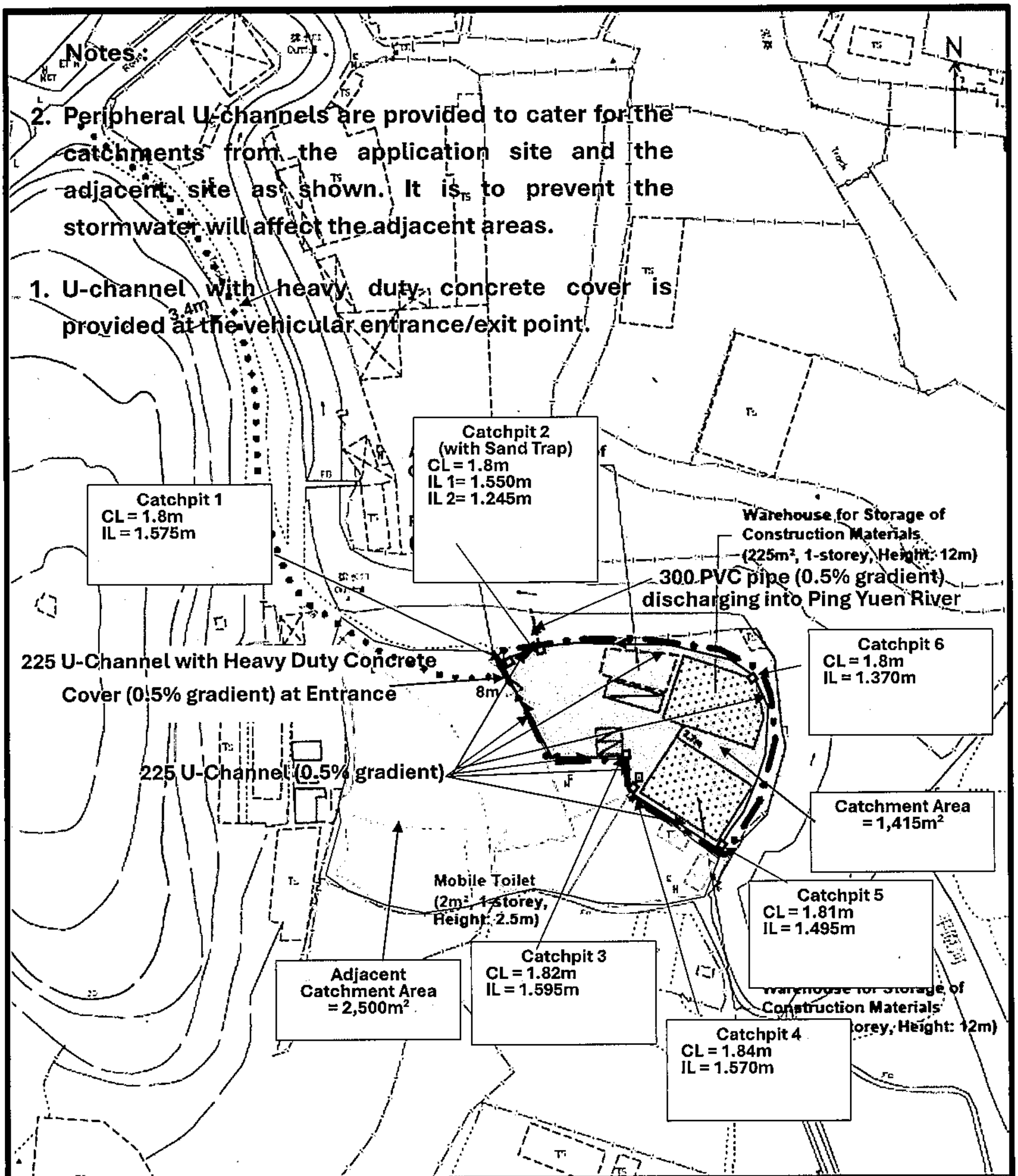


Legend:

- Application Site (about 1,415 sq.m.)
- Warehouse for Storage of Construction Materials
- Loading/Unloading Space for Medium Goods Vehicle (3.5m x 11m) (1 no.)
- Parking Spaces for Staff/Visitors (2.5m x 5m) (2 nos.)

For Identification Purpose

Drainage Plan	**Drawing No. D - 001**

Drainage Design for the site near Ping Yuen River

DSD - STORMWATER DRAINAGE MANUAL

7.5.2 Rational Method

$$Qp = 0.278CiA$$

where Qp = peak runoff in m^3/s

C = runoff coefficient (dimensionless)

i = rainfall intensity in mm/hr

A = catchment area in km^2

In Hong Kong, a value of C = 1.0 is commonly used in developed urban areas. In less developed areas, appropriate C values in order to ensure that the design would be fully cost-effective.

Surface Characteristics	Runoff coefficient, C*
Asphalt	0.70 - 0.95
Concrete	0.80 - 0.95
Brick	0.70 - 0.85
Grassland (heavy soil**)	
Flat	0.13 - 0.25
Steep	0.25 - 0.35
Grassland (sandy soil)	
Flat	0.05 - 0.15
Steep	0.15 - 0.20

The surface of the site and the adjacent site are covered by Grassland (sandy soil), the C should be 0.15

6.6.1 Village Drainage and Main Rural Catchment Drainage Channels

'Village Drainage' refers to the local stormwater drainage system within a village. A stormwater drain conveying stormwater runoff from an upstream catchment but happens to pass through a village may need to be considered as either a 'Main Rural Catchment Drainage Channel' or 'Village Drainage', depending on the nature and size of the upstream catchment. In any case, the impact of a 50-year event should be assessed in the planning and design of village drainage system to check whether a higher standard than 10 years is justified. **50 Years is used.**

Table 2d – Intensity-Duration-Frequency (IDF) Relationship of North District Area for durations not exceeding 240 minutes

Duration (min)	Extreme Intensity x (mm/h) for various Return Periods T(year)						
	2	5	10	20	50	100	200
240	28.5	37.7	43.4	48.6	54.9	59.4	63.6
120	42.2	54.7	62.5	69.6	78.4	84.7	90.8
60	61.0	75.7	84.3	92.0	101	108	114
30	84.0	100	110	118	128	135	142
15	106	127	139	150	163	173	182
10	119	141	155	168	184	196	208
5	138	161	177	193	216	234	254

Notes:
1. based on continuous rainfall recorded at GEO rain gauges N05 (31 years), N34 (15 years), N46 (15 years), N33 (15 years), N35 (15 years), N36 (15 years), N45 (15 years) and HKO rain gauges EPC (22 years), SSH (11 years), TKL (29 years), R24 (31 years), R29 (30 years), R30 (25 years), SEK (18 years) up to 2014
2. rainfall IDF relationships are derived from regional frequency analysis of extreme rainfall of local rain gauges

i (rainfall intensity) = 184mm/hr (Duration of 10min is used)

4.3.3 Intensity-Duration-Frequency (IDF) Relationship

The rainfall statistics at HKO Headquarters* are recommended for general application (except Tai Mo Shan area, West Lantau area and North District area) because of its long-term and good quality records. The recommended IDF Relationship is based on the GEV distribution model, which is the best-fit model for different rainstorm durations on average and also adopted by HKO, in the frequency analysis of the annual maximum rainfall recorded at HKO Headquarters*. The relationships are presented in Table 2a and Figure 4a for various durations not exceeding 4 hours.

For Tai Mo Shan, West Lantau and North District areas, it is recommended to adopt the annual maximum rainfall for various durations recorded by the local rain gauges within the 3 areas in the statistical analysis. The distribution models which fit the respective durations the best are applied and regional frequency analysis of extreme rainfall has also been employed to develop the IDF Relationships. These relationships are presented in Tables 2b, 2c and 2d and Figures 4b, 4c and 4d for various durations not exceeding 4 hours.

The IDF data can also be expressed by the following algebraic equation for easy application:

$$i = \frac{a}{(t_d + b)^c}$$

where i = extreme mean intensity in mm/hr,
t_d = duration in minutes ($t_d \leq 240$), and
a, b, c = storm constants given in Tables 3a, 3b, 3c and 3d.

* See Notes 2 & 3 of Table 2a

Table 3d – Storm Constants for Different Return Periods of North District Area

Return Period T (years)	2	5	10	20	50	100	200
a	1004.5	1112.2	1157.7	1178.6	1167.6	1131.2	1074.8
b	17.24	18.86	19.04	18.49	16.76	14.82	12.47
c	0.644	0.614	0.597	0.582	0.561	0.543	0.523

$i = 1167.6 / (10 + 16.67)^{0.561}$

$= 185.05$ mm/hr > 184mm/hr (Table 2d)

Calculations of U-channel

Qp = 0.278CiA

C = 0.15 (Grass Land (Sandy Soil) (Application Site)

C = 0.15 (Grass Land (Sandy Soil) (Adjacent Area)

i = 185.05mm/hr

A = 1,415m^2 (0.00142km^2) (Application Site)

+ 2,500m^2 (0.00250km^2) (Adjacent Area)

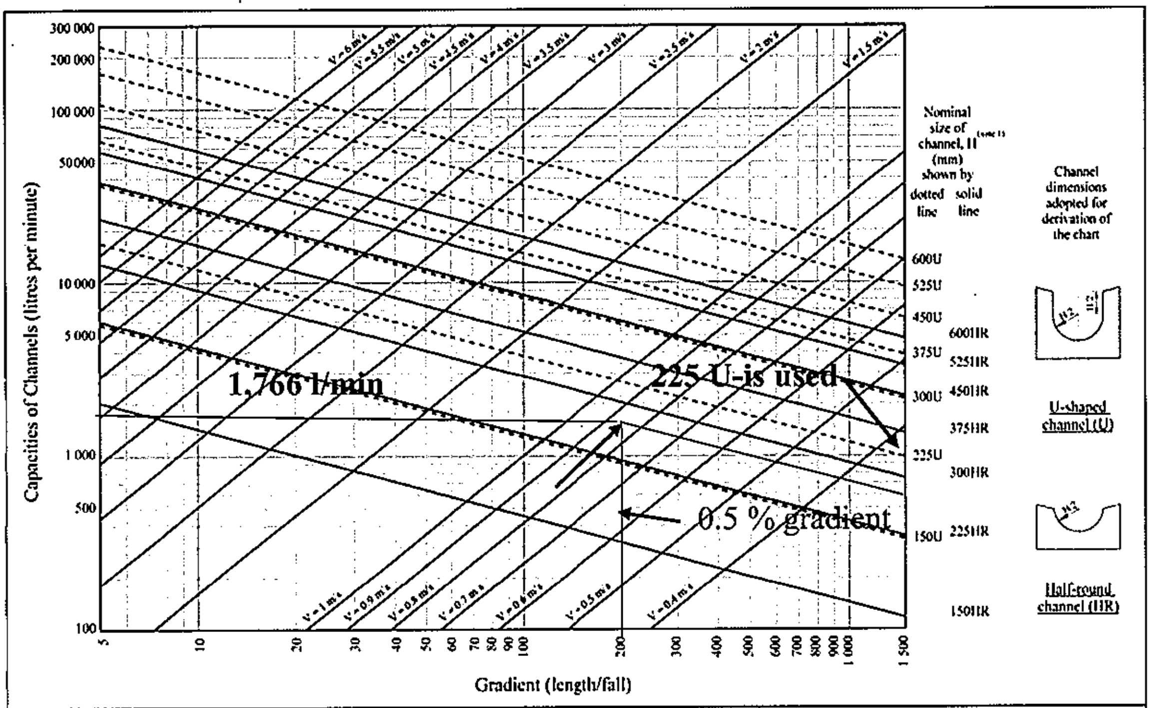
Qp = 0.278 x **185.05** x ((0.15 x 0.00142) +(0.15 x 0.00250))

Qp =0.0295m^3/s or 1,766 l/min

For conservative calculations, all catchment areas are combined for calculation of all U-Channels.

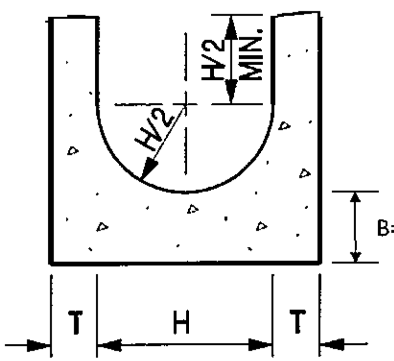
GEO Technical Guidance Note No. 43 (TGN 43) Guidelines on Hydraulic Design of U-shaped

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

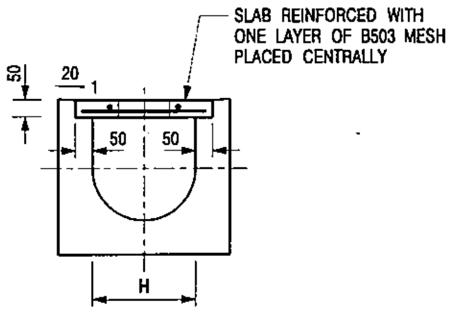


Note: (1) Refer to the latest CEDD Standard Drawings for the details of U-shaped (U) and half-round (HR) channels.

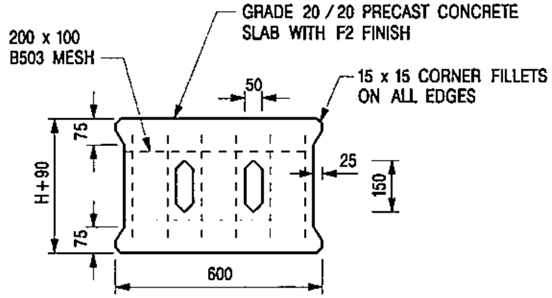
For 1,766 l/min, 225 U-channel is used.



U-channel Details



TYPICAL SECTION

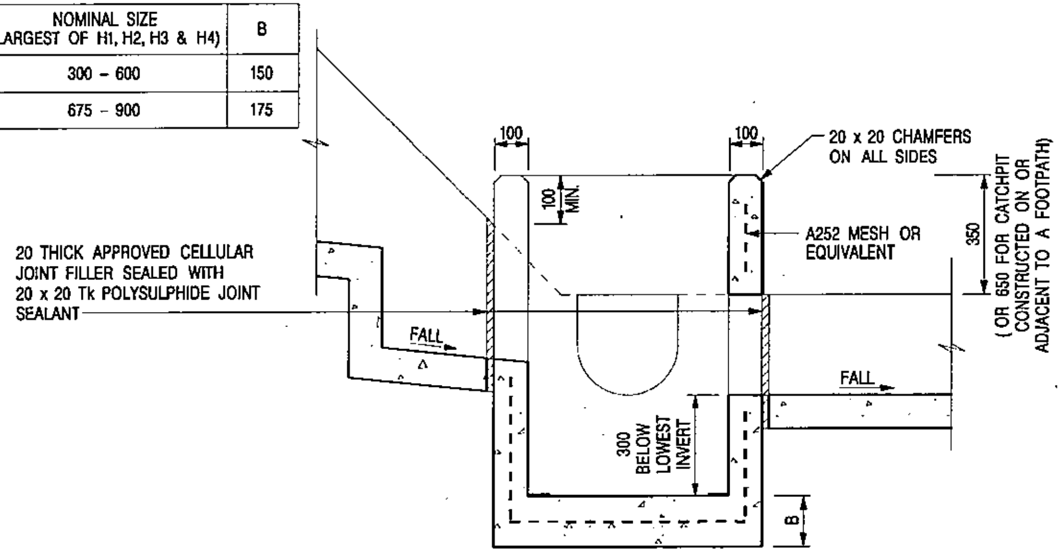


PLAN OF SLAB

U-CHANNELS WITH PRECAST CONCRETE SLABS

(UP TO H OF 525)

NOMINAL SIZE (LARGEST OF H1, H2, H3 & H4)	B
300 - 600	150
675 - 900	175



Details of Catchpit with Sand Trap

Details of Catchpit and U-channel	Sketch No. 1