

SUBMISSION REPORT
FOR
DRAINAGE PROPOSAL DESIGN
FOR PROPOSED DEVELOPMENT
ON
LOT 972s.C IN D.D.107

Date : June 2024

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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 development lot 972s.C in D.D.107.

2. Existing Drainage Condition

A plan showing the existing catchments are enclosed in **Appendix B**. Currently, the surface runoff collected from the site is discharging to existing 375UC located at the east of the site 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, Third 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 urban drainage branch system.

Stormwater Runoff (Q)

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 (m²)

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 1 for developed 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 existing 375UC at the east of the site. 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

Photo 1

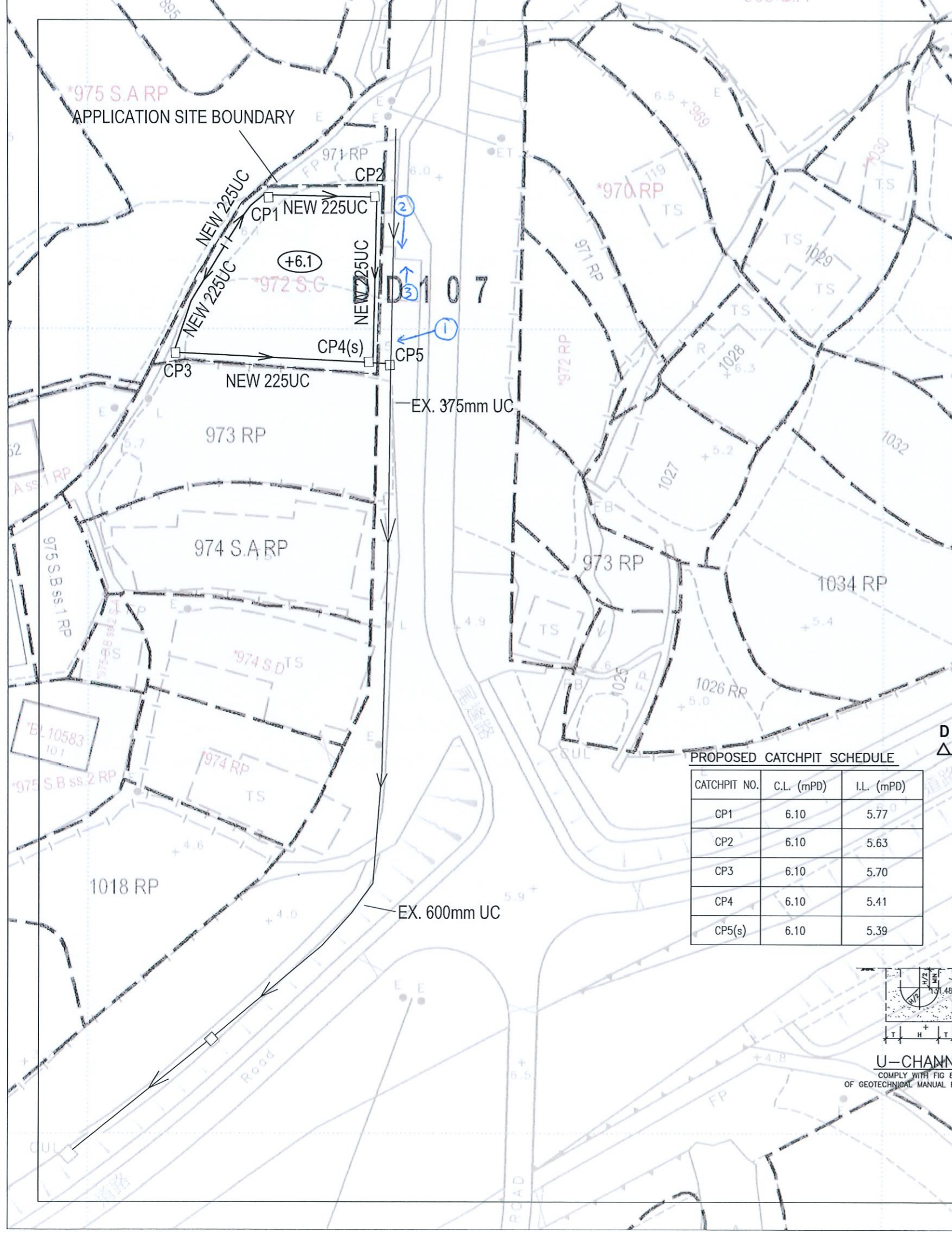


Photo 2



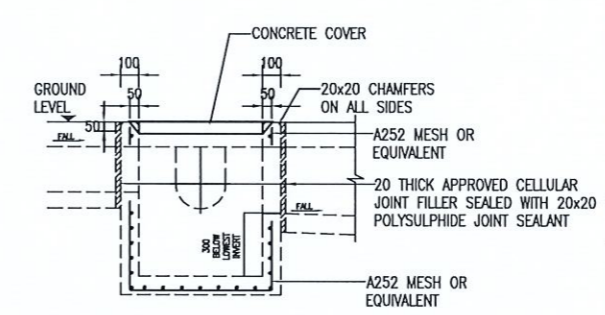
Photo 3





- LEGEND:**
- APPLICATION SITE BOUNDARY
 - NEW 225UC PROPOSED 225mm U-CHANNEL WITH GRATING AT FALL 1: 200 (MIN)
 - CP4(s) PROPOSED COVERED DESILTED CATCHPIT NO. CP4
 - CP1 PROPOSED COVERED CATCHPIT NO. CP1
 - (+6.10) PROPOSED SITE FORMATION LEVEL
 - (1) → PHOTO TAKING DIRECTION

- GENERAL NOTE**
- 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.
- CONCRETE STRENGTH AND STEEL REINFORCEMENT SPECIFICATION FOR DRAINAGE DETAILS**
- 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.
 - 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
 - CONCRETE COVER TO MAIN REINFORCEMENT TO BE 50mm.
 - LAP LENGTH FOR ALL BARS TO BE 46x DIAMETER OF LARGER BAR TO BE LAPPED.
 - REACTIVE ALKALI CONTENT EXPRESSED IN SODIUM OXIDE PER CUBIC METER OF CONCRETE SHOULD NOT EXCEED 3KG AS PER PNPAP APP-74.

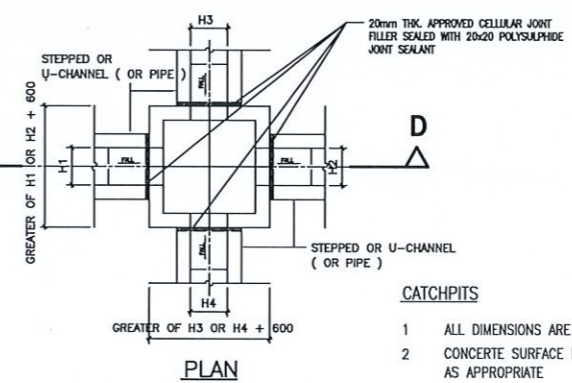


SECTION D - D WITH DESILTED TRAP
COMPLY WITH CEDD'S DRAWING NO. DS C2405 AND C2406I

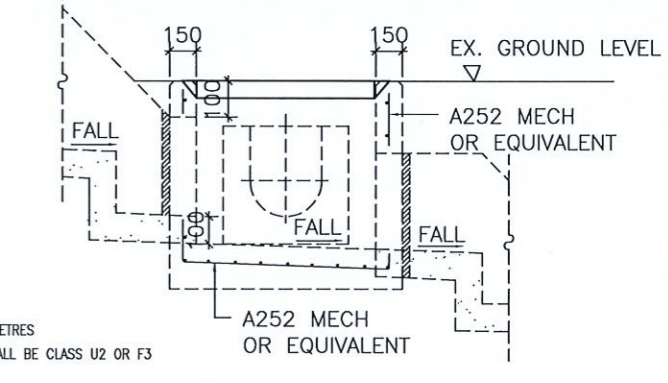
- HALF ROUND, U, AND STEPPED - CHANNELS**
- ALL DIMENSIONS ARE IN MILLIMETERS
 - CONCRETE SURFACE FINISHING SHALL BE CLASS U2 OR F2 AS APPROPRIATE
 - FOR HALF ROUND AND U - CHANNEL, SPACING OF EXPANSION JOINT IN CHANNELS, BERMS AND APRON TO BE 10m MAXIMUM. FOR STEPPED CHANNELS, EXPANSION JOINTS TO BE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



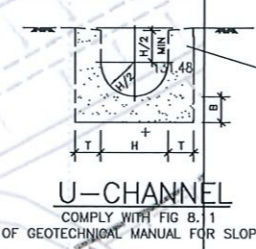
TYPICAL DETAILS OF CATCHPIT



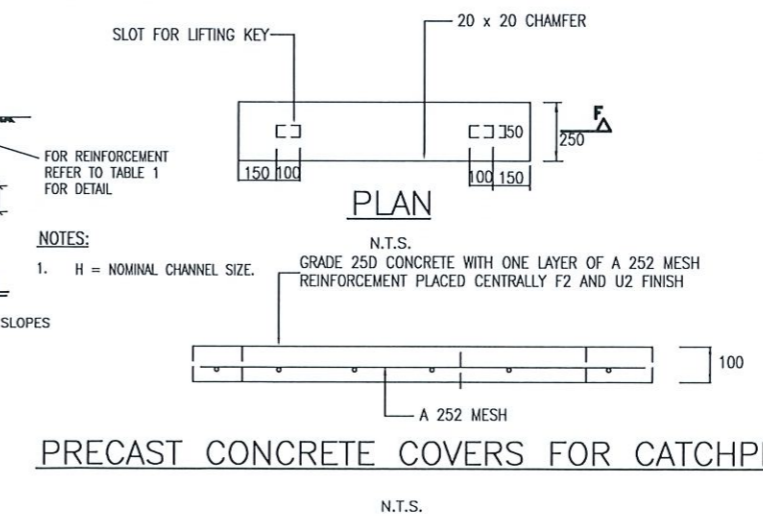
SECTION D-D

PROPOSED CATCHPIT SCHEDULE

CATCHPIT NO.	C.L. (mPD)	I.L. (mPD)
CP1	6.10	5.77
CP2	6.10	5.63
CP3	6.10	5.70
CP4	6.10	5.41
CP5(s)	6.10	5.39



U-CHANNEL
COMPLY WITH FIG B.1 OF GEOTECHNICAL MANUAL FOR SLOPES



PRECAST CONCRETE COVERS FOR CATCHPIT

N.T.S.

REV	DLO SUBMIT DESCRIPTION	RC CHECKED	AY APPROVED	RY DWN	JULY 22 DATE

PROJECT TITLE:
STORMWATER DRAINAGE PROPOSAL
LOT 972s.c IN D.D. 107

DRAWING TITLE:
DRAINAGE PROPOSAL PLAN
AND TYPICAL DETAILS

SCALE :	N.T.S.	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

Drainage Design at lot 972s.C in

Project No.: DD107

Date: 4-Jun-24

Prepared by: Ray Cheng

Check for the drainage capacity of proposed 225UC

Catchment area, A1 = 510 m² Assume k = 1.0 for paved surface
0.3 for unpaved 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 (m²)

Longest distance from summit point to outlet, CP5(s) (Ld) = 48.00 m
Shortest distance from summit point to outlet, CP5(s) (Ls) = 27.00 m

Elevation of remote point (Pt A) = 6.10 mPD
Elevation of outlet point (CP5(s)) = 5.39 mPD

Average fall, H = (z₁-z₂)/L_s x 100
= 2.63 m per 100m

From TGN30

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

$$= 3.07 \text{ min}$$

Assume a 1 in 50 year design rainfall return period for rural area
From Geo-Manual (Fig 8.2)

$$i = 360 \text{ mm/hr}$$

$$Q = kiA/60 \times 1.138$$

$$= 3482 \text{ lit/min}$$

From TGN 43A1

For proposed 225 UC with 1 in 100 gradient

Maximum capacity = 4000 lit/min > 3482 o.k.
The corresponding velocity = 1.40 m/s < 4 o.k.

GEO Technical Guidance Note No. 30 (TGN 30)
Updated Intensity-Duration-Frequency Curves with Provision for
Climate Change for Slope Drainage Design

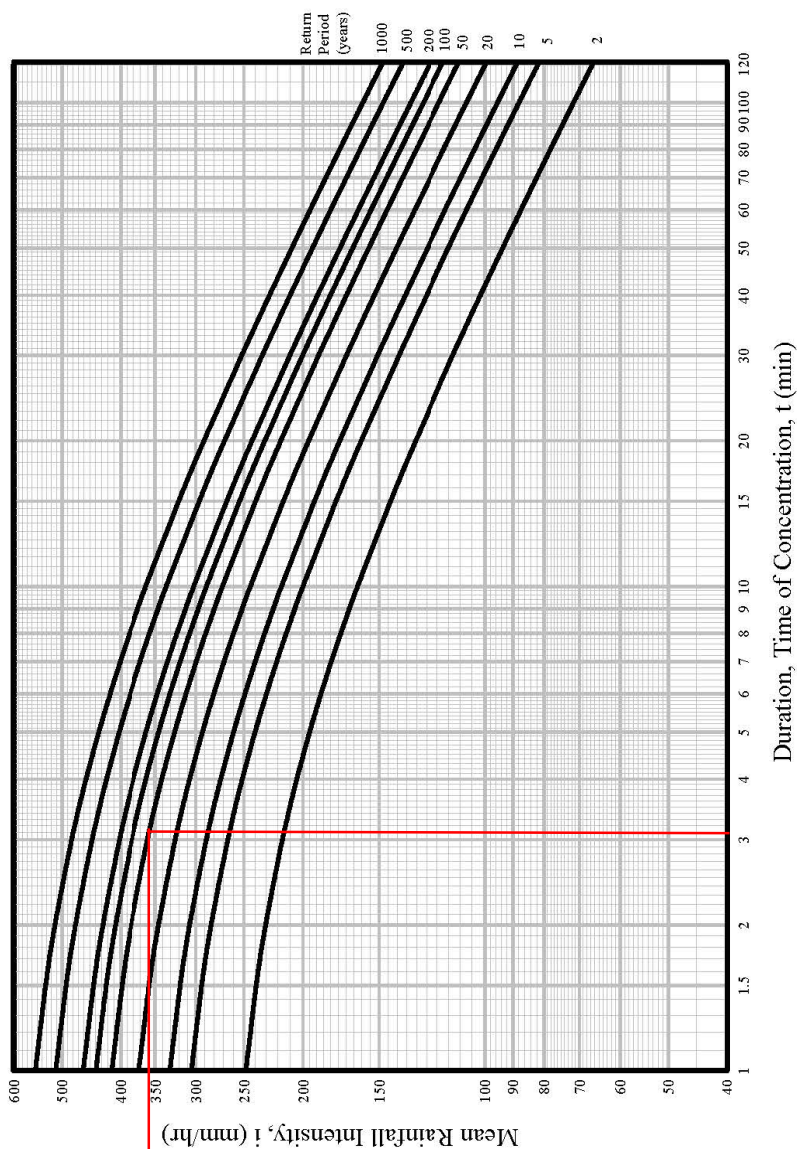


Figure 1 – Updated Intensity-Duration-Frequency Curves

- Notes:
1. These IDF curves are to supersede those given in Figure 8.2 of the Geotechnical Manual for Slopes (GCO, 1984).
 2. These IDF curves have not incorporated any projected climate change effects. Except for temporary slope drainage design, the mean rainfall intensity given by these IDF curves shall be increased by 13.8% for incorporating climate change effects.
 3. The mathematical formulae of these IDF curves are shown in Table 1 of Annex TGN 30 A1.

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

