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

Stormwater Drainage Design

For

Temporary Shop and Services with Ancillary Office

at Lot No. 764 RP in D.D. 120

in DD120 in Ma Tin Road in Yuen Long, N.T.

Report No.: **LD/L764 RP/DS01**
Date: **23/4/2024**

Project :	Temporary Shop and Services with Ancillary Office at Lot no.764RP	Date	File No: DS01
	in DD120 in Ma Tin Road in Yuen Long, N.T.	23/4/2024	Sheet No.
Title:	**Stormwater Drainage Proposal**		1 of 2

Background

Due to the proposed development in Lot 764RP DD 120, surface runoff will be connected to the drainage system at the site by U-channels and catchpits. The runoff will be finally discharged to an existing drainage system.
This report is to briefly assess the impact to the existing drainage system arising from the development.

Objective

Determine the existing drainage condition & impact arising from the development and verify the adequacy of the downstream drainage to cater for the additional runoff in the proposed condition.

Methodogy

1. Determine the catchment area of the existing drainage channel adjacent to Lot 764RP DD 120 to be affected.
2. Determine the runoff directions and land uses to assign suitable runoff coefficients to the catchments.
3. Determine the rainfall intensity for the catchments.
4. Determine the runoff by Rational Method as advised in the Stormwater Drainage Manual (SDM).
5. Determine the capacity of the affected channel.

1. Determine the Catchment for the Downstream Drainage

Refer to Appendix-A for the proposed catchment plan.
As shown, the catchment area of the development to be affected is 206 meter square.

2. Determine the Rainfall Intensity for the Catchment

2.1. Determine the Rainfall lntensity for the Catchment of the affected channel.
SDM
Table 1- storm constants for Different Return Periods of HKO Headquarters:

Return period T (years)	2	5	10	20	50	100	200	500	1000
a =	499.8	480.2	471.9	463.6	451.3	440.8	429.5	414.0	402.1
b =	4.26	3.36	3.02	2.76	2.46	2.26	2.05	1.77	1.55
c =	0.494	0.429	0.397	0.369	0.337	0.316	0.295	0.269	0.251

time of concentration (t_d) = natural flow time (t_0) + channel flow time (t_f)

SDM
CI.7.5.2

$$t_0 = 0.14465 \frac{L}{H^{0.2} A^{0.1}}$$

For the affected channel section:
distance (L) = 20 m
average slope (H) = (change in height)/L
H = (5.85 - 5.65) / 20
H = 1.00%
area of catchment(A)= 206 m^2 = 0.000206 km^2
t_0 = 6.85 min
t_f=time of flow (which is assumed to be zero for conservative checking
t_f = 0 min
t_d = 6.85 min

SDM
Cl. 4.3.2

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

where i is the rainfall intensity

Return period T (years)	2	5	10	20	50	100	200	500	1000	
i =	152	177	190	201	213	219	225	232	236	mm/hr

3. Determine Existing Flow to the affected channel

SDM
Cl. 7.5.2

$$Q = 0.278 i \sum_{j=1}^{m} CjAj$$

where m is the number of subcatchments
refer to LD/L1038A/D01 for the existing catchment plan

Assumptions

SDM Cl. 7.5.2

The whole catchment can be described by three types of catchment characteristics:

1. Grassland & paved.
2. Grassland catchment shall take a runoff coefficient of 0.35 as taken from the higher end of 0.35 "Steep Grassland"· C=0.25.
3. Paved catchement shall take a runoff coefficient of 0.95 as taken from the higher end of ”Concrete .

3.1. Summary of existing flow in the affected section of the channel in different return period

For the section of the channel to be affected

Return Period	Existing Flow (m^3/s)
2	0.003
10	0.004
50	0.004
200	0.005

4. Proposed Diversion for the affected section of channel

$$Q = A\frac{R^{1/6}}{n}\sqrt{RSf}$$

Use the Manning Equation to Determine the Drainage Capacity

Refer to Drawing No. LD/L764RP/D01, the alignment of proposed channel is indicated to suit for the proposed development. The proposed diversion comprise of 300mm concrete U-channel. The channel size and the capacity check are as follows.

Assumptions:

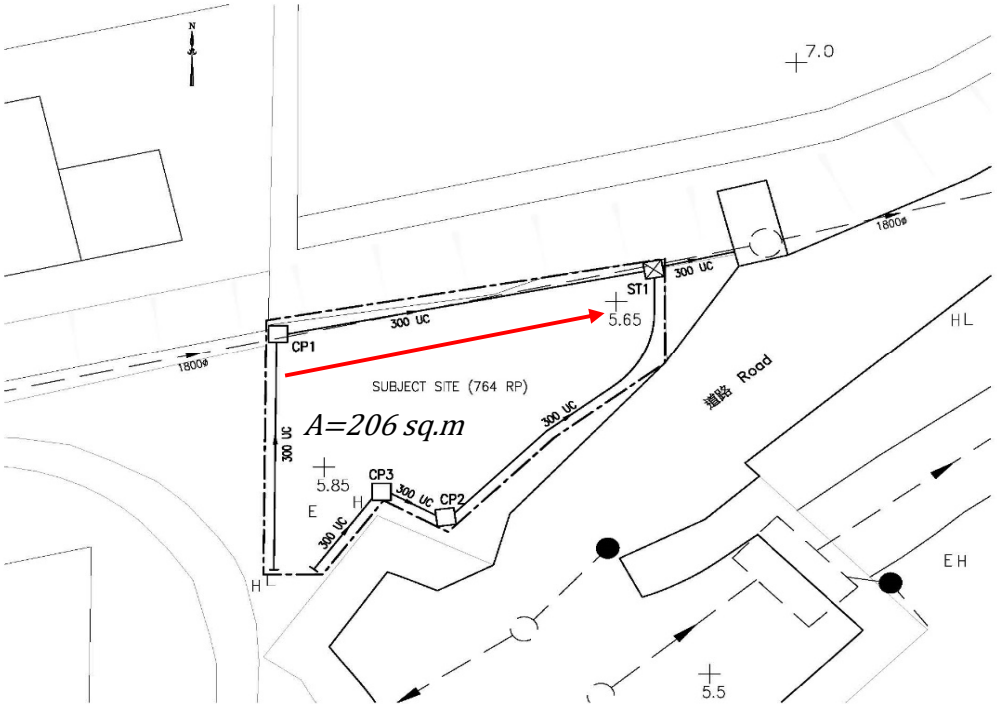
1. Roughless coefficient of proposed channel, n is 0.03
2. End of the proposed channel will connect with existing channel gradient would be a little bit flatter, say 1 in 150

Full-bore capacity of the proposed channel section

Channel Width	=	300	mm	= 0.3	m
Channel Depth	=	300	mm	= 0.3	m
Hydraulic Gradient, S_f	=	0.0067			
Gradient 1 in	=	150			
A	=	0.09	m^2		
P	=	0.9	m		
R	=	0.1	m		
Full bore capacity	=	0.0528	m^3/s		

The capacity of the proposed channel is larger than the highest capacity of Return Period 1 in 200 (0.005 m^3/s).

Therefore, used 300mm UC is adequate for catchment Area of A.



Plan of Catchment Areas
NTS