1. Drainage Proposal

1.1 Site Particulars

1.1.1 The application site is abutting a local vehicular access leading to Kong Nga Po Road. possesses an area of approximately 1,763m^2.

1.1.2 There is an existing streamcourse to the South of the application site, and works have been done to widen the streamcourse and concrete blocks were place along the streamcourse to ensure capacity and flooding susceptibility of the adjoining areas would not be adversely affected. Photos of current condition of the streamcourse are shown in Figures 6.1 to 6.4. Figure 5 depicts the location of the camera and the direction of the photo.

1.1.3 Calculations have been made comparing the capacity of the original stream course and the channel after the completed works.

1.2 Level and gradient of the subject site & proposed surface channel

1.2.1 The application site is mostly flat grassland, an area of approximately 1,763m^2. The proposed development is paved area will have a gradient sloping from North to South from about +26.6mPD to +26.5mPD.

1.2.2 In order to follow the topography of the application site, the proposed surface channel will be constructed following the gradient of the site. As demonstrated in the calculations in Paragraph 3 and 4 hereunder, a 300mm surface U-channel and 375mm stepped channel will be capable to drain the surface runoff accrued at the subject site.

1.3 Catchment area of the proposed drainage provision at the subject site.

1.3.1 For the internal catchment, with an area of approximately 1,763m^2, a 300mm surface U-Channel along the site peripheral is proposed to intercept the run-off of the site.

1.3.2 The intercepted stormwater from the site will then be discharged to the existing open streamcourse to the South of the Site via a proposed 375mm stepped channel.

1.3.3 It is noted that the land to the North, South, and East command a lower level. Although a portion of the land towards the South Western border commands a slightly higher, the majority of the land to the West commands a lower level. It is also noted that the land to the West is occupied by an open storage site that is completely fenced off with corrugated metal. Therefore, we assume overland flow from adjacent land to be minimal.

2 Runoff Estimation and Proposed Drainage Facilities

2.1 Proposed Drainage Facilities

2.1.1 Subject to the below calculations, it is determined that 300mm surface U-channel which is made of concrete along the site periphery is adequate to intercept storm water generated at the application site.

2.1.2 The intercepted stormwater from the site will then be discharged to the existing streamcourse to the South of the application site as shown in Figure 1.

2.1.3 The flow capacities of the proposed U-channel are calculated using the Chart for the Rapid Design of Channels. Runoff from corresponding Site Catchments (calculated based on a return period of 50 years), and Design Chart for Standard Sized Stepped Channel, the capacity estimation are included below.

2.1.4 The calculations below shows that the proposed 300mm U-channel and 375mm stepped channel has adequate capacity to cater for the surface runoff generated at the application site.

2.1.5 In order to reduce the drainage impact on the existing natural stream, an underground storage tank is proposed to store the additional runoff due to the proposed development. A water tank with pumping system is proposed to temporary store the runoff from the site and the pumping system keeps operating with designed pump rate during rainstorm.

2.1.6 The discharge from the proposed site will not be greater than the existing site including the external catchment. please refer to the calculation shown in Section 4. The total volume of the water tank is designed to be at least 316 m2 (Area) x 1 m (Depth) = 316 m3 (Volume)

2.1.7 Since Rational Method is not based on a total storm duration, but rather a period of rain that produces the peak runoff rate. The method cannot compute the runoff volumes unless the total storm duration is assumed. Therefore, 4 hours storm duration is proposed for the size design of the on-site water storage tank.

2.1.8 A sump/pumping system is proposed to pump the additional stormwater into the tank during heavy rain. The pump rate of sump/pumping system is designed to be at least 0.022 m3/s which is the additional runoff over the existing site and external catchment mentioned in Section 4.4.

2.1.9 In case of power failure, emergency generator will be used as the power supplier of the pump. Regular maintenance of the equipment will be carried out, spare pump will be used to maintain the operation when there is equipment failure.

2.1.10 The stored stormwater will be reused as far as practicable and the surplus water will be drained off to the proposed stepped channel and subsequently conveyed to the existing natural stream after heavy rain. Hence, there is no additional flooding risk caused by the Proposed Development.

2.1.11 The final design of the storage tank will be confirmed during the detailed design stage after the planning application. The detailed design of the storage tank should be incorporated in the later “Drainage Proposal” and submitted to DSD for review.

2.1.12 A next set of calculations checks and confirms that the downstream watercourse has the capacity for the surface runoff generated at the application site and external catchment.

2.1.13 All the proposed drainage facilities, including the section of stepped channel proposed in between the subject site to the streamcourse will be provided and maintained at the applicant’s own expense. Also, surface U-channel and stepped channel will be cleaned at regular interval to avoid the accumulation of rubbish/debris which would affect the dissipation of storm water.

2.1.14 The provision of the proposed surface U-channel will follow the gradient of the application site. All the proposed drainage facilities will be constructed and maintained at the expense of the applicant.

2.1.15 The applicant will move the concrete blocks back away from the stream course, to create and maintain a buffer area, at +23.0mPD, at a minimum 3m from the top of the bank. All of the concrete blocks will be placed outside this 3m wide buffer area, and no proposed works will be done within this buffer area after the construction.

3 Calculation 1: Drainage Calculation for the proposed Provision of Drainage Facilities at the Application Site

3.1 Runoff Estimation

3.1.1 Rational method is adopted for estimating the designed run-off

$$Q=0.278\ C \times I \times A$$

Table 1: Runoff Coefficients

Surface Characteristics	Runoff Coefficient
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	0.15-0.2

Assuming that:

I. The total catchment area from the application site is about 1,763 m^2;
II. Approximately 1,763 m^2 is hard paved, and therefore the value of run-off co-efficient (k) is taken as 0.95.

Difference in Land Datum = 26.6m –26.5m = 0.1m
L = 50.6m
Average fall = 0.2m in 100m

According to the Brandsby-Williams Equation adopted from the "Stormwater Drainage Manual – Planning, Design and management" published by the Drainage Services Department (DSD),

Time of Concentration (t_c) = $0.14465[L/(H^{0.2} \times A^{0.1})]$
t_c = $0.14465[50.6/(0.2^{0.2} \times 1{,}763^{0.1})]$
t_c = 4.78 minutes

The rainfall intensity *i* is determined by using the Gumbel Solution:

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

Where *I* = Extreme mean intensity in mm/hr
td = Duration in minutes (td≤240)
a, b, c = Storm constants given in the table below

Table 2: Storm Constants for Different Return Periods of North District Area

Return Period T(years)	2	5	10	20	50
a	439.1	448.1	454.9	462.3	474.6
b	4.10	3.67	3.44	3.21	2.90
c	0.484	0.437	0.412	0.392	0.371

i = $474.6/[4.78+2.90]^{0.371}$
i = 222.7mm/hr
By Rational Method, Q = 0.95× 222.7mm/hr × 1,763/3600
Q = 104l/s = 0.104m^3/s = 6,218 l/min

In accordance with the Chart of the Rapid Design of Channels in "Geotechnical Manual for Slopes", 300mm surface U-channel in 1:100 gradient is considered adequate to dissipate all the stormwater accrued by the application site, as shown in Figure 2. The intercepted stormwater will then be discharged to the existing natural stream to the South of the application site by 375mm stepped channel, as shown in Figure 1. A 375mm stepped channel, with α = 45 degrees, is considered adequate to dissipate all the stormwater accrued by the application site as shown in Figure 3

4 Calculation 1a: On-site Storage Tank Calculations

4.1 Since Rational Method is not based on a total storm duration, but rather a period of rain that produces the peak runoff rate. The method cannot compute the runoff volumes unless the total storm duration is assumed. Therefore, 4 hours storm duration is proposed to be used as to design the size of on-site storage tank. This duration is sufficient to cover the effective life of many rainstorms (Royal Observatory, 1981). With reference to the IDF relationship of North District Area stated in Table 2d of the Stormwater Drainage Manual CORRIGENDUM No. 1/2024 (DSD, 2024), the rainfall intensity of 63.9mm/hr was adopted, which is based on 4 hours rainfall duration for 50 years return period

4.2 The existing site is primarily flat grassland, and the proposed development is mostly paved concrete. Thus, the runoff coefficients of 0.25 and 0.95 were adopted for the Site before and after the proposed development, respectively.

4.3 The abovementioned parameter and the estimated runoff volume of the Site before and after the proposed development under 50 return periods is summarised and calculated in the below Table 3.

Table 3

Scenario Under 50 Years Return Period	**Area, m^2**	**Runoff Coefficient**	**Rainfall Intensity, mm/hr**	**Peak Runoff Rate m^3/s**	**Duration, hours**	**Estimated Runoff Volume, m^3**
Before Development	1,763	0.25	63.9	0.008	4	113
After Development		0.95		0.030	4	428
					Incremental Runoff	**316**

4.4 A sump/pumping system is proposed to pump the additional stormwater into the tank during heavy rain. Since the additional runoff over the existing site and external catchment is $0.030m^3/s - 0.030m^3/s = 0.022\ m^3/s$, thus, the pump rate of sump/pumping system is designed to be at least $0.022\ m^3/s$

5 Calculation 2: Runoff Calculations of the Entire Catchment

5.1 Runoff Estimation

5.1.1 Rational method is adopted for estimating the designed run-off

$$Q=0.278\ C \times I \times A$$

Assuming that:

III. The total catchment area of the application and its surrounding is estimated to be about 679,773 m^2;

IV. An area of approximately 97,280m^2 are developments with mostly hard paved surfaces, and therefore the value of run-off co-efficient (k) is taken as 0.8. And the rest of the catchment area, 582,493m^2, is steep grassland and therefore the value of run-off co-efficient (k) is taken as 0.25.

Difference in Land Datum	=	139m –22.4m = 116.6m
L	=	1,090m
Average fall	=	10.7m in 100m

According to the Brandsby-Williams Equation adopted from the "Stormwater Drainage Manual – Planning, Design and management" published by the Drainage Services Department (DSD),

Time of Concentration (t_c)	=	$0.14465[L/(H^{0.2}\times A^{0.1})]$
t_c	=	$0.14465[1,090/(116.6^{0.2}\times 679,773^{0.1})]$
t_c	=	25.34 minutes

The rainfall intensity *i* is determined by using the Gumbel Solution:

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

Where *I*		= Extreme mean intensity in mm/hr
td		= Duration in minutes (td≤240)
a, b, c		= Storm constants given in the table below

Table 4: Storm Constants for Different Return Periods of North District Area

Return Period T(years)	2	5	10	20	50
a	439.1	448.1	454.9	462.3	474.6
b	4.10	3.67	3.44	3.21	2.90
c	0.484	0.437	0.412	0.392	0.371

i	=	$474.6/[25.35+2.90]^{0.371}$
i	=	137.4mm/hr

By Rational Method, Q	=	0.8× 137.4mm/hr × 97,280m2/3600 +0.25 x 137.4mm/hr x 582,493m2/3600
Q	=	7,418l/s = 7.418m^3/s

6 Checking the Capacity of the Original Streamcourse

Manning Equation

$$V = \frac{R^{\frac{2}{3}} \times S_f^{0.5}}{n}$$

$$R = \frac{L \times D}{2D+L}$$

L	=	1.9m
D	=	0.6m
R	=	[1.9×0.7]/[2×0.7+1.9]
R	=	0.40m
n	=	0.035 s/m$^{1/3}$
		(Table 13 of Stormwater Drainage Manual, Natural Stream channel, with weeds, fair)
V	=	[0.40$^{2/3}$]×[0.01$^{0.5}$]/0.035
V	=	2.07m/sec

Maximum Capacity Q_{Max} = V × A

A	=	L × D
A	=	1.9 × 0.7
A	=	1.33m^2
Q_{Max}	=	1.53m/sec × 1.33m^2
Q_{Max}	=	2.07m^3/sec
2.07m^3/sec	<	7.418m^3/sec
Q_{Max}	<	Q

The original streamcourse's capacity was not sufficient for the entire catchment area

7 Checking the Capacity of the Widened Streamcourse

Manning Equation

$$V = \frac{R^{\frac{2}{3}} \times S_f^{0.5}}{n}$$

$$R = \frac{L \times D}{2D+L}$$

L	=	2.2m
D	=	0.7m
R	=	[2.2×0.7]/[2×0.7+2.2]
R	=	0.43m
n	=	0.014 s/m$^{1/3}$
		(Table 13 of Stormwater Drainage Manual, concrete lined channels)
V	=	[0.43$^{2/3}$]×[0.01$^{0.5}$]/0.014
V	=	4.06m/sec

Maximum Capacity Q_{Max} = V × A

A	=	L × D
A	=	2.2 × 0.7
A	=	1.54m^2

$$Q_{Max} = 4.06\text{m/sec} \times 1.54\text{m}^2$$
$$Q_{Max} = 6.25\text{m}^3\text{/sec}$$
$$6.25\text{m}^3\text{/sec} < 7.418\text{m}^3\text{/sec}$$
$$Q_{Max} < Q$$

After the work done on the drainage streamcourse, the capacity has increased significantly from 2.07m^3/sec to 6.25m^3/sec, however it is still not sufficient for the entire catchment area. The applicant proposes to further improve on the streamcourse, by further widening the streamcourse to 2.6m wide and also deepen the streamcourse to 0.9m deep.

8 Checking the Capacity of the Proposed streamcourse

Manning Equation

$$V = \frac{R^{\frac{2}{3}} \times S_f^{0.5}}{n}$$

$$R = \frac{L \times D}{2D + L}$$

$$L = 2.6\text{m}$$
$$D = 0.9\text{m}$$
$$R = [2.6 \times 0.9]/[2 \times 0.9 + 2.6]$$
$$R = 0.53\text{m}$$
$$n = 0.014\ \text{s/m}^{1/3}$$
(Table 13 of Stormwater Drainage Manual, concrete lined channels)
$$V = [0.53^{2/3}] \times [0.01^{0.5}]/0.014$$
$$V = 4.69\text{m/sec}$$

Maximum Capacity $Q_{Max} = V \times A$

$$A = L \times D$$
$$A = 2.6 \times 0.9$$
$$A = 2.34\text{m}^2$$
$$Q_{Max} = 4.69\text{m/sec} \times 2.34\text{m}^2$$
$$Q_{Max} = 10.97\text{m}^3\text{/sec}$$
$$10.97\text{m}^3\text{/sec} > 7.418\text{m}^3\text{/sec}$$
$$Q_{Max} > Q$$

The proposed work on the streamcourse will further increase the capacity and will be sufficient to receive the runoff from the entire catchment.

9 Conclusion

9.1 The emergency works that the applicant has performed has increased the streamcourse's capacity significantly, however it is still insufficient to receive runoff from the entire catchment area.

9.2 The applicant proposes to further widen and deepen the streamcourse to increase the capacity so that it would be sufficient to receive runoff from the entire catchment.

9.3 The applicant has assessed the potential drainage impact due to the proposed hard paving works and with the proposal of the underground stormwater storage tank with pump system, no net increase of runoff.

9.4 The applicant will be responsible for the construction and ongoing maintenance of the drainage facilities.

9.5 Potential drainage impacts that may arise from the Site after construction of the Proposed Development have been assessed. Thus, the stormwater system will have sufficient capacity to receive stormwater runoff from the Proposed Development and surrounding catchments.

9.6 Adequate measures are provided at the resources of the applicant to prevent the site from being eroded and flooded

9.7 External catchment is taken into account such that flooding susceptibility of the adjoining areas would not be adversely affected by the proposed development.

Figure 1 Drainage Plan

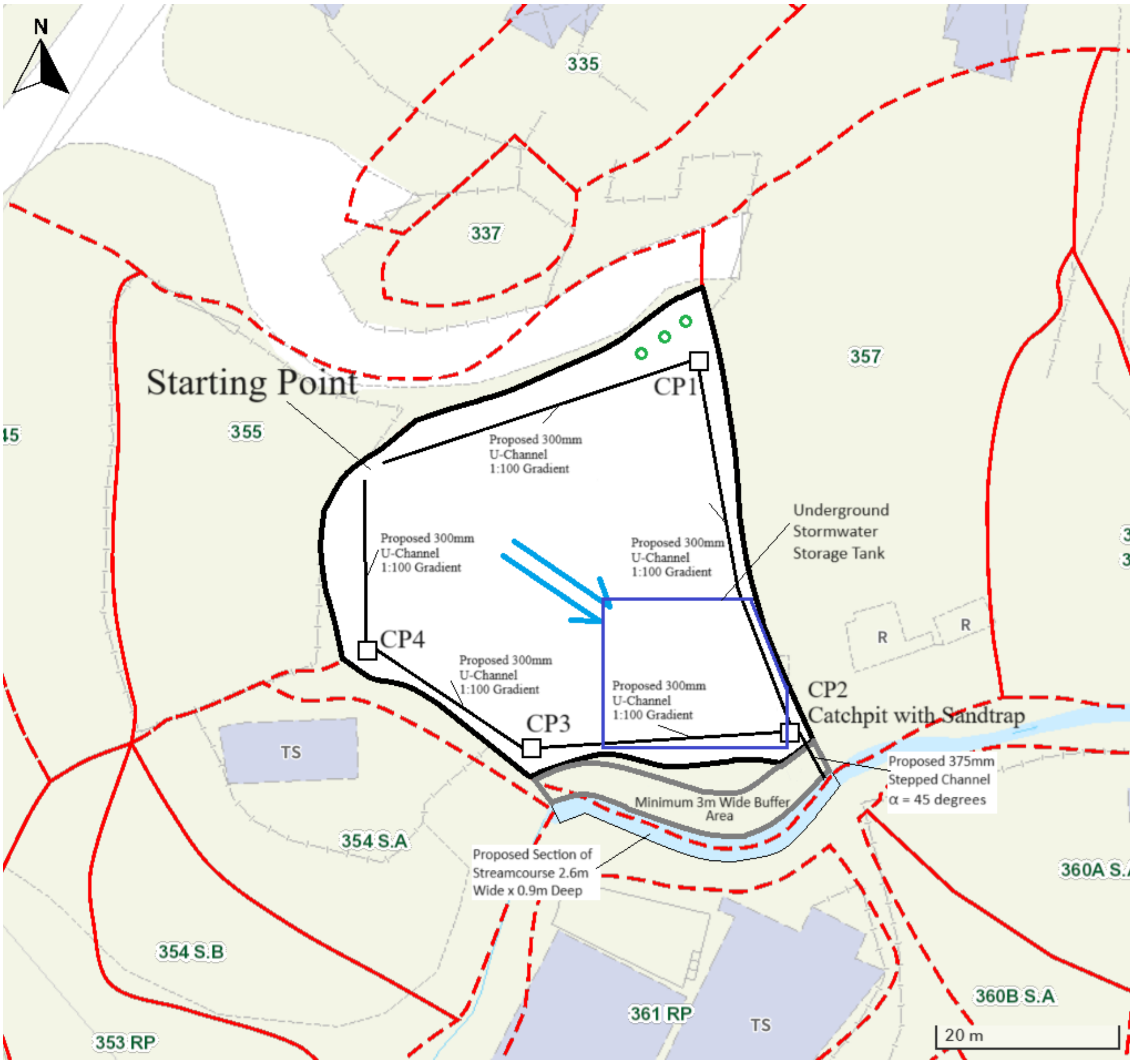


Figure 2 Cross Section of Streamcourse and Buffer Area

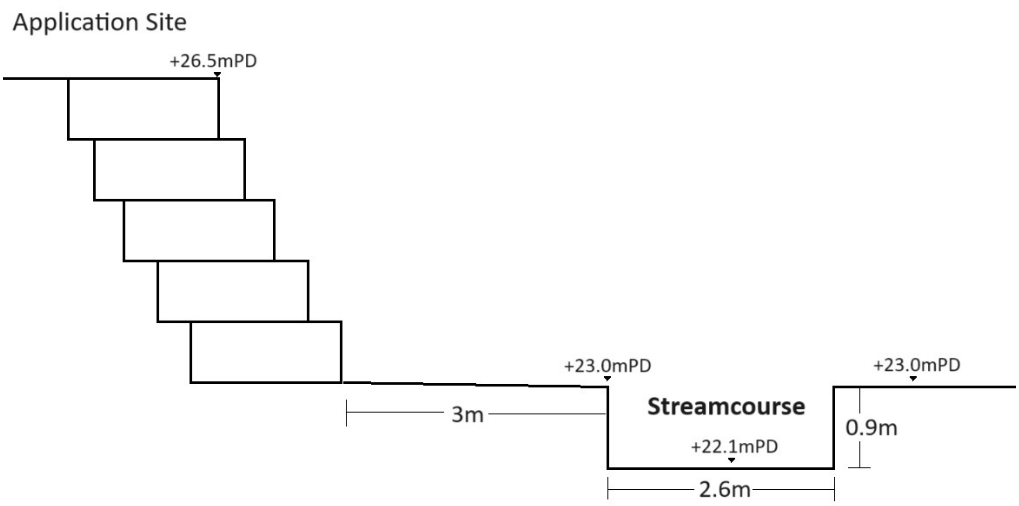


Figure 3 Chart for the Rapid Designs of Channels (Application Site)

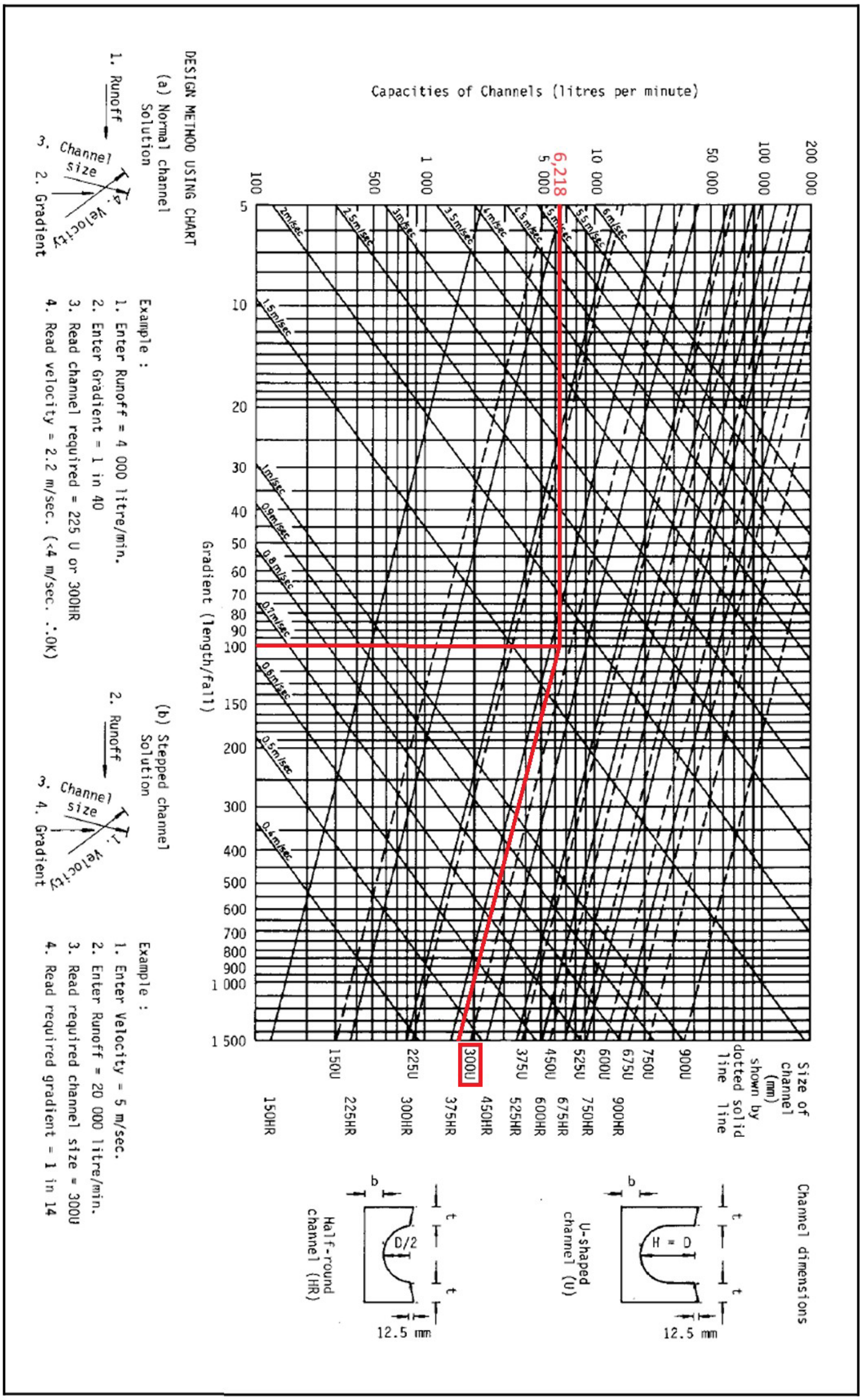


Chart for the Rapid Design of Channels in the Geotechnical Manual for Slopes (Second Edition) (GCO, 1984)

Figure 4 Design Chart for Standard Sized Stepped Channels

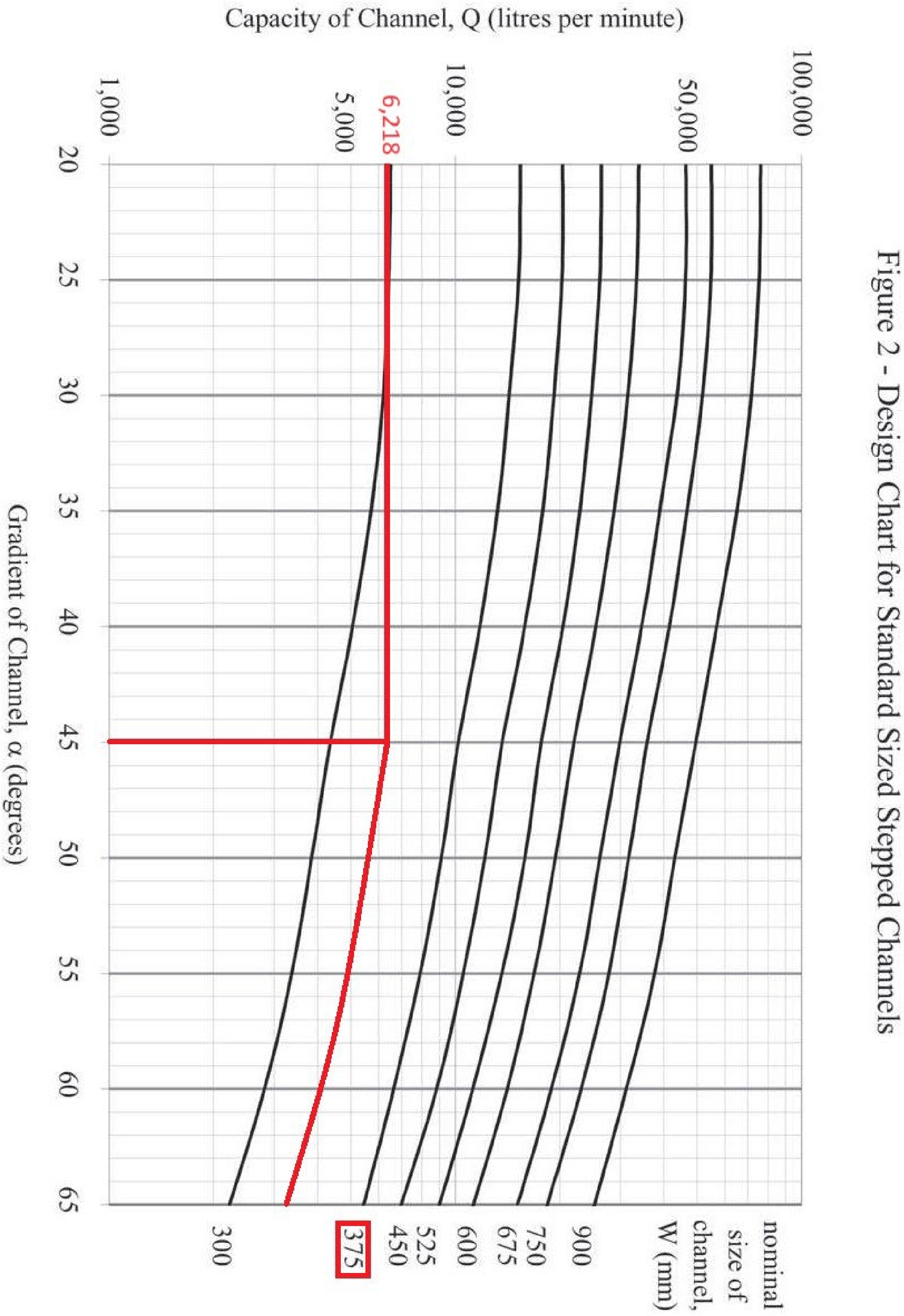


Figure 5 Photo Location

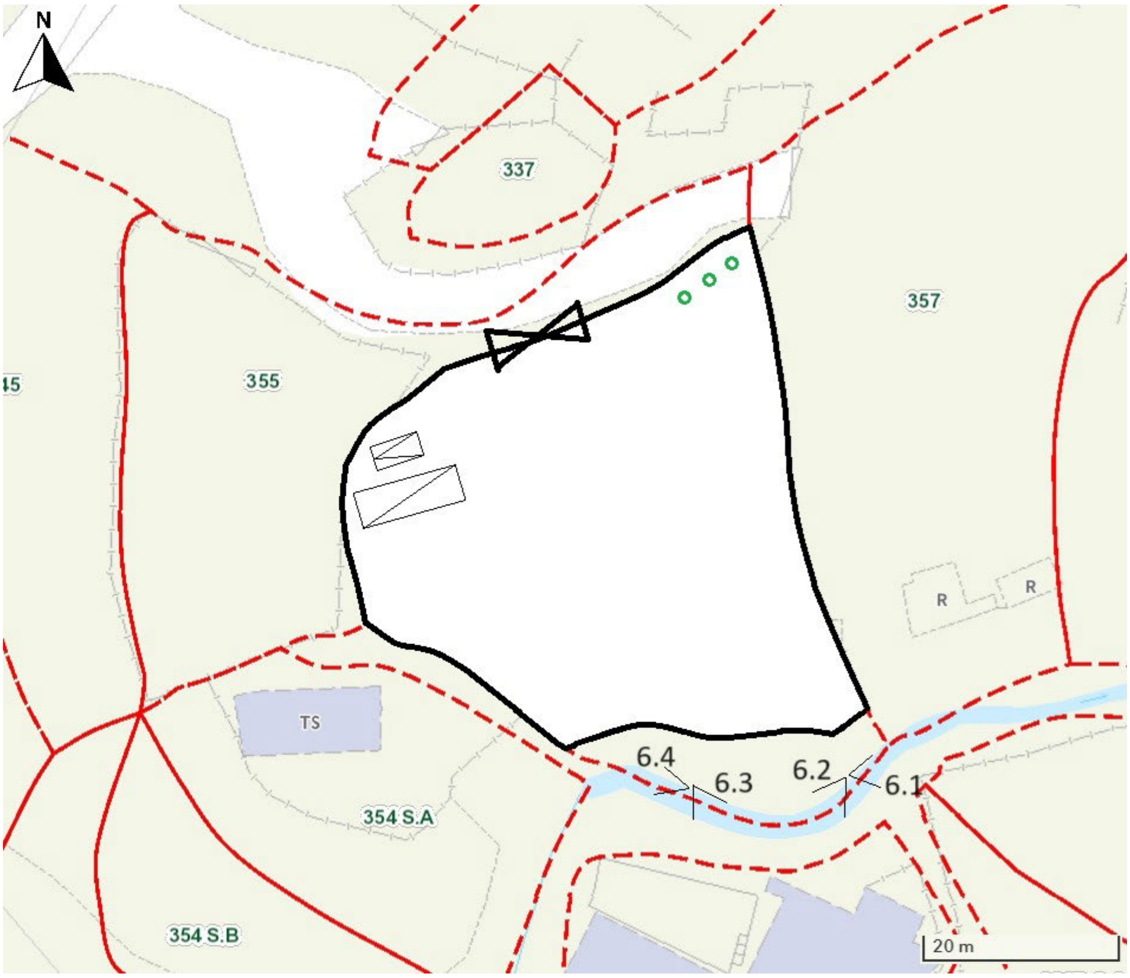
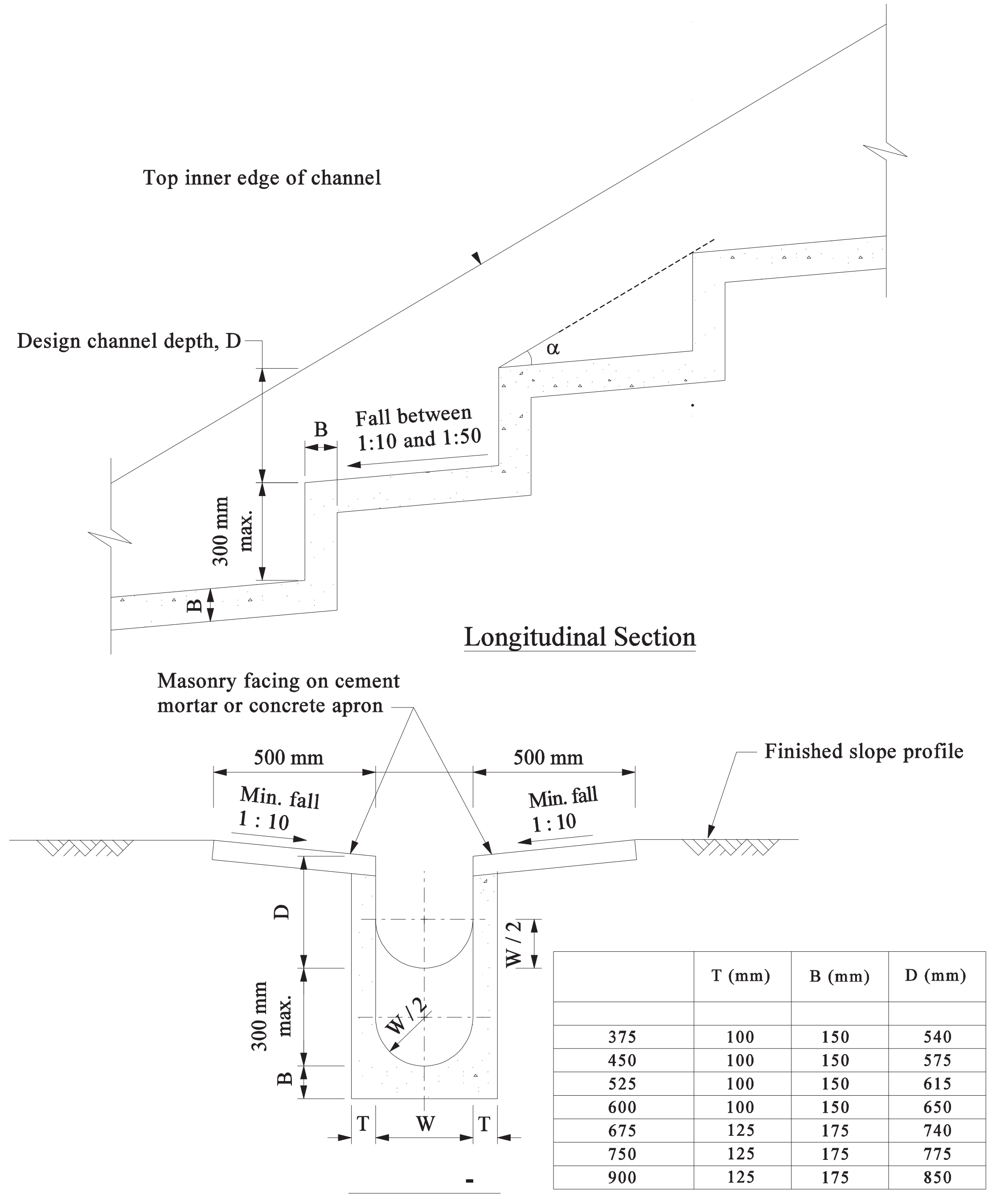


Figure 6.1

Figure 6.2

Figure 6.3

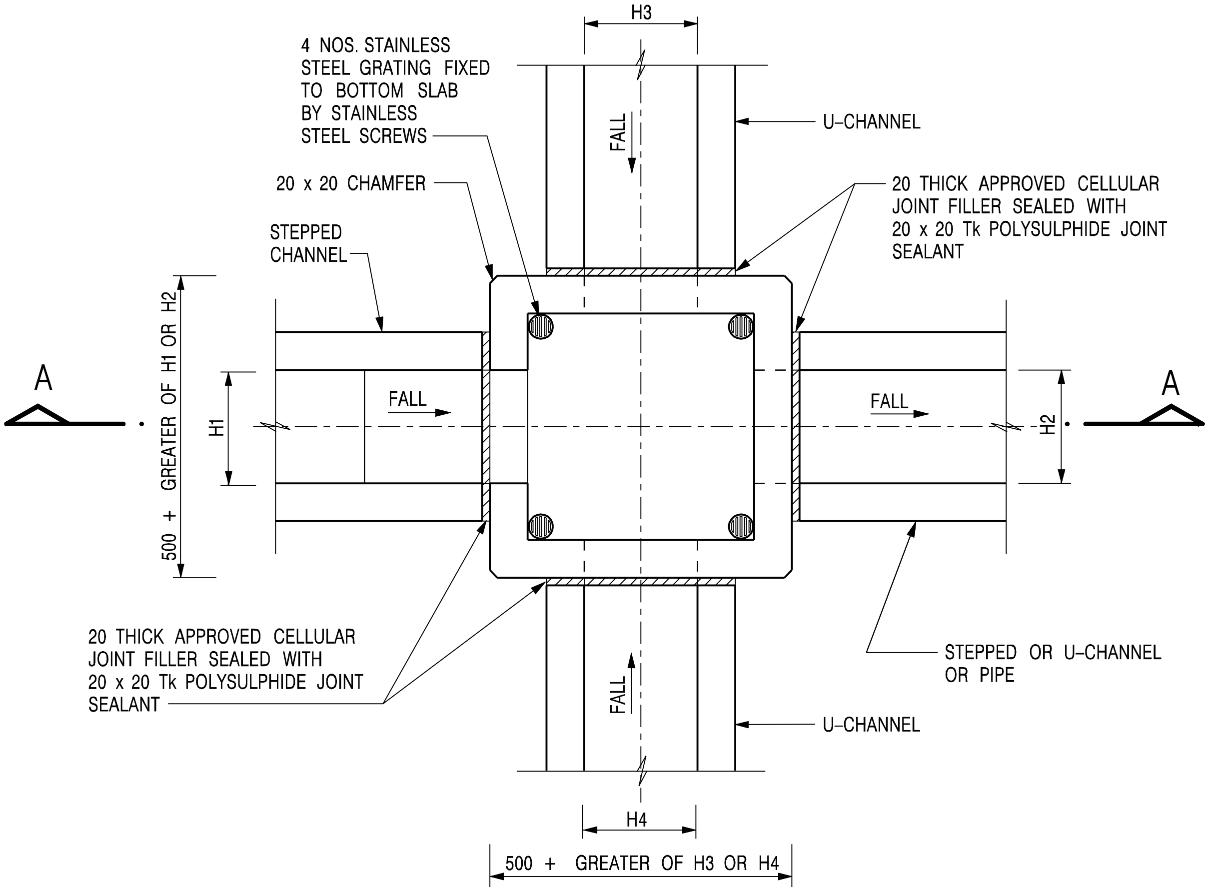
Figure 6.4



	T (mm)	B (mm)	D (mm)
375	100	150	540
450	100	150	575
525	100	150	615
600	100	150	650
675	125	175	740
750	125	175	775
900	125	175	850

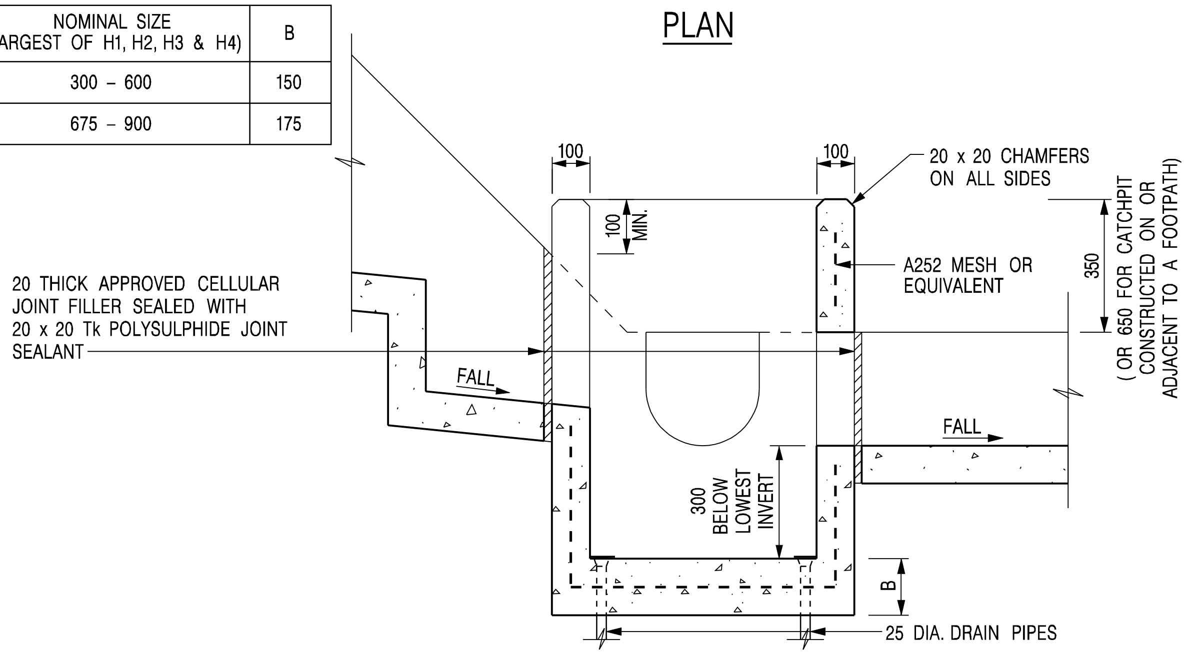
Figure 7 – Details of Standard Sized Stepped Channels

Extracted from GEO Technical Guidance Note No. 27 (TGN 27) Hydraulic Design of Stepped Channels on Slopes, Geotechnical Engineering Office, Civil Engineering and Development Department



PLAN

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



SECTION A – A

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. REFER TO SHEET 2 FOR OTHER NOTES.

REF.	REVISION	SIGNATURE	DATE
–	FORMER DRG. NO. C2406J.	Original Signed	03.2015

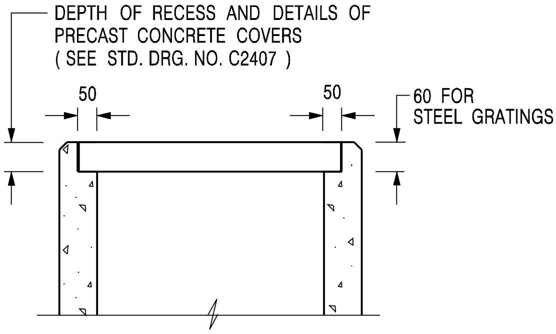
CATCHPIT WITH TRAP
(SHEET 1 OF 2)

CEDD CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

SCALE 1 : 20

DATE JAN 1991

DRAWING NO. C2406 /1



ALTERNATIVE TOP SECTION
FOR PRECAST CONCRETE COVERS / GRATINGS

NOTES:

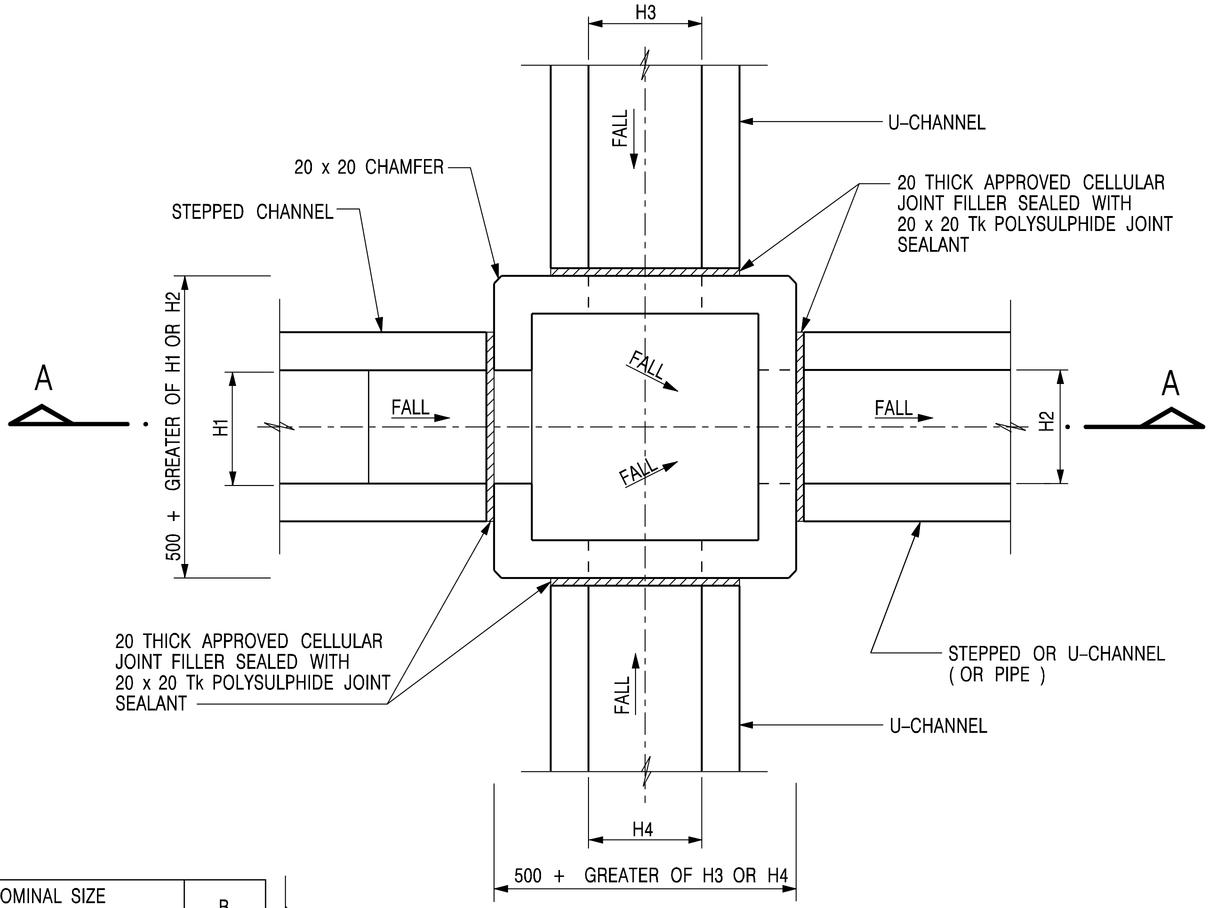
1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. ALL CONCRETE SHALL BE GRADE 20 /20.
3. CONCRETE SURFACE FINISH SHALL BE CLASS U2 OR F2 AS APPROPRIATE.
4. FOR DETAILS OF JOINT, REFER TO STD. DRG. NO. C2413.
5. CONCRETE TO BE COLOURED AS SPECIFIED.
6. UNLESS REQUESTED BY THE MAINTENANCE PARTY AND AS DIRECTED BY THE ENGINEER, CATCHPIT WITH TRAP IS NORMALLY NOT PREFERRED DUE TO PONDING PROBLEM.
7. UPON THE REQUEST FROM MAINTENANCE PARTY, DRAIN PIPES AT CATCHPIT BASE CAN BE USED BUT THIS IS FOR CATCHPITS LOCATED AT SLOPE TOE ONLY AND AS DIRECTED BY THE ENGINEER.
8. FOR CATCHPITS CONSTRUCTED ON OR ADJACENT TO A FOOTPATH, STEEL GRATINGS (SEE DETAIL 'A' ON STD. DRG. NO. C2405 /2) OR CONCRETE COVERS (SEE STD. DRG. NO. C2407) SHALL BE PROVIDED AS DIRECTED BY THE ENGINEER.
9. IF INSTRUCTED BY THE ENGINEER, HANDRAILING (SEE DETAIL 'J' ON STD. DRG. NO. C2405 /5; EXCEPT ON THE UPSLOPE SIDE) IN LIEU OF STEEL GRATINGS OR CONCRETE COVERS CAN BE ACCEPTED AS AN ALTERNATIVE SAFETY MEASURE FOR CATCHPITS NOT ON A FOOTPATH NOR ADJACENT TO IT. TOP OF THE HANDRAILING SHALL BE 1 000 mm MIN. MEASURED FROM THE ADJACENT GROUND LEVEL.
10. MINIMUM INTERNAL CATCHPIT WIDTH SHALL BE 1 000 mm FOR CATCHPITS WITH A HEIGHT EXCEEDING 1 000 mm MEASURED FROM THE INVERT LEVEL TO THE ADJACENT GROUND LEVEL. AND, STEP IRONS (SEE DSD STD. DRG. NO. DS1043) AT 300 c/c STAGGERED SHALL BE PROVIDED. THICKNESS OF CATCHPIT WALL FOR INSTALLATION OF STEP IRONS SHALL BE INCREASED TO 150 mm.
11. FOR RETROFITTING AN EXISTING CATCHPIT WITH STEEL GRATING, SEE DETAIL 'G' ON STD. DRG. NO. C2405 /4.
12. SUBJECT TO THE APPROVAL OF THE ENGINEER, OTHER MATERIALS CAN ALSO BE USED AS COVERS / GRATINGS.

REF.	REVISION	SIGNATURE	DATE
A	MINOR AMENDMENT.	Original Signed	04.2016
–	FORMER DRG. NO. C2406J.	Original Signed	03.2015

CATCHPIT WITH TRAP
(SHEET 2 OF 2)

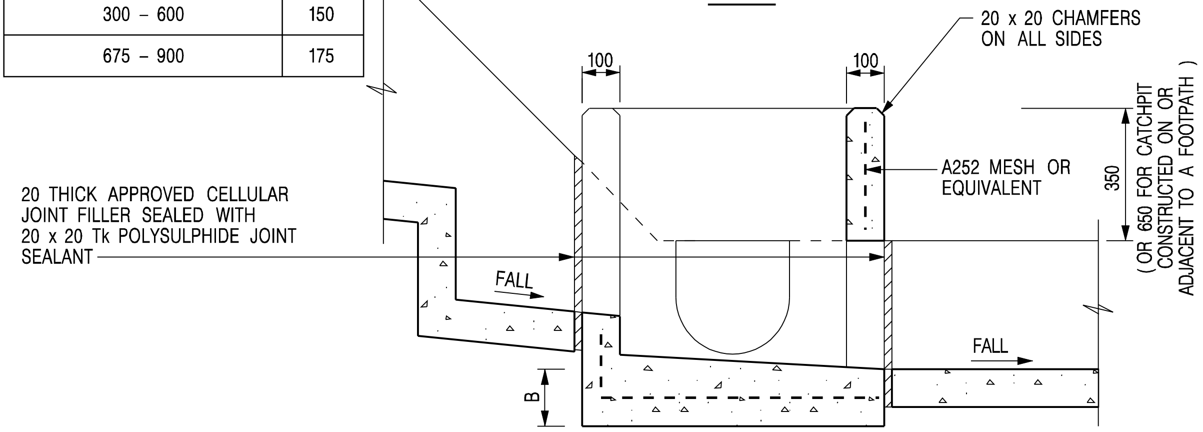
CEDD CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

SCALE 1 : 20
DATE JAN 1991
DRAWING NO. C2406 /2A

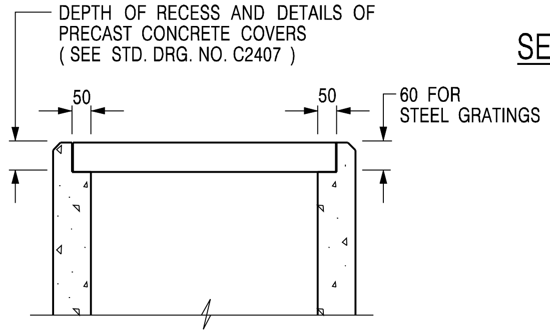


PLAN

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



SECTION A – A



NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. REFER TO SHEET 5 FOR OTHER NOTES.

ALTERNATIVE TOP SECTION FOR PRECAST CONCRETE COVERS / GRATINGS

REF.	REVISION	SIGNATURE	DATE
–	FORMER DRG. NO. C2405J.	Original Signed	03.2015

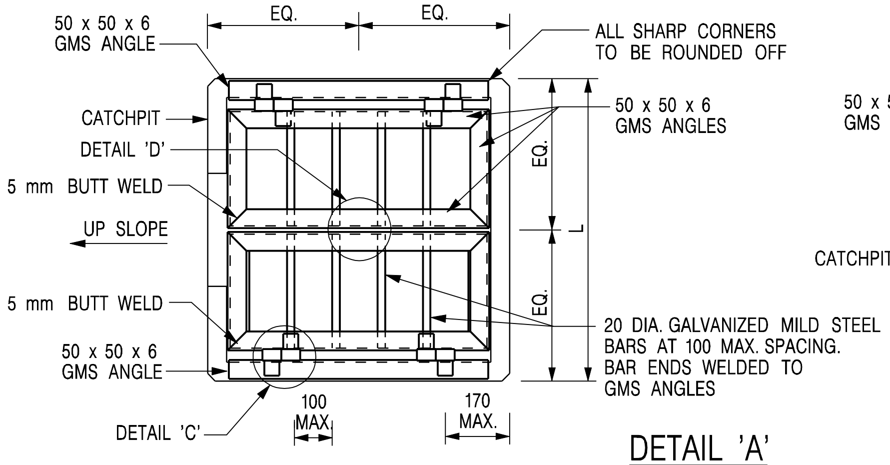
STANDARD CATCHPIT DETAILS (SHEET 1 OF 5)

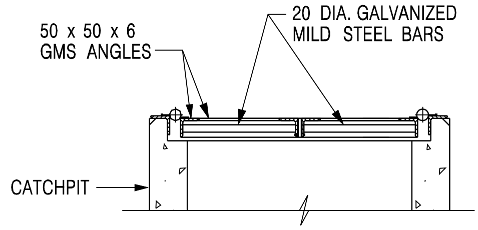
CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

SCALE 1 : 20

DATE JAN 1991

DRAWING NO. C2405 /1



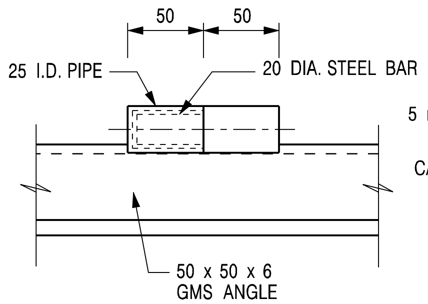


SECTIONAL ELEVATION

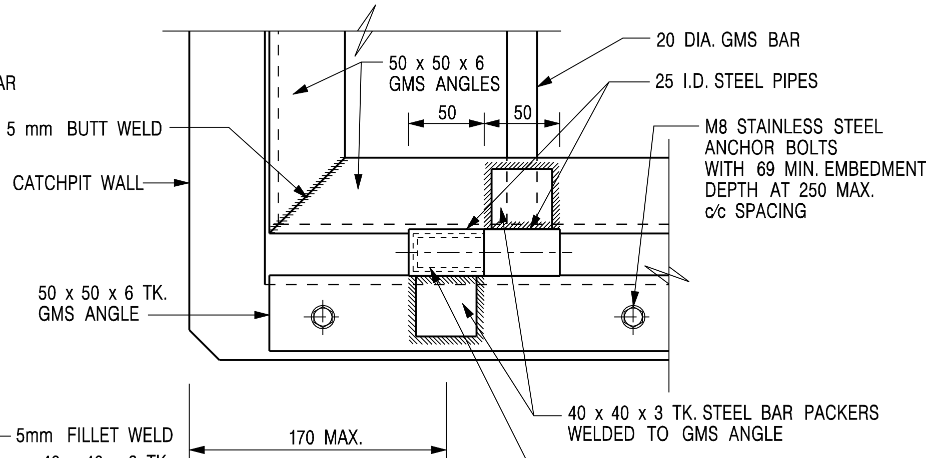
DETAIL 'A'

(DETAILS OF DOUBLE SIDE OPENING STEEL GRATING FOR L>900mm)

SCALE 1 : 20



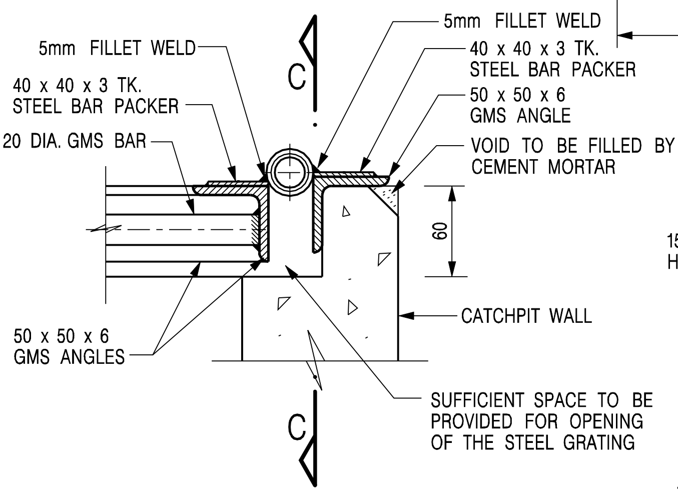
SECTION C – C



DETAIL 'C'

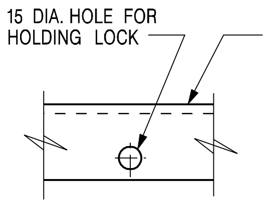
(DETAILS OF HINGE)

SCALE 1 : 5

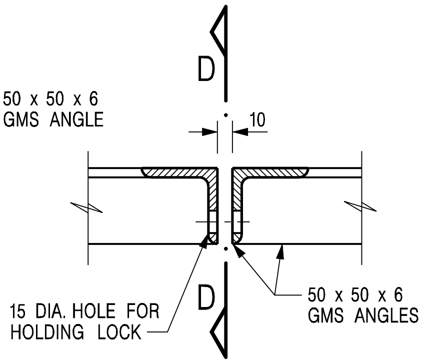


SECTIONAL ELEVATION

(DETAIL 'C')



SECTION D – D



DETAIL 'D'

(DETAILS OF HOLE FOR LOCK)

SCALE 1 : 5

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. REFER TO SHEET 5 FOR OTHER NOTES.

REF.	REVISION	SIGNATURE	DATE
–	FORMER DRG. NO. C2405J.	Original Signed	03.2015

STANDARD CATCHPIT DETAILS

(SHEET 2 OF 5)

CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

SCALE AS SHOWN

DATE JAN 1991

DRAWING NO. C2405 /2

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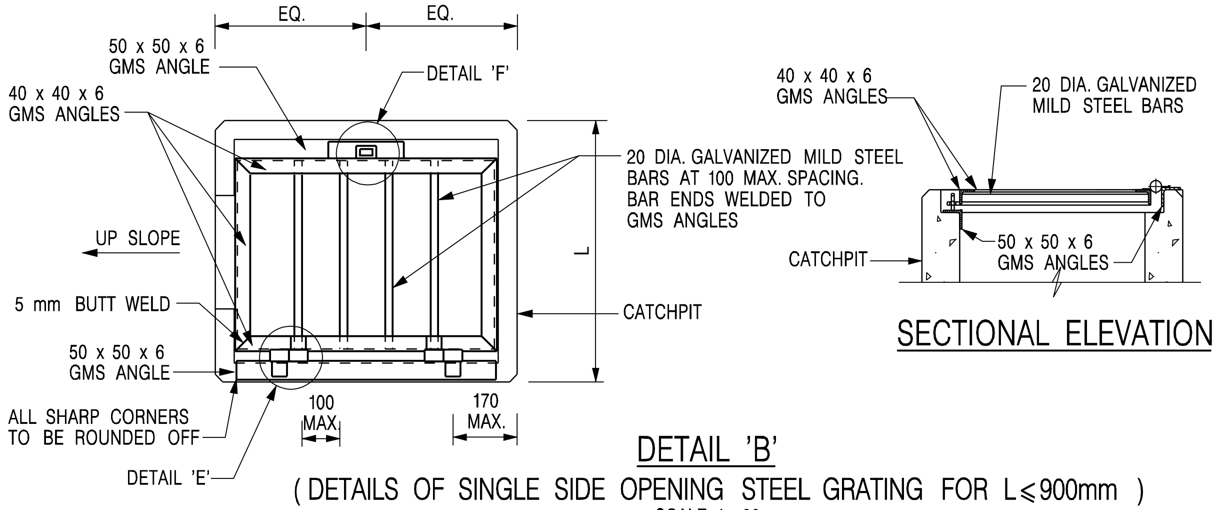
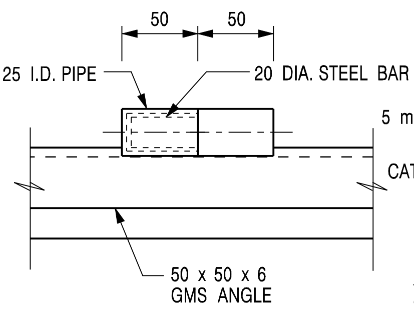


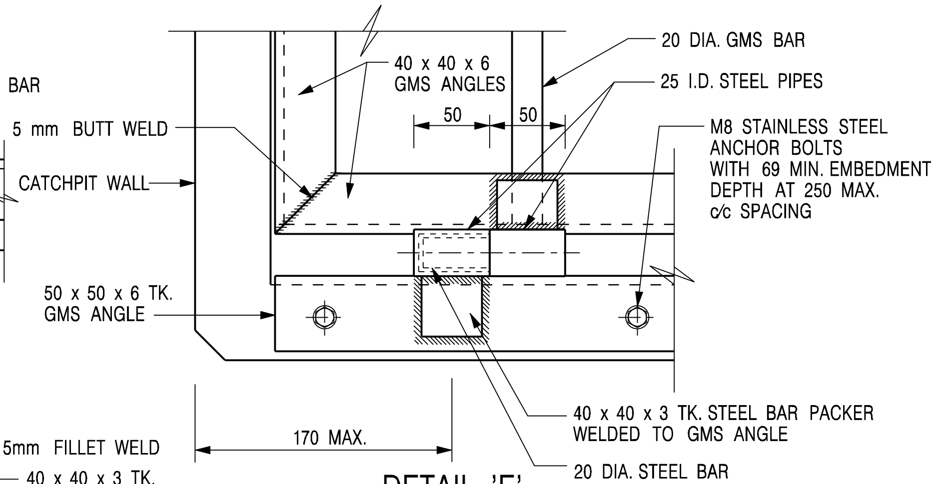
DETAIL 'B'

(DETAILS OF SINGLE SIDE OPENING STEEL GRATING FOR L⩽900mm)

SCALE 1 : 20



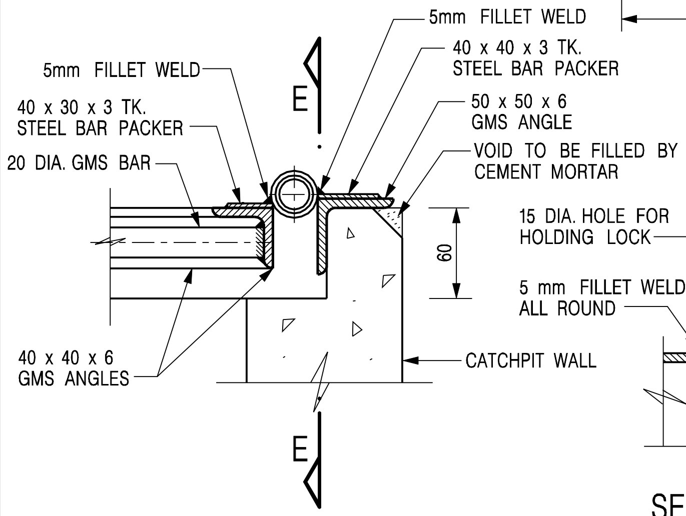
SECTION E – E



DETAIL 'E'

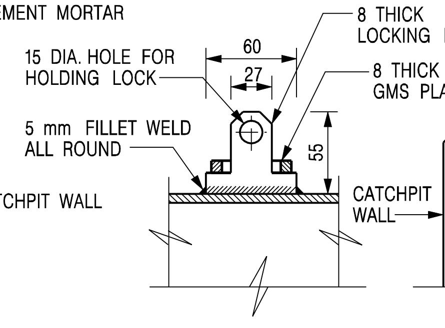
(DETAILS OF HINGE)

SCALE 1 : 5

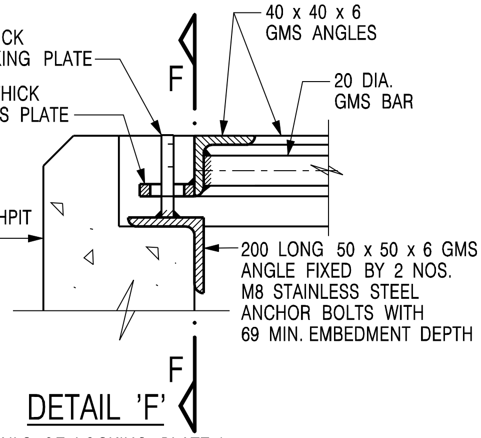


SECTIONAL ELEVATION

(DETAIL 'E')



SECTION F – F



DETAIL 'F'

(DETAILS OF LOCKING PLATE)

SCALE 1 : 5

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. REFER TO SHEET 5 FOR OTHER NOTES.

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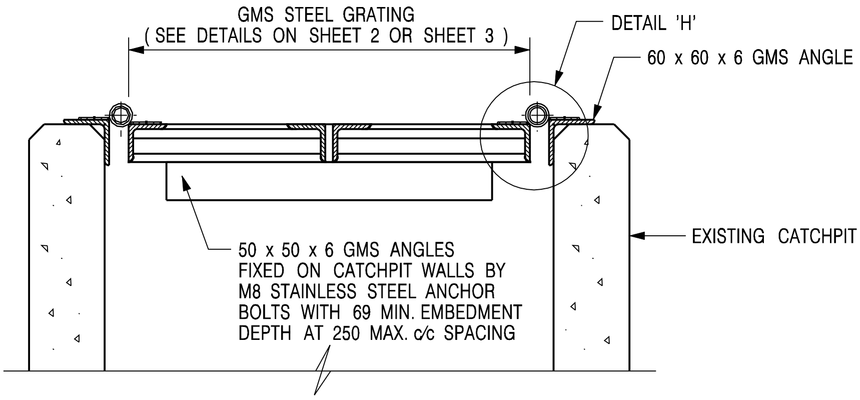
STANDARD CATCHPIT DETAILS (SHEET 3 OF 5)

CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

SCALE AS SHOWN

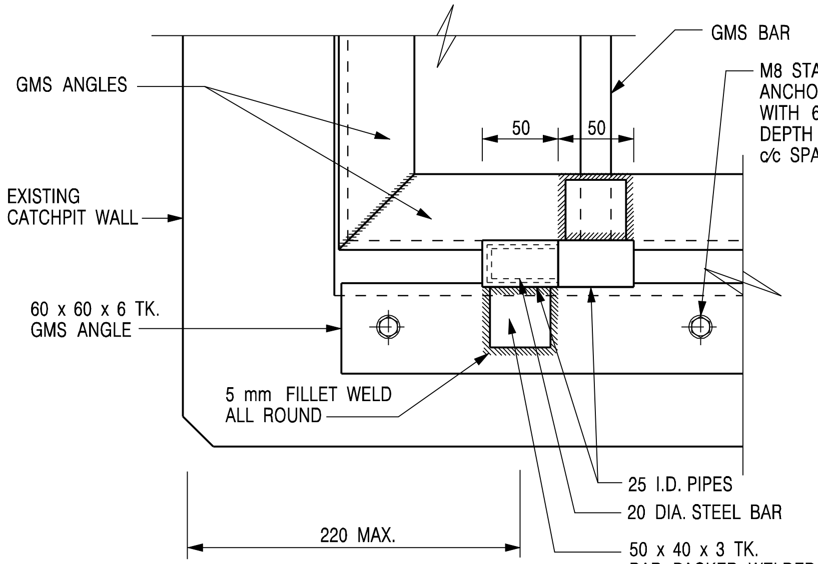
DATE JAN 1991

DRAWING NO. C2405 /3



DETAIL 'G' – DETAILS OF STEEL GRATING CONSTRUCTED ON EXISTING CATCHPIT

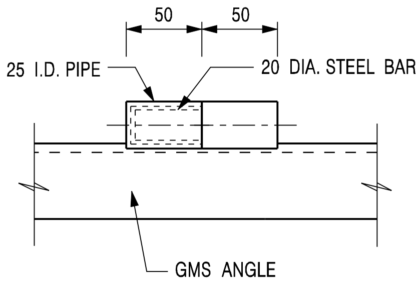
SCALE 1 : 10



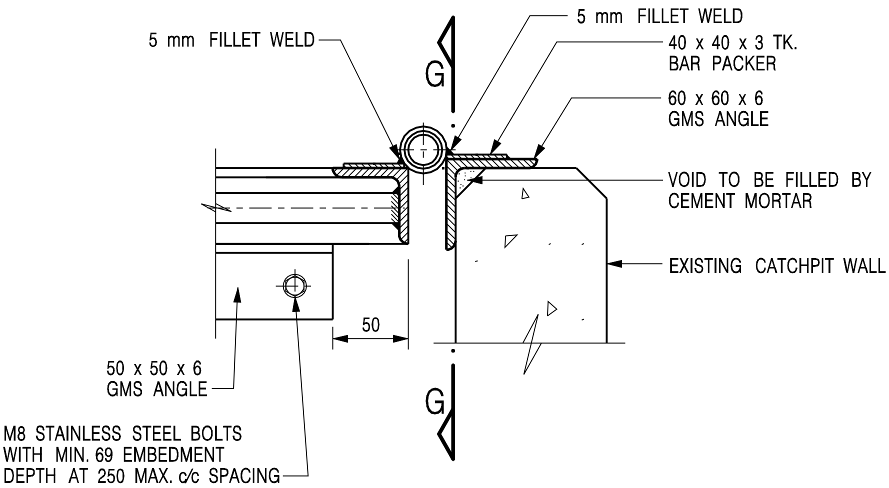
DETAIL 'H'

(DETAILS OF HINGE)

SCALE 1 : 5



SECTION G – G



SECTIONAL ELEVATION

(DETAIL 'H')

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. REFER TO SHEET 5 FOR OTHER NOTES.

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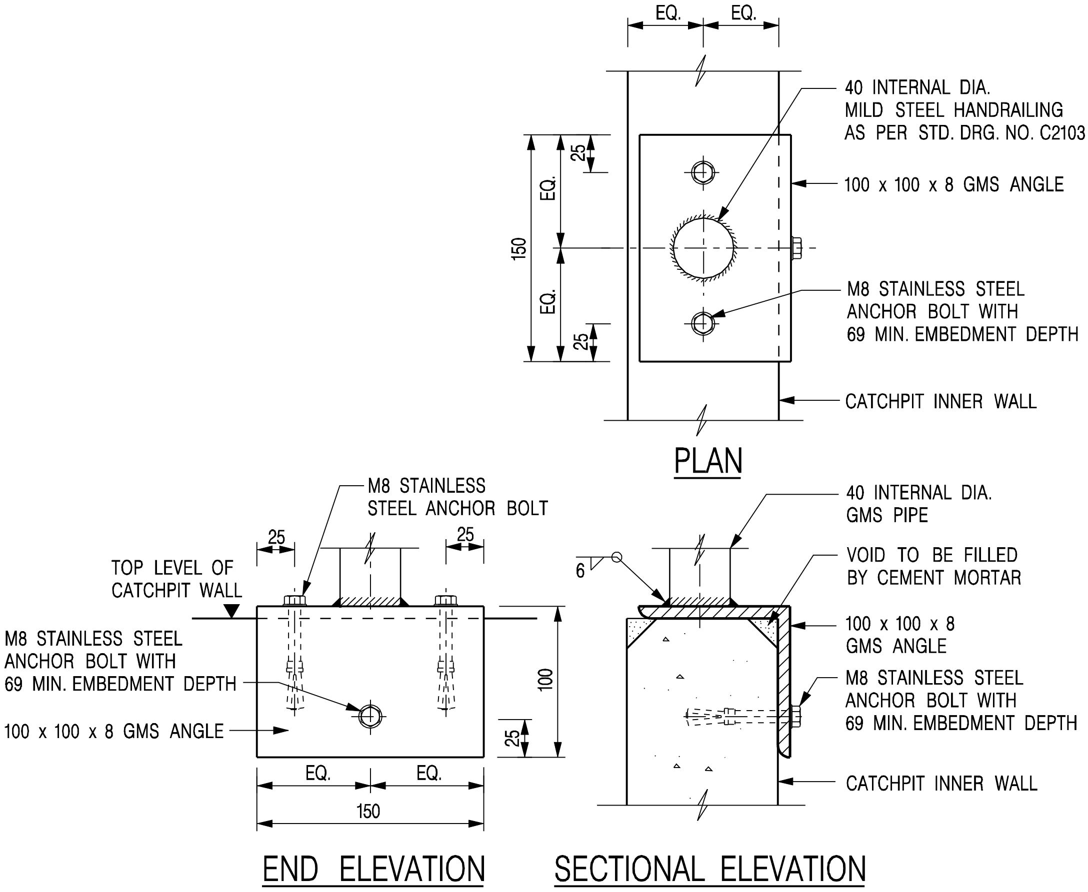
STANDARD CATCHPIT DETAILS

(SHEET 4 OF 5)

CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

SCALE AS SHOWN	**DRAWING NO.**
DATE JAN 1991	C2405 /4



DETAIL 'J' – FIXING DETAILS FOR HANDRAILING ON TOP OF CATCHPIT WALL

SCALE 1 : 5

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. ALL CONCRETE SHALL BE GRADE 20 / 20.
3. CONCRETE SURFACE FINISH SHALL BE CLASS U2 OR F2 AS APPROPRIATE.
4. FOR DETAILS OF JOINT, REFER TO STD. DRG. NO. C2413.
5. CONCRETE TO BE COLOURED AS SPECIFIED.
6. FOR CATCHPITS CONSTRUCTED ON OR ADJACENT TO A FOOTPATH, STEEL GRATINGS (SEE DETAILS ON SHEET 2 OR SHEET 3) OR CONCRETE COVERS (SEE STD. DRG. NO. C2407) SHALL BE PROVIDED AS DIRECTED BY THE ENGINEER.
7. IF INSTRUCTED BY THE ENGINEER, HANDRAILING (SEE DETAIL 'J' ON SHEET 5; EXCEPT ON THE UPSLOPE SIDE) IN LIEU OF STEEL GRATINGS OR CONCRETE COVERS CAN BE ACCEPTED AS AN ALTERNATIVE SAFETY MEASURE FOR CATCHPITS NOT ON A FOOTPATH NOR ADJACENT TO IT. TOP OF THE HANDRAILING SHALL BE 1 000 mm MIN. MEASURED FROM THE ADJACENT GROUND LEVEL.
8. MINIMUM INTERNAL CATCHPIT WIDTH SHALL BE 1 000 mm FOR CATCHPITS WITH A HEIGHT EXCEEDING 1 000 mm MEASURED FROM THE INVERT LEVEL TO THE ADJACENT GROUND LEVEL. AND, STEP IRONS (SEE DSD STD. DRG. NO. DS1043) AT 300 mm c/c STAGGERED SHALL BE PROVIDED. THICKNESS OF CATCHPIT WALL FOR INSTALLATION OF STEP IRONS SHALL BE INCREASED TO 150 mm.
9. FOR RETROFITTING AN EXISTING CATCHPIT WITH STEEL GRATING, SEE DETAIL 'G' ON SHEET 4.
10. ALL STEEL ANGLES SHALL COMPLY WITH BS EN 10025 AND BS EN 10056.
11. UNLESS OTHERWISE SPECIFIED, ALL WELDS SHALL BE 5 mm CONTINUOUS FILLET WELDS.
12. ALL WELDS SHALL BE CHIPPED, GROUND SMOOTH, BRUSHED TO REMOVE SLAG PRIOR TO HOT-DIP GALVANIZATION.
13. ALL STEELWORK SHALL BE HOT-DIP GALVANIZED TO BS EN ISO 1461. ALL EXPOSED STEELWORK SURFACES SHALL BE TREATED AND PAINTED IN ACCORDANCE WITH THE GENERAL SPECIFICATION.
14. SUBJECT TO THE APPROVAL OF THE ENGINEER, OTHER MATERIALS CAN ALSO BE USED AS COVERS / GRATINGS.

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STANDARD CATCHPIT DETAILS

(SHEET 5 OF 5)

CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

SCALE AS SHOWN	DRAWING NO.
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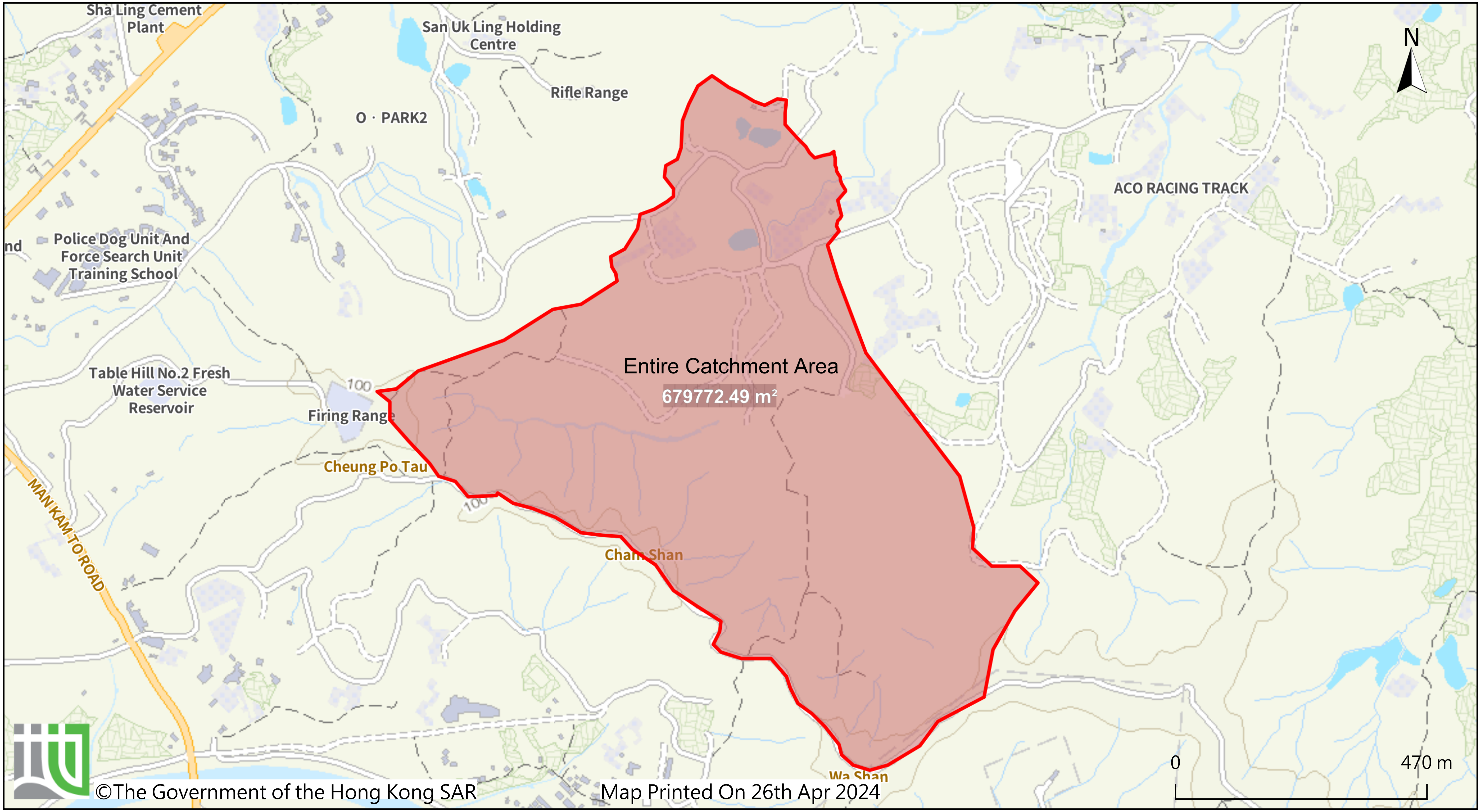
GEOINFO MAP
地理資訊地圖

Go to map: https://www.map.gov.hk/gm/geo:22.5218,114.1361?z=9028



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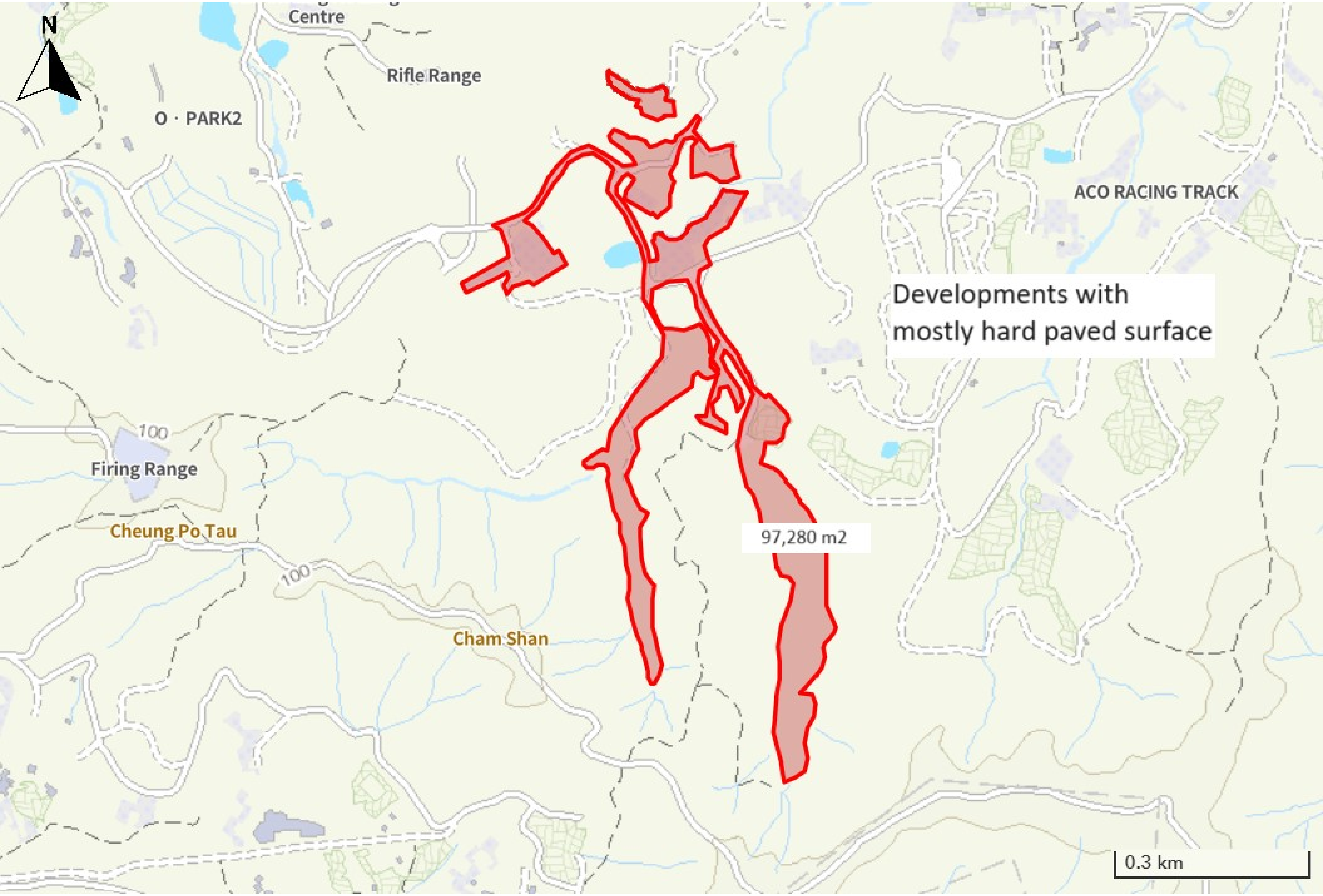

N
Centre
Rifle Range
O · PARK2
ACO RACING TRACK
Developments with mostly hard paved surface
100
Firing Range
Cheung Po Tau
100
Cham Shan
97,280 m2
0.3 km