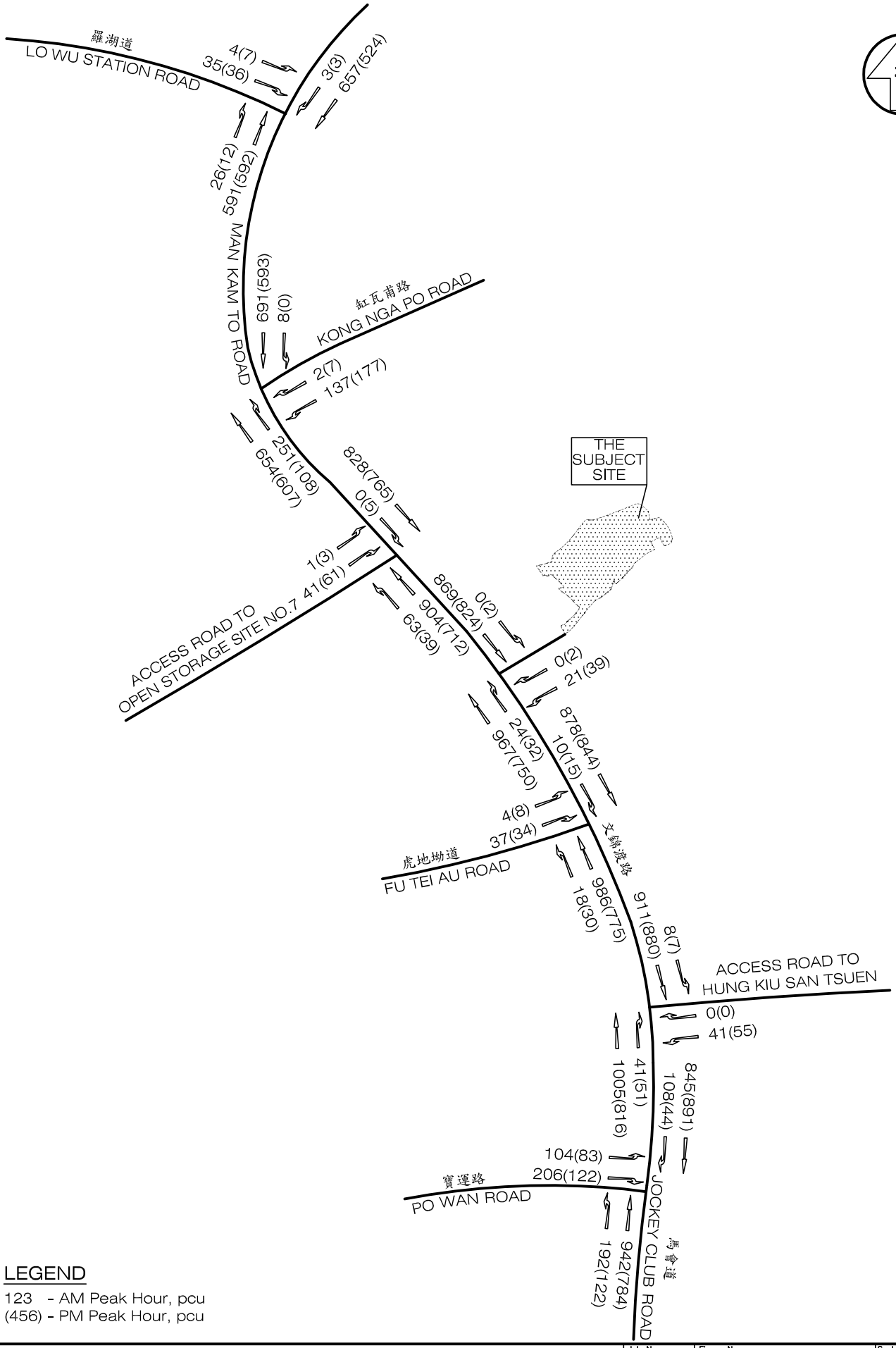

LEGEND

123 - AM Peak Hour, pcu
(456) - PM Peak Hour, pcu

Project Title: RENEWAL OF SECTION 16 PLANNING APPLICATION FOR TEMPORARY ASPHALT PLANT FOR A PERIOD OF 5 YEARS AT LOTS 20RP (PART), 21 AND 23RP (PART) IN D.D. 88 AND ADJOINING GOVERNMENT LAND TO THE EAST OF MAN KAM TO ROAD, SHEUNG SHUI, NEW TERRITORIES	Job No. J7343	Figure No. 2.9			Scale in A4 N.T.S.
	Designed by T T O	Drawn by S C Y	Checked by K C	Revision A	Date 14 JUN 2024
Figure Title: EXISTING PEAK HOUR TRAFFIC FLOWS WITH EXISTING TEMPORARY ASPHALT PLANT	CKM Asia Limited Traffic and Transportation Planning Consultants 21st Floor, Methodist House, 36 Hennessy Road, Wan Chai, Hong Kong Tel : (852) 2520 5990 Fax : (852) 2528 6343 Email : mail@ckmasia.com.hk				

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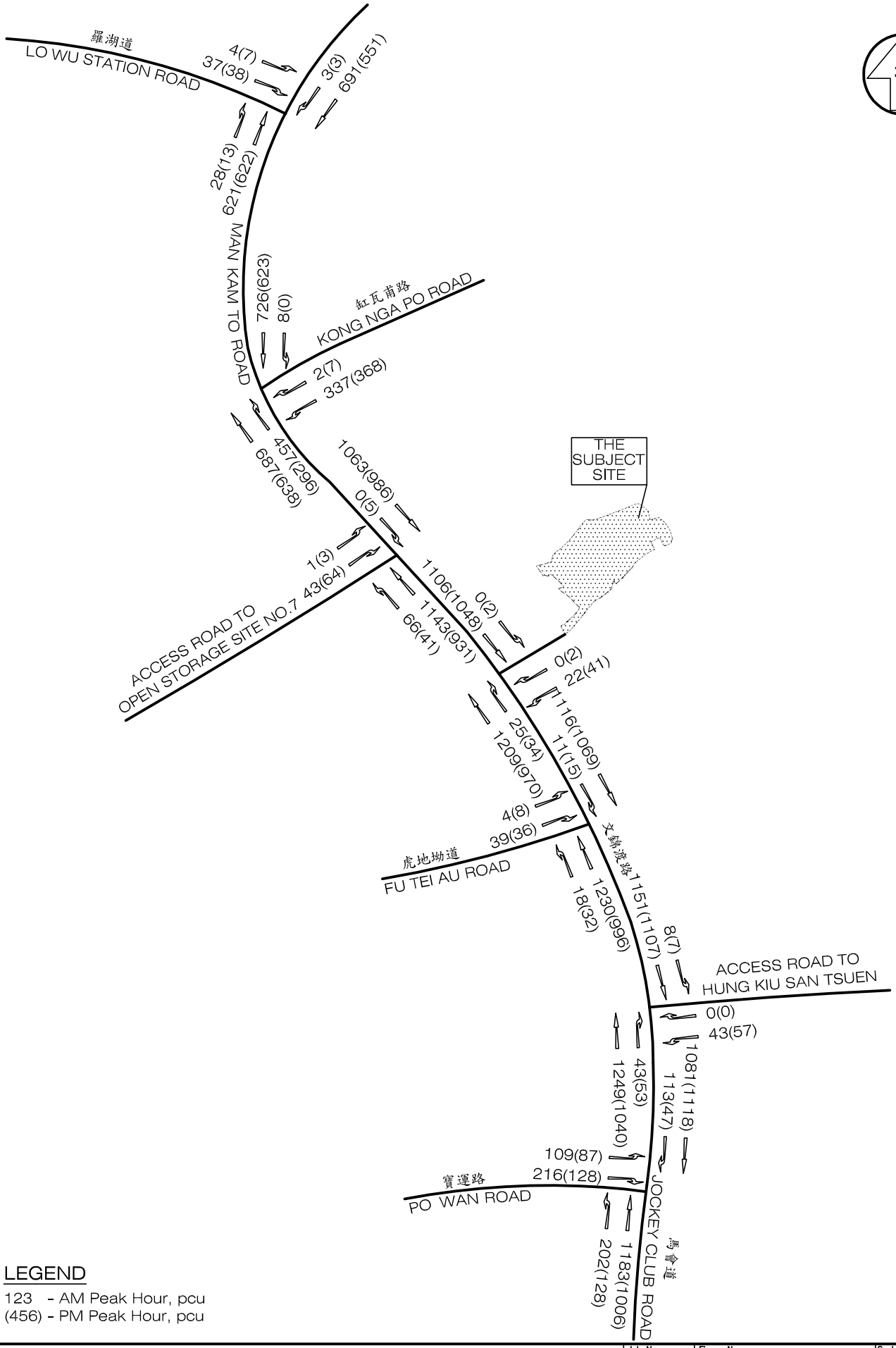

LEGEND

123 - AM Peak Hour, pcu
(456) - PM Peak Hour, pcu

Project Title: RENEWAL OF SECTION 16 PLANNING APPLICATION FOR TEMPORARY ASPHALT PLANT FOR A PERIOD OF 5 YEARS AT LOTS 20RP (PART), 21 AND 23RP (PART) IN D.D. 88 AND ADJOINING GOVERNMENT LAND TO THE EAST OF MAN KAM TO ROAD, SHEUNG SHUI, NEW TERRITORIES	Job No. J7343	Figure No. 4.1			Scale in A4 N.T.S.
	Designed by T T O	Drawn by S C Y	Checked by K C	Revision A	Date 14 JUN 2024

Figure Title: **2029 PEAK HOUR TRAFFIC FLOWS WITH THE PROPOSED TEMPORARY ASPHALT PLANT**

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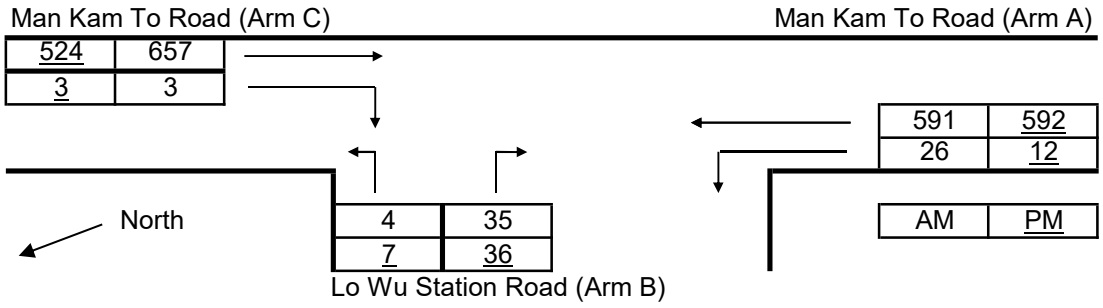
Appendix A – Junction Capacity Analyses

Priority Junction Analysis

Junction:	Man Kam To Road / Lo Wu Station Road			Job Number:	J7343
Scenario:	Existing Condition				J1 - P. 1
Design Year:	2024	Designed By:	TTO	Checked By: WCH	Date: 14-Jun-24



The predictive equations of capacity of movement are:

Q-BA = D[627 + 14W-CR - Y(0.364q-AC + 0.144q-AB + 0.229q-CA + 0.52q-CB)]

Q-BC = E[745 - Y(0.364q-AC + 0.144q-AB)]

Q-CB = F[745 - 0.364Y(q-AC + q-AB)]

The geometric parameters represented by D, E, F are:

D = [1 + 0.094(w-BA - 3.65)][1 + 0.0009(V-rBA - 120)][1 + 0.0006(V-lBA - 150)]

E = [1 + 0.094(w-BC - 3.65)][1 + 0.0009(V-rBC - 120)]

F = [1 + 0.094(w-CB - 3.65)][1 + 0.0009(V-rCB - 120)]

where Y = 1 - 0.0345W

q-AB, etc = the design flow of movement AB, etc

W = major road width

W-CR = central reserve width

w-BA, etc = lane width to vehicle

v-rBA, etc = visibility to the right for waiting vehicles in stream BA, etc

v-lBA, etc = visibility to the left for waiting vehicles in stream BA, etc

Geometry :	Input		Input		Input		Calculated	
	W	10.50	V-rBA	50	w-BA	3.70	D	0.8849
	W-CR	0.00	V-lBA	50	w-BC	3.70	E	0.9414
			V-rBC	50	w-CB	3.40	F	0.9150
			V-rCB	50			Y	0.6378

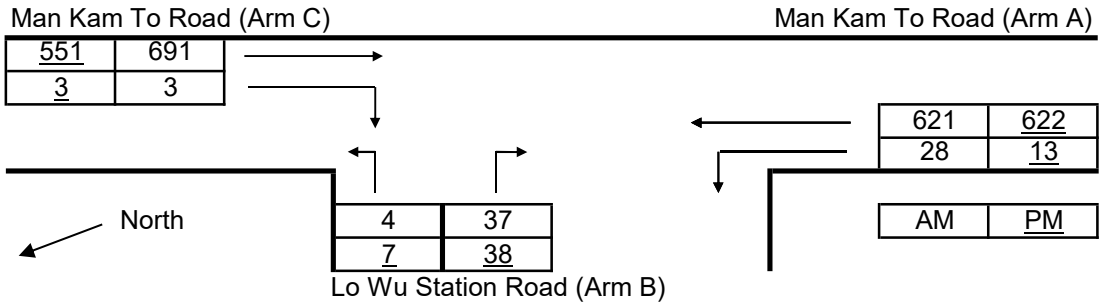
Analysis :

Traffic Flows, pcu/hr	AM	PM	Capacity, pcu/hr	AM	PM
q-CA	657	524	Q-BA	346	364
q-CB	3	3	Q-BC	570	571
q-AB	26	12	Q-CB	551	553
q-AC	591	592	Q-BAC	360	386
q-BA	35	36			
q-BC	4	7			
f	0.102	0.156			

Ratio-of-flow to Capacity	AM	PM
B-A	**0.102**	**0.098**
B-C	0.007	0.012
C-B	0.005	0.005
B-AC	0.109	0.110

Priority Junction Analysis

Junction:	Man Kam To Road / Lo Wu Station Road			Job Number:	J7343
Scenario:	Design Case				J1 - P. 2
Design Year:	2029	Designed By: TTO	Checked By: WCH	Date:	14-Jun-24



The predictive equations of capacity of movement are:

Q-BA = D[627 + 14W-CR - Y(0.364q-AC + 0.144q-AB + 0.229q-CA + 0.52q-CB)]

Q-BC = E[745 - Y(0.364q-AC + 0.144q-AB)]

Q-CB = F[745 - 0.364Y(q-AC + q-AB)]

The geometric parameters represented by D, E, F are:

D = [1 + 0.094(w-BA - 3.65)][1 + 0.0009(V-rBA - 120)][1 + 0.0006(V-lBA - 150)]

E = [1 + 0.094(w-BC - 3.65)][1 + 0.0009(V-rBC - 120)]

F = [1 + 0.094(w-CB - 3.65)][1 + 0.0009(V-rCB - 120)]

where Y = 1 - 0.0345W

q-AB, etc = the design flow of movement AB, etc

W = major road width

W-CR = central reserve width

w-BA, etc = lane width to vehicle

v-rBA, etc = visibility to the right for waiting vehicles in stream BA, etc

v-lBA, etc = visibility to the left for waiting vehicles in stream BA, etc

Geometry :	Input		Input		Input		Calculated	
	W	10.50	V-rBA	100	w-BA	3.70	D	0.9570
	W-CR	0.00	V-lBA	100	w-BC	3.70	E	0.9866
			V-rBC	100	w-CB	3.40	F	0.9589
			V-rCB	100			Y	0.6378

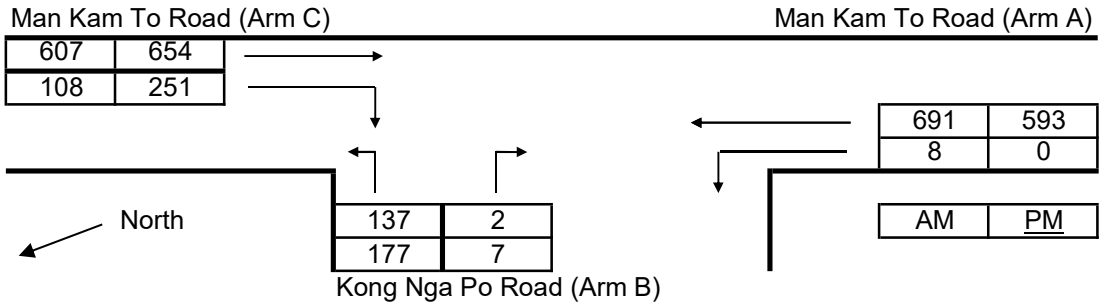
Analysis :

Traffic Flows, pcu/hr	AM	PM	Capacity, pcu/hr	AM	PM
q-CA	691	551	Q-BA	362	383
q-CB	3	3	Q-BC	590	591
q-AB	28	13	Q-CB	570	573
q-AC	621	622	Q-BAC	377	405
q-BA	37	38			
q-BC	4	7			
f	0.102	0.156			

Ratio-of-flow to Capacity	AM	PM
B-A	**0.103**	**0.098**
B-C	0.007	0.012
C-B	0.005	0.005
B-AC	0.110	0.110

Priority Junction Analysis

Junction:	Man Kam To Road / Kong Nga Po Road			Job Number:	J7343
Scenario:	Existing Condition				J2 - P. 1
Design Year:	2024	Designed By:	TTO	Checked By: WCH	Date: 14-Jun-24



The predictive equations of capacity of movement are:

Q-BA = D[627 + 14W-CR - Y(0.364q-AC + 0.144q-AB + 0.229q-CA + 0.52q-CB)]

Q-BC = E[745 - Y(0.364q-AC + 0.144q-AB)]

Q-CB = F[745 - 0.364Y(q-AC + q-AB)]

The geometric parameters represented by D, E, F are:

D = [1 + 0.094(w-BA - 3.65)][1 + 0.0009(V-rBA - 120)][1 + 0.0006(V-lBA - 150)]

E = [1 + 0.094(w-BC - 3.65)][1 + 0.0009(V-rBC - 120)]

F = [1 + 0.094(w-CB - 3.65)][1 + 0.0009(V-rCB - 120)]

where Y = 1 - 0.0345W

q-AB, etc = the design flow of movement AB, etc

W = major road width

W-CR = central reserve width

w-BA, etc = lane width to vehicle

v-rBA, etc = visibility to the right for waiting vehicles in stream BA, etc

v-lBA, etc = visibility to the left for waiting vehicles in stream BA, etc

Geometry :	Input		Input		Input		Calculated	
	W	12.00	V-rBA	70	w-BA	3.50	D	0.8963
	W-CR	3.50	V-lBA	70	w-BC	3.50	E	0.9415
			V-rBC	70	w-CB	3.70	F	0.9866
			V-rCB	100			Y	0.5860

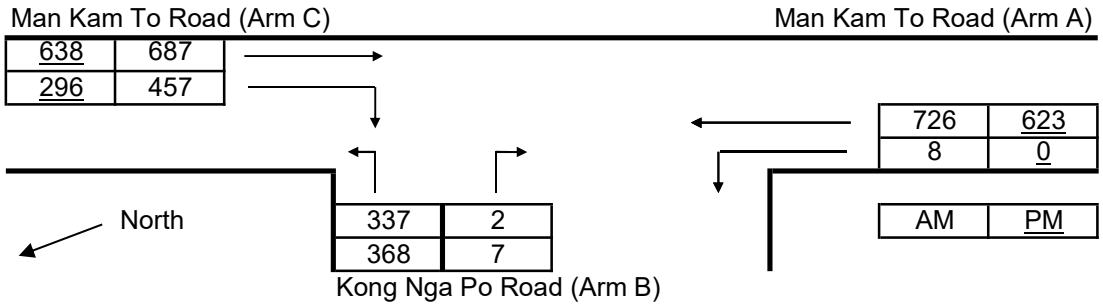
Analysis :

Traffic Flows, pcu/hr	AM	PM	Capacity, pcu/hr	AM	PM
q-CA	654	607	Q-BA	326	390
q-CB	251	108	Q-BC	562	582
q-AB	8	0	Q-CB	588	610
q-AC	691	593	Q-BAC	556	572
q-BA	2	7			
q-BC	137	177			
f	0.985	0.964			

Ratio-of-flow to Capacity	AM	PM
B-A	0.006	0.017
B-C	0.244	0.303
C-B	0.427	0.177
B-AC	0.250	0.320

Priority Junction Analysis

Junction:	Man Kam To Road / Kong Nga Po Road			Job Number:	J7343
Scenario:	Design Case				J2 - P. 2
Design Year:	2029	Designed By: TTO	Checked By: WCH	Date:	14-Jun-24



The predictive equations of capacity of movement are:

Q-BA = D[627 + 14W-CR - Y(0.364q-AC + 0.144q-AB + 0.229q-CA + 0.52q-CB)]

Q-BC = E[745 - Y(0.364q-AC + 0.144q-AB)]

Q-CB = F[745 - 0.364Y(q-AC + q-AB)]

The geometric parameters represented by D, E, F are:

D = [1 + 0.094(w-BA - 3.65)][1 + 0.0009(V-rBA - 120)][1 + 0.0006(V-lBA - 150)]

E = [1 + 0.094(w-BC - 3.65)][1 + 0.0009(V-rBC - 120)]

F = [1 + 0.094(w-CB - 3.65)][1 + 0.0009(V-rCB - 120)]

where Y = 1 - 0.0345W

q-AB, etc = the design flow of movement AB, etc

W = major road width

W-CR = central reserve width

w-BA, etc = lane width to vehicle

v-rBA, etc = visibility to the right for waiting vehicles in stream BA, etc

v-lBA, etc = visibility to the left for waiting vehicles in stream BA, etc

Geometry :	Input		Input		Input		Calculated	
	W	12.00	V-rBA	70	w-BA	3.50	D	0.8963
	W-CR	3.50	V-lBA	70	w-BC	3.50	E	0.9415
			V-rBC	70	w-CB	3.70	F	0.9866
			V-rCB	100			Y	0.5860

Analysis :

Traffic Flows, pcu/hr	AM	PM	Capacity, pcu/hr	AM	PM
q-CA	687	638	Q-BA	259	329
q-CB	457	296	Q-BC	555	576
q-AB	8	0	Q-CB	581	604
q-AC	726	623	Q-BAC	551	568
q-BA	2	7			
q-BC	337	368			
f	0.993	0.981			

Ratio-of-flow to Capacity	AM	PM
B-A	0.009	0.021
B-C	0.607	0.638
C-B	0.788	0.489
B-AC	0.616	0.659

Signal Junction Analysis

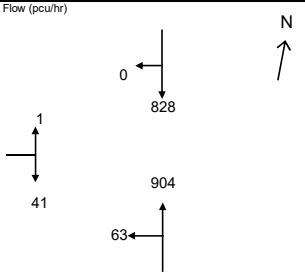
Junction: Man Kam To Road / Access Road to Open Storage Site No.7 Job Number: J7343

Scenario: Existing Condition J3 - P. 1

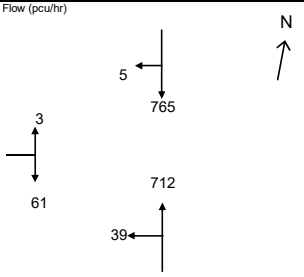
Design Year: 2024 Designed By: TTO Checked By: WCH Date: 14 June 2024

Approach		Phase	Stage	Width (m)	Radius (m)	% Up-hill Gradient	AM Peak					PM Peak				
							Turning %	Sat. Flow (pcu/hr)	Flow (pcu/hr)	y value	Critical y	Turning %	Sat. Flow (pcu/hr)	Flow (pcu/hr)	y value	Critical y
Man Kam To Road SB	SA	A1	1,2	3.50				1965	828	0.421	0.421		1965	765	0.389	0.389
	RT	A2	2	3.50	25.0		100	1986	0	0.000		100	1986	5	0.002	
Access Road to Open Storage Site No.7 EB	LT+RT	B1	3	4.50	20.0		100	1921	42	0.022	0.022	100	1921	64	0.033	0.033
Man Kam To Road NB	LT	C1	1	3.40	15.0		100	1777	63	0.035		100	1777	39	0.022	
	SA	C2	1	3.40				2095	452	0.216			2095	356	0.170	
	SA	C3	1	3.40				2095	452	0.216			2095	356	0.170	
pedestrian phase																

AM Traffic Flow (pcu/hr)



PM Traffic Flow (pcu/hr)

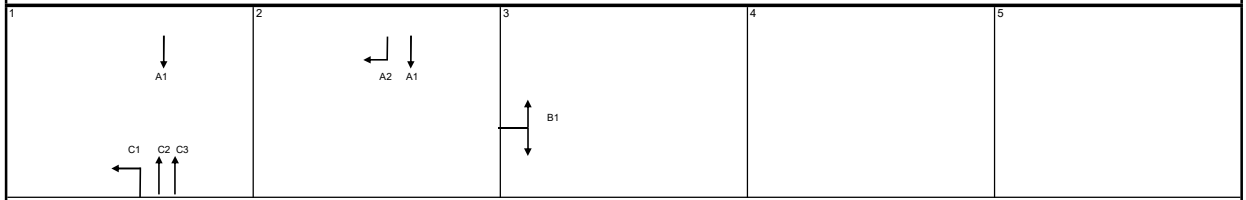


$S=1940+100(W-3.25)$ $S=2080+100(W-3.25)$

$S_M=S\div(1+1.5f/r)$ $S_M=(S-230)\div(1+1.5f/r)$

Note:

	AM Peak Hour		PM Peak Hour	
	1,2 + 3		1,2 + 3	
Sum y	0.443		0.423	
L (s)	9		9	
C (s)	101		101	
practical y	0.820		0.820	
R.C. (%)	85%		94%	



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

Signal Junction Analysis

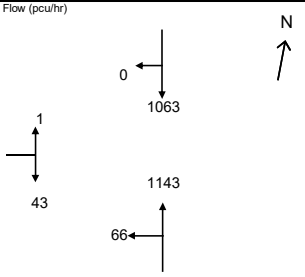
Junction: Man Kam To Road / Access Road to Open Storage Site No.7 Job Number: J7343

Scenario: Design Case J3 - P. 2

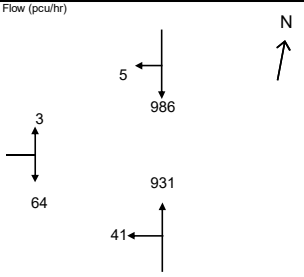
Design Year: 2029 Designed By: TTO Checked By: WCH Date: 14 June 2024

Approach		Phase	Stage	Width (m)	Radius (m)	% Up-hill Gradient	AM Peak Turning %	AM Peak Sat. Flow (pcu/hr)	AM Peak Flow (pcu/hr)	AM Peak y value	AM Peak Critical y	PM Peak Turning %	PM Peak Sat. Flow (pcu/hr)	PM Peak Flow (pcu/hr)	PM Peak y value	PM Peak Critical y
Man Kam To Road SB	SA	A1	1,2	3.50				1965	1063	0.541	0.541		1965	986	0.502	0.502
	RT	A2	2	3.50	25.0		100	1986	0	0.000		100	1986	5	0.002	
Access Road to Open	LT+RT	B1	3	4.50	20.0		100	1921	44	0.023	0.023	100	1921	68	0.035	0.035
Storage Site No.7 EB																
Man Kam To Road NB	LT	C1	1	3.40	15.0		100	1777	66	0.037		100	1777	41	0.023	
	SA	C2	1	3.40				2095	572	0.273			2095	465	0.222	
	SA	C3	1	3.40				2095	572	0.273			2095	465	0.222	
pedestrian phase																

AM Traffic Flow (pcu/hr)



PM Traffic Flow (pcu/hr)

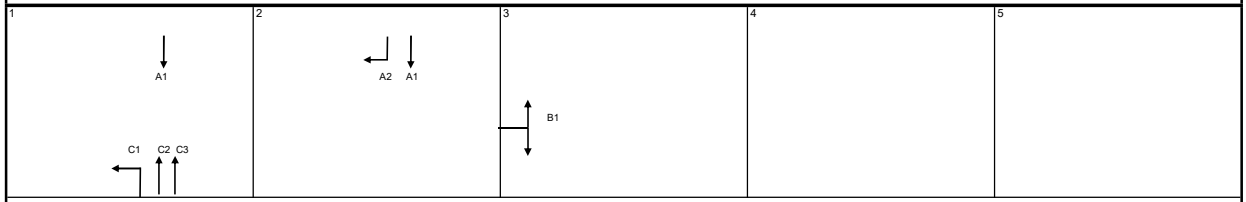


$S=1940+100(W-3.25)$ $S=2080+100(W-3.25)$

$S_M=S\div(1+1.5f/r)$ $S_M=(S-230)\div(1+1.5f/r)$

Note:

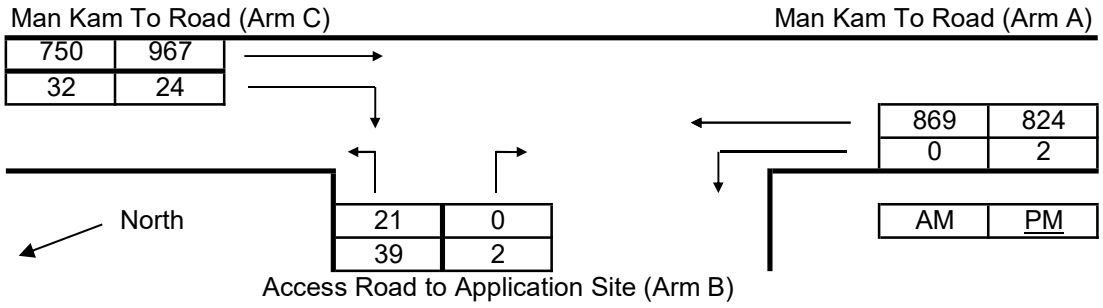
	AM Peak Hour 1,2 + 3		PM Peak Hour 1,2 + 3	
Sum y	0.564		0.537	
L (s)	9		9	
C (s)	100		130	
practical y	0.819		0.838	
R.C. (%)	45%		56%	



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

Priority Junction Analysis

Junction:	Man Kam To Road / Access Road to Application Site			Job Number:	J7343
Scenario:	Existing Condition				J4 - P. 1
Design Year:	2024	Designed By: TTO	Checked By: WCH	Date:	14-Jun-24



The predictive equations of capacity of movement are:

Q-BA = D[627 + 14W-CR - Y(0.364q-AC + 0.144q-AB + 0.229q-CA + 0.52q-CB)]

Q-BC = E[745 - Y(0.364q-AC + 0.144q-AB)]

Q-CB = F[745 - 0.364Y(q-AC + q-AB)]

The geometric parameters represented by D, E, F are:

D = [1 + 0.094(w-BA - 3.65)][1 + 0.0009(V-rBA - 120)][1 + 0.0006(V-lBA - 150)]

E = [1 + 0.094(w-BC - 3.65)][1 + 0.0009(V-rBC - 120)]

F = [1 + 0.094(w-CB - 3.65)][1 + 0.0009(V-rCB - 120)]

where Y = 1 - 0.0345W

q-AB, etc = the design flow of movement AB, etc

W = major road width

W-CR = central reserve width

w-BA, etc = lane width to vehicle

v-rBA, etc = visibility to the right for waiting vehicles in stream BA, etc

v-lBA, etc = visibility to the left for waiting vehicles in stream BA, etc

Geometry :	Input		Input		Input		Calculated	
	W	11.00	V-rBA	75	w-BA	3.30	D	0.8862
	W-CR	3.00	V-lBA	75	w-BC	3.30	E	0.9279
			V-rBC	75	w-CB	3.30	F	0.9279
			V-rCB	75			Y	0.6205

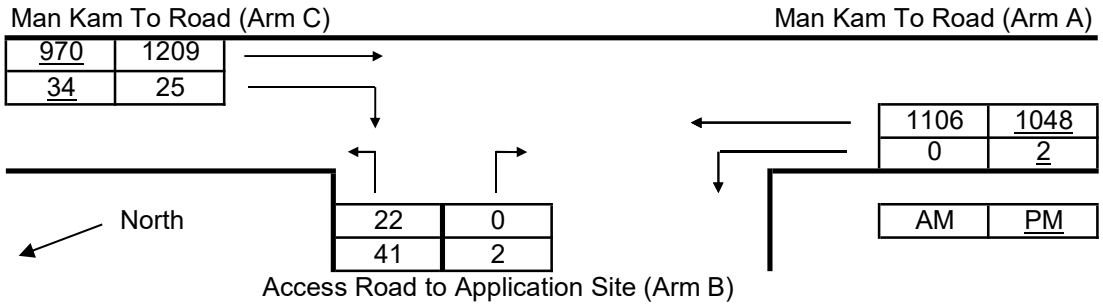
Analysis :

Traffic Flows, pcu/hr	AM	PM	Capacity, pcu/hr	AM	PM
q-CA	967	750	Q-BA	290	324
q-CB	24	32	Q-BC	509	518
q-AB	0	2	Q-CB	509	518
q-AC	869	824	Q-BAC	509	507
q-BA	0	2			
q-BC	21	39			
f	1.000	0.963			

Ratio-of-flow to Capacity	AM	PM
B-A	0.000	0.005
B-C	0.041	0.075
C-B	0.047	0.062
B-AC	0.041	0.080

Priority Junction Analysis

Junction:	Man Kam To Road / Access Road to Application Site			Job Number:	J7343
Scenario:	Design Case				J4 - P. 2
Design Year:	2029	Designed By: TTO	Checked By: WCH	Date:	14-Jun-24



The predictive equations of capacity of movement are:

Q-BA = D[627 + 14W-CR - Y(0.364q-AC + 0.144q-AB + 0.229q-CA + 0.52q-CB)]

Q-BC = E[745 - Y(0.364q-AC + 0.144q-AB)]

Q-CB = F[745 - 0.364Y(q-AC + q-AB)]

The geometric parameters represented by D, E, F are:

D = [1 + 0.094(w-BA - 3.65)][1 + 0.0009(V-rBA - 120)][1 + 0.0006(V-lBA - 150)]

E = [1 + 0.094(w-BC - 3.65)][1 + 0.0009(V-rBC - 120)]

F = [1 + 0.094(w-CB - 3.65)][1 + 0.0009(V-rCB - 120)]

where Y = 1 - 0.0345W

q-AB, etc = the design flow of movement AB, etc

W = major road width

W-CR = central reserve width

w-BA, etc = lane width to vehicle

v-rBA, etc = visibility to the right for waiting vehicles in stream BA, etc

v-lBA, etc = visibility to the left for waiting vehicles in stream BA, etc

Geometry :	Input		Input		Input		Calculated	
	W	11.00	V-rBA	75	w-BA	3.30	D	0.8862
	W-CR	3.00	V-lBA	75	w-BC	3.30	E	0.9279
			V-rBC	75	w-CB	3.30	F	0.9279
			V-rCB	75			Y	0.6205

Analysis :

Traffic Flows, pcu/hr	AM	PM	Capacity, pcu/hr	AM	PM
q-CA	1209	970	Q-BA	212	251
q-CB	25	34	Q-BC	459	471
q-AB	0	2	Q-CB	459	471
q-AC	1106	1048	Q-BAC	459	457
q-BA	0	2			
q-BC	22	41			
f	1.000	0.963			

Ratio-of-flow to Capacity	AM	PM
B-A	0.000	0.006
B-C	0.048	0.087
C-B	0.054	0.072
B-AC	0.048	0.093

Signal Junction Analysis

Junction: Man Kam To Road / Fu Tei Au Road — Job Number: J7343

Scenario: Existing Condition — J5 - P. 1

Design Year: 2024 — Designed By: TTO — Checked By: WCH — Date: 14 June 2024

Approach		Phase	Stage	Width (m)	Radius (m)	% Up-hill Gradient	AM Peak					PM Peak				
							Turning %	Sat. Flow (pcu/hr)	Flow (pcu/hr)	y value	Critical y	Turning %	Sat. Flow (pcu/hr)	Flow (pcu/hr)	y value	Critical y
Man Kam To Road SB	SA+RT	A1	1,2	5.70	20.0		1	2183	888	0.407	0.407	1	2183	858	0.393	0.393
Fu Tei Au Road EB	LT+RT	B1	3	4.50	10.0		100	1796	41	0.023	0.023	100	1796	42	0.023	0.023
Man Kam To Road NB	LT+SA	C1	1	3.00	12.0		9	1894	542	0.286		9	1894	358	0.189	
	SA	C2	1	3.00				2055	462	0.225			2055	447	0.217	
pedestrian phase		$D_{(P)}$	4		min crossing time =			6	sec GM +		11	sec FGM =		17	sec	

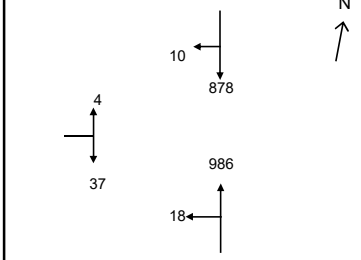
NOTE: As Stage 4 is depmand dependent, we have 3 cases during the peak hours:

Case 1 ALL of the cycles have 4 stages (i.e. lost time = 33s)

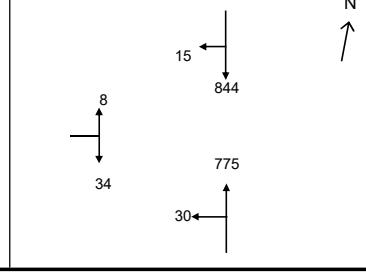
Case 2 ALL of the cycles have only 3 stages (i.e. lost time = 9s)

Case 3 20% of the cycles have 4 stages, and the rest of them have 3 stages. (i.e. lost time = [20% x 34 cyc x 33s + 80% x 34 cyc x 9s] / 34 = 14s)

AM Traffic Flow (pcu/hr)



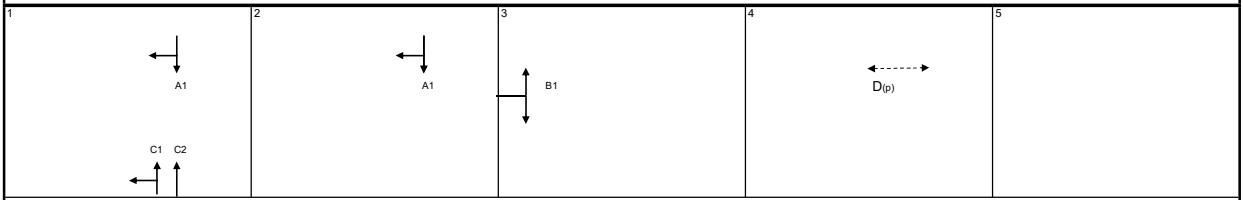
PM Traffic Flow (pcu/hr)



S=1940+100(W–3.25) S=2080+100(W–3.25)

SM=S÷(1+1.5f/r) SM=(S–230)÷(1+1.5f/r)

	AM Peak Hour			PM Peak Hour		
	Case 1	Case 2	Case 3	Case 1	Case 2	Case 3
Sum y	0.430	0.430	0.430	0.416	0.416	0.416
L (s)	35	10	15	35	10	15
C (s)	106	106	106	106	106	106
practical y	0.603	0.815	0.773	0.603	0.815	0.773
R.C. (%)	40%	90%	80%	45%	96%	86%



AM	G =	I/G =	G =	I/G = 7	G =	I/G = 6	G = 21	I/G = 4	G =	I/G =						
	G =	I/G =	G =	I/G =	G =	I/G =	G =	I/G =	G =	I/G =						
PM	G =	I/G =	G =	I/G = 7	G =	I/G = 6	G = 21	I/G = 4	G =	I/G =						
	G =	I/G =	G =	I/G =	G =	I/G =	G =	I/G =	G =	I/G =						

Signal Junction Analysis

Junction: Man Kam To Road / Fu Tei Au Road — Job Number: J7343

Scenario: Design Case — J5 - P. 2

Design Year: 2029 — Designed By: TTO — Checked By: WCH — Date: 14 June 2024

Approach		Phase	Stage	Width (m)	Radius (m)	% Up-hill Gradient	AM Peak Turning %	AM Peak Sat. Flow (pcu/hr)	AM Peak Flow (pcu/hr)	AM Peak y value	AM Peak Critical y	PM Peak Turning %	PM Peak Sat. Flow (pcu/hr)	PM Peak Flow (pcu/hr)	PM Peak y value	PM Peak Critical y
Man Kam To Road SB	SA+RT	A1	1,2	5.70	20.0		1	2183	1063	0.487	0.487	1	2183	991	0.454	0.454
Fu Tei Au Road EB	LT+RT	B1	3	4.50	10.0		100	1796	44	0.025	0.025	100	1796	68	0.038	0.038
Man Kam To Road NB	LT+SA	C1	1	3.00	12.0		9	1894	656	0.346		9	1894	456	0.241	
	SA	C2	1	3.00				2055	553	0.269			2055	515	0.251	
pedestrian phase		$D_{(P)}$	4		min crossing time =			6	sec GM +		11	sec FGM =		17	sec	

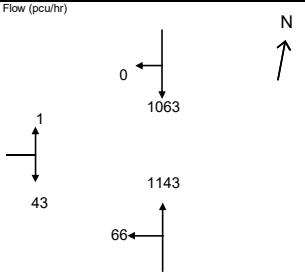
NOTE: As Stage 4 is depmand dependent, we have 3 cases during the peak hours:

Case 1 ALL of the cycles have 4 stages (i.e. lost time = 33s)

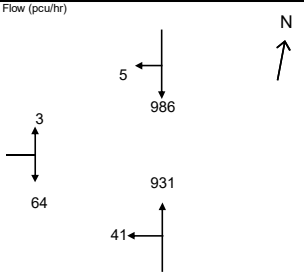
Case 2 ALL of the cycles have only 3 stages (i.e. lost time = 9s)

Case 3 20% of the cycles have 4 stages, and the rest of them have 3 stages. (i.e. lost time = [20% x 34 cyc x 33s + 80% x 34 cyc x 9s] / 34 = 14s)

AM Traffic Flow (pcu/hr)



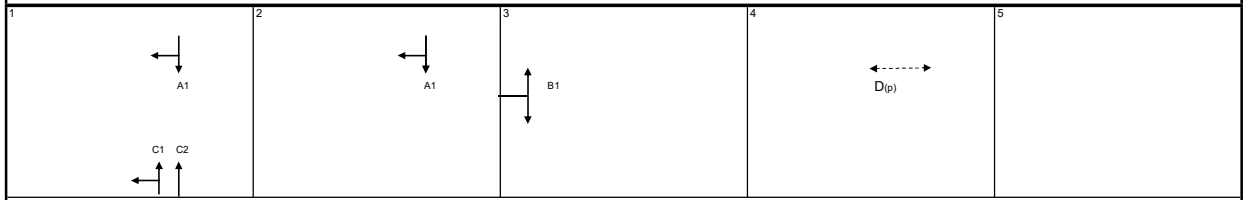
PM Traffic Flow (pcu/hr)



S=1940+100(W–3.25) S=2080+100(W–3.25)

SM=S÷(1+1.5f/r) SM=(S–230)÷(1+1.5f/r)

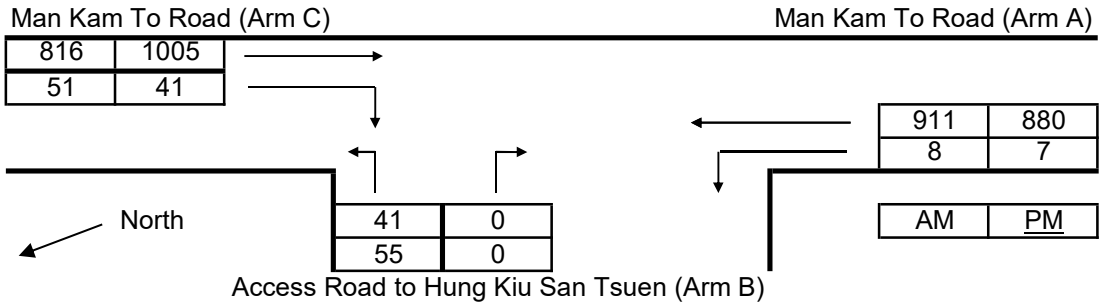
	AM Peak Hour Case 1	AM Peak Hour Case 2	AM Peak Hour Case 3	PM Peak Hour Case 1	PM Peak Hour Case 2	PM Peak Hour Case 3
Sum y	0.512	0.512	0.512	0.491	0.491	0.491
L (s)	35	10	15	35	10	15
C (s)	106	106	106	106	106	106
practical y	0.603	0.815	0.773	0.603	0.815	0.773
R.C. (%)	18%	59%	51%	23%	66%	57%



AM	G =	I/G =	G =	I/G = 7	G =	I/G = 6	G = 21	I/G = 4	G =	I/G =						
	G =	I/G =	G =	I/G =	G =	I/G =	G =	I/G =	G =	I/G =						
PM	G =	I/G =	G =	I/G = 7	G =	I/G = 6	G = 21	I/G = 4	G =	I/G =						
	G =	I/G =	G =	I/G =	G =	I/G =	G =	I/G =	G =	I/G =						

Priority Junction Analysis

Junction:	Man Kam To Road / Access Road to Hung Kiu San Tsuen			Job Number:	J7343
Scenario:	Existing Condition				J6 - P. 1
Design Year:	2024	Designed By:	TTO	Checked By: WCH	Date: 14-Jun-24



The predictive equations of capacity of movement are:

Q-BA = D[627 + 14W-CR - Y(0.364q-AC + 0.144q-AB + 0.229q-CA + 0.52q-CB)]

Q-BC = E[745 - Y(0.364q-AC + 0.144q-AB)]

Q-CB = F[745 - 0.364Y(q-AC + q-AB)]

The geometric parameters represented by D, E, F are:

D = [1 + 0.094(w-BA - 3.65)][1 + 0.0009(V-rBA - 120)][1 + 0.0006(V-lBA - 150)]

E = [1 + 0.094(w-BC - 3.65)][1 + 0.0009(V-rBC - 120)]

F = [1 + 0.094(w-CB - 3.65)][1 + 0.0009(V-rCB - 120)]

where Y = 1 - 0.0345W

q-AB, etc = the design flow of movement AB, etc

W = major road width

W-CR = central reserve width

w-BA, etc = lane width to vehicle

v-rBA, etc = visibility to the right for waiting vehicles in stream BA, etc

v-lBA, etc = visibility to the left for waiting vehicles in stream BA, etc

Geometry :	Input		Input		Input		Calculated	
	W	12.00	V-rBA	75	w-BA	3.50	D	0.9034
	W-CR	0.00	V-lBA	75	w-BC	3.50	E	0.9460
			V-rBC	75	w-CB	3.20	F	0.9189
			V-rCB	75			Y	0.5860

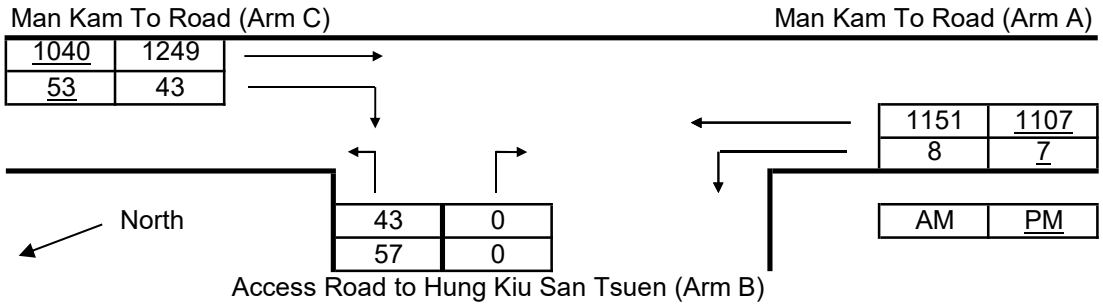
Analysis :

Traffic Flows, pcu/hr	AM	PM	Capacity, pcu/hr	AM	PM
q-CA	1005	816	Q-BA	257	283
q-CB	41	51	Q-BC	520	527
q-AB	8	7	Q-CB	504	511
q-AC	911	880	Q-BAC	520	527
q-BA	0	0			
q-BC	41	55			
f	1.000	1.000			

Ratio-of-flow to Capacity	AM	PM
B-A	0.000	0.000
B-C	0.078	0.104
C-B	0.080	0.099
B-AC	0.078	0.104

Priority Junction Analysis

Junction:	Man Kam To Road / Access Road to Hung Kiu San Tsuen			Job Number:	J7343
Scenario:	Design Case				J6 - P. 2
Design Year:	2029	Designed By: TTO	Checked By: WCH	Date:	14-Jun-24



The predictive equations of capacity of movement are:

Q-BA = D[627 + 14W-CR - Y(0.364q-AC + 0.144q-AB + 0.229q-CA + 0.52q-CB)]

Q-BC = E[745 - Y(0.364q-AC + 0.144q-AB)]

Q-CB = F[745 - 0.364Y(q-AC + q-AB)]

The geometric parameters represented by D, E, F are:

D = [1 + 0.094(w-BA - 3.65)][1 + 0.0009(V-rBA - 120)][1 + 0.0006(V-lBA - 150)]

E = [1 + 0.094(w-BC - 3.65)][1 + 0.0009(V-rBC - 120)]

F = [1 + 0.094(w-CB - 3.65)][1 + 0.0009(V-rCB - 120)]

where Y = 1 - 0.0345W

q-AB, etc = the design flow of movement AB, etc

W = major road width

W-CR = central reserve width

w-BA, etc = lane width to vehicle

v-rBA, etc = visibility to the right for waiting vehicles in stream BA, etc

v-lBA, etc = visibility to the left for waiting vehicles in stream BA, etc

Geometry :	Input		Input		Input		Calculated	
	W	12.00	V-rBA	75	w-BA	3.50	D	0.9034
	W-CR	0.00	V-lBA	75	w-BC	3.50	E	0.9460
			V-rBC	75	w-CB	3.20	F	0.9189
			V-rCB	75			Y	0.5860

Analysis :

Traffic Flows, pcu/hr	AM	PM	Capacity, pcu/hr	AM	PM
q-CA	1249	1040	Q-BA	181	212
q-CB	43	53	Q-BC	472	481
q-AB	8	7	Q-CB	457	466
q-AC	1151	1107	Q-BAC	472	481
q-BA	0	0			
q-BC	43	57			
f	1.000	1.000			

Ratio-of-flow to Capacity	AM	PM
B-A	0.000	0.000
B-C	0.091	0.119
C-B	0.093	0.114
B-AC	0.091	0.119

Signal Junction Analysis

Junction: Jockey Club Road / Po Wan Road — Job Number: J7343

Scenario: Existing Condition — J7 - P. 1

Design Year: 2024 — Designed By: TTO — Checked By: WCH — Date: 14 June 2024

Approach		Phase	Stage	Width (m)	Radius (m)	% Up-hill Gradient	AM Peak					PM Peak				
							Turning %	Sat. Flow (pcu/hr)	Flow (pcu/hr)	y value	Critical y	Turning %	Sat. Flow (pcu/hr)	Flow (pcu/hr)	y value	Critical y
Jockey Club Road SB	SA	A1	1,2	3.40				1955	492	0.252	0.252		1955	480	0.246	0.246
	SA+RT	A2	1,2	3.40	18.0		23	1830	460	0.251		10	1850	455	0.246	
Po Wan Road EB	LT+RT	B1	3	3.20	12.0		100	1720	148	0.086	0.086	100	1720	93	0.054	
	RT	B2	3	3.20	15.0		100	1886	161	0.085		100	2075	112	0.054	0.054
Jockey Club Road NB	LT+SA	C1	1	3.20	12.0		36	1852	535	0.289		28	1870	430	0.230	
	SA	C2	1	3.20				2075	599	0.289			2075	476	0.229	
pedestrian phase		$D_{(P)}$	4		min crossing time =			5	sec GM +		7	sec FGM =		12	sec	

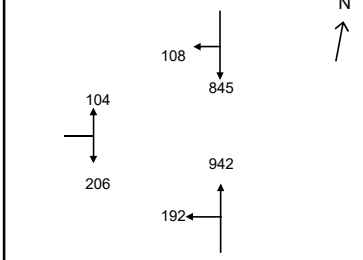
NOTE: As Stage 4 is depmand dependent, we have 3 cases during the peak hours:

Case 1 ALL of the cycles have 4 stages (i.e. lost time = 26s)

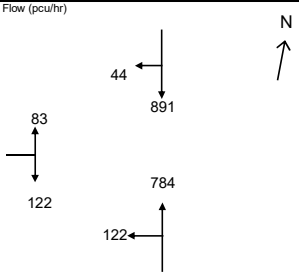
Case 2 ALL of the cycles have only 3 stages (i.e. lost time = 9s)

Case 3 20% of the cycles have 4 stages, and the rest of them have 3 stages. (i.e. lost time = [20% x 40 cyc x 26 sec + 80% x 40 cyc x 9 sec] / 40 = 14

AM Traffic Flow (pcu/hr)



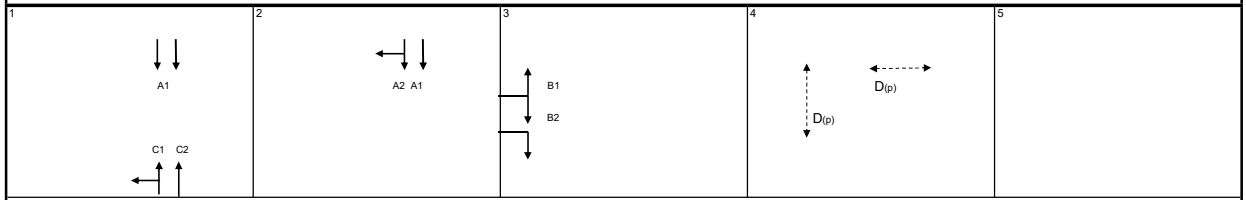
PM Traffic Flow (pcu/hr)



S=1940+100(W–3.25) S=2080+100(W–3.25)

S_M=S÷(1+1.5f/r) S_M=(S–230)÷(1+1.5f/r)

	AM Peak Hour			PM Peak Hour		
	Case 1	Case 2	Case 3	Case 1	Case 2	Case 3
Sum y	0.338	0.338	0.338	0.300	0.300	0.300
L (s)	26	9	12	26	9	12
C (s)	90	90	90	90	90	90
practical y	0.640	0.810	0.780	0.640	0.810	0.776
R.C. (%)	90%	140%	131%	114%	170%	159%



AM	G =	I/G =	G =	I/G =	5	G =	I/G =	9	G =	12	I/G =	3	G =	I/G =		
	G =	I/G =	G =	I/G =		G =	I/G =		G =		I/G =		G =	I/G =		
PM	G =	I/G =	G =	I/G =	5	G =	I/G =	9	G =	12	I/G =	3	G =	I/G =		
	G =	I/G =	G =	I/G =		G =	I/G =		G =		I/G =		G =	I/G =		

Signal Junction Analysis

Junction: Jockey Club Road / Po Wan Road — Job Number: J7343

Scenario: Design Case — J7 - P. 2

Design Year: 2029 — Designed By: TTO — Checked By: WCH — Date: 14 June 2024

Approach		Phase	Stage	Width (m)	Radius (m)	% Up-hill Gradient	AM Peak Turning %	AM Peak Sat. Flow (pcu/hr)	AM Peak Flow (pcu/hr)	AM Peak y value	AM Peak Critical y	PM Peak Turning %	PM Peak Sat. Flow (pcu/hr)	PM Peak Flow (pcu/hr)	PM Peak y value	PM Peak Critical y
Jockey Club Road SB	SA	A1	1,2	3.40				1955	616	0.315	0.315		1955	598	0.306	0.306
	SA+RT	A2	1,2	3.40	18.0		20	1834	578	0.315		8	1853	567	0.306	
Po Wan Road EB	LT+RT	B1	3	3.20	12.0		100	1720	155	0.090	0.090	100	1720	91	0.053	
	RT	B2	3	3.20	15.0		100	1886	170	0.090		100	2075	114	0.055	0.055
Jockey Club Road NB	LT+SA	C1	1	3.20	12.0		31	1863	655	0.352		24	1879	539	0.287	
	SA	C2	1	3.20				2075	730	0.352			2075	595	0.287	
pedestrian phase		$D_{(P)}$	4		min crossing time =		5	sec GM +		7	sec FGM =		12	sec		

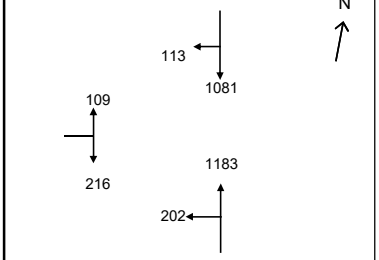
NOTE: As Stage 4 is depmand dependent, we have 3 cases during the peak hours:

Case 1 ALL of the cycles have 4 stages (i.e. lost time = 26s)

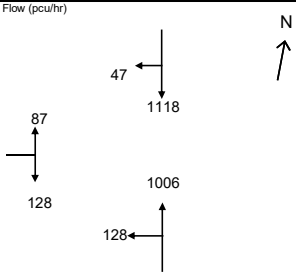
Case 2 ALL of the cycles have only 3 stages (i.e. lost time = 9s)

s) Case 3 20% of the cycles have 4 stages, and the rest of them have 3 stages. (i.e. lost time = [20% x 40 cyc x 26 sec + 80% x 40 cyc x 9 sec] / 40 = 14

AM Traffic Flow (pcu/hr)



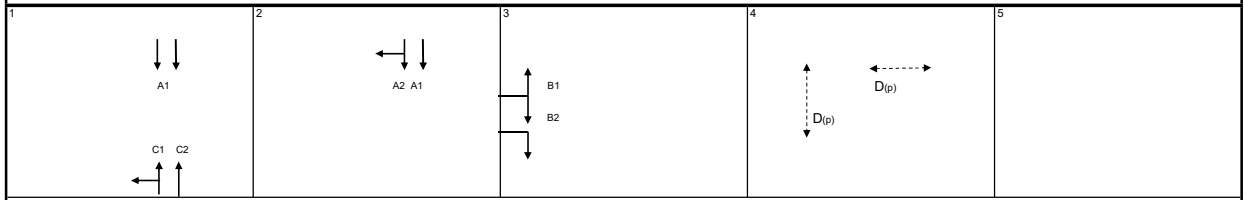
PM Traffic Flow (pcu/hr)



S=1940+100(W–3.25) S=2080+100(W–3.25)

SM=S÷(1+1.5f/r) SM=(S–230)÷(1+1.5f/r)

	AM Peak Hour Case 1	AM Peak Hour Case 2	AM Peak Hour Case 3	PM Peak Hour Case 1	PM Peak Hour Case 2	PM Peak Hour Case 3
Sum y	0.405	0.405	0.405	0.361	0.361	0.361
L (s)	26	9	12	26	9	12
C (s)	90	90	90	90	90	90
practical y	0.640	0.810	0.780	0.640	0.810	0.776
R.C. (%)	58%	100%	92%	77%	124%	115%



AM	G =	I/G =	G =	I/G = 5	G =	I/G = 9	G = 12	I/G = 3	G =	I/G =						
	G =	I/G =	G =	I/G =	G =	I/G =	G =	I/G =	G =	I/G =						
PM	G =	I/G =	G =	I/G = 5	G =	I/G = 9	G = 12	I/G = 3	G =	I/G =						
	G =	I/G =	G =	I/G =	G =	I/G =	G =	I/G =	G =	I/G =						