(translation)

Legislative Council Public Works Subcommittee
meeting on 29 November 2017

868TH – Road Improvement Works at Ma On Shan, Sha Tin

Supplementary Information

PURPOSE

On 29 November 2017, the Public Works Subcommittee (PWSC) requested that the following supplementary information be provided –

(a) the full report of the traffic impact assessment;

(b) the breakdown and amount of the annual recurrent expenditure (about $ 14.9 million) incurred by the proposed project;

(c) details of sustainable building design in the related public housing developments to improve natural ventilation;

(d) the existing planning standards for providing parking facilities for the related public housing developments;

(e) the number of parking spaces for commercial vehicles (such as minibuses / school buses and light goods vehicles) to be provided in the related public housing developments and the number of vehicle lay-bys provided for the disabled;

(f) how the impact of traffic noise on residents can be mitigated after installing acoustic windows at the residential units of the related public housing developments;

(g) the latest development parameters on the related public housing developments; and

(h) regarding the retail / commercial facilities in the related public housing developments and the provision of social welfare facilities, the estimated number of jobs to be provided to residents in the district.

GOVERNMENT'S RESPONSES

2. The Government's responses to the matters set out in paragraph 1 above are listed below –

(a) Please refer to the full report of the traffic impact assessment (English only) at **Appendix 1**.

(b) We estimate that the annual recurrent expenditure incurred by the proposed project is about $ 14.9 million. The breakdown is as follows –

Government Department	**Recurrent expenditure item (operation, maintenance and management fee)**	**Estimated annual recurrent expenditure ($'000)**
Highways Department	Routine operation, maintenance and repair of road facilities, including expressways, ordinary roads, footpaths, sign gantries, geotechnical works, roadside planters, noise barriers, public lighting systems and maintenance of vegetation within expressway boundaries.	about 12,300
Food and Environmental Hygiene Department	Cleansing fee	about 20
Drainage Services Department	Drainage and sewerage works	about 90

Water Supplies Department	Waterworks	about 80
Transport Department	Traffic signalling system	about 240
Leisure and Cultural Services Department	Maintenance of vegetation outside expressway boundaries	about 2,170
Total estimated annual recurrent expenditure =		**about 14,900**

(c) For the two public housing developments at Ma On Shan Road and Hang Tai Road, Housing Department will follow the "Practice Notes for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers APP-152" as a guideline for the sustainable building design. A ventilation corridor with a spacing of 15 meters or more will be reserved between buildings/group of buildings to improve the natural ventilation of the development sites and the surrounding area.

(d) In planning public housing developments, the Hong Kong Housing Authority (HA) will make reference to the "Hong Kong Planning Standards and Guidelines (HKPSG)" and consult relevant departments and organisations, including the Transport Department (TD) and the District Councils, for the formulation of parking facilities in public housing developments. TD will advise on the provision of parking facilities in each development site based on circumstances of individual district, such as the demand and supply of parking spaces in the vicinity, whether there are any public transport services, or the traffic capacity of public roads in the area.

According to the HKPSG, the current planning standards for subsidised housing development projects (parking facilities) are as follows: (For details, please refer to the Planning Department's link: http://www.pland.gov.hk/pland_en/tech_doc/hkpsg/full/ch8/ch8_tbl_11.htm)

Parking facilities	Current planning standards
Private car parking spaces (residential)	• within a 500m radius of rail station – provision of one parking space for every 31 to 46 flats* • outside a 500m radius of rail station - provision of one parking space for every 26 to 40 flats*
Private car parking spaces (retail)	Provision of one parking space for every 200 to 300 m^2 gross floor area (GFA)
Private car parking spaces (offices)	First 15 000 m^2 of GFA - provision of one parking space for every 150 to 200 m^2 GFA
Light goods vehicle parking space (residential)	Provision of one parking space for every 200 to 600 flats*
Motorcycle parking spaces (residential)	Provision of one parking space for every 110 to 250 flats*
Cycle parking spaces (applicable to residential development where proper cycle tracks with direct connection to rail station are accessible)	• within a 0.5-2km radius of a rail station – provision of one parking space for every 15 flats with flat size smaller than 70 m^2. • outside a 2km radius of a rail station – provision of one cycle parking space for every 30 flats with flat size smaller than 70 m^2.

* When calculating the required overall parking provision based on the number of flats, "one person/ two persons flats" shall be excluded.

The parking standards for subsidised housing as mentioned above are applicable to public rental housing developments. The parking requirements for subsidised sale flats developments are determined by the relevant departments on a case-by-case basis.

The parking ratios for the subsidised sale flats development at Ma On Shan Road and the public rental housing development at Hang Tai Road (Yan On Estate Extension) which are within a 500m radius of rail station are as follows:

Public rental housing development at Hang Tai Road (Yan On Estate Extension)

Private car parking spaces (residential)	Provision of one parking space for every 34 to 37 flats*
Private car parking spaces (retail)	Provision of one parking space for every 300 m^2 GFA
Light goods vehicle parking space (residential)	Provision of one parking space for every 400 flats*
Motor cycle parking space (residential)	Provision of one parking space for every 180 flats*
Cycle parking spaces	Provision of one parking space for every 15 flats

* When calculating the required overall parking provision based on the number of flats, "one person/ two persons flats" shall be excluded.

Subsidised sale flats development at Ma On Shan Road

Private car parking spaces (residential)	Provision of one parking space for every 22 flats
Private car parking spaces (office)	Provision of one parking space for every 200 m^2 GFA
Motor cycle parking space (residential)	Provision of one parking space for every 110 flats
Cycle parking spaces	Provision of one parking space for every 15 flats

(e) Parking facilities for the related public housing developments are provided in accordance with the requirements of HKPSG and various government departments including TD and Social Welfare Department have been consulted. The number of parking spaces for commercial vehicles (eg minibuses / school buses, light goods vehicles) and those for pick-up/drop-off of vehicles carrying the disabled are as follows -

Public rental housing development at Hang Tai Road (Yan On Estate Extension)

Commercial vehicles	**Number of vehicle parking spaces/ arrangement**
Light goods vehicles parking spaces for residential use	• Four new parking spaces (Together with the existing ones, a total provision of 14) (One parking space for every 400 flats [excluding one person / two persons flats])
Social welfare facilities parking spaces	• One minibus parking space for Residential Care Home for the Elderly • One minibus parking space for Special Child Care Centre • Three minibus parking spaces for Day Care Centre for the Elderly • One parking space for ambulance
Private car parking spaces for retail use	• 21 new parking spaces (including accessible parking spaces; together with the existing ones, a total of provision of 23) (provision of one parking space for every 300 m^2 GFA)
Pick-up and drop-off of taxis and vehicles carrying the disabled	Apart from the above social welfare facilities parking spaces and accessible parking spaces, taxis and vehicles carrying the disabled can also use roadside lay-bys near the existing entrance of Yan On Estate, or loading/unloading areas near residential buildings of the estate.

Subsidised sale flats development at Ma On Shan Road

Commercial vehicles	**Number of vehicle parking spaces/ arrangement**
Private car parking spaces for commercial use	• 11 parking spaces (including accessible parking spaces) (according to HKPSG, provision of one parking space for every 200 m^2 GFA)
Pick-up and drop-off of taxis and vehicles carrying the disabled	The loading/unloading areas near commercial and residential buildings of the estate can be used.

(f) Acoustic windows and acoustic balconies are innovative noise mitigation measures. Acoustic windows have been used in public housing developments, including the recently-sold King Tai Court in San Po Kong. For details of the acoustic installation, please refer to the following Environmental Protection Department (EPD)'s website:
http://www.epd.gov.hk/epd/Innovative/greeny/trad/acoustic_window.html,
http://www.epd.gov.hk/epd/Innovative/greeny/trad/balcony_acoustic.html

Acoustic windows and acoustic balconies will be adopted for the two public housing projects at Ma On Shan Road and Hang Tai Road to mitigate the impact of traffic noise on residential units to 70 dB as required by EPD.

(g) On 5 September and 31 October 2013, the Housing Department (HD) consulted the Development and Housing Committee (DHC) of Sha Tin District Council on the public housing developments. Members had no objection to the developments (development parameters can be referred to DHC Discussion Paper No. DH 52/2013 and its Annex 2). On 2 March 2017, HD reported to DHC a number of updated development parameters on public housing developments (DHC Information Paper No. DH 10/2017 refers). The latest development parameters on public housing developments are as follows -

Public rental housing development at Hang Tai Road
(Yan On Estate Extension)

Site area	• a total area of about 3.15 hectares (ha) (including the existing 2.22 ha of Yan On Estate, about 0.85 ha of the extended part arising from the re-alignment of the Hang Tai Road and about 0.08 ha of "Government, Institution or Community" (GIC) site for provision of a basketball court) • net area of about 3.07 ha (excluding GIC site)
Plot ratio	about 6 (domestic) about 0.5 (non-domestic)
No. of domestic block	3 (excluding the existing 3 domestic blocks in Yan On Estate)
Building height	• about 40-41 domestic floors, not higher than +130 to +140mPD • if ground floor and first floor podium in one of the domestic blocks are also included, domestic floor number ranges from 41 to 43.
Flat number (anticipated population)	about 1 900 units (about 4 900 people)
Greening coverage	about 20-30%
Retail facilities	about 6 700m^2 (gross floor area)
Leisure facilities	open space, children play area and ball court etc.
Social welfare facilities	• Special Child Care Centre • Early Education and Training Centre • Supported Hostel for Mentally Handicapped Persons • Residential Care Home for the Elderly • Day Care Centre for the Elderly • Integrated Children and Youth Service Centre Sub-base
Other facilities	• kindergarten • footbridge across Ma On Shan Road

	• light goods vehicles parking spaces • private car and motorcycle parking spaces, and cycle parking area • estate management facilities etc.
Completion date	• retail, social welfare facilities and footbridge : 2021/22 • residential project : 2023/24

Subsidised sale flats development at Ma On Shan Road

Site area	• a total area of about 1.93 ha (including an increase of about 0.08 ha to be approved by the Town Planning Board)
Plot ratio	about 5.5 (domestic) about 0.3 (non-domestic)
No. of domestic block	5
Building height	• about 37-40 domestic floors, not higher than +122 to +137mPD • if ground floor is included, domestic floor number ranges from 38 to 41.
Flat number (anticipated population)	about 2 100 units (about 6 450 people)
Greening coverage	about 20-30%
Commercial facilities	about 2 200m^2 (gross floor area)
Leisure facilities	open space, children play area and ball court etc.
Completion date	2021/22

(h) The availability of employment places in retail and commercial facilities will be based on the actual operational needs of the respective shops. It is estimated that there will be a total of about 150 and 200 employment places available for retail facilities (about 6 700 m^2) and commercial facilities (about 2 200 m^2) respectively. According to the Social Welfare Department's

estimates, the six social welfare facilities (including Day Care Centre for the Elderly, Residential Care Homes for the Elderly, Special Child Care Centre, Early Education and Training Centre, Integrated Children and Youth Service Centre (Sub-base) and Supported Hostel for Mentally Handicapped Persons) are anticipated to provide about 120 employment places. The above facilities in the public housing developments are estimated to provide a total of about 470 employment places.

Transport and Housing Bureau
December 2017

附件一
APPENDIX 1

Hong Kong Housing Authority

PWP Project No. B868TH - Road Improvement Works at Ma On Shan, Shatin

Traffic Impact Assessment

Final Report

Revision 1 | November 2017

Job number 236072-08

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1 INTRODUCTION

1.1 General

1.1.1 Ove Arup and Partners Hong Kong Limited (Arup) was commissioned by Hong Kong Housing Authority (HKHA) to prepare a Traffic Impact Assessment (TIA) to (i) review the sufficiency of the traffic mitigation measures recommended by the previous TIA carried out at planning stage of the proposed Public Rental Housing (PRH) development at Yan On Estate extension and the proposed Subsidised Sale Flats (SSF) development at Ma On Shan Road, hereafter called "the previous study"; (ii) assess the cumulative traffic impacts to critical junctions and links as a results of the new developments; (iii) assess the traffic impacts during construction stage; and (iv) review the adequacy of pedestrian facilities.

1.2 Project Background

1.2.1 As mentioned in Section 1.1.1, HKHA conducted a TIA in the previous study to support the rezoning for the proposed PRH development at Hang Tai Road MOS Area 86B, and SSF development at Ma On Shan Road, hereafter the former called "PRH Site" and the latter called "SSF Site", the realignment of Hang Tai Road and the construction of two new slip roads to/from Ma On Shan Road. The subject report was circulated to relevant government departments in June 2014.

1.2.2 The proposed mixed use development at the PRH site comprises approximately 30,800 sqm of land. As Yan On Estate extension, it consists of 1,896 residential flats and a total of 15,588 sqm Gross Floor Area (GFA) of welfare and retail uses.

1.2.3 The proposed SSF development at SSF site comprises approximately 19,200 sqm of land development at the SSF site including 2,069 flats.

1.2.4 For the PRH site, Hang Tai Road was proposed to be realigned which will enable the merging of the two separated PRH Sites with the existing Yan On Estate, and optimize the flat production, taking into account the setback requirement imposed by the adjacent LPG filling station. The integration of the new site with the Yan On Estate will also enable better planning on the provision of various supporting facilities to serve the local community.

1.2.5 In addition, a new slip road from Hang Tai Road to Ma On Shan Road Northbound was also proposed, to provide a better connectivity from the local road network to Ma On Shan Road Northbound. However, the existing slip road from Ma On Shan Road to Hang Tai Road will be closed.

1.2.6 For the SSF site, widening of a section of Ma On Shan Road Southbound is required for the housing development at the SSF site.

1.2.7 The planned completion year of the aforesaid road modification works is 2021. This TIA report is aimed to study the traffic impact arising due to the aforesaid road modification work.

1.3 Objective of the Report

1.3.1 The main objective of this TIA Report is for the road layout review and traffic impact assessment for the proposed road improvement works proposed by HKHA, including Operation and Construction traffic impact assessment and development of schematic TTM.

1.3.2 The report has been prepared in accordance with the scope and it contains the following:

(a) To develop Traffic Model (TM) for future traffic forecast;

(b) To carry out a series of assessment based on the traffic survey figures, TM, traffic aids and method of control (MOC) to investigate the existing and future traffic conditions and design the preliminary road layout; &

(c) To assess the construction impact due to construction traffic, and propose mitigation / improvement measures, if necessary, and also develop schematic temporary traffic management for the road improvement work.

(d) To review the adequacy of existing pedestrian facilities, and also assess the necessity of the additional pedestrian connection of new footbridge to the proposed new bus stops on Ma On Shan Road.

1.4 Structure of the Report

1.4.1 Following this introductory chapter, there are seven further chapters:

Chapter 2 – Describes the existing traffic conditions;

Chapter 3 – Discusses the proposed road improvement works;

Chapter 4 – Presents the trip generation of the associated development in Study Area and the traffic forecast methodology; and reports the results of the junction and link capacity assessments with and without the proposed road improvement works;

Chapter 5 – Presents the proposed temporary traffic management;

Chapter 6 – Presents the junction and link capacity assessments for construction stage;

Chapter 7 – Presents the pedestrian connection analysis;

Chapter 8 – Summarises and concludes the study.

2 EXISTING TRAFFIC CONDITIONS

2.1 Existing Road Network

2.1.1 The proposed road improvement works and its environs in the vicinity are shown in **Figure 3.1**.

2.1.2 Some major road network in the vicinity of the proposed road improvement works are listed as follows:

2.1.3 Hang Tai Road is a local distributor configured in single-two-lane carriageway. Hang Tai Road connects Ma On Shan Road at the south and Hang Fai Street/ Sai Sha Road roundabout at the north.

2.1.4 Junction J1 Hang Fai Street / Sai Sha Road is a four-arm roundabout. Hang Fai Street provides access to residential area along Ma On Shan Promenade at the west, and Sai Sha Road West connecting to Ma On Shan Bypass, providing access to Tate's Cairn Highway.

2.1.5 Ma On Shan Road is a primary distributor which is configured in dual-three-lane carriageway with speed limit of 80km/h. It connects Tate's Cirn Highway near Tai Shui Hang at the south, and Sai Sha Road near Wu Kai Sha at the north. Its branch road, Ma On Shan Bypass, redirects traffic between Shatin and Sai Kung away from the town centre near Heng On Estate.

2.1.6 Tate's Cairn Highway is an urban trunk road, it is a dual 3-lane highway connecting Tate's Cairn Tunnel.

2.2 Existing Traffic Condition

2.2.1 To appreciate the existing traffic conditions, comprehensive classified traffic counts were conducted at the following key junctions. The assessments have been based on the latest junction layouts and method of control. Locations of these surveyed junctions are listed below and shown in **Figure 2.1**, and the surveyed links are shown in **Figure 2.2**.

J1	Hang Fai Street/ Sai Sha Road	(Roundabout)
J2	Hang Tai Road/ Hang Shun Street	(Signal Junction)
J3	Hang Shun Street/ Hang Tak Street/ A Kung Kok Street	(Signal Junction)
J4	Ma On Shan Road/ Hang Hong Street	(Roundabout)
A1,2	Hang Tai Road	(Link)
A9,10	Ma On Shan Road	(Link)
A11	A Kung Kok Street	(Link)
A13,14	Hang Tak Street	(Link)
A15	Hang Fai Street	(Link)
A16-21	Sai Sha Road	(Link)

2.2.2 The traffic counts were undertaken on a normal weekday in June 2015 during the periods 0730 - 1030 and 1630 - 1930 hours. The observed Year 2015 traffic flows during these peak hours are presented in **Figure 2.3.** From the observed traffic flows, the morning and evening peak hours were identified as 0730-0830 hours and 1715-1815 respectively. In general, the morning peak hour flows were observed to be higher than the evening peak periods.

2.2.3 Junction and link capacity analyses have been carried out at the key junctions along the key access routes of the Site. Results of the capacity assessment are shown in **Table 2.1** and **2.2** below.

(Hidden Information)

Table 2.1: Year 2015 Existing Junction Performance

Junction (1)		Type	Performance (2)	
			AM	PM
J1	Hang Fai Street/ Sai Sha Road	Roundabout	0.55	0.30
J2	Hang Tai Road/ Hang Shun Street	Signal	>50%	>50%
J3	Hang Shun Street/ Hang Tak Street/ A Kung Kok Street	Signal	31%	>50%
J4	Ma On Shan Road/ Hang Hong Street	Roundabout	0.64	0.47

Notes: 1. Please refer to **Figure 2.1** for the location of the assessed junctions.
2. Figures shown represent "Reserve Capacity" (RC) for the signal controlled junctions and "Design Flow to Capacity" (DFC) ratio for the roundabout.

Table 2.2: Year 2015 Existing Link Performance

Link Index	Road Name[1]	Capacity (veh/hr) [2]	Flow (veh/hr)		V/C[3]	
			AM	PM	AM	PM
A1	Hang Tai Road	1,700	400	294	0.24	0.17
A2	Hang Tai Road	1,700	583	528	0.34	0.31
A9	Ma On Shan Road northbound	4,200	1,351	1,708	0.32	0.41
A10	Ma On Shan Road southbound	5,600	2,517	1,374	0.45	0.25
A11	A Kung Kok Street northbound	1,700	741	649	0.44	0.38
A13	Hang Tak Street northbound	2,000	70	53	0.04	0.03
A14	Hang Tak Street southbound	2,000	346	264	0.17	0.13
A15	Hang Fai Street	2,000	93	115	0.05	0.06
A16	Sai Sha Road	2,800	344	264	0.12	0.09
A17	Sai Sha Road	2,800	344	264	0.12	0.09
A18	Sai Sha Road northbound	4,200	942	885	0.22	0.21
A19	Sai Sha Road southbound	4,200	1,321	725	0.31	0.17
A20	Sai Sha Road northbound	5,600	783	765	0.14	0.14
A21	Sai Sha Road southbound	4,200	2,143	894	0.51	0.21

Notes:
1. Refer to **Figure 2.2** for the location of the assessed links.
2. Link capacity is made reference to TPDM.
3. A v/c ratio below 1.0 indicates that the road is operating within the design capacity. A v/c ratio above 1.0 indicates a mild to serious degree of congestion. When a v/c ratio reaches 1.2, traffic congestion will become obvious.

2.2.4 Results of the analysis indicate that all junctions and links in the study area are currently operating satisfactorily with spare capacity during both morning and evening peaks.

3 PROPOSED ROAD IMPROVEMENT

3.1 Road Improvement

3.1.1 To enhance connectivity to the public housing development, road improvement works were proposed in the previous study, including:

1. Re-alignment of Hang Tai Road;
2. Hang Fai Street Bus Lay-bys
3. New slip road from Hang Tai Road to Ma On Shan Road Northbound
4. Additional bus lane from Ma On Shan Road Northbound to Hang Tai Road; and signalized crossing at Hang Tai Road
5. Widening of a section of Ma On Shan Road Southbound for SSF Site

3.1.2 The planned completion year of the aforesaid road improvement works is 2021.

3.1.3 The road layout and geometry provided in the previous study has been reviewed. Enhancement to the road layout is proposed as detailed in below section. The proposed road improvement works are illustrated in **Figure 3.1**.

1. Re-alignment of Hang Tai Road

3.1.4 Hang Tai Road will be shifted to southeast. Its existing configuration will be retained, i.e. 10.3m wide one-way two-lane carriageway, but narrowing to one lane at the junction with Hang Fai Street. Meanwhile, 3.5m-wide footpath and 2.5m-wide amenity will be provided along both side of the re-aligned Hang Tai Road. The priority junction of Hang Tai Road and Hang Yiu Street will be shifted to southeast accordingly.

3.1.5 The right-turning movement from Hang Tai Road to Hang Fai Street will be suspended, the affected traffic will be diverted to the roundabout of junction J1 - Hang Fai Street/ Sai Sha Road to take U-turn to Hang Fai Street.

3.1.6 A signalized pedestrian crossing will be provided near northern end of Hang Tai Road to allow for a safe crossing facility for pedestrian movement between the PRH Site and facilities on other side of Hang Tai Road and Hang Yiu Street.

2. Hang Fai Street Bus Lay-bys

3.1.7 In view of the change of road configuration of Hang Tai Road, the existing pedestrian crossing at Hang Fai Street will be relocated from the road bend to enhance safety of road user. The existing pedestrian crossing, between the existing bus lay-bys at Hang Fai Street eastbound, will be relocated to the western end of the bus lay-bys, where the carriageway will be configured in straight alignment, while

the existing western bus lay-by will be shifted to the east and occupy the space of the existing pedestrian crossing, in order to maintain the same number of bus bays.

3. New Slip Road from Hang Tai Road to Ma On Shan Road Northbound

3.1.8 A new slip road from Hang Tai Road to Ma On Shan Road NB is proposed to enhance connectivity from the local road network to Ma On Shan Road Northbound. The existing slip road from Ma On Shan Road to Hang Tai Road will be closed. The available weaving length between the end of new slip road (from Hang Tai Road to Ma On Shan Road Northbound) and the downstream junction of Ma On Shan Road/ Ma On Shan Bypass will be longer than 200m. Based on the future year traffic forecast, the year 2026 forecast traffic flow of the new slip road is only 167pcu/hr at the critical AM peak hour. In view of the low demand of weaving traffic (from new slip road to Ma On Shan Bypass), the aforesaid available weaving length is considered adequate. In the meantime, the existing slip road to Hang Tai Road will be closed, weaving movement (for traffic from Hang Tai Road slip road bus lane to Ma On Shan Road Northbound mainline; and traffic from Ma On Shan Road Northbound mainline to the existing slip road to Hang Tai Road) will be eliminated, so that the existing weaving traffic condition will be improved by the proposed road modification.

3.1.9 The proposed configuration of the new slip road will comply with Transport Planning and Design Manual (TPDM), Volume 2, Chapter 4.6, Diagram 4.6.8.2 for Shadow Island merging lane with design speed of 80km/h, i.e. 100m-long shadow island and 110m-long merging lane. For the new bus lane along Ma On Shan Road Northbound, the proposed merging taper will be 100m in length in about 1:12.

3.1.10 In view of short distance between Sui Tai Road and this new slip road to Ma On Shan Road Northbound, double white line is proposed on Hang Tai Road between Sui Tai Road and the new slip road to avoid weaving movement within the concerned carriageway section and enhance road safety. The affected traffic can make use of alternative route via Ning Tai Road, Hi Tai Street Eastbound, Hang Tai Road Northbound to access this new slip road to Ma On Shan Road Northbound.

4. Additional bus lane from Ma On Shan Road northbound to Hang Tai Road and signalized crossing at Hang Tai Road

3.1.11 In view of the recent request of additional bus stop along Ma On Shan Road Northbound by the local public, modification to the original slip road alignment in the previous study is proposed.

3.1.12 An additional bus lane is proposed between Ma On Shan Road Northbound and Hang Tai Road. The additional bus lane will be connected to Hang Tai Road before the new slip road. Bus routes to be operating on this new bus lane could travel back to Ma On Shan Road Northbound via Hang Tai Road and the new slip road.

3.1.13 The bus lay-by will be configured in 39m-long which can accommodate at least 3 buses at the same time. And it will be 7.3m-wide and can allow vehicle bypassing when the bus bay is occupied for boarding/ alighting activities. 3.5m- wide footpath will also be provided to connect the bus stop to Hang Tai Street.

3.1.14 A new signalized pedestrian crossing will also be provided across Hang Tai Road to serve pedestrian movement to/from northern side (e.g. Yan On Estate, La Costa) and the new bus lane. In addition, new footpath along southern side of Hang Tai Road will be provided to connect to the existing pedestrian network near Sausalito.

3.1.15 In view of the complicated weaving movement (for traffic from Hang Tai Road slip road bus lane near Kam Tai Shopping Centre to Ma On Shan Road Northbound Mainline; and traffic from Ma On Shan Road Northbound mainline to Hang Tak Street/ Sai Sha Road Flyover), it is proposed to restrict the use of the additional bus lane, solely for bus routes accessing from the Hang Tai Road slip road bus lane near Kam Tai Shopping Centre, so that the existing weaving movement will not be deteriorated. The bus routes running on Ma On Shan Road Northbound can serve at the additional bus lane and back to Ma On Shan Road Northbound via Hang Tai Road and the new slip road.

5. Widening of a section of Ma On Shan Road for SSF site

3.1.16 Widening of Ma On Shan Road Southbound at northeast side of SSF Site is proposed to provide additional side road in one-way two-lane configuration of speed limit 50kph. Traffic island is proposed to segregate the side road from the mainline carriageway. Additional bus lay-by in 52m-long which can accommodate at least 4 buses at the same time, and a 3.5m-wide footpath will also be provided along the side road.

3.1.17 This side road will provide vehicular access to SSF site at the northern access, it is expected that the side road will be predominately used by SSF site residents and will not promote use of through route for by-passing traffic.

3.1.18 In addition, in view of the insufficient weaving length on Ma On Shan Road Southbound, between the exit of new slip road and the existing Sai Sha Road slip road, the latter will be shifted to the south in order to comply the weaving length requirement of 240m for carriageway with speed limit of 80kph, as stipulated in TPDM Volume 2 Chapter 4.6 Diagram 4.6.10.1.

3.2 Directional Sign Modification

3.2.1 Associating with the road improvement works and change of the existing of traffic circulation, the existing directional signs along Ma On Shan Road and other adjoining roads are reviewed. It is necessary to revise the sign face details of some existing signs to cope with the change of traffic direction. The proposed changes are demonstrated in **Figure 3.2**.

3.3 Junction Improvement Scheme

3.3.1 Improvement work at the junction J3 Hang Shun Street/ Hang Tak Street/ A Kung Kok Street was proposed in the previous study. **Appendix B** shows the proposed layout of the junction improvement scheme.

3.3.2 In the previous study, it was proposed to shift the existing pedestrian refuge island at Hang Shun Street Westbound to Northeast direction, and to increase the entry lanes of Hang Shun Street Westbound form two to three.

3.3.3 The improvement scheme will be incorporated into the junction assessment in both reference and design scenarios in the succeeding section.

3.4 Potential Cycle Track Extension

3.4.1 In the meeting of Sha Tin DC T&TC on 7 July 2015 regarding the extension of Ma On Shan Cycle Track to Hang Tai Road (under Highways Department (HyD)), members requested the cycle track along Sui Tai Road should be extended to Yan On Estate as part of this road improvement works project. A plan showing the cycle track extension proposed by HyD is enclosed in **Appendix C**.

3.4.2 Feasibility study has been carried out to explore the potential cycle track extension options under this road improvement works project.

3.4.3 In the option development process, the adopted basic assumptions are listed as follows:

(i) Footpath to be aligned near the site boundary to ensure safe pedestrian movement to/from Yan On Estate, cycle track to be located on the outer side, near the carriageway.

(ii) Desirable 4m-wide cycle track to be adopted.

(iii) Minimum 3.5m-wide footpath to be maintained.

(iv) 1m-wide verge to be provided to separate cycle track and carriageway.

(v) Total 8.5m in width will be required for accommodation of cycle track along northern side Hang Tai Road.

(vi) The cycle track will be extended to connect the existing network in the northern side of Yan On Estate; and HyD's proposed new cycle track near La Costa as shown in **Appendix C**.

3.4.4 Two cycle track extension options are explored as follows:

Option 1 (Figure 3.3 refers)

3.4.5 To allow adequate width (i.e. 8.5m) to accommodate the cycle track cum footpath and verge, Hang Tai Road will be realigned and reduced from 10.3m (2-lane) to 7.3m (2-lane) in width. Amenity on the northern side of Hang Tai Road will also be removed. Approximate 200m-long cycle track could be accommodated on the eastern boundary of Yan On Estate.

3.4.6 However, a long dismount section of approximate 190m for connection to HyD's proposed new cycle track near La Costa; and another long dismount section of approximate 130m for connection to the existing network in the northwest side of Yan On Estate will be required.

Option 2 (Figure 3.4 refers)

3.4.7 This option is similar to Option 1, except that the carriageway width of Hang Tai Road will be maintained as 10.3m (2-lane), while the amenity on the southern/eastern side will be removed.

3.4.8 A short 45m-long section of additional cycle track cum footpath and verge could be provided near the northeast corner of Yan On Estate. However, due to existence of run-in and pedestrian crossing under this road improvement works project, intermittent cycle track in this location will be required.

3.4.9 In fact, Yan On Estate and the PRH Site are well served by the existing cycle track network with connection in the northern side of the site, where the existing cycle parking areas, i.e. the expected cyclist trips ends at Yan On Estate, are also situated at this location. Cycle track subways also exist underneath the roundabout of Hang Fai Street/ Sai Sha Road to provide grade-separated crossing for cyclists to cross Sai Sha Road, and safe access to the major cycle track route along the Ma On Shan Promenade and Sai Sha Road northbound carriageway.

3.4.10 In view of the existing comprehensive and safe cycle track network, as well as the intermittent cycle track and long dismount section for connection to the existing/ planned cycle track network under both cycle track extension options, the cycle track extension along Hang Tai Road is considered unnecessary and undesirable in traffic view point.

4 FUTURE TRAFFIC CONDITIONS

4.1 Assessment Scenarios

4.1.1 To evaluate the associated traffic impact arising by the proposed road improvement works, four assessment scenarios were analysed. The first and third scenarios are Reference Scenario (without the proposed work modification and housing developments in PRH site and SSF site) in Year 2021 and 2026. The second and fourth scenarios are Design Scenario (with the proposed work modification and housing developments in PRH site and SSF site) in Year 2021 and 2026.

4.1.2 The four assessment scenarios are listed as follows,

- 2021 Reference Case (2021 Background Traffic Flows including generated/attracted traffic related to other planned developments in the vicinity)
- 2021 Design Case (2021 Reference Case Traffic Flows + change in traffic pattern due to the proposed road improvement works and SSF housing development)
- 2026 Reference Case (2026 Background Traffic Flows including generated/attracted traffic related to other planned developments in the vicinity)
- 2026 Design Case (2026 Reference Case Traffic Flows + change in traffic pattern due to the proposed road improvement works, PRH and SSF housing development)

4.1.3 The road improvement works are essential for the formation of SSF site and PRH site, the housing developments will not be in place without the road improvement works. Therefore, the housing developments will only be considered in the design scenarios.

4.1.4 The SSF site and PRH site will be completed in year 2021/22 and 2023/24 respectively. **Table 4.1** summarises the list of development being considered in different assessment scenarios.

Table 4.1: Summary of Assessment Scenarios

Proposed Development	Year 2021		Year 2026	
	Reference	Design	Reference	Design
Road Improvement	×	✓	×	✓
SSF site	×	✓	×	✓
PRH site	×	×	×	✓

4.1.5 The methodology adopted to future years traffic forecast is presented in the next section. (Hidden Information)

4.2 Forecasting Methodology

Proposed Area of Influence (AOI)

4.2.1 Area of Influence (AOI) is proposed and presented in **Figures 2.1.** It covers the critical road junctions and road networks, which may be affected by the proposed development in Ma On Shan. Necessary data and information within the AOI have been collected and assembled for assessments.

Planned/ Committed Developments

4.2.2 There are some other planned developments in the vicinity of the proposed road improvement works, including:

- HOS Development at Hang Kin Street;
- Commercial Development on Po Tai Road and ;
- Relocation of Sha Tin Sewage Treatment Works to Cavern project

4.2.3 The estimated trips of these developments have also been reviewed and incorporated into the development of traffic forecast, as appropriate. A summary of the trips generation of these developments is given in **Table 4.2.**

Table 4.2: Estimated Generated and Attracted Traffic for the other planned developments (pcu/ hr)

Development Type	AM Peak		PM Peak	
	Generation	Attraction	Generation	Attraction
HOS at Hang Kin Street (1)	55	37	26	35
Commercial Development on Po Tai Road (2)	35	37	47	54
Sha Tin Sewage Treatment Works to Cavern (Construction Stage) (3)	210	210	210	210
Total	300	284	283	299

Source:

1. HKHA's study "Hang Kin Street, Area 90B, Ma On Shan - Traffic Review Study".
2. The previous study carried out at planning stage of the proposed PRH development at Yan On Estate extension and the proposed SSF development at Ma On Shan, details refer to above Section 1.1.1 and 1.2.1.
3. DSD's study "Relocation of Sha Tin Sewage Treatment Works to Caverns – Feasibility Study".

2-Tier Transport Modelling

4.2.4 A two-tier modelling approach was adopted. The upper tier involved the use of Arup's in-house TM which produced traffic forecasts on a strategic basis. The cordoned matrices from the TM would then be input into the lower tier LATM which would be used to predict the future year traffic flow on a more local perspective. The modelling approach is elaborated in the following sections.

Upper Tier Model

4.2.5 Arup's in-house CTS-compatible TM was applied as the upper tier model. The TM was capable of producing trip matrices for the base and future years throughout the territory. The TM also offered the advantage of being capable of reflecting the traffic impacts especially the mode choice caused due to changes of road networks. It was hence recommended to adopt this model as the basis, and updated using the latest public available data for planned and committed new infrastructures and local developments in the AOI for this study.

4.2.6 In order to ensure the traffic patterns predicted by the model could reasonably replicate the current traffic condition and hence provided confidence in forecasting the future year traffic, the output from the base year TM was compared against observed traffic flows as published in the Annual Traffic Census for both the AM and PM peak hours.

Lower Tier Model

4.2.7 Matrices cordoned from the TM were input into the LATM. Despite the LATM only performs traffic assignment, it offered the benefit of giving more detailed accounting of queuing, junction control and delays, making it more suitable for the evaluation of localized traffic impacts.

4.2.8 The development of the LATM would follow the same approach as TD's latest 2008-based BDTM. The compatibility between the 2 tiers was ensured by the control of the external trip ends, which were essentially the link flows of Sai Sha Road, Tate's Cairn Tunnel, Lion Rock Tunnel, Eagle's Nest Tunnel, Tai Po Road, Shing Mun Tunnel, Tai Po Road – Tai Po Kau and Tolo Highway, obtained from the TM. The link flows and junction turning counts on a more local level would be produced by the LATM assignments for subsequent impact assessments.

4.2.9 Validation was also carried out for the LATM and additional focus was given to the comparison of observed and modelled flows at both strategic and local road links. Supplementary traffic survey had been conducted to provide traffic flows and turning counts which were not available in the Annual Traffic Census.

4.2.10 As survey counts represented the Year 2015 observed traffic flows, it was proposed to adopt Year 2015 as the LATM base year, and the LATM was validated to Year 2015 conditions. Trip matrices cordoned from the validated TM for the LATM model validation was projected from Year 2011 to 2015 by making reference to the published growth factors of various road links in AOI according to the Annual Traffic Census.

4.2.11 The LATM has been developed for the area of East New Territories, where the area of Ma On Shan has been included.

Trip Generation and Attraction for Public Housing Developments

in PRH Site and SSF Site

4.2.12 The trip generation of these developments were estimated by applying the trip rate adopted in the previous study and adopted in the traffic forecast. **Table 4.3** summarises the estimated trip generation.

Table 4.3: Estimated Generated and Attracted Traffic for the Public Housing Developments in PRH Site and SSF Site

Development Type	Unit	AM Peak		PM Peak	
		Generation	Attraction	Generation	Attraction
PRH Site					
PRH (2,086 flats*)	pcu/hr	50	47	37	42
Retail (4,900 m^2 GFA)	pcu/hr	11	12	15	17
Welfare (8,900 m^2 GFA)	pcu/hr	12	11	7	7
Total		73	70	59	66
SSF Site					
SSF (2,276 flats*)	pcu/hr	141	97	68	91
Commercial (2,200 m^2 GFA)	pcu/hr	5	5	8	7

Note:

* With additional 10% allowance for the proposed number of flats for assessment purpose

4.3 Junctions and Links Capacity Assessment

4.3.1 Junction capacity assessment was undertaken based on the methodology presented in the TPDM. The results for the 2021 and 2026 reference and design cases are shown in **Tables 4.4 to 4.7.**

(Hidden Information)

Table 4.4: Summary of Junction Performance – Year 2021

Junction (1)		Type	Junction Performance			
			Reference Case (2)		Design Case (2)	
			AM	PM	AM	PM
J1	Hang Fai Street/ Sai Sha Road	Roundabout	0.71	0.36	0.75	0.40
J2	Hang Tai Road/ Hang Shun Street	Signal	>50%	>50%	43%	>50%
J3	Hang Shun Street/ Hang Tak Street/ A Kung Kok Street	Signal	42%	>50%	35%	34%
J4	Ma On Shan Road/ Hang Hong Street	Roundabout	0.75	0.44	0.70	0.44
J5	Proposed Hang Tai Road Signalized Crossing (Connecting New Bus Lane from Ma On Shan Road Northbound)	Signal	N/A	N/A	>50%	>50%
J6	Proposed Hang Tai Road Signalized Crossing (Northern end of Hang Tai Road connecting proposed basketball court)	Signal	N/A	N/A	>50%	>50%

Notes: 1. Please refer to **Figure 2.1** for the location of the assessed junctions.
2. Figures shown represent "Reserve Capacity" (RC) for the signal controlled junctions and "Design Flow to Capacity" (DFC) ratio for the roundabout.

Table 4.5: Summary of Junction Performance – Year 2026

Junction (1)		Type	Junction Performance			
			Reference Case (2)		Design Case (2)	
			AM	PM	AM	PM
J1	Hang Fai Street/ Sai Sha Road	Roundabout	0.70	0.35	0.72	0.41
J2	Hang Tai Road/ Hang Shun Street	Signal	>50%	>50%	33%	>50%
J3	Hang Shun Street/ Hang Tak Street/ A Kung Kok Street	Signal	46%	>50%	29%	36%
J4	Ma On Shan Road/ Hang Hong Street	Roundabout	0.69	0.44	0.65	0.44
J5	Proposed Hang Tai Road Signalized Crossing (Connecting New Bus Lane from Ma On Shan Road Northbound)	Signal	N/A	N/A	>50%	>50%
J6	Proposed Hang Tai Road Signalized Crossing (Northern end of Hang Tai Road connecting proposed basketball court)	Signal	N/A	N/A	>50%	>50%

Notes: 1. Please refer to **Figure 2.1** for the location of the assessed junctions.
2. Figures shown represent "Reserve Capacity" (RC) for the signal controlled junctions and "Design Flow to Capacity" (DFC) ratio for the roundabout.

Table 4.6: Year 2021 Link Performance

Link Index	Road Name[1]	Capacity (veh/hr) [2]	Reference		Design	
			V/C[3]		V/C[3]	
			AM	M	AM	PM
A1	Hang Tai Road	1,700	0.23	0.21	-	-
A2	Hang Tai Road	1,700	0.34	0.35	-	-
A3	Hang Tai Road	850	-	-	0.29	0.24
A4	Hang Tai Road	850	-	-	0.53	0.55
A6	SSF site slip road	2,000	-	-	0.07	0.07
A7	SSF site slip road	1,000	-	-	0.09	0.09
A8	SSF site slip road	1,000	-	-	0.33	0.23
A9	Ma On Shan Road northbound	4,200	0.43	0.56	0.47	0.59
A10	Ma On Shan Road southbound	5,600	0.58	0.31	0.60	0.32
A11	A Kung Kok Street	1,700	0.51	0.48	0.51	0.48
A13	Hang Tak Street northbound	2,000	0.05	0.04	0.02	0.03
A14	Hang Tak Street southbound	2,000	0.15	0.15	0.21	0.16
A15	Hang Fai Street	2,000	0.05	0.06	0.10	0.12
A16	Sai Sha Road	2,800	0.11	0.11	0.15	0.12
A17	Sai Sha Road	2,800	0.11	0.11	0.15	0.12
A18	Sai Sha Road northbound	4,200	0.25	0.23	0.23	0.22
A19	Sai Sha Road southbound	4,200	0.32	0.20	0.33	0.20
A20	Sai Sha Road northbound	5,600	0.19	0.18	0.20	0.20
A21	Sai Sha Road southbound	4,200	0.57	0.29	0.59	0.30

(Hidden Information)

(Hidden Information)

Notes:
1. Refer to **Figure 4.5** for the location of the assessed links.
2. Link capacity is made reference to TPDM.
3. A v/c ratio below 1.0 indicates that the road is operating within the design capacity. A v/c ratio above 1.0 indicates a mild to serious degree of congestion. When a v/c ratio reaches 1.2, traffic congestion will become obvious.

Table 4.7: Year 2026 Link Performance

Link Index	Road Name[1]	Capacity (veh/hr) [2]	Reference		Design	
			V/C[3]		V/C[3]	
			AM	PM	AM	PM
A1	Hang Tai Road	1,700	0.23	0.21	-	-
A2	Hang Tai Road	1,700	0.34	0.35	-	-
A3	Hang Tai Road	850	-	-	0.39	0.32
A4	Hang Tai Road	850	-	-	0.71	0.71
A6	SSF site slip road	2,000	-	-	0.07	0.07
A7	SSF site slip road	1,000	-	-	0.09	0.09
A8	SSF site slip road	1,000	-	-	0.33	0.24
A9	Ma On Shan Road northbound	4,200	0.43	0.56	0.48	0.59
A10	Ma On Shan Road southbound	5,600	0.58	0.32	0.60	0.32
A11	A Kung Kok Street	1,700	0.50	0.47	0.50	0.47
A13	Hang Tak Street northbound	2,000	0.05	0.03	0.02	0.02
A14	Hang Tak Street southbound	2,000	0.15	0.15	0.21	0.17
A15	Hang Fai Street	2,000	0.05	0.06	0.13	0.16
A16	Sai Sha Road	2,800	0.11	0.11	0.15	0.12
A17	Sai Sha Road	2,800	0.11	0.11	0.15	0.12
A18	Sai Sha Road northbound	4,200	0.25	0.22	0.23	0.21
A19	Sai Sha Road southbound	4,200	0.32	0.19	0.32	0.19
A20	Sai Sha Road northbound	5,600	0.19	0.17	0.21	0.20
A21	Sai Sha Road southbound	4,200	0.56	0.29	0.58	0.31

(Hidden Information)

(Hidden Information)

Notes: 1. Refer to **Figure 4.5** for the location of the assessed links.
2. Link capacity is made reference to TPDM.
3. A v/c ratio below 1.0 indicates that the road is operating within the design capacity. A v/c ratio above 1.0 indicates a mild to serious degree of congestion. When a v/c ratio reaches 1.2, traffic congestion will become obvious.

4.3.2 All analysed results revealed the assessed junctions and links would still be performing with ample spare capacity in Year 2021 and 2026.

5 TEMPORARY TRAFFIC MANAGMENT

5.1 General Principles

5.1.1 The Temporary Traffic Management Schemes (TTMS) have been designed to facilitate the existing vehicular and pedestrian movements, based on the expected demand during the periods of TTM operation.

5.1.2 In formulating the temporary traffic management proposals to enable the works to proceed, the following general principles have been taken into consideration:-

(i) The TTM schemes offer guidance to suitable sequences of construction with the detailed TTM schemes to be developed by the contractor. The contractor will be required to arrange trial runs, prepare detailed signage plan and gain approval from the Site Liaison Group (SLG) / Traffic Management Liaison Group (TMLG) before commencement of the construction.

(ii) A working area, capable of being fenced, is to be provided in front of the works under construction. Hoarding will take into account the sightline requirements for traffic.

(iii) A minimum of 3.5m clear road width with appropriate widening around bends is to be maintained for each traffic lane.

(iv) Disruption of vehicular traffic and pedestrians is to be minimised.

(v) All traffic management is to be carried out in accordance with Highway Department's publication "Code of Practice for the Lighting, Signing and Guarding of Roadworks".

(vi) Footpath with minimum width of 1.5m is to be maintained for pedestrians, otherwise appropriate pedestrian diversion will be proposed.

(vii) A 500 mm highway clearance is to be maintained at all times.

(viii) Roads in TTM schemes for EVA purpose are to comply with FSD's requirements.

5.2 Re-alignment of Hang Tai Road and New Slip Road from Hang Tai Road to Man On Shan Road Northbound

5.2.1 The TTMs of re-alignment of Hang Tai Road as well as the construction of new slip road from Hang Tai Road to Ma on Shan Northbound are shown in **Figure 5.1- 5.4**.

5.2.2 The construction works and the corresponding traffic arrangement through different stages are summarized in **Table 5.1** below:

Table 5.1: Summary of Work for the Construction of new slip road to Ma On Shan Road northbound and re-alignment of Hang Tai Road

Stage	Highlights of Temporary Traffic Management Scheme (TTMS)
Stage 1a & 1b	**Figure 5.1a & b** **Re-alignment of Hang Tai Road** • Construction of re-aligned Hang Tai Road in the vacant areas at south of Hang Tai Road and east of Hang Fai Street • Hang Yiu Street near its junction with Hang Tai Road will be temporarily narrowed from 2 lanes to 1 lane for the kerb modification along Hang Yiu Street right lane at stage 1a, and left lane at stage 1b respectively. • Hang Fai Street at the right turn from Hang Tai Road will be temporarily shifted eastern at stage 1a and western at stage 1b for the kerb modification.
Stage 2	**Figure 5.2** **Re-alignment of Hang Tai Road** • Hang Tai Road will be temporarily narrowed from 2 lanes to 1 wide lane at the section between Sui Tai Road and the existing slip road connecting from Ma On Shan northbound. • Kerb modification for the connection between the existing and re-aligned Hang Tai Road. • Hang Yiu Street will be resumed as existing. **New slip road to Ma On Shan Road** • Existing slip road from Ma On Shan Road to Hang Tai Road to be closed. • Hard shoulder of Ma On Shan Road northbound will be temporarily closed, • Construction of public transport layby along Ma On Shan Road northbound
Stage 3	**Figure 5.3** **Re-alignment of Hang Tai Road** • Construction of the re-aligned Hang Tai road cross Hang Yiu Street. • The right turn from Hang Tai Road northbound to Hang Fai Street to be closed. • Temporarily one lane closure along Hang Tai Road northbound. **Hang Fai Street Bus Lay-bys** • Permanent closure of existing pedestrian crossing at Hang Fai Street eastbound, between the existing bus lay-bys, for conversion as bus lay-by. • Temporary provision of pedestrian crossing at the western side of existing bus lay-by.
Stage 4	**Figure 5.4** **Re-alignment of Hang Tai Road** • Kerb modification for the connection between the existing and re-aligned Hang Tai Road. • Traffic to be diverted onto the re-aligned Hang Tai Road **Hang Fai Street Bus Lay-bys** • Permanent closure of western end of existing bus lay-by at Hang Fai Street eastbound, for conversion as pedestrian crossing and footpath • Temporary provision of pedestrian crossing at the western side of existing bus lay-by.

5.3 Widening of a Section of Ma On Shan Road Southbound for SSF site

5.3.1 The TTMs of the construction of new slip road are shown in **Figure 5.11-5.12.**

5.3.2 The construction works and the corresponding traffic arrangement through the stages are summarized in **Table 5.2** below:

Table 5.2 Summary of Work for the Construction of new slip road for SSF site

Stage	Highlights of Temporary Traffic Management Scheme (TTMS)
Stage 1	**Figure 5.11** **Widening of a section of Ma On Shan Road Southbound for SSF site** • Hatching area of Ma On Shan Road southbound carriageway to be temporarily closed. • Construction of slip road and bus layby. • Adequate diverging lane (130m-long for site ingress) and merging lane (150m-long for site egress) to be provided at construction site access on Ma On Shan Road southbound with speed limit of 80kph. **Re-alignment of Sai Sha Road slip road** • Construction of the slip road in the vacant area • Construction site access to be provided on existing Sai Sha Road slip road with speed limit of 50kph.
Stage 2	**Figure 5.12** **Widening of a section of Ma On Shan Road Southbound for SSF site** • Slow lane of Ma On Shan Road southbound (near Sai Sha Road) to be temporarily closed. • Construction of slip road and bus layby. • Adequate diverging lane (145m-long completed permanent slip road for site ingress) and merging lane (150m-long for site egress) to be provided at construction site access on Ma On Shan Road southbound with speed limit of 80kph. **Re-alignment of Sai Sha Road slip road** • Demolition of the existing slip road

5.4 Junction Improvement of Junction J3 - Hang Shun Street/ Hang Tak Street/ A Kung Kok Street

5.4.1 The TTM of the junction improvement work is shown in **Figure 5.21.**

5.4.2 Work area will be situated in the middle of Hang Shun Street, covering the existing refuge island and right lane on Hang Shun Street Eastbound exit arm. Temporary decking will be provided within the work area to maintain pedestrian crossing across Hang Shun Street. Lane allocation road marking on A Kung Kok Street Northbound will also be adjusted accordingly.

6 CONSTRUCTION TRAFFIC IMPACT ASSESSMENT

6.1 Construction Programme

6.1.1 Considering the positive background traffic growth, year 2021 right before completion of the development is identified as the critical design year with respect to the peak accumulative traffic during construction period.

6.2 Construction Traffic Volume

6.2.1 The volume of construction traffic is based on the preliminary estimates on the excavation and construction material, including the piling and building contract of the public housing development at Ma On Shan Road, provided by HKHA.

6.2.2 On normal working days, the construction vehicle volume will be 6 trucks/hour (i.e. 15 pcu/hour) during the peak hour of construction works, when some 16 trucks/hour (i.e. 40 pcu/hour) will be generated and attracted in the peak hour of peak working day for a week per month.

6.2.3 For conservative assessment purpose, the aforesaid peak construction traffic volume, i.e. 40 pcu/hour is adopted for the construction traffic impact assessment.

6.3 Construction Traffic Routing

6.3.1 It is assumed that the construction traffic would be to/from the urban area via Ma On Shan Road, Sai Sha Road, roundabout of Junction J1 Hang Fai Street/ Sai Sha Road and roundabout of Junction J4 Ma On Shan Road/ Hang Hong Street. The construction traffic routing is shown in **Figure 6.1**.

6.4 Assessment Scenarios

6.4.1 To evaluate the associated traffic impact likely to be induced by construction works, below design scenarios is assessed

- Construction Year 2021 Design Scenario – Year 2021 reference scenario + traffic generated / attracted due to construction activities

6.4.2 (Hidden Information)

6.5 Junctions and Links Capacity Assessment

6.5.1 Junctions and links capacity assessment was undertaken based on the methodology presented in the TPDM. The results are shown in **Tables 6.1 and 6.2**.

(Hidden Information)

Table 6.1: Summary of Junction Performance – Construction Year 2021

Junction (1)		Type	Junction Performance			
			Reference Case (2)		Design Case (2)	
			AM	PM	AM	PM
J1	Hang Fai Street/ Sai Sha Road	Roundabout	0.71	0.36	0.72	0.37
J2	Hang Tai Road/ Hang Shun Street	Signal	>50%	>50%	>50%	>50%
J3	Hang Shun Street/ Hang Tak Street/ A Kung Kok Street	Signal	42%	>50%	40%	47%
J4	Ma On Shan Road/ Hang Hong Street	Roundabout	0.75	0.44	0.75	0.44

Notes: 1. Please refer to **Figure 2.1** for the location of the assessed junctions.
2. Figures shown represent "Reserve Capacity" (RC) for the signal controlled junctions and "Design Flow to Capacity" (DFC) ratio for the roundabout.

Table 6.2: Construction Year 2021 Link Performance

Link Index	Road Name[1]	Capacity (veh/hr) [2]	Reference		Design	
			V/C[3]		V/C[3]	
			AM	PM	AM	PM
A1	Hang Tai Road	1,700	0.23	0.21	0.23	0.21
A2	Hang Tai Road	1,700	0.34	0.35	0.35	0.36
A3	Hang Tai Road	-	-	-	-	-
A4	Hang Tai Road	-	-	-	-	-
A6	SSF site slip road	-	-	-	-	-
A7	SSF site slip road	-	-	-	-	-
A8	SSF site slip road	-	-	-	-	-
A9	Ma On Shan Road northbound	4,200	0.43	0.56	0.43	0.56
A10	Ma On Shan Road southbound	5,600	0.58	0.31	0.58	0.31
A11	A Kung Kok Street	1,700	0.51	0.48	0.51	0.48
A13	Hang Tak Street northbound	2,000	0.05	0.04	0.05	0.04
A14	Hang Tak Street southbound	2,000	0.15	0.15	0.16	0.16
A15	Hang Fai Street	2,000	0.05	0.06	0.05	0.07
A16	Sai Sha Road	2,800	0.11	0.11	0.11	0.11
A17	Sai Sha Road	2,800	0.11	0.11	0.11	0.11
A18	Sai Sha Road northbound	4,200	0.25	0.23	0.25	0.23
A19	Sai Sha Road southbound	4,200	0.32	0.20	0.32	0.20
A20	Sai Sha Road northbound	5,600	0.19	0.18	0.19	0.18
A21	Sai Sha Road southbound	4,200	0.57	0.29	0.57	0.29

(Hidden Information)

(Hidden Information)

Notes:
1. Refer to **Figure 4.5** for the location of the assessed links.
2. Link capacity is made reference to TPDM.
3. A v/c ratio below 1.0 indicates that the road is operating within the design capacity. A v/c ratio above 1.0 indicates a mild to serious degree of congestion. When a v/c ratio reaches 1.2, traffic congestion will become obvious.

6.5.2 All analysed results revealed the assessed junctions and links would still be performing with ample spare capacity during the construction stage.

7 PEDESTRIAN CONNECTION ANALYSIS

7.1 General

7.1.1 Due to the public concern regarding the provision of direct pedestrian connection of new footbridge (between Yan On Estate and the proposed Subsidised Sale Flats (SSF) development at Ma On Shan Road) to the proposed new bus stops at Ma On Shan Road northbound slip road or Ma On Shan Road southbound, the adequacy of existing pedestrian facilities and the necessity of the additional pedestrian connection of new footbridge to the proposed new bus stops are investigated in this section. **Figure 7.1** illustrates the locations of the concerned existing footpaths and pedestrian crossing in this study.

7.1.2 Taking account of usual commuting pattern during peak hours, the majority of the trip generation from the sites would travel towards urban area whereas the majority of the trip attraction to the sites (i.e. existing Yan On Estate, proposed PRH and SSF developments) would travel toward NT area. It is therefore assumed that the generated trips of bus passengers from the sites would walk to the Urban Bound bus stop on Ma On Shan Road southbound, while the attracted trips of bus passengers to the sites would walk from NT Bound bus stop located on the new Ma On Shan Road slip road. **Figures 7.2 and 7.3** depict the pedestrian routes of the bus passengers based on the latest layout of housing sites. **Figure 7.4** illustrates the additional connections of the new footbridge to the proposed new bus stops.

7.2 Pedestrian Demand Estimation

7.2.1 Reference was made to the Final Traffic Impact Assessment for "Hong Kong Housing Authority – Proposed Subsidized Housing Development at GIC and Road Site at Hang Tai Road and GB Site near Tai Shui Hang Station, Ma On Shan" (as mentioned in Section 1.1.1 and hereafter named as 2014 FTIA), the pedestrian forecast at the critical footpaths and pedestrian crossing as shown in **Figure 7.1** was estimated based on the critical peak hour pedestrian forecast in the 2014 FTIA, as well as the latest population of the studied sites.

7.2.2 In addition, the NT bound bus stop is located with 400m catchment of the existing private residential developments (i.e. Mountain Shore, Sausalito, La Costa and Ocean View), the residents will be anticipated to use the NT bound bus stop.

7.2.3 The pedestrian flows between these private residential developments and the NT bound bus stop are estimated based on the distribution of PRH-related trips as established in the 2014 FTIA. However, it is worth to note that majority of these pedestrians will not be expected to use the new footbridge in view of long distance to the urban bound bus stop. In addition, the desire path of these pedestrians will only pass via the crossing no. 3 as shown in **Figure 7.1** for this assessment.

7.2.4 The bus passenger forecast by developments are summarized in **Table 7.1** below:

Table 7.1: Estimated Bus Passenger Demand

Site	Flat No. Adopted in 2014 FTIA	Population Adopted in 2014 FTIA	Latest Flat No.	Latest Population	Bus Passenger Demand	
					NT Bound Bus Stop	Urban Bound Bus Stop
SSF	2,849	8,775	2,276 (1)	7,010 (3)	280	471
PRH	1,839	5,630	2,086 (1)	6,380 (3)	230	119
Yan On Estate (4)	-	-	2,600 (2)	6,200 (2)	224	116
Mountain Shore (4)	-	-	1,124	3,147 (5)	113	It is anticipated that residents of these developments will not use the urban bound bus stop in view of the long distance
Sausalito (4)	-	-	1,036	2,900 (5)	105	
La Costa (4)	-	-	606	1,697 (5)	61	
Ocean View (4)	-	-	911	2,551 (5)	92	

Note:
1. With additional 10% allowance for the proposed number of flats for assessment purpose
2. Dated on 31 December 2016 provided in HKHA website (website: http://www.housingauthority.gov.hk/tc/global-elements/estate-locator/detail.html?propertyType=1&id=12644)
3. Based on population to flat ratio adopted in Final Traffic Impact Assessment for "Hong Kong Housing Authority – Proposed Subsidized Housing Development at GIC and Road Site at Hang Tai Road and GB Site near Tai Shui Hang Station, Ma On Shan"
4. Bus passenger demand is estimated based on the ratio of "bus passenger demand/ latest population" of PRH Site.
5. Estimation based on average household size of 2.8.

7.2.5 (Hidden Information)

7.3 Pedestrian Facilities Assessment

Assessment of Footpaths

7.3.1 The adequacy of the critical pedestrian facilities (without the additional pedestrian connection of the new footbridge as shown in **Figure 7.4**) was assessed based on the Level-Of-Service (LOS) requirement as stipulated in "Highway Capacity Manual 2000".

7.3.2 This follows the approach currently being recommended by Transport Department. In general, LOS C and D are typical values and LOS A and B would provide a very good LOS.

7.3.3 LOS assessment was carried out for the critical walkway as illustrated in **Figure 7.1. Table 7.2** shows the various LOS 'quantified' in terms of pedestrian flow rates.

Table 7.2: Level of Service (LOS) for Walkway

LOS	Flow rate (ped/min/m)	Description
A	<= 16	Pedestrians move in desired paths. Walking speeds are freely selected and conflicts between pedestrians are unlikely.
B	16 - 23	Sufficient space is provided for pedestrians to freely select walking speeds, to bypass other pedestrians and to avoid crossing conflicts with others. Pedestrians become aware of other pedestrians.
C	23 - 33	Sufficient space is available to select normal walking speeds and to bypass other pedestrians in unidirectional stream. Minor conflicts will occur in reverse direction or crossing movements.
D	33 - 49	Freedom to select individual walking speeds and bypass other pedestrians is restricted. Probability of conflicts is high in crossing or reverse-flow movements. LOS provides reasonable fluid flow, however, friction and interactions between pedestrians are likely to occur.
E	49 - 75	All pedestrians would have normal walking speeds restricted. Space is insufficient to pass over slower pedestrians. Cross and reverse movements are possible only with extreme difficulties. Design volumes approach the limit of walking capacity.
F	> 75	Walking speeds are severely restricted. Forward progress is made by shuffling. Cross and reverse movements are virtually impossible. Space is more characteristic of queued pedestrians than of moving pedestrian streams.

7.3.4 The results of the LOS assessment of the walkway are tabulated in **Table 7.3** below:

Table 7.3: Level of Service (LOS) of Footpaths

Location (1)	Clear Width (m) (2)	(Hidden Information)	LOS
1	4.9		A
2	1.5		C
4	3.0		A

Notes:
1. Please refer to Figure 1.1 for the location of the assessed pedestrian facilities.
2. Critical section is selected for assessment purpose
3. Computed based on effective width, by assuming 0.5m lateral clearance on both sides.

7.3.5 The results indicate that the critical walkways will be operating satisfactorily with LOS C or better, even without the additional pedestrian connection of the new footbridge.

Assessment of Pedestrian Crossing

7.3.6 The critical pedestrian crossing is assessed based on a capacity of 1,900 peds/metre/hr as defined in the Transport Planning and Design Manual (TPDM). The results are shown in **Table 7.4.**

Table 7.4: Performance of Pedestrian Crossing

Crossing (1)	Cycle Time (secs)	Pedestrian Green Time (secs)	Green Time Proportion	Clear Width (m)	(Hidden Information)	V/C ratio
3	60	16	0.27	3.50		0.62

Notes:
1. Please refer to **Figure 7.1** for the location of the assessed pedestrian facilities.

7.3.7 The results indicate that the crossing will be operating satisfactorily with ample spare capacity, even without the additional pedestrian connection of the new footbridge.

7.4 Walking Distance and Time Analysis

Additional Footbridge Landing to New NT Bound Bus Stop at Ma On Shan Road Northbound Slip Road

7.4.1 Considering the provision of additional direct pedestrian connection of new footbridge to the proposed new bus stop at Ma On Shan Road northbound slip road, the walking distance between the bus stop and SSF site will be reduced by avoiding the detour via footpaths along Hang Tai Road, while minimal impact to the walking distance between the bus stop and the existing Yan On Estate / PRH site is observed.

7.4.2 Walking distances from SSF site to the northbound bus stop, with and without the additional direct pedestrian connection of new footbridge are compared. As shown in below **Figure 7.6** illustrating the pedestrian routings, the walking distance would be reduced by approximate 115m by using the additional direct pedestrian connection. Based on average walking speed of 1.2m/sec, the walking time can be reduced by approximate 2min and the time required to wait at the at-grade pedestrian crossings across Hang Tai Road and Hang Chi Street will also be eliminated.

7.4.3 Based on the passenger forecast as presented in **Figure 7.5**, at least 280 passengers (between SSF and NT bound bus stop) will be benefited in the peak hour.

7.4.4 In view of the weather proof condition, it is anticipated that some PRH and Yan On Estate trips will also use the additional direct pedestrian connection, though the walking distance via the new footbridge is a bit longer.

(Hidden Information)

7.4.5 The pedestrian flow using the at-

grade crossing no. 3 across Hang Tai Road and crossing across Hang Chi Street will be reduced (Hidden Information) (i.e decrease of 38%); and (Hidden Information) (i.e decrease of 57%) respectively.

Study on Footbridge Extension to New Urban Bound Bus Stop at Ma On Shan Road Southbound

7.4.6 Study is carried out to investigate the implication to walking distance and time due to the new footbridge from SSF site to the new urban bound bus stop at Ma On Shan Road southbound, it is observed that the walking distance of either using at-grade footpath or the footbridge extension would be similar, and there is insignificant change to walking time. **Figure 7.8** shows the pedestrian routings of using at-grade footpath and the footbridge extension.

7.5 Safety Consideration

Additional Footbridge Landing to New NT Bound Bus Stop at Ma On Shan Road Northbound Slip Road

7.5.1 The introduction of additional footbridge landing could enhance the connectivity and reduce walking distance and time (by 115m and 2min) to the bus stop, especially for residents of SSF site. The pedestrian demand using the at-grade crossing will also be significantly reduced by about 38%. In addition, the use of pedestrian crossings (i.e. across Hang Tai Road, Hang Chi Street and the existing car park access at Hang Chi Street) will be minimized. It means the pedestrian and vehicle conflict will be greatly reduced, so as the risk of traffic accident, and thus enhance road safety.

Additional Footbridge Extension to New Urban Bound Bus Stop at Ma On Shan Road Southbound

7.5.2 The footbridge extension will reduce the utilization of the proposed at-grade cautionary crossing at the vehicular access of SSF Site. It is noted that the speed limit of Ma On Shan Road southbound slip road is 50km/hr, and desirable minimum sight distance of 70m (as per TPDM Vol. 2 Ch. 3.7 Table 3.7.3.2) will be provided for both approaching motorists and crossing pedestrians. In addition, vehicle gates will be provided at the aforesaid access, so that slow speed of vehicle at the concerned crossing is expected. Refuge island will also be provided in the middle of the carriageway for pedestrian waiting. It is therefore considered desirable to maintain the at-grade cautionary crossing in traffic safety viewpoint.

7.5.3 In addition, appropriate road marking (e.g. "Look Left Look Right" at the crossing; and "Slow and yellow bar marking" along the approaching slip road) and traffic sign (e.g. "Slow" and "Crossing Ahead") shall be installed to ensure safety. Details of road marking and traffic sign shall be further developed in detailed design stage.

7.6 Summary

7.6.1 For the NT bound bus stop on Ma On Shan Road northbound, although the performance assessment results showed that the at-grade pedestrian facilities will be sufficient to cater for the future pedestrian demand, even without the additional footbridge landing in place, the introduction of additional footbridge landing could enhance the connectivity and reduce walking distance and time (by 115m and 1.5min) to the bus stop, especially for residents of SSF site. The pedestrian demand using the at-grade crossing will also be significantly reduced by about 38%, and the use of pedestrian crossings (i.e. across Hang Tai Road, Hang Chi Street and the existing car park access at Hang Chi Street) will be minimized. It means the pedestrian and vehicle conflict will be greatly reduced, so as the risk of traffic accident, and thus enhance road safety.

7.6.2 Regarding the study on extending footbridge to the urban bound bus stop on Ma On Shan Road southbound, it is revealed that the at-grade footpath would operate satisfactorily at LOS A, while the walking distance and time would not be shorten by introducing the footbridge extension. The speed limit of Ma On Shan Road southbound slip road is 50km/hr, and desirable minimum sight distance of 70m (as per TPDM Vol. 2 Ch. 3.7 Table 3.7.3.2) will be provided for both approaching motorists and crossing pedestrians. In addition, vehicle gates will be provided at the aforesaid access, so that slow speed of vehicle at the concerned crossing is expected. Refuge island will also be provided in the middle of the carriageway for pedestrian waiting. Appropriate road marking and traffic sign will also be installed to ensure safety. It is therefore considered desirable to maintain the at-grade cautionary crossing in traffic safety viewpoint.

7.6.3 In view of road safety consideration, reduction of walking distance and time, it is considered that provision of additional footbridge connections to the new footbridge near the NT bound bus stop (between Yan On Estate and the proposed Subsidised Sale Flats (SSF) development at Ma On Shan Road) is recommended for implementation.

8 SUMMARY AND CONCLUSION

8.1.1 Ove Arup and Partners Hong Kong Limited (Arup) was commissioned by Hong Kong Housing Authority (HKHA) to prepare a Traffic Impact Assessment (TIA) for the road improvement works at Ma On Shan, Sha Tin.

8.1.2 The planned completion year of the aforesaid road improvement works is 2021. The road improvement works comprise of:

1. Re-alignment of Hang Tai Road;
2. Hang Fai Street Bus Lay-bys
3. New slip road from Hang Tai Road to Ma On Shan Road Northbound,
4. Additional bus lane from Ma On Shan Road Northbound to Hang Tai Road; and signalized crossing at Hang Tai Road
5. Widening of a section of Ma On Shan Road Southbound for SSF site; and
6. Junction Improvement Works at J/O Hang Shun Street/ Hang Tak Street/ A Kung Kok Street.

8.1.3 The road layout and geometry provided in the previous study has been reviewed. Enhancement to the road layout is proposed in response to local public concerns and compliance to TPDM requirement.

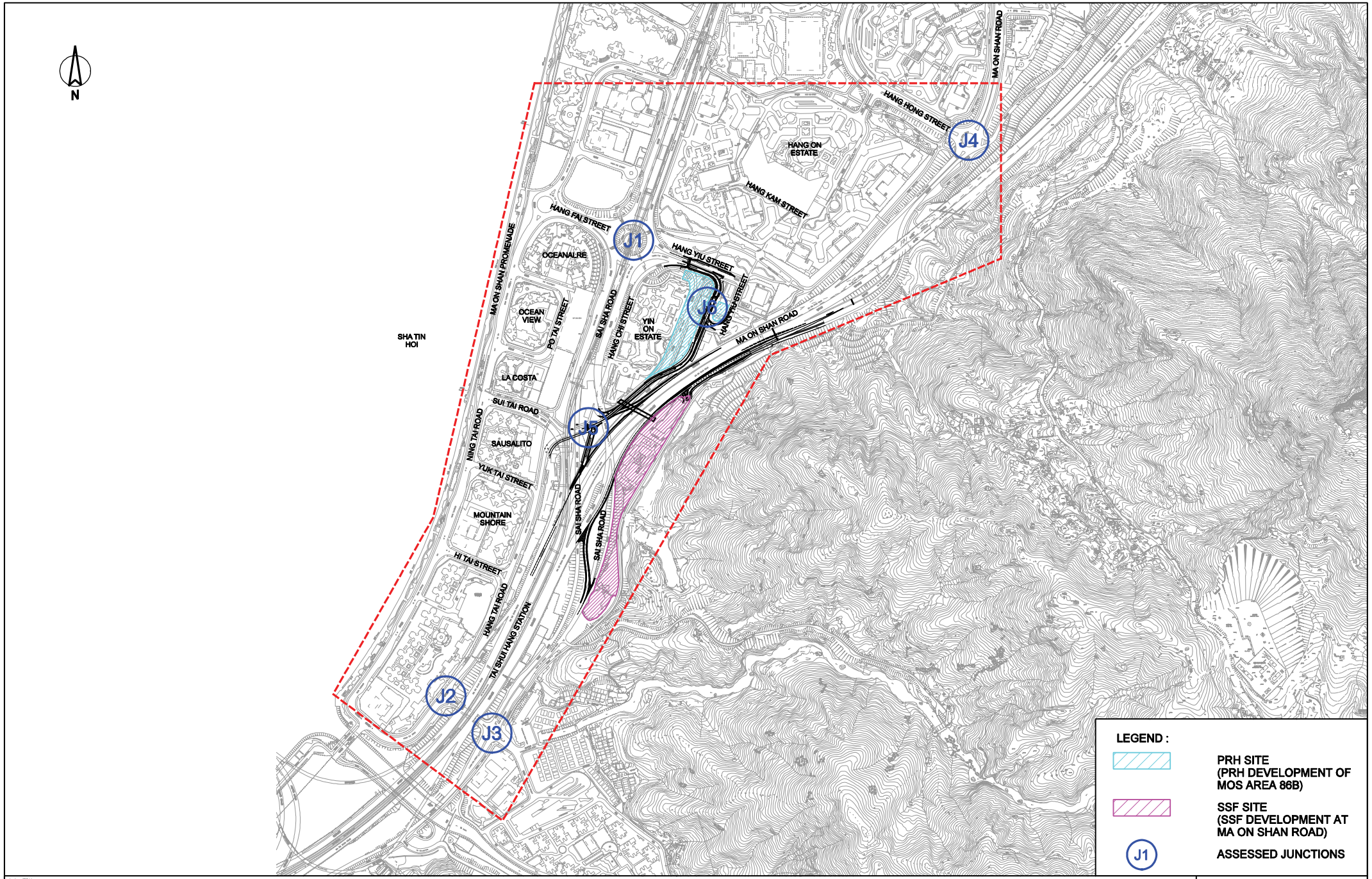
8.1.4 Junctions and links capacity assessment was undertaken. All analysed results revealed the assessed junctions and links would still be performing with ample spare capacity in Year 2021 and 2026 for both operation and construction stages.

8.1.5 Temporary traffic management scheme (TTMs) was developed to facilitate the phased construction of the proposed road improvement works. Peak volume of construction traffic was estimated. The impact of construction traffic on the road network was evaluated.

8.1.6 Pedestrian connection analysis was also undertaken. It is considered that the additional footbridge connections of the new footbridge to the proposed new bus stops at Ma On Shan Road northbound slip road will improve the pedestrian condition in view of road safety consideration, reduction of walking distance and time.

8.1.7 It is concluded that the proposed road improvement works is justifiable from the traffic point of view and complies TPDM requirement. In addition, traffic arising from the proposed works can be accommodated by the existing road network with the proposed TTMS in place.

Figures



Job Title

TRAFFIC IMPACT ASSESSMENT FOR ROAD IMPROVEMENT WORKS AT MA ON SHAN, SHA TIN

FIGURE 2.1

Date	Scale
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WTL	236072-08

Drawing Title

ASSESSED JUNCTION AND AREA OF influence (AOI)

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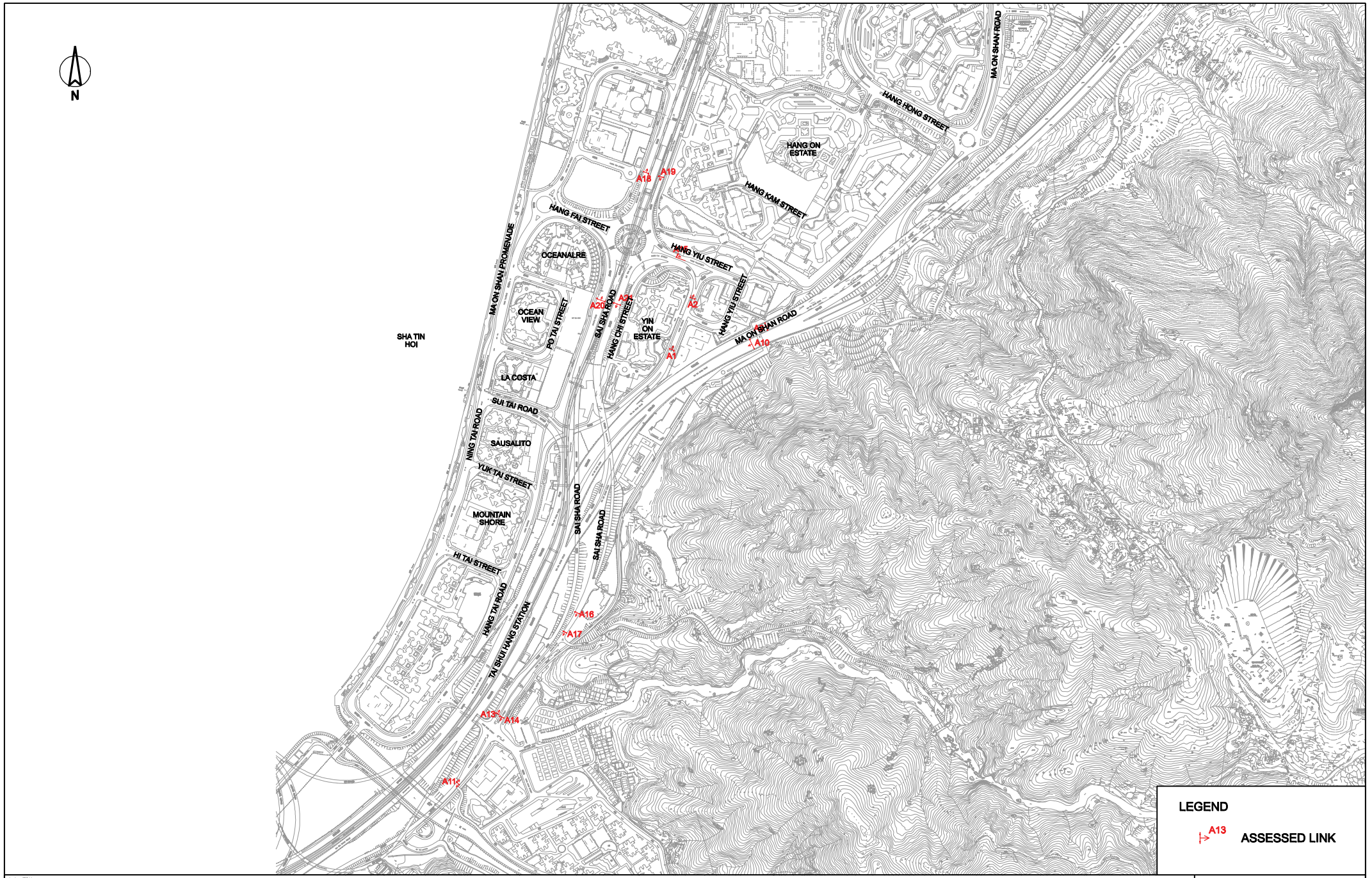

Job Title

TRAFFIC IMPACT ASSESSMENT FOR ROAD IMPROVEMENT WORKS AT MA ON SHAN, SHA TIN

FIGURE 2.2

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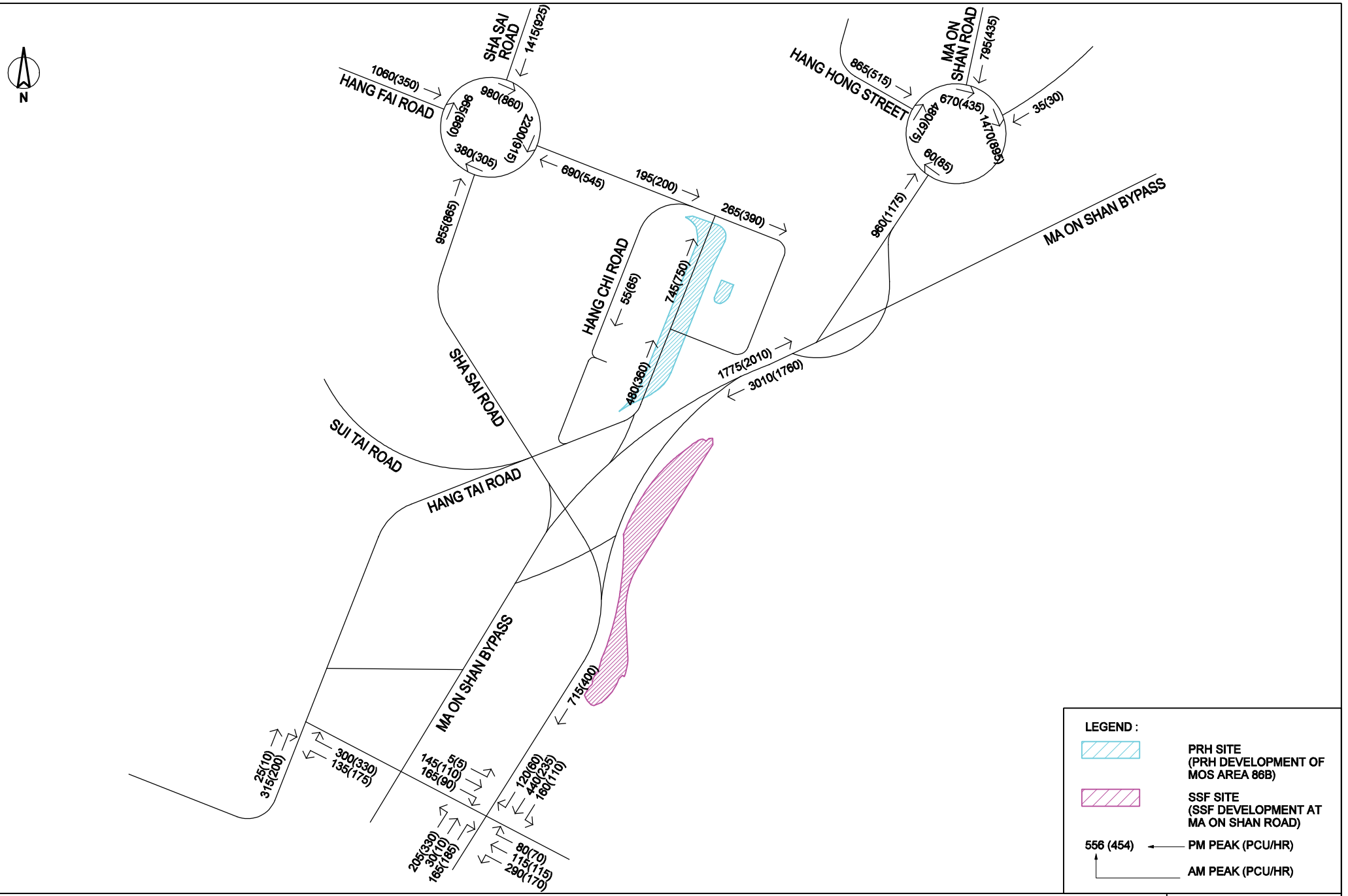

Job Title

TRAFFIC IMPACT ASSESSMENT FOR ROAD IMPROVEMENT WORKS AT MA ON SHAN, SHA TIN

FIGURE 2.3

Date	Scale
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Drawn	Job No.
WTL	236072-08

Drawing Title

2015 EXISTING TRAFFIC FLOWS

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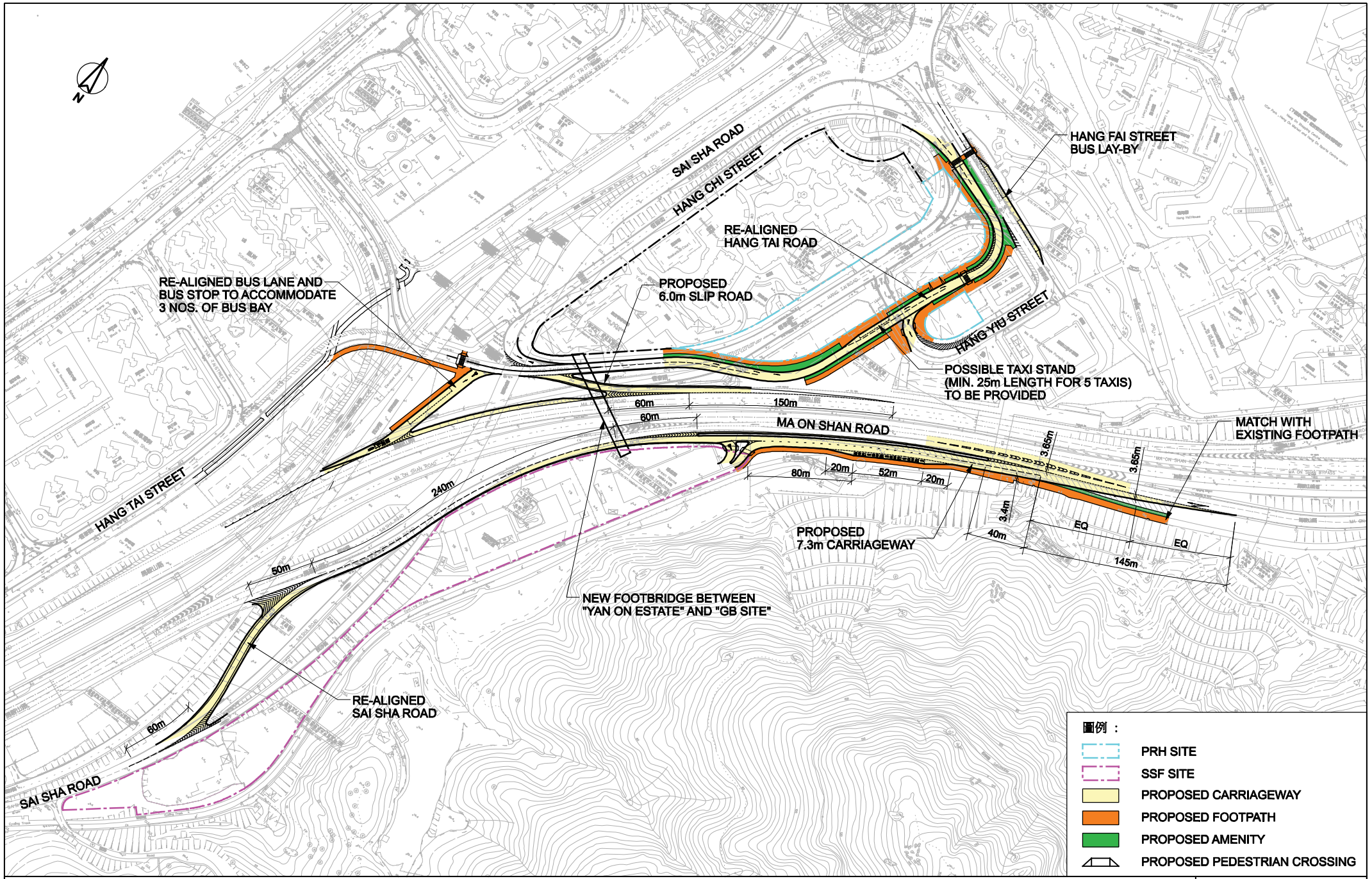

Job Title
TRAFFIC IMPACT ASSESSMENT FOR ROAD IMPROVEMENT WORKS AT MA ON SHAN, SHA TIN

FIGURE 3.1

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WTL	236072-08

Drawing Title
PROPOSED ROAD MODIFICATION

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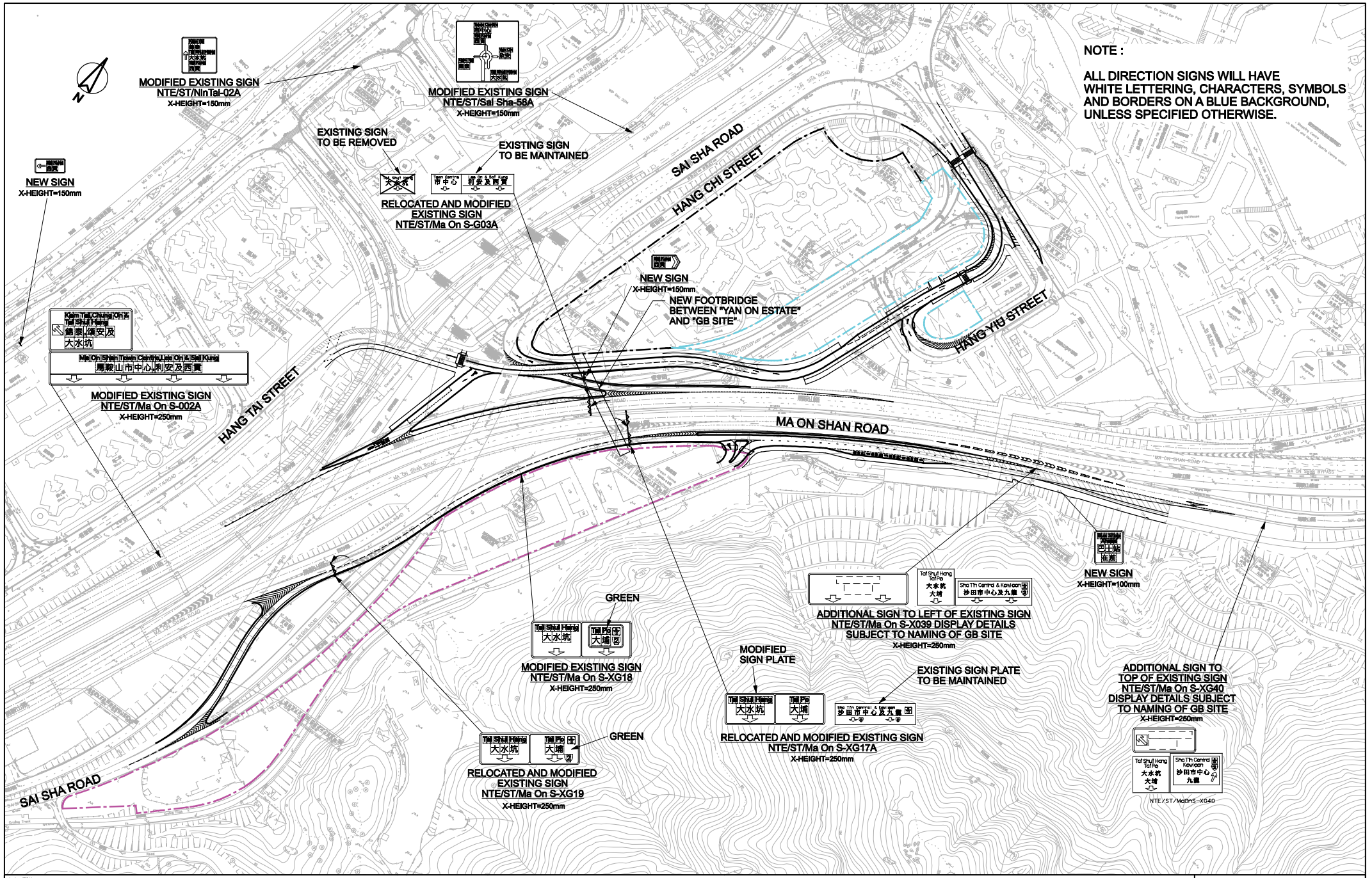

Job Title

TRAFFIC IMPACT ASSESSMENT FOR ROAD IMPROVEMENT WORKS AT MA ON SHAN, SHA TIN

FIGURE 3.2

Date	Scale
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Drawn	Job No.
WTL	236072-08

Drawing Title

PROPOSED DIRECTIONAL SIGN ARRANGEMENT

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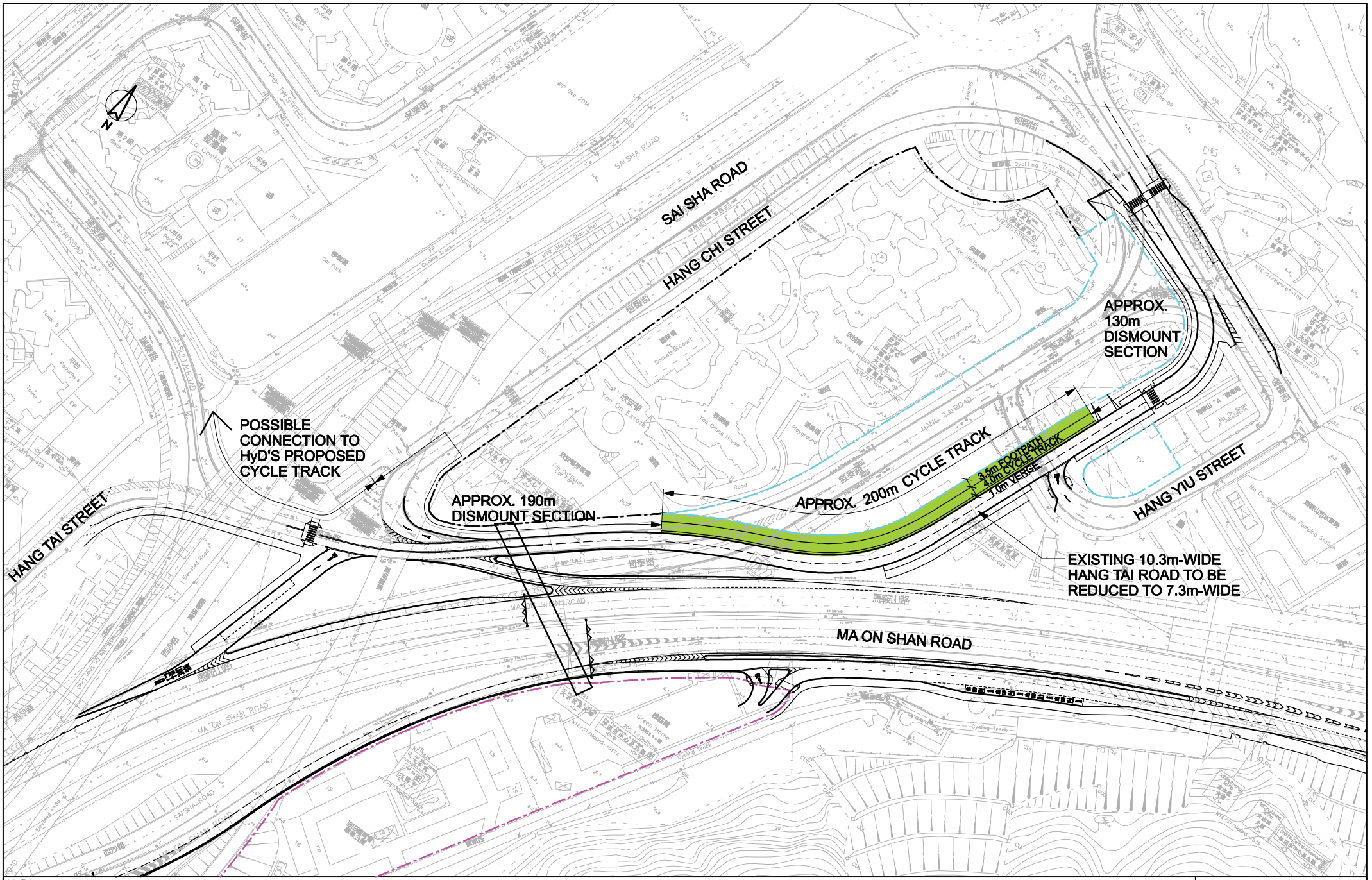

Job Title

TRAFFIC IMPACT ASSESSMENT FOR ROAD IMPROVEMENT WORKS AT MA ON SHAN, SHA TIN

FIGURE 3.3

Date	Scale
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WTL	236072-08

Drawing Title

FEASIBILITY STUDY ON CYCLE TRACK EXTENSION - OPTION 1

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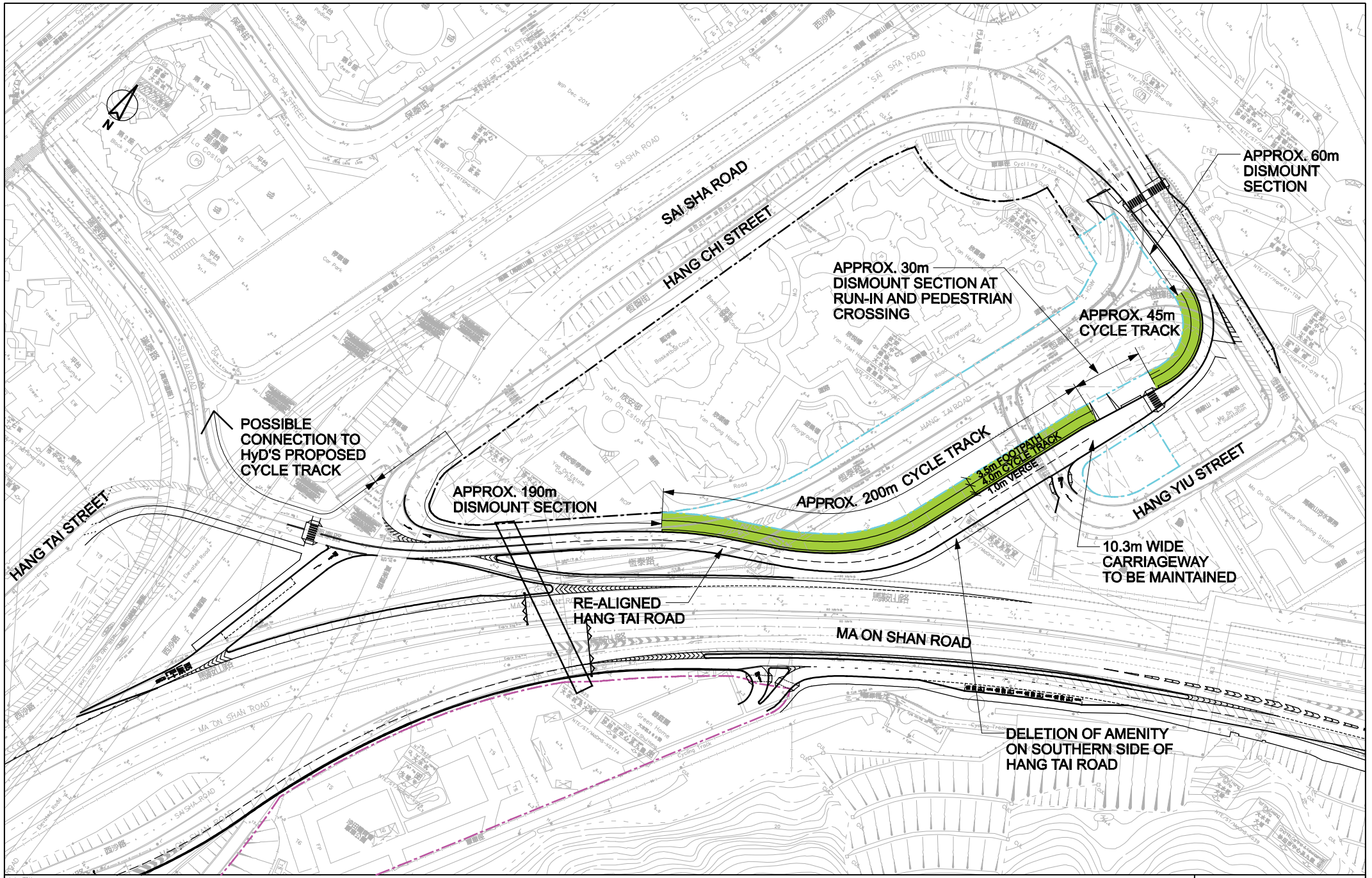

Job Title

TRAFFIC IMPACT ASSESSMENT FOR ROAD IMPROVEMENT WORKS AT MA ON SHAN, SHA TIN

FIGURE 3.4

Date	Scale
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WTL	236072-08

Drawing Title

FEASIBILITY STUDY ON CYCLE TRACK EXTENSION - OPTION 2

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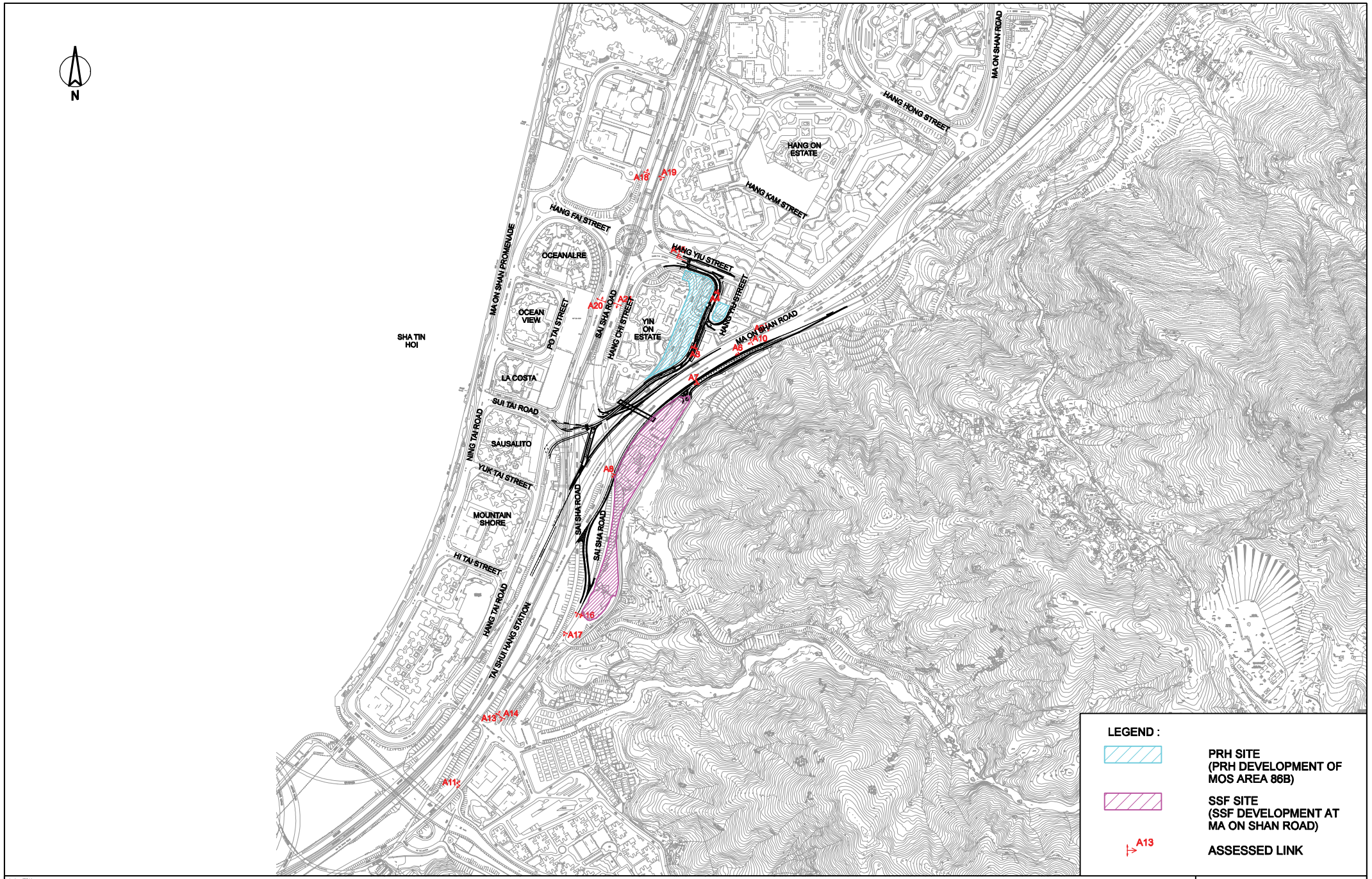

Job Title

TRAFFIC IMPACT ASSESSMENT FOR ROAD IMPROVEMENT WORKS AT MA ON SHAN, SHA TIN

FIGURE 4.5

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Drawn	Job No.
WTL	236072-08

Drawing Title

V/C LINK INDEX FOR DESIGN CASE

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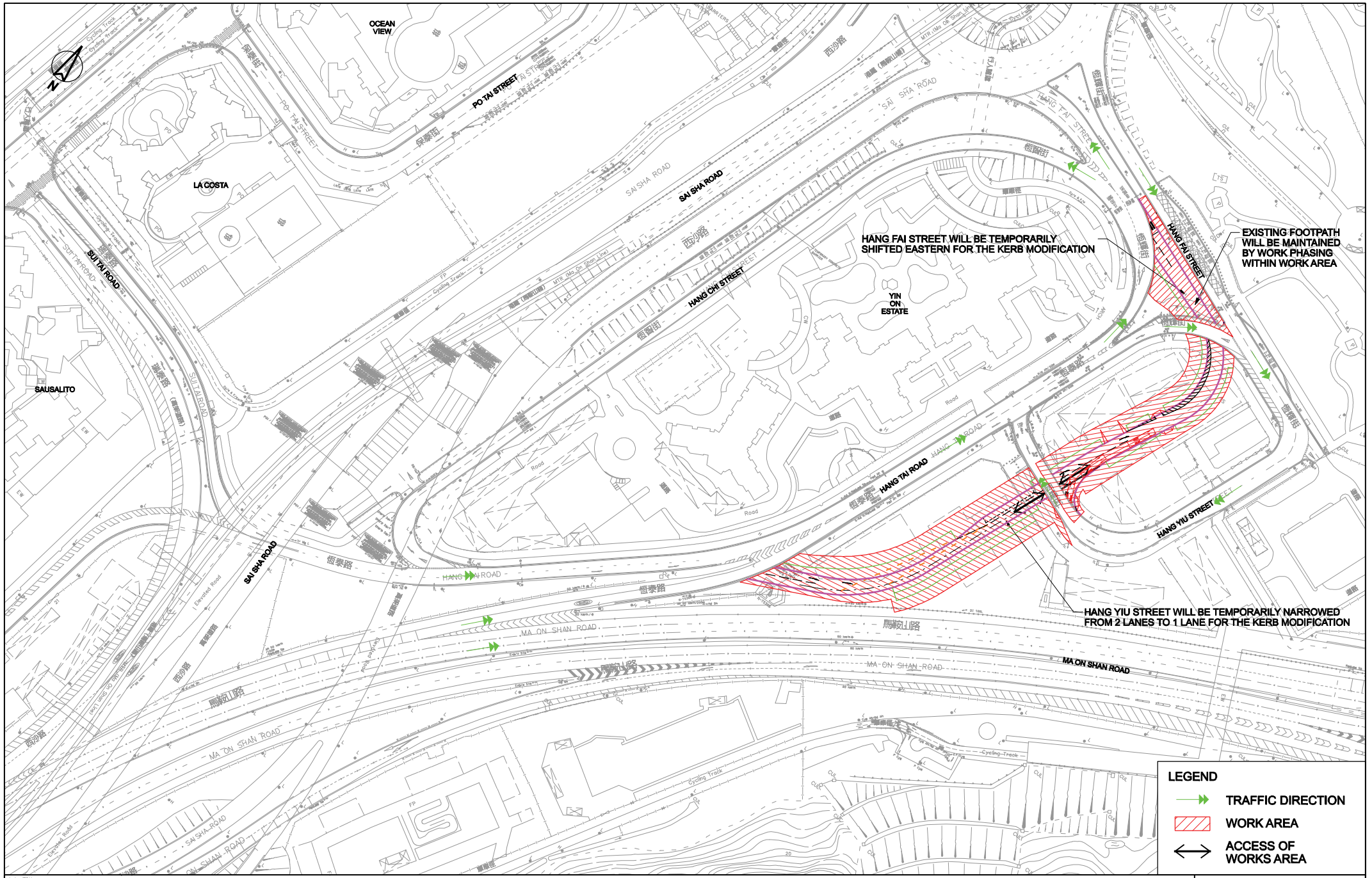

Job Title

TRAFFIC IMPACT ASSESSMENT FOR ROAD IMPROVEMENT WORKS AT MA ON SHAN, SHA TIN

FIGURE 5.1A

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WTL	236072-08

Drawing Title

TTMS FOR REALIGNMENT OF HANG TAI ROAD AND ADDITIONAL SLIP ROAD TO MA ON SHAN ROAD NORTHBOUND (STAGE 1)

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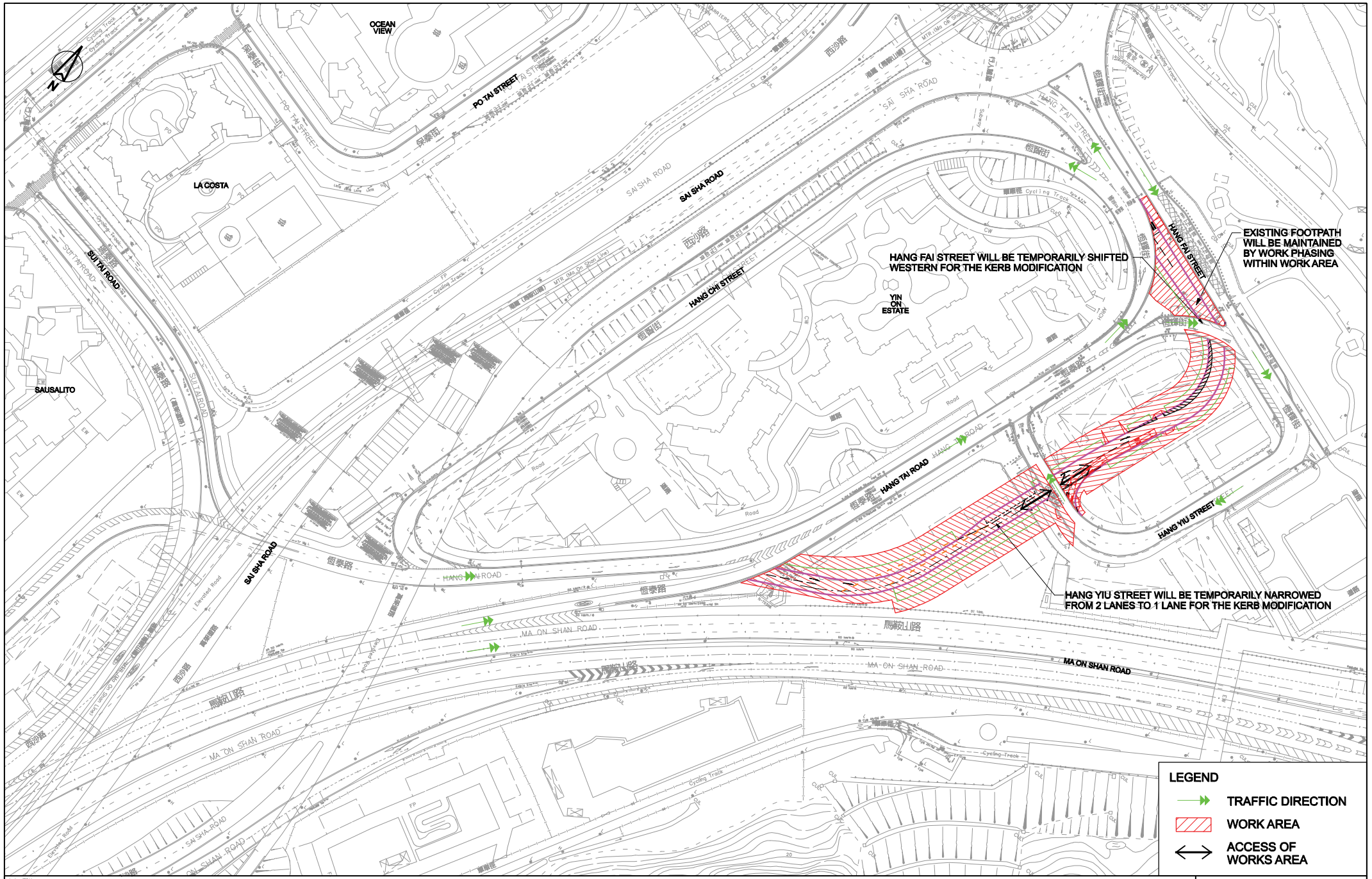

Job Title

TRAFFIC IMPACT ASSESSMENT FOR ROAD IMPROVEMENT WORKS AT MA ON SHAN, SHA TIN

FIGURE 5.1B

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Drawn	Job No.
WTL	236072-08

Drawing Title

TTMS FOR REALIGNMENT OF HANG TAI ROAD AND ADDITIONAL SLIP ROAD TO MA ON SHAN ROAD NORTHBOUND (STAGE 1)

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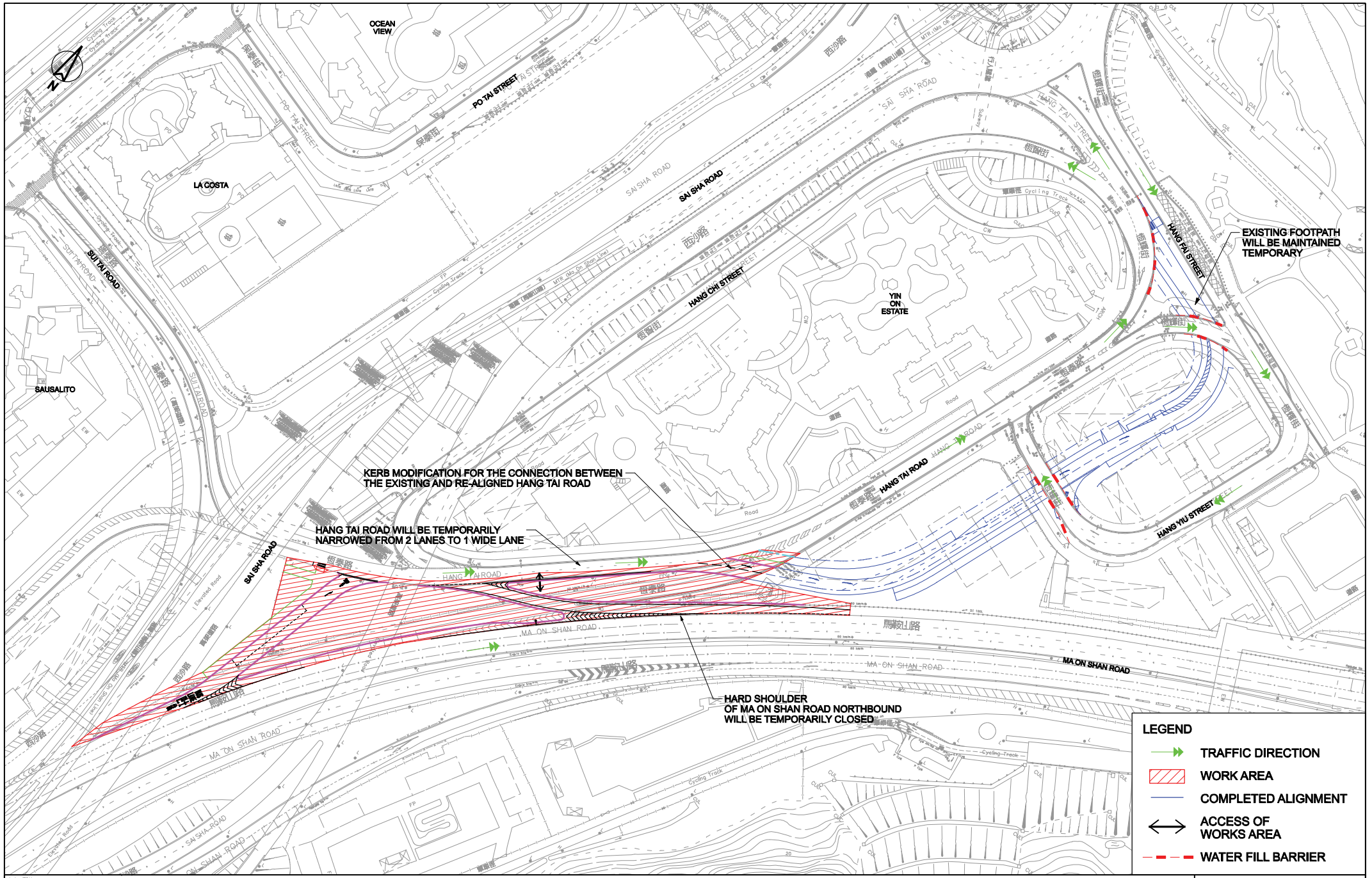

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Job Title
TRAFFIC IMPACT ASSESSMENT FOR ROAD IMPROVEMENT WORKS AT MA ON SHAN, SHA TIN

FIGURE 5.2

Date	Scale
DEC 2016	1:1500 @ A3
Drawn	Job No.
WTL	236072-08

Drawing Title
TTMS FOR REALIGNMENT OF HANG TAI ROAD AND ADDITIONAL SLIP ROAD TO MA ON SHAN ROAD NORTHBOUND (STAGE 2)

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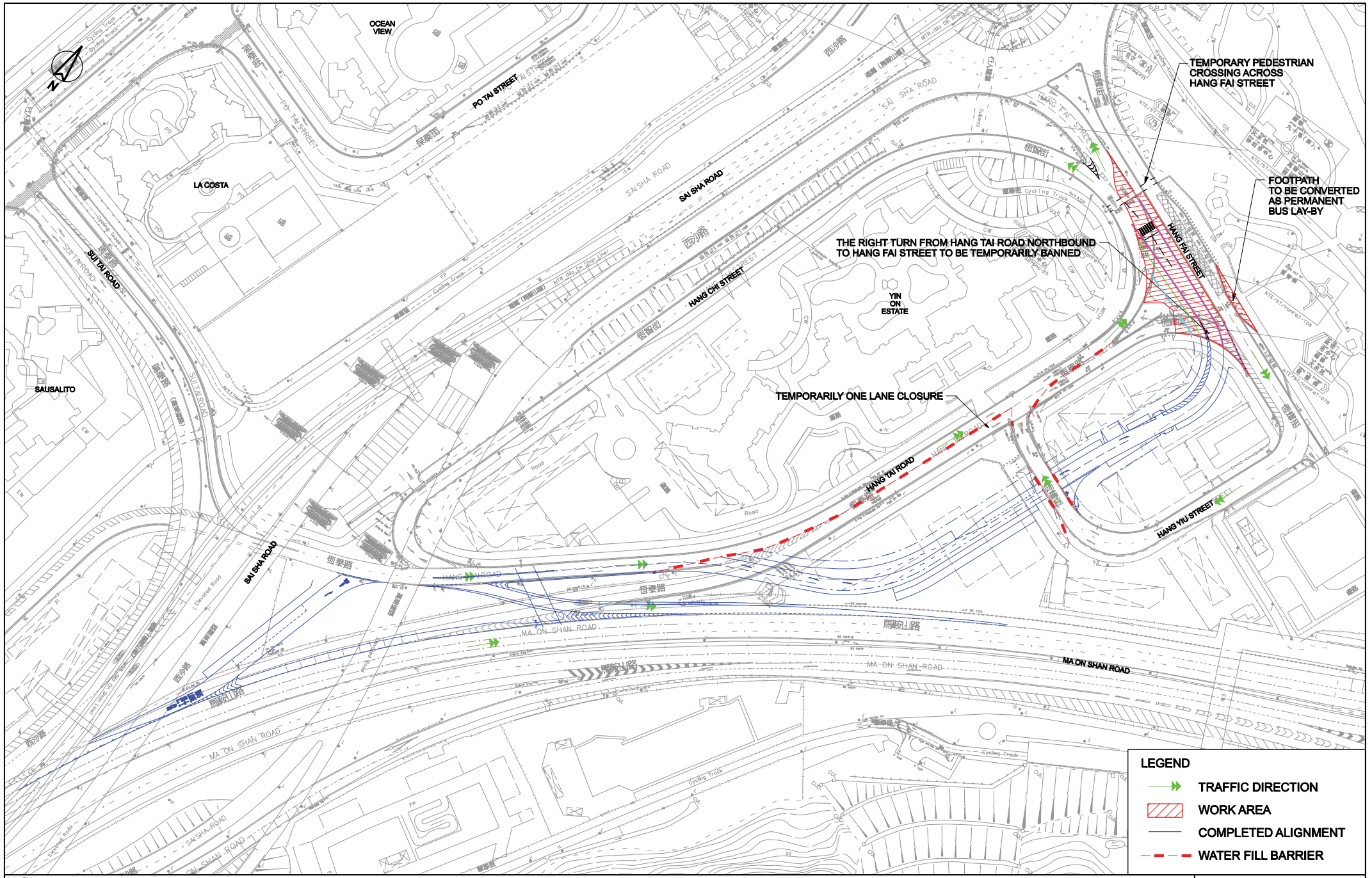

Job Title

TRAFFIC IMPACT ASSESSMENT FOR ROAD IMPROVEMENT WORKS AT MA ON SHAN, SHA TIN

FIGURE 5.3

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DEC 2016	1:1500 @ A3
Drawn	Job No.
WTL	236072-08

Drawing Title

TTMS FOR REALIGNMENT OF HANG TAI ROAD AND ADDITIONAL SLIP ROAD TO MA ON SHAN ROAD NORTHBOUND (STAGE 3)

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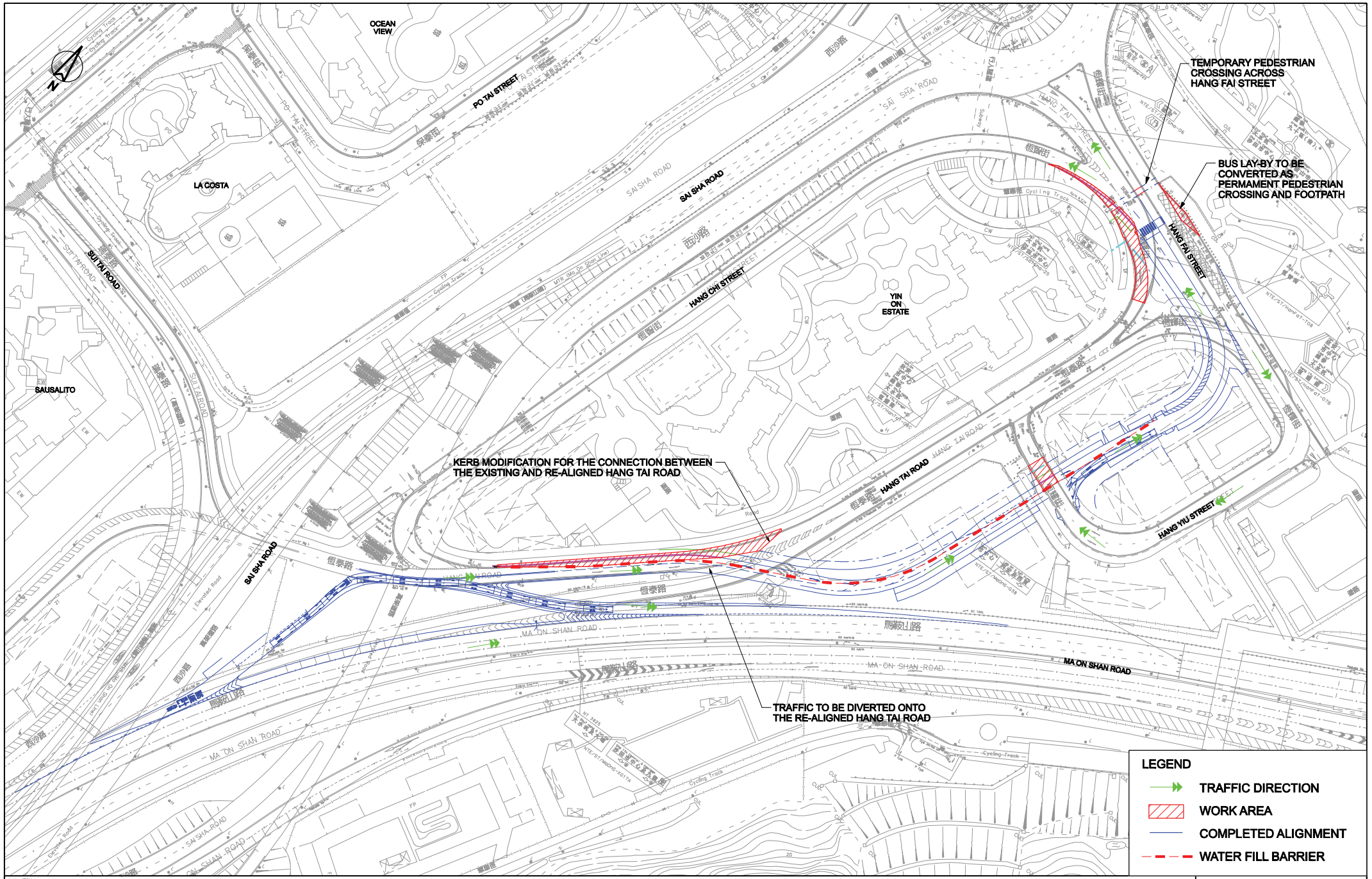

Job Title

TRAFFIC IMPACT ASSESSMENT FOR ROAD IMPROVEMENT WORKS AT MA ON SHAN, SHA TIN

FIGURE 5.4

Date	Scale
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WTL	236072-08

Drawing Title

TTMS FOR REALIGNMENT OF HANG TAI ROAD AND ADDITIONAL SLIP ROAD TO MA ON SHAN ROAD NORTHBOUND (STAGE 4)

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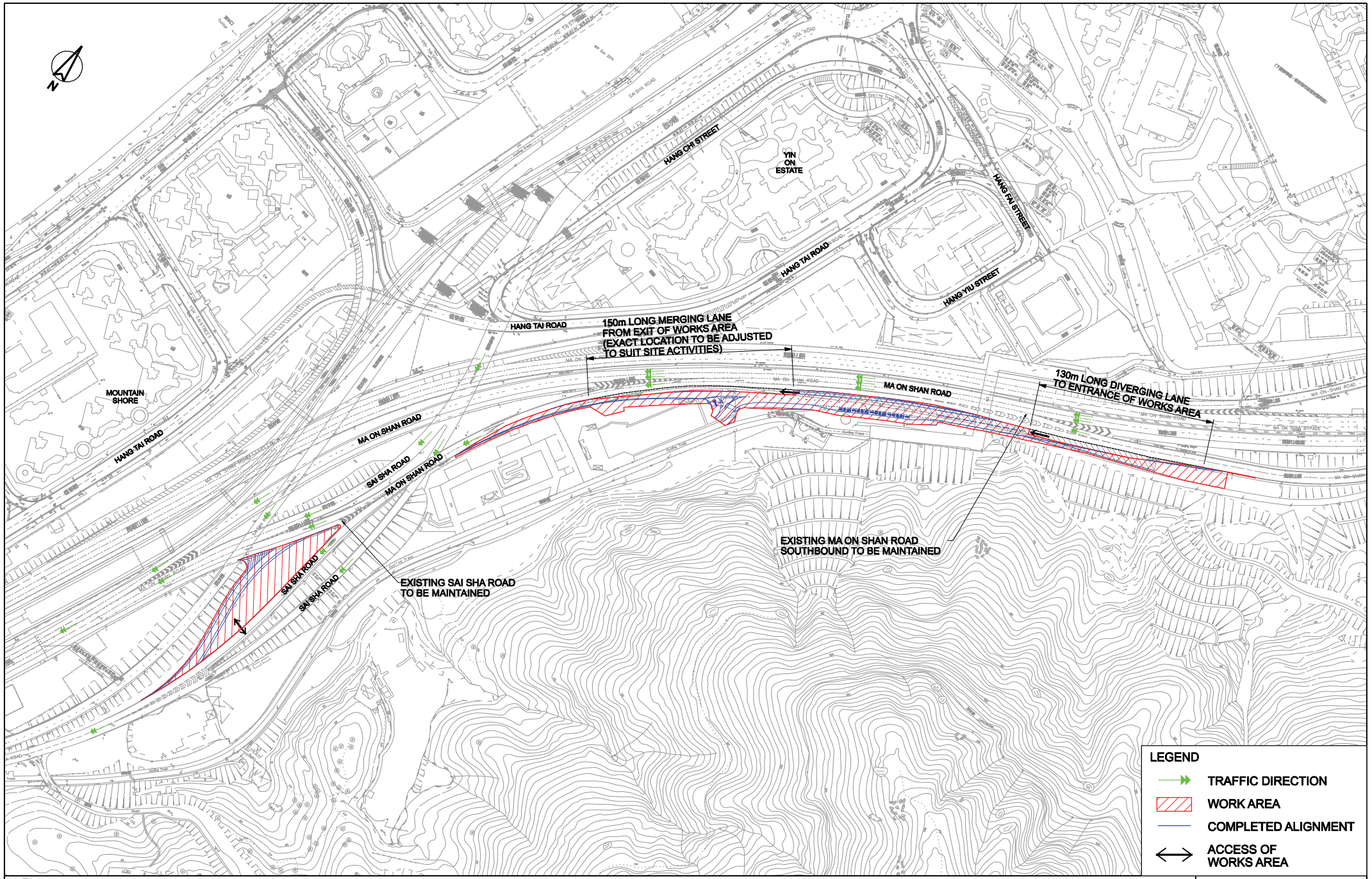

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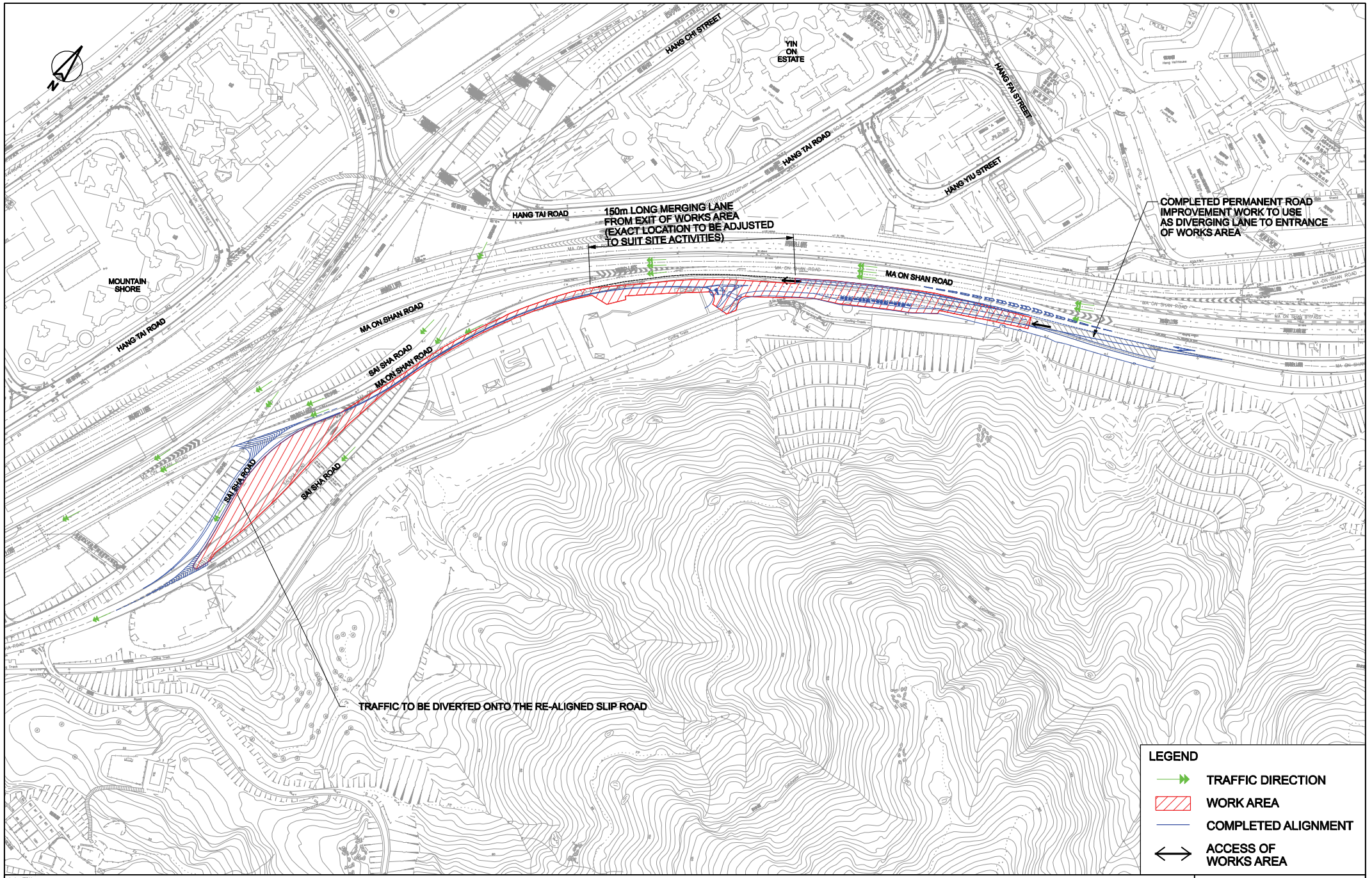
Job Title
TRAFFIC IMPACT ASSESSMENT FOR ROAD IMPROVEMENT WORKS AT MA ON SHAN, SHA TIN

FIGURE 5.11

Date	Scale
DEC 2016	1:1500 @ A3
Drawn	Job No.
WTL	236072-08

Drawing Title
TTMS FOR CONSTRUCTION OF NEW SLIP ROAD FOR SSF SITE (STAGE 1)

ARUP



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Job Title
TRAFFIC IMPACT ASSESSMENT FOR ROAD IMPROVEMENT WORKS AT MA ON SHAN, SHA TIN

FIGURE 5.12

Date	Scale	Drawing Title
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Drawn	Job No.	
WTL	236072-08	

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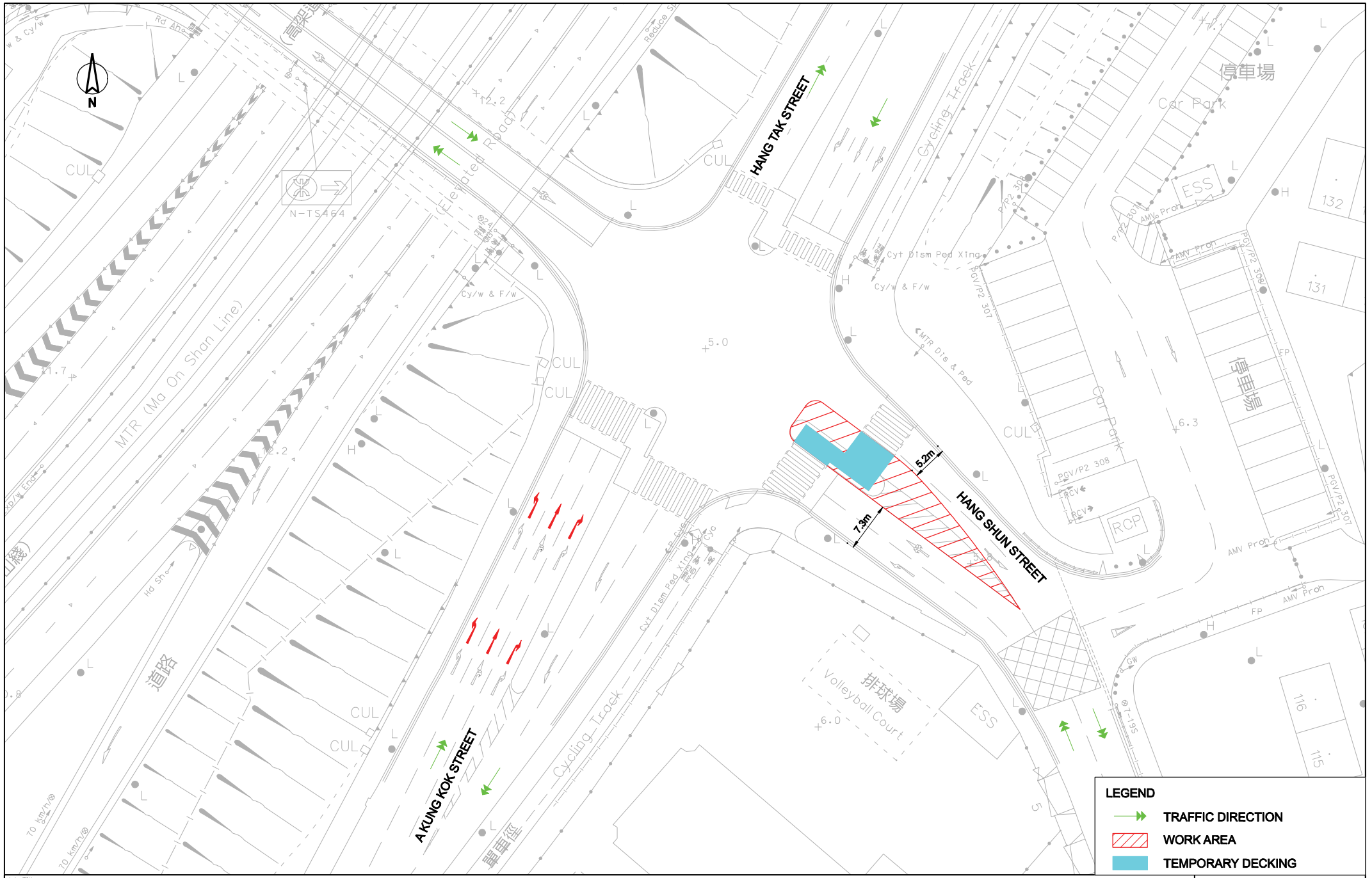

Job Title

TRAFFIC IMPACT ASSESSMENT FOR ROAD IMPROVEMENT WORKS AT MA ON SHAN, SHA TIN

FIGURE 5.21

Date	Scale
DEC 2016	1:500 @ A3
Drawn	Job No.
WTL	236072-08

Drawing Title

TTMS FOR JUNCTION IMPROVEMENT WORKS AT J/O HANG SHUN STREET / HANG TAK STREET / A KUNG KOK STREET

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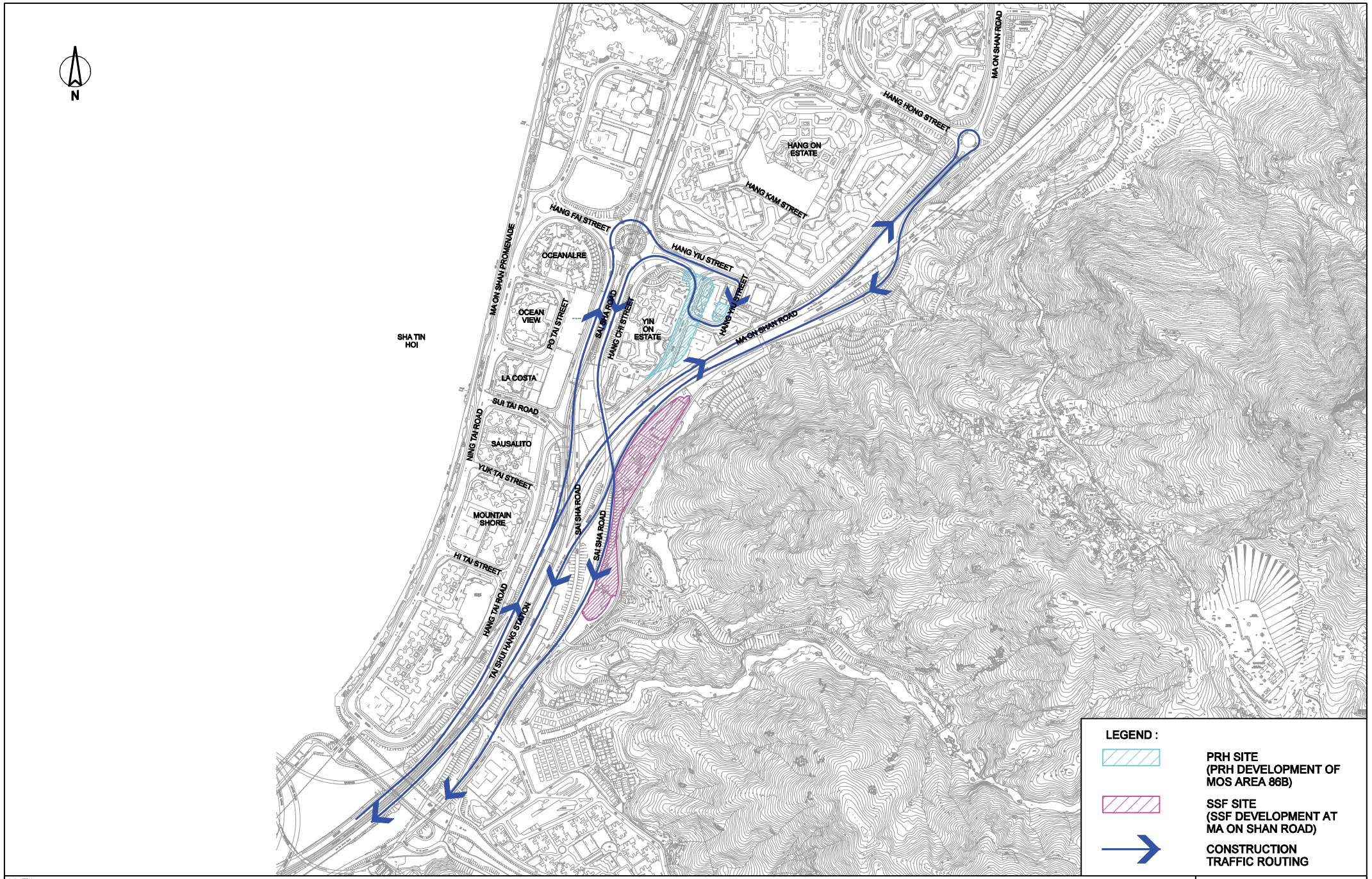


PRINTED BY: wing-tung.au 12/29/2016 9:45:36 AM
FILENAME: \\hkgnts69\Traffic\Drawing\230000\236072-08 A15 Road Improvement Works at Ma On Shan\Drawing\2016\04\ROAD LAYOUT\Fig 6.1.dgn

Job Title
TRAFFIC IMPACT ASSESSMENT FOR ROAD IMPROVEMENT WORKS AT MA ON SHAN, SHA TIN

FIGURE 6.1

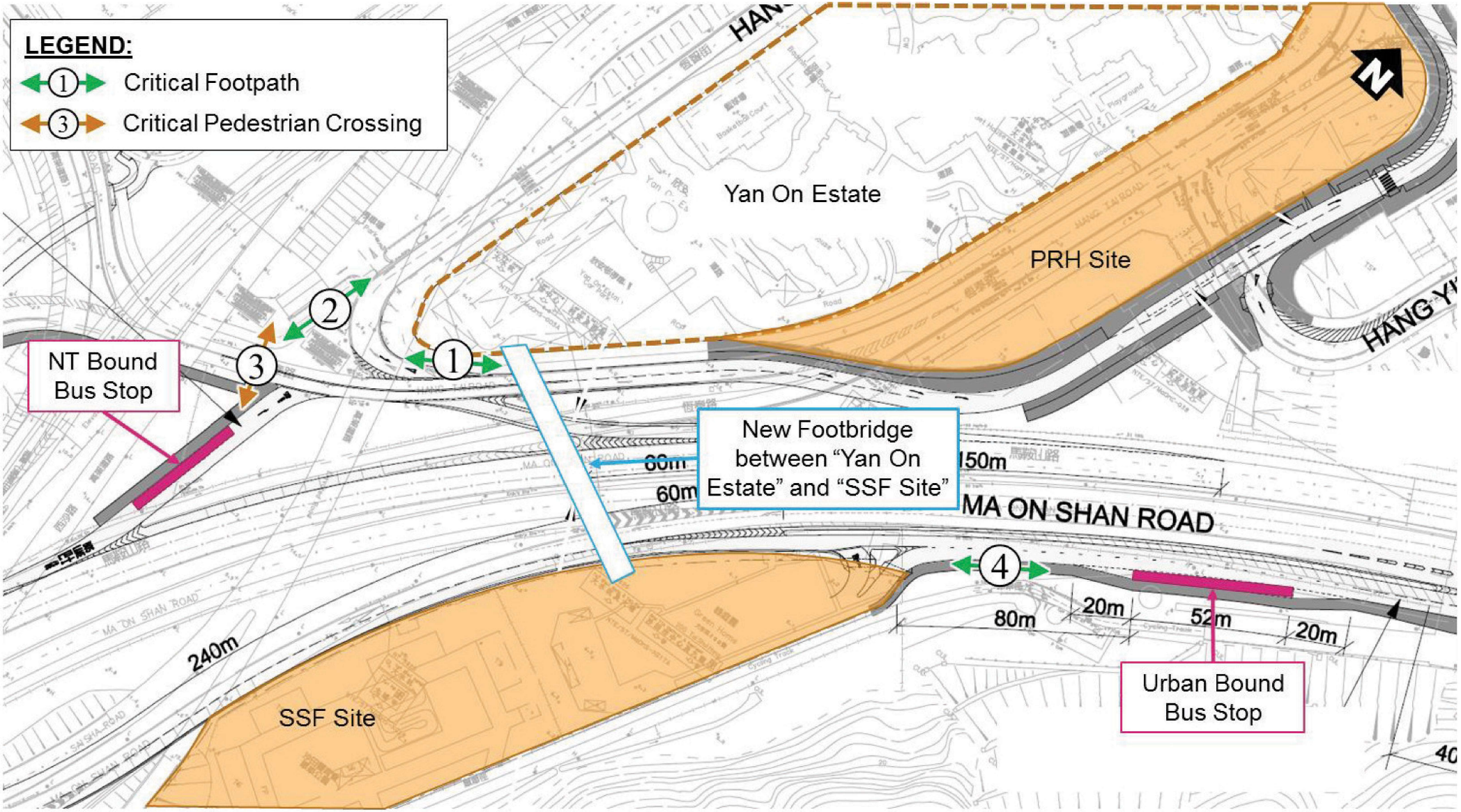
Date	Scale
DEC 2016	1:7000 @ A3
Drawn	Job No.
WTL	236072-08

Drawing Title
PROPOSED CONSTRUCTION TRAFFIC ROUTING

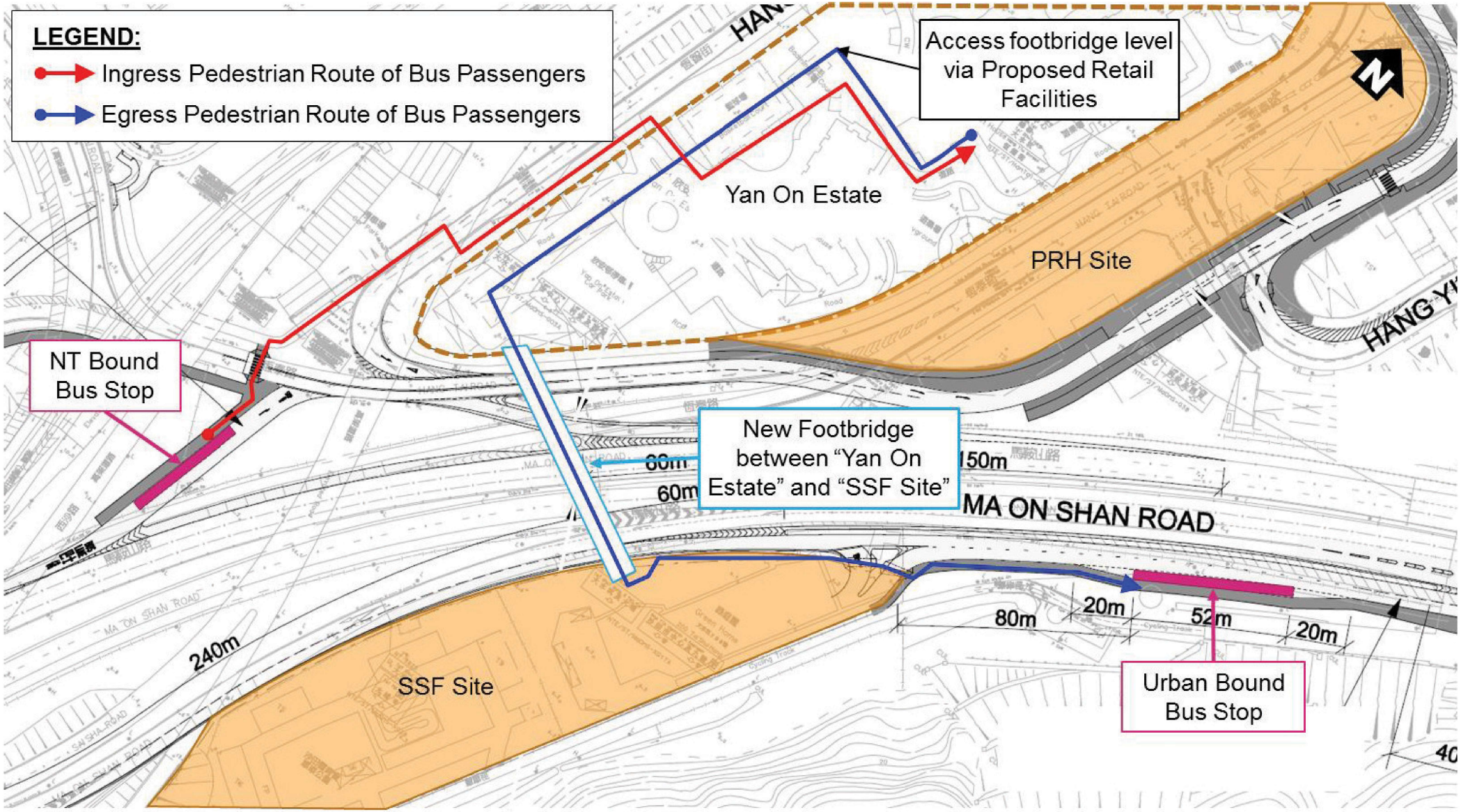
ARUP

(Hidden Information)

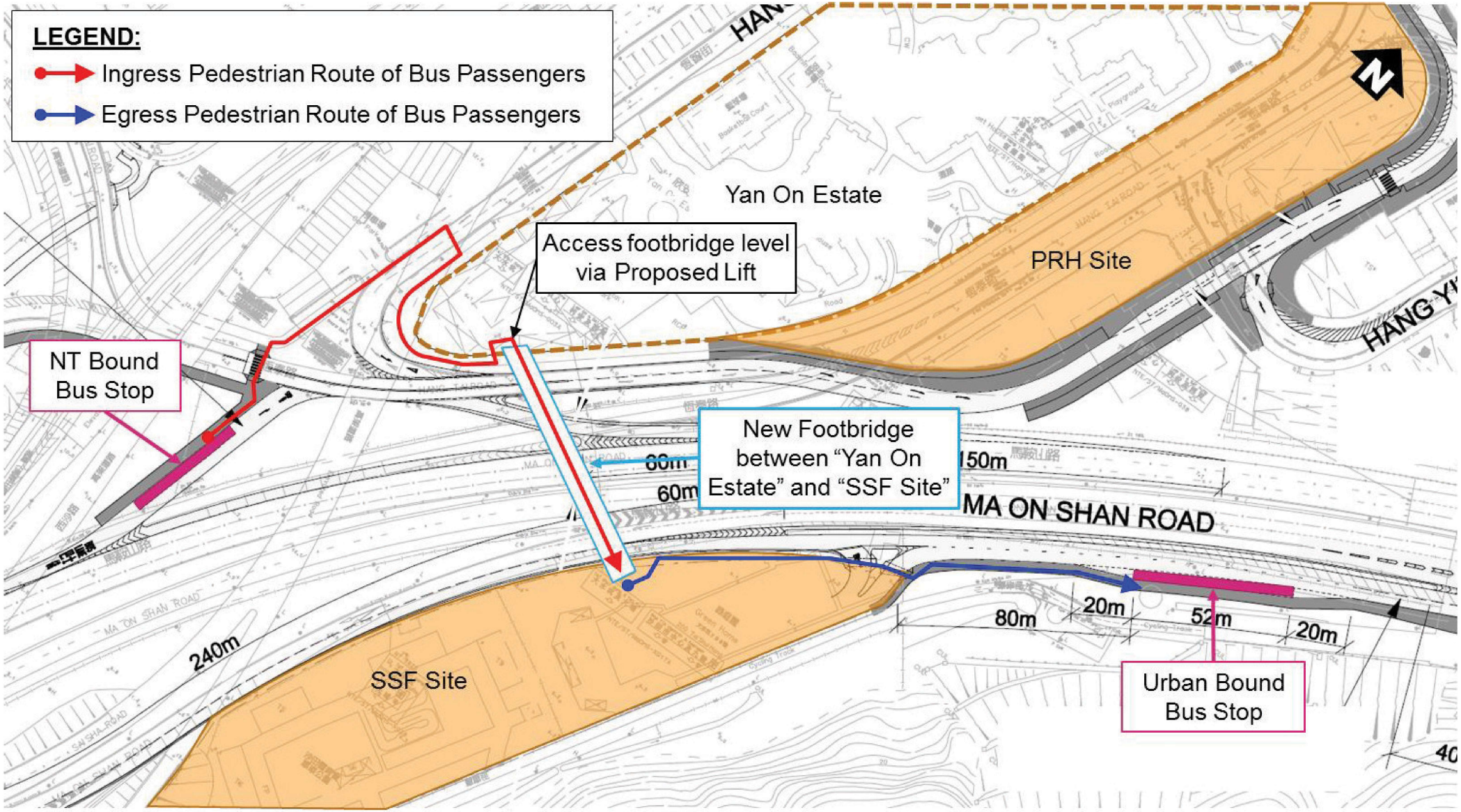
(Hidden Information)



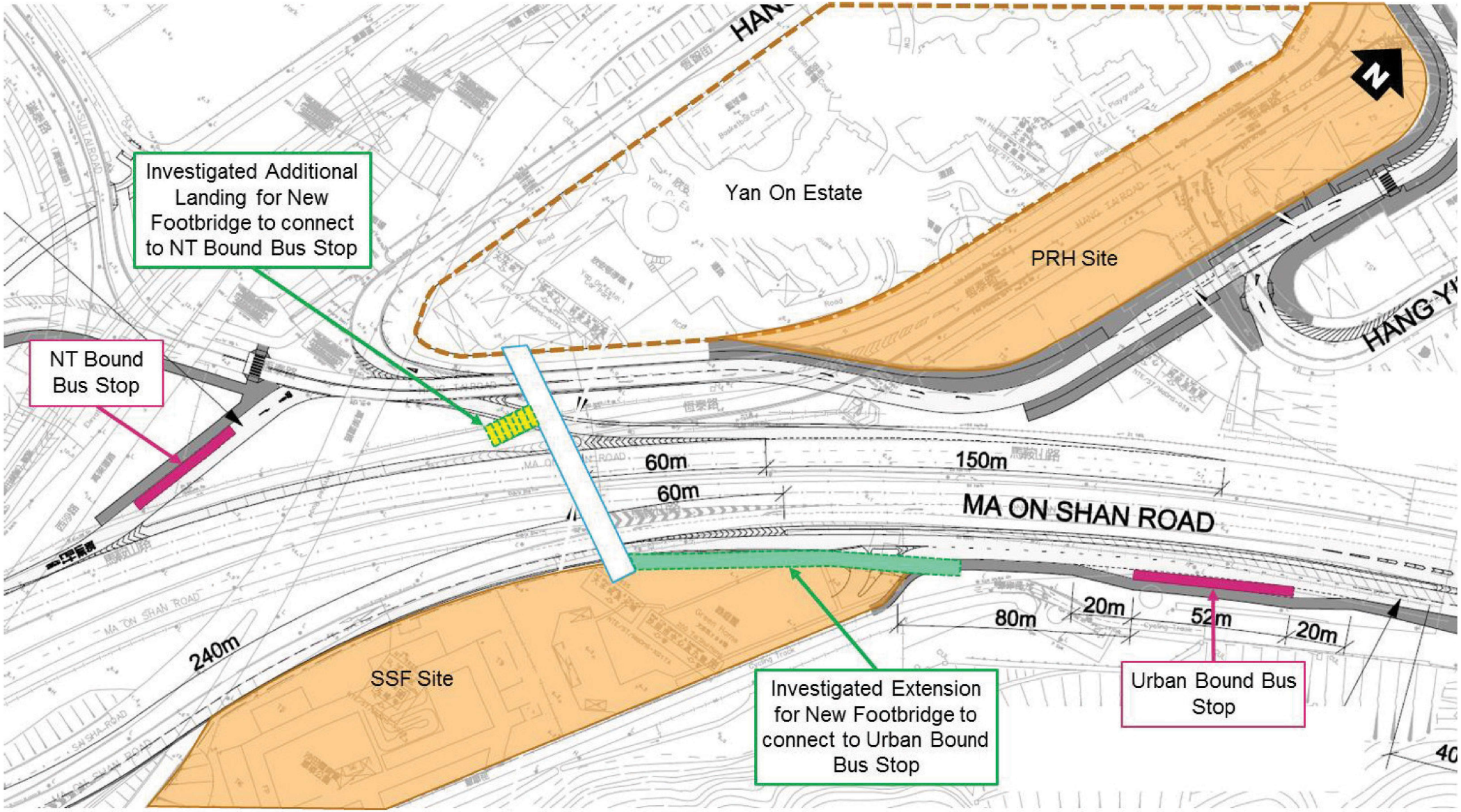
Job Title: TRAFFIC IMPACT ASSESSMENT FOR ROAD IMPROVEMENT WORKS AT MA ON SHAN, SHA TIN		FIGURE 7.1
Date: 10/2017	Scale: N.T.S.	Drawing Title: LOCATIONS OF CRITICAL FOOTPATH AND PEDESTRIAN CROSSING
Drawn: CYRL	Job No.: 236072-08	ARUP



Job Title: TRAFFIC IMPACT ASSESSMENT FOR ROAD IMPROVEMENT WORKS AT MA ON SHAN, SHA TIN		FIGURE 7.2
Date: 10/2017	Scale: N.T.S.	Drawing Title: PEDESTRIAN ROUTES OF BUS PASSENGERS FOR YAN ON ESTATE AND PRH SITE
Drawn: CYRL	Job No.: 236072-08	ARUP

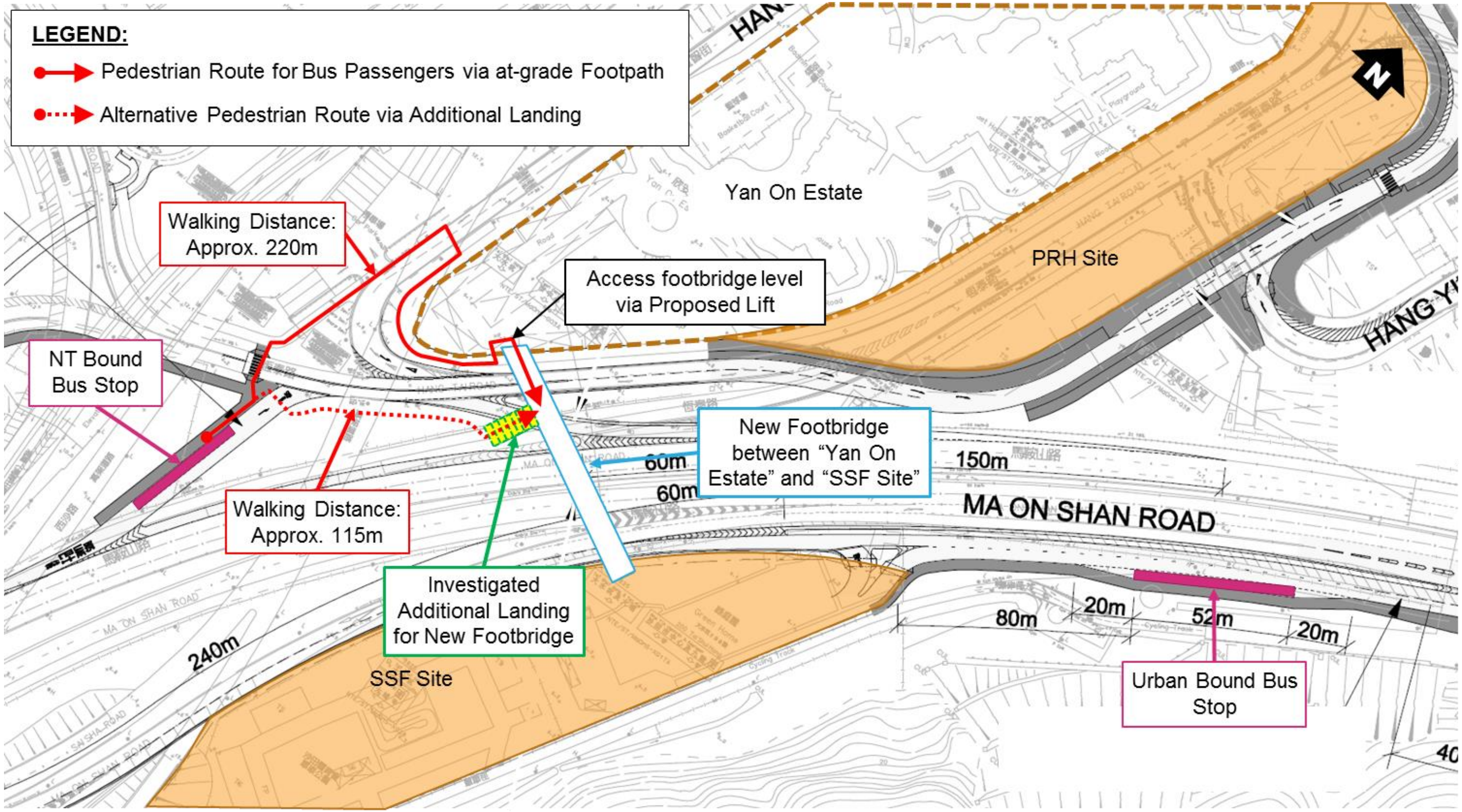


Job Title: TRAFFIC IMPACT ASSESSMENT FOR ROAD IMPROVEMENT WORKS AT MA ON SHAN, SHA TIN		FIGURE 7.3
Date: 10/2017	Scale: N.T.S.	Drawing Title: PEDESTRIAN ROUTES OF BUS PASSENGERS FOR SSF SITE
Drawn: CYRL	Job No.: 236072-08	ARUP



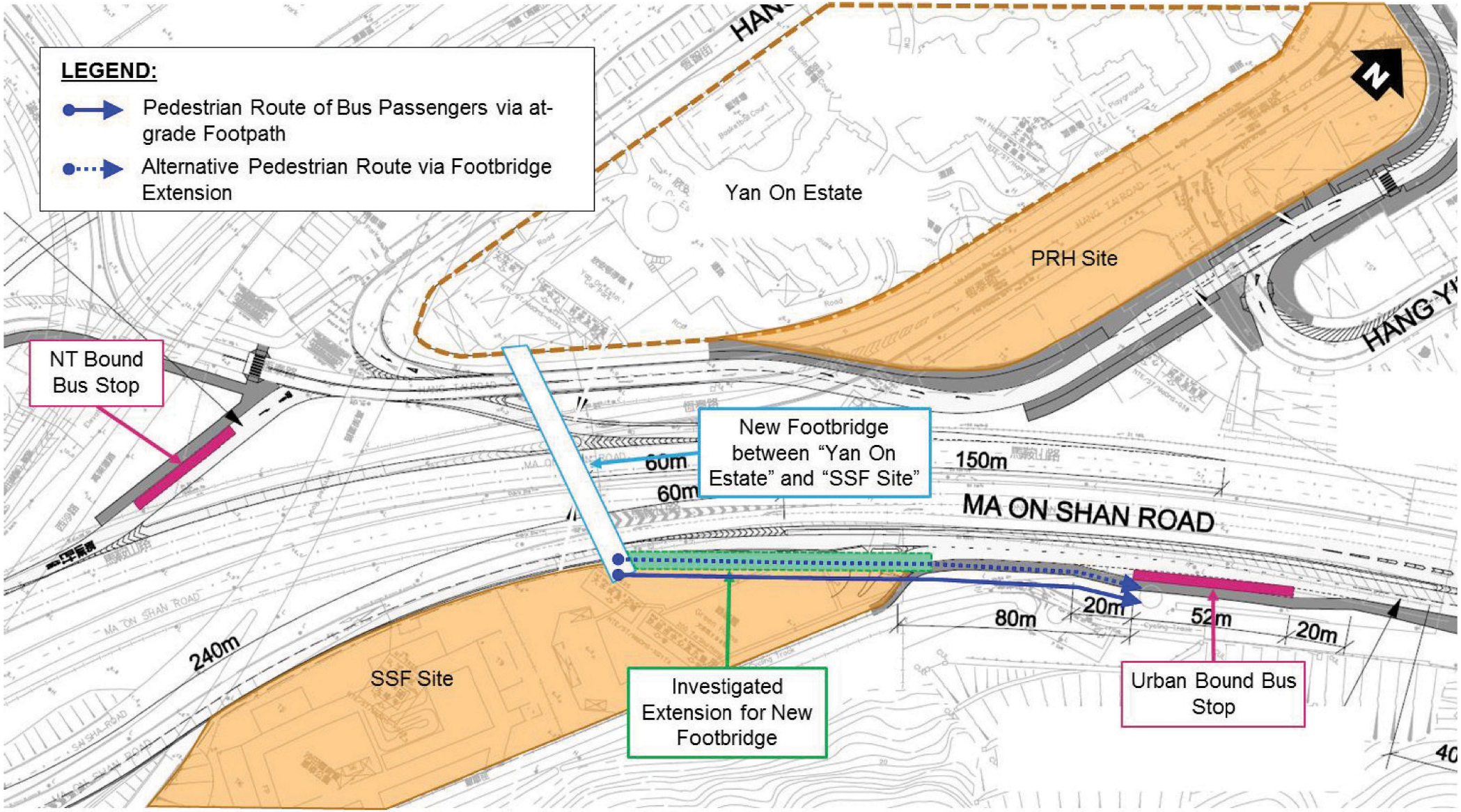
Job Title: TRAFFIC IMPACT ASSESSMENT FOR ROAD IMPROVEMENT WORKS AT MA ON SHAN, SHA TIN		FIGURE 7.4
Date: 10/2017	Scale: N.T.S.	Drawing Title: ADDITIONAL CONNECTIONS OF THE NEW FOOTBRIDGE TO BE INVESTIGATED
Drawn: CYRL	Job No.: 236072-08	ARUP

(Hidden Information)



Job Title: TRAFFIC IMPACT ASSESSMENT FOR ROAD IMPROVEMENT WORKS AT MA ON SHAN, SHA TIN			FIGURE 7.6
Date: 10/2017	Scale: N.T.S.	Drawing Title: WALKING DISTANCE OF BUS PASSENGERS WALKING FROM NT BOUND BUS STOP TO SSF SITE	ARUP
Drawn: CYRL	Job No.: 236072-08		

(Hidden Information)



Job Title: TRAFFIC IMPACT ASSESSMENT FOR ROAD IMPROVEMENT WORKS AT MA ON SHAN, SHA TIN		FIGURE 7.8
Date: 10/2017	Scale: N.T.S.	Drawing Title: WALKING ROUTE OF BUS PASSENGERS WALKING FROM NEW FOOTBRIDGE TO URBAN BOUND BUS STOP
Drawn: CYRL	Job No.: 236072-08	ARUP

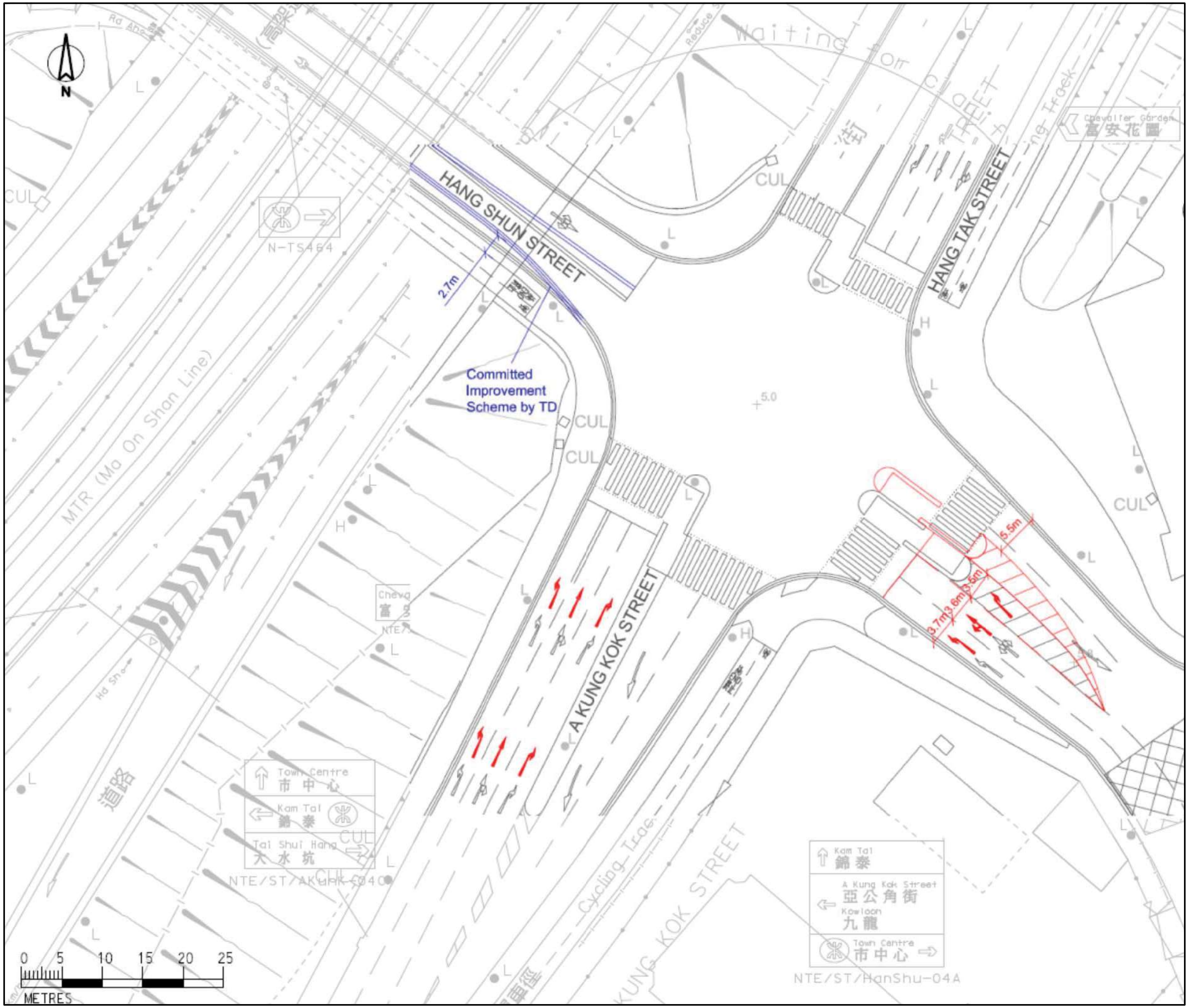
Appendix A

Junction Calculation Sheets

(Hidden the whole part of Appendix A)

Appendix B

Proposed Junction Modification of J/O Hang Tak Street/ Hang Shun Street in the Previous Study


HANG SHUN STREET
HANG TAK STREET
A KUNG KOK STREET
Committed Improvement Scheme by TD
2.7m
5.5m
3.7m
3.6m
3.5m
Chevalier Garden 富安花園
Kam Tai 錦泰
A Kung Kok Street 亞公角街
Kowloon 九龍
Town Centre 市中心
NTE/ST/HanShu-04A
Tai Shui Hang 大水坑
N-TS464
MTR (Ma On Shan Line)
0 5 10 15 20 25
METRES

Appendix C

Extension of Ma On Shan Cycle Track to Hang Tai Road, by HyD

位置圖 Location Plan
比例 Scale 1 : 10 000

註NOTES :

圖例
Legend:

- 施工區界限 Limit of Works Site
- 擬建單車徑 Proposed Cycle Track
- 擬建行人路 Proposed Footpath
- 現有單車徑 Existing Cycle Track

工程名稱 project title
伸延馬鞍山單車徑至恆泰路
Extension of Ma On Shan Cycle Track to Hang Tai Road

圖則名稱 drawing title
總平面圖
General Layout

圖則編號 drawing no.
HWDST143A-SK0029

比例 scale 1 : 1000 | A3

辦事處 office
工 程 部
WORKS DIVISION

HIGHWAYS DEPARTMENT HONG KONG
路政署

SCALE 1 : 1
0 10 20 30 40 50 mm

\STO_x\xxxxxx\HWDST143A-SK0029.dgn

A3 420x297