Appendix 4

Drainage Proposal

Drainage Design
For the application near Lin Ma Hang Road
8/12/2025

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 = l.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 will be covered by Asphalt, the C should be **0.85** (Mid value)

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.

Table 10 – Recommended Design Return Periods based on Flood Levels

Intensively Used Agricultural Land	2-5 years
Village Drainage including Internal Drainage System under a Polder Scheme	10 years [1,3]
Main Rural Catchment Drainage Channels	50 years [2,3]
Urban Drainage Trunk Systems	200 years [4]
Urban Drainage Branch Systems	50 years [4]

Notes:
1. The impact of a 50-year event should be assessed in each village to check whether a higher standard than 10 years can be justified.
2. Embanked channels must be capable of passing a 200-year flood within banks.
3. For definitions of Village Drainage and Main Rural Catchment Drainage Channels, refer to Section 6.6.1.
4. For definitions of Urban Drainage Branch and Urban Drainage Trunk Systems, refer to Section 6.6.2.

50 years is used

Table 2a – Intensity-Duration-Frequency (IDF) Relationship of HKO Headquarters
for durations not exceeding 240 minutes

Duration (min)	Parameters			Extreme Intensity x (mm/h) for various Return Periods T(year)								
	ξ (mm/h)	α	κ	2	5	10	20	50	100	200	500	1000
240**	26.00	9.30	-0.009	29.4	40.0	47.1	54.0	62.9	69.7	76.4	85.4	92.2
120++	43.79	14.56	0.081	49.1	64.4	73.7	82.2	92.5	99.7	107	115	121
60++	64.42	19.34	0.092	71.4	91.5	104	115	128	137	145	156	163
30++	84.48	20.28	0.141	91.7	112	124	134	145	153	160	168	174
15++	106.47	21.34	0.157	114	135	147	157	169	176	183	191	197
10	*122.53	*24.90	*0.198	131	155	168	179	190	198	204	212	216
5	*145.27	*28.54	*0.235	155	181	195	206	218	226	232	239	243
2	*175.33	*34.18	*0.285	187	217	232	244	256	263	269	275	279
1	*198.07	*39.17	*0.322	212	245	261	273	285	292	298	303	307
0.50	*220.81	*44.90	*0.360	236	273	290	303	315	322	327	332	335
0.25+++	244.85	52.05	0.404	263	303	322	335	347	354	359	363	366

i (rainfall intensity) = **145mm/hr** (Duration of 30min is used)

Calculation of the Flow from the Application Site

$Qp = 0.278CiA$

C = 0.9 (mid high Value) Asphalt

i = 145 mm/hr

A = 8,720m^2 (0.003030km^2) (Catchment 1)

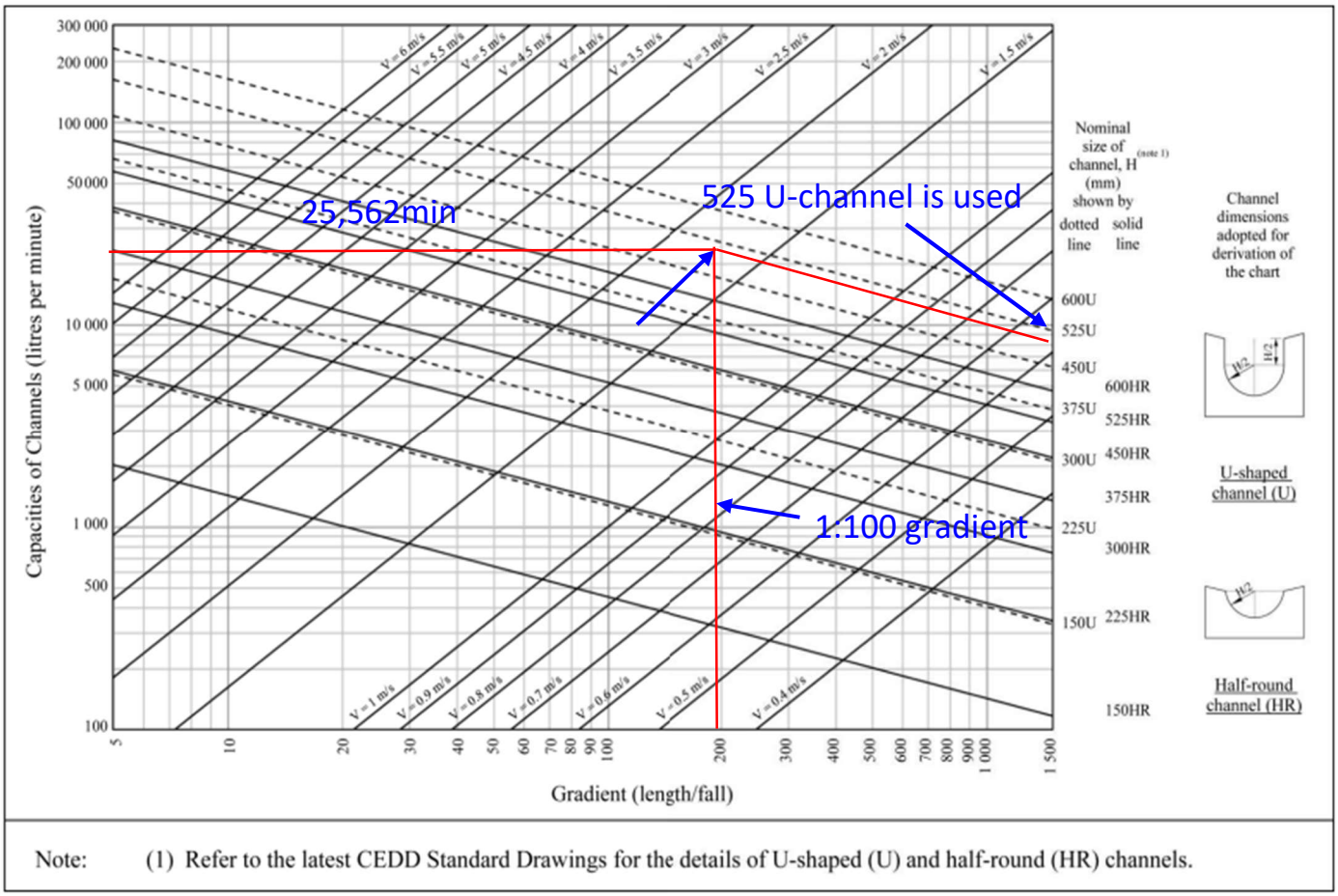
= 2,000m^2 (0.01000km^2) (Catchment 2)

$Qp = 0.278 \times 0.85 \times 145 \times (0.008720+0.002000) \times 1.16$ (By considering Rainfall Increase due to climate change, 16% of discharge is added)

$Qp = 0.426$ m^3/s or 25,562 l/min

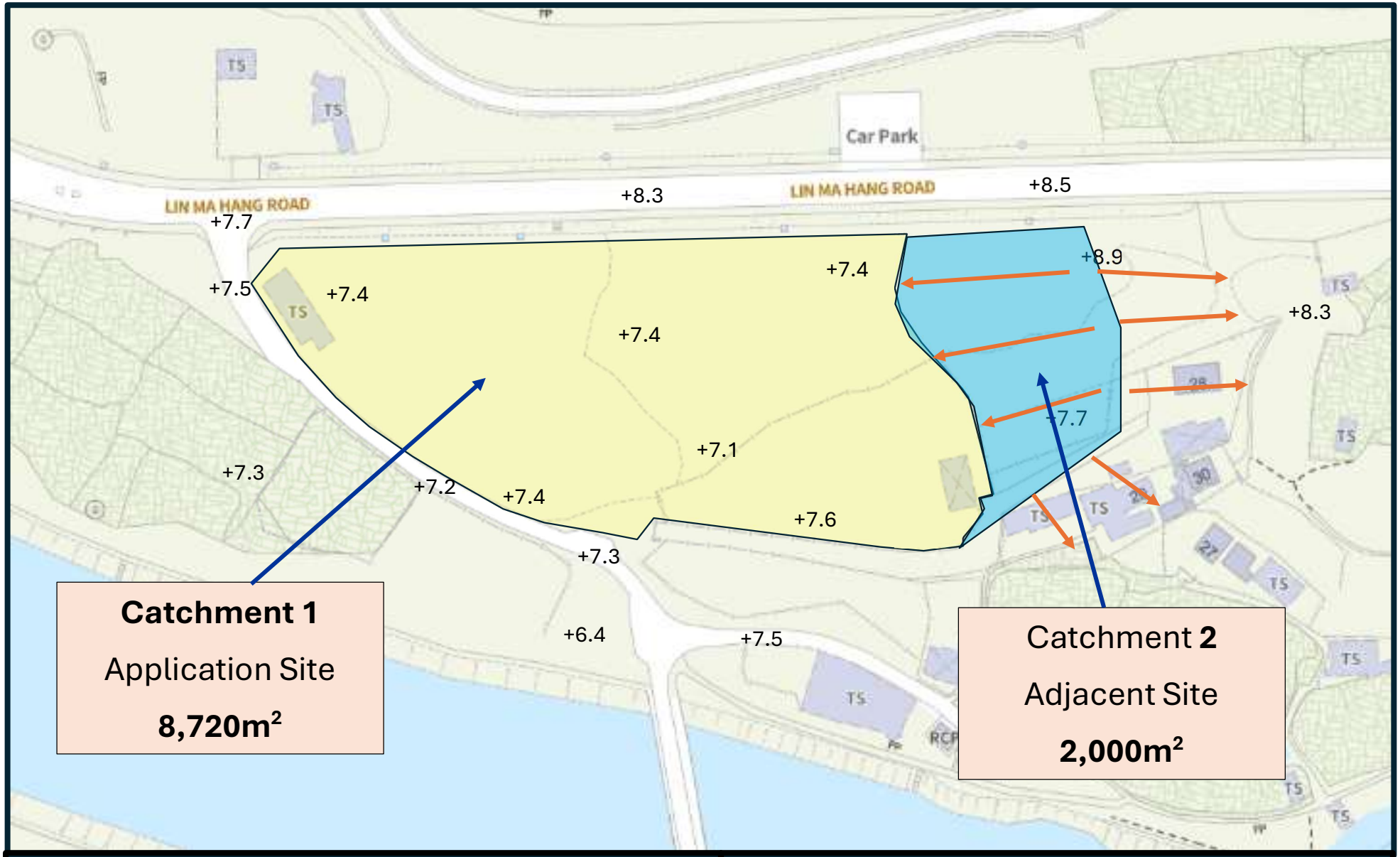
GEO Technical Guidance Note No. 43 (TGN 43) Guidelines on Hydraulic Design of U-shaped

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

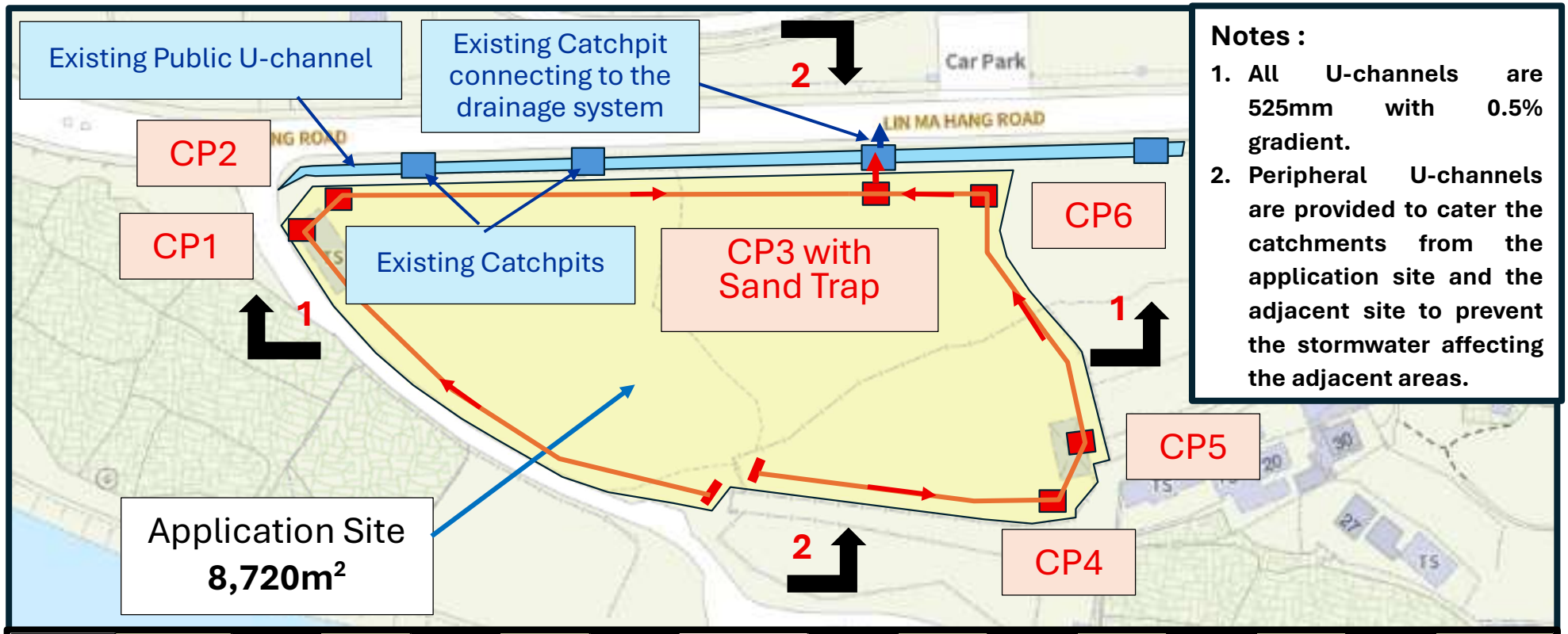


Note: (1) Refer to the latest CEDD Standard Drawings for the details of U-shaped (U) and half-round (HR) channels.

For 25,5620 l/min, **525 U-channel is used.**



Catchment Plan	Drawing No. LMH01



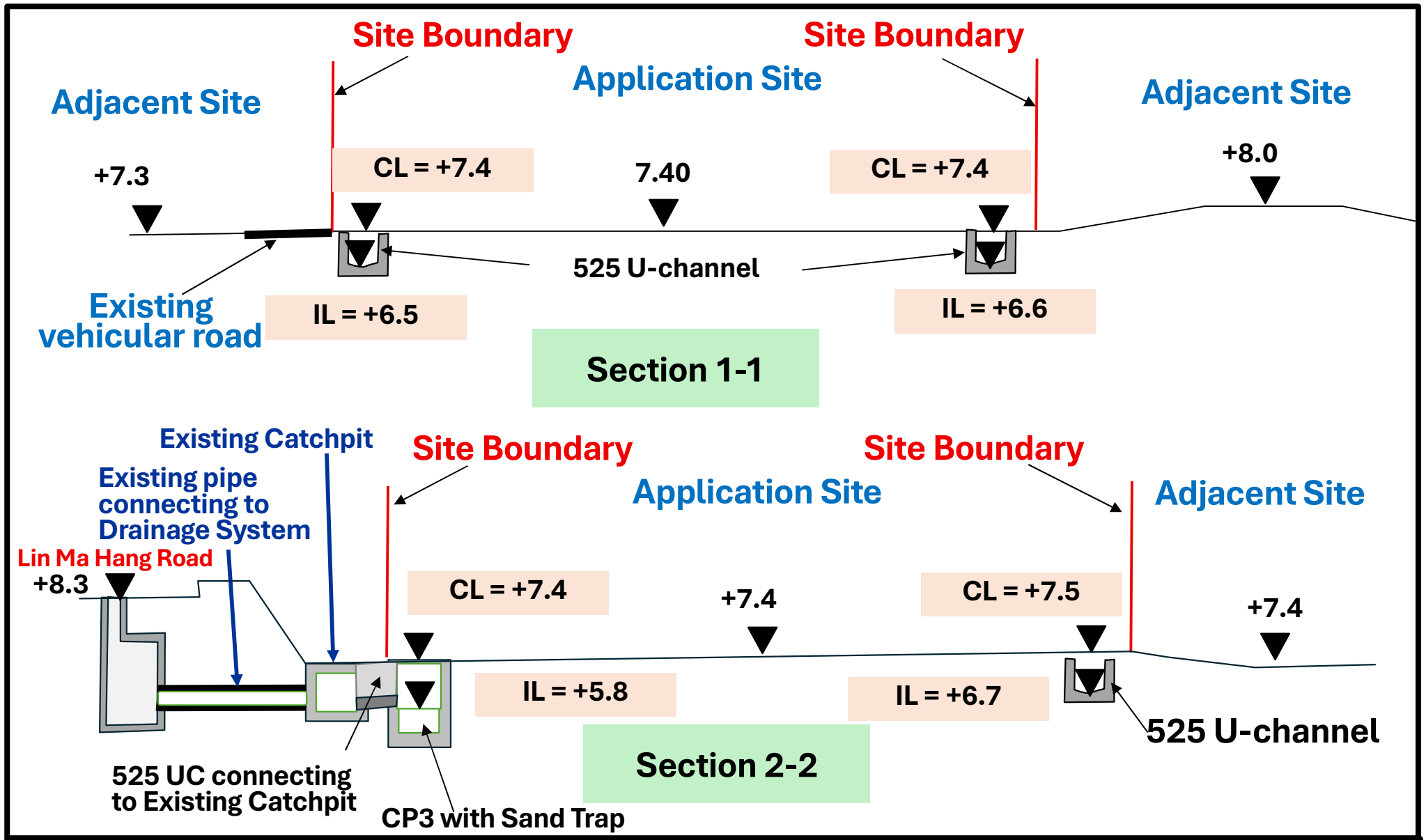
Notes :

1. **All U-channels are 525mm with 0.5% gradient.**
2. **Peripheral U-channels are provided to cater the catchments from the application site and the adjacent site to prevent the stormwater affecting the adjacent areas.**

	Start of u-channel Shoutern West Disrection)	Distance /Gradient	CP 1	Distance /Gradient	CP 2	Distance /Gradient	CP 3	Distance /Gradient	CP 6	Distance /Gradient	CP 5	Distance /Gradient	CP 4	Distance /Gradient	Start of u-channel (Southern-East Direction)
Direction of Flow		→		→		→	Terminal Catchpit with Sand Trap	←		←		←		←	
CL	7.5		7.4		7.4		7.4		7.4		7.5		7.5		7.5
Distance		100		10		115		40		80		10		60	
Gradient		1:200		1:200		1:200		1:200		1:200		1:200		1:200	
IL1	6.925		6.425		6.375		5.800								
IL2							5.975		6.175		6.575		6.625		6.925
IL $_{out}$	6.925		6.425		6.375		5.800		6.175		6.575		6.625		6.925

Drainage Plan

Drawing No. LMH02



Sections	Drawing No. LMH03