

Stormwater Drainage Design

For

Temporary Open Storage of Construction Materials and Machinery

with Facilities at Lots 1198B and 1199RP(Part) in DD109,

Kam Tin North, Yuen Long, N.T.

Report No.: **LD/L1198B/DS01**
Date: **25/5/2026**

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 50 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:

$$t_e = 0.14465 \times L / (H^{0.2} \times A^{0.1})$$

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 paved [ground surface](#).

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

$$Q = KiA/60$$

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) .

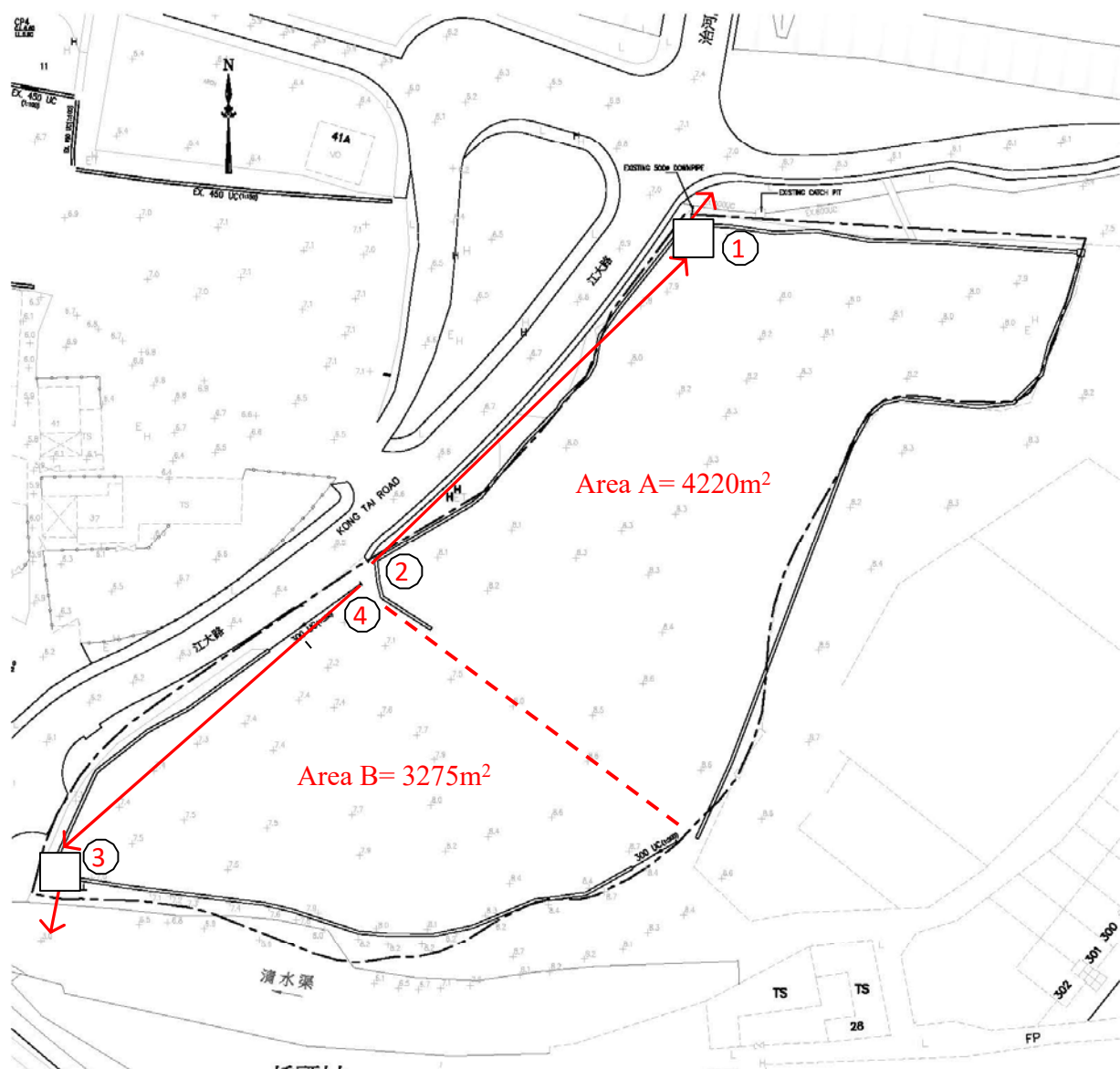
Eqn. 8.2
Geotechnical
Manual for Slopes

Geotechnical
Manual for
Slopes (p. 96)

Eqn. 8.7
Geotechnical
Manual for Slopes

2. Catchment Area

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



3. Checking requirement width by rainwater through between 1 and 2

a. Catchment Area A to Existing Drainage (450 UC)

$$\begin{aligned} \text{Area } A &= 4220 \text{ m}^2 \\ L &= 91 \text{ m} \end{aligned}$$

$$\delta h = 8.6 - 8 = 0.6 \text{ m}$$

$$H = 0.6 * 100 / 91 = 0.66 \text{ m} \quad (\text{average fall per 100m run})$$

$$t_c = 0.14465 \times 91 / (0.66^{0.2} \times 4220^{0.1}) = 6.208 \text{ min}$$

$$\text{For } t_f, \quad w = 69 \text{ m}, \quad v = 3 \text{ m/s} \quad (\text{assumed})$$

$$t_{f1} = 69 / (3 \times 60) = 0.383 \text{ min}$$

$$t_1 = 6.208 + 0.383 = 6.591 \text{ min}$$

$$\text{From rainfall curve, use } t = 6.6 \text{ min}$$

$$\begin{aligned} i_{50} &= 280 \text{ mm/hr} \\ K &= 1 \end{aligned}$$

Flow for 50 years return periods,

$$Q_{50} = 1 * 280 \times 4220 / 60 = 19693 \text{ litres/min}$$

$$\text{Drop of channel} = 7.400 - 6.800 = 0.60 \text{ m}$$

$$\text{Gradient} = 0.6 / 69 = 1 \text{ in } 115$$

$$\text{Existing channel size} = 450 \text{ UC}$$

$$\text{Capacity} = 24000 > Q_{50} \quad \text{OK}$$

$$\text{Read } v_{\max} = 2.2 \text{ m/s} < 4 \text{ m/s} \quad \text{OK}$$

Therefore, existing 450mm UC is adequate for catchment Area of A.

Fig. 1, TGN 30

Fig. 8.7
Geotechnical
Manual for Slopes

4. Checking requirement width by rainwater through between 3 and 4

a. Catchment Area B to Existing Drainage (450 UC)

$$\begin{aligned} \text{Area B} &= 2375 \text{ m}^2 \\ L &= 95 \text{ m} \end{aligned}$$

$$\delta h = 8.7 - 6.9 = 1.8 \text{ m}$$

$$H = 1.8 * 100 / 95 = 1.89 \text{ m} \quad (\text{average fall per 100m run})$$

$$t_c = 0.14465 \times 95 / (1.89^{0.2} \times 2375^{0.1}) = 5.561 \text{ min}$$

$$\text{For } t_f, \quad w = 47 \text{ m}, \quad v = 3 \text{ m/s} \quad (\text{assumed})$$

$$t_{fl} = 47 / (3 \times 60) = 0.261 \text{ min}$$

$$t_l = 5.561 + 0.261 = 5.822 \text{ min}$$

$$\text{From rainfall curve, use } t = 5.8 \text{ min}$$

$$\begin{aligned} i_{50} &= 290 \text{ mm/hr} \\ K &= 1 \end{aligned}$$

Flow for 50 years return periods,

$$Q_{50} = 1 * 290 \times 2375 / 60 = 11479 \text{ litres/min}$$

$$\text{Drop of channel} = 6.700 - 6.500 = 0.20 \text{ m}$$

$$\text{Gradient} = 0.2 / 47 = 1 \text{ in } 235$$

$$\text{Existing channel size} = 450 \text{ UC}$$

$$\text{Capacity} = 16000 > Q_{50} \quad \text{OK}$$

$$\text{Read } v_{\max} = 1.45 \text{ m/s} < 4 \text{ m/s} \quad \text{OK}$$

Therefore, existing 450mm UC is adequate for catchment Area of B.

Fig. 1, TGN 30

Fig. 8.7
Geotechnical
Manual for Slopes

**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

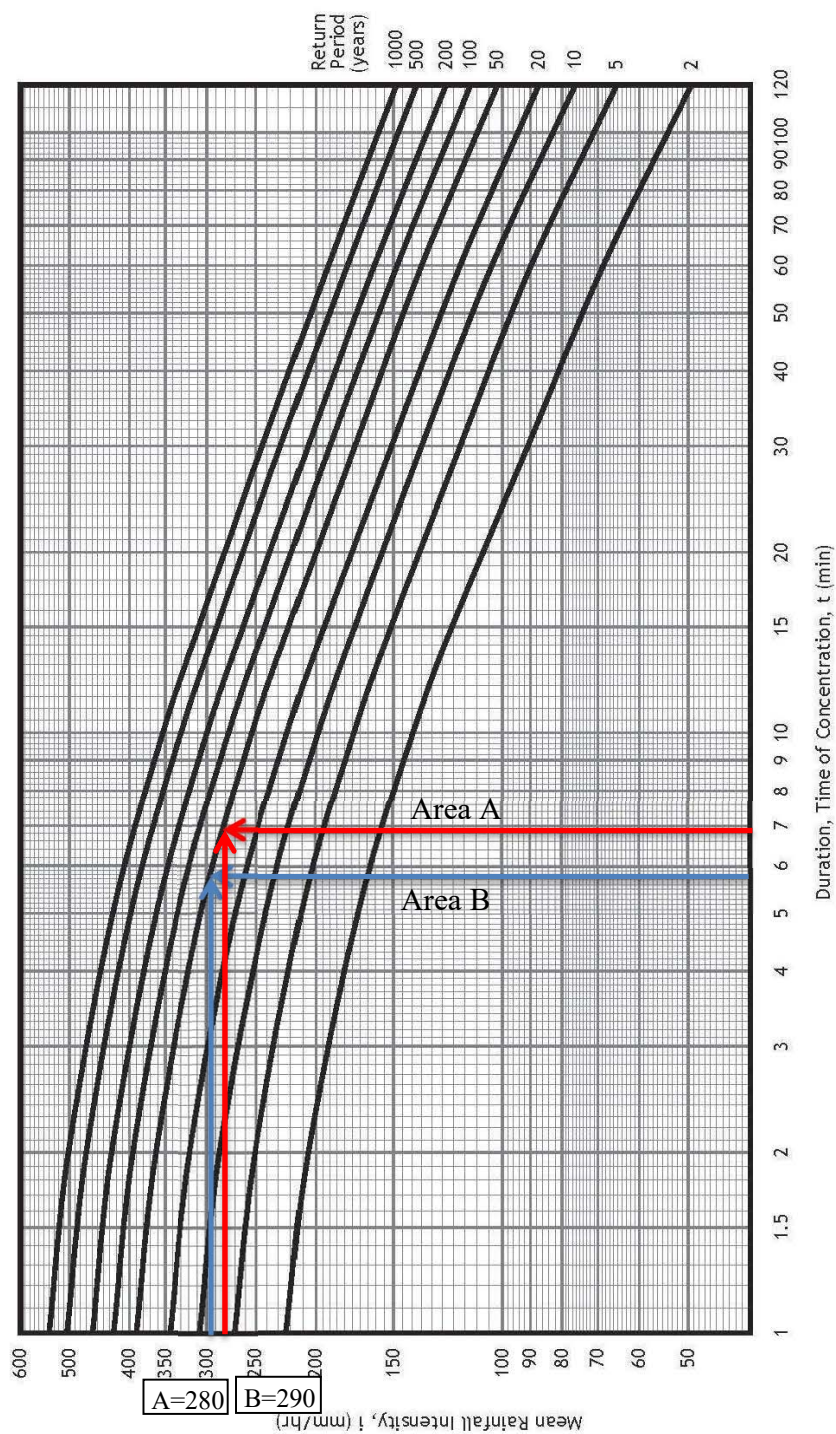


Figure 1 – New Intensity-Duration-Frequency (IDF) Curves (Tang & Cheung, 2011)

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

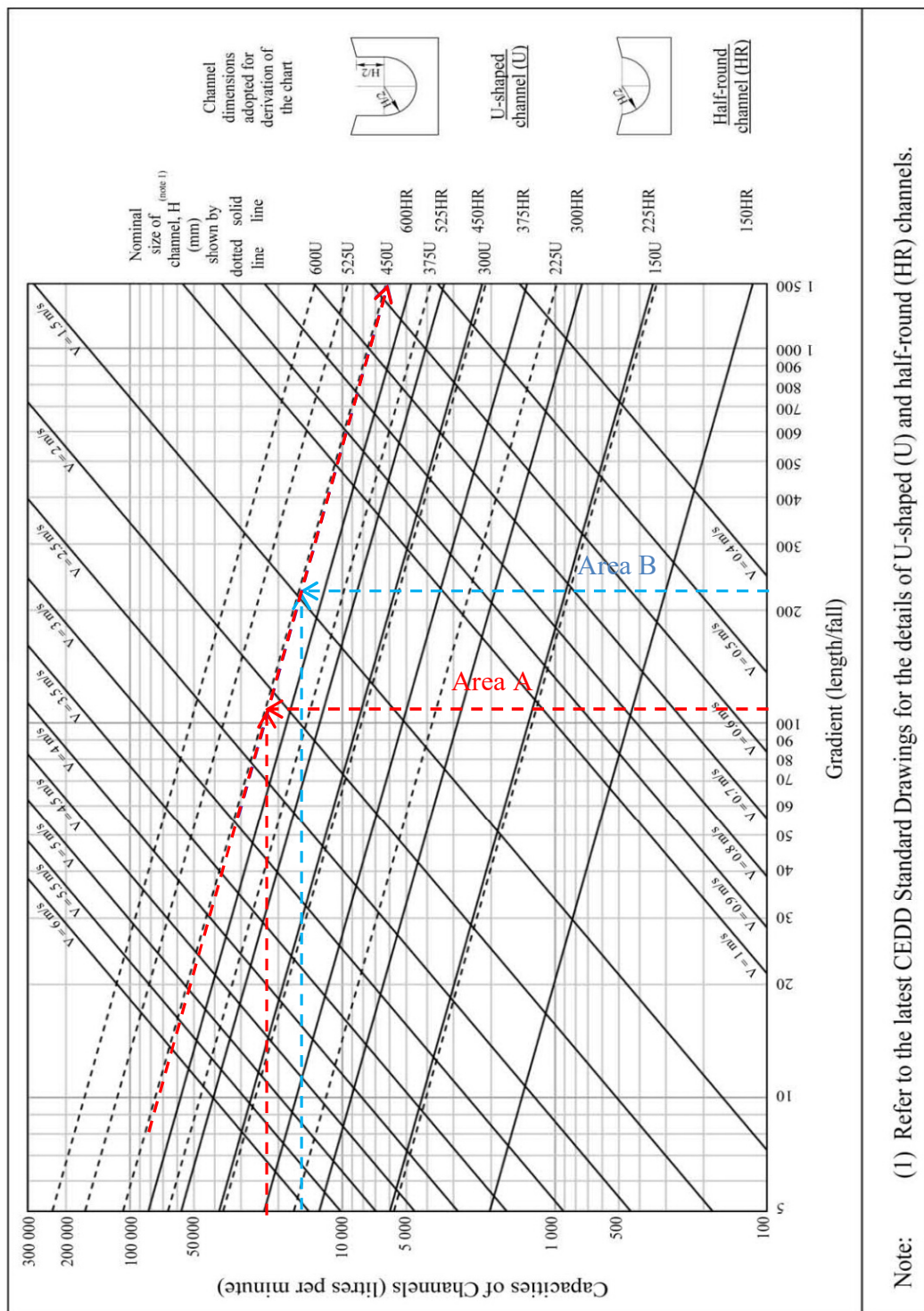
**Geotechnical Engineering Office, Civil Engineering and Development Department
The Government of the Hong Kong Special Administrative Region**

GEO Technical Guidance Note No. 43 (TGN 43)

Guidelines on Hydraulic Design of U-shaped and Half-round Channels on Slopes

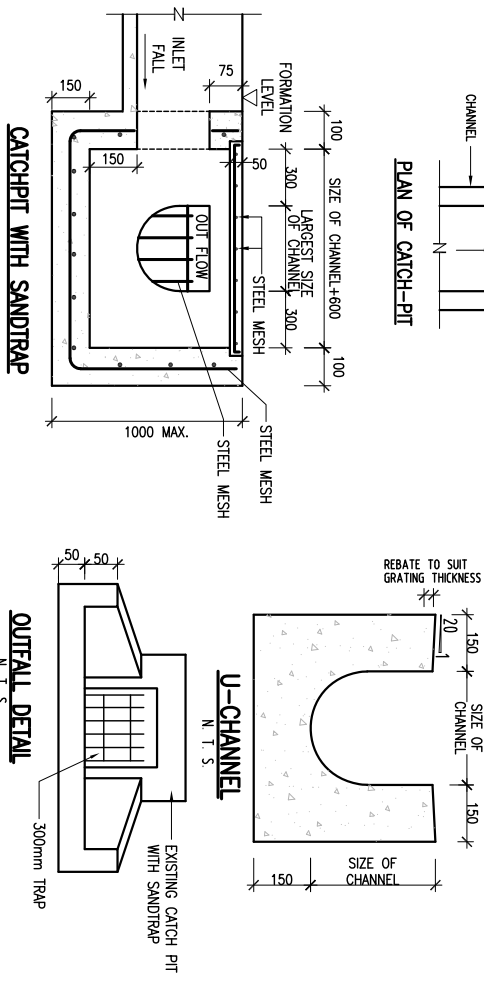
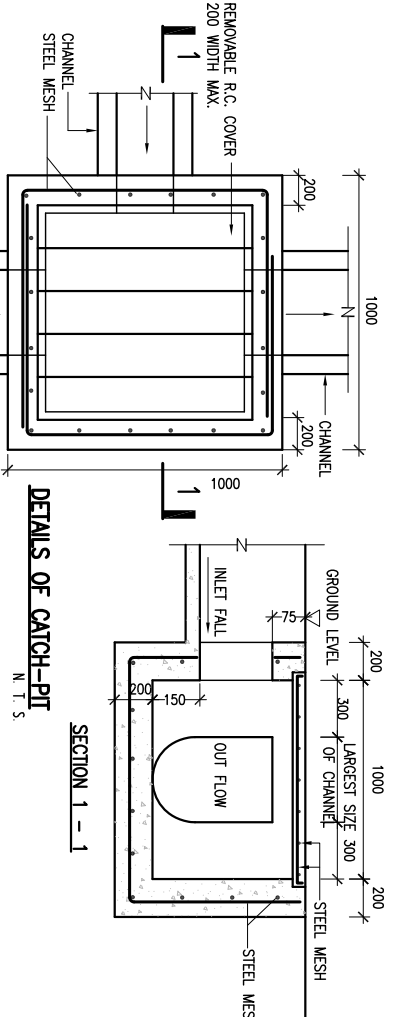
Issue No.: 1 Revision: - Date: 05.06.2014 Page: 3 of 3

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





- LEGEND**
- APPLICATION BOUNDARY
 - CP1 PROPOSED CATCHPIT
 - ▣ ST1 EXISTING CATCHPIT WITH SANDTRAP
 - 300 UC PROPOSED 300 U-CHANNEL WITH FALL 1 IN 200
 - EX. 450UC EXISTING 450 U-CHANNEL
 - C.L.7.90 COVER LEVEL
 - I.L.6.80 INVERT LEVEL



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PROJECT

Temporary Open Storage of Construction Materials and Machinery with Facilities at Lots 1198B and 1199RP(Part) in DD109, Kam Tin North, Yuen Long, N.T.

TITLE

PROPOSED DRAINAGE LAYOUT PLAN

DRAWN BY		CHECKED BY		DATE
EN		PT		May 2026
SCALE	JOB NO.			
1 : 600	LD/ -			
CAD / FILE	DWG NO.			
LD-L1198B-D01	LD/L1198B/D01			