添 比 建 設 有 限 公 司

Ratio Architecture & Construction Limited

SUBMISSION REPORT
FOR
DRAINAGE PROPOSAL DESIGN
FOR
TEMPORARY EATING PLACE AND BARBECUE SITE WITH ANCILLARY FACILITIES AND CARPARK
FOR A PERIOD OF 3 YEARS
AT VARIOUS LOTS IN D.D.17, TING KOK
TAI PO, NEW TERRITORIES

Ratio Architecture & Construction Limited

Date : June 2026

[redacted]

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APPENDIX

REFERENCES

1. Stormwater Drainage Manual, Planning Design and Management by DSD
2. Geotechnical Manual for Slopes by GEO
3. Standard Drawings by DSD

1. Introduction

This proposal is prepared for the proposed stormwater drainage works for the temporary eating place and barbecue site with ancillary facilities and carpark for a period of 3 years at various lots in D.D.17, Ting Kok, Tai Po, N.T.

2. Existing Drainage Condition

A plan showing the existing catchments are enclosed in **Appendix B**. Currently, the surface runoff collected from the existing site and is discharging to the existing 525mm surface channel and terminates at the sea as shown in **Appendix A**. As per the existing site condition, additional peripheral U-channels area considered necessary for the proposed development. Drainage proposal is required to be carried out for the proposed development.

3. Design Parameters & Assumptions

The design criteria to be used for the modeling assessment are based on the standards set out in the Stormwater Drainage Manual, Fifth Edition (SDM). According to Section 6.6.1 of the SDM, the existing village drainage system in the vicinity of the development is classified as main rural catchment drainage system. Table 10 of the SDM recommends to be adopted a 50 year design return period storm event for the main rural drainage branch system.

<u>Stormwater Runoff (Q)</u>

The rate of stormwater runoff used in this assessment report is estimated by the "Rational method" in which the peak runoff is calculated from the formula:

$$Q = K \times i \times A / 3600$$

where
- Q = maximum runoff (L/s)
- i = design mean intensity of rainfall (mm/hr)
- A = area of catchment (m^2)
- K = runoff coefficient

Time of Concentration (tc)

The time of concentration is defined as the time required for stormwater runoff to flow from the most remote part of the catchment area to the point in the drainage system under consideration. Based on the assumptions adopted in the Rational Method, this is the time taken for the peak runoff to become established at the considered section.

The time of concentration comprises the time for water flowing within natural catchments and along the man-made drainage pipes/channels. For natural catchments, the time of concentration is estimated by the modified form of the Brandsby William's equation.

$$t_o = \frac{0.14465L}{H^{0.2} A^{0.1}}$$

Where t_o = time of concentration of a natural catchment (min.)

A = catchment area (m^2)

H = average slope (m per 100m), measured along the line of natural flow, from the summit of the catchment to the point under consideration

L = distance (on plan) measured on the line of natural flow between the summit and the point under consideration (m)

Mean Rainfall Intensity (i)

Mean rainfall intensity-duration curves attached in this report are based on the Statistical analysis of long term rainfall records from the Hong Kong Observatory. A return period of 50 years is adopted.

Runoff Coefficient (K)

The value of K is taken as 0.95 for paved area. For vegetated ground, the value of K is taken as 0.3.

4. Proposed Stormwater Drainage

The proposed stormwater drainage works include surface U-channels at the peripheral of the site collecting the runoff from catchments within the site. The U-channels will connect and discharge the surface runoff to the sea. Catchpits with 300mm sump are proposed at the discharged points of proposed U-Channel to desilt the surface water before discharging to the drainage outside. The proposed stormwater drainage layout plan is shown in **Appendix A**.

5. Effect on Drainage Characteristics and Potential Drainage Impact

The drainage design of the proposed U-channel are presented in **Appendix B**.

6. Conclusion

Peripheral channels are to be provided along the site boundary where necessary to intercept runoff from crossing the site. The drainage conditions of adjacent areas will not be adversely affected.

Appendix A

Stormwater Drainage Proposal Plan

Site Photos for Stormwater Drainage Proposal at Various Lots in D.D. 17, Ting Kok, Tai Po, N.T.

Photo 1

Photo 2

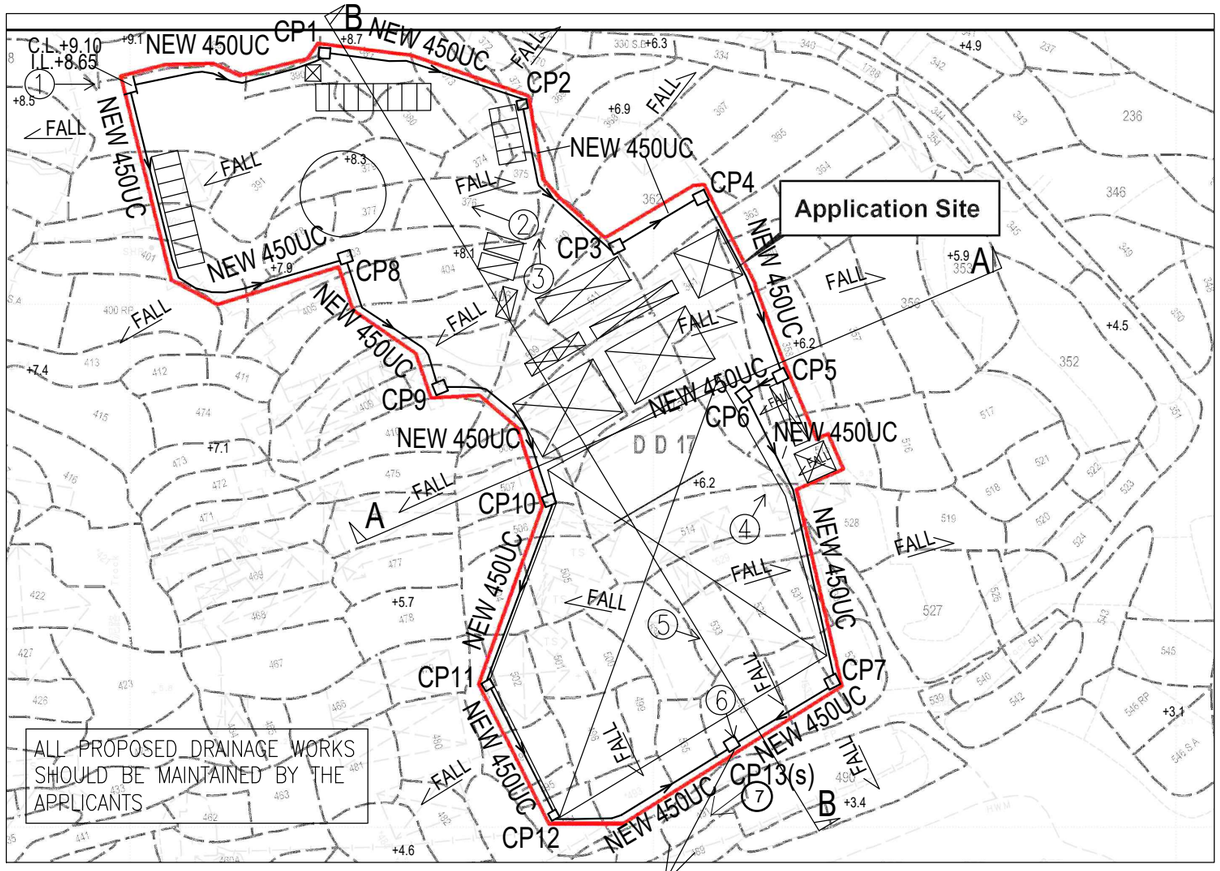
Photo 3

Photo 4

Photo 5

Photo 6

Photo 7



EXISTING 525UC (DISCHARGE TO SEA SHOWN ON GEOINFO MAP)

LEGEND:

- NEW 450UC → PROPOSED 450mm U-CHANNEL WITH GRATING AT FALL 1: 100 (MIN)
- CP13(s) □ PROPOSED COVERED DESILTED CATCHPIT NO. CP13
- CP1 □ PROPOSED COVERED CATCHPIT NO. CP1
- +4.5 EXISTING GROUND LEVEL
- ⊠ PROPOSED STRUCTURES UNDER PLANNING APPLICATION (FOR REFERENCE ONLY)
- ①→ PHOTO TAKING DIRECTION

PROPOSED CATCHPIT SCHEDULE

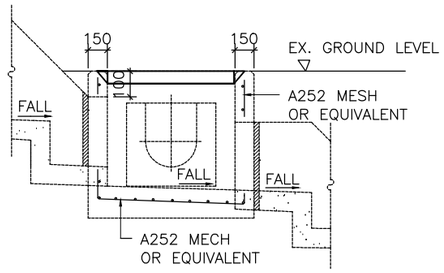
CATCHPIT	C.L. (mPD)	I.L. (mPD)
CP1	8.70	8.15
CP2	7.50	6.95
CP3	7.50	6.61
CP4	6.90	6.35
CP5	6.20	5.65
CP6	6.20	5.59
CP7	4.0	3.45
CP8	7.90	7.35
CP9	7.10	6.55
CP10	6.20	5.65
CP11	5.70	5.15
CP12	4.60	4.05
CP13(s)	3.40	2.85

GENERAL NOTE

1. THE PROPOSED DRAINAGE WORK, WHETHER WITHIN OR OUTSIDE THE LOT BOUNDARY, SHOULD BE CONSTRUCTED AND MAINTAINED BY THE LOT OWNER AT HIS OWN EXPENSE. FOR WORKS TO BE UNDERTAKEN OUTSIDE THE LOT BOUNDARY, PRIOR CONSENT AND AGREEMENT FROM DLO AND/OR RELEVANT PRIVATE LOT OWNER SHOULD BE SOUGHT.
2. NO WALL AND HOARDING WOULD BE ERECTED UNDER THIS APPLICATION.

CONCRETE STRENGTH AND STEEL REINFORCEMENT SPECIFICATION FOR DRAINAGE DETAILS

1. CONCRETE GRADE FOR CATCHPITS AND U-CHANNEL SHALL BE 30D DESIGN IN COMPLIANCE WITH CS1 : 2010 FOR BLINDING LAYER SHALL BE 15D, DESIGN COMPLY WITH CS1-2010.
2. ALL MAIN BARS TO BE HOT ROLLED HIGH YIELD STEEL DEFORMED BAR COMPLM WITH CS2 : 2012
   Y – HIGH YIELD BAR 500 MPa
   M – MILD STEEL BAR 250 MPa
3. CONCRETE COVER TO MAIN REINFORCEMENT TO BE 50mm.
4. LAP LENGTH FOR ALL BARS TO BE 46x DIAMETER OF LARGER BAR TO BE LAPPED.
5. REACTIVE ALKALI CONTENT EXPRESSED IN SODIUM OXIDE PER CUBIC METER OF CONCRETE SHOULD NOT EXCEED 3KG AS PER PNAP APP-74.



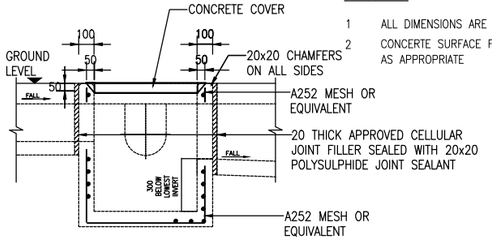
SECTION D–D
N.T.S.

HALF ROUND, U, AND STEPPED – CHANNELS

1 ALL DIMENSIONS ARE IN MILLIMETERS
2 CONCRETE SURFACE FINISHING SHALL BE CLASS U2 OR F2 AS APPROPRIATE
3 FOR HALF ROUND AND U – CHANNEL, SPACING OF EXPANSION JOINT IN CHANNELS, BERMS AND APRON TO BE 10m MAXIMUN. FOR STEPPED CHANNELS, EXPANSION JOINTS TO BE PROVIDED AT A MAXIMUN SPACING OF 10m.
4 DIMENSIONS FOR HALF ROUND AND U-CHANNELS SEE TABLE 1.
5 THE COVER FOR U-CHANNELS AND CATCHPIT SHALL COMPLY WITH CEDD'S STANDARD DRAWINGS NO. C2405 TO C2407 AND C2412.
6 ALL PROPOSED U-CHANNELS SHALL BE COVERED WITH GRATING

TABLE 1 : DIMENSION OF U-CHANNEL AND HALF-ROUND CHANNEL

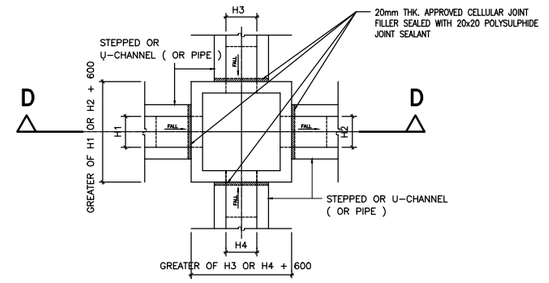
NORMAL SIZE H	T	B	REINFORCING
<300	100	100	NIL
375 – 675	150	150	NIL
750 – 900	175	175	A252 MESH PLACED CENTRALLY



SECTION D – D WITH DESILTED TRAP
COMPLY WITH CEDD'S DRAWING NO. DS C2405 AND C2406I

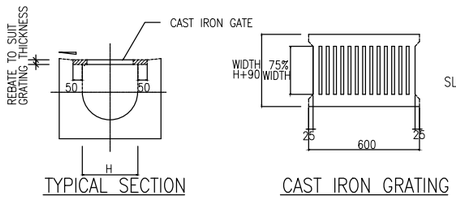
CATCHPITS

1 ALL DIMENSIONS ARE IN MILLIMETRES
2 CONCERTE SURFACE FINISH SHALL BE CLASS U2 OR F3 AS APPROPRIATE

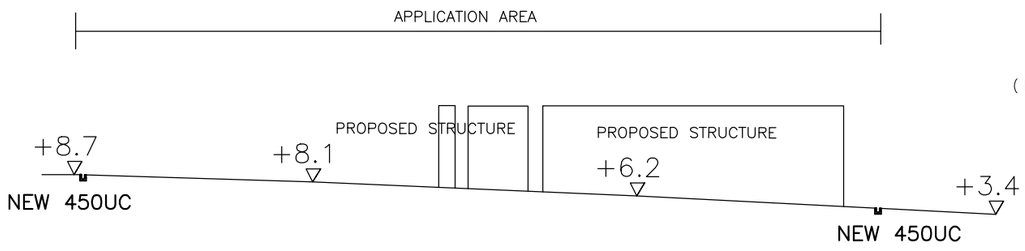


PLAN

TYPICAL DETAILS OF CATCHPIT



SECTION A–A
(NO EXCAVATIONA AND FILLING WORKS WOULD BE PROPOSED IN THIS APPLICATION)

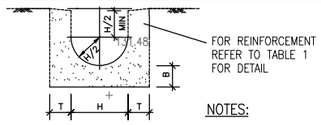


SECTION B–B
(NO EXCAVATIONA AND FILLING WORKS WOULD BE PROPOSED IN THE APPLICATION)

TYPICAL SECTION — CAST IRON GRATING

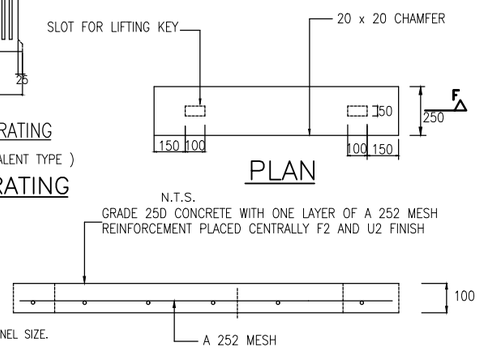
(DIMENSIONS ARE FOR GUIDANCE ONLY. CONTRACTOR MAY SUBMIT EQUIVALENT TYPE)

U–CHANNEL WITH CAST IRON GRATING



NOTES:
1. H = NOMINAL CHANNEL SIZE.

U–CHANNEL
COMPLY WITH FIG 8.11 OF GEOTECHNICAL MANUAL FOR SLOPES



PLAN
N.T.S.
GRADE 25D CONCRETE WITH ONE LAYER OF A 252 MESH REINFORCEMENT PLACED CENTRALLY F2 AND U2 FINISH

PRECAST CONCRETE COVERS FOR CATCHPIT
N.T.S.

REV	DESCRIPTION	CHECKED	APPROVED	DWN	DATE
	DLO SUBMIT	RC	AY	RY	JUNE 26

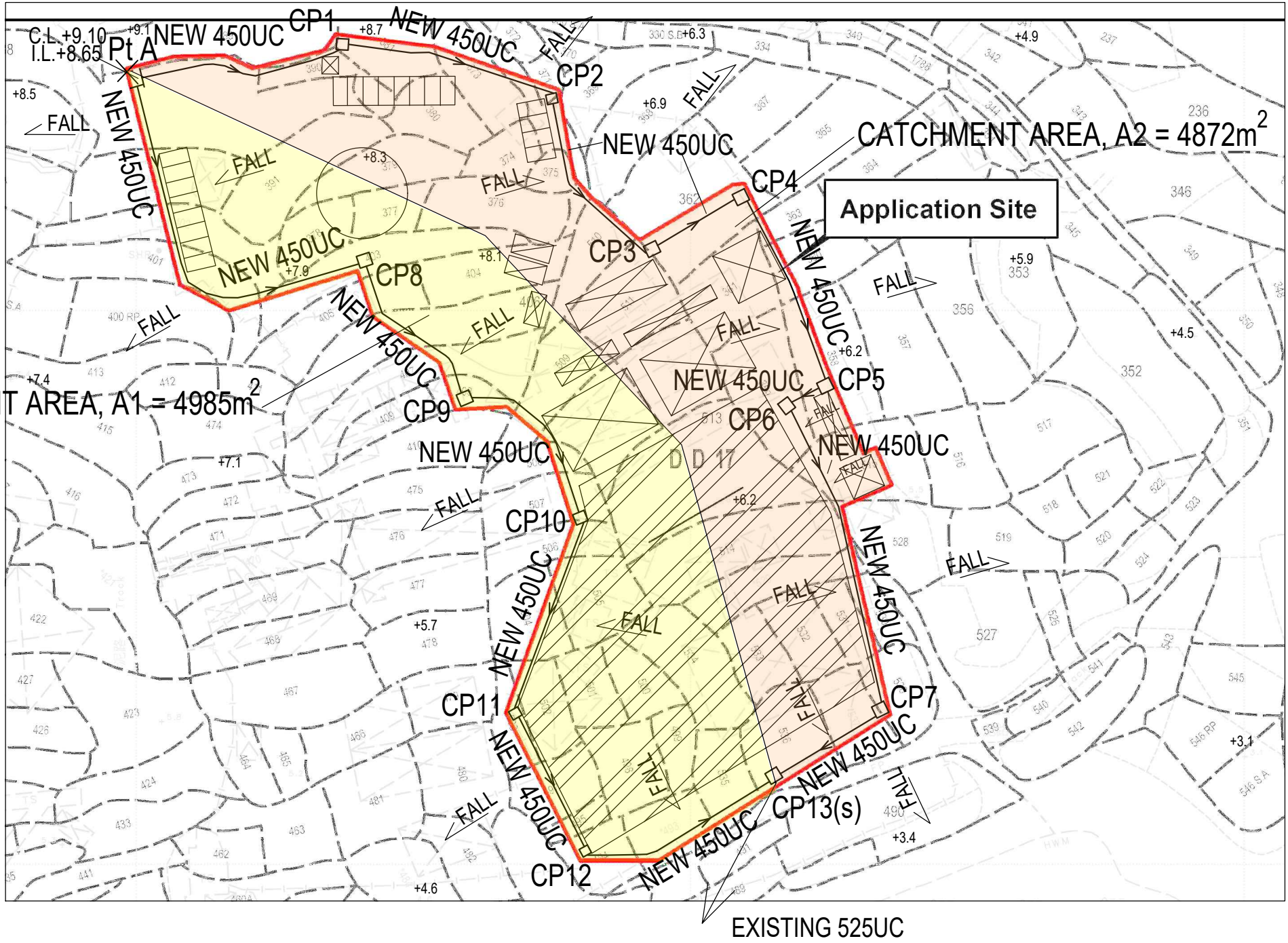
PROJECT TITLE:
STORMWATER DRAINAGE PROPOSAL
FOR VARIOUS LOT IN D.D.17 TING KOK, TAI PO

DRAWING TITLE:
DRAINAGE PROPOSAL PLAN AND TYPICAL DETAILS

SCALE :	1:1500		CAD FILE: CAD_REF
DRAWN	RY		DRAWING NO. SDP001
S.D	RY		
DESIGNED	RC		
CHECKED	AY		
			B.D. REF. NO.:

Appendix B

Surface Drainage Design



CATCHMENT AREA PLAN

Drainage Design Page no.

Project No.: Drainage Design at Various lot in D.D.17 Date: 9-Jun-26
Prepared by: Ray Cheng

Check for the drainage capactiy of proposed 450UC

Catchment area, A1 = 4985 m^2 Assume k = 0.95 for paved surface

Use Rational Method from Geo-Manual

$Q = kiA/3600$ where,

Q = Maximum runoff (lit/sec)
k = Runoff coefficient
i = Design mean intensity of rainfall (mm/hr)
A = Total catchment area (m^2)

Longest distance from summit point to outlet, CP13(s) (Ld) = 247.00 m
Shortest distance from summit point to outlet, CP13(s) (Ls) = 172.00 m

Elevation of remote point (Pt A) = 9.10 mPD
Elevation of outlet point CP13(s) = 2.850 mPD

Average fall, H = $(z_1-z_2)/L_s$ x 100
= 3.63 m per 100m

T_c = $0.14465 \times L_d / (H^{0.2} \times A^{0.1})$
= 11.78 min

Assume a 1 in 50 year design rainfall return period for rural area
From Table 3d of SDM Corrigendum No. 1/2024

i = 175 mm/hr
Q = kiA/60 x 1.16 rainfall increase
16038 lit/min

From TGN 43A1
For proposed 450 UC with 1 in 100 gradient

Maximum capacity	=	24500	lit/min	>	16038	o.k.
The corresponding velocity	=	2.25	m/s	<	4	o.k.

Drainage Design Page no.

Project No.: Drainage Design at Various lot in D.D.17 Date: 9-Jun-26
Prepared by: Ray Cheng

Check for the drainage capactiy of proposed 450UC

Catchment area, A2 = 4872 m^2 Assume k = 0.95 for paved surface

Use Rational Method from Geo-Manual

$Q = kiA/3600$ where,

Q = Maximum runoff (lit/sec)
k = Runoff coefficient
i = Design mean intensity of rainfall (mm/hr)
A = Total catchment area (m^2)

Longest distance from summit point to outlet, CP13(s) (Ld) = 260.00 m
Shortest distance from summit point to outlet, CP13(s) (Ls) = 172.00 m

Elevation of remote point (Pt A) = 9.10 mPD
Elevation of outlet point CP13(s) = 2.850 mPD

Average fall, H = $(z_1-z_2)/L_s$ x 100
= 3.63 m per 100m

T_c = $0.14465 \times L_d / (H^{0.2} \times A^{0.1})$
= 12.43 min

Assume a 1 in 50 year design rainfall return period for rural area
From Table 3d of SDM Corrigendum No. 1/2024

i = 172 mm/hr
Q = kiA/60 x 1.16 rainfall increase
15425 lit/min

From TGN 43A1
For proposed 450 UC with 1 in 100 gradient

Maximum capacity	=	24500	lit/min	>	15425	o.k.
The corresponding velocity	=	2.25	m/s	<	4	o.k.

Drainage Design Page no.

Project No.: Drainage Design at Various lot in D.D.17 Date: 9-Jun-26
Prepared by: Ray Cheng

Check for the drainage capactiy of existing 525UC

Catchment area,	A1	=	4985	m^2	Assume k =	0.95 for paved surface
	A2	=	4872	m^2		
Total catchment area, A1+A2		=	9857	m^2		

Use Rational Method from Geo-Manual

$Q = kiA/3600$ where,

Q = Maximum runoff (lit/sec)
k = Runoff coefficient
i = Design mean intensity of rainfall (mm/hr)
A = Total catchment area (m^2)

Longest distance from summit point to outlet, CP13(s)		(Ld) =	260.00	m
Shortest distance from summit point to outlet, CP13(s)		(Ls) =	172.00	m

Elevation of remote point (Pt A)	=	9.10	mPD
Elevation of outlet point CP13(s)	=	2.850	mPD
Average fall, H	=	$(z_1-z_2)/L_s$ x 100	
	=	3.63	m per 100m

T_c = $0.14465 \times L_d / (H^{0.2} \times A^{0.1})$
= 11.58 min

Assume a 1 in 50 year design rainfall return period for rural area
From Table 3d of SDM Corrigendum No. 1/2024

i = 176 mm/hr rainfall increase
Q = kiA/60 x 1.16
31873 lit/min

From TGN 43A1
For existing 525 UC with 1 in 100 gradient

Maximum capacity	=	39000	lit/min	>	31873	o.k.
The corresponding velocity	=	2.50	m/s	<	4	o.k.

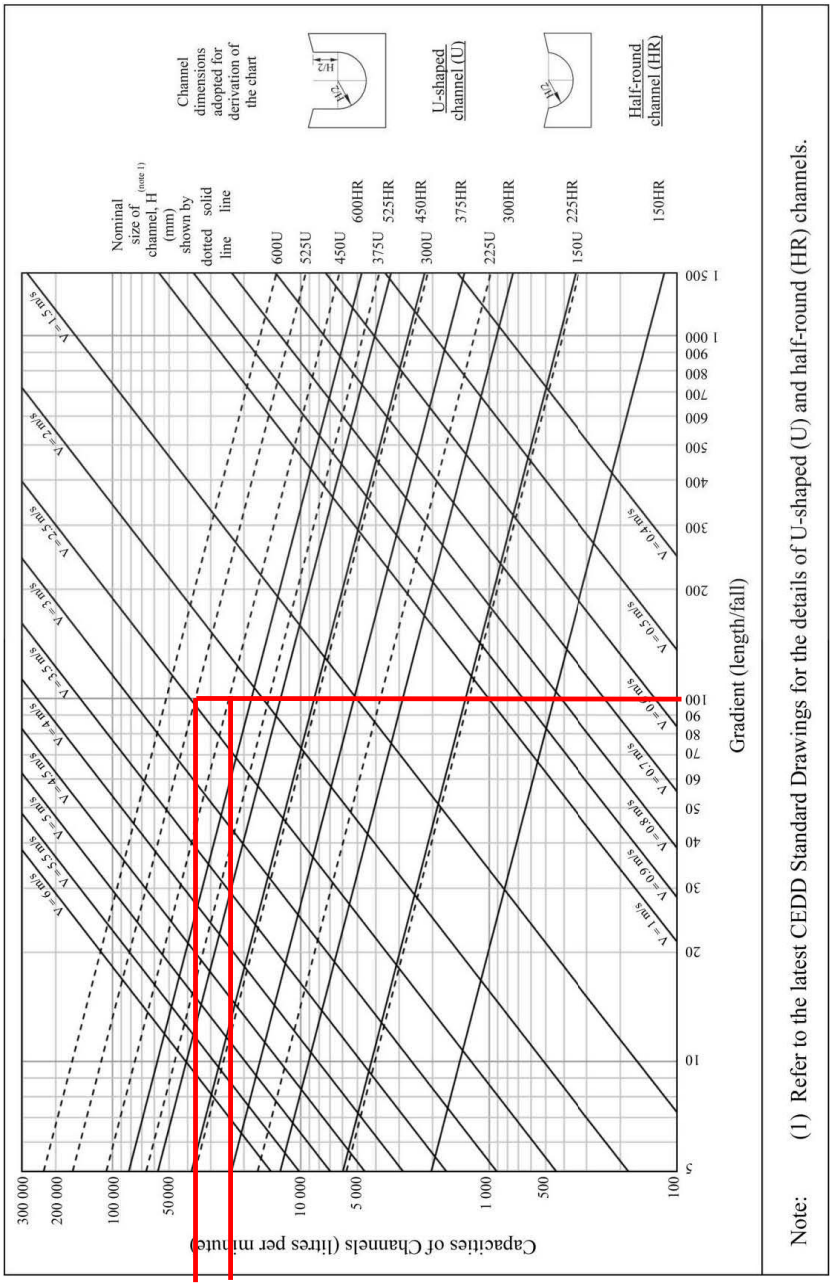


Figure 1 - Chart for the rapid design of U-shaped and half-round channels up to 600 mm

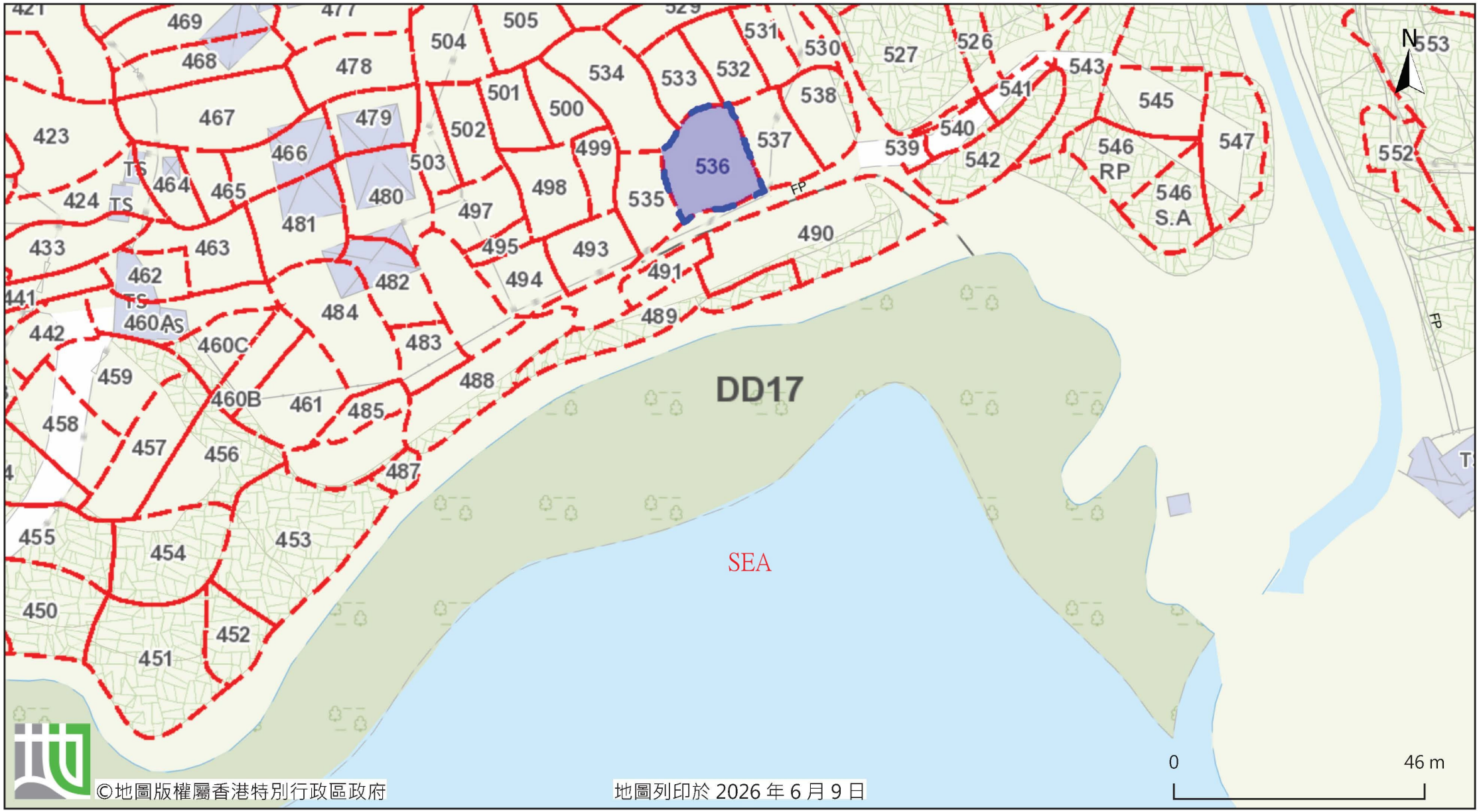
Note: (1) Refer to the latest CEDD Standard Drawings for the details of U-shaped (U) and half-round (HR) channels.

Appendix C

Geoinfo Map Showing the Existing Watercourse

GEOINFO MAP
地理資訊地圖

前往地圖: https://www.map.gov.hk/gm/geo:22.4687,114.2216?z=1128



由「地理資訊地圖」網站提供: https://www.map.gov.hk