Proposed Temporary Place of Recreation, Sports or Culture with Ancillary Facilities for a Period of 3 Years and Associated Filling of Land in "Agriculture" Zone, Various Lots in D.D. 112, Shek Kong, Yuen Long, New Territories

Drainage Appraisal

APR 2024

Table of Content

List of Table

List of Figure

List of Appendix

1. Introduction

1.1 Background

1.1.1 The applicant seeks planning permission from the Town Planning Board (the Board) to use Lots 110 S.A RP, 110 S.B, 110 S.C, 110 S.D ss.1 S.A, 110 S.D ss.1 RP, 110 S.D ss.2, 110 S.D ss.3 and 110 S.D RP in D.D. 112, Shek Kong, Yuen Long, New Territories (the Site) for 'Proposed Temporary Place of Recreation, Sports or Culture with Ancillary Facilities for a Period of 3 Years and Associated Filling of Land' (Proposed Development).

1.1.2 This Drainage Proposal is to support the planning application for the proposed use.

1.2 The Site

1.2.1 The Application Site at Shek Kong has an area of about 2,856 m^2. It situates Nam Hing West Road and Ko Sheung Road. The site is currently an unused grassland. The site location plan is shown in **Figure 1**.

1.2.2 The existing ground level of the site is approx. +26.4 mPD and it is intended to maintain similar site levels in the development. The site and the surrounding are generally flat, the ground levels are similar.

1.2.3 There is an existing public 750 mm U Channel by the side of Nam Hing West Road. Existing Drainage Plan is shown in **Figure 2** for reference.

1.2.4 There are asbuilt 300mm U Channels (gradient 1 in 100) within the development area. The asbuilt drainage in green solid line are shown in **Figure 3**.

1.2.5 Proposed Development Layout plan is shown in **Appendix B** for reference.

2. Development Proposal

2.1 The Proposed Development

2.1.1 The total site area is approximately 2,856 m^2. The indicative development schedule is summarized in **Table 1** below for technical assessment purpose.

Proposed Development	
Total Site Area (m^2)	2,856
Paved Area (m^2)*	1,052

Table 1 - Key Development Parameters

* Please refer to **Appendix B** and Catchment Plan in **Figure 4**

3. Assessment Criteria

3.1.1 The Recommended Design Return Period based on Flood Level from SDM (Table 10) is adopted for this DIA. The recommendation is summarized in **Table 2** below.

Description	Design Return Periods
Intensively Used Agricultural Land	2 – 5 Years
Village Drainage Including Internal Drainage System under a polder Scheme	10 Years
Main Rural Catchment Drainage Channels	50 Years
Urban Drainage Trunk System	200 Years
Urban Drainage Branch System	50 Years

Table 2– Design Return Periods under SDM

3.1.2 The proposed village drainage system intended to collect runoff from the internal site and discharge to existing nearby public drainage system. 1 in 10 years return period is adopted for the drainage design.

3.1.3 Stormwater drainage design will be carried out in accordance with the criteria set out in the Stormwater Drainage Manual published by DSD. The proposed design criteria to be adopted for design of this stormwater drainage system and factors which have been considered are summarised below.

1. Intensity-Duration-Frequency Relationship – The Recommended Intensity-Duration-Frequency relationship is used to estimate the intensity of rainfall. It can be expressed by the following algebraic equation.

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

The site is located within the HKO Headquarters Rainfall Zone. Therefore, for 10 years return period, the following values are adopted.

a	=	471.9
b	=	3.02
c	=	0.397

2. The peak runoff is calculated by the Rational Method
   i.e. $Q_p = 0.278CiA$

where	Q_p	=	peak runoff in m^3/s
	C	=	runoff coefficient (dimensionless)
	i	=	rainfall intensity in mm/hr
	A	=	catchment area in km^2

3. The run-off coefficient (C) of surface runoff are taken as follows:

- Paved Area: C = 0.95
- Unpaved Area: C = 0.35

4. Manning's Equation is used for calculation of velocity of flow inside the channels:

Manning's Equation: $v = \frac{R^{\frac{1}{6}}}{n} R^{\frac{1}{2}} S_f^{\frac{1}{2}}$

Where,

V = velocity of the pipe flow (m/s)
S_f = hydraulic gradient
n = manning's coefficient
R = hydraulic radius (m)

5. Colebrook-White Equation is used for calculation of velocity of flow inside the pipes:

Colebrook-White Equation: $\underline{v} = -\sqrt{32gRS}\ log\ log\ (\frac{k_s}{14.8R} + \frac{1.255v}{R\sqrt{32gRS_f}})$

where,

V	=	velocity of the pipe flow (m/s)
S_f	=	hydraulic gradient
k_f	=	roughness value (m)
v	=	kinematics viscosity of fluid
D	=	pipe diameter (m)
R	=	hydraulic radius (m)

4. Proposed Drainage System

4.1.1 Proposed drainage system and existing asbuilt channels are designed/checked for collection of runoff from the application site and external catchment nearby. It is proposed to discharge to existing channel at Nam Hing West Road. The alignment, size and gradient of the proposed drains are shown in **Figure 3**. The catchment plan is shown in **Figure 4**.

4.1.2 The design calculations of proposed drains are shown in **Appendix A**.

4.1.3 The reference standard drawings of drains are shown in **Appendix C**.

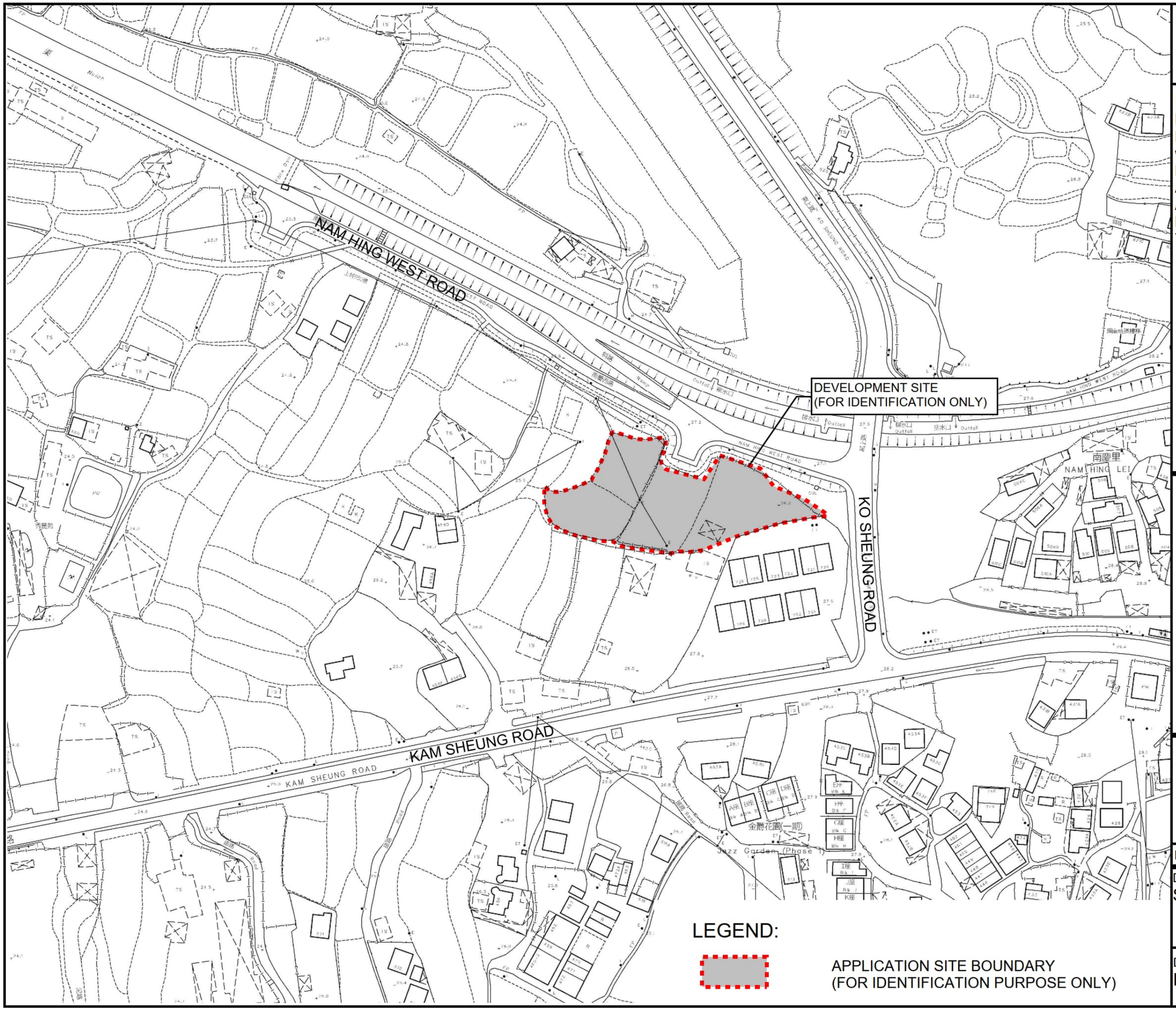
5. Conclusion

5.1.1 A drainage appraisal has been conducted for the Proposed Development. The surface runoff from the Application Site will be collected by the existing/proposed drains and discharged to the existing channel at Nam Hing West Road.

5.1.2 With the proposed drainage system, it is anticipated that there will be no significant drainage impact to the area after the implementation of the development.

- End of Text -

FIGURES

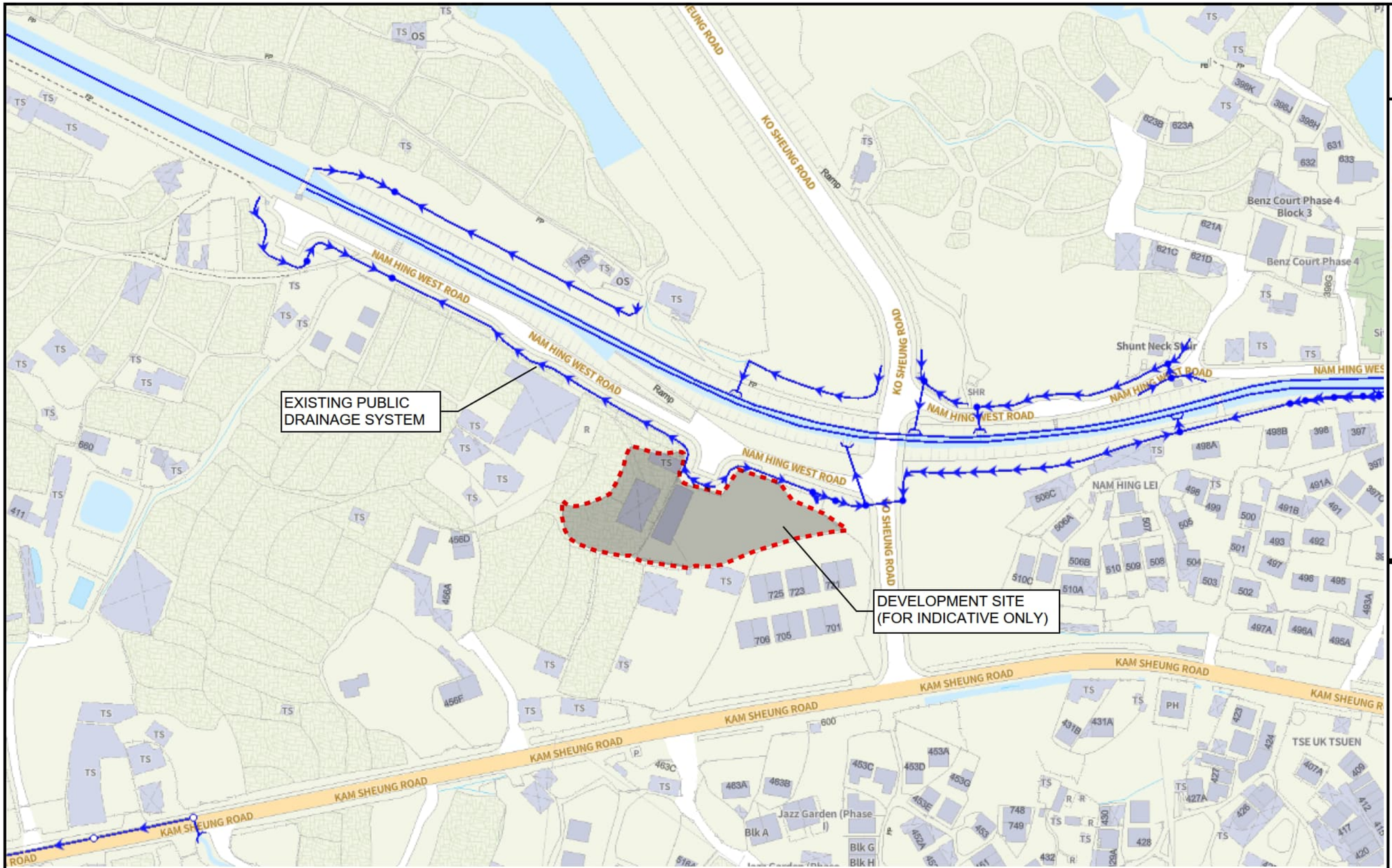


PROJECT:
Proposed Temporary Place of Recreation, Sports or Culture with Ancillary Facilities for a Period of 3 Years and Associated Filling of Land in " Agriculture" Zone, Various Lots in D.D. 112, Shek Kong, Yuen Long, New Territories

REV	DESCRIPTION	DATE

DRAWING TITLE
SITE LOCATION PLAN

DRAWING NUMBER
FIGURE 1



LEGEND:

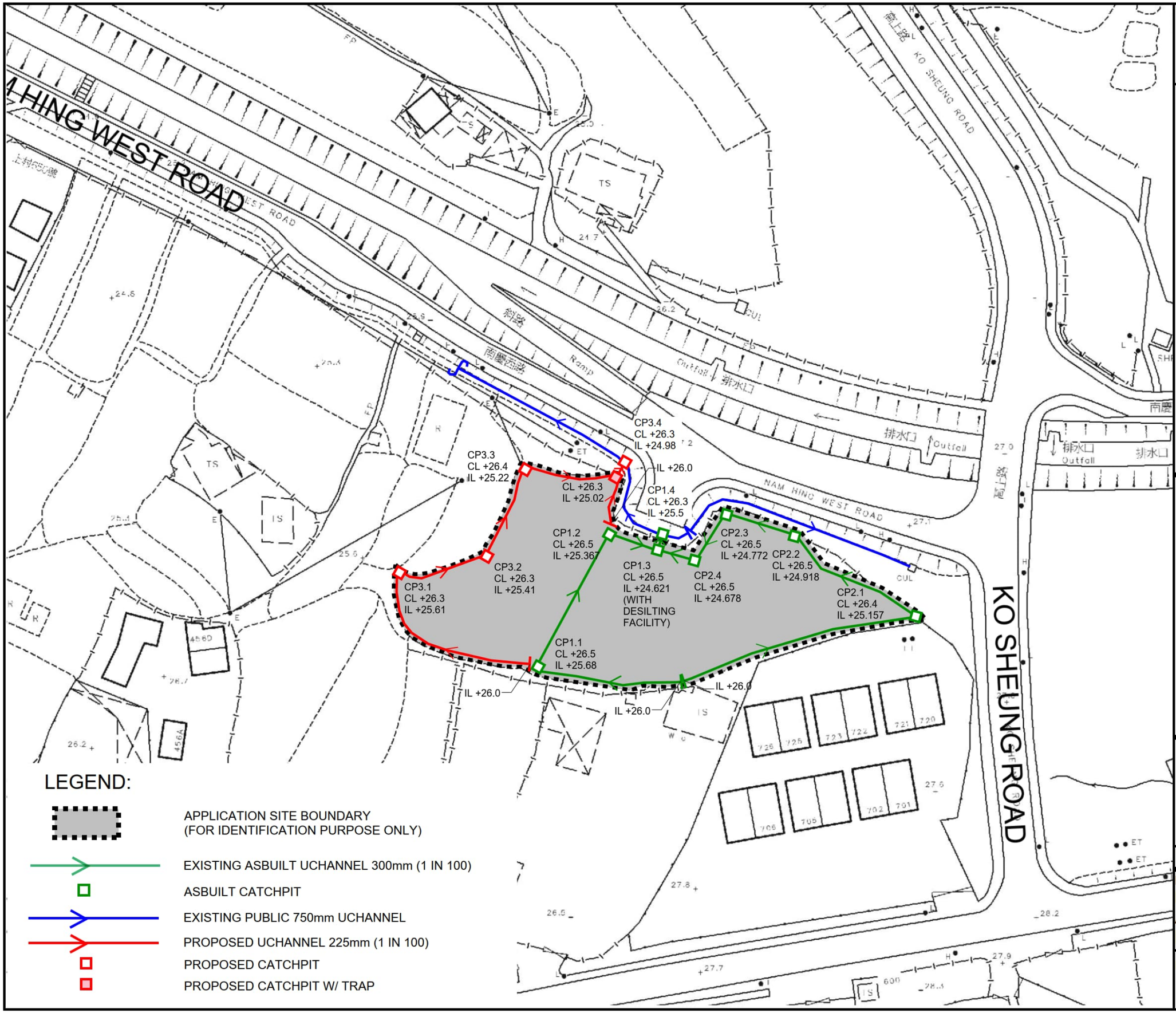
Combined Manhole	H	Tapping Point (Sewer)	H	Tapping Point (Storm)
Overflow (Combined)		Sewer Terminal Manhole		Storm Water Terminal Manhole
Pipe (Combined)		Catchpit		Tunnel Protection Zone (100m / 200m)
Interface Valve Chamber		Inlet		Tunnel Protection Zone (General Range)
Sewer Manhole		Storm Water Manhole		Tunnel / Box Culvert (Sewer)
Oil / Petrol Interceptor		Outlet		Tunnel / Box Culvert (Storm)
Overflow (Sewer)		Pipe (Storm)		
Pipe (Sewer)		Sand Trap		

PROJECT:
Proposed Temporary Place of Recreation, Sports or Culture with Ancillary Facilities for a Period of 3 Years and Associated Filling of Land in " Agriculture" Zone, Various Lots in D.D. 112, Shek Kong, Yuen Long, New Territories

REV	DESCRIPTION	DATE

DRAWING TITLE
EXISTING DRAINAGE PLAN

DRAWING NUMBER
FIGURE 2



LEGEND:

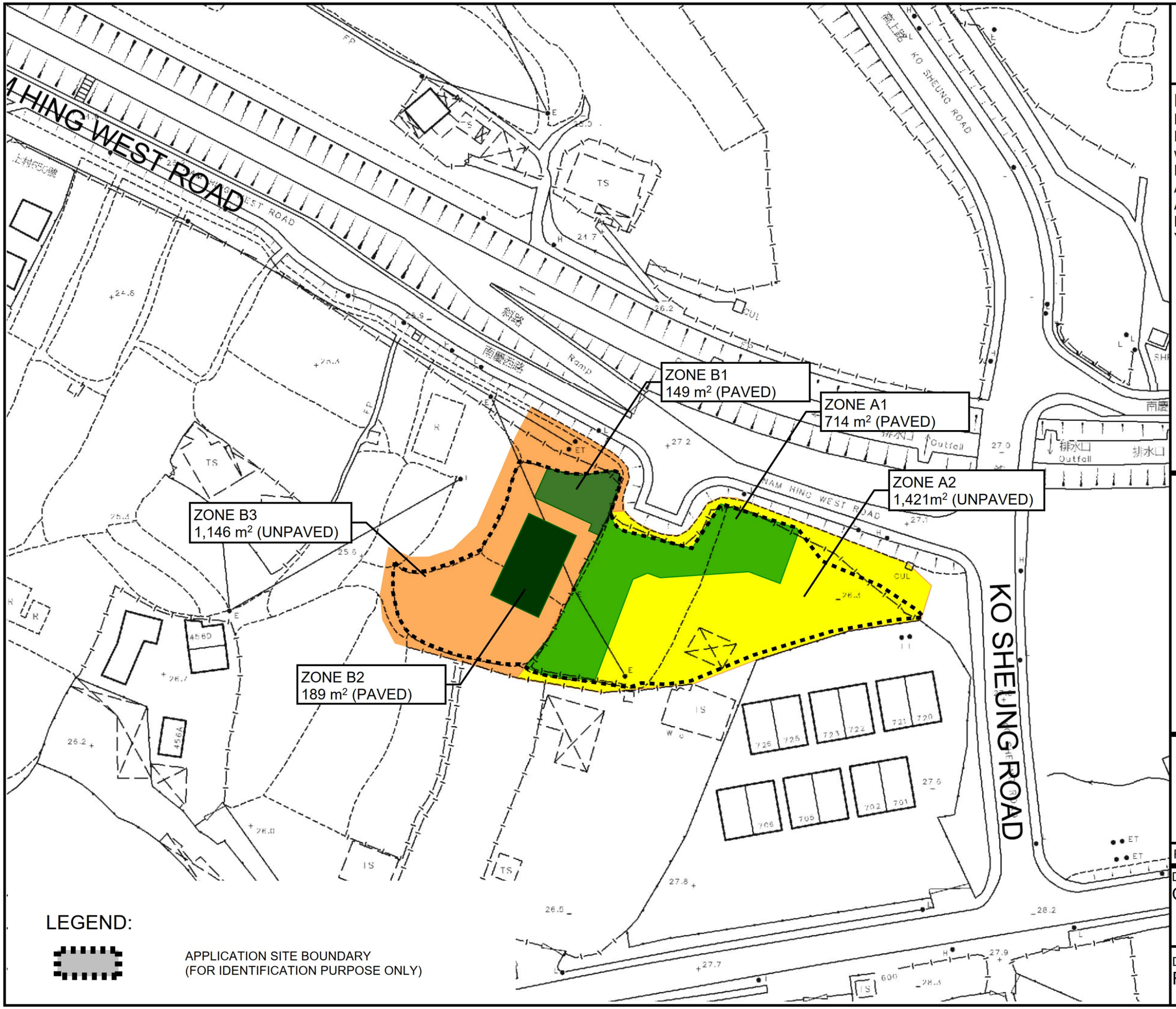
- APPLICATION SITE BOUNDARY (FOR IDENTIFICATION PURPOSE ONLY)
- EXISTING ASBUILT UCHANNEL 300mm (1 IN 100)
- ASBUILT CATCHPIT
- EXISTING PUBLIC 750mm UCHANNEL
- PROPOSED UCHANNEL 225mm (1 IN 100)
- PROPOSED CATCHPIT
- PROPOSED CATCHPIT W/ TRAP

PROJECT:
Proposed Temporary Place of Recreation, Sports or Culture with Ancillary Facilities for a Period of 3 Years and Associated Filling of Land in " Agriculture" Zone, Various Lots in D.D. 112, Shek Kong, Yuen Long, New Territories

REV	DESCRIPTION	DATE

DRAWING TITLE
PROPOSED DRAINAGE AND EXISTING ASBUILT DRAINAGE SYSTEM

DRAWING NUMBER
FIGURE 3



PROJECT:
Proposed Temporary Place of Recreation, Sports or Culture with Ancillary Facilities for a Period of 3 Years and Associated Filling of Land in " Agriculture" Zone, Various Lots in D.D. 112, Shek Kong, Yuen Long, New Territories

REV	DESCRIPTION	DATE

DRAWING TITLE
CATCHMENT PLAN

DRAWING NUMBER
FIGURE 4

Appendix

Appendix A - Design Calculation

U Channel 1 (Zone A1 + A2)

Runoff Estimation				
Design Return Period		1 in	10	years
Paved Area	714 =		714	(m2)
Unpaved Area	1421 =		1421	(m2)
Total Equivalent Area	714 x 0.95 + 1421 x 0.35 =		1176	(m2)
Rainfall Intensity, I *			206	mm/hr
Design Discharge Rate, Q	0.278 x 1176 x 206 / 1000000 =		0.067	m3/s

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

U Channel			
Channel Size		300	(mm)
Gradient	1 in	100	
Velocity		1.58	m/s
Capacity		0.127	m3/s

Utilization 0.067 / 0.127 = **53.12** % OK

U Channel 2 (Zone B1 + B2 + B3)

Runoff Estimation				
Design Return Period		1 in	10	years
Paved Area	338 =		338	(m2)
Unpaved Area	1146 =		1146	(m2)
Total Equivalent Area	338 x 0.95 + 1146 x 0.35 =		722	(m2)
Rainfall Intensity, I *			206	mm/hr
Design Discharge Rate, Q	0.278 x 1146 x 206 / 1000000 =		0.041	m3/s

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

U Channel			
Channel Size		225	(mm)
Gradient	1 in	100	
Velocity		1.31	m/s
Capacity		0.059	m3/s

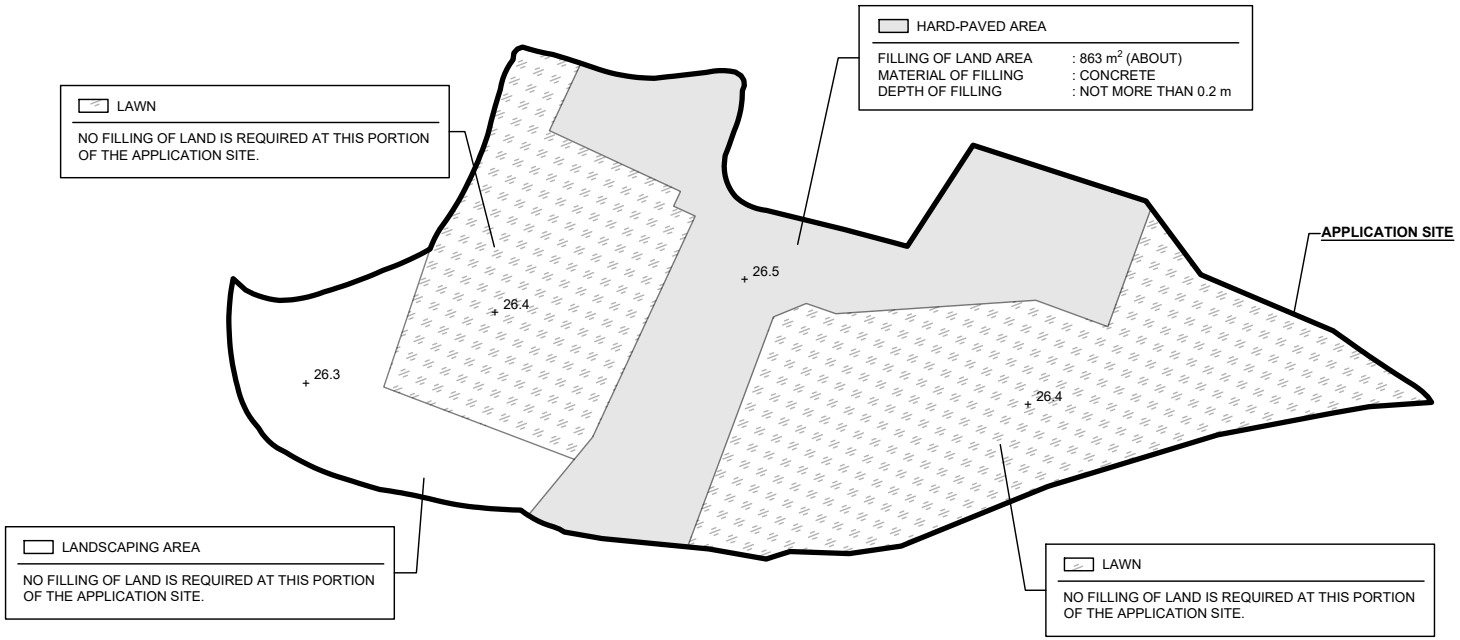
Utilization 0.041 / 0.059 = **70.27** % OK

Appendix B - Proposed Development Layout Plan

PAVED RATIO OF THE APPLICATION SITE

APPLICATION SITE AREA	: 2,856 m^2	(ABOUT)
COVERED BY STRUCTURE	: 409 m^2	(ABOUT)
EXISTING HARD-PAVED AREA	: 863 m^2	(ABOUT)
DEPTH OF LAND FILLING	: NOT MORE THAN 0.2 m	
EXISTING SITE LEVELS	: +26.5 mPD (ABOUT)	
MATERIAL OF LAND FILLING	: CONCRETE	
USE	: SITE FORMATION OF STRUCTURES, AND CIRCULATION SPACE	
EXISTING LAWN AREA	: 1,623 m^2	(ABOUT)
EXISTING LANDSCAPING AREA	: 370 m^2	(ABOUT)

**NO FURTHER FILLING OF LAND WILL BE CARRIED OUT AT THE APPLICATION SITE AFTER PLANNING APPROVAL HAS BEEN GRANTED FROM THE TOWN PLANNING BOARD.*



SITE LEVELS ARE FOR REFERENCE ONLY.

LEGEND

APPLICATION SITE

LAND FILLING AREA

+3.4 SITE LEVEL

W E S

PLANNING CONSULTANT

R-Riches Property Consultants Ltd.

PROJECT

PROPOSED TEMPORARY PLACE OF RECREATION, SPORTS OR CULTURE WITH ANCILLARY FACILITIES FOR A PERIOD OF 3 YEARS AND ASSOCIATED FILLING OF LAND

SITE LOCATION

VARIOUS LOTS IN D.D. 112, SHEK KONG, YUEN LONG, NEW TERRITORIES

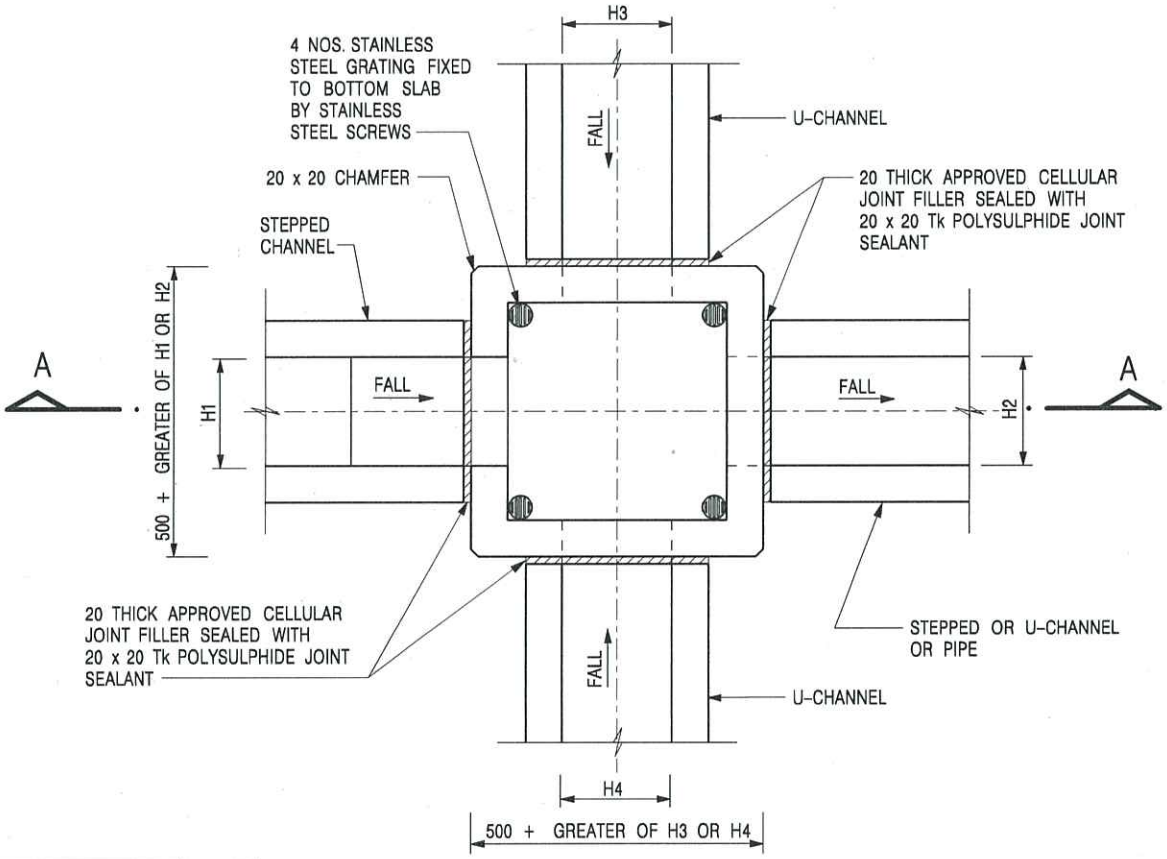
SCALE: 1 : 700 @ A4

DRAWN BY	DATE
MN	1.2.2024
REVISED BY	DATE
APPROVED BY	DATE

DWG. TITLE: FILLING OF LAND

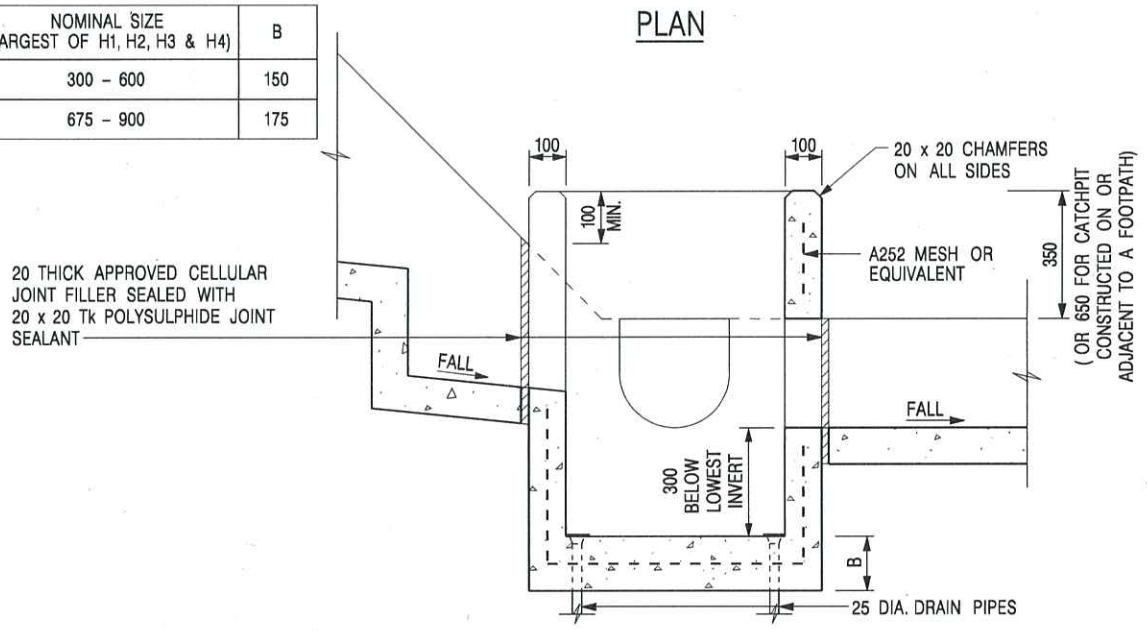
DWG NO.	VER.
PLAN 5	001

Appendix C - Reference Drawings



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)

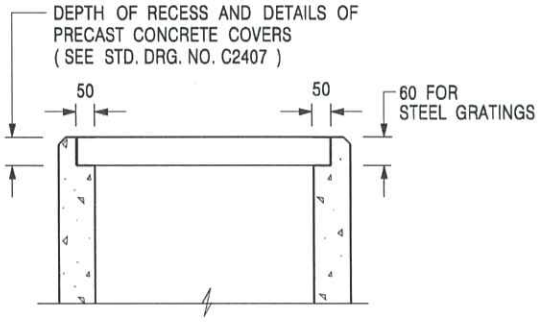
CEDD CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

SCALE 1 : 20

DATE JAN 1991

DRAWING NO. C2406 /1

卓越工程 建設香港 We Engineer Hong Kong's Development



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

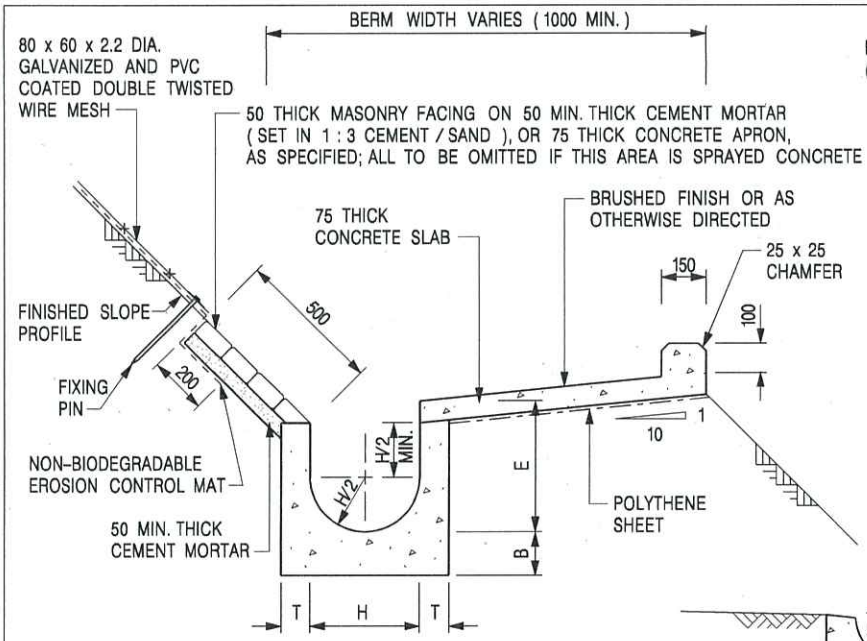
CATCHPIT WITH TRAP
(SHEET 2 OF 2)

CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

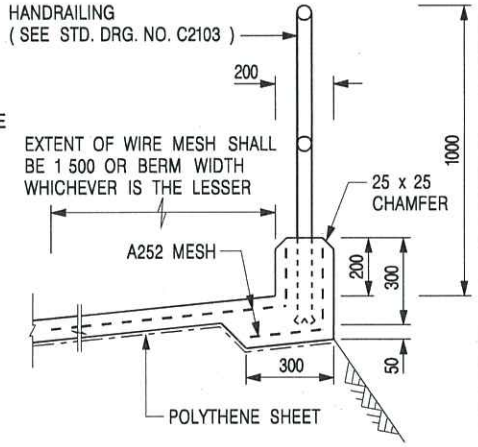
SCALE 1 : 20

DATE JAN 1991

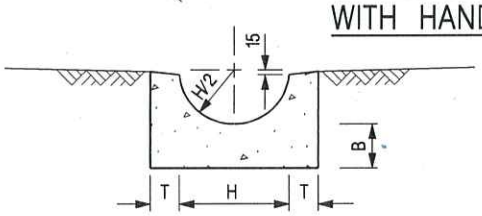
DRAWING NO. C2406 /2A



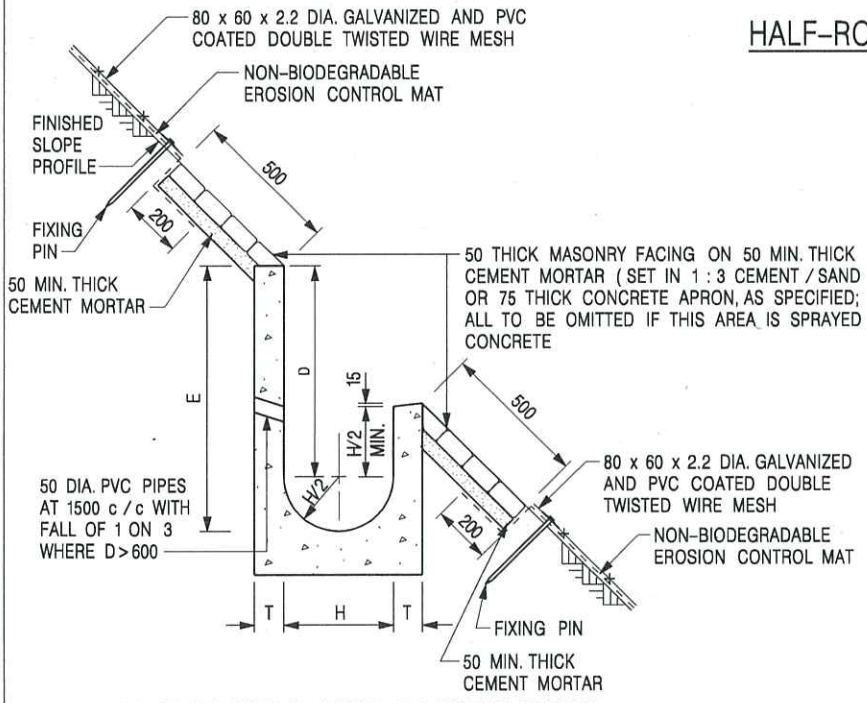
U-CHANNELS CONSTRUCTED ON BERM



DETAILS OF BERM WITH HANDRAILING



HALF-ROUND CHANNEL



U-CHANNELS NOT CONSTRUCTED ON BERM

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. ALL CONCRETE TO BE GRADE 20 / 20.
3. CONCRETE SURFACE FINISH SHALL BE CLASS U2, F2 OR BRUSHED FINISH AS DIRECTED.
4. SPACING OF EXPANSION JOINT IN CHANNELS, BERM SLABS AND APRONS TO BE 10 METRES MAXIMUM, SEE STD. DRG. NO. C2413 FOR DETAILS.
5. JOINTS FOR CHANNELS, BERM SLABS, APRONS AND WALLS, ETC. TO BE ON THE SAME ALIGNMENT.
6. FOR DIMENSIONS T, H, & B, SEE TABLE BELOW.
7. BIODEGRADABLE EROSION CONTROL MAT IF REQUIRED, SEE STD. DRG. NO. C2511/1E.
8. CONCRETE TO BE COLOURED AS SPECIFIED.
9. CONCRETE U-CHANNEL CAN BE CAST IN-SITU OR PRECAST CONCRETE SUBJECT TO THE ENGINEER'S AGREEMENT ON THE DETAILS.
10. DETAILS OF EROSION CONTROL MAT AND WESH MESH ON BERM. (SEE STD DRG. NO. C2511/1E)

NOMINAL SIZE H	T	B	REINFORCEMENT
300	80	100	A252 MESH PLACED CENTRALLY AND T=100 WHEN E>650
375 - 600	100	150	
675 - 900	125	175	A252 MESH PLACED CENTRALLY

REF.	REVISION	SIGNATURE	DATE
I	MINOR AMENDMENT.	Original Signed	07.2018
H	THICKNESS OF MASONRY FACING AMENDED.	Original Signed	01.2005
G	MINOR AMENDMENT.	Original Signed	01.2004
F	GENERAL REVISION.	Original Signed	12.2002
E	DRAWING TITLE AMENDED.	Original Signed	11.2001
D	MINOR AMENDMENT.	Original Signed	08.2001
C	150 x 100 UPSTAND ADDED AT BERM.	Original Signed	6.99
B	MINOR AMENDMENTS.	Original Signed	3.94

DETAILS OF HALF-ROUND AND U-CHANNELS (TYPE A - WITH MASONRY APRON)

CEDD **CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT**

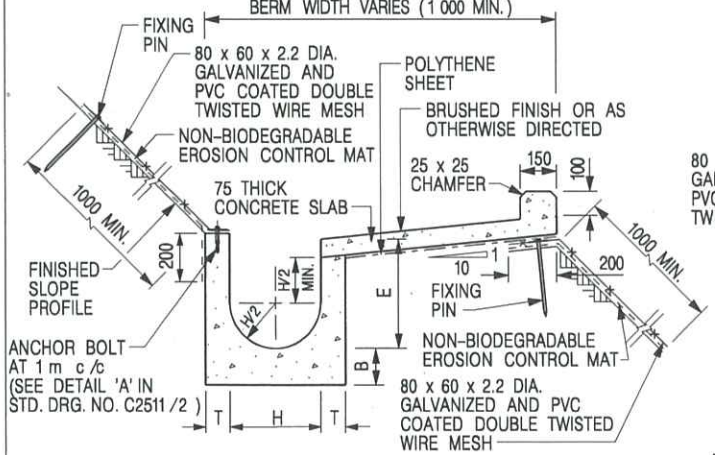
SCALE 1 : 25

DATE JAN 1991

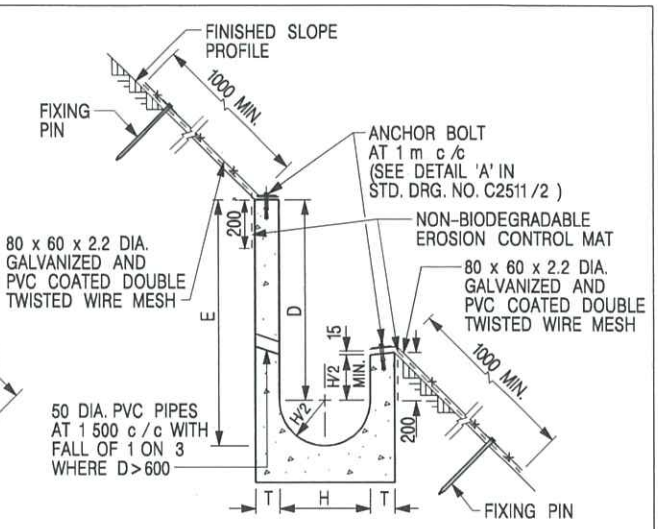
DRAWING NO. C2409I

卓越工程 建設香港

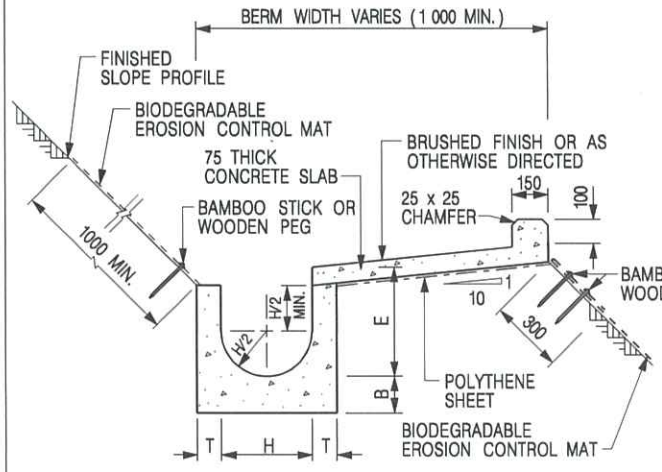
We Engineer Hong Kong's Development



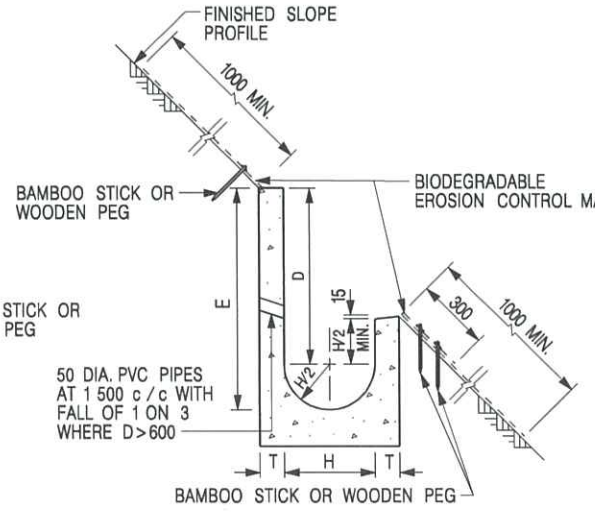
U-CHANNELS CONSTRUCTED ON BERM WITH NON-BIODEGRADABLE EROSION CONTROL MAT



U-CHANNELS NOT CONSTRUCTED ON BERM WITH NON-BIODEGRADABLE EROSION CONTROL MAT



U-CHANNELS CONSTRUCTED ON BERM WITH BIODEGRADABLE EROSION CONTROL MAT



U-CHANNELS NOT CONSTRUCTED ON BERM WITH BIODEGRADABLE EROSION CONTROL MAT

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. ALL CONCRETE TO BE GRADE 20 /20.
3. CONCRETE SURFACE FINISH SHALL BE CLASS U2, F2 OR BRUSHED FINISH AS DIRECTED.
4. SPACING OF EXPANSION JOINT IN CHANNELS, BERM SLABS AND APRONS TO BE 10 METRES MAXIMUM, SEE STD. DRG. NO. C2413 FOR DETAILS.
5. JOINTS FOR CHANNELS, BERM SLABS, APRONS AND WALLS, ETC. TO BE ON THE SAME ALIGNMENT.
6. FOR DIMENSIONS T, H, & B, SEE TABLE BELOW.
7. FOR TYPICAL FIXING PIN DETAILS, SEE STD. DRG. NO. C2511/2.
8. MINIMUM SIZE OF 25 x 50 x 300mm SHALL BE PROVIDED FOR WOODEN PEG.
9. MINIMUM SIZE OF 10mm DIAMETER WITH 200mm LONG SHALL BE PROVIDED FOR BAMBOO STICK.
10. THE FIXING DETAILS OF NON-BIODEGRADABLE AND BIODEGRADABLE EROSION CONTROL MATS ON EXISTING BERM SHALL REFER TO STD. DRG. NO. C2511/1.

NOMINAL SIZE H	T	B	REINFORCEMENT
300	80	100	A252 MESH PLACED CENTRALLY AND T=100 WHEN E>650
375 - 600	100	150	
675 - 900	125	175	A252 MESH PLACED CENTRALLY

REF.	REVISION	SIGNATURE	DATE
I	MINOR AMENDMENT.	Original Signed	07.2018
H	FIXING DETAILS OF BIODEGRADABLE EROSION CONTROL MAT ADDED.	Original Signed	12.2017
G	DIMENSION TABLE AMENDED.	Original Signed	01.2005
F	MINOR AMENDMENT.	Original Signed	01.2004
E	GENERAL REVISION.	Original Signed	12.2002
D	MINOR AMENDMENT.	Original Signed	08.2001
C	150 x 100 UPSTAND ADDED AT BERM.	Original Signed	6.99
B	MINOR AMENDMENT.	Original Signed	3.94
A	MINOR AMENDMENT.	Original Signed	10.92

DETAILS OF HALF-ROUND AND U-CHANNELS (TYPE B - WITH EROSION CONTROL MAT APRON)

CEDD **CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT**

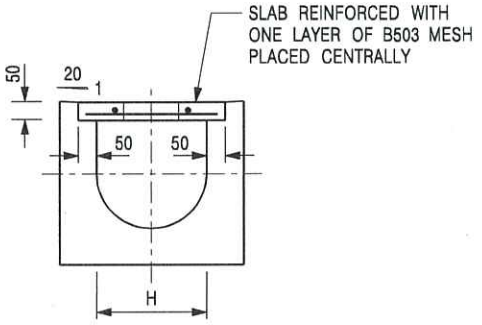
SCALE DIAGRAMMATIC

DATE JAN 1991

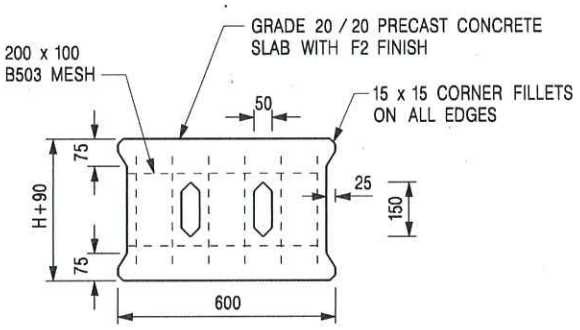
DRAWING NO. C2410I

卓越工程 建設香港

We Engineer Hong Kong's Development



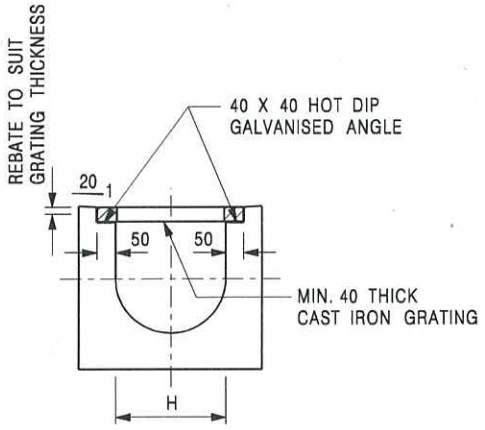
TYPICAL SECTION



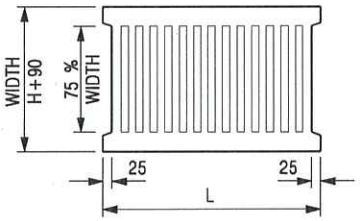
PLAN OF SLAB

U-CHANNELS WITH PRECAST CONCRETE SLABS

(UP TO H OF 525)



TYPICAL SECTION



L = 600mm FOR H ≤ 375mm
L = 400mm FOR H > 375mm

CAST IRON GRATING

(DIMENSIONS ARE FOR GUIDANCE ONLY, CONTRACTOR MAY SUBMIT EQUIVALENT TYPE)

U-CHANNEL WITH CAST IRON GRATING

(UP TO H OF 525)

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. H = NOMINAL CHANNEL SIZE.
3. ALL CAST IRON FOR GRATINGS SHALL BE GRADE EN-GJL-150 COMPLYING WITH BS EN 1561.
4. FOR COVERED CHANNELS TO BE HANDED OVER TO HIGHWAYS DEPARTMENT FOR MAINTENANCE, THE GRATING DETAILS SHALL FOLLOW THOSE AS SHOWN ON HyD STD. DRG. NO. H3156.

REF.	REVISION	SIGNATURE	DATE
E	NOTES 3 & 4 AMENDED.	Original Signed	12.2014
D	NOTE 4 ADDED.	Original Signed	06.2008
C	MINOR AMENDMENT. NOTE 3 ADDED.	Original Signed	12.2005
B	NAME OF DEPARTMENT AMENDED.	Original Signed	01.2005
A	CAST IRON GRATING AMENDED.	Original Signed	12.2002

COVER SLAB AND CAST IRON GRATING FOR CHANNELS

CEDD CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

SCALE 1 : 20

DATE JAN 1991

DRAWING NO. C2412E