才鴻顧問有限公司
TOP BRIGHT CONSULTANTS LIMITED

Your Ref.: TPB/A/YL-ST/600
Our Ref.: 21/707/L05

May 3, 2022

Secretary
Town Planning Board
15/F., North Point Government Offices
333 Java Road, North Point
Hong Kong

By Hand

Dear Sir/Madam,

Compliance with Approval Condition (e)
Temporary Shop and Services and associated Filling and Excavation of Land for a Period of 3 Years in "Other Specified Uses" annotated "Service Stations" Zone at Lots 733SF(Part), 737RP(Part), 738RP, 741(Part), 742RP(Part), 744RP(Part) and Adjoining Government Land in DD99, San Tin, Yuen Long, New Territories
(Application No. A/YL-ST/600)

With reference to the captioned application, we submit herewith 3 copies of the Drainage Proposal for the compliance of approval condition (e).

Should you have any queries or require further information, please feel free to contact the undersigned at 2401 0173.

Yours faithfully,

For and on behalf of
Top Bright Consultants Ltd.

Adam Chow

Encl.

c.c. DPO/FS&YLE - Attn.: Mr. LUNG Ching Ho, Otto (By Email - ochlung@pland.gov.hk)
Smart Union Motors (Asia) Company Limited (the Applicant)

Room 103, 300 Kung Um Road, Yuen Long, N. T, Hong Kong 香港新界元朗公庵路300號103室
Tel 電話: (852) 2401 0173 Fax 傳真: (852) 2401 0973

Drainage Proposal in compliance with Planning Application No. A/YL-ST/600 Approval Condition (e) for Proposed Temporary Shop and Services and associated Filling and Excavation of Land for a Period of 3 Years in “Other Specified Uses” annotated “Service Stations” Zone, Lots 733 SF (Part), 737 RP (Part), 738 RP (Part), 741 (Part), 742 RP (Part) and 744 RP (Part) in DD99 and Adjoining Government Land, San Tin, Yuen Long, New Territories

(HT 21094)

May 2022

何田顧問工程師有限公司
HO TIN & ASSOCIATES
CONSULTING ENGINEERS LIMITED
香港九龍官塘鴻圖道26號威登中心12樓1201-3室
電話:2895 2238 圖文傳真:2890 8872 電郵:admin@hotin.com.hk
Rooms 1201-3, Westin Centre, 26 Hung To Road, Kwun Tong, Kowloon, Hong Kong
Tel : 2895 2238 Fax : 2890 8872 E-mail : admin@hotin.com.hk

Checked & approved by	K C LEE	[signature]

CE/MN, DSD's Comments given via PlanD's letter dated 6 April 2022	Responses
We consider that the drainage proposal submitted by the applicant is unacceptable from drainage operation and maintenance point of view. The applicant shall duly address our comments below and re-submit the proposal for our further review:	Noted.
(i) An underground drain is proposed to be constructed within the government land to divert the surface runoff collected from the Site to the existing watercourse. Since the underground drain will solely serve the proposed development and there is no existing drainage system maintained by DSD in the vicinity, DSD will not take up the maintenance of the proposed drainage facilities, including the proposed underground drainage pipe and the outlet;	Noted and no objection.
(ii) Please advise whether the underground drain will collect the runoff from other sites in the vicinity later. As the underground drain will be constructed on government land, comment from the relevant departments (e.g. LandsD) on the drainage proposal should be sought;	It will be subject to the Government's approval when the underground drain will collect the runoff from other sites in the vicinity later. It was stipulated in Section 6.1 and 7.3 that 'consent of laying the proposed drains within Government lands will be sought prior to construction of the proposed drainage'.
(iii) Section 5.1.1 refers. The changes in paving condition, the drainage flow path and drainage impact to the adjacent areas before and after the proposed development should be presented;	There is no change in paving condition, the drainage flow path and drainage impact to the adjacent areas before and after the proposed development. A corresponding statement is added into Section 5.1.1.

CE/MN, DSD's Comments given via PlanD's letter dated 6 April 2022		Responses
(iv)	Table 6.4 refers. Sufficient freeboards, i.e. min. 300mm, should be allowed for the proposed drainage system in accordance with Section 6.5 of the latest version of Stormwater Drainage Manual;	Table 6.4 is amended and new cover levels are proposed such that sufficient freeboards, i.e. min. 300mm, are allowed for the proposed drainage system in accordance with Section 6.5 of the latest version of Stormwater Drainage Manual.
(v)	Section 6.4 and Appendix refer. The drainage calculation for the 50-year rainfall event is missing in the Appendix;	Drainage calculation for the 50-year rainfall event is added in the Appendix in this resubmission.
(vi)	Drawing No. HT21094/DD/01 refers. As no internal drains are provided within the Site, please demonstrate how the catchment areas for the peripheral drains are determined;	The ground levels of the subject site slope downward from the centre toward the subject site boundary. The catchment areas for the peripheral channels are determined according to the apportionment of the sloping grounds with respect to each channel. In order to cater for the effect of existence of buildings encroaching upon more than one catchment, the concerned catchments are summed up and conservatively adopted as the catchment of the corresponding channels at the most upstream. Calculations in the Appendix are amended accordingly.
(vii)	The proposed drainage works should neither obstruct overland flow nor adversely affected any existing natural streams, village drains, ditches and the adjacent areas and free flow condition of all public drainage should be maintained at all time in order to avoid the risk of flooding or ponding; and	Agreed and will strictly follow. Peripheral channels with appropriate sizes are proposed and will be constructed to collect all overland flow across the subject Site boundary and to convey to the existing watercourse at the downstream.

CE/MN, DSD's Comments given via PlanD's letter dated 6 April 2022	Responses
(viii) The applicant is required to ensure that no debris, silt and sediments or cementitious materials will be discharged to the natural stream at the downstream.	Agreed and will strictly follow.

CONTENT

FIGURES

APPENDICES

DRAWINGS

1. Background

1.1 Ho Tin & Associates Consulting Engineers Limited (HTA) was appointed by the applicant to prepare a Drainage Proposal in compliance with the planning approval condition (e), i.e. the submission of a drainage proposal to the satisfaction of the Director of Drainage Services or of the Town Planning Board as stipulated in Town Planning Board's letter ref. TPB/A/YL-ST/600 dated 14 January 2022 for the Proposed Temporary Shop and Services and associated Filling and Excavation of Land for a Period of 3 Years in "Other Specified Uses" annotated "Service Stations" Zone, Lots 733 SF (Part), 737 RP (Part), 738 RP (Part), 741 (Part),742 RP (Part) and 744 RP (Part) in DD99 and adjoining Government land, San Tin, Yuen Long, New Territories.

2. Objectives and Scope of this Report

2.1 The objective of this report is to propose drainage works in compliance with the planning approval condition (e) as stipulated in the Town Planning Board's letter ref. TPB/A/YL-ST/600 dated 14 January 2022.

2.2 The scope of this report includes:

(i) identifying existing drainage conditions of the subject area;
(ii) evaluating flooding susceptibility and potential drainage impacts on the subject area; and
(iii) proposing necessary drainage works.

3. The Subject Site

3.1 The subject site of an area of about 7,858m^2 is located on the southern side of San Tin Tsuen Road and adjacent to an existing access road front of Tung Chun Wai. It comprises of Lots 733 SF (Part), 737 RP (Part), 738 RP (Part), 741 (Part), 742 RP (Part), 744 RP (Part) in DD99, and adjoining Government land, San Tin, Yuen Long, N.T. A Site Location Plan is shown on **Figure 1**.

4. Existing Drainage Conditions of the Subject Site

4.1 The subject area is located within a fluvial-tidal zone in San Tin and was identified as flood prone area due to its low lying nature such that stormwater within the subject area and its adjacent areas could not effectively be drained by gravity to the primary drainage network.

4.2 However, after the government completed the river training at the Shenzhen River network, flooding risk in the area was significantly reduced. Besides, the government also completed village flood protection scheme at San Tin in 1999. Under the scheme, San Tin Stormwater Pumping Station was constructed at about 200m to the west of the subject site. The pumping station will pump stormwater from within the low lying area to an outside channel during rainstorms such that the area will be protected from flooding. Flow directions of the surface runoff and catchment boundaries within the subject area is shown in **Figure 2**.

4.3 With reference to the "Stormwater Drainage Manual", the subject area would be classified as 'Village Drainage including Internal Drainage System under a Polder Scheme'. Therefore, the subject area should have been protected from minimum 10-year flood level return periods after the government completed the river training works and village flood protection scheme at San Tin.

4.4 At present, there is no drainage within the subject site.

5. Approach and Methodology

5.1 Catchment Areas

5.1.1 Flow paths of the surface runoff over the subject areas are identified with respect to the spot levels of the government survey sheet. Runoff from the land to the east of Castle Peak Road – San Tin are intercepted and conveyed to the main drainage channel (constructed by the government under PWP Item 73CD) next to Lok Ma Chau Road. Existing flow paths in the vicinity of the subject site are as indicated in **Figure 2**. At present, the Site is hard paved. The paving condition of the Site will remain unchanged after the development. There would be no change in the flow paths of the adjacent areas before and after the proposed development. Overland flows within the Site will be properly managed into engineering drainage after the proposed development. Since the proposed development basically would not disturb the existing drainage conditions, it would not incur any drainage impact onto the adjacent areas.

5.1.2 According to the BD approved Site Drainage Layout Plan for the proposed development of a temporary commercial development (hereinafter called "The Boxes Shopping City") at Lot 661R.P., 669R.P., 674R.P., 733R.P. in DD9a, Yuen Long as shown in **Figure 3**, surface runoff from the southern part of The Boxes Shopping City which is 24,742 m^2, is conveyed and flows into the discharge point B'2 and then to the existing 1200 dia. pipe at the downstream.

5.1.3 In general, there would be no surface runoff flowing into the subject site from the surroundings. Therefore, the total catchment area of the subject site is about 7,859m^2. The ground levels of the subject site slope downward from the centre toward the subject site boundary. The catchment areas for the peripheral channels are determined according to the apportionment of the sloping grounds with respect to each channel. In order to cater for the effect of existence of buildings encroaching upon more than one catchment, the concerned catchments are summed up and conservatively adopted as the catchment of the corresponding channels at the most upstream. Hydraulic calculations of the proposed drainage system of the subject site are included in the **Appendix** in this drainage submission.

5.2 Design Return Periods and Rainstorm Profile

5.2.1 Assessment criteria are based on the recommendation set out in the Stormwater Drainage Manual (SDM) issued by DSD. Since the drainage systems of the subject is classified as 'Village Drainage including Internal Drainage System under a Polder Scheme', the subject area is now under protection from minimum 10-year flood level return periods.

5.2.2 With reference from Table 11 in the "Stormwater Drainage Manual", the drainage conditions of the subject area under the following two cases shall be checked:
Case I – 10-year rain + 2-year sea level
Case II – 2-year rain + 10-year sea level

5.2.3 The corresponding runoffs under rainfall intensity for various return period are worked out with reference to Rational Method and Brandy-Williams method is used in calculation of the time of concentration. A uniformly distributed rainfall with an intensity is determined by the Intensity-Duration-Frequency. With referenced to GEO TGN 30 (2018 version), the rainfall profiles are derived based on the following equation:

$$\mathrm{i} = \frac{\mathrm{a}}{(t+b)^{\mathrm{c}}}$$

where i = mean rainfall intensity (mm/hr)
t = duration time of concentration (min)
a, b, c = storm constants given in **Table 5.2** below

Table 5.2 Storm Constants for Different Return Periods

Return Period (years)	2	10	50	200
a	480	640	800	892
b	4	4	4	4
c	0.41	0.41	0.41	0.41

5.3 Design Sea Level

5.3.1 With reference to the figures of Tsim Bei Tsui (the nearest location) in Table 8 in the "Stormwater Drainage Manual (2018 version)", the Design Extreme Sea Level at 2-year and 10-year return period would be +3.07mPD and +3.51mPD respectively. In order to incorporate the effect of climate change in the drainage design, according to DSD's Stormwater Drainage Manual Table 28, the sea level rise for mid-21st Century (2041-2060) shall be 0.23m. Thus, the revised Design Extreme Sea Level at 2-year and 10-year would be +3.30mPD and +3.74mPD respectively.

5.4 Roughness

5.4.1 In this assessment, it is assumed that the existing and new proposed drains are at "Normal" condition. Hence, a value of 0.6mm for roughness k_s has been adopted with respect to Table 14 in SDM.

5.5 Velocity Design

5.5.1 For design of new proposed drains, sediment inside the pipeline system is allowed in accordance with paragraph 9.3 of SDM which suggests allowing 5% reduction in flow area if the gradient is greater than 1 in 25 or 10% reduction in flow area in other cases.

6. Proposed Drainage Works

6.1 In order to prevent surface runoff from the subject site directly flowing across the site boundary onto the existing adjacent access road, peripheral channels are proposed to be constructed within the subject site. The surface runoff collected in the channels will be discharged via a terminal manhole into a proposed underground drain which will convey the flow into an existing watercourse to the west of the subject site. The proposed underground drain will be constructed within Government lands. Consent of laying the proposed drains within Government lands will be sought prior to construction of the proposed drainage.

6.2 The required sizes of the proposed U-channels and underground drainage of the subject development are shown in **HT21094/DD/01** and the hydraulic calculations are enclosed in the **Appendix**.

6.3 Based on the hydraulic assessment results, the estimated water levels at the catchment discharge points with proposed drainage are determined. Since all pipes have sufficient spare capacity, no water backup will occur at the upstream under rainstorms of 2-year and 10-year return periods. The following hydraulic results at the subject site are anticipated:

Table 6.4 Estimate Water Levels with Proposed Drainage

		Case I **10-year rain + 2-year sea level (+3.30mPD)**		**Case II** **2-year rain + 10-year sea level (+3.74mPD)**	
Node No. [1]	**Ground Level (mPD)**	**Water Level** [2] **(mPD)**	**Freeboard** [3] **(m)**	**Water Level** [2] **(mPD)**	**Freeboard** [3] **(m)**
1.1	4.30	3.56	0.74	4.00	0.30
CP1.2	4.30	3.37	0.93	3.81	0.49
CP1.3	4.30	3.34	0.96	3.78	0.52
CP1.4	4.30	3.46	0.84	3.90	0.40
CP1.5	4.30	3.55	0.75	3.99	0.31
CP1.6	4.30	3.39	0.91	3.83	0.47
CP1.7	4.20	3.33	0.97	3.77	0.53
2.1	4.30	3.40	0.90	3.84	0.46
CP2.2	4.30	3.40	0.90	3.84	0.46
CP2.3	4.30	3.36	0.94	3.80	0.50
MH TM	4.30	3.50	0.80	3.94	0.36
MH1	4.20	3.46	0.74	3.90	0.30
MH2	4.20	3.33	0.87	3.77	0.43

[1] – Node layout numbers refer to Drawing Nos. **HT21094/DD/01**

[2] – Water Level = Invert Level at upstream + Extreme Sea Level – Invert Level at downstream

[3] – Negative freeboard indicates an occurrence of flooding.

6.4 Since the existing ground levels of the subject site are approximately between +4.20mPD and +4.30mPD, the subject site would not be flooded under Case I and Case II. It is noted that the subject site is located in a fluvial-tidal zone and the extreme sea level is the major contributory factor that leads to high water level. The flooding will be further prohibited if the nearby San Tin Stormwater Pumping Station was operated during high tide.

6.5 Nevertheless, the proposed drains are designed to have sufficient hydraulic capacity to withstand 50 and 200-year rainfalls as shown in the **Appendix**.

7. Conclusion and Recommendations

7.1 The subject area is located within a fluvial-tidal zone in San Tin. River training works and village flood protection scheme of the area were completed by the government some years ago. The water levels at the subject area are now regulated by San Tin Stormwater Pumping Station at about 200m to the west of the subject site. San Tin Stormwater Pumping Station would be operated when the water level at the flood water storage pond is high.

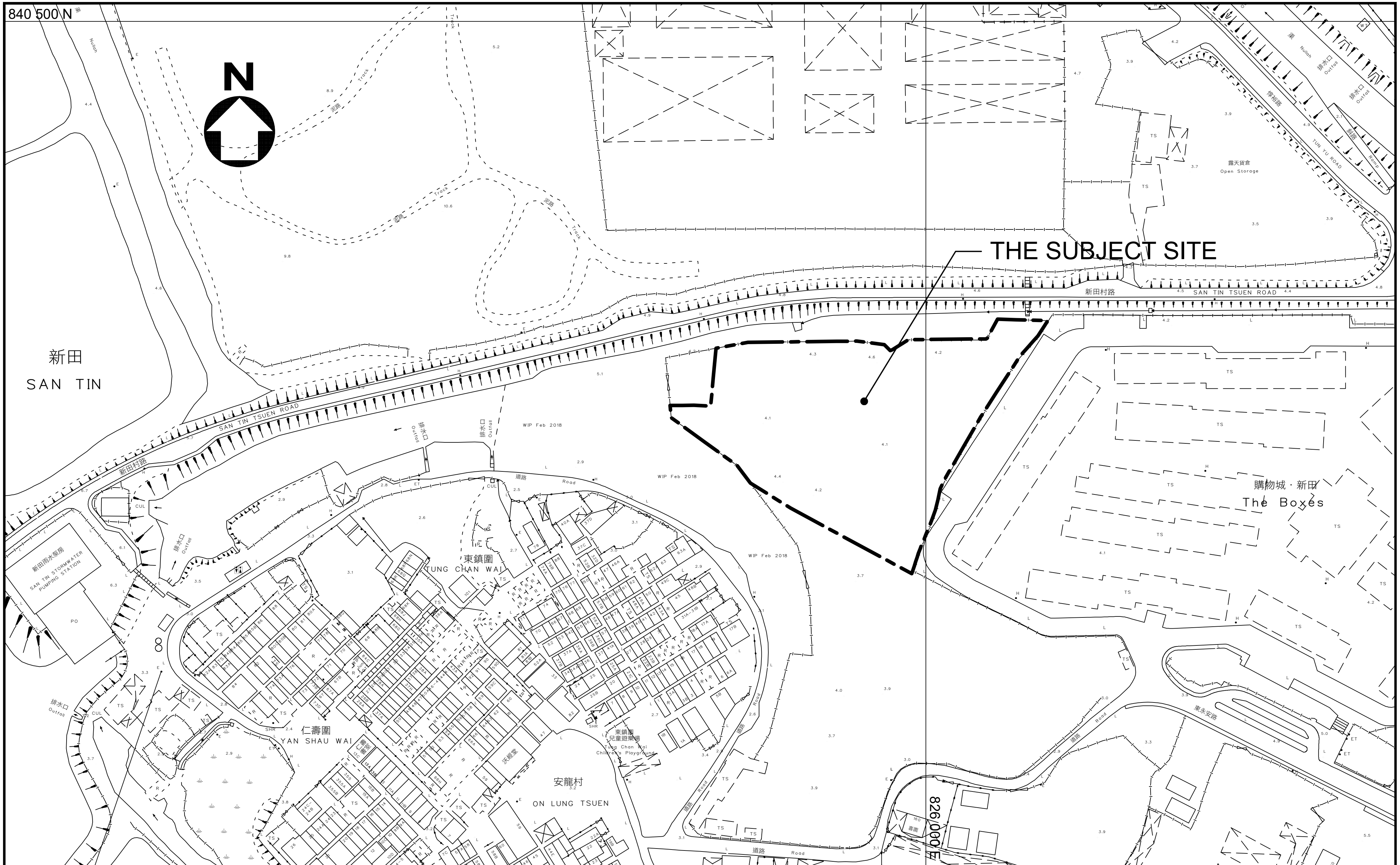
7.2 The subject development will construct a new internal drainage system consisting of peripheral 300mm to 750mm U channels and a terminal manhole which will discharge its flow into a proposed 900mm dia. underground drain which will discharge its flow into an existing watercourse to the further west. The owners of the application site would bear the costs of construction of the proposed drainage works including those outside the subject application site.

7.3 The proposed underground drain will be constructed within Government lands. Consent of laying the proposed drains within Government lands will be sought prior to construction of the proposed drainage.

7.4 In conclusion, the proposed development with implementation of the proposed drainage works will not cause any adverse drainage impacts onto the area.

8. Design Drawings attached to this Report

Drawing No.	Title
HT21094/DD/01	Proposed Drainage Layout Plan
HT21094/DD/02	Details of Standard Terminal Manhole Type T2_1
HT21094/DD/03	Pipe Laying, Standard Manhole Type E1, Surface Channel & Catch Pit Details



PROJECT
LOTS 733 SF(PART), 737 RP(PART), 738 RP(PART), 741(PART), 742 RP(PART), 744 RP(PART) AND ADJOINING GOVERNMENT LAND IN DD99, SAN TIN, YUEN LONG, N.T.

何田顧問工程師有限公司
HO TIN & ASSOCIATES
CONSULTING ENGINEERS LIMITED

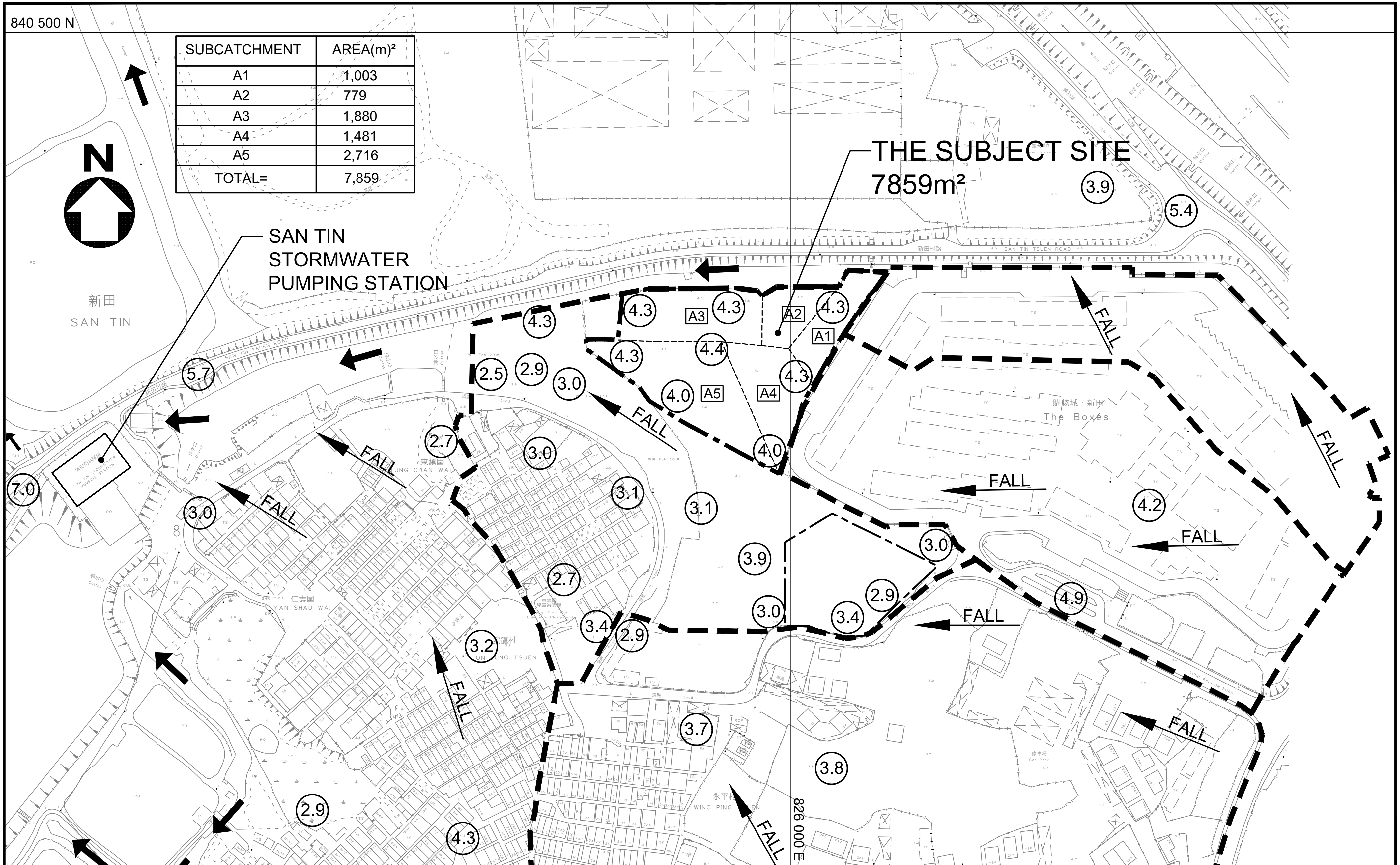
TITLE
SITE LOCATION PLAN

SCALE
1 : 2000 - A4

DRAWING No.
FIGURE 1

H:\21094_SanTin\DRAWING\21094_DIA_FIGURE_1.dwg, 3/9/2021 17:10:49, 1:1

SUBCATCHMENT	AREA(m)²
A1	1,003
A2	779
A3	1,880
A4	1,481
A5	2,716
TOTAL=	7,859



LEGEND

- — — SUBJECT SITE BOUNDARY
- (4.3) EXISTING GROUND LEVEL
- ← FLOW DIRECTION OF SURFACE RUNOFF
- ▬ ▬ CATCHMENT BOUNDARY
- – – – SUBCATCHMENT BOUNDARY

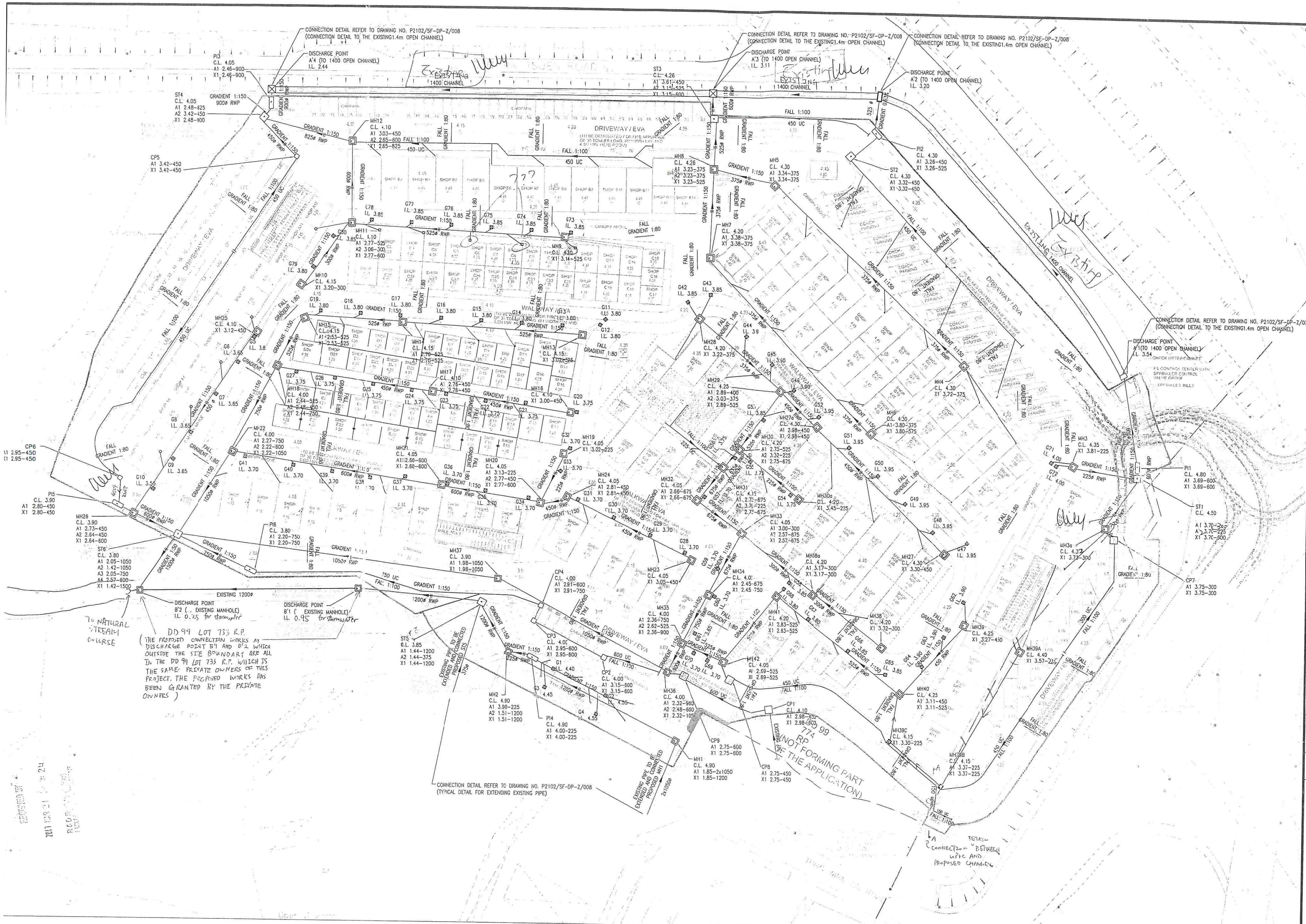
PROJECT: LOTS 733 SF(PART), 737 RP(PART), 738 RP(PART), 741(PART), 742 RP(PART), 744 RP(PART) AND ADJOINING GOVERNMENT LAND IN DD99, SAN TIN, YUEN LONG, N.T.

何田顧問工程師有限公司
HO TIN & ASSOCIATES
CONSULTING ENGINEERS LIMITED

TITLE: CATCHMENT AREAS & FLOW DIRECTIONS OF SURFACE RUNOFF

SCALE: 1 : 2500 - A4

DRAWING No.: FIGURE 2



DRAINAGE LAYOUT PLAN
1 : 500

LEGEND:

— · —	SITE BOUNDARY (WITH BOUNDARY POINTS A TO BF)
150 UC FALL 1 : 100	PROPOSED 150 COVERED U CHANNEL 1 IN 100
GRADIENT 1 : 150 150ø RWP	PROPOSED 150ø RAIN WATER PIPE 1 : 150
CP1	PROPOSED CATCHPIT
MH1	PROPOSED MANHOLE
G1	PROPOSED GULLY
ST1	PROPOSED SAND TRAP
PI1	PROPOSED PETROL INTERCEPTOR
—	PROPOSED 150ø PIPE 1 : 100

NOTES :
1. DO NOT SCALE DRAWINGS.
2. ALL DIMENSIONS SHOWN ARE IN MILLMETRES EXCEPT LEVEL WHICH ARE SHOWN IN METRES.

DRAWN BY	K.W.	CHECKED	F.C.
DESIGNED	J.S.	APPROVED	K.T.
SCALE	1 : 500	CAD FILE	007bSF-DP-P1

REV.	DESCRIPTION	CKD	DWN	DATE
	SUBMIT BD	F.C.	K.W.	16/3/16
A	BD APPROVED IN 23/6/16	F.C.	K.W.	29/4/16
B	SUBMIT BD	F.C.	K.W.	20/3/17

Greg Wong & Associates Ltd.
Consulting Engineers & Project Managers (Civil, Structural & Geotechnical)
黃泽恩顧問工程師事務所
Unit D 8/F Seabright Plaza, 9-23 Shell Street, North Point, Hong Kong
Tel : (852) 2512 8003 Fax : (852) 2571 3105

CLIENT:

ARCHITECT:
MG DESIGN HK LTD.

PROJECT TITLE:
PROPOSED DEVELOPMENT OF A TEMPORARY COMMERCAIL DEVELOPMENT OR LOT 661R.P. 669R.P. 674R.P. 733R.P. IN DD99 YUEN LONG

DRAWING TITLE:
SITE DRAINAGE LAYOUT PLAN

DRAWING NO.
P2102/SF-DP-P1/007/B

R.S.E. / R.G.E. / A.P. USE

B.D. / GOVERNMENT AUTHORITY APPROVAL USE

YEUNG Ka Kit, Daniel
Authorized Person (Architect)

Figure 3 - Site Drainage Layout Plan for The Boxes Shopping City

APPENDIX 1

Hydraulic Calculations

Assessment of Hydraulic Capacities of the Drainage System for 1 in 2 year design return period

Using Rational Method

Design Flow = 0.278CiA m^3/s for grassland (heavy soil) - steep, C = 0.35

for concrete surface, C = 0.95

Using Manning Equation

Design Mean Velocity = $R^{1/6}/n(RS_f)^{1/2}$ and n= 0.013 for concrete pipe with good surface

Using Gumbel Solution in frequency analysis

Rainfall intensity = a / $(t_d+b)^c$ where a= 480 , b= 4 and c= 0.41 in 2 year design return period

Using Brandsby William's Equation (for channel flow)

Inlet time t_0 = 0.14465L/ $(H^{0.2}A^{0.1})$ or 2 when the distance is too short

Using Colebrook's White Equation (for pipe flow)

V = - Sqt (8gDs) x log [(k_s / 3.7D) + (2.51v / D x Sqt (2gDs))]

Parameters Input

k_s (mm) = 0.6 k_s (m) = 0.0006

v (m^2/s) = 1.00E-06

g (m^2/s) = 9.81

(*allowing min, 300mm freeboard)

USCP/USMH	DSCP/DSMH	USGL	DSGL	USIL	DSIL	INVERT DIFF.	LENGTH (m)	SLOPE s	SLOPE 1 IN	t_0 (min)	t_c (= t_d) (min)	RAINFALL INTENSITY (mm/hr)	RAINFALL INTENSITY INCLUDING EFFECT OF CLIMATE CHANGE (mm/hr)	RUNOFF COEF. C	SUB-CATCHMENT AREA (m^2)	EFF. AREA (m^2)	CUM. EFF. AREA (m^2)	DESIGN FLOW (m^3/s)	SIZE (mm)	UC Type	VEL (m/s)	*FLOW CAPACITY (m^3/s)	90% FLOW CAPACITY (for pipe)	SPARE CAPACITY (m^3/s)	Occupancy of the proposed pipe	
Branch from A/YL-ST/559																										
1.1	CP1.2	4.30	4.30	3.97	3.67	0.26	65.00	0.004	250	2.00	2.89	217.57	240.19	0.95	1,003	953	953	0.064	300	UC	1.22	0.22		0.155		OK!
CP1.2	CP1.3	4.30	4.30	3.67	3.60	0.07	17.00	0.004	250	2.89	3.12	214.66	236.98	0.95	0	0	953	0.063	300	UC	1.23	0.25		0.183		OK!
CP1.3	CP1.4	4.30	4.30	3.60	3.56	0.04	10.00	0.004	250	3.12	3.25	213.02	235.17	0.95	0	0	953	0.062	300	UC	1.24	0.26		0.200		OK!
CP1.4	CP1.5	4.30	4.30	3.56	3.35	0.16	40.00	0.004	250	3.25	3.78	206.99	228.51	0.95	779	740	1,693	0.108	300	UC	1.27	0.35		0.241		OK!
CP1.5	CP1.6	4.30	4.30	3.35	3.10	0.25	70.00	0.004	275	3.78	4.73	197.44	217.97	0.95	1,880	1,786	3,479	0.211	300	UC	1.23	0.43		0.220		OK!
CP1.6	CP1.7	4.30	4.30	3.10	3.01	0.09	23.00	0.004	250	4.73	5.03	194.76	215.01	0.95	0	0	3,479	0.208	300	UC	1.29	0.49		0.282		OK!
CP1.7	MH TM	4.30	4.30	3.01	2.97	0.03	15.00	0.002	450	5.03	5.23	192.99	213.06	0.95	0	0	3,479	0.206	450	UC	1.23	0.71		0.503		OK!
2.1	CP2.2	4.30	4.30	3.70	3.60	0.10	48.00	0.002	500	2.00	2.64	220.86	243.83	0.95	1,481	1,407	1,407	0.095	600	UC	1.25	0.47		0.378		OK!
CP2.2	CP2.3	4.30	4.30	3.60	3.50	0.10	73.00	0.001	700	2.64	3.65	208.39	230.06	0.95	2,716	2,580	3,987	0.255	750	UC	1.20	0.65		0.394		OK!
CP2.3	MH TM	4.30	4.30	3.50	3.44	0.06	42.00	0.001	700	3.65	4.23	202.31	223.35	0.95	0	0	3,987	0.248	750	UC	1.22	0.71		0.467		OK!
														total =	7,859	7,466										
Main Route																										
MH TM (CP1.7 + CP2.3)	MH1	4.30	4.20	2.00	1.94	0.06	20.00	0.003	350	5.23	5.43	191.30	211.20	0.95	0	0	7,466	0.438	900	conc. Pipe	1.67	1.06	0.96	0.517	46%	OK!
MH1	MH2	4.20	4.20	1.94	1.83	0.11	39.00	0.003	350	5.43	5.82	188.15	207.72	0.95	0	0	7,466	0.431	900	conc. Pipe	1.67	1.06	0.96	0.524	45%	OK!
MH2	Outfall	4.20	4.20	1.83	1.81	0.03	9.00	0.003	350	5.82	5.91	187.45	206.95	0.95	0	0	7,466	0.430	900	conc. Pipe	1.67	1.06	0.96	0.526	45%	OK!

Assessment of Hydraulic Capacities of the Drainage System for 1 in 10 year design return period

Using Rational Method

Design Flow = 0.278CiA m^3/s for grassland (heavy soil) - steep, C = 0.35

for concrete surface, C = 0.95

Using Manning Equation

Design Mean Velocity = $R^{1/6}/n(RS_f)^{1/2}$ and n= 0.013 for concrete pipe with good surface

Using Gumbel Solution in frequency analysis

Rainfall intensity = $a / (t_d+b)^c$ where a= 640 , b= 4 and c= 0.41 in 10 year design return period

Using Brandsby William's Equation (for channel flow)

Inlet time t_0 = $0.14465L/ (H^{0.2}A^{0.1})$ or 2 when the distance is too short

Using Colebrook's White Equation (for pipe flow)

V = - Sqt (8gDs) x log [(k_s / 3.7D) + (2.51v / D x Sqt (2gDs))]

Parameters Input

k_s (mm) = 0.6 k_s (m) = 0.0006

v (m^2/s) = 1.00E-06

g (m^2/s) = 9.81

(*allowing min, 300mm freeboard)

USCP/USMH	DSCP/DSMH	USGL	DSGL	USIL	DSIL	INVERT DIFF.	LENGTH (m)	SLOPE s	SLOPE 1 IN	t_0 (min)	t_c (= t_d) (min)	RAINFALL INTENSITY (mm/hr)	RAINFALL INTENSITY INCLUDING EFFECT OF CLIMATE CHANGE (mm/hr)	RUNOFF COEF. C	SUB-CATCHMENT AREA (m^2)	EFF. AREA (m^2)	CUM. EFF. AREA (m^2)	DESIGN FLOW (m^3/s)	SIZE (mm)	UC Type	VEL (m/s)	*FLOW CAPACITY (m^3/s)	90% FLOW CAPACITY (for pipe)	SPARE CAPACITY (m^3/s)	Occupancy of the proposed pipe	
Branch from A/YL-ST/559																										
1.1	CP1.2	4.30	4.30	3.97	3.67	0.26	65.00	0.004	250	2.00	2.89	290.09	320.26	0.95	1,003	953	953	0.085	300	UC	1.22	0.22		0.134		OK!
CP1.2	CP1.3	4.30	4.30	3.67	3.60	0.07	17.00	0.004	250	2.89	3.12	286.21	315.97	0.95	0	0	953	0.084	300	UC	1.23	0.25		0.162		OK!
CP1.3	CP1.4	4.30	4.30	3.60	3.56	0.04	10.00	0.004	250	3.12	3.25	284.02	313.56	0.95	0	0	953	0.083	300	UC	1.24	0.26		0.179		OK!
CP1.4	CP1.5	4.30	4.30	3.56	3.35	0.16	40.00	0.004	250	3.25	3.78	275.98	304.68	0.95	779	740	1,693	0.143	300	UC	1.27	0.35		0.205		OK!
CP1.5	CP1.6	4.30	4.30	3.35	3.10	0.25	70.00	0.004	275	3.78	4.73	263.25	290.63	0.95	1,880	1,786	3,479	0.281	300	UC	1.23	0.43		0.150		OK!
CP1.6	CP1.7	4.30	4.30	3.10	3.01	0.09	23.00	0.004	250	4.73	5.03	259.68	286.68	0.95	0	0	3,479	0.277	300	UC	1.29	0.49		0.213		OK!
CP1.7	MH TM	4.30	4.30	3.01	2.97	0.03	15.00	0.002	450	5.03	5.23	257.32	284.08	0.95	0	0	3,479	0.275	450	UC	1.23	0.71		0.434		OK!
2.1	CP2.2	4.30	4.30	3.70	3.60	0.10	48.00	0.002	500	2.00	2.64	294.48	325.11	0.95	1,481	1,407	1,407	0.127	600	UC	1.25	0.47		0.346		OK!
CP2.2	CP2.3	4.30	4.30	3.60	3.50	0.10	73.00	0.001	700	2.64	3.65	277.86	306.75	0.95	2,716	2,580	3,987	0.340	750	UC	1.20	0.65		0.309		OK!
CP2.3	MH TM	4.30	4.30	3.50	3.44	0.06	42.00	0.001	700	3.65	4.23	269.75	297.80	0.95	0	0	3,987	0.330	750	UC	1.22	0.71		0.384		OK!
														total =	7,859	7,466										
Main Route																										
MH TM (CP1.7 + CP2.3)	MH1	4.30	4.20	2.00	1.94	0.06	20.00	0.003	350	5.23	5.43	255.07	281.59	0.95	0	0	7,466	0.584	900	conc. Pipe	1.67	1.06	0.96	0.371	61%	OK!
MH1	MH2	4.20	4.20	1.94	1.83	0.11	39.00	0.003	350	5.43	5.82	250.87	276.96	0.95	0	0	7,466	0.575	900	conc. Pipe	1.67	1.06	0.96	0.381	60%	OK!
MH2	Outfall	4.20	4.20	1.83	1.81	0.03	9.00	0.003	350	5.82	5.91	249.93	275.93	0.95	0	0	7,466	0.573	900	conc. Pipe	1.67	1.06	0.96	0.383	60%	OK!

Assessment of Hydraulic Capacities of the Drainage System for 1 in 50 year design return period

Using Rational Method

Design Flow = 0.278CiA m^3/s for grassland (heavy soil) - steep, C = 0.35

for concrete surface, C = 0.95

Using Manning Equation

Design Mean Velocity = $R^{1/6}/n(RS_f)^{1/2}$ and n= 0.013 for concrete pipe with good surface

Using Gumbel Solution in frequency analysis

Rainfall intensity = $a / (t_d+b)^c$ where a= 800 , b= 4 and c= 0.41 in 50 year design return period

Using Brandsby William's Equation (for channel flow)

Inlet time t_0 = $0.14465L/ (H^{0.2}A^{0.1})$ or 2 when the distance is too short

Using Colebrook's White Equation (for pipe flow)

V = - Sqt (8gDs) x log [(k_s / 3.7D) + (2.51v / D x Sqt (2gDs))]

Parameters Input

k_s (mm) = **0.6** k_s (m) = **0.0006**

v (m^2/s) = 1.00E-06

g (m^2/s) = 9.81

(*allowing min, 300mm freeboard)

USCP/USMH	DSCP/DSMH	USGL	DSGL	USIL	DSIL	INVERT DIFF.	LENGTH (m)	SLOPE s	SLOPE 1 IN	t_0 (min)	t_c (= t_d) (min)	RAINFALL INTENSITY (mm/hr)	RAINFALL INTENSITY INCLUDING EFFECT OF CLIMATE CHANGE (mm/hr)	RUNOFF COEF. C	SUB-CATCHMENT AREA (m^2)	EFF. AREA (m^2)	CUM. EFF. AREA (m^2)	DESIGN FLOW (m^3/s)	SIZE (mm)	UC Type	VEL (m/s)	*FLOW CAPACITY (m^3/s)	90% FLOW CAPACITY (for pipe)	SPARE CAPACITY (m^3/s)	Occupancy of the proposed pipe	
Branch from A/YL-ST/559																										
1.1	CP1.2	4.30	4.30	3.97	3.67	0.26	65.00	0.004	250	2.00	2.89	362.61	400.32	0.95	1,003	953	953	0.106	300	UC	1.22	0.22		0.112		OK!
CP1.2	CP1.3	4.30	4.30	3.67	3.60	0.07	17.00	0.004	250	2.89	3.12	357.76	394.97	0.95	0	0	953	0.105	300	UC	1.23	0.25		0.141		OK!
CP1.3	CP1.4	4.30	4.30	3.60	3.56	0.04	10.00	0.004	250	3.12	3.25	355.03	391.95	0.95	0	0	953	0.104	300	UC	1.24	0.26		0.159		OK!
CP1.4	CP1.5	4.30	4.30	3.56	3.35	0.16	40.00	0.004	250	3.25	3.78	344.98	380.86	0.95	779	740	1,693	0.179	300	UC	1.27	0.35		0.169		OK!
CP1.5	CP1.6	4.30	4.30	3.35	3.10	0.25	70.00	0.004	275	3.78	4.73	329.07	363.29	0.95	1,880	1,786	3,479	0.351	300	UC	1.23	0.43		0.080		OK!
CP1.6	CP1.7	4.30	4.30	3.10	3.01	0.09	23.00	0.004	250	4.73	5.03	324.59	358.35	0.95	0	0	3,479	0.347	300	UC	1.29	0.49		0.144		OK!
CP1.7	MH TM	4.30	4.30	3.01	2.97	0.03	15.00	0.002	450	5.03	5.23	321.65	355.10	0.95	0	0	3,479	0.343	450	UC	1.23	0.71		0.365		OK!
2.1	CP2.2	4.30	4.30	3.70	3.60	0.10	48.00	0.002	500	2.00	2.64	368.11	406.39	0.95	1,481	1,407	1,407	0.159	600	UC	1.25	0.47		0.314		OK!
CP2.2	CP2.3	4.30	4.30	3.60	3.50	0.10	73.00	0.001	700	2.64	3.65	347.32	383.44	0.95	2,716	2,580	3,987	0.425	750	UC	1.20	0.65		0.224		OK!
CP2.3	MH TM	4.30	4.30	3.50	3.44	0.06	42.00	0.001	700	3.65	4.23	337.18	372.25	0.95	0	0	3,987	0.413	750	UC	1.22	0.71		0.302		OK!
														total =	7,859	7,466										
Main Route																										
MH TM (CP1.7 + CP2.3)	MH1	4.30	4.20	2.00	1.94	0.06	20.00	0.003	350	5.23	5.43	318.83	351.99	0.95	0	0	7,466	0.731	900	conc. Pipe	1.67	1.06	0.96	0.225	76%	OK!
MH1	MH2	4.20	4.20	1.94	1.83	0.11	39.00	0.003	350	5.43	5.82	313.59	346.20	0.95	0	0	7,466	0.719	900	conc. Pipe	1.67	1.06	0.96	0.237	75%	OK!
MH2	Outfall	4.20	4.20	1.83	1.81	0.03	9.00	0.003	350	5.82	5.91	312.42	344.91	0.95	0	0	7,466	0.716	900	conc. Pipe	1.67	1.06	0.96	0.240	75%	OK!

Assessment of Hydraulic Capacities of the Drainage System for 1 in 200 year design return period

Using Rational Method
Design Flow = 0.278CiA m^3/s for grassland (heavy soil) - steep, C = 0.35
for concrete surface, C = 0.95

Using Manning Equation
Design Mean Velocity = $R^{1/6}/n(RS_f)^{1/2}$ and n= 0.013 for concrete pipe with good surface

Using Gumbel Solution in frequency analysis
Rainfall intensity = $a / (t_d+b)^c$ where a= 892 , b= 4 and c= 0.41 in 200 year design return period

Using Brandsby William's Equation (for channel flow)
Inlet time t_0 = $0.14465L/ (H^{0.2}A^{0.1})$ or 2 when the distance is too short

Using Colebrook's White Equation (for pipe flow)
V = - Sqt (8gDs) x log [(k_s / 3.7D) + (2.51v / D x Sqt (2gDs))]

Parameters Input
k_s (mm) = **0.6** k_s (m) = **0.0006**
v (m^2/s) = 1.00E-06
g (m^2/s) = 9.81

(*allowing min, 300mm freeboard)

USCP/USMH	DSCP/DSMH	USGL	DSGL	USIL	DSIL	INVERT DIFF.	LENGTH (m)	SLOPE s	SLOPE 1 IN	t_0 (min)	t_c (= t_d) (min)	RAINFALL INTENSITY (mm/hr)	RAINFALL INTENSITY INCLUDING EFFECT OF CLIMATE CHANGE (mm/hr)	RUNOFF COEF. C	SUB-CATCHMENT AREA (m^2)	EFF. AREA (m^2)	CUM. EFF. AREA (m^2)	DESIGN FLOW (m^3/s)	SIZE (mm)	UC Type	VEL (m/s)	*FLOW CAPACITY (m^3/s)	90% FLOW CAPACITY (for pipe)	SPARE CAPACITY (m^3/s)	Occupancy of the proposed pipe	
Branch from A/YL-ST/559																										
1.1	CP1.2	4.30	4.30	3.97	3.67	0.26	65.00	0.004	250	2.00	2.89	404.31	446.36	0.95	1,003	953	953	0.118	300	UC	1.22	0.22		0.100		OK!
CP1.2	CP1.3	4.30	4.30	3.67	3.60	0.07	17.00	0.004	250	2.89	3.12	398.90	440.39	0.95	0	0	953	0.117	300	UC	1.23	0.25		0.129		OK!
CP1.3	CP1.4	4.30	4.30	3.60	3.56	0.04	10.00	0.004	250	3.12	3.25	395.85	437.02	0.95	0	0	953	0.116	300	UC	1.24	0.26		0.147		OK!
CP1.4	CP1.5	4.30	4.30	3.56	3.35	0.16	40.00	0.004	250	3.25	3.78	384.65	424.65	0.95	779	740	1,693	0.200	300	UC	1.27	0.35		0.148		OK!
CP1.5	CP1.6	4.30	4.30	3.35	3.10	0.25	70.00	0.004	275	3.78	4.73	366.91	405.07	0.95	1,880	1,786	3,479	0.392	300	UC	1.23	0.43		0.040		OK!
CP1.6	CP1.7	4.30	4.30	3.10	3.01	0.09	23.00	0.004	250	4.73	5.03	361.92	399.56	0.95	0	0	3,479	0.386	300	UC	1.29	0.49		0.104		OK!
CP1.7	MH TM	4.30	4.30	3.01	2.97	0.03	15.00	0.002	450	5.03	5.23	358.63	395.93	0.95	0	0	3,479	0.383	450	UC	1.23	0.71		0.326		OK!
2.1	CP2.2	4.30	4.30	3.70	3.60	0.10	48.00	0.002	500	2.00	2.64	410.44	453.12	0.95	1,481	1,407	1,407	0.177	600	UC	1.25	0.47		0.296		OK!
CP2.2	CP2.3	4.30	4.30	3.60	3.50	0.10	73.00	0.001	700	2.64	3.65	387.26	427.54	0.95	2,716	2,580	3,987	0.474	750	UC	1.20	0.65		0.175		OK!
CP2.3	MH TM	4.30	4.30	3.50	3.44	0.06	42.00	0.001	700	3.65	4.23	375.96	415.06	0.95	0	0	3,987	0.460	750	UC	1.22	0.71		0.254		OK!
														total =	7,859	7,466										
Main Route																										
MH TM (CP1.7 + CP2.3)	MH1	4.30	4.20	2.00	1.94	0.06	20.00	0.003	350	5.23	5.43	355.50	392.47	0.95	0	0	7,466	0.815	900	conc. Pipe	1.67	1.06	0.96	0.141	85%	OK!
MH1	MH2	4.20	4.20	1.94	1.83	0.11	39.00	0.003	350	5.43	5.82	349.65	386.01	0.95	0	0	7,466	0.801	900	conc. Pipe	1.67	1.06	0.96	0.154	84%	OK!
MH2	Outfall	4.20	4.20	1.83	1.81	0.03	9.00	0.003	350	5.82	5.91	348.35	384.57	0.95	0	0	7,466	0.798	900	conc. Pipe	1.67	1.06	0.96	0.157	84%	OK!

USCP/USMH	DSCP/DSMH	USGL	DSGL	USIL	DSIL	INVERT DIFF.	LENGTH (m)	SLOPE s	SLOPE 1 IN	RUNOFF COEF. C	SUB-CATCHMENT AREA (m2)	EFF. AREA (m2)	CUM. EFF. AREA (m2)	DESIGN FLOW (m3/s)	SIZE (mm)	UC Type	VEL (m/s)	*FLOW CAPACITY (m3/s)	90% FLOW CAPACITY (for pipe) (m3/s)	SPARE CAPACITY (m3/s)	Occupancy of the proposed pipe
1.1	CP1.2	4.30	4.30	4.00	3.74	0.26	65.00	0.004	250	0.95	1,003	953	953	0.118	300	UC	1.20	0.19		0.072	
CP1.2	CP1.3	4.30	4.30	3.74	3.67	0.07	17.00	0.004	250	0.95	0	0	953	0.117	300	UC	1.22	0.22		0.101	
CP1.3	CP1.4	4.30	4.30	3.67	3.63	0.04	10.00	0.004	250	0.95	0	0	953	0.116	300	UC	1.23	0.23		0.118	
CP1.4	CP1.5	4.30	4.30	3.63	3.42	0.16	40.00	0.004	250	0.95	779	740	1,693	0.200	300	UC	1.26	0.32		0.120	
CP1.5	CP1.6	4.30	4.30	3.42	3.17	0.25	70.00	0.004	275	0.95	1,880	1,786	3,479	0.391	300	UC	1.22	0.40		0.013	
CP1.6	CP1.7	4.30	4.30	3.17	3.08	0.09	23.00	0.004	250	0.95	0	0	3,479	0.386	300	UC	1.29	0.46		0.075	
CP1.7	MH TM	4.30	4.30	3.08	3.04	0.03	15.00	0.002	450	0.95	0	0	3,479	0.382	450	UC	1.22	0.67		0.284	
2.1	CP2.2	4.30	4.30	3.70	3.60	0.10	48.00	0.002	500	0.95	1,481	1,407	1,407	0.177	600	UC	1.25	0.47		0.296	
CP2.2	CP2.3	4.30	4.30	3.60	3.50	0.10	73.00	0.001	700	0.95	2,716	2,580	3,987	0.474	750	UC	1.20	0.65		0.175	
CP2.3	MH TM	4.30	4.30	3.50	3.44	0.06	42.00	0.001	700	0.95	0	0	3,987	0.460	750	UC	1.22	0.71		0.254	
										total =	7,859	7,466									
Discharge Pipe																					
MH TM (CP1.7 + CP2.3)	MH1	4.30	4.20	2.00	1.80	0.20	20.00	0.010	100	0.95	0	0	7,466	0.817	900	conc. Pipe	3.13	1.99	1.79	0.977	46%
MH1	MH2	4.20	4.20	1.45	1.29	0.16	39.00	0.004	240	0.95	0	0	7,466	0.806	900	conc. Pipe	2.02	1.28	1.16	0.350	70%
MH2	Outfall	4.20	4.20	1.29	1.26	0.03	9.00	0.003	350	0.95	0	0	7,466	0.803	900	conc. Pipe	1.67	1.06	0.96	0.153	84%

NOTES :

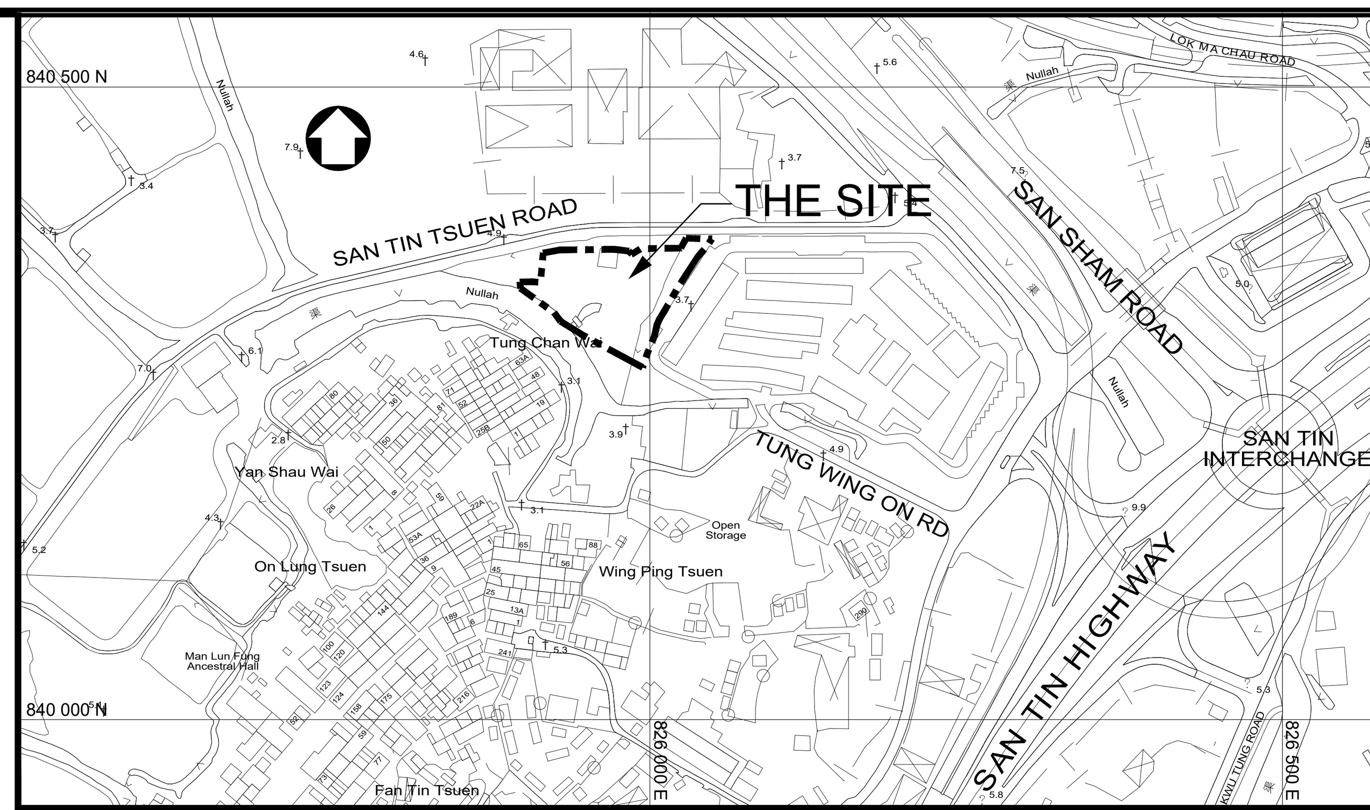
1. ALL LEVELS SHOWN ARE IN METRES ABOVE THE PRINCIPAL DATUM.
2. LOCATIONS OF EXISTING MANHOLES AND DRAINS ARE INDICATIVE ONLY. THE EXACT LOCATIONS SHALL BE VERIFIED ON SITE.
3. THE EXACT LOCATIONS OF THE PROPOSED MANHOLES SHALL BE AGREED WITH THE ENGINEER ON SITE.
4. PRECAST CONCRETE PIPES AND FITTINGS SHALL COMPLY WITH BS EN 1916 AND BS 5911-1, AND SHALL HAVE FLEXIBLE SPIGOT AND SOCKET JOINTS.
5. ALL GROUND LEVELS SHOWN IN THIS DRAWING ARE REFERENCE ONLY.
6. ALL MANHOLE COVERS SHOULD BE HEAVY DUTY.
7. ALL REINFORCEMENT TO B.S. 4449. REINFORCEMENT SHALL BE HIGH YIELD STEEL BARS AND (GRADE 460) WITH YIELD STRESS 460 MPA.
   - ALL CONCRETE SHALL COMPLY WITH CSI : 1990.
   - ALL REINFORCEMENT CONCRETE WORKS SHALL COMPLY WITH THE HONG KONG BUILDING (CONSTRUCTION) REGULATION 1990.
8. UNLESS SPECIFIED OTHERWISE, CONCRETE GRADE ARE :-
   STRUCTURAL CONCRETE 40D/20.
   BLINDING CONCRETE 10D/20.
9. UNLESS SPECIFIED OTHERWISE, CONCRETE SURFACE FINISHES ARE :-
   FORMED :-
   EXTERNAL F1
   INTERNAL F4
   UNFORMED :-
   EXTERNAL U1
   INTERNAL U5
10. MOVEMENT JOINT IS NORMAL TO THE FLOW DIRECTION.
11. DOWEL BARS AT MOVEMENT JOINT SHALL BE SAW-CUT PERPENDICULAR TO BAR AXIS AND INSTALLED NORMAL TO THE MOVEMENT JOINT.
12. CONCRETE COVER TO MAIN REINFORCEMENT TO BE 50mm (MIN.)
13. MINIMUM LAP. LENGTH SHOULD BE 46xDIA OF REINFORCEMENT.
14. LEVELLING STONE AND ROCK FILL LAYERS ARE OPTIONAL AND DETERMINED BY THE ENGINEER.
15. INTERFACE BETWEEN OLD AND NEW CONCRETE SHOULD BE ROUGHENED.
16. REACTIVE ALKALI OF CONCRETE EXPRESSED AS THE EQUIVALENT SODIUM OXIDE PER CUBIC METRE OF CONCRETE SHOULD NOT EXCEED 3.0kg AS DETERMINATION IN ACCORDANCE WITH SPECIFICATION ITEMS GIVEN IN APPENDIX A OF PNAP 180.
17. CONCRETE PIPE WITH COVER LESS THAN 900mm IN ROAD OR 450mm IN FOOTPATH SHOULD BE CONCRETE SURROUNDED
18. ALL PIPES SHALL BE WITH CONCRETE SURROUND TYPE II .
19. ALL WORKS, WHERE APPLICABLE, SHALL COMPLY WITH GENERAL SPECIFICATION FOR CIVIL ENGINEERING WORKS, 2006 EDITION.

Abbreviation

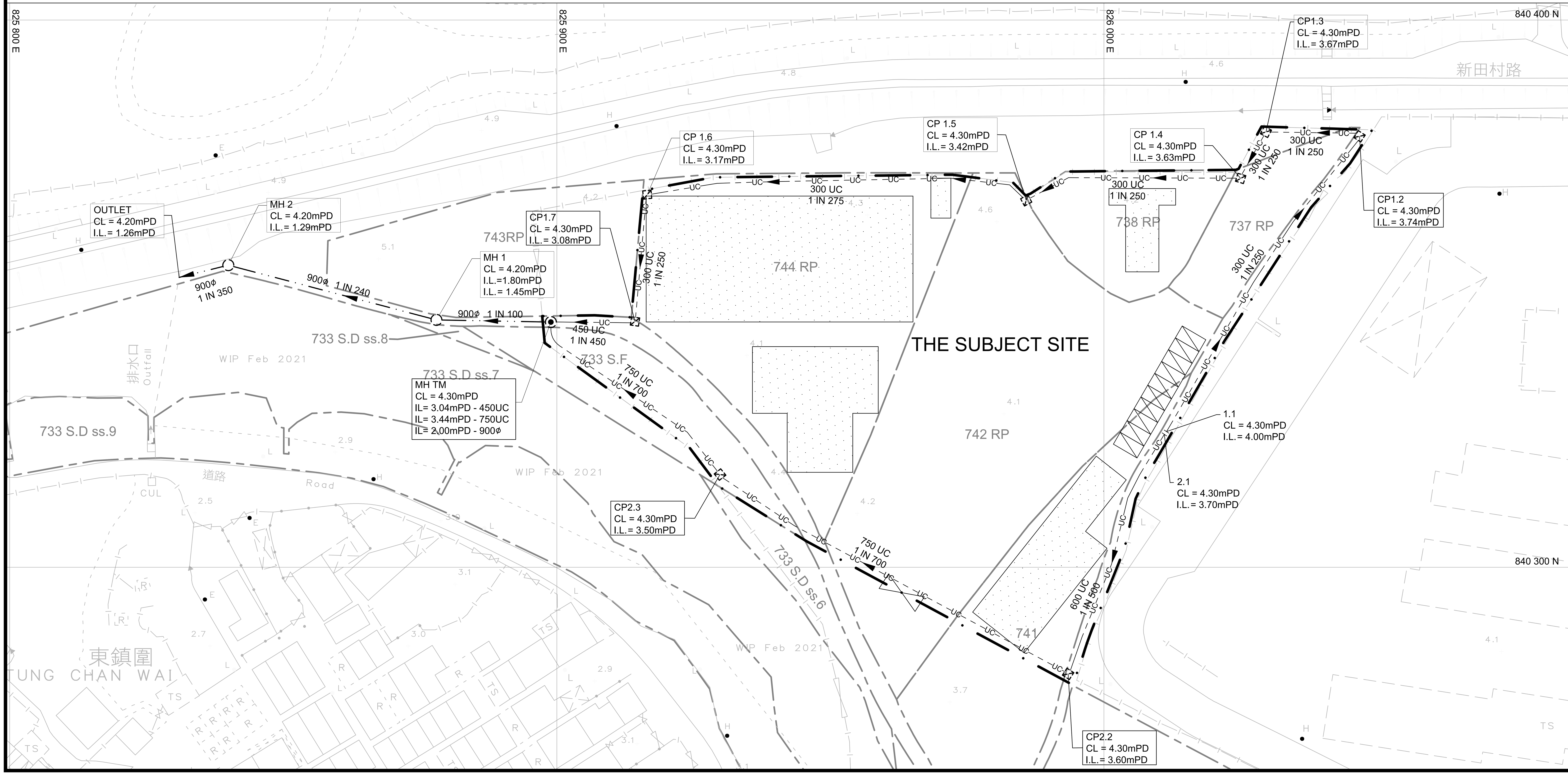
USMH	Upstream Manhole
DSMH	Downstream Manhole
USGL	Upstream Ground Level, mPD
DSGL	Downstream Ground Level, mPD
USIL	Upstream Invert Level, mPD
DSIL	Downstream Invert Level, mPD

LEGEND:

- LOT BOUNDARY LINE
- SITE BOUNDARY LINE
- PROPOSED SURFACE CHANNEL WITH COVER
- PROPOSED CATCHPIT WITH COVER
- PROPOSED STORMWATER DRAIN
- PROPOSED STORMWATER MANHOLE
- PROPOSED STORMWATER TERMINAL MANHOLE



BLOCK PLAN 1 : 5 000



B.D. REF.

F.S.D. REF.

Do not scale drawing

Figured dimensions are to be taken in preference to scaled dimensions in all cases.

Read this drawing in conjunction with general architectural plans, structural plans and other related drawings. Before commencing work, the full extent and exact nature of the works shown on this drawing shall be ascertained and all dimensions verified with site measurements. Any discrepancy must be brought immediately to the notice of Ho Tin & Associates Consulting Engineers Limited.

All prints and copies of this drawing are the properties of Ho Tin & Associates Consulting Engineers Limited and shall be returned on completion of works.

REVISIONS

PROJECT

LOTS 733 SF(PART), 737 RP(PART), 738 RP(PART), 741(PART),742 RP(PART), 744 RP(PART) AND ADJOINING GOVERNMENT LAND IN DD99, SAN TIN, YUEN LONG, N.T.

何 田 顧 問 工 程 師 有 限 公 司
HO TIN & ASSOCIATES
CONSULTING ENGINEERS LIMITED
電話 : 2895 2238 圖文傳真 : 2890 8872 電郵 : admin@hotin.com.hk
Tel : 2895 2238 Fax : 2890 8872 E-mail : admin@hotin.com.hk

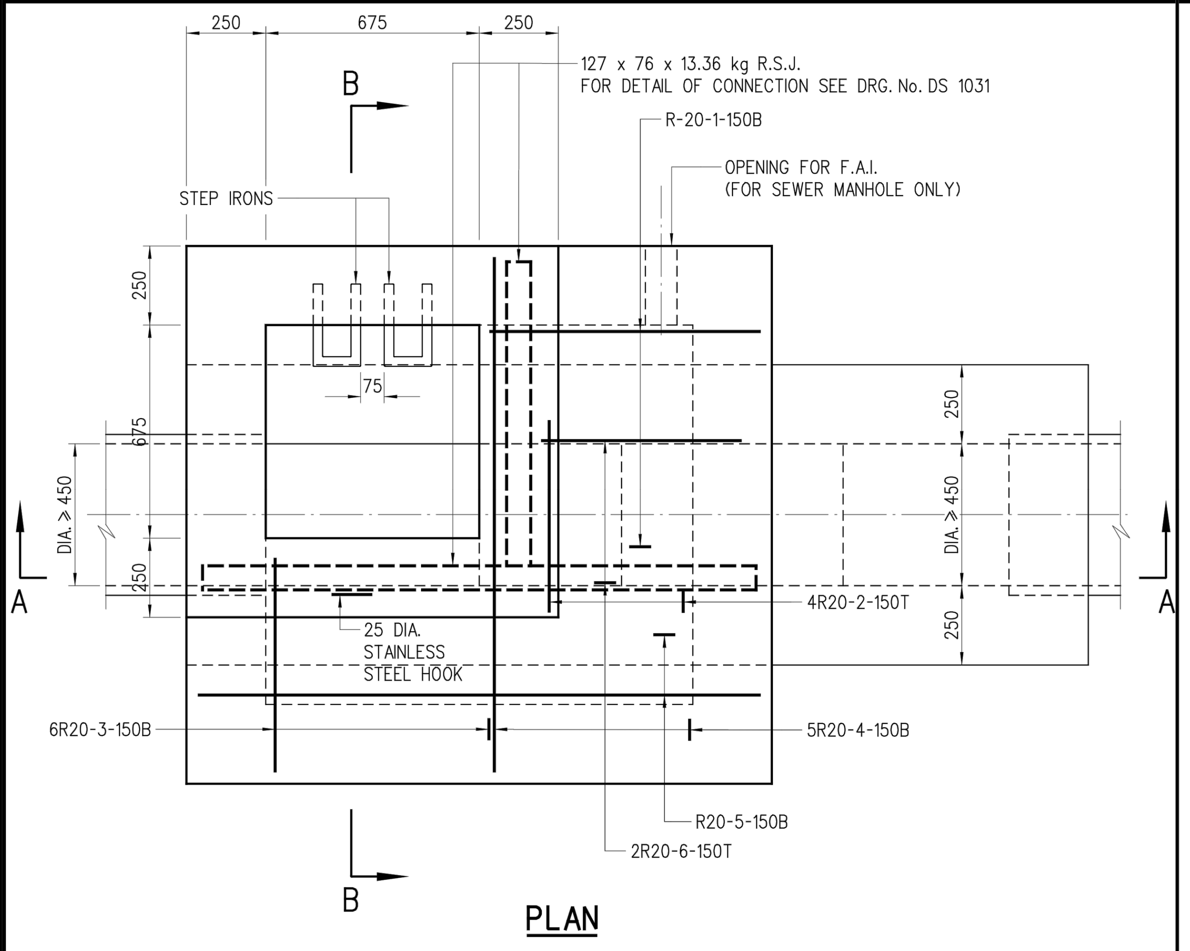
DATE PRINTED	
JOB NO.	HT21094
SCALE:	1 : 400 OR AS SHOWN (A1)
DRAWN:	S . L . LAM
CHECKED:	FRED LUI
APPROVED:	K . C . LEE

TITLE

PROPOSED DRAINAGE LAYOUT PLAN

DRAWING NO.

HT 21094 / DD / 01

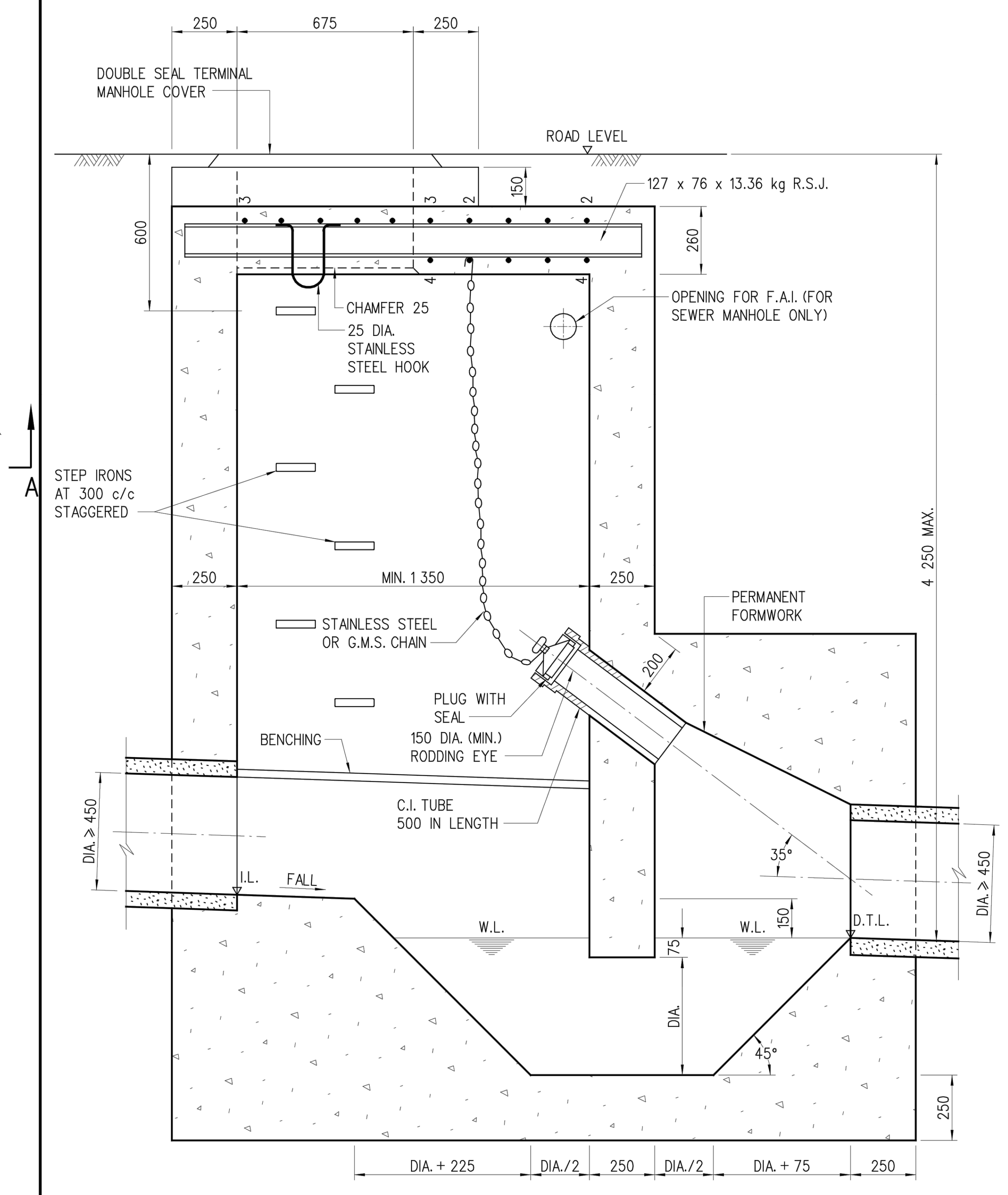


PLAN

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. NOTATION OF REINFORCEMENT : THE SEQUENCE OF DESCRIPTION OF IDENTIFICATION MARKS ON DRAWINGS FOR STEEL REINFORCING BARS FOR CONCRETE WORK IS AS FOLLOWS (NUMBER, TYPE, SIZE, MARK, SPACING, LOCATION OR COMMENT)
3. B DENOTES GRADE 500B RIBBED REINFORCEMENT.
4. R DENOTES GRADE 250 PLAIN REINFORCEMENT.
5. PIPE DIAMETER : EQUAL OR GREATER THAN 450 mm
6. NORMAL RANGE OF DEPTH : 1 750 TO 4 250 mm (MEASURED FROM ROAD LEVEL TO LOWEST INVERT)
7. USED IN : STORMWATER DRAIN AND SEWER
8. JUNCTION : POSITION OF JUNCTION TO BE DETERMINED IN EACH INDIVIDUAL CASE. CHANNELS IMMEDIATELY UNDER ACCESS TO MANHOLE SHOULD BE AVOIDED.
9. TOP TREATMENT : SEE DRAWING No. DS 1032
10. STEP IRON : SEE DRAWING No. DS 1043
11. FOUNDATION : FOUNDATION OF MANHOLE VARIES WITH SITE CONDITION. THEREFORE, IT SHOULD BE DETERMINED ON SITE BY THE ENGINEER.
12. CONCRETE MIX : GRADE 30/20
13. DIAMETER OF F.A.I. NORMALLY 100 mm
14. MINIMUM COVER AT END OF BARS 40 mm
15. COVER AND FRAME NOT SHOWN ON PLAN FOR CLARITY.

REV.	DESCRIPTION	SIGNATURE	DATE
	NEW ISSUE	ORIGINAL SIGNED	13.1.2016

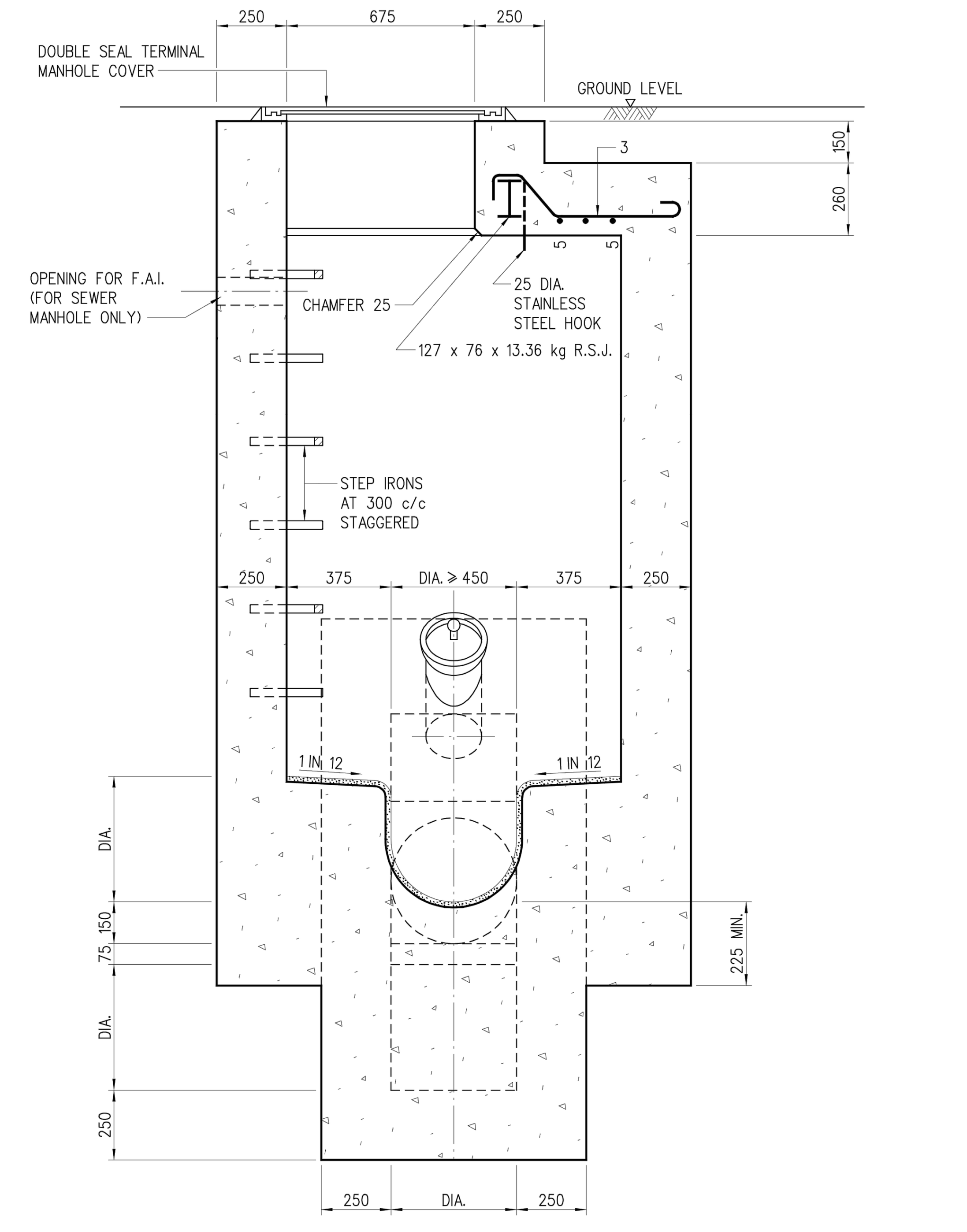
TERMINAL MANHOLE TYPE T2_1 — DRAINAGE SERVICES DEPARTMENT — REFERENCE — SCALE 1:20 — DRAWING No. DS 1091 (SHEET 1 OF 3)



SECTION A-A

REV.	DESCRIPTION	SIGNATURE	DATE
	NEW ISSUE	ORIGINAL SIGNED	13.1.2016

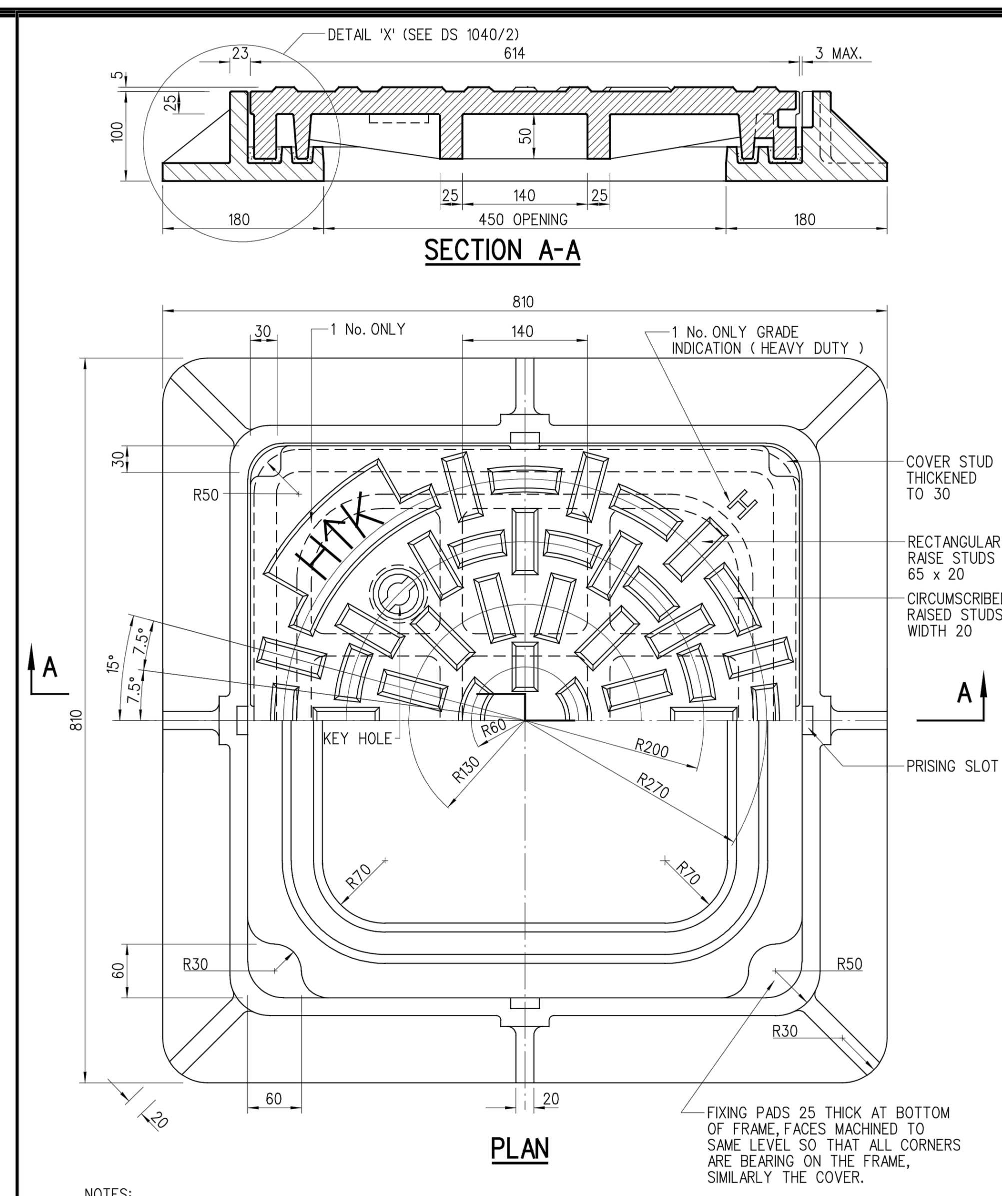
TERMINAL MANHOLE TYPE T2_1 — DRAINAGE SERVICES DEPARTMENT — REFERENCE — SCALE 1:20 — DRAWING No. DS 1091 (SHEET 2 OF 3)



SECTION B-B

REV.	DESCRIPTION	SIGNATURE	DATE
	NEW ISSUE	ORIGINAL SIGNED	13.1.2016

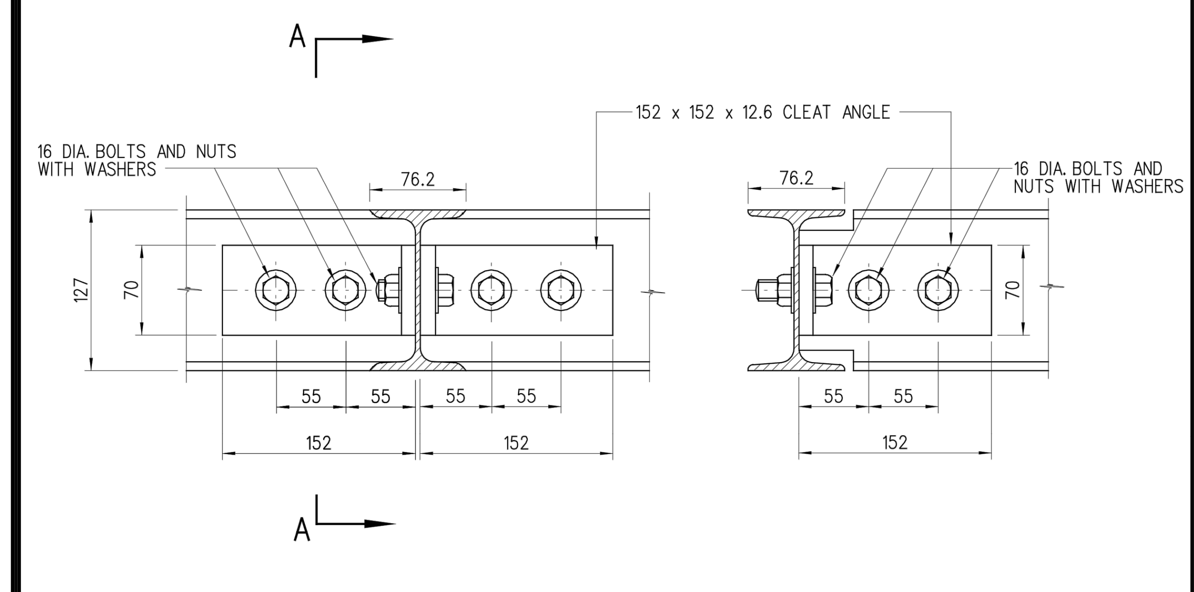
TERMINAL MANHOLE TYPE T2_1 — DRAINAGE SERVICES DEPARTMENT — REFERENCE — SCALE 1:20 — DRAWING No. DS 1091 (SHEET 3 OF 3)



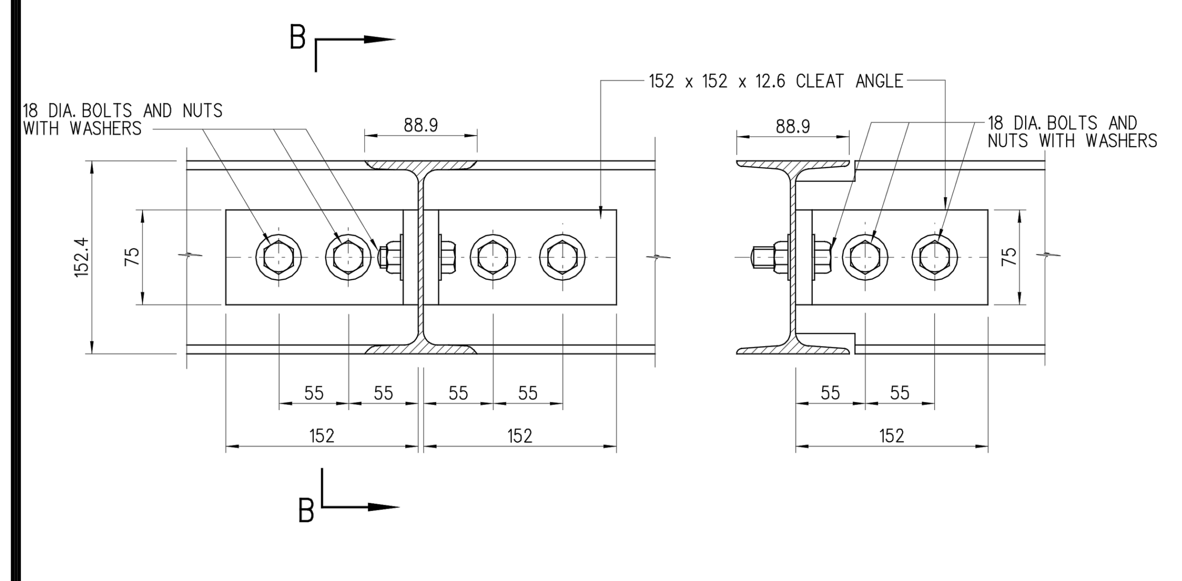
NOTES:
1. DIMENSIONS ARE IN MILLIMETRES.
2. ALL CORNERS ARE TO BE ROUNDED TO APPROXIMATELY 2 RADIUS.
3. CAST IRON FOR M.H. COVER AND FRAME IS TO CONFORM WITH GRADE 150 OF BS 1452.
4. COVER ACCESSIBLE TO WHEELED VEHICLE NOT EXCEEDING 100 kN/WHEEL.

REV.	DESCRIPTION	SIGNATURE	DATE
B	REDRAWN BY CAD	ORIGINAL SIGNED	8.8.2001
A	GENERAL REVIEW	ORIGINAL SIGNED	2.2.2001

DOUBLE SEAL TERMINAL STORMWATER M. H. COVER TYPE MA2 - 45 / 45B — DRAINAGE SERVICES DEPARTMENT — REFERENCE — SCALE N.T.S. — DRAWING No. DS 1040B (SHEET 1 OF 2)



127 x 76 x 13.36 kg R.S.J.

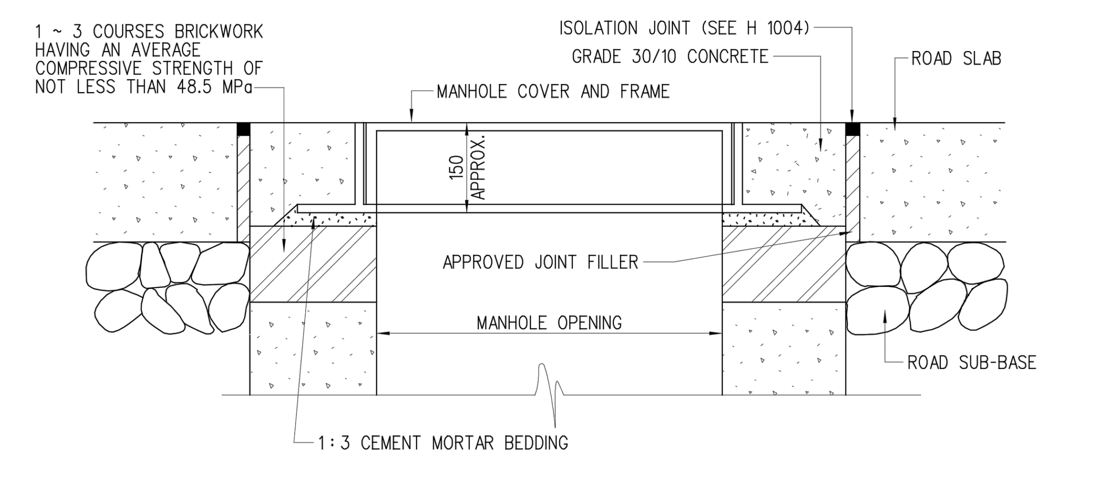


152 x 89 x 17.09 kg R.S.J.

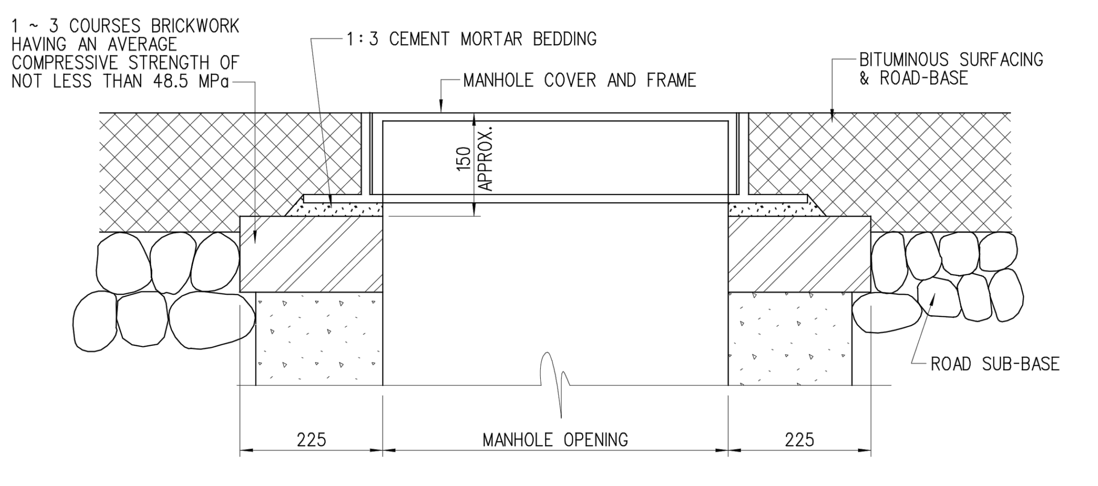
NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. ALTERNATIVE WELDING CONNECTIONS MAY BE USED.

REV.	DESCRIPTION	SIGNATURE	DATE
B	REDRAWN BY CAD	ORIGINAL SIGNED	8.8.2001
A	GENERAL REVIEW	ORIGINAL SIGNED	2.2.2001

R. S. J. CONNECTIONS (IN MANHOLES) — DRAINAGE SERVICES DEPARTMENT — REFERENCE — SCALE 1:5 — DRAWING No. DS 1031B



TOP TREATMENT APPLIED TO CONCRETE ROAD SURFACE

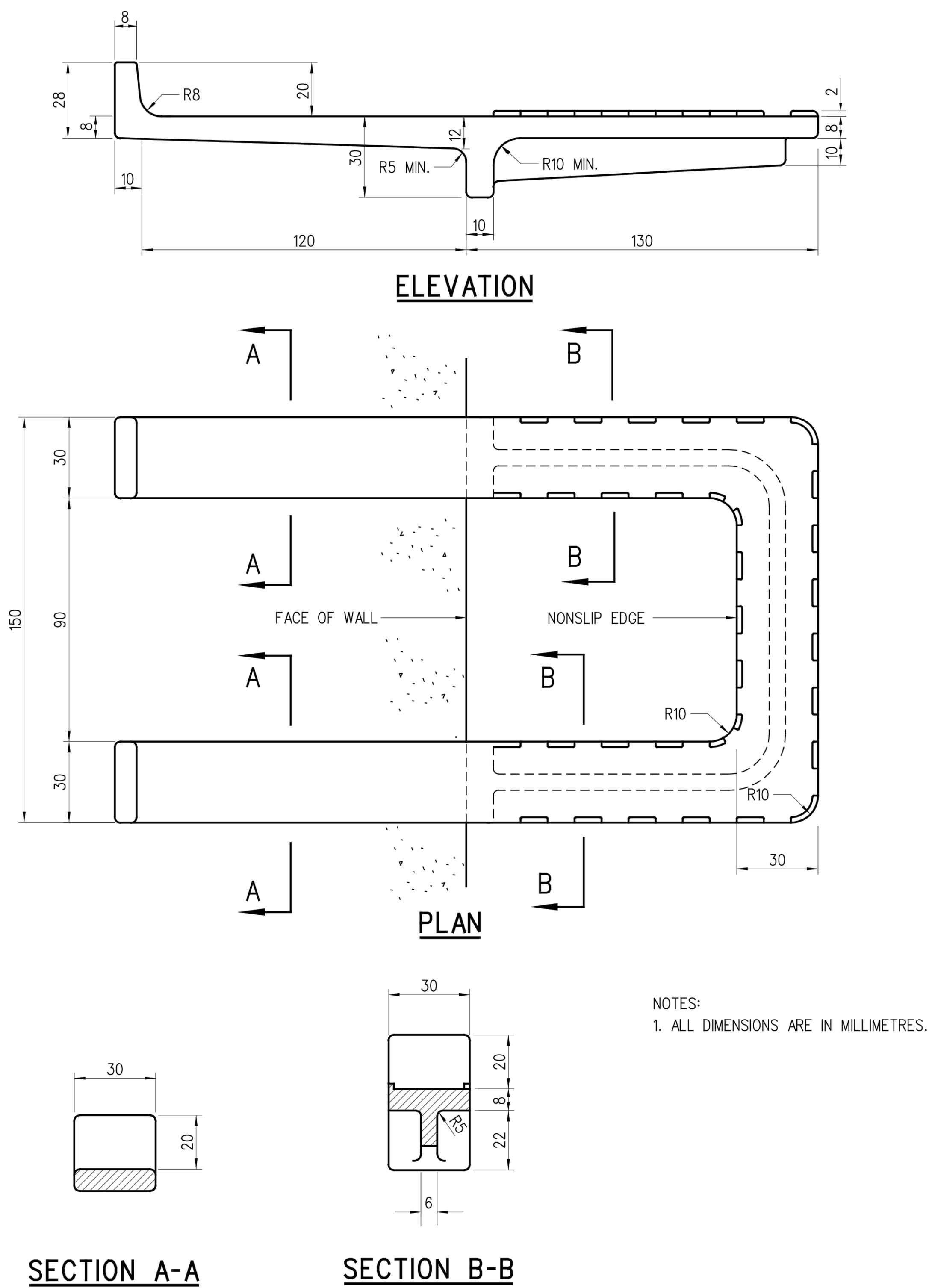


TOP TREATMENT APPLIED TO FLEXIBLE ROAD SURFACE

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES.

REV.	DESCRIPTION	SIGNATURE	DATE
B	REDRAWN BY CAD	ORIGINAL SIGNED	8.8.2001
A	GENERAL REVIEW	ORIGINAL SIGNED	2.2.2001

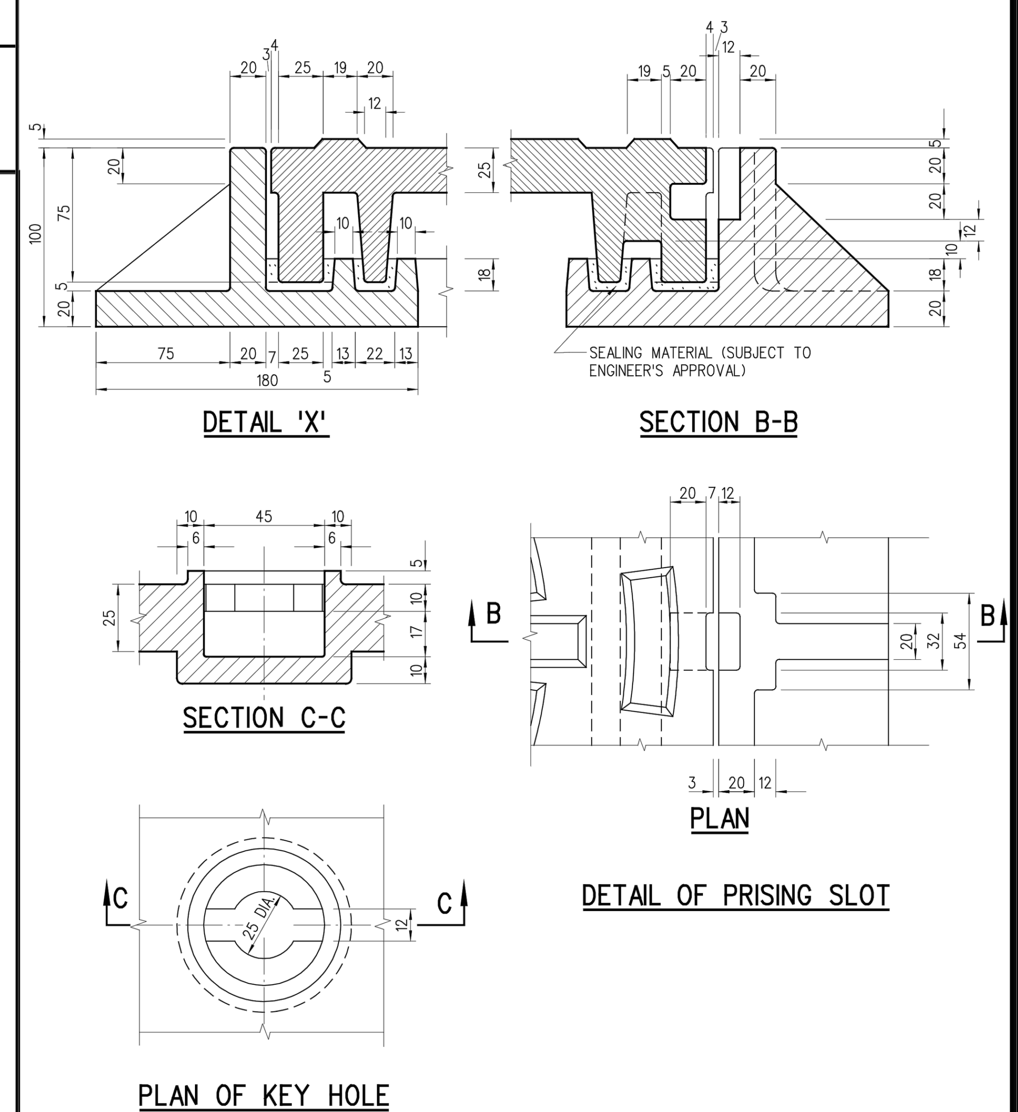
TOP TREATMENT TO MANHOLE — DRAINAGE SERVICES DEPARTMENT — REFERENCE — SCALE 1:10 — DRAWING No. DS 1032B



NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES.

REV.	DESCRIPTION	SIGNATURE	DATE
B	REDRAWN BY CAD	ORIGINAL SIGNED	8.8.2001
A	GENERAL REVIEW	ORIGINAL SIGNED	2.2.2001

MANHOLE STEP IRON — DRAINAGE SERVICES DEPARTMENT — REFERENCE — SCALE 1:2 — DRAWING No. DS 1043B



REV.	DESCRIPTION	SIGNATURE	DATE
B	REDRAWN BY CAD	ORIGINAL SIGNED	8.8.2001
A	GENERAL REVIEW	ORIGINAL SIGNED	2.2.2001

DOUBLE SEAL TERMINAL STORMWATER M. H. COVER TYPE MA2 - 45 / 45B — DRAINAGE SERVICES DEPARTMENT — REFERENCE — SCALE N.T.S. — DRAWING No. DS 1040B (SHEET 2 OF 2)

B.D. REF.

F.S.D. REF.

Do not scale drawing

Figured dimensions are to be taken in preference to scaled dimensions in all cases.

Read this drawing in conjunction with general architectural plans, structural plans and other related drawings. Before commencing work, the full extent and exact nature of the works shown on this drawing shall be ascertained and all dimensions verified with site measurements. Any discrepancy must be brought immediately to the notice of Ho Tin & Associates Consulting Engineers Limited.

All prints and copies of this drawing are the properties of Ho Tin & Associates Consulting Engineers Limited and shall be returned on completion of works.

REVISIONS

PROJECT

LOTS 733 SF(PART), 737 RP(PART), 738 RP(PART), 741(PART),742 RP(PART), 744 RP(PART) AND ADJOINING GOVERNMENT LAND IN DD99, SAN TIN, YUEN LONG, N.T.

何田顧問工程師有限公司
HO TIN & ASSOCIATES
CONSULTING ENGINEERS LIMITED
電話 : 2895 2238 圖文傳真 : 2890 8872 電郵 : admin@hotin.com.hk
Tel : 2895 2238 Fax : 2890 8872 E-mail : admin@hotin.com.hk

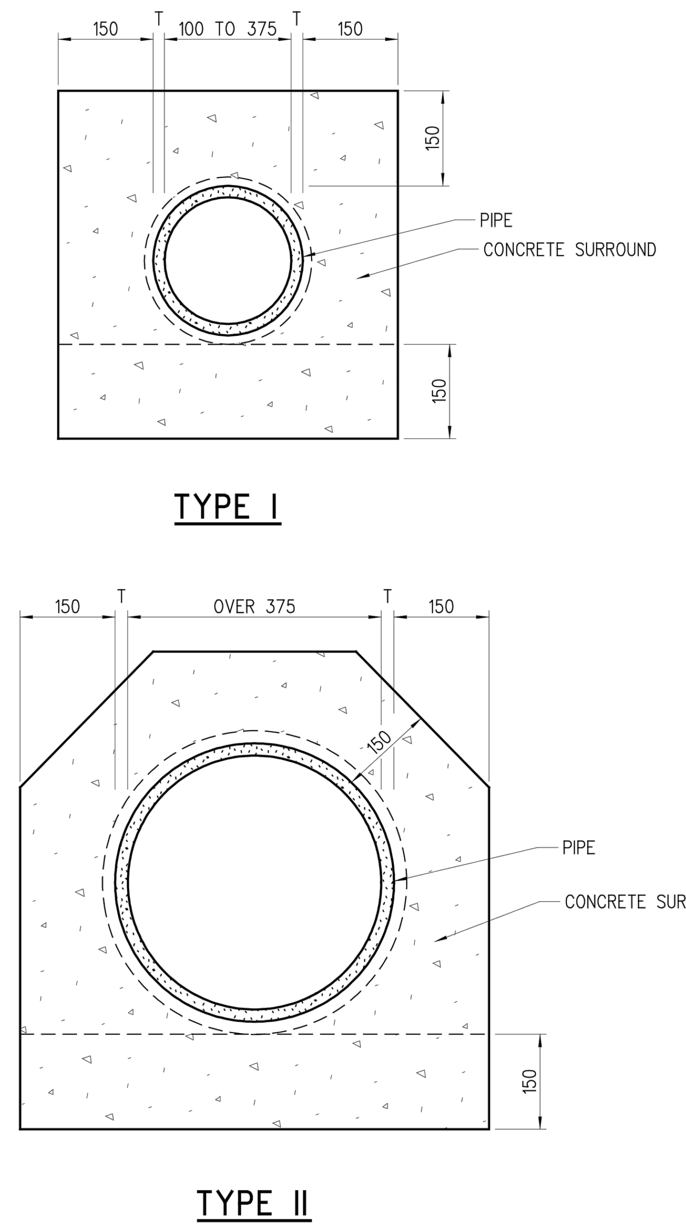
DATE PRINTED	
JOB NO.	HT21094
SCALE:	AS SHOWN (A1)
DRAWN:	S. L. LAM
CHECKED:	FRED LUI
APPROVED:	K. C. LEE

TITLE

DETAILS OF STANDARD TERMINAL MANHOLE TYPE T2_1

DRAWING NO.

HT 21094 / DD / 02



NOTES:
1. 'T' DENOTES WALL THICKNESS OF PIPE.
2. CONCRETE MIX TO BE GRADE 20/20 WITH MINIMUM CEMENTITIOUS CONTENT:-

EXPOSURE CONDITION*	MINIMUM CEMENTITIOUS CONTENT (kg/m³)
MODERATE	280
SEVERE	330

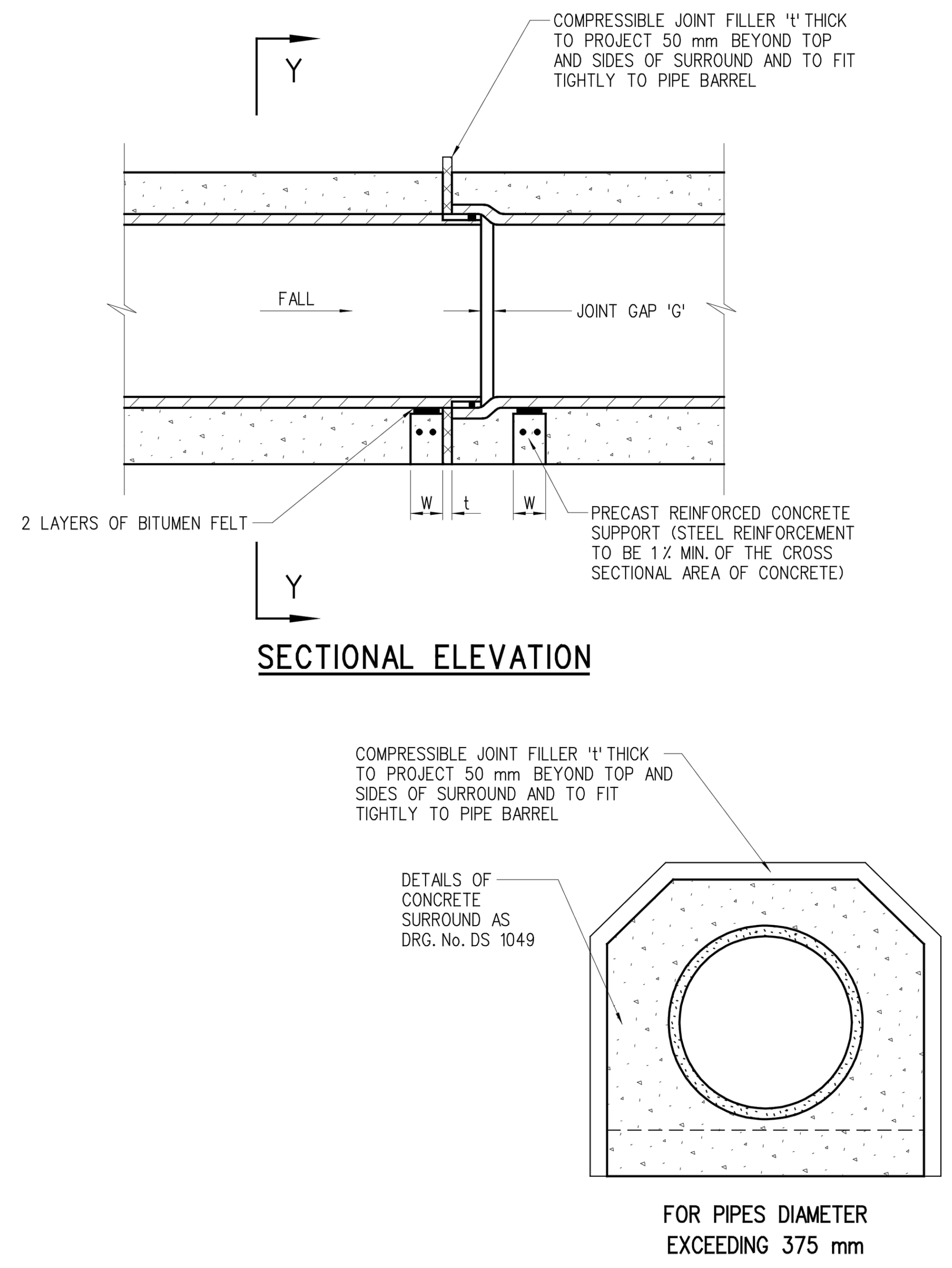
[*EXPOSURE CONDITION SHALL BE STATED IN THE CONTRACT.]

REV.	DESCRIPTION	SIGNATURE	DATE
B	NOTES REVISED	ORIGINAL SIGNED	31.7.2001
A	GENERAL REVIEW	ORIGINAL SIGNED	2.2.2001

SURROUND TO PIPES

DRAINAGE SERVICES DEPARTMENT

REFERENCE | DRAWING No. DS 1049B | SCALE 1 : 10



SECTION Y-Y

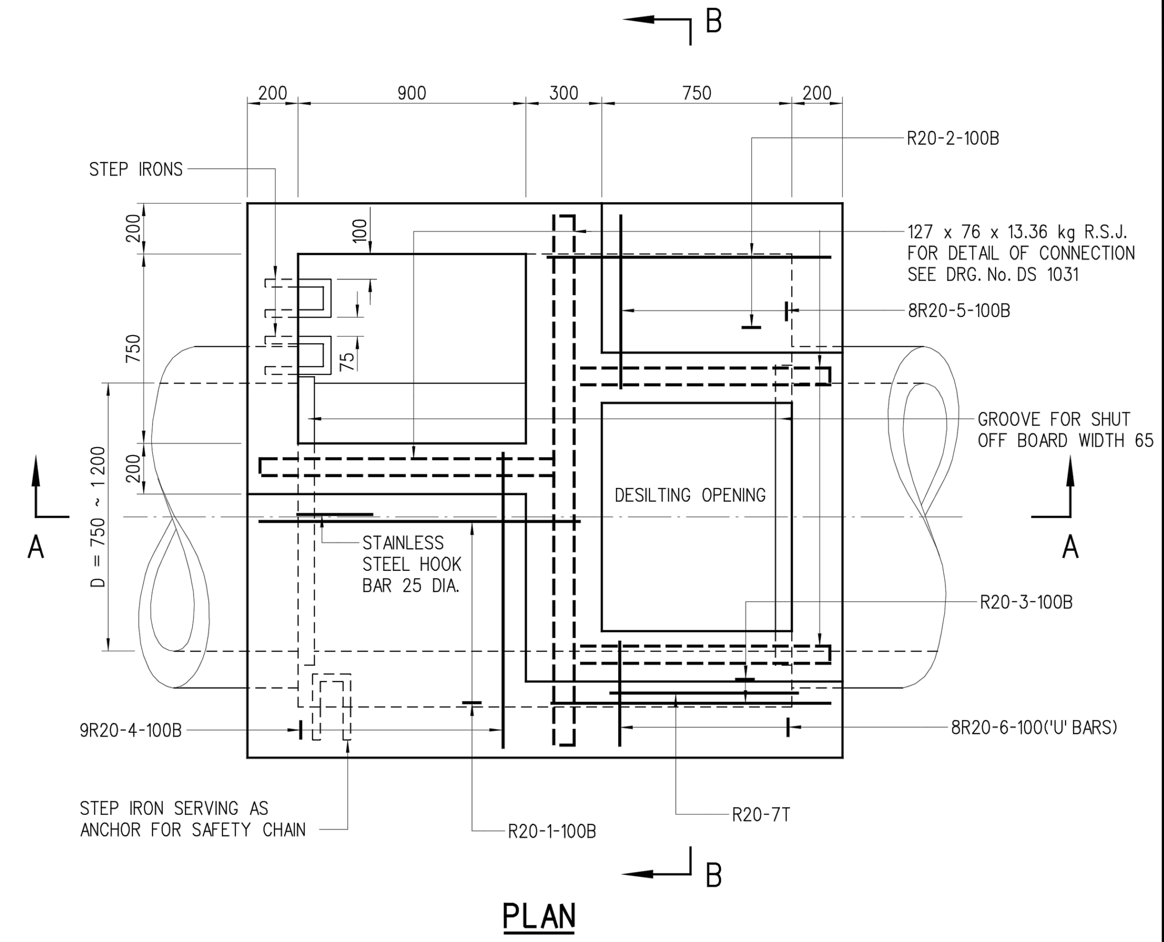
DETAILS FOR PIPE WITH CONCRETE SURROUND

REV.	DESCRIPTION	SIGNATURE	DATE
B	NOTES REVISED	ORIGINAL SIGNED	31.7.2001
A	GENERAL REVIEW	ORIGINAL SIGNED	2.2.2001

TYPICAL DETAILS OF FLEXIBLE JOINT

DRAINAGE SERVICES DEPARTMENT

REFERENCE | DRAWING No. DS 1050B (SHEET 2 OF 2) | SCALE 1 : 20



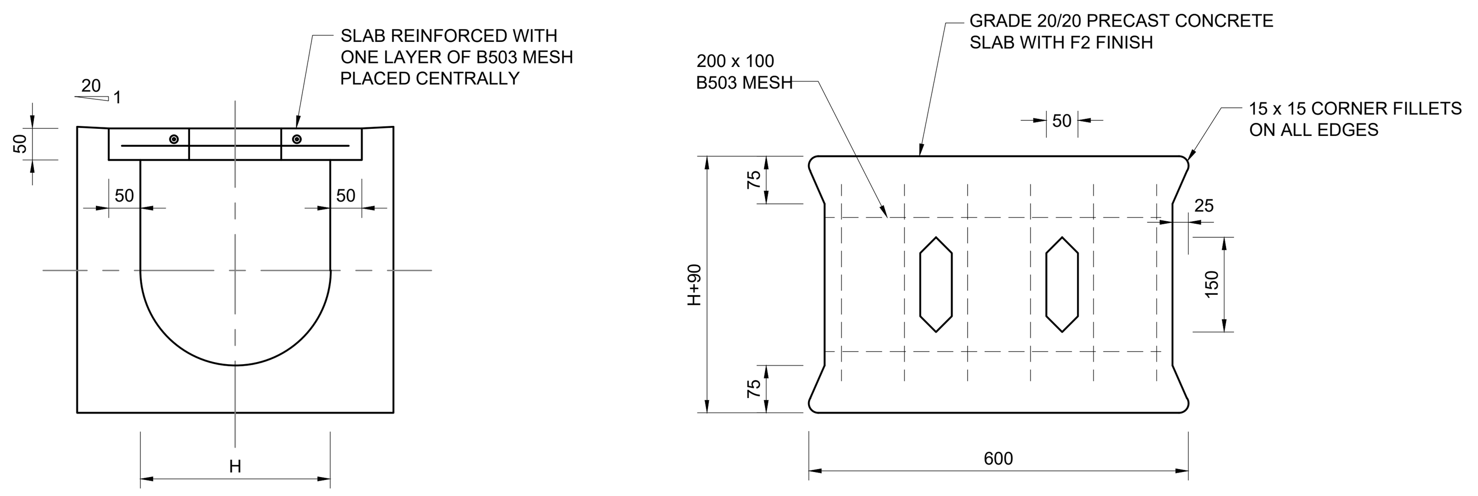
NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. NOTATION OF REINFORCEMENT : THE SEQUENCE OF DESCRIPTION OF IDENTIFICATION MARKS ON DRAWINGS FOR STEEL REINFORCING BARS FOR CONCRETE WORK IS AS FOLLOWS (NUMBER, TYPE, SIZE, MARK, SPACING, LOCATION OR COMMENT)
3. B DENOTES GRADE 500B RIBBED REINFORCEMENT.
4. R DENOTES GRADE 250 PLAN REINFORCEMENT.
5. PIPE DIAMETER : 750 TO 1 200 mm
6. NORMAL RANGE OF DEPTH : 2 250 TO 3 250 mm (MEASURED FROM ROAD LEVEL TO LOWEST INVERT)
7. USED IN : STORMWATER DRAIN AND SEWER
8. JUNCTION : POSITION OF JUNCTION TO BE DETERMINED IN EACH INDIVIDUAL CASE. CHANNELS IMMEDIATELY UNDER ACCESS TO MANHOLE SHOULD BE AVOIDED.
9. TOP TREATMENT : SEE DRAWING No. DS 1032
10. FOUNDATION : FOUNDATION OF MANHOLE VARIES WITH SITE CONDITION. THEREFORE, IT SHOULD BE DETERMINED ON SITE BY THE ENGINEER.
11. CONCRETE : GRADE 30/20
12. ALL BAR MARKS APPEARED HEREON ARE USED FOR REFERENCE IN THIS DRAWING ONLY.
13. MINIMUM COVER AT END OF BARS 40 mm
14. COVERS AND FRAMES NOT SHOWN ON PLAN FOR CLARITY.

REV.	DESCRIPTION	SIGNATURE	DATE
D	NOTE 11 DELETED NOTES 2, 3 & 4 ADDED	ORIGINAL SIGNED	29.4.2015
C	NOTE 11 REVISED	ORIGINAL SIGNED	24.11.2014
B	REDRAWN BY CAD	ORIGINAL SIGNED	8.8.2001
A	GENERAL REVIEW	ORIGINAL SIGNED	2.2.2001

STANDARD MANHOLE TYPE H / D (WITH DESILTING OPENING)

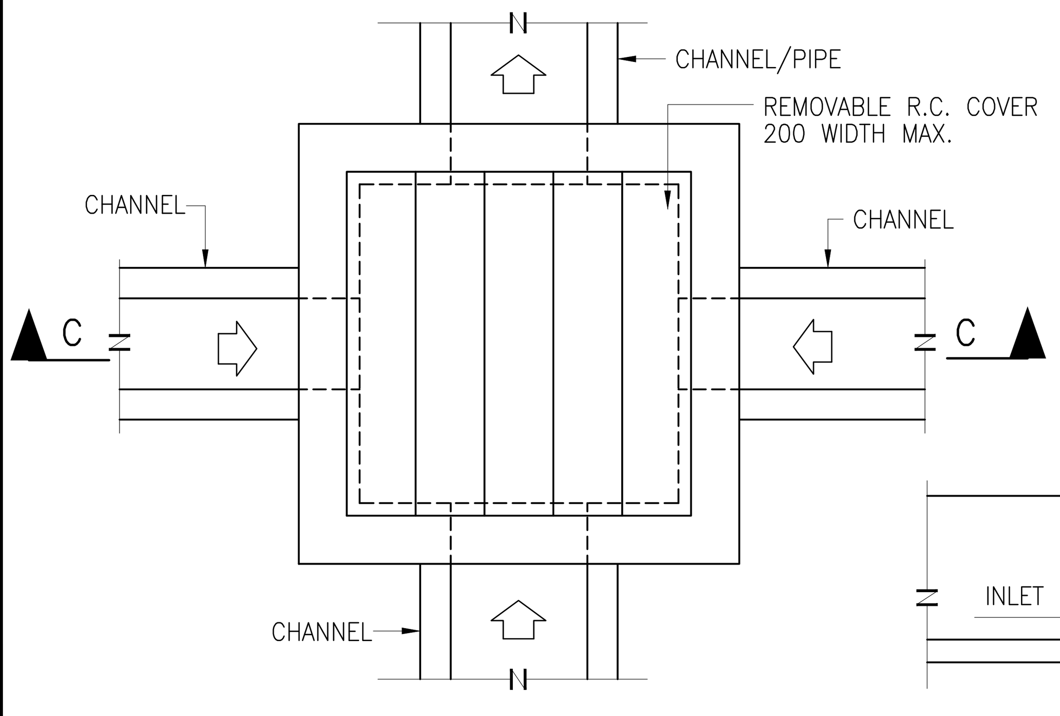
DRAINAGE SERVICES DEPARTMENT

REFERENCE | DRAWING No. DS 1010D (SHEET 1 OF 3) | SCALE 1 : 25



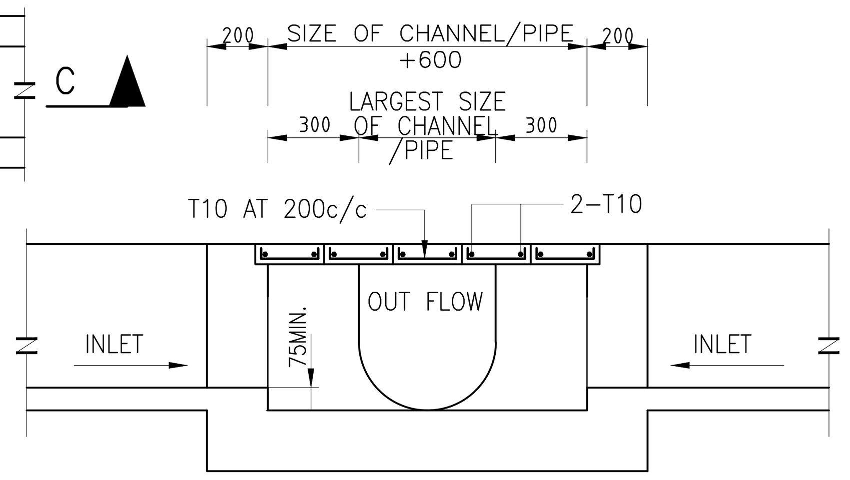
U-CHANNELS WITH PRECAST CONCRETE SLABS

(UP TO H OF 525)



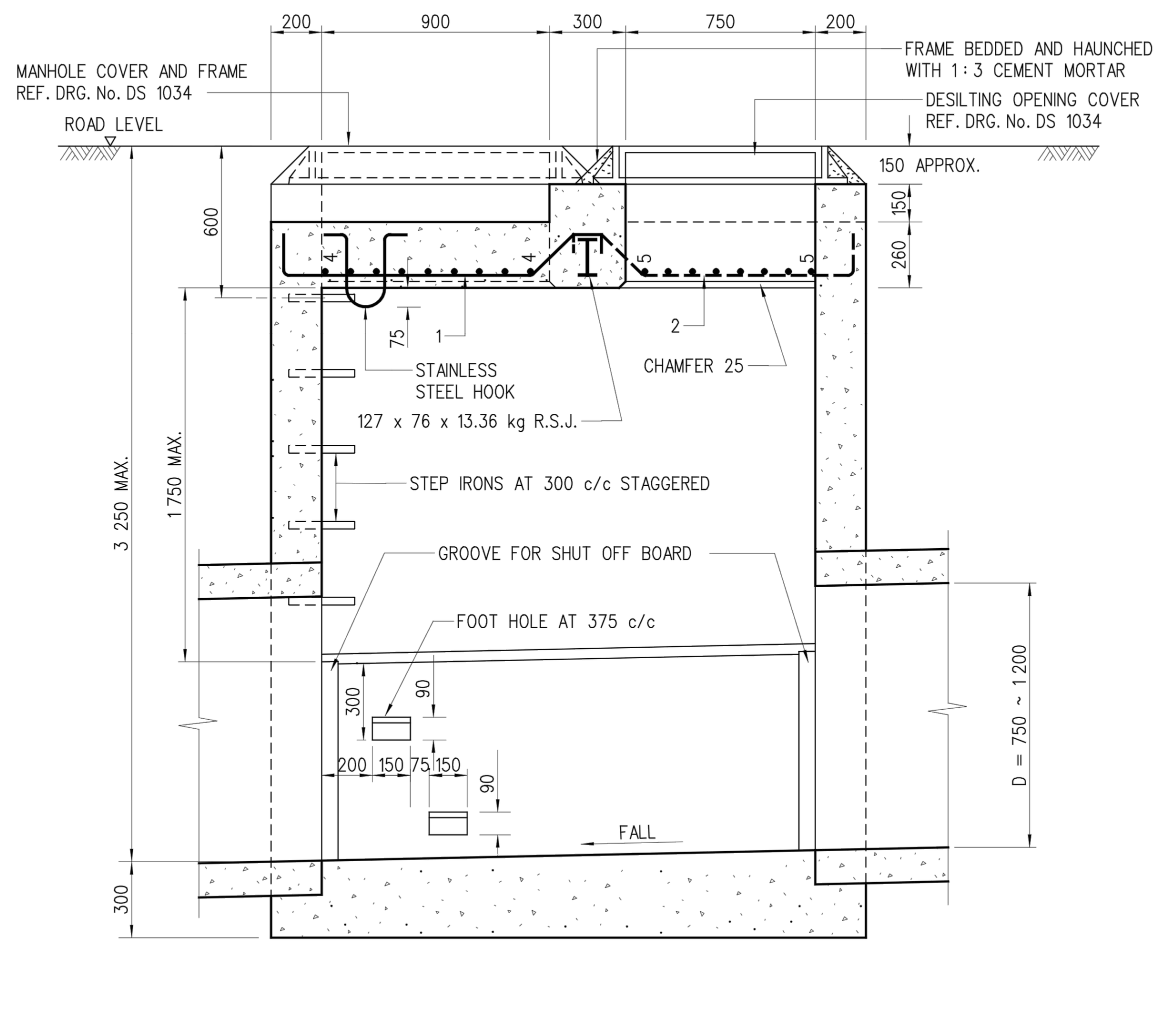
PLAN OF CATCH-PIT

N.T.S



SECTION C - C

N.T.S



SECTION A-A

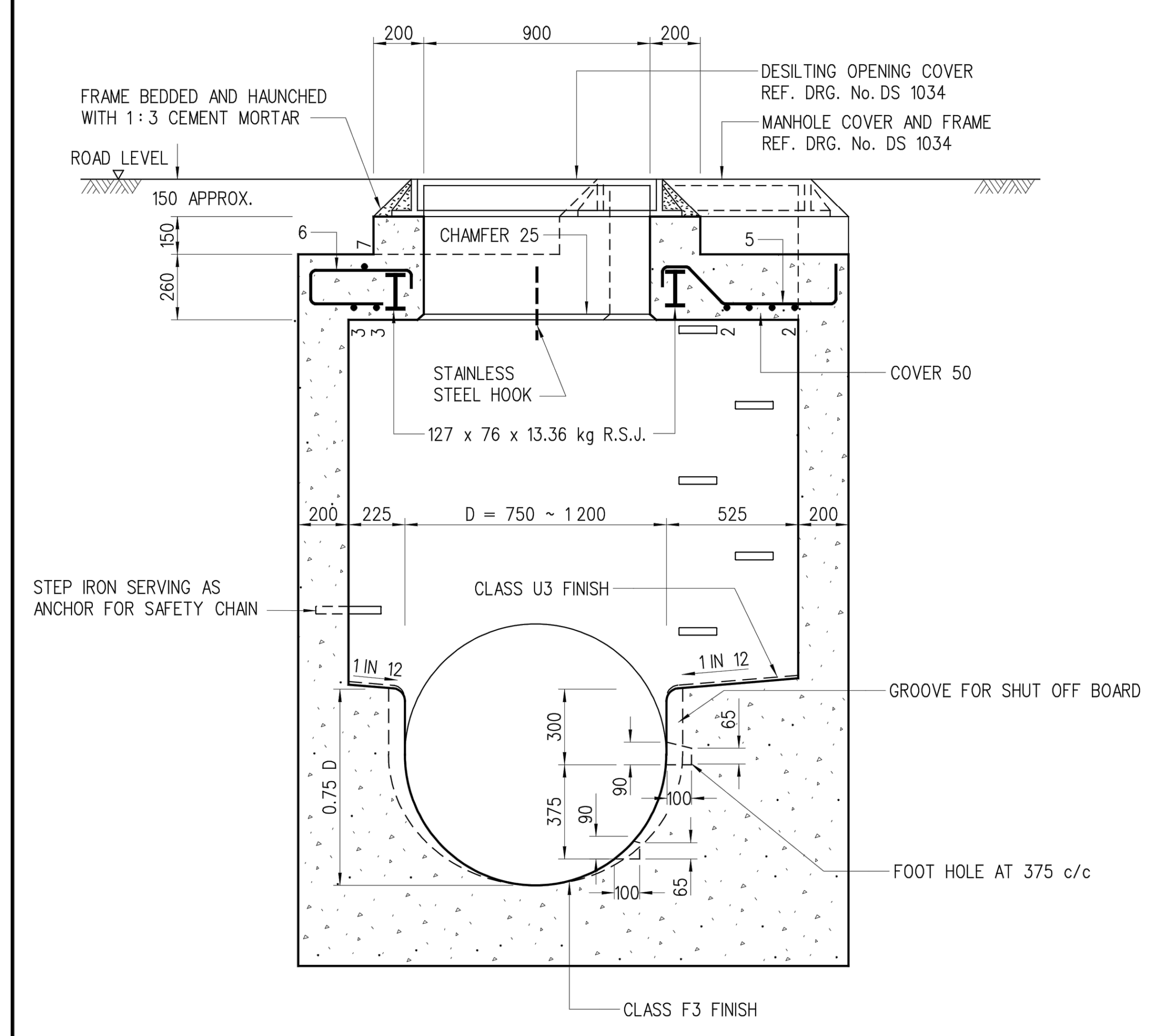
BAR MARK	SHAPE CODE
1 TO 5	99
6	99
7	20

REV.	DESCRIPTION	SIGNATURE	DATE
D	NOTE 11 DELETED NOTES 2, 3 & 4 ADDED	ORIGINAL SIGNED	29.4.2015
C	NOTE 11 REVISED	ORIGINAL SIGNED	24.11.2014
B	REDRAWN BY CAD	ORIGINAL SIGNED	8.8.2001
A	GENERAL REVIEW	ORIGINAL SIGNED	2.2.2001

STANDARD MANHOLE TYPE H / D (WITH DESILTING OPENING)

DRAINAGE SERVICES DEPARTMENT

REFERENCE | DRAWING No. DS 1010D (SHEET 2 OF 3) | SCALE 1 : 25



SECTION B-B

REV.	DESCRIPTION	SIGNATURE	DATE
D	NOTE 11 DELETED NOTES 2, 3 & 4 ADDED	ORIGINAL SIGNED	29.4.2015
C	NOTE 11 REVISED	ORIGINAL SIGNED	24.11.2014
B	REDRAWN BY CAD	ORIGINAL SIGNED	8.8.2001
A	GENERAL REVIEW	ORIGINAL SIGNED	2.2.2001

STANDARD MANHOLE TYPE H / D (WITH DESILTING OPENING)

DRAINAGE SERVICES DEPARTMENT

REFERENCE | DRAWING No. DS 1010D (SHEET 3 OF 3) | SCALE 1 : 25

B.D. REF.

F.S.D. REF.

Do not scale drawing

Figured dimensions are to be taken in preference to scaled dimensions in all cases.

Read this drawing in conjunction with general architectural plans, structural plans and other related drawings. Before commencing work, the full extent and exact nature of the works shown on this drawing shall be ascertained and all dimensions verified with site measurements. Any discrepancy must be brought immediately to the notice of Ho Tin & Associates Consulting Engineers Limited.

REVISIONS

PROJECT

LOTS 733 SF(PART), 737 RP(PART), 738 RP(PART), 741(PART),742 RP(PART), 744 RP(PART) AND ADJOINING GOVERNMENT LAND IN DD99, SAN TIN, YUEN LONG, N.T.

何田顧問工程師有限公司
HO TIN & ASSOCIATES
CONSULTING ENGINEERS LIMITED
電話 : 2895 2238 圖文傳真 : 2890 8872 電郵 : admin@hotin.com.hk
Tel : 2895 2238 Fax : 2890 8872 E-mail : admin@hotin.com.hk

DATE PRINTED

JOB NO.	HT21094
SCALE:	AS SHOWN (A1)
DRAWN:	S.L.LAM
CHECKED:	FRED LUI
APPROVED:	K.C.LEE

TITLE

PIPE LAYING, STANDARD MANHOLE TYPE E1, SURFACE CHANNEL & CATCH PIT DETAILS

DRAWING NO.

HT 21094 / DD / 03