利安設計工程有限公司
LEON Design Engineering Limited

Stormwater Drainage Design

For

Temporary Open Storage of Construction Materials and steel scalfolding with Ancillary office at Lots 1043,1044, 1046,1047RP(part), 1049A,1049RP & 1054 in DD109, Kam Tin North, Yuen Long, N.T.

Report No.: **LD/L1043/DS01**
Date: **6/6/2026**

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:

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

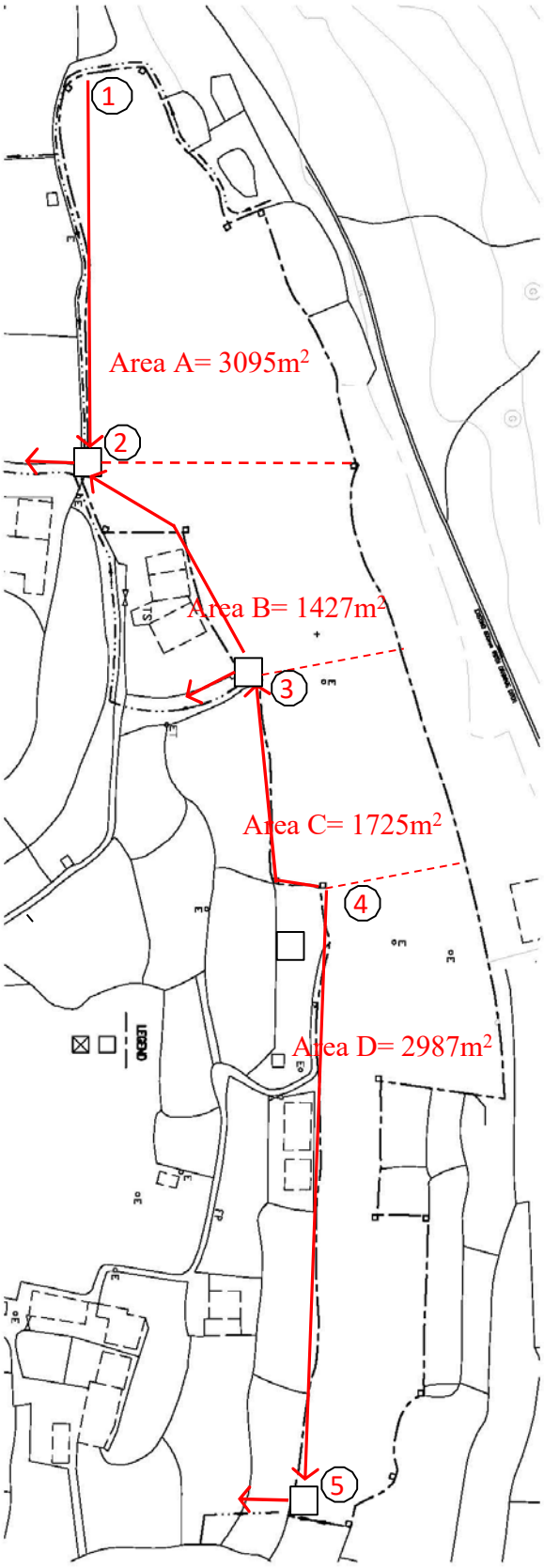
K = runoff coefficient (K = 1.0) ,

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

A = area of catchment (m^2) .

2. Catchment Area

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



Plan of Catchment Areas

NTS

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

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

Area A = 3095 m^2
L = 84 m

δh = 11.8 - 11.4 = 0.4 m

H = 0.4 * 100/ 84 = 0.48 m (average fall per 100m run)

t_c = 0.14465 x 84/(0.48 $^{0.2}$ x 3095 $^{0.1}$) = 6.299 min

For t_f, w = 78 m, v = 3 m/s (assumed)

t_{f1} = 78 / (3 x 60) = 0.433 min

t_1 = 6.299 + 0.433 = 6.732 min

From rainfall curve, use t = 6.7 min

i_{50} = 280 mm/hr — Fig. 1, TGN 30
K = 1

Flow for 50 years return periods,

Q_{50} = 1*280 x 3095 / 60 = 14443 litres/min

Drop of channel = 11.000 - 10.610 = 0.39 m

Gradient = 0.39 / 78 = 1 in 200

Proposed channel size = 450 UC — Fig. 8.7 Geotechnical Manual for Slopes

Capacity = 16500 > Q50 OK

Read v_{max} = 1.6 m/s < 4 m/s OK

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

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

a. Catchment Area B to Proposed Drainage (375 UC)

Area B = 1427 m^2
L = 43 m

δh = 12 - 11.4 = 0.6 m

H = 0.6 * 100 / 43 = 1.40 m (average fall per 100m run)

t_c = 0.14465 x 43/(1.4 $^{0.2}$ x 1427 $^{0.1}$) = 2.813 min

For t_f, w = 60 m, v = 3 m/s (assumed)

t_{f1} = 60 / (3 x 60) = 0.333 min

t_1 = 2.813 + 0.333 = 3.146 min

From rainfall curve, use t = 3.1 min

i_{50} = 330 mm/hr — Fig. 1, TGN 30
K = 1

Flow for 50 years return periods,

Q_{50} = 1*330 x 1427 / 60 = 7849 litres/min

Drop of channel = 11.550 - 11.250 = 0.30 m

Gradient = 0.3 / 60 = 1 in 200

Proposed channel size = 375 UC — Fig. 8.7 Geotechnical Manual for Slopes

Capacity = 10000 > Q50 OK

Read v_{max} = 1.4 m/s < 4 m/s OK

Therefore,existing 375mm UC is adequate for catchment Area of B.

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

a. Catchment Area C to Proposed Drainage (375 UC)

Area C = 1725 m^2
L = 61 m

δh = 12.6 - 11.8 = 0.8 m

H =)999999999999 * 10(= 1.31 m (average fall per 100m run)

t_c = 0.14465 x 61/(1.31 $^{0.2}$ x 1725 $^{0.1}$) = 3.967 min

For t_f, w = 49 m, v = 3 m/s (assumed)

t_{f1} = 49 / (3 x 60) = 0.272 min

t_1 = 3.967 + 0.272 = 4.239 min

From rainfall curve, use t = 4.2 min

i_{50} = 310 mm/hr — Fig. 1, TGN 30
K = 1

Flow for 50 years return periods,

Q_{50} = 1*310 x 1725 / 60 = 8913 litres/min

Drop of channel = 11.800 - 11.550 = 0.25 m

Gradient = 0.25 / 49 = 1 in 196

Proposed channel size = 375 UC — Fig. 8.7 Geotechnical Manual for Slopes

Capacity = 10000 > Q50 OK

Read v_{max} = 1.4 m/s < 4 m/s OK

Therefore,existing 375mm UC is adequate for catchment Area of C.

6. Checking requirement width by rainwater through between 5 and 6

a. Catchment Area D to Proposed Drainage (450 UC)

Area D = 2987 m^2
L = 133 m

δh = 12.5 - 12.1 = 0.4 m

H = 0.4 * 100 / 133 = 0.30 m (average fall per 100m run)

t_c = 0.14465 x 133/(0.3 $^{0.2}$ x 2987 $^{0.1}$) = 10.996 min

For t_f, w = 127 m, v = 3 m/s (assumed)

t_{f1} = 127 / (3 x 60) = 0.706 min

t_1 = 10.996 + 0.706 = 11.702 min

From rainfall curve, use t = 11.7 min

i_{50} = 240 mm/hr — Fig. 1, TGN 30
K = 1

Flow for 50 years return periods,

Q_{50} = 1*240 x 2987 / 60 = 11948 litres/min

Drop of channel = 11.800 - 11.160 = 0.64 m

Gradient = 0.64 / 127 = 1 in 199

Proposed channel size = 450 UC — Fig. 8.7 Geotechnical Manual for Slopes

Capacity = 16500 > Q50 OK

Read v_{max} = 1.6 m/s < 4 m/s OK

Therefore, proposed 450mm UC is adequate for catchment Area of D.

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

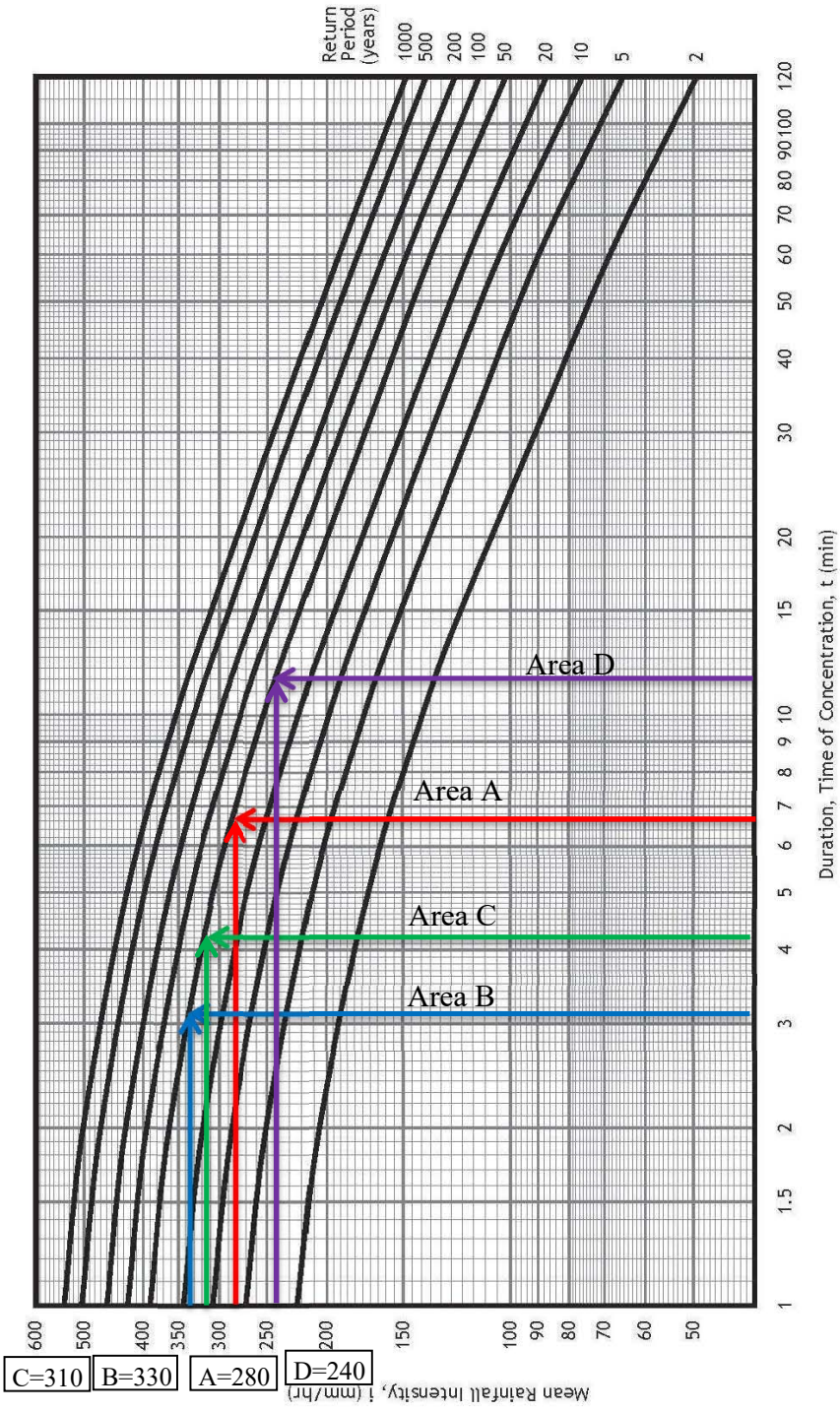


Figure 1 – New Intensity-Duration-Frequency (IDF) Curves (Tang & Cheung, 2011)

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

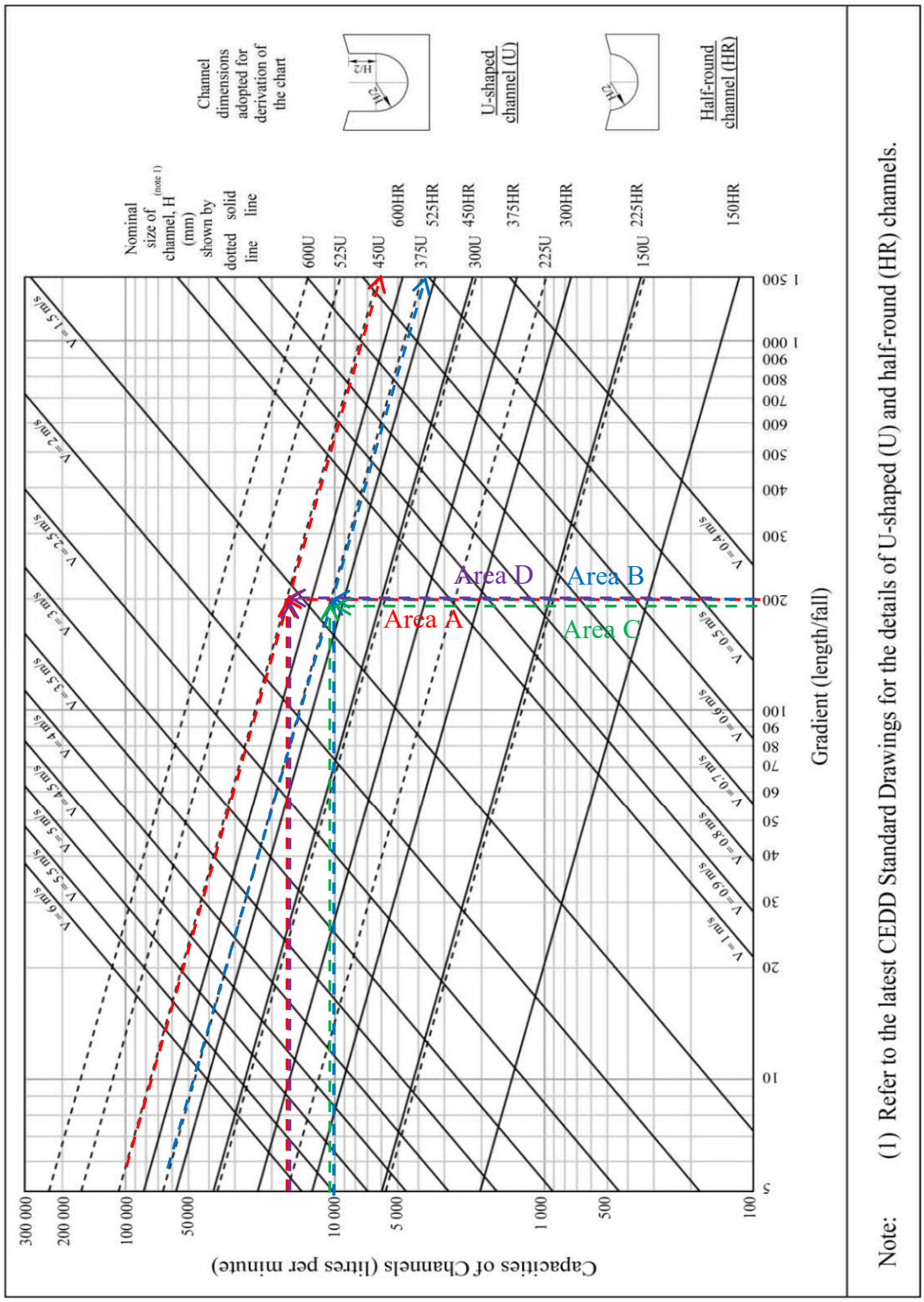
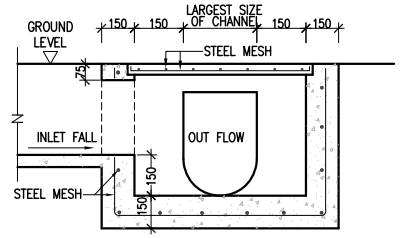


Figure 1 - Chart for the rapid design of U-shaped and half-round channels up to 600 mm

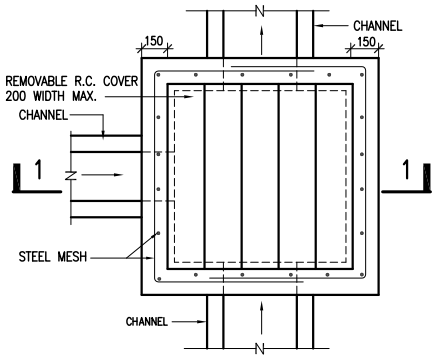
Note: (1) Refer to the latest CEDD Standard Drawings for the details of U-shaped (U) and half-round (HR) channels.

ANNEX TGN 43 A1

KEY PLAN
1 : 10000

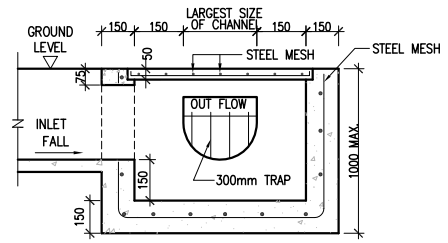


SECTION 1 – 1

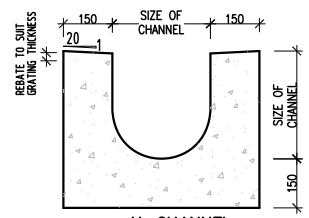


PLAN OF CATCH-PIT

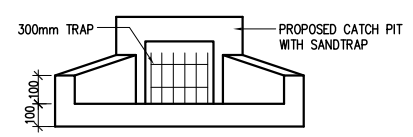
DETAILS OF CATCH-PIT
N.T.S



CATCHPIT WITH SANDTRAP
N.T.S



U-CHANNEL
N.T.S



OUTFALL DETAIL
N.T.S

LEGEND

APPLICATION BOUNDARY	
CP1	PROPOSED CATCHPIT
ST1	PROPOSED CATCHPIT WITH SANDTRAP
450 UC	PROPOSED 300 U-CHANNEL WITH FALL 1 IN 200
CL:12.00	PROPOSED COVER LEVEL
IL:11.16	PROPOSED INVERT LEVEL
	EXISTING DRAINAGE DITCH/CHANNEL

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PROJECT

Temporary Open Storage of Construction Materials and steel scalfolding with Ancillary office at Lots 1043,1044, 1046,1047RP (part), 1049A ,1049RP and 1054 in DD109, Kam Tin North, Yuen Long, N.T.

TITLE

PROPOSED DRAINAGE LAYOUT PLAN

DRAWN BY	CHECKED BY	DATE
PT	PT	June 2026
SCALE: 1 : 1000	JOB NO.: LD/ -	
CAD / FILE: LD-L1043-D01	DWG NO.: LD/L1043/D01	