Existing Stormwater Drainage Checking

For

Temporary Shop and Services with Ancillary Office

at Lot Nos. 446 & 447 in D.D. 122

Ping Shan, Yuen Long, N.T.

Report No.: **LD/L446/DS01**
Date: **20/1/2024**

Table of Contents

A. Introdution

The subject site is generally located at Lot Nos. 446 & 447 in DD 122 at Ping Shan in Yuen Long N. T. and the site is surrounding by the existing drainage which has been checked in accordance with the Rational Method as prescribed in the Geotechnical Manual for Slopes. The existing drainage system has been checked to a 1 in 200 year return rainstorm, and connected to the existing catch pit system at the site. Surface runoff from the site will be collected by a existing drainage system of the existing U-channels and catchpits. The calculation for the existing drainage system is presented in the following items 2 and 3. Having reviewed the existing dranage layout plan (No. LD/L446/D01) for the adjacent Lots, the collected runoff from all of the Lots at the existing dranage was discharged into the existing catch pit via the existing U-channels.

B. Checking for the Existing of Surface Channels

1. Equations and Assumptions

1.1 Surface drainage design is in accordance with Geotechnical Manual for Slopes (2nd Edition, 1984).

1.2 Slope drainage is designed to a frequency of 1 in 200 rainfall return period.

1.3 Time of Concentration = time of entry + time of flow

i.e. $t_c = t_e + t_f$

1.4 Time of entry is calculated based on the modified form of Bransby-Williams Equation:

$$t_e = 0.14465 \times L / (H^{0.2} \times A^{0.1})$$ Eqn. 8.2 Geotechnical Manual for Slopes

where t_e = time of entry (min) ,

A = area of catchment (m^2) ,

H = average fall (m per 100m) from the summit of catchment to the point of design,

L = distance in metre measured on the line of natural flow between the design section and that point of catchment from which water would take the longest time to reach the design section (m)

1.5 Time of flow is calculated from the measured water flow length in channel divided by the assumed flow velocity.

i.e. $t_f = w / v$

where t_f = time of flow (min) ,

w = measured water flow length in channel (m) ,

v = assumed water flow velocity (m/s)

1.6 Runoff coefficient for the slope is assumed to be 1.0 for vegetated ground surface. Geotechnical Manual for Slopes (p. 96)

1.7 Peak stormwater is determined by the "Rational Method" using the following formula:

$$Q = KiA/60$$ Eqn. 8.7 Geotechnical Manual for Slopes

where Q = maximum runoff (litres/min) ,

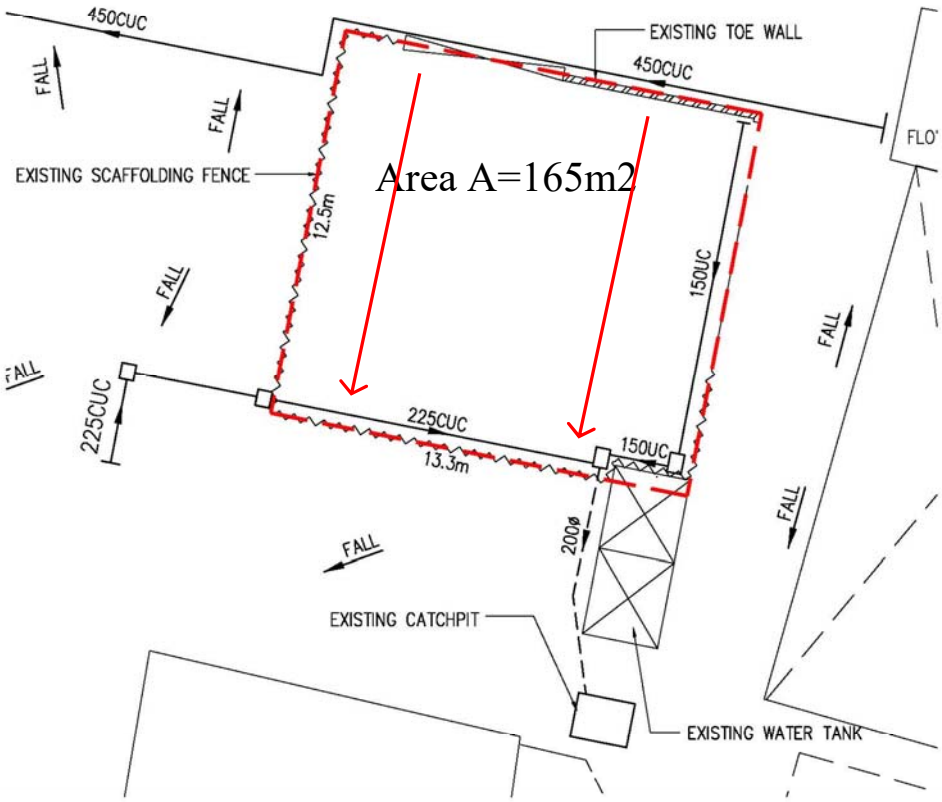
K = runoff coefficient (K = 1.0) ,

i = design mean intensity of rainfall (mm/hr) ,

A = area of catchment (m^2) .

2. Catchment Area

The catchment area for the existing of surface channels is shown below :



Plan of Catchment Areas

NTS

3. Checking of Surface Channel(Assumed all rainwater will be connected by 225 CUC)

a. Catchment Area A to Existing Drainage (225 CUC)

Area A = 165 m^2

L = 12.5 m

δh = 5.88 - 5.62 = 0.26 m

H = 0.26 * 100 / 12.5 = 2.08 m (average fall per 100m run)

t_c = 0.14465 x 12.5/(2.08 $^{0.2}$ x 165 $^{0.1}$) = 0.937 min

For t_f, w = 13.3 m, v = 3 m/s (assumed)

t_{f1} = 13.3 / (3 x 60) = 0.074 min

t_1 = 0.937 + 0.074 = 1.011 min

From rainfall curve, use t = 1.0 min

i_{200} = 450 mm/hr — Fig. 1, TGN 30

K = 1

Flow for 200 years return periods,

Q_{200} = 1*450 x 165 / 60 = 1238 litres/min

Drop of channel = 5.540 - 5.430 = 0.11 m

Gradient = 0.11 / 13.3 = 1 in 121

Existing channel size = 225 UC — Fig. 8.7 Geotechnical Manual for Slopes

Capacity = 3500 > Q200 OK

Read v_{max} = 1.3 m/s < 4 m/s OK

Therefore, used 225mm UC is adequate for catchment Area of A.

Geotechnical Engineering Office, Civil Engineering and Development Department
The Government of the Hong Kong Special Administrative Region

GEO Technical Guidance Note No. 30 (TGN 30)
New Intensity-Duration-Frequency Curves for Slope Drainage Design

Issue No.: 1	Revision: -	Date: 21.3.2011	Page: 3 of 4

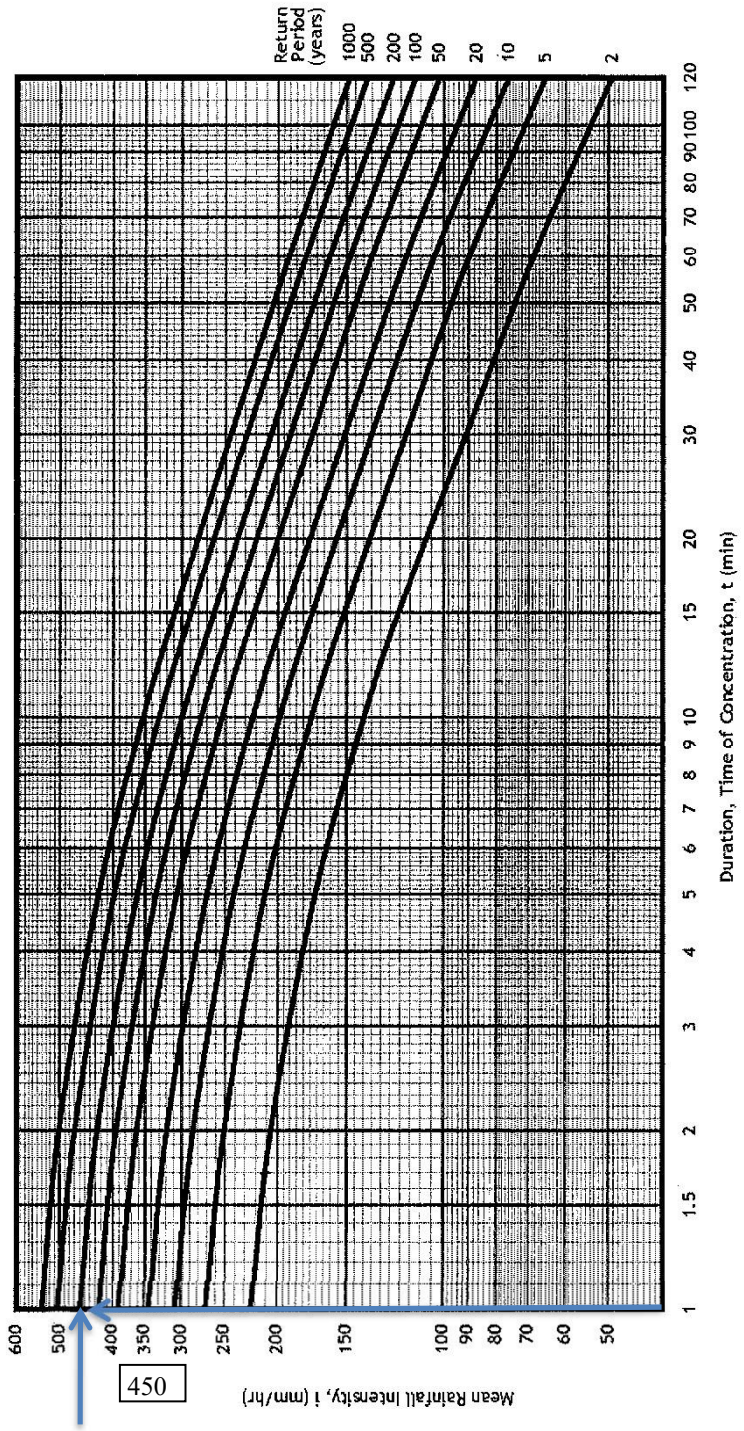


Figure 1 – New Intensity-Duration-Frequency (IDF) Curves (Tang & Cheung, 2011)

Note: These IDF curves are to supersede those given in Figure 8.2 of the Geotechnical Manual for Slopes (GCO, 1984).

ANNEX TGN 30 A1 (1/2)

Geotechnical Engineering Office, Civil Engineering and Development Department
The Government of the Hong Kong Special Administrative Region

GEO Technical Guidance Note No. 43 (TGN 43)
Guidelines on Hydraulic Design of U-shaped and Half-round Channels on Slopes

Issue No.: 1	Revision: -	Date: 05.06.2014	Page: 3 of 3

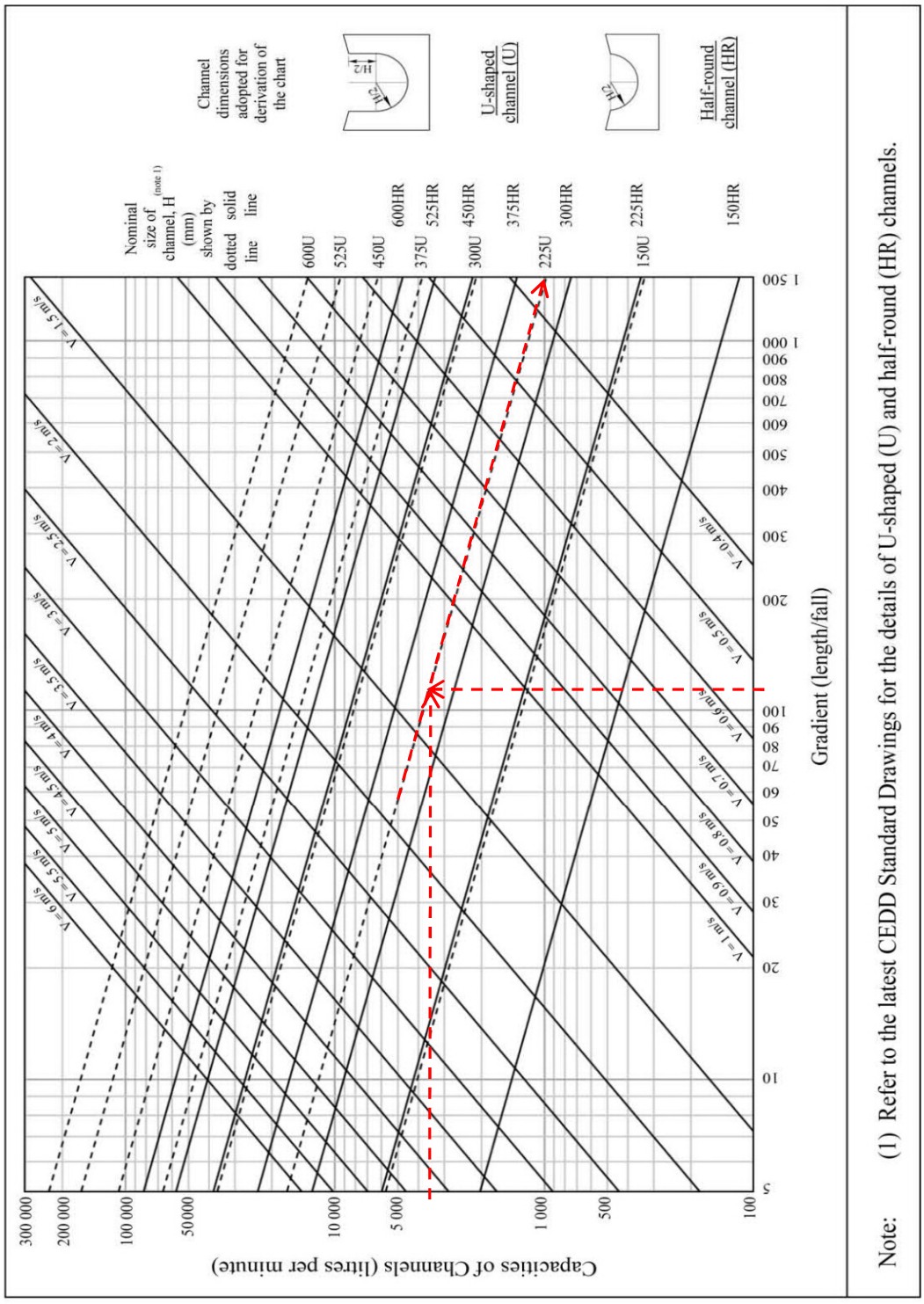


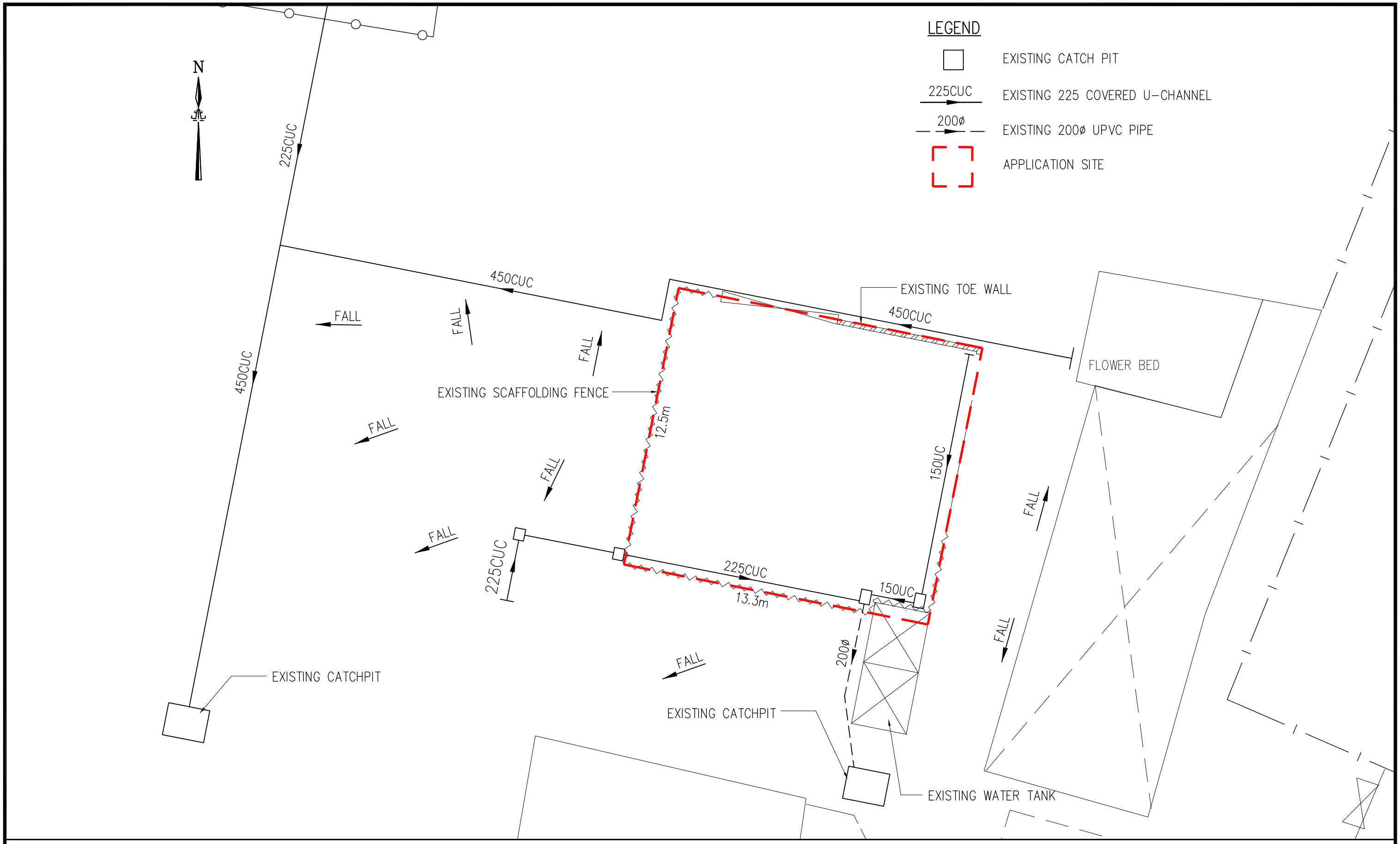
Figure 1 - Chart for the rapid design of U-shaped and half-round channels up to 600 mm

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

ANNEX TGN 43 A1

C. Conclusion

Based on the above calculation result, existing drainage surface channel to be discharged for the catchment areas, the existing drainage system are considered to be adequate and acceptable. The runoff discharge from the application area would not cause adverse drainage impact to the surrounding area at all times.



EXISTING DRAINAGE LAYOUT PLAN

利安設計工程有限公司
LEON Design Engineering Limited
新界屯門藍地屯子圍205號
No. 205 Tuen Tsz Wai, Lam Tei, Tuen Mun, N.T.
Tel: 2328 7060 Fax: 2328 7080 E-mail: leonlimited@gmail.com

PROJECT

LOTS 446 (PART) AND 447 (PART) IN D.D.122, PING SHAN,YUEN LONG, N.T. (APPLICATION NO. A/YL-PS/693)

TITLE

EXISTING DRAINAGE LAYOUT PLAN

DRAWN BY	CHECKED BY	DATE
PT	PT	January 2024
SCALE: 1 : 150	JOB NO.: LD/ -	
CAD / FILE: LD-L446-D01	DWG NO.: LD/L446/D01	