

Appendix 7

DRAINAGE IMPACT ASSESSMENT

The Hong Kong Jockey Club

Proposed Place of Recreation, Sports or Culture (Public Riding School) with Ancillary Facilities at Government Land in D.D. 233, The Restored Landfill Site (TKOL II/III) in TKO Area 105, Tseung Kwan O (GLA TSK-500 (Part))

Drainage Impact Assessment

Reference: DIA_REP_003

Rev. 2 | 30 January 2026

This report takes into account the particular instructions and requirements of our client. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 304521

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1. Introduction

1.1 Project Description

This **Drainage Impact Assessment (DIA)** is prepared in support of the Section 16 (“**S16**”) Planning Application to allow for the development of a Public Riding School with ancillary facilities (e.g. utility trench) (collectively as the “**PRS**”) at Government Land in D.D. 233, The Restored Landfill Site (TKOL II/III) in TKO Area 105, New Territories (“**TKOL II/III**”) for the HKJC Public Riding Schools Limited (the “**Applicant**”). The Application Site comprises of three (3) existing platforms and land required for the provision of ancillary utility trench connecting to the three (3) platforms (collectively as the “**Application Site**”) within TKOL II/III. The PRS aligns with the Government’s policy objectives in fostering more public participation in the community through wider visibility and popularity of horse riding, supporting equestrian as an elite sport, and maintaining Hong Kong as a centre for major international sports events.

The Application Site is predominately zoned “Open Space” (“**O**”) on the Approved Tseung Kwan O Outline Zoning Plan No. S/TKO/32 (“**Approved OZP**”), whilst a strip of area at the north is zoned “Green Belt” (“**GB**”) and a minor portion abutting Chun Sing Street is zoned “Other Specified Uses” annotated “Industrial Estate” (“**OU(Industrial Estate)**”) on the Approved OZP. The PRS with ancillary facilities (‘Horse Riding School’ subsumed under ‘Place of Recreation, Sports or Culture’ use) is a Column 2 use under the “O”, “GB” and “OU(Industrial Estate)” zones that may be permitted with or without conditions on Application under S16 of the Town Planning Ordinance (“**TPO**”). There are no plot ratio (“**PR**”), building height (“**BH**”), and site coverage (“**SC**”) restrictions imposed on the “O”, “GB” and “OU(Industrial Estate)” zones of the Approved OZP. While a portion of TKOL II/III falls within the Clear Water Bay Country Park (“**CWBCP**”), the Application Site does not involve any areas falling within the Country Park Boundary.

The PRS is located on three (3) platforms, namely the Lower Platform (i.e. Reception and Hospitality Lounges) (approx.+6.0mPD), Middle Platform (i.e. Pony Paddock & Pavilion I)(approx. +40.0mPD) and Upper Platform (i.e. Horse Paddock & Pavilion II) (approx.140.0mPD), with a proposed total GFA of approx. 9,000m² and a proposed building height of 4.8m to 7.7m. An ancillary utility trench connecting to the three (3) platforms is also proposed to accommodate various essential utilities services in support of the PRS operations.

1.2 Purpose of the Report

The objective of this DIA is to identify, assess and mitigate potential drainage impacts from the proposed development of public riding school at the three platforms with ancillary facilities and land required for the provision of ancillary utility trench connecting to the three (3) platforms within at TKOL II/III. The existing access road will undergo upgrading and widening works by EPD to facilitate operation and aftercare of TKOL II/III by EPD which will enable two-way traffic operations, while meeting a minimum width of 6m necessary for Emergency Vehicular Access (“**EVA**”). The drainage impact of the road improvement works had been separately assessed, and the cumulative drainage impact had been considered in this report.

1.3 Structure of the Report

This report is structured as follow:

Section 1 Introduction

Introduction and a brief description of the project

Section 2 Drainage Impact Assessment

Assessment of the drainage impact due to the proposed development of public riding school

Section 3 Conclusion

Conclusion of the assessment results

2. Drainage Impact Assessment

2.1 Assessment Approach

This drainage impact assessment (DIA) is following the standards set out in the Stormwater Drainage Manual (Fifth Edition) issued by the Drainage Services Department in January 2018 (SDM), the Corrigendum No. 1/2022 and No. 1/2024. The objective of this assessment is to review the performance of the existing stormwater drainage system and propose mitigation measures, if any.

2.2 Runoff Estimation

Flood Protection Level

The design standard for a drainage system shall be able to accommodate a flood event with a predefined return period, which depends on the area and type of drainage system.

The design flood protection level is determined in accordance with Table 10 of the SDM, which is reproduced in the below table.

Table 2.1 – Design Flood Protection Levels

Category	Return Period
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 of the SDM 4. For definitions of Urban Drainage Branch and Urban Drainage Trunk Systems, refer to Section 6.6.2 of the SDM	

Peak Runoff

The peak runoff is estimated using the Rational Method in accordance with Section 7.5.2 of the SDM with the following equation:

$$Q = 0.278CiA$$

where, Q = peak runoff in m³/s
 C = runoff coefficient
 i = rainfall intensity in mm/hr
 A = catchment area in km²

Runoff Coefficient

The runoff coefficients, C, for different surface characteristic to be adopted in this DIA for the peak runoff estimation are made reference to Section 7.5.2 (b) of the SDM and listed in the below table.

Table 2.2 – Runoff Coefficient

Surface Characteristics	Runoff Coefficient, C ¹
Asphalt	0.70 – 0.95
Concrete	0.80 – 0.95
Brick	0.70 – 0.85
Grassland (heavy soil ²)	
Flat	0.13 – 0.25
Steep	0.25 – 0.35
Grassland (sandy soil)	
- Flat	0.05 – 0.15
- Steep	0.15 – 0.20
Notes:	
1. For steep natural slopes or areas where a shallow soil surface is underlain by an impervious rock layer, a higher C value of 0.4 – 0.9 may be applicable.	
2. Heavy soil refers to fine grain soil composed largely of silt and clay	

Runoff coefficients of 0.9 and 0.35 are adopted for paved and unpaved catchments respectively. The drainage layout plan showing the footprint of the proposed development, including the Upper Platform (Horse Paddock & Pavilion II), Middle Platform (Pony Paddock & Pavilion I), Lower Platform (Reception and Hospitality Lounges), Spelling Yard, Central Fodder Store and E&M Block, is appended to **Appendix A**. For the development at the Upper Platform, Middle Platform, Lower Platform, Central Fodder Store and E&M Block, they are assumed to be paved in this assessment. For the Spelling Yard, no change to the catchment characteristic is anticipated and remains unpaved.

Rainfall Intensity

The rainfall intensity is determined by the following equation with reference to Section 4.3.3 of the SDM:

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

where, i = rainfall intensity in mm/hr
 t_d = duration in minutes
 a, b, c = storm constants

The storm constants, i.e., a, b, and c, under Table 3a “Storm Constants for Different Return Period of HKO Headquarters” of the SDM, which are recommended for general application, are adopted in this DIA. The Application Site is a restored landfill, where strict measures are required to protect the integrity of the capping system. The capping comprises a geotextile polyethylene liner, overlain by a synthetic geo-composite drainage layer and fill above the waste. To avoid damaging these layers, an excavation depth limit of approximately 500 mm has been imposed across most of the site. This constraint presents significant technical challenges for any pipeline upgrading works. In addition, the site is located within a well-developed urban area, where the nearest public drainage facilities consist of 3-cell and 2-cell box culverts with limited space for further expansion, climate change effects up to mid-21st century (2014-2060) with 11.1% increase in rainfall intensity are therefore considered. The equation is given as,

$$i = \frac{a}{(t_d + b)^c} \times (1 + 11.1\%)$$

where, i = rainfall intensity in mm/hr
 t_d = duration in minutes
 a, b, c = storm constants

2.3 System Capacity

The capacity of the proposed and existing stormwater drainage system is checked by using the continuity equation, assuming full-bore flow condition:

$$Q = VA$$

where, Q = peak runoff in m³/s
 V = cross-sectional mean velocity in m/s
 A = cross-sectional area of the pipe/channel in m²

The cross-section mean velocity, V , of drainage pipes is estimated using the Colebrook-white equation:

$$V = -\sqrt{32gRS_f} \log \left[\frac{k_s}{14.8R} + \frac{1.255v}{R\sqrt{32gRS_f}} \right]$$

where, V = cross-sectional mean velocity in m/s
 R = hydraulic radius in m
 S_f = friction gradient
 k_s = roughness
 v = kinematic viscosity

The cross-section mean velocity, V , of box culverts is estimated using the Manning equation:

$$V = \frac{R^{\frac{1}{6}}}{n} \sqrt{RS_f}$$

where, V = cross-sectional mean velocity in m/s
 R = hydraulic radius in m
 S_f = friction gradient
 n = Manning roughness coefficient

The roughness, k_s for the proposed and existing drainage pipe is assumed to be 0.15 mm in accordance with the SDM Table 14, Precast concrete pipes with 'O' ring joints, normal.

The Manning roughness coefficient, n for the existing box culvert is assumed to be 0.014 in accordance with the SDM Table 13, Concrete-lined channels, good.

Other than typical surface channels and pipes, the Site is served by a number of baffled channels, which are 1000mm to 3300mm trapezoidal channels with baffle blocks. Relevant as-built drawings are provided in **Appendix B** for reference. The basic parameters of baffled channels within the Site are summarised in the table below,

Table 2.3 – Summary of Existing Baffled Channels Parameters

Channel Width	Baffled Block Height	Channel Depth
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Proposed Place of Recreation, Sports or Culture (Public Riding School) with Ancillary Facilities at Government Land in D.D. 233, The Restored Landfill Site (TKOL II/III) in TKO Area 105, Tseung Kwan O (GLA TSK-500 (Part))

(Based Width in mm)	(mm)	(mm)
1000	400	1000
1500	400	1000
2200	500	1000
3300	600	1200

To account for the baffled blocks, the roughness coefficient is assumed to be 0.06, Natural-stream channels, Winding some pools and shoals, clean, lower stages, more ineffective slope and sections, stony sections, bad.

For all underground pipeworks and box culverts, 10% reduction in flow area is considered to take into account the effects to flow capacity due to materials deposited on the bed. No reduction in flow area is assumed for open channels as any sediments could be removed on a regular basis under a normal maintenance regime.

2.4 Drainage Impact Assessment

Referring to the as-built drainage drawings of the Site and DSD drainage record, drainage provisions at each platform are subsoil drains only with a perimeter perforated pipe along the platform edge. Surface runoff is anticipated to be soaked away and drained to the baffled channels down the slope. Ultimately, they are to be discharged to the 3-cell 3500mm (W) x 2600mm (H) and 2-cell 3500mm (W) x 3200mm (H) box culverts along the Site's boundary, which both merge into a 5-cell to 7-cell 3500mm (W) x 3200mm (H) box culvert to the sea. New drainage system would be designed to serve each platform and the associated facilities and it is subject to further development. Existing drainage infrastructure within TKOL II/III would be utilised for stormwater discharge to the public drainage system. As the TKOL II/III site is subject to long-term settlement, the invert levels shown in the as-built drawings shall be for reference only. The levels and their condition are subject to verification on site.

The catchments within the Site could be divided into 13 sub-catchments, which surface runoff would either be discharged to the 3-cell 3500mm (W) x 2600mm (H) or the 2-cell 3500mm (W) x 3200mm (H) box culverts. They are summarised as the following,

Table 2.4 – Summary of Catchments within the Site

Catchment Name	Paved Catchment Area (m ²)	Unpaved Catchment Area (m ²)	Downstream Trunk Drainage
A	0	27,350	3-cell 3500mm(W) x 2600mm(H) Box Culverts
B	0	77,600	3-cell 3500mm(W) x 2600mm(H) Box Culverts
C	0	73,650	3-cell 3500mm(W) x 2600mm(H) Box Culverts
D1	0	70,540	2-cell 3500mm(W) x 3200mm(H) Box Culverts
D2	0	42,050	2-cell 3500mm(W) x 3200mm(H) Box Culverts
D3	0	14,990	2-cell 3500mm(W) x 3200mm(H) Box Culverts
E	0	32,670	3-cell 3500mm(W) x 2600mm(H) Box Culverts

F	0	15,340	2-cell 3500(mm) x 3200mm(H) Box Culverts
G	0	880	2-cell 3500mm(W) x 3200mm(H) Box Culverts
H	1,640	1,770	3-cell 3500mm(W) x 2600mm(H) Box Culverts
I	4,620	8,550	2-cell 3500mm(W) x 3200mm(H) Box Culverts
J	0	15,420	3-cell 3500mm(W) x 2600mm(H) Box Culverts
Existing Access Road	5,130	0	1520 m ² to 3-cell 3500mm(W) x 2600mm(H) Box Culverts 3610 m ² to 2-cell 3500 mm(W) x 3200mm(H) Box Culverts

For the existing access road, it can be further delineated into 7 sub-catchments. Surface runoff from sub-catchment R1 to R5 would be ultimately discharged to the 2-cell 3500mm(W) x 3200mm (H) box culverts, and that from sub-catchment R6 and R7 would be discharged to the 3-cell 3500mm(W) x 3200mm (H) box culverts. The road widening roads would result in an increase in paved catchment area by 8,120 m².

Table 2.5 – Summary of Access Road Sub-catchments Before and After Road Widening

Access Road Sub-catchment Name	Catchment Area before Widening (m ²)	Catchment Area after Widening (m ²)
R1	800	2,300
R2	810	1,990
R3	1,040	2,430
R4	510	1,200
R5	450	1,090
R6	1,520	3,620
R7 (from Catchment H)	470	1,090
Total	5,600	13,720

Regarding the catchments of the proposed development, each sub-catchment and their corresponding discharge point is presented below,

Table 2.6 – Summary of PRS Sub-catchments

PRS Sub-catchment Name	Catchment Area (m ²)	Proposed Discharge Point
Upper Platform 1	9,080	C18
Upper Platform 2	5,820	C17
Upper Platform 3	5,590	C16

Middle Platform (Spelling Yard)	-	-
Middle Platform	8,960	C20
Lower Platform 1	3,700	C3
Lower Platform 2	510	MH1
Lower Platform 3	3,040	MH5
Lower Platform (Central Fodder Store)	840	C4
Lower Platform (E&M Block)	440	C7

Subject to design development of the PRS and agreement with EPD, the existing catchpits within TKOL II/III may not be utilised and new drainage pipes may be constructed for connection to the existing drainage network. Such change would not alter the hydraulic checking in this report.

For the catchments of the abovementioned 2 box culverts (including the Site), they are summarised in the following table,

Table 2.6 – Summary of Catchments of the 3-cell 3500mm (W) x 2600mm (H) and 2-cell 3500mm (W) x 3200mm (H) Box Culvert Before and After Road Widening, and After PRS Development

	Before Road Widening		After Road Widening		After PRS Development	
	Paved Catchment Area (m ²)	Unpaved Catchment Area (m ²)	Paved Catchment Area (m ²)	Unpaved Catchment Area (m ²)	Paved Catchment Area (m ²)	Unpaved Catchment Area (m ²)
3-cell 3500mm(W) x 2600mm(H) Box Culverts	276,590	1,475,040	276,590	1,475,040	276,590	1,475,040
Catchment from the Site	3,160	228,460	5,880	225,740	39,870	189,280
Total	<u>279,750</u>	<u>1,703,500</u>	<u>282,470</u>	<u>1,700,780</u>	<u>316,460</u>	<u>1,664,320</u>
2-cell 3500mm(W) x 3200mm(H) Box Culverts	119,100	619,080	119,100	619,080	119,100	619,080
Catchment from the Site	8,230	137,010	13,630	131,610	17,620	130,090
Total	<u>127,330</u>	<u>756,090</u>	<u>132,730</u>	<u>750,690</u>	<u>136,720</u>	<u>749,170</u>

The corresponding catchment plans are appended to **Appendix C**. For the baffled channels within the Site and the box culverts along the Site's boundary, they are considered to be Urban Drainage Trunk System (equivalent diameter larger than 1800mm) and checked against 200-year rainfall events. Whereas for the others, they are checked against 50-year rainfall events. As the road widening works would convert various unpaved catchments at respective sub-catchments to paved by margin, no reduction in unpaved catchments within the Site is assumed in the assessment of drainage system within TKOL II/III for conservativeness.

Based on the current available information, the existing drainage system within TKOL II/III had been checked to have sufficient capacity to cater for the increased surface runoff due to the proposed development, ranging from 1.83% to 86.44% full. Regarding the 3-cell 3500mm (W) x 2600mm (W) and 2-cell 3500mm (W) x 3200mm (H) box culverts, the peak flow only increased from 66.95m³/s to 68.47m³/s by 2.27% (83.06% full) and 29.69 m³/s to 30.16 m³/s by 1.58% (69.76% full) respectively, no adverse drainage impact to the public drainage system is anticipated.

The detailed calculation for hydraulic assessment is provided in **Appendix D**.

3. Conclusion

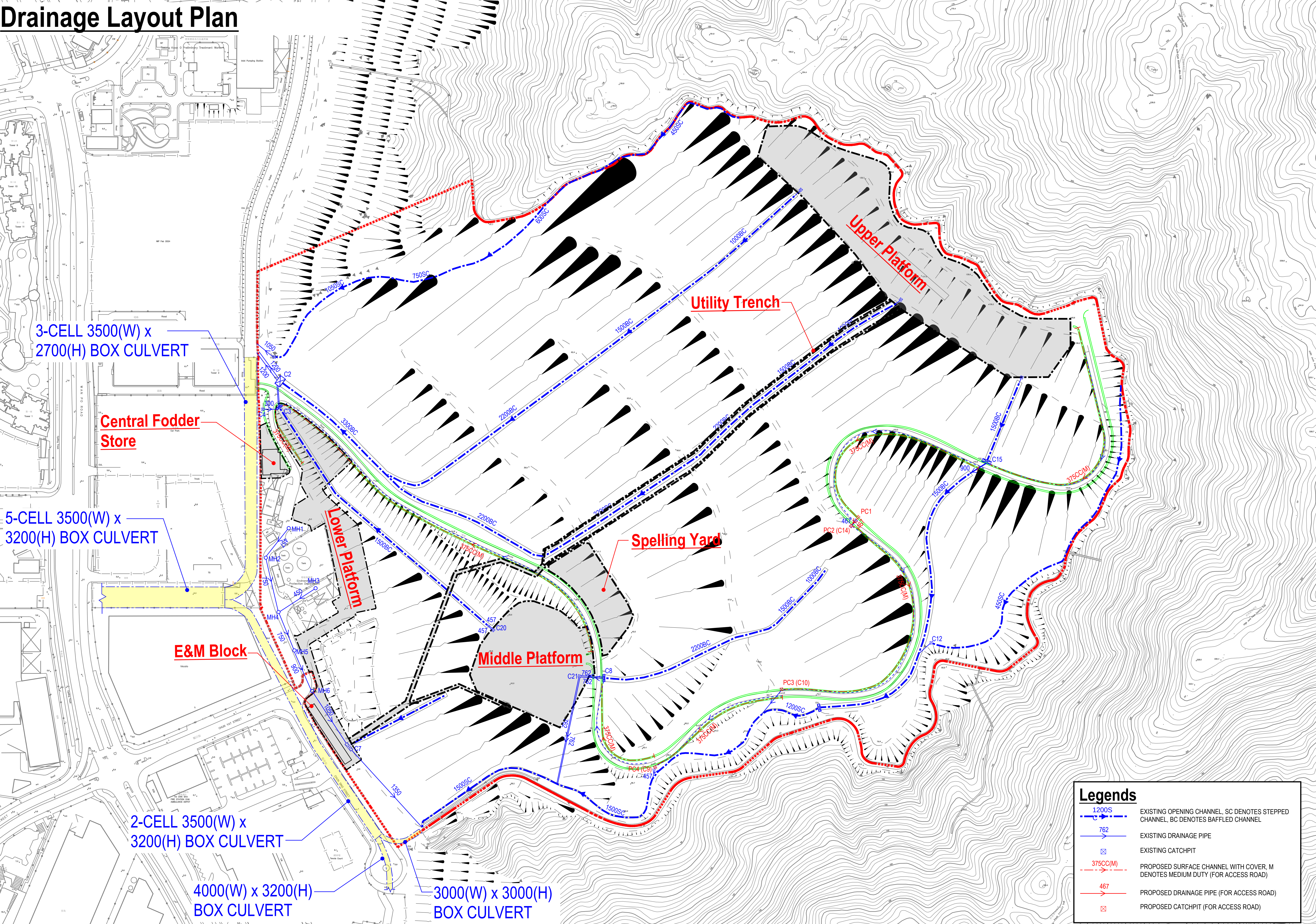
3.1 Conclusion

This report assessed the drainage impact of the proposed road widening works at the restored landfill site (TKOL II/III) in Tseung Kwan O. The drainage provisions within the Site and the public drainage system in the vicinity had been reviewed, no adverse drainage impact to the existing public drainage system is anticipated.

Appendix A

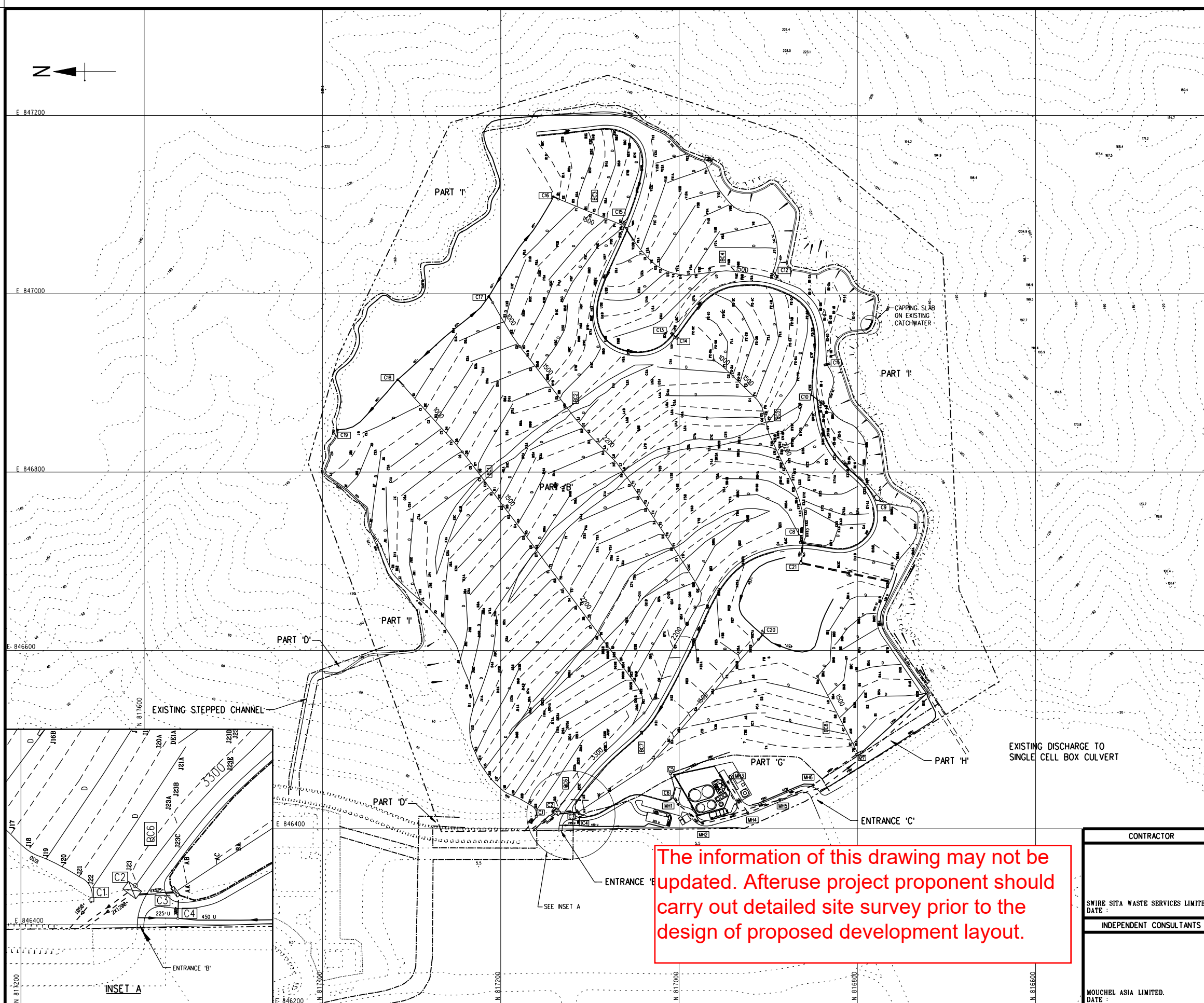
Drainage Layout Plan

Drainage Layout Plan



Appendix B

As-built Drawings of Existing Drainage System



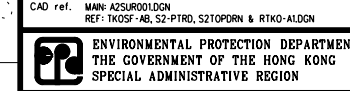
- NOTES:
1. ALL GRIDS ARE HONG KONG GRID 1980.
 2. ALL LEVEL ARE METRES ABOVE PRINCIPAL DATUM.
 3. FOR SURFACE WATER DETAILS REFER TO DRAWING NOS. GENL/SUR/DRW/001/R TO 008/R AND STG2/SUR/DRW/011/R TO 020/R.
 4. PLATFORM PERIMETER DRAINS LAID AT 1:125.
 5. FOR PRECAST CONCRETE PIPE, ALL PIPES BEDDINGS CLASS B AS PER DSD DRAWING NO. 1048.
 6. ALL PRECAST CONCRETE PIPES CLASS H TO BS 5911: PART 100 : 1988 UNLESS OTHERWISE STATED.
 7. FOR AS-CONSTRUCTED DETAILS OF CATCHPITS AND MANHOLES, REFER TO STG2/SUR/DRW/002/R.

- LEGEND :
- SITE BOUNDARY
 - EXISTING STEPPED CHANNEL
 - BAFFLED CHANNEL OF BC1 WITH BASE WIDTH 1000mm
 - 250mm DIAMETER NETLON PIPE
 - NETLON WITH DAYLIGHT
 - PERIMETER DRAIN PERFORATED HDPE PIPE OF DIA. 457mm
 - STEPPED CHANNEL OF SIZE 1050mm
 - ROADWAY DRAIN 300mm DIA. PERFORATED PIPE
 - U-CHANNEL WITH SIZE 600mm
 - HDPE PIPE OF DIAMETER 300mm
 - PRECAST CONCRETE PIPE OF DIAMETER 300mm
 - RECTANGULAR CHANNEL WITH WIDTH 1200mm
 - PIPEWORK CONNECTION TO DOWNSLOPE SURFACE CHANNEL
 - CATCHPIT
 - CATCHPIT NUMBER
 - CONNECTION BETWEEN DIFFERENT SIZES OF BAFFLED CHANNELS / U-CHANNELS
 - TAPER SECTION / APRON STRUCTURE

Details of Revision			Date
Initial	Designed	Drawn	Checked
Date			

Amendment to the Registered Design approved

CAD ref. MAIN A2SUR001.DGN
REF: TKOSF-AB, SZ-PTD, SZTOPDRN & RTKO-ALGN



Contract no. EP/SP/29/95

Contract title
TSEUNG KWAN O LANDFILLS RESTORATION

Drawing title

**STAGE II/III
SURFACE WATER DRAINAGE
LAYOUT PLAN**

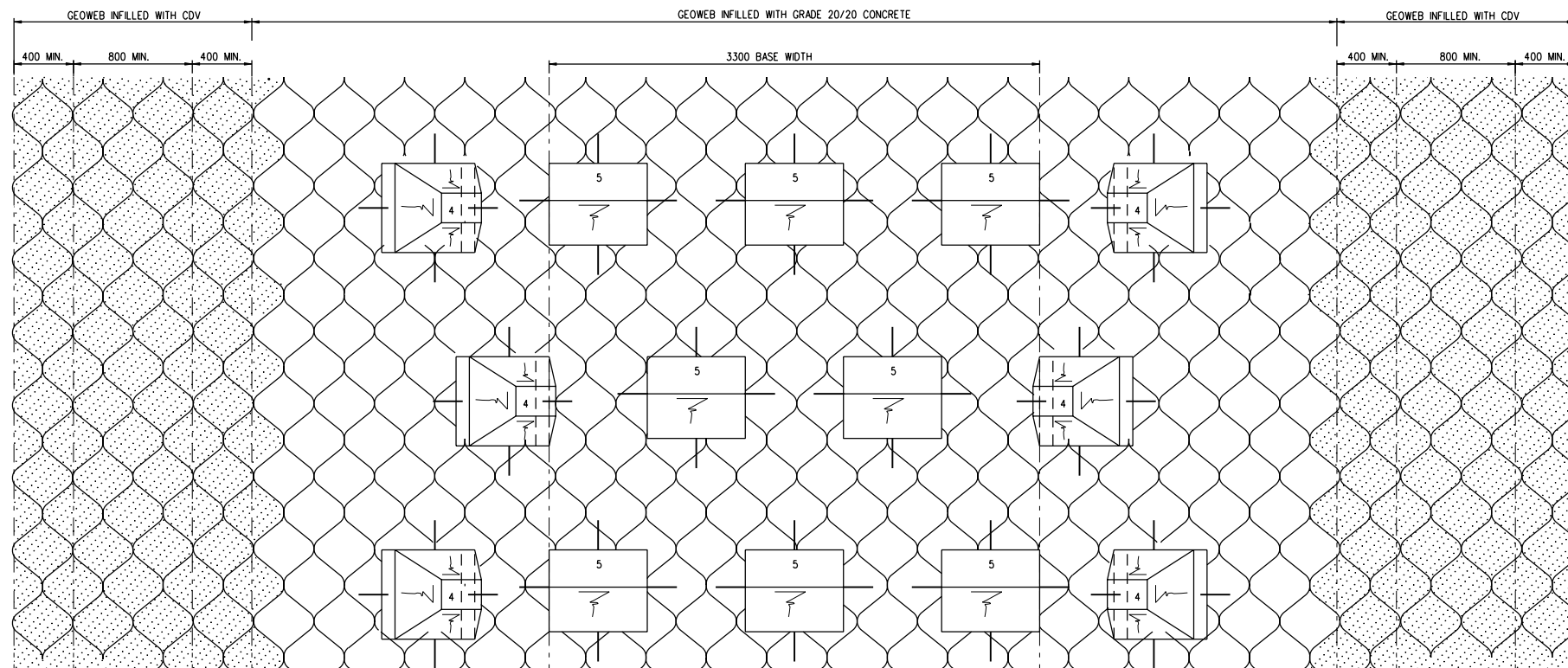
AS CONSTRUCTED RECORD DRAWING

Drawing no. STG2/SUR/DRW/001/R

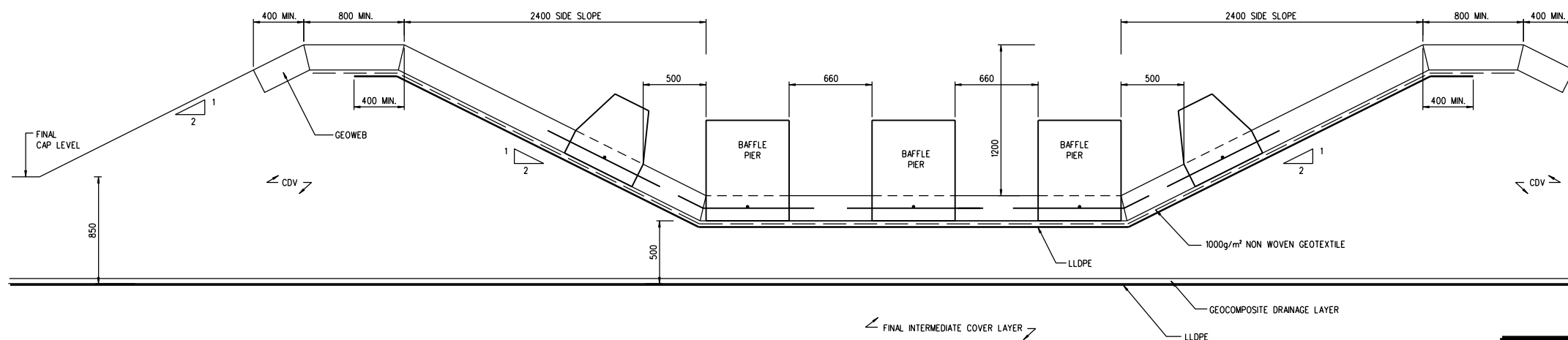
Scale 1:2000

CONTRACTOR		Binnie Black & Veatch Hong Kong Limited
SWIRE SITA WASTE SERVICES LIMITED. DATE :		Construction Contractor CHUN WO CONSTRUCTION & ENGINEERING CO., LTD.
INDEPENDENT CONSULTANTS		Environmental Consultants ERM (HK) LTD.
MOUCHEL ASIA LIMITED. DATE :		Independent Consultants MOUCHEL ASIA LIMITED CONSULTING ENGINEERS
SWIRE SITA WASTE SERVICES LTD.		

The information of this drawing may not be updated. After use project proponent should carry out detailed site survey prior to the design of proposed development layout.



BAFFLED CHANNEL
(BASE WIDTH = 3300mm)



TRANSVERSE SECTION OF BAFFLED CHANNEL

NOTES :

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH DRAWING NOS. STG2/SUR/DRW/012/R TO 017/R, 019/R & 020/R.
3. BAFFLED CHANNEL IS FORMED BY GEOWEB FILLED WITH GRADE 20/20 CONCRETE.
4. GEOWEB IS LARGE CELL A-SECTION 203 THICK.
5. BAFFLE PIERS ARE PRECAST UNITS OF CONCRETE GRADE 30/20.
6. FOR LAYOUT OF SURFACE WATER DRAINAGE REFER TO DRAWING NO. STG2/SUR/DRW/001/R.
7. FOR BAFFLE PIERS ROW SPACING, AND DETAILS OF PIERS REFER TO DRAWING NO. STG2/SUR/DRW/012/R.
8. FOR DOWEL BAR DETAILS REFER TO DRAWING NO. GENL/SUR/DRW/003/R.

LEGEND :



INFILLED WITH CDV



INFILLED WITH CONCRETE

Details of Revision		Date
Designed	Drawn	Checked
Initial		
Date		

Amendment to the Registered Design approved

CAD ref. MAIN : A2SUR011.DGN
REF : RTKO-A1DGN

ENVIRONMENTAL PROTECTION DEPARTMENT
THE GOVERNMENT OF THE HONG KONG
SPECIAL ADMINISTRATIVE REGION

Contract no. **EP/SP/29/95**

Contract title **TSEUNG KWAN O LANDFILLS RESTORATION**

Drawing title

**STAGE II/III
SURFACE WATER
DRAINAGE DETAILS
SHEET 1 OF 10**

AS CONSTRUCTED RECORD DRAWING

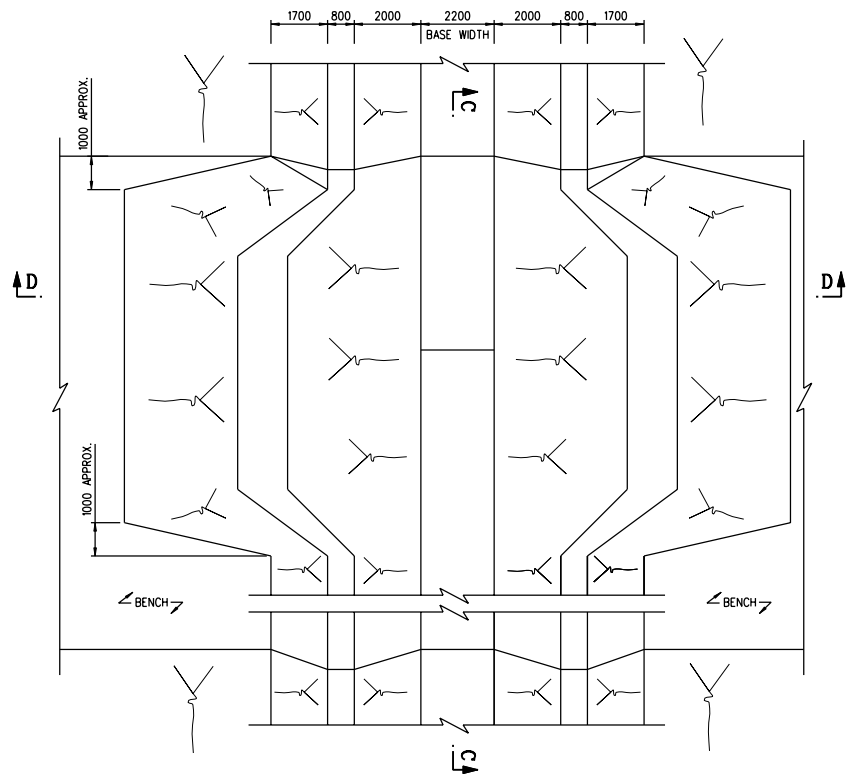
Drawing no. **STG2/SUR/DRW/011/R** Scale **1 : 20**

CONTRACTOR	
Binnie Black & Veatch Hong Kong Limited	
Construction Contractor	
CHUN WO CONSTRUCTION & ENGINEERING CO., LTD.	
Environmental Consultants	
ERM (HK) LTD.	
Independent Consultants	
MOUCHEL ASIA LIMITED CONSULTING ENGINEERS	
SWIRE SITA WASTE SERVICES LTD.	

SWIRE SITA WASTE SERVICES LIMITED.
DATE :

INDEPENDENT CONSULTANTS

MOUCHEL ASIA LIMITED.
DATE :



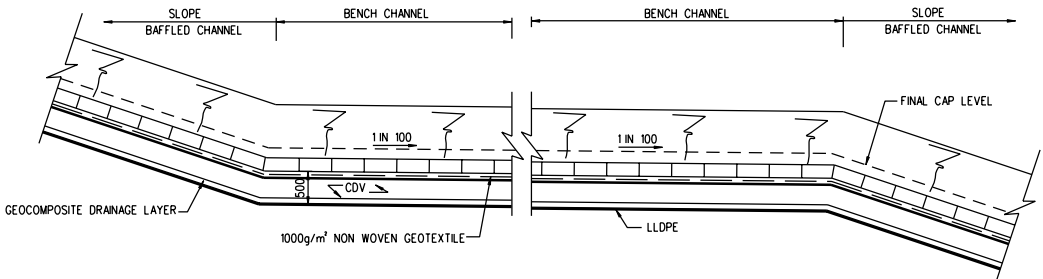
DETAILS OF BAFFLED CHANNEL CROSSING BENCH
1:100

DETAILS OF BAFFLE PIERS AND SPACING FOR 3300 mm BAFFLE CHANNEL
REFER TO DRAWING NO. STG2/SUR/DRW/011/R.

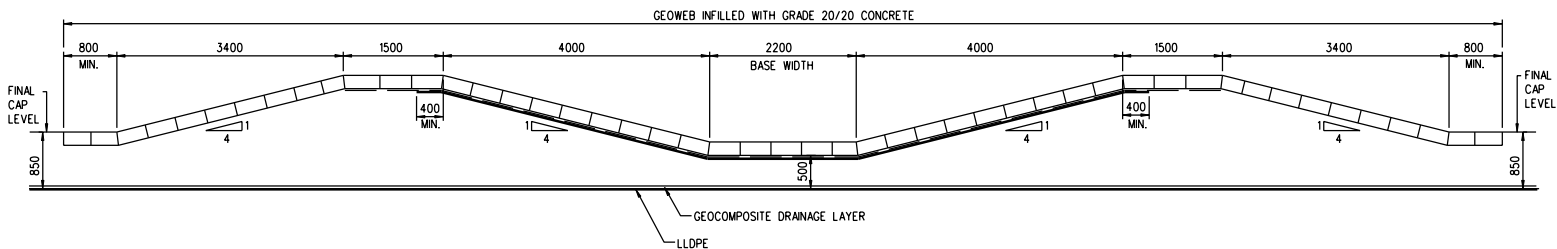
BAFFLE PIER TYPE	PLAN	SECTION A - A	SECTION B - B
4			
5			

NOTE: DOWEL BAR NOT SHOWN

CHANNEL GRADIENT	L (mm) (REFER TO DRAWING NO. GENL/SUR/DRW/002 FOR L)
1:3	1700
1:4	2220
1:5	2740
> 1:6	3270



SECTION C - C
1:50



SECTION D - D
1:50

- NOTES:
- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
 - THIS DRAWING IS TO BE READ IN CONJUNCTION WITH DRAWING NOS. STG2/SUR/DRW/011/R, 013/R TO 017/R, 019/R & 020/R.
 - FOR LOCATIONS OF BENCH REFER TO DRAWING NO. STG2/SUR/DRW/001/R.

Details of Revision		Date
Designed	Drawn	Checked
Initial		
Date		

Amendment to the Registered Design approved

CAD ref. MAN: A2SUR012.DGN
REF: RTKO-ALDGN

ENVIRONMENTAL PROTECTION DEPARTMENT
THE GOVERNMENT OF THE HONG KONG
SPECIAL ADMINISTRATIVE REGION

Contract no. EP/SP/29/95

Contract title
TSEUNG KWAN O LANDFILLS RESTORATION

Drawing title
STAGE II/III
SURFACE WATER
DRAINAGE DETAILS
SHEET 2 OF 10

AS CONSTRUCTED RECORD DRAWING

Drawing no. STG2/SUR/DRW/012/R
Scale AS SHOWN

CONTRACTOR	
 Binnie Black & Veatch Hong Kong Limited	
Construction Contractor CHUN WO CONSTRUCTION & ENGINEERING CO., LTD.	
Environmental Consultants BRM (HK) LTD.	
Independent Consultants MOUCHEL ASIA LIMITED CONSULTING ENGINEERS	
 SWIRE SITA WASTE SERVICES LTD.	

- NOTES :
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
 2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH DRAWING NOS. STG2/SUR/DRW/011/R TO 012/R, 014/R TO 017/R, 19/R & 20/R.
 3. DETAILS OF BAFFLED CHANNEL REFER TO DRAWING NO. GENL/SUR/DRW/001/R.
 4. NOT USED.

Details of Revision			Date
	Designed	Drawn	Checked
Initial			
Date			

Amendment to the Registered Design approved

CAD ref. MAN : ZSUR013.DGN
REF : TKD-AIDGN



Contract no. EP/SP/29/95

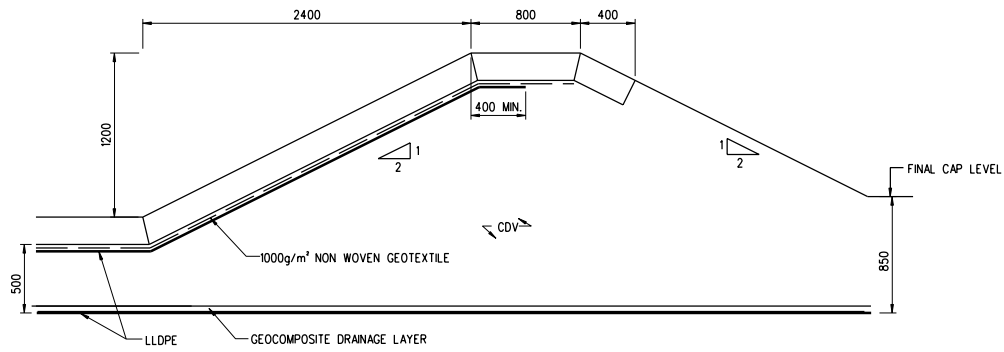
Contract title
TSEUNG KWAN O LANDFILLS RESTORATION

Drawing title
**STAGE II/III
SURFACE WATER
DRAINAGE DETAILS
SHEET 3 OF 10**

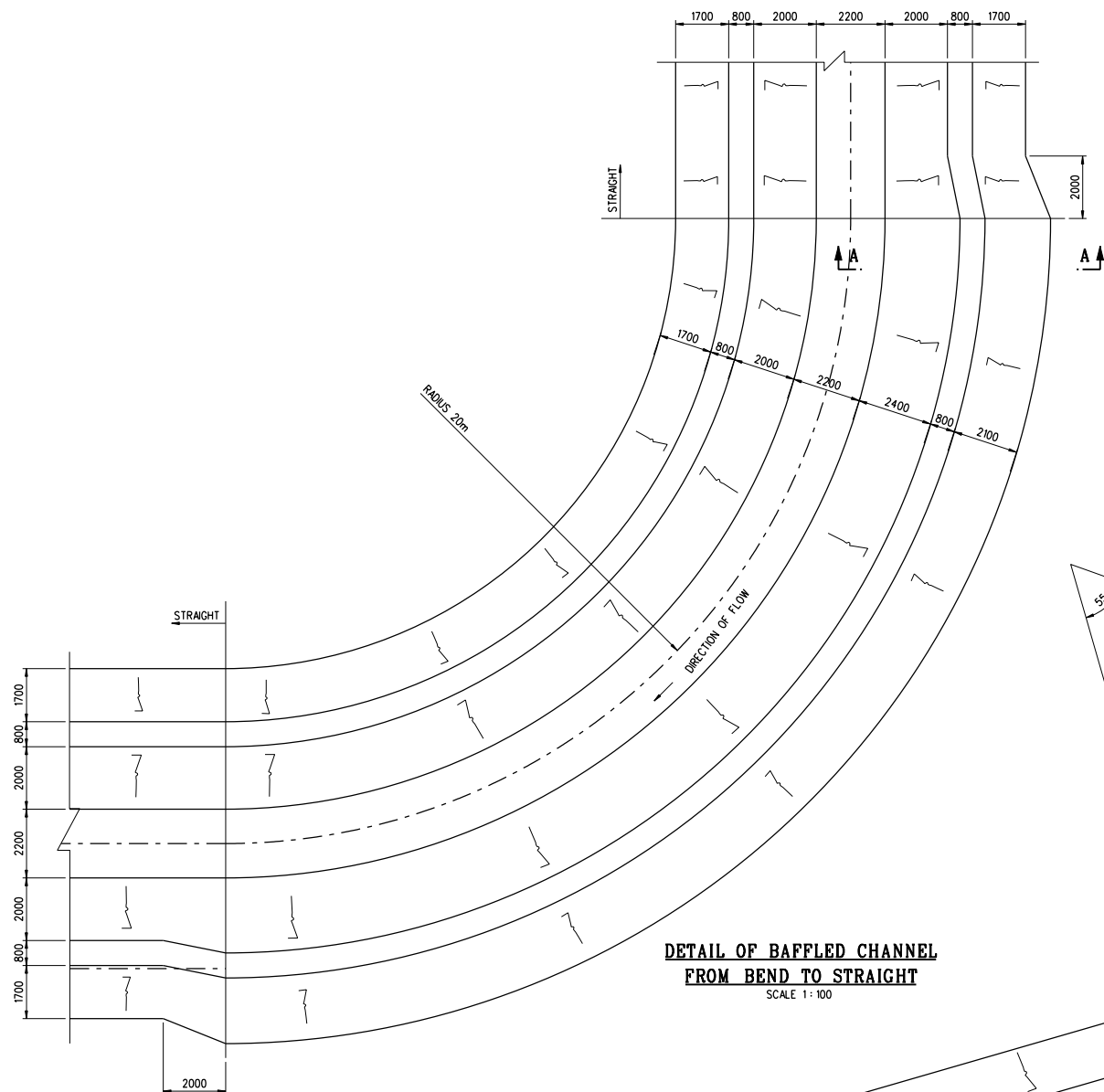
AS CONSTRUCTED RECORD DRAWING

Drawing no.	Scale
STG2/SUR/DRW/013/R	AS SHOWN

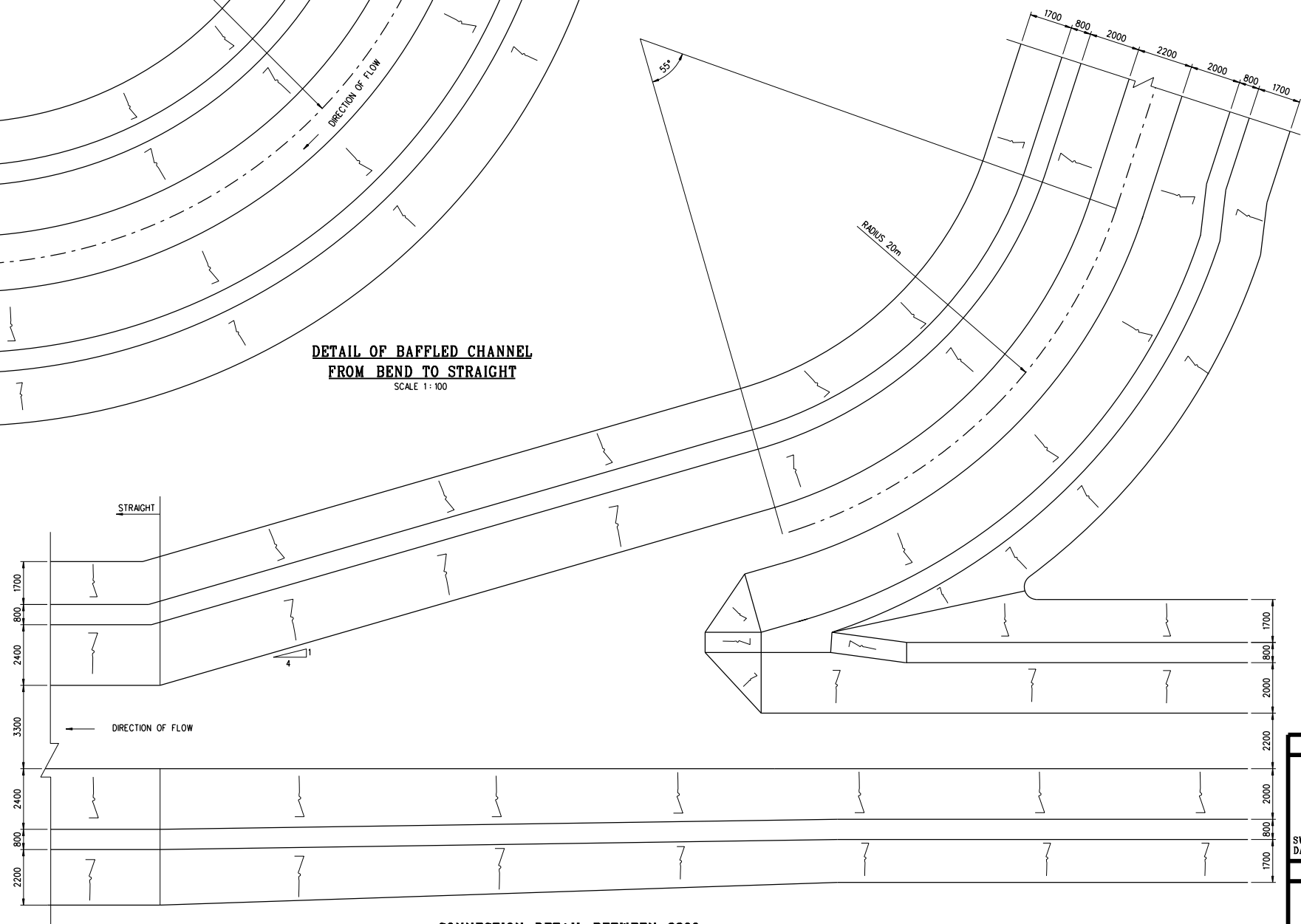
CONTRACTOR	
Binnie Black & Veatch Hong Kong Limited	
Construction Contractor CHUN WO CONSTRUCTION & ENGINEERING CO., LTD.	
Environmental Consultants ERM (HK) LTD.	
Independent Consultants MOUCHEL ASIA LIMITED CONSULTING ENGINEERS	
SWIRE SITA WASTE SERVICES LTD.	



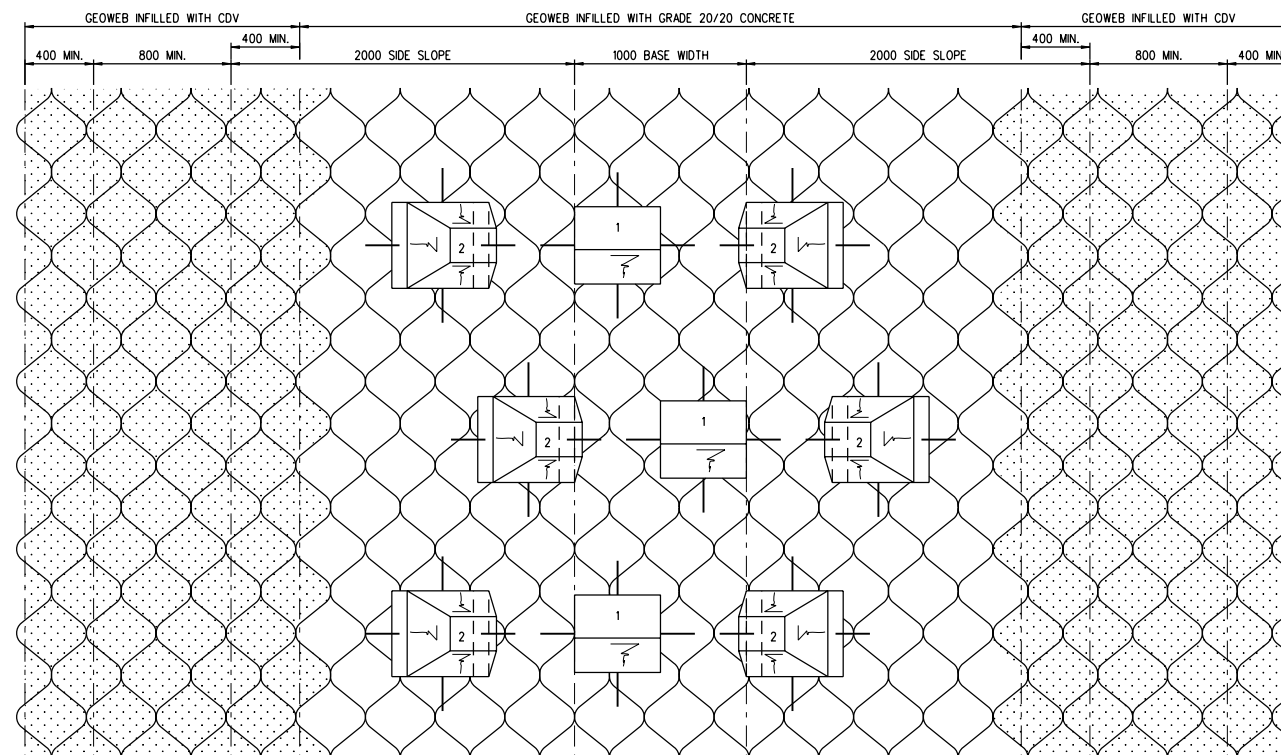
SECTION A - A
SCALE 1:25



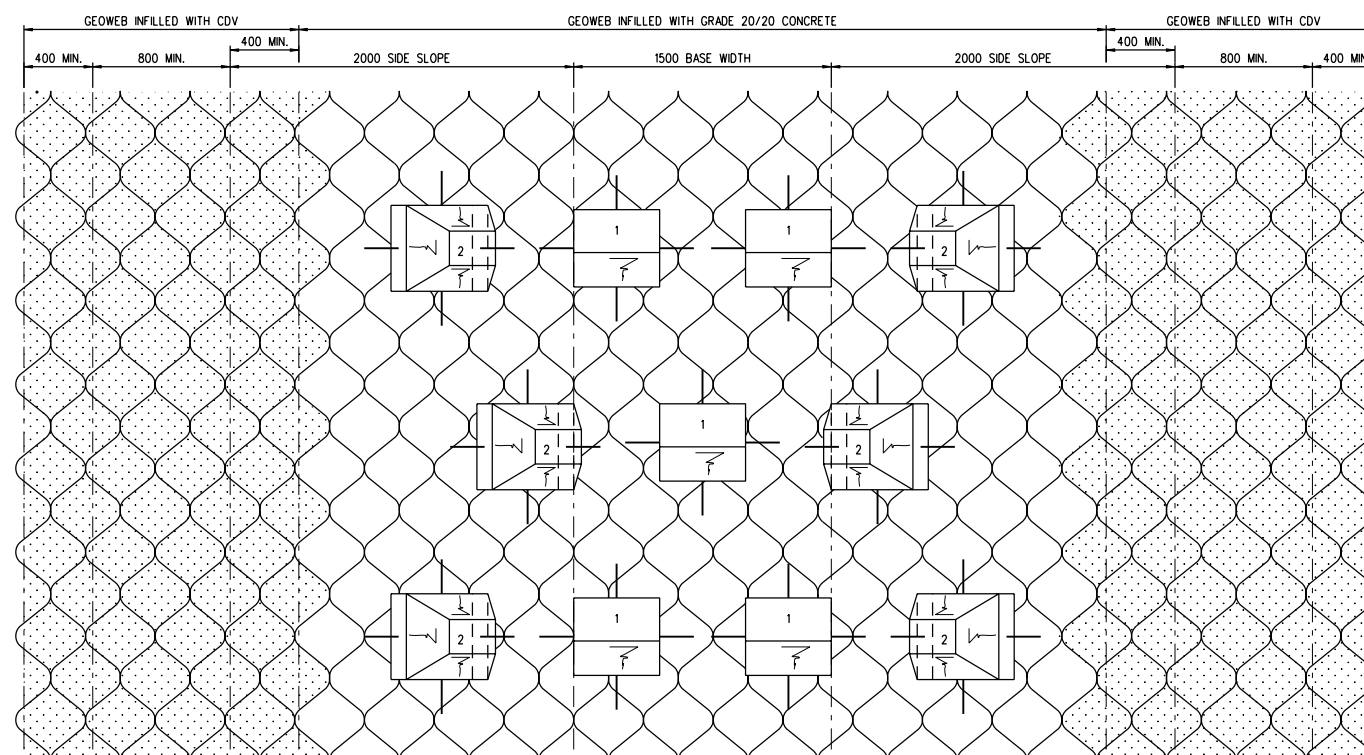
**DETAIL OF BAFFLED CHANNEL
FROM BEND TO STRAIGHT**
SCALE 1:100



**CONNECTION DETAIL BETWEEN 2200mm
BAFFLED CHANNEL AND 3300mm BAFFLED CHANNEL**
SCALE 1:100



TYPE 1 BAFFLED CHANNEL
(BASE WIDTH = 1000mm)

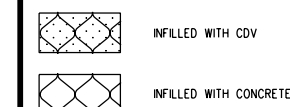


TYPE 2 BAFFLED CHANNEL
(BASE WIDTH = 1500mm)

NOTE :

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH DRAWING NOS. GENL/SUR/DRW/002/R TO 009/R.
3. BAFFLED CHANNEL IS FORMED BY GEOWEB INFILL WITH GRADE 20/20 CONCRETE.
4. GEOWEB IS LARGE CELL A-SECTION 203 THICK.
5. BAFFLE PIERS ARE PRECAST UNIT OF CONCRETE GRADE 30/20.
6. FOR LAYOUT OF SURFACE WATER DRAINAGE REFER TO DRAWING NO. STG1/SUR/DRW/001 & STG2/SUR/DRW/001.
7. TYPICAL SECTION OF CHANNEL REFER TO DRAWING NO. GENL/SUR/DRW/003/R.

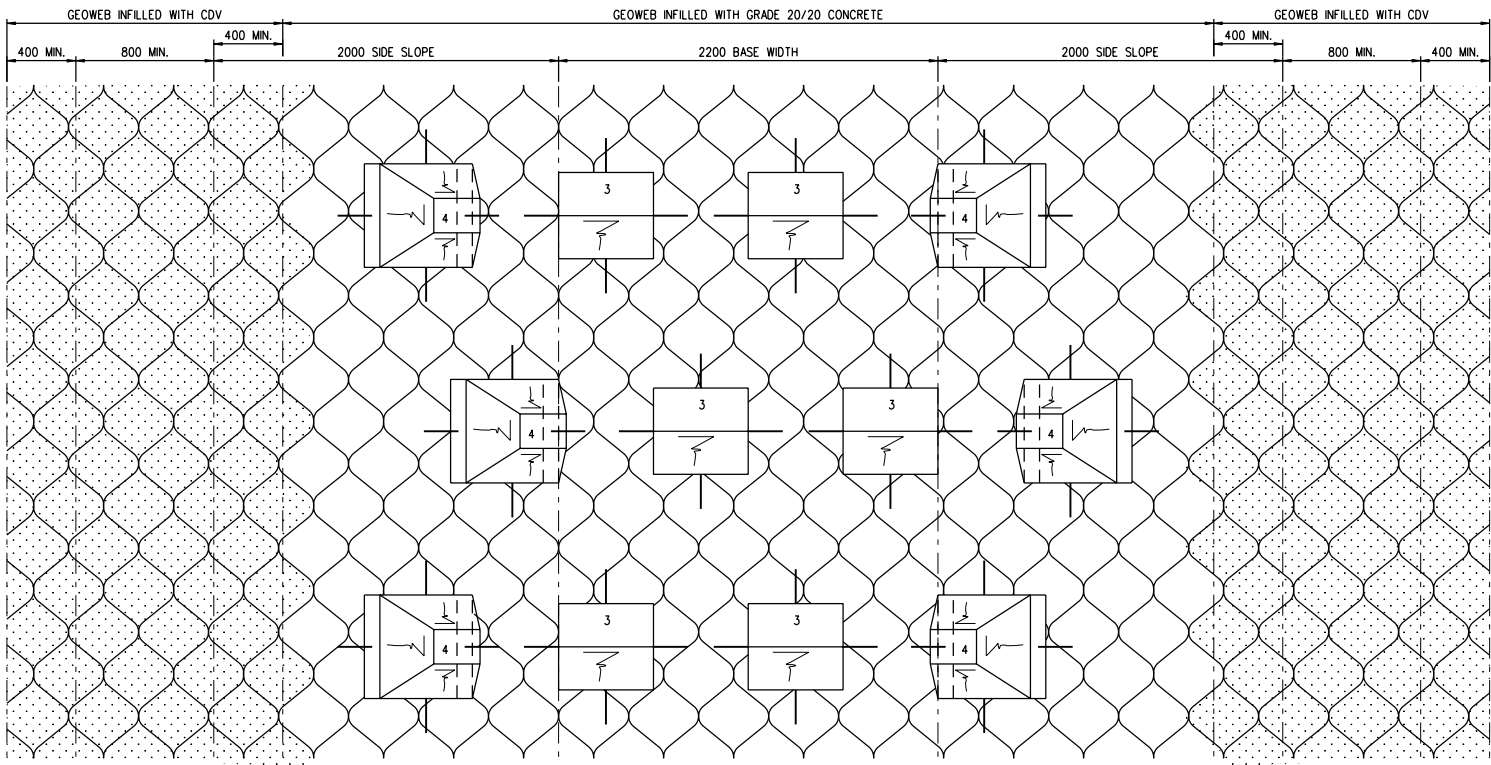
LEGEND :



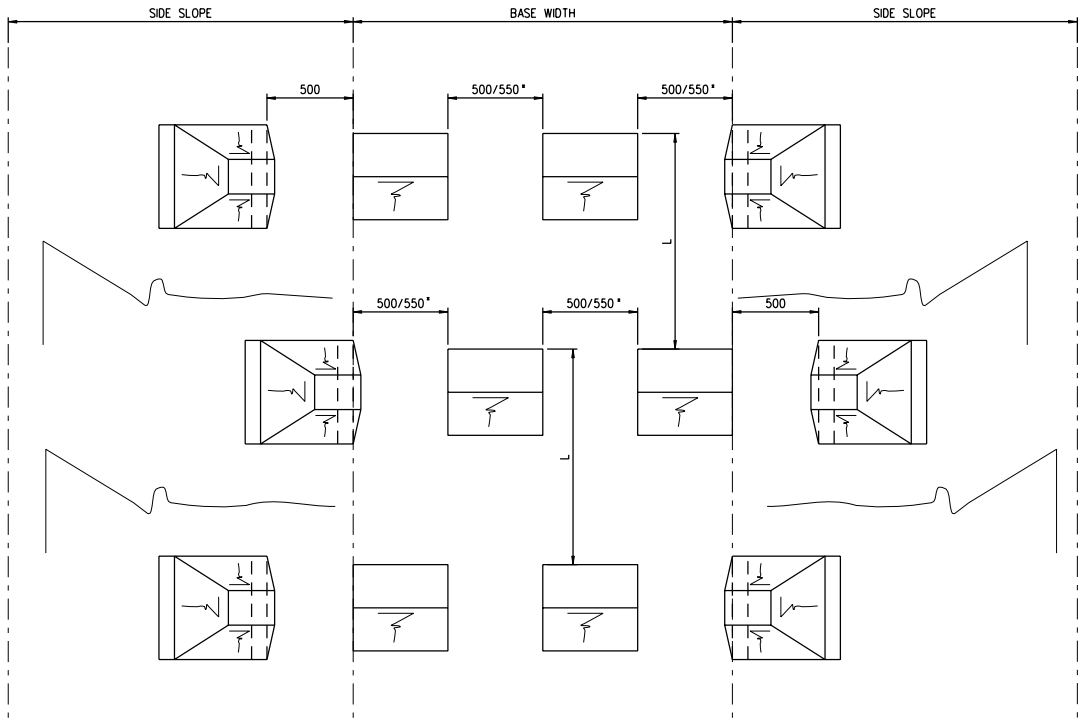
Details of Revision			Date
	Designed	Drawn	Checked
Initial			
Date			
Amendment to the Registered Design approved			
CAD ref. MAIN : ACSUR001.DGN REF : RTKO-AIDGN			
ENVIRONMENTAL PROTECTION DEPARTMENT THE GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION			
Contract no. EP/SP/29/95			
Contract title TSEUNG KWAN O LANDFILLS RESTORATION			
Drawing title SURFACE WATER DRAINAGE GENERAL DETAILS SHEET 1 OF 9			
AS CONSTRUCTED RECORD DRAWING			
Drawing no. GENL/SUR/DRW/001/R		Scale 1 : 20	
CONTRACTOR		Binnie Binnie Black & Veatch Hong Kong Limited	
SWIRE SITA WASTE SERVICES LIMITED. DATE :		Construction Contractor CHUN WO CONSTRUCTION & ENGINEERING CO., LTD.	
INDEPENDENT CONSULTANTS		Environmental Consultants ERM (HK) LTD.	
MOUCHEL ASIA LIMITED. DATE :		Independent Consultants MOUCHEL ASIA LIMITED CONSULTING ENGINEERS	
		SWIRE SITA WASTE SERVICES LTD.	

CONTRACTOR	
SWIRE SITA WASTE SERVICES LIMITED. DATE :	
INDEPENDENT CONSULTANTS	
MOUCHEL ASIA LIMITED. DATE :	

Binnie Binnie Black & Veatch Hong Kong Limited	
Construction Contractor CHUN WO CONSTRUCTION & ENGINEERING CO., LTD.	
Environmental Consultants ERM (HK) LTD.	
Independent Consultants MOUCHEL ASIA LIMITED CONSULTING ENGINEERS	
SWIRE SITA WASTE SERVICES LTD.	



TYPE 3 BAFFLED CHANNEL
(BASE WIDTH = 2200mm)



* FOR TYPE 3 BAFFLE CHANNEL

ARRANGEMENT OF BAFFLE PIERS

CHANNEL GRADIENT	L (mm)	
	PIER HEIGHT 500mm	PIER HEIGHT 400mm
1 : 3	1580	1260
1 : 4	2060	1650
1 : 5	2550	2040
> 1 : 6	3040 MIN.	2430

NOTE : PIER HEIGHT REFER TO DRAWING GENL/SUR/DRW/003/R.

- NOTE :
- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
 - THIS DRAWING IS TO BE READ IN CONJUNCTION WITH DRAWING NOS. GENL/SUR/DRW/001/R, 003/R TO 009/R.
 - BAFFLED CHANNEL IS FORMED BY GEOWEB INFILL WITH GRADE 20/20 CONCRETE.
 - GEOWEB IS LARGE CELL A-SECTION 203 THICK.
 - BAFFLE PIERS ARE PRECAST UNIT OF CONCRETE GRADE 30/20.
 - DETAILS OF TRAPEZODIAL CHANNELS ARE SAME AS BAFFLED CHANNELS BUT WITHOUT BAFFLE PIERS.
 - FOR LAYOUT OF SURFACE WATER DRAINAGE REFER TO DRAWING NOS. STG1/SUR/DRW/001/R & STG2/SUR/DRW/001/R.
 - TYPICAL SECTION OF CHANNEL REFER TO DRAWING NO. GENL/SUR/DRW/003/R.
 - FOR DETAILS OF 3300mm INVERT BAFFLE CHANNEL (STAGE II/III ONLY) REFER TO DRAWING STG2/SUR/DRW/011/R.

LEGEND :



INFILLED WITH CDV



INFILLED WITH CONCRETE

Details of Revision		Date
Initial	Designed	Drawn
Date	Checked	

Amendment to the Registered Design approved

CAD ref. MAN : ACSUR002.DGN
REF : RTKO-ALDGN

ENVIRONMENTAL PROTECTION DEPARTMENT
THE GOVERNMENT OF THE HONG KONG
SPECIAL ADMINISTRATIVE REGION

Contract no. EP/SP/29/95

Contract title
TSEUNG KWAN O LANDFILLS RESTORATION

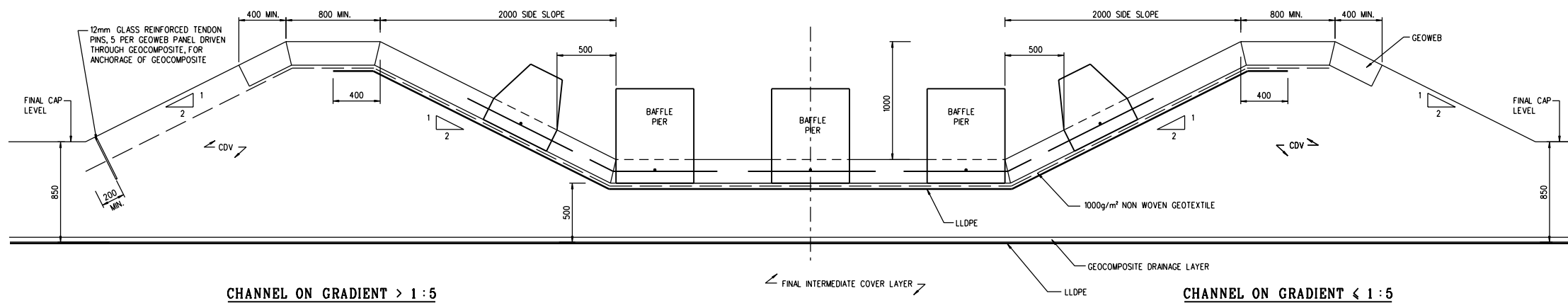
Drawing title

SURFACE WATER
DRAINAGE GENERAL DETAILS
SHEET 2 OF 9

AS CONSTRUCTED RECORD DRAWING

Drawing no. GENL/SUR/DRW/002/R	Scale 1 : 20
-----------------------------------	-----------------

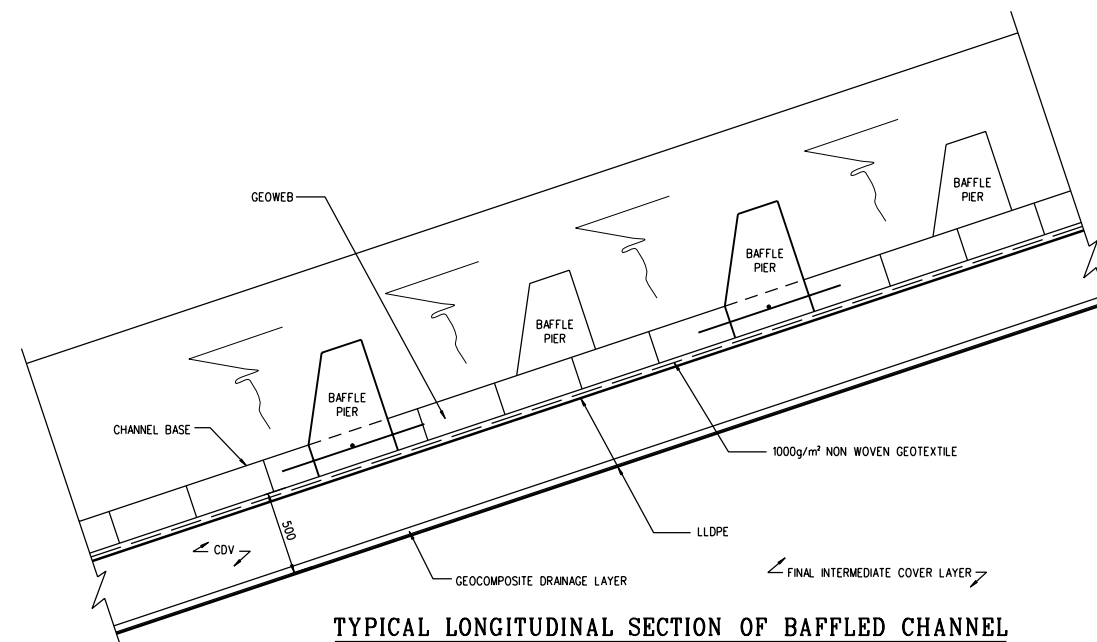
CONTRACTOR	Binnie Black & Veatch Hong Kong Limited
Construction Contractor	CHUN WO CONSTRUCTION & ENGINEERING CO., LTD.
Environmental Consultants	ERM (HK) LTD.
Independent Consultants	MOUCHEL ASIA LIMITED CONSULTING ENGINEERS
MOUCHEL ASIA LIMITED. DATE :	SWIRE SITA WASTE SERVICES LTD.



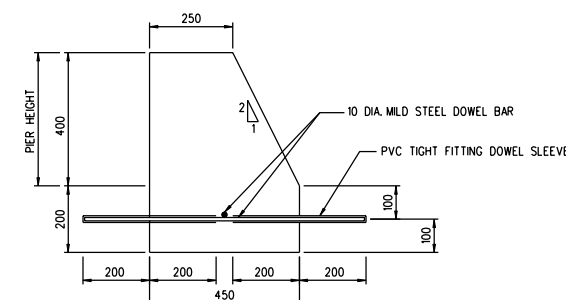
TYPICAL TRANSVERSE SECTION OF BAFFLED CHANNEL

BAFFLE PIER TYPE	PLAN	SECTION A - A	SECTION B - B
1			
2			
3			
4			

NOTE : DOWEL BAR NOT SHOWN.
PARTICULAR DETAILS OF BAFFLES REFER TO DRAWING STG/SUR/DRW/012/R.



TYPICAL LONGITUDINAL SECTION OF BAFFLED CHANNEL



DOWEL BARS DETAILS

1:10

NOTE :

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH DRAWING NOS. GENL/SUR/DRW/001/R, 002/R, 004/R TO 009/R.
3. BAFFLED CHANNEL IS FORMED BY GEOWEB FILLED WITH GRADE 20/20 CONCRETE.
4. GEOWEB IS LARGE CELL A-SECTION 203 THICK.
5. BAFFLE PIERS ARE PRECAST UNITS OF CONCRETE GRADE 30/20.
6. NOT USED.
7. FOR LAYOUT OF SURFACE WATER DRAINAGE REFER TO DRAWING NOS. STG1/SUR/DRW/001/R AND STG2/SUR/DRW/001/R.
8. FOR DIMENSIONS OF CHANNEL BASE WIDTH REFER TO DRAWING NOS. GENL/SUR/DRW/001/R AND GENL/SUR/DRW/002/R.

Details of Revision		Date
Initial	Designed	Checked

Amendment to the Registered Design approved

CAD ref. MAIN : ACSUR003.DGN
REF : RTKO-ALDGN

ENVIRONMENTAL PROTECTION DEPARTMENT
THE GOVERNMENT OF THE HONG KONG
SPECIAL ADMINISTRATIVE REGION

Contract no. EP/SP/29/95

Contract title
TSEUNG KWAN O LANDFILLS RESTORATION

Drawing title

SURFACE WATER
DRAINAGE GENERAL DETAILS
SHEET 3 OF 9

AS CONSTRUCTED RECORD DRAWING

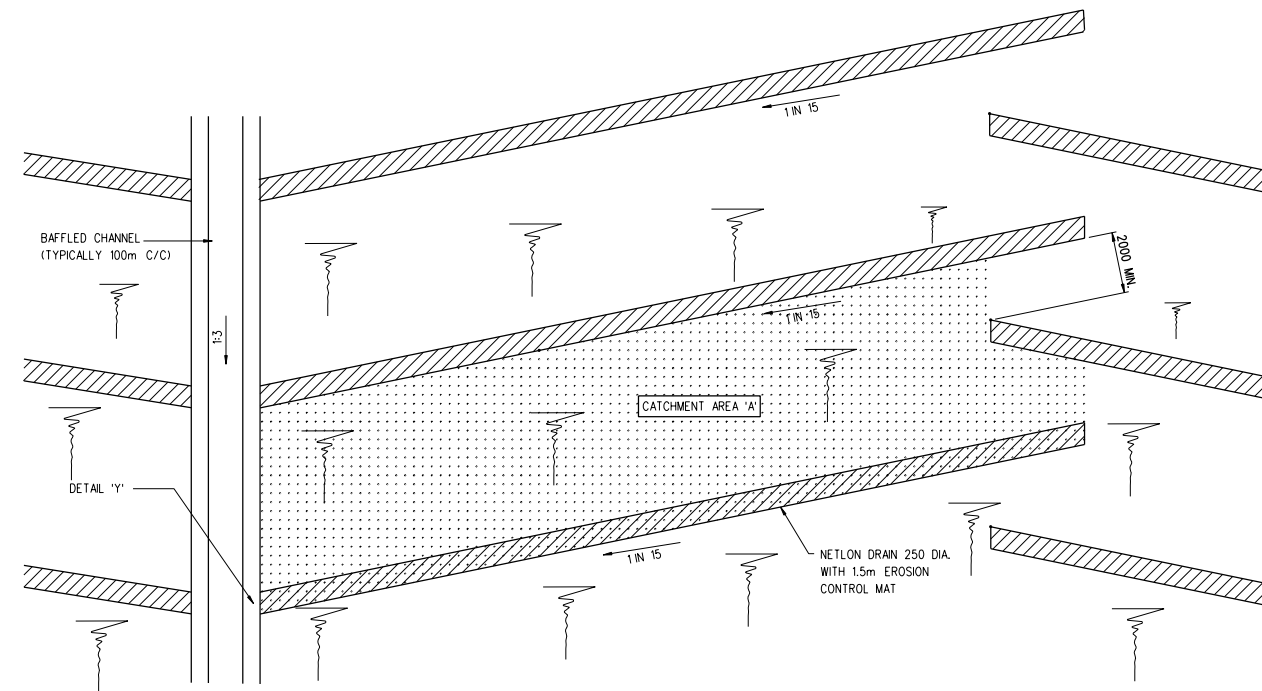
Drawing no. GENL/SUR/DRW/003/R
Scale 1 : 20

CONTRACTOR	
Binnie Black & Veatch Hong Kong Limited	
Construction Contractor	
CHUN WO CONSTRUCTION & ENGINEERING CO., LTD.	
Environmental Consultants	
BRM (HK) LTD.	
Independent Consultants	
MOUHEL ASIA LIMITED CONSULTING ENGINEERS	
SWIRE SITA WASTE SERVICES LTD.	

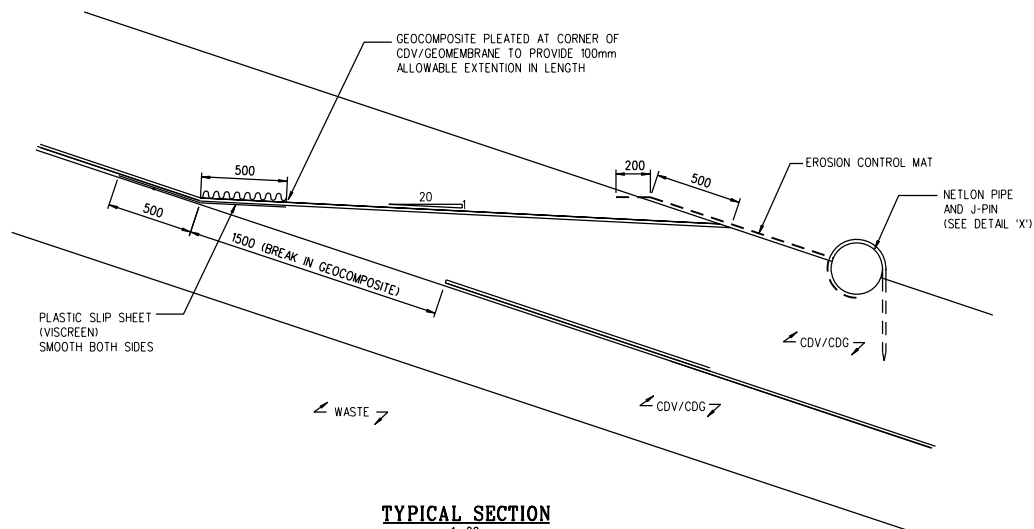
MOUHEL ASIA LIMITED.
DATE :



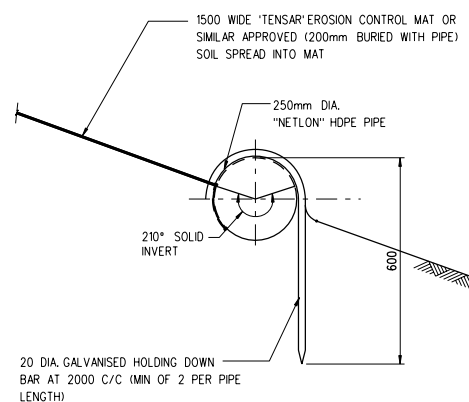
SWIRE SITA WASTE
SERVICES LTD.



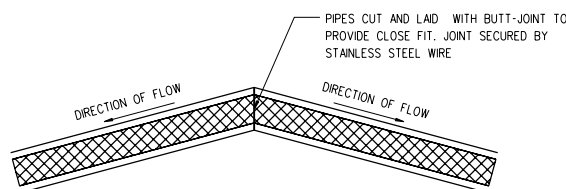
TYPICAL ARRANGEMENT OF NETLON DRAINS
1:200



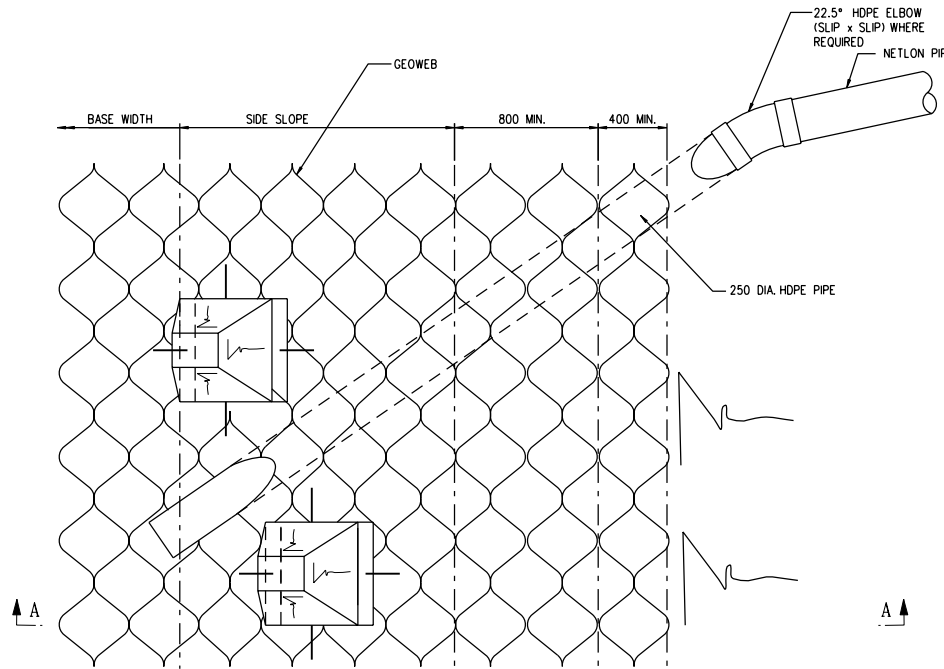
TYPICAL SECTION
1:20



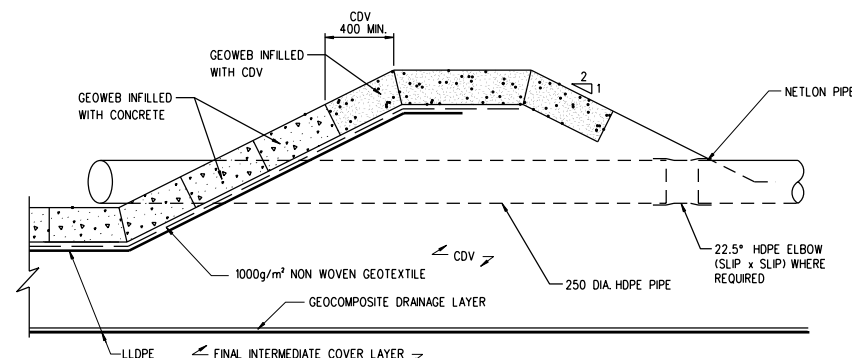
DETAIL 'X'
1:10



DETAIL OF APEX JOINT
1:20



PLAN
1:200

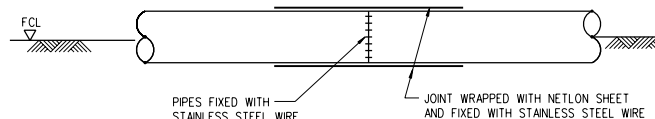


SECTION A - A
DETAIL 'Y'
DISCHARGE OF NETLON DRAIN INTO BAFFLED CHANNEL
1:20

NOTE: DETAIL OF BAFFLED CHANNEL ON GRADIENT $\leq 1:5$ SHOWN

TABLE OF NETLON CATCHMENT AREAS

NETLON DIAMETER (mm)	TYPICAL FALL	MAXIMUM CATCHMENT AREA 'A' (m ²) 210° SOLID INVERT
250	1:15	1280
250	1:20	1110
250	1:40	780



DETAIL OF SPLICE JOINT
1:20

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH DRAWING NOS. GENL/SUR/DRW/001/R TO 004/R, 006/R TO 009/R.
3. FOR DETAILS OF BAFFLED CHANNEL, REFER TO DRAWING NOS. GENL/SUR/DRW/001/R & 002/R.
4. 'NETLON' IS EXTRUDED HDPE PIPE BY MITSUI PETROCHEMICAL IND..

LEGEND:

- INFILLED WITH CONCRETE
- INFILLED WITH CDV

DETAIL OF SPLICE JOINT REVISED			12/99
Details of Revision			Date
	Designed	Drawn	Checked
Initial			
Date			

Amendment to the Registered Design approved

CAD ref. MAN: AGS0005.DGN
REF: RTKO-ALDGN

ENVIRONMENTAL PROTECTION DEPARTMENT
THE GOVERNMENT OF THE HONG KONG
SPECIAL ADMINISTRATIVE REGION

Contract no. EP/SP/29/95

Contract title
TSEUNG KWAN O LANDFILLS RESTORATION

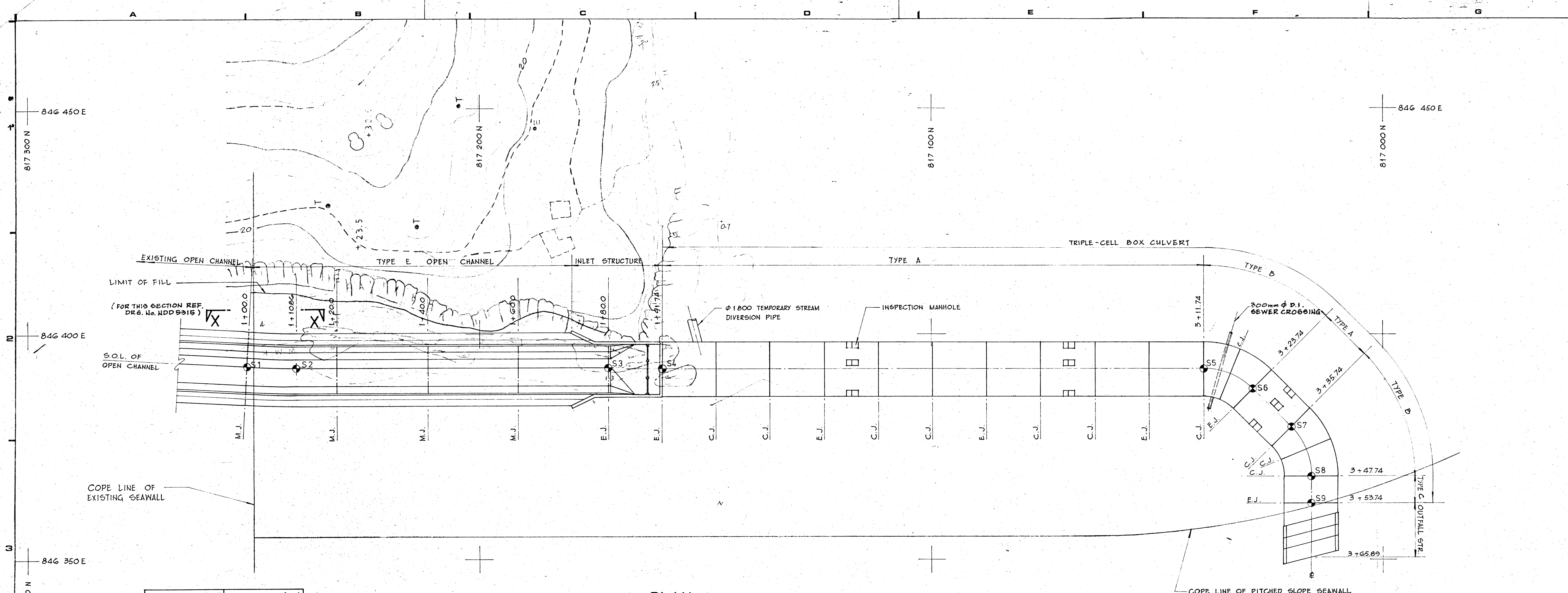
Drawing title

SURFACE WATER DRAINAGE GENERAL DETAILS
SHEET 5 OF 9

AS CONSTRUCTED RECORD DRAWING

Drawing no. GENL/SUR/DRW/005/R
Scale AS SHOWN

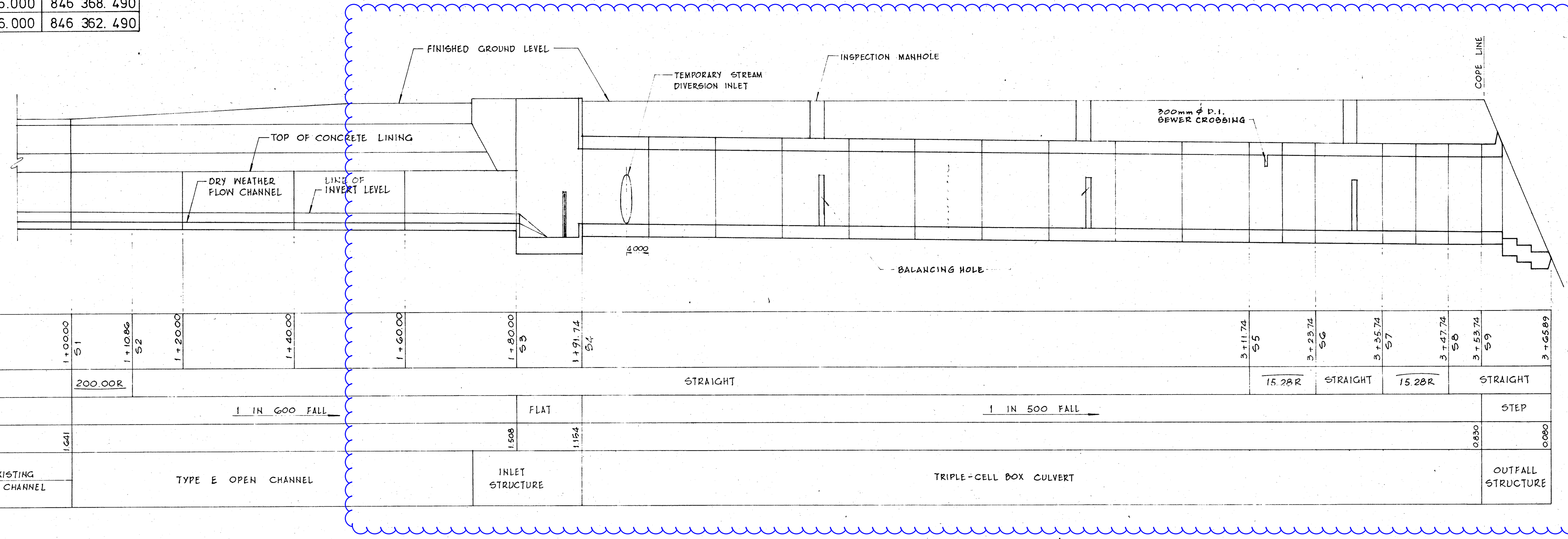
CONTRACTOR	Binnie Black & Veatch Hong Kong Limited
SWIRE SITA WASTE SERVICES LIMITED. DATE:	Construction Contractor CHUN WO CONSTRUCTION & ENGINEERING CO., LTD.
INDEPENDENT CONSULTANTS	Environmental Consultants ERM (HK) LTD.
MOUCHEL ASIA LIMITED. DATE:	Independent Consultants MOUCHEL ASIA LIMITED CONSULTING ENGINEERS
	SWIRE SITA WASTE SERVICES LTD.



	NORTHING (m)	EASTING (m)
S 1	817 251.500	846 392.798
S 2	817 240.644	846 392.504
S 3	817 171.503	846 392.504
S 4	817 159.764	846 392.254
S 5	817 039.764	846 392.254
S 6	817 028.960	846 387.779
S 7	817 020.475	846 379.294
S 8	817 016.000	846 368.490
S 9	817 016.000	846 362.490

PLAN
SCALE: 1:500

3-cell 3500mm (W) x 2600mm (H) box culvert
downstream from GLA-TSK 500 drainage connection



CHAINAGE (m) & S.O.P.	1+0000	1+1086	1+2000	1+4000	1+6000	1+8000	1+9174	3+1174	3+2374	3+3574	3+4774	3+5374	3+6589
HORI. ALIGNMENT (m)	200.00R							15.28R	STRAIGHT	15.28R	STRAIGHT		
VERT. ALIGNMENT			1 IN 600 FALL			FLAT		1 IN 500 FALL					STEP
INVERT LEVEL	1.641					1.608	1.164					0.630	0.080
REMARKS	EXISTING OPEN CHANNEL		TYPE E OPEN CHANNEL			INLET STRUCTURE		TRIPLE-CELL BOX CULVERT					OUTFALL STRUCTURE

LONGITUDINAL SECTION
SCALE: HORIZ. 1:500, VERT. 1:100

- NOTES:
- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SPECIFIED OTHERWISE.
 - ALL LEVELS ARE IN METRES ABOVE P.D.
 - ABBREVIATIONS :-
M.J. DENOTES MOVEMENT JOINT
E.J. DENOTES EXPANSION JOINT
C.J. DENOTES CONTRACTION JOINT
 - CONCRETE SHALL BE :-
GRADE 30/20 FOR TYPE E OPEN CHANNEL, INLET STRUCTURE, TRIPLE-CELL BOX CULVERT AND OUTFALL STRUCTURE.
GRADE 10/20 FOR BLINDING LAYER
 - THIS DRAWING SHALL BE READ IN CONJUNCTION WITH DRAWING Nos. NDD 5310, NDD 5311, NDD 5312, NDD 5313, NDD 5314 AND NDD 5315.

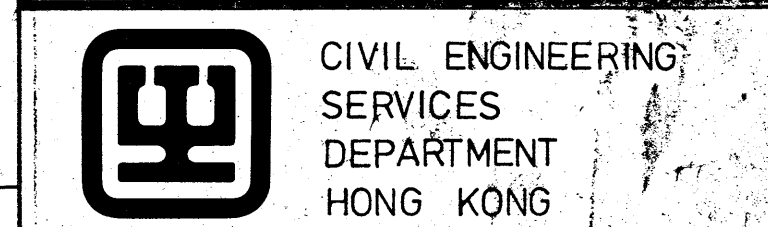
A	AS CONSTRUCTED		J. C. Cheuk
no.	date	description	initial
REVISION			
		name	date
surveyed			
designed	M. T. Cheuk	M. T. CHEUK	5/12/86
drawn	Y. C. Wong	Y. C. WONG	6/12/86
traced	Y. C. Wong	Y. C. WONG	6/12/86
checked	W. T. Yeung	W. T. YEUNG	6/1/87
approved	T. Thumb	T. THUMB	18.2.87
		Chief Engineer	26.2.87

contract no.	CV/86/15
file no.	SP 9/1/44
project no.	29 DR
contract	CONTROLLED TIPPING OF REFUSE AT JUNK BAY STAGE II, PHASE I, CONTRACT A -SITE WORKS AND SANITARY LANDFILL

drawing title
CHANNEL EXTENSION DETAILS—
GENERAL ARRANGEMENT OF
TYPE E OPEN CHANNEL AND
TRIPLE-CELL BOX CULVERT

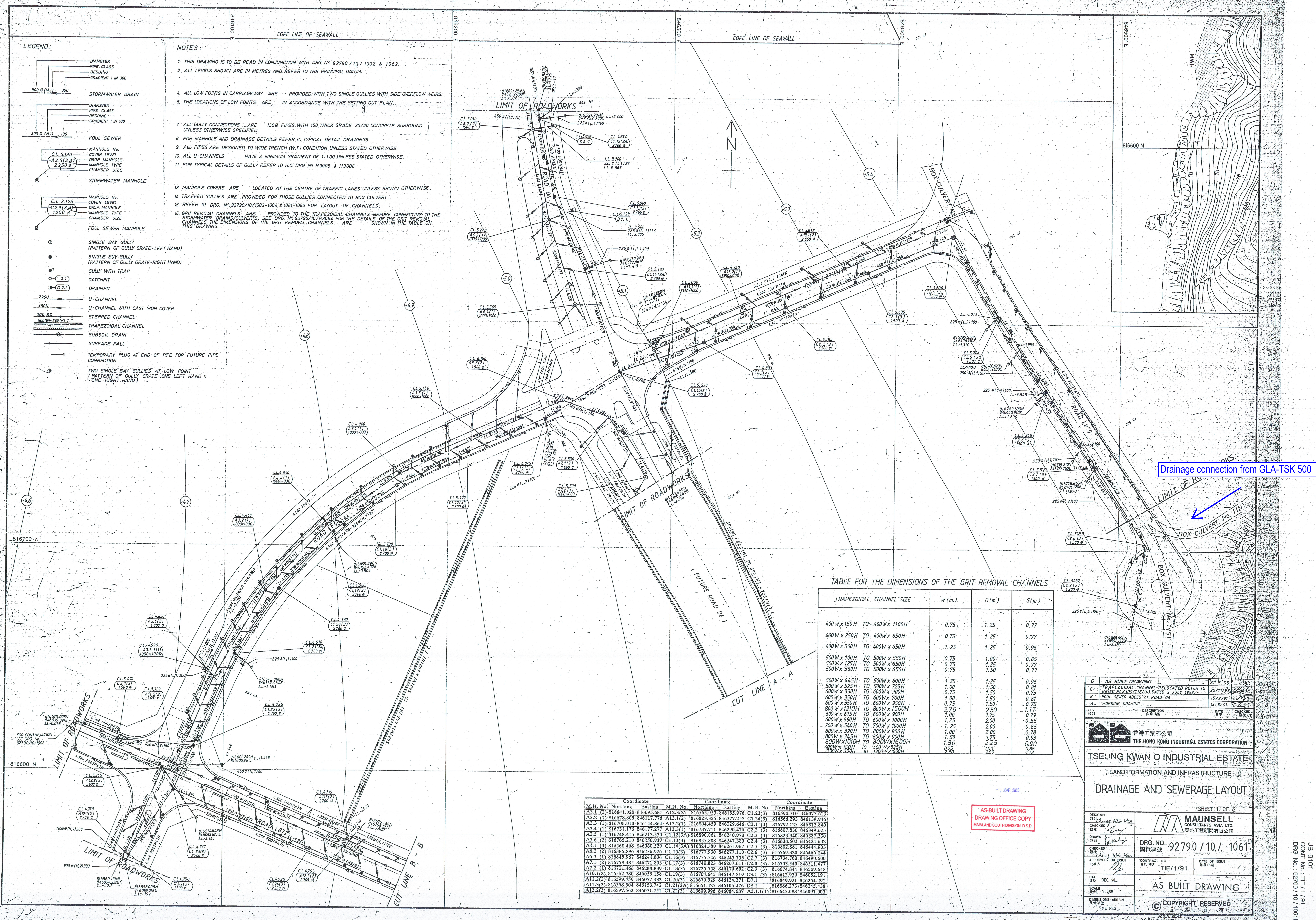
drawing no. NDD 5309A
scale AS SHOWN

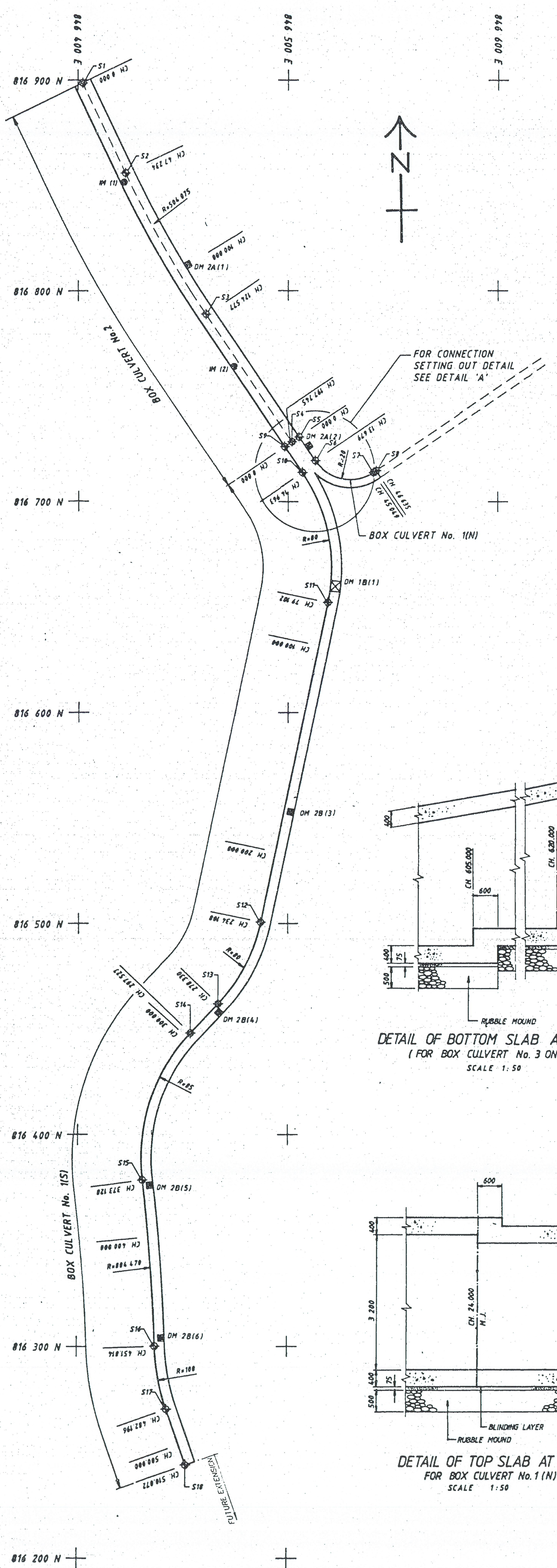
office
DRAINAGE (DESIGN) DIVISION
CIVIL ENGINEERING OFFICE



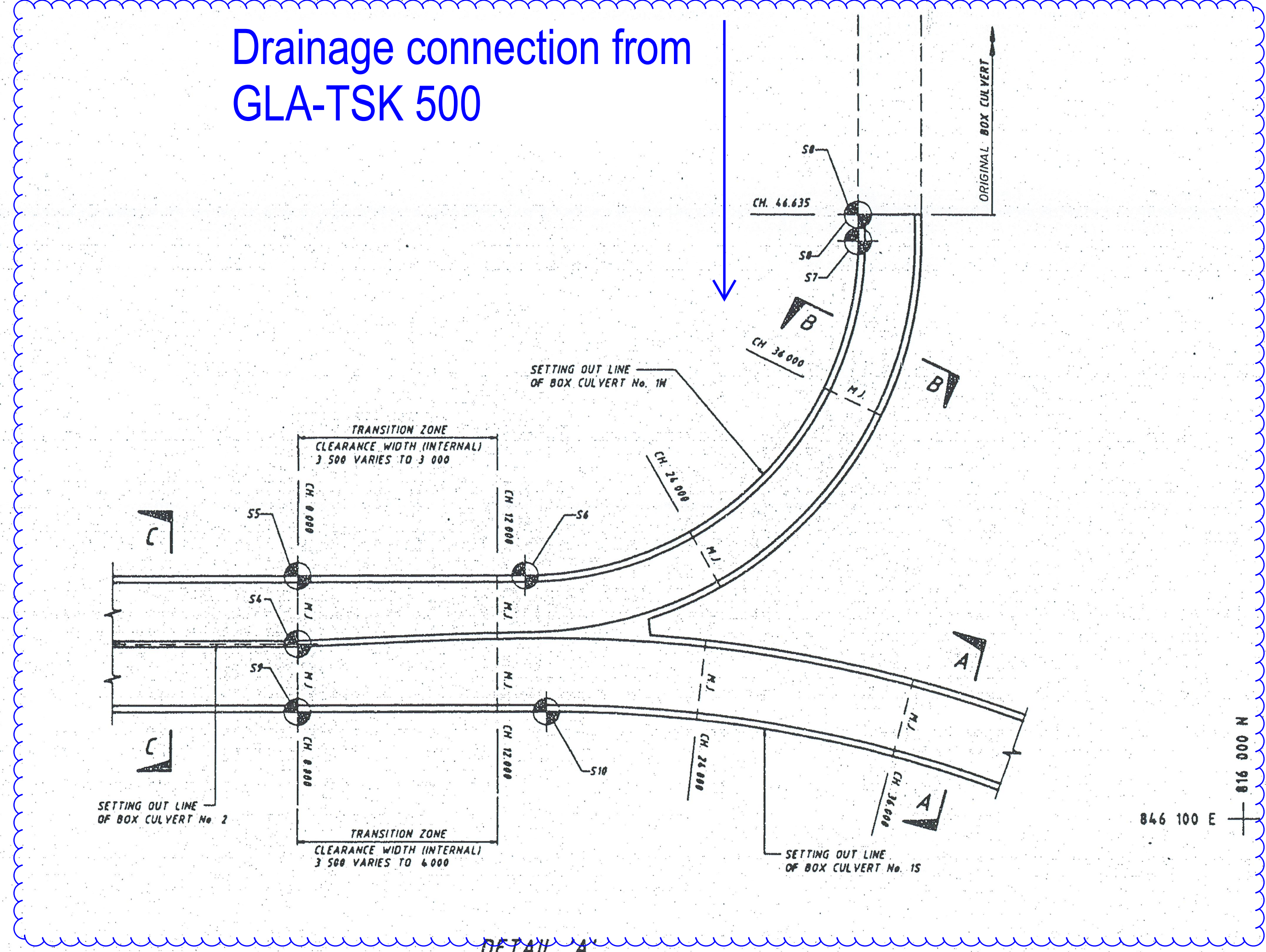
AS CONSTRUCTED

COPYRIGHT RESERVED

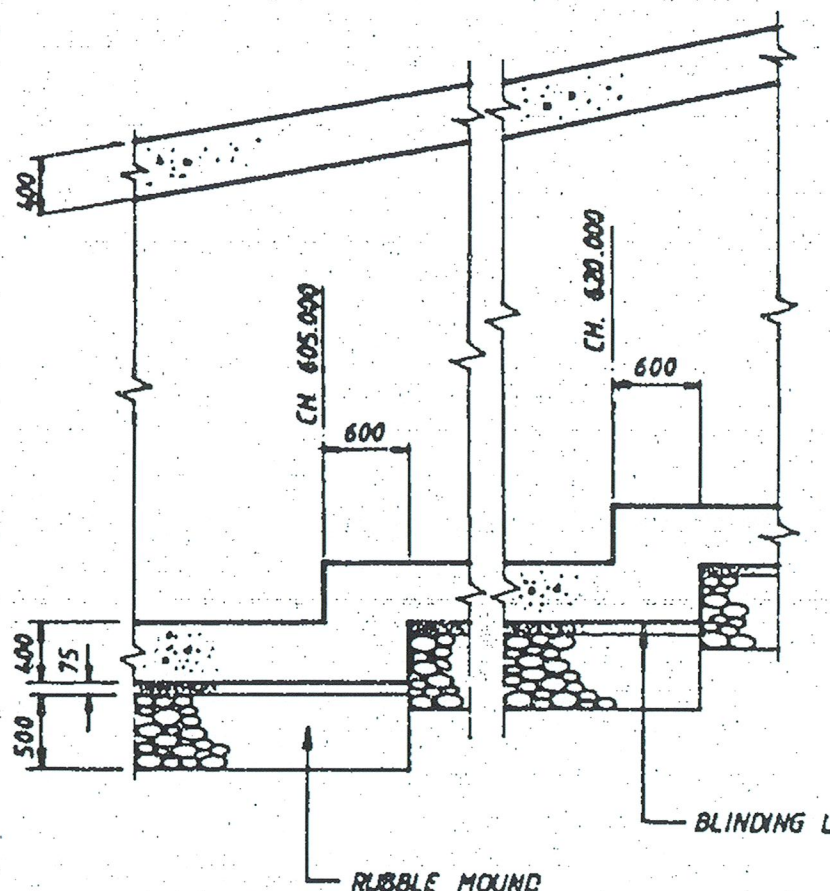




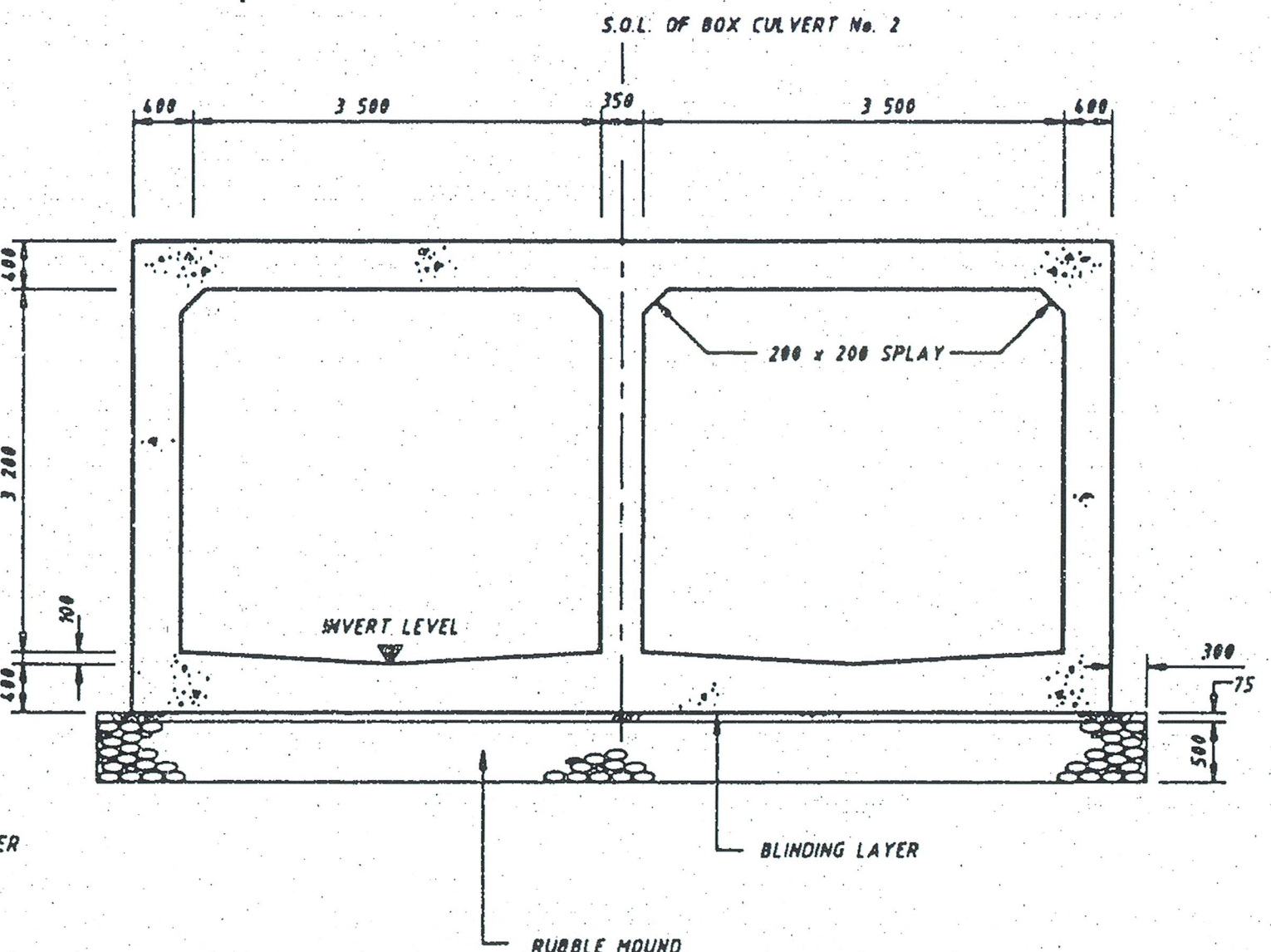
PLAN OF BOX CULVERT No.1 & 2
SCALE 1:1 000



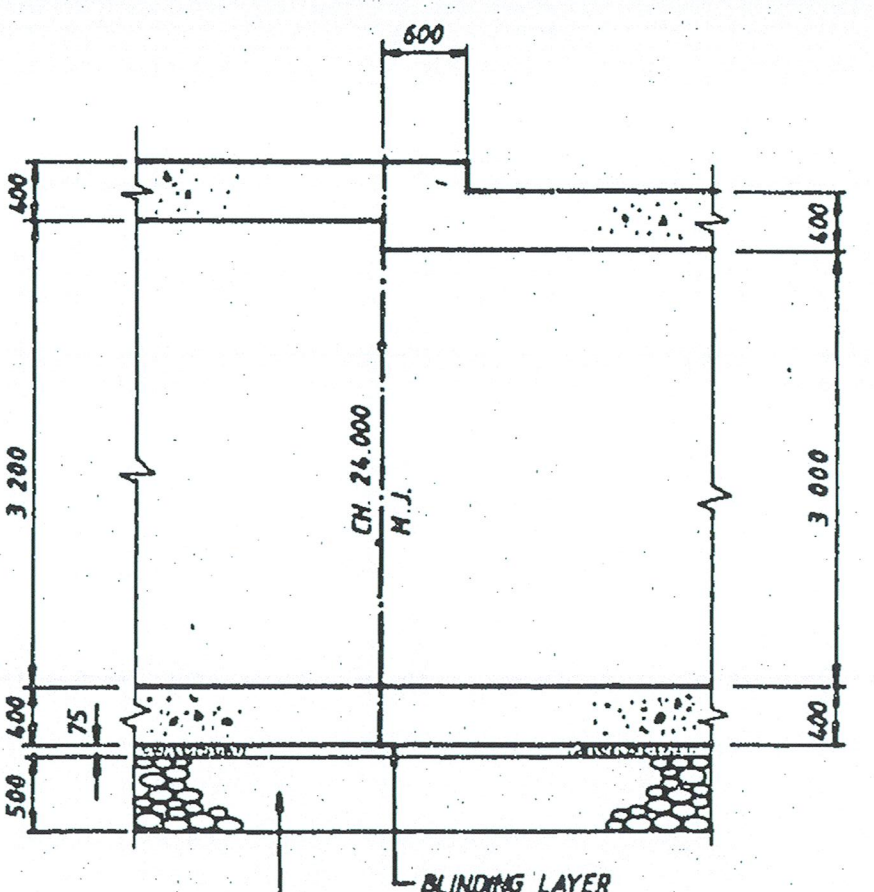
DETAIL A
SCALE 1: 200



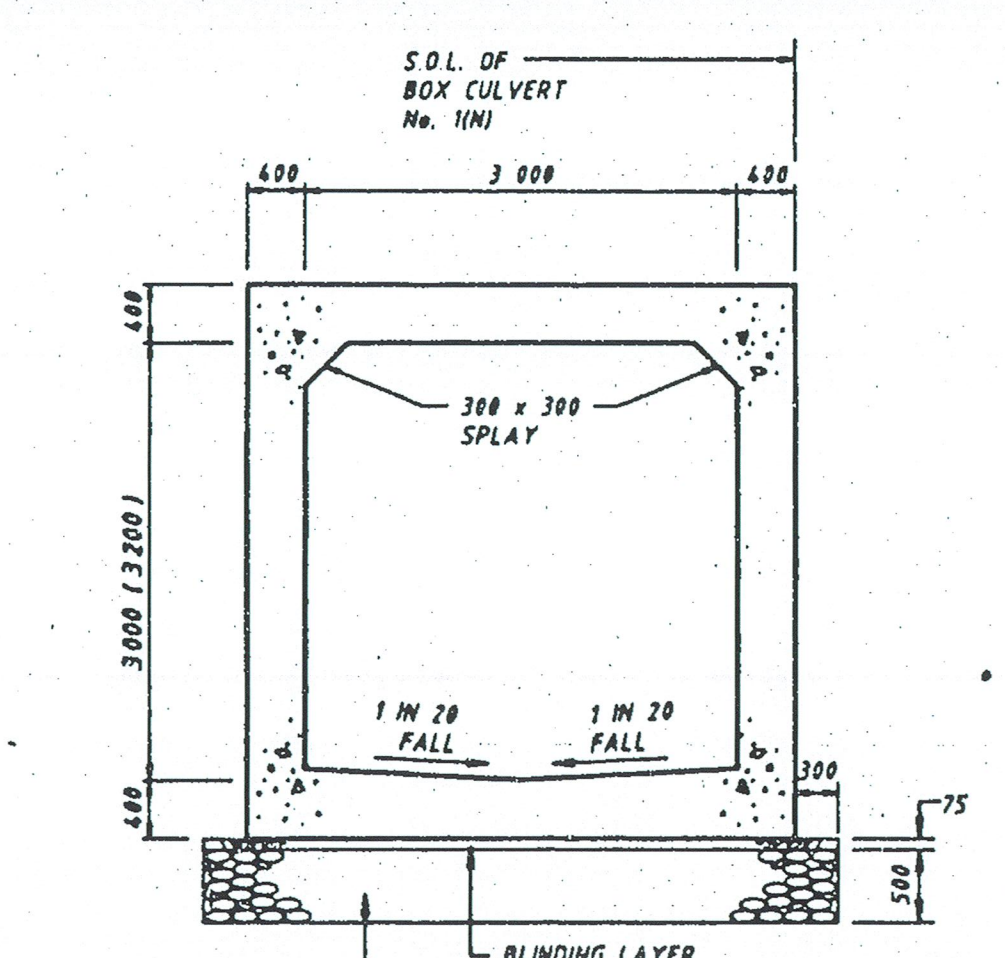
DETAIL OF BOTTOM SLAB AT STEPS
(FOR BOX CULVERT No.3 ONLY)
SCALE 1:50



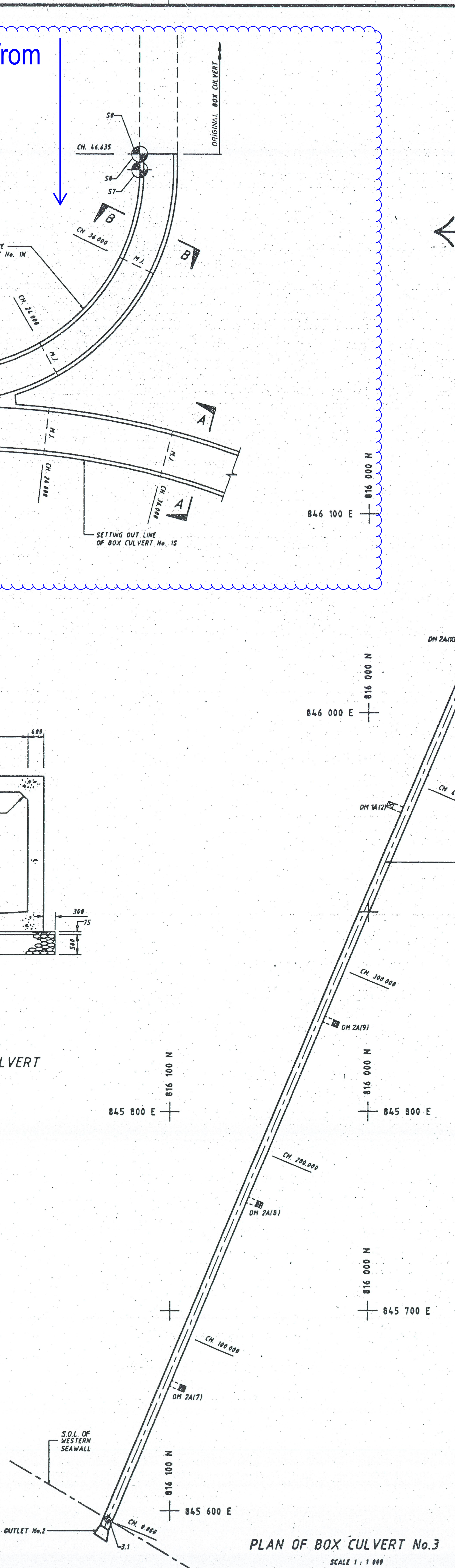
SECTION C - C
TYPICAL SECTION OF TWIN-CELLS BOX CULVERT
SCALE 1: 50



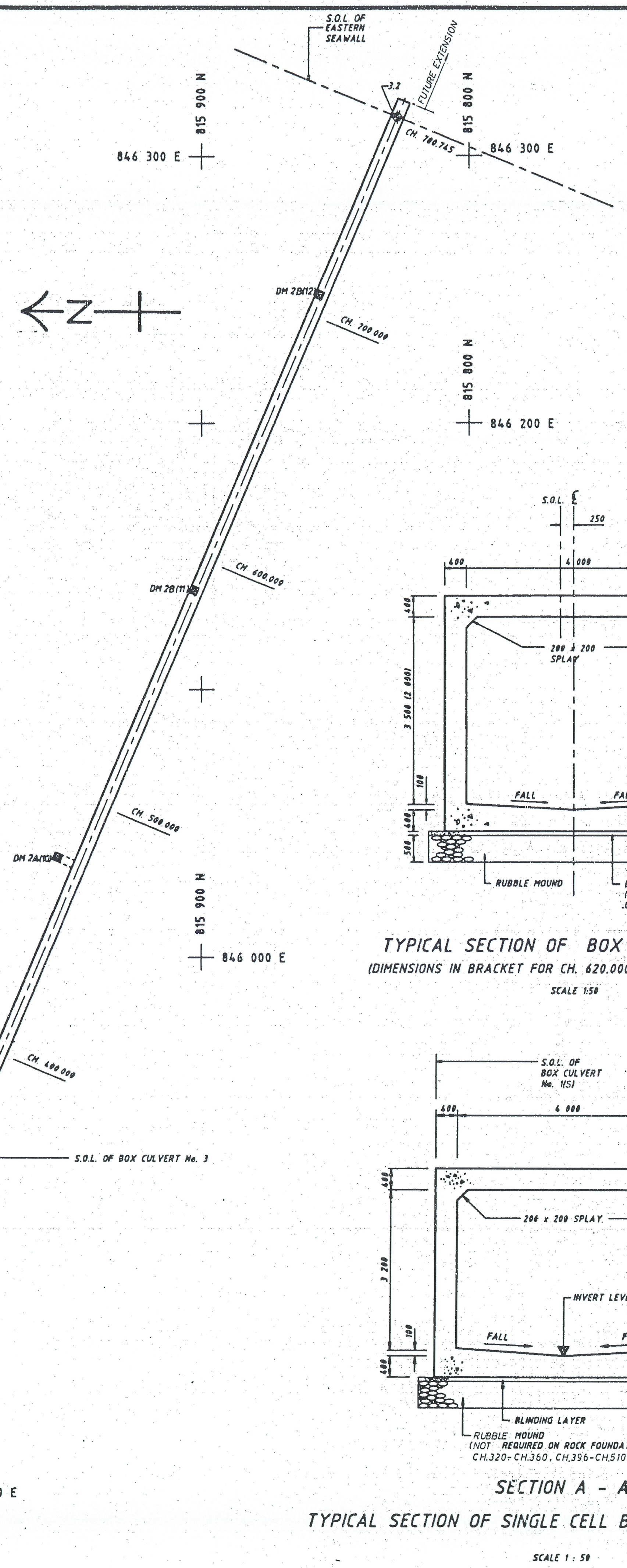
DETAIL OF TOP SLAB AT STEP
FOR BOX CULVERT No.1(N)
SCALE 1:50



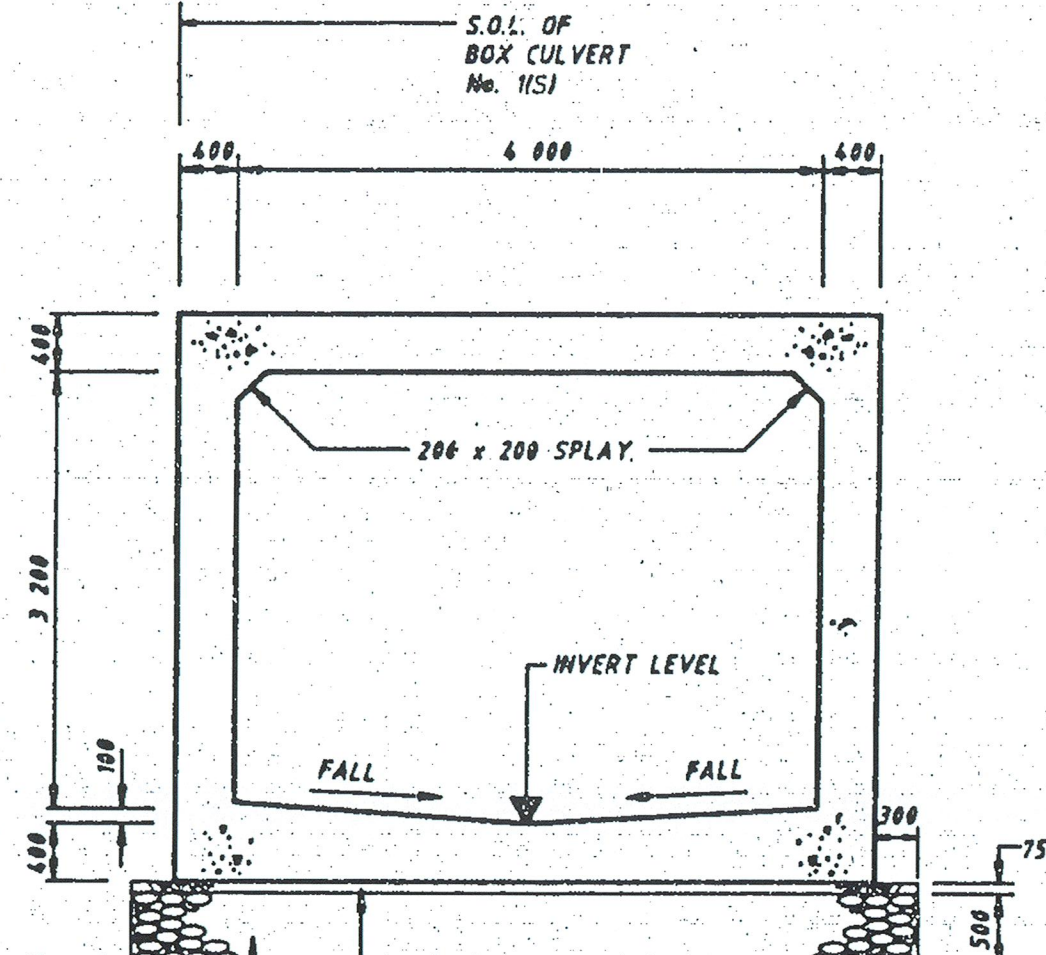
SECTION B-B
TYPICAL SECTION OF BOX CULVERT No.1(N)
(DIMENSIONS IN BRACKET FOR CH.0.000 TO CH.24.000)
SCALE 1:50



PLAN OF BOX CULVERT No.3
SCALE 1: 1 000



TYPICAL SECTION OF BOX CULVERT No.3
(DIMENSIONS IN BRACKET FOR CH. 620.000 TO FUTURE EXTENSION)
SCALE 1:50



SECTION A - A
TYPICAL SECTION OF SINGLE CELL BOX CULVERT No.1(S)
SCALE 1: 50

SETTING OUT POINTS FOR BOX CULVERTS

BOX CULVERT	POINTS	CO-ORDINATES		CHAINAGE
		NORTHING	EASTING	
No. 2	S1	816 898.545	846 402.253	0.000
	S2	816 855.859	846 422.475	47.234
	S3	816 788.884	846 468.785	124.577
	S4	816 728.288	846 581.844	197.745
No. 1(N)	S5	816 738.494	846 585.229	0.000
	S6	816 719.172	846 512.914	13.474
	S7	816 713.838	846 548.489	45.849
	S8	816 714.728	846 542.801	46.435
No. 1(S)	S9	816 725.921	846 498.493	0.000
	S10	816 713.536	846 586.889	14.943
	S11	816 452.264	846 518.943	79.182
	S12	816 588.584	845 487.123	234.188
No. 3	S13	816 461.927	845 464.331	278.339
	S14	816 448.889	846 453.689	297.527
	S15	816 378.474	846 438.947	373.128
	S16	816 388.874	845 437.289	451.814
No. 3	S17	816 378.321	845 442.618	482.194
	S18	815 344.888	846 452.888	518.072
	S19	816 130.945	845 595.538	0.000
	S20	815 826.759	846 314.580	780.745

- NOTES :-
- THIS DRAWING TO BE READ IN CONNECTION WITH DRG. No. 92790/10/1072 TO 1075
 - ALL LEVELS ARE IN METRES ABOVE PRINCIPAL DATUM
 - CONCRETE GRADE IS :
STRUCTURE - 18/20
BLINDING - 18/20
 - UNLESS OTHERWISE STATED ALL EXPOSED CONCRETE CORNERS ARE 25 x 25 CHAMFERS.
 - THE RUBBLE MOUND FOR USE UNDER BOX CULVERTS IS 15mm NOMINAL SIZE RUBBLE.
 - THE TEMPERATURE OF FRESH CONCRETE OF CHARACTERISTIC STRENGTH ABOVE 20 MPa WAS NOT EXCEED 32°C BEFORE IT WAS COMPACTED IN POSITION.
 - FOR REINFORCEMENT DETAILS SEE DRG. No. 92790/10/1076 TO 1079 & 1401,1402.
 - ALL MOVEMENT JOINTS ARE SET OUT NORMAL TO S.O.L.
 - DOVEL BARS AT MOVEMENT JOINTS WERE SAW CUT PERPENDICULAR TO BAR AXIS AND INSTALLED NORMAL TO THE MOVEMENT JOINT.
 - ALL METAL WORKS WERE HOT DIP GALVANISED IN ACCORDANCE WITH THE SPECIFICATION.
 - CONCRETE SURFACES FINISH CLASSES :
FORMED SURFACE - F3 FOR EXPOSED SURFACE
F2 FOR UNEXPOSED SURFACE
UNFORMED SURFACE - U3 FOR EXPOSED SURFACE
U2 FOR UNEXPOSED SURFACE
 - FOR GENERAL NOTES SEE DRG. NO. 92790/10/1002.
 - EXPOSED SURFACES ARE THOSE STILL VISIBLE AFTER BACKFILLING AND THE APPLICATION OF FINISHES (I.E., INTERNAL SURFACES OF THE BOX CULVERT CELLS, ACCESS CHAMBERS, MANHOLES AND EXTERNAL SURFACES WHERE VISIBLE ABOVE GROUND).

LEGEND :-

- S.O.L. SETTING OUT LINE
- C.L. CENTRE LINE
- CH. CHAINAGE
- M.J. MOVEMENT JOINT
- S.O.P. 2.2 SETTING OUT POINT 2.2
- IM 13 INSPECTION MANHOLE No. 3
- DM 18 (1) DESILTING MANHOLE TYPE 18 No. 1
- DM 2A (1) DESILTING MANHOLE TYPE 2A No. 1

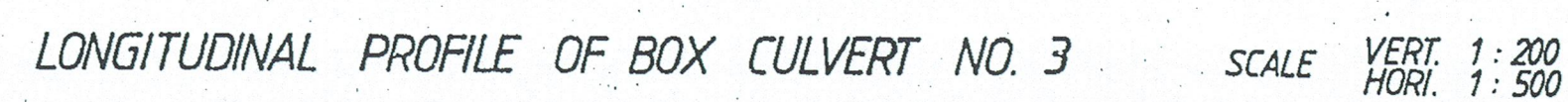
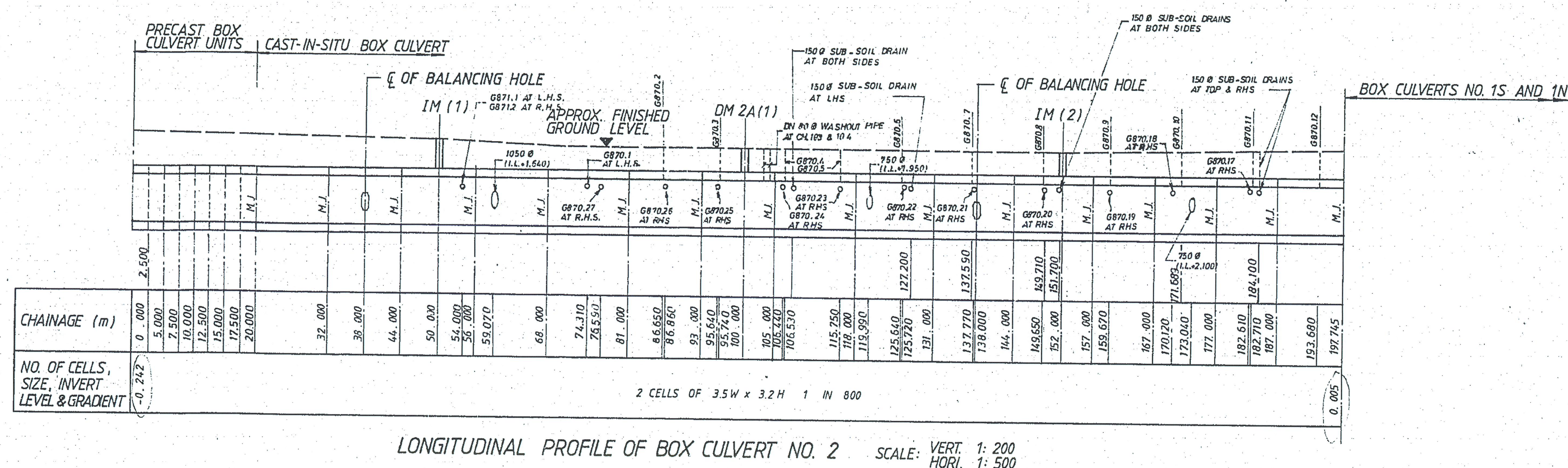
- FOR BOX CULVERT No. 15, IN & 2 WHERE THE BOX CULVERT IS SITUATED IN NEW RECLAMATION AREA, THE FILL WAS FIRST PLACED AND COMPACTED TO THE FORMATION LEVEL FOR A DISTANCE OF NOT LESS THAN 20m ON EITHER SIDE OF THE CENTRE-LINE OF THE BOX CULVERT. THE CULVERT WAS THEN CONSTRUCTED IN AN EXCAVATED TRENCH.
- FOR BOX CULVERT No. 3 THE CONSTRUCTION OF THE CULVERT WAS COMMENCED AFTER THE REMOVAL OF THE SURCHARGE ABOVE THE CULVERT AND THE CULVERT WAS THEN CONSTRUCTED IN AN EXCAVATED TRENCH.
- FOR DETAILS OF PIPES CONNECTING TO OR IN THE VICINITY OF THE BOX CULVERTS REFER TO DRAINAGE LAYOUT AND GENERAL LAYOUT DRAWINGS.

AS-BUILT DRAWING
DRAWING OFFICE COPY
MAINLAND SOUTH DIVISION D.S.D.

B	AS BUILT DRAWING	31.5.95	
A	WORKING DRAWING	15/8/97	
REV.	DESCRIPTION	DATE	CHECKED
1	AS BUILT DRAWING	15/8/97	
香港工業發展公司 THE HONG KONG INDUSTRIAL ESTATES CORPORATION			
TSEUNG KWAN O INDUSTRIAL ESTATE LAND FORMATION AND INFRASTRUCTURE			
BOX CULVERT DETAILS (G.A.)			
SHEET 1 OF 5			
DESIGNED	DRG. NO.	92790/10/1071	
CHECKED	DATE	TIE/1/91	
DRAWN	CONTRACT NO.	DATE OF ISSUE	
APPROVED FOR ISSUE	DATE		
AS BUILT DRAWING			
COPYRIGHT RESERVED			



- NOTES:
1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH DRG. NOS. 92790/10/ 1071, 1073 TO 1075.
 2. FOR GENERAL NOTES, SEE DRG. NO. 92790/10/ 1002.
 3. FOR R. C. DETAILS SEE DRG. NO. 92790/10/ 1076 & 1079, & 1401 TO 1402.



C	AS BUILT DRAWING	31.5 x 95	
B	BOX-OUT LOCATIONS ADDED	21/9/93	
A	WORKING DRAWING	15/9/93	
REV.	DESCRIPTION	DATE	CHECKED
內置圖	內置圖	日期	校核



香港工業總公司
THE HONG KONG INDUSTRIAL ESTATES CORPORATION

TSEUNG KWAN O INDUSTRIAL ESTATE

LAND FORMATION AND INFRASTRUCTURE

BOX CULVERT DETAILS (G.A.)

SHEET 2 OF 5

DESIGNED 設計 <i>Ng Yung Chi</i> 陳榮發	 MAUNSEEL CONSULTANTS ASIA LTD. 茂盛工程顧問有限公司	DRG. NO. 圖紙編號 92790 / 10 / 1072
DRAWN 繪圖 <i>B. Chan</i> 陳偉強		
CHECKED 校核 <i>Ng Yung Chi</i> 陳榮發		
APPROVED FOR ISSUE 此單人 <i>Ng Yung Chi</i> 陳榮發		CONTRACT NO. 合約編號 TIE / 1/9/-
		DATE OF ISSUE 發售日期

DATE
日期
DEC 90

SCALE
比例
AS SHOWN

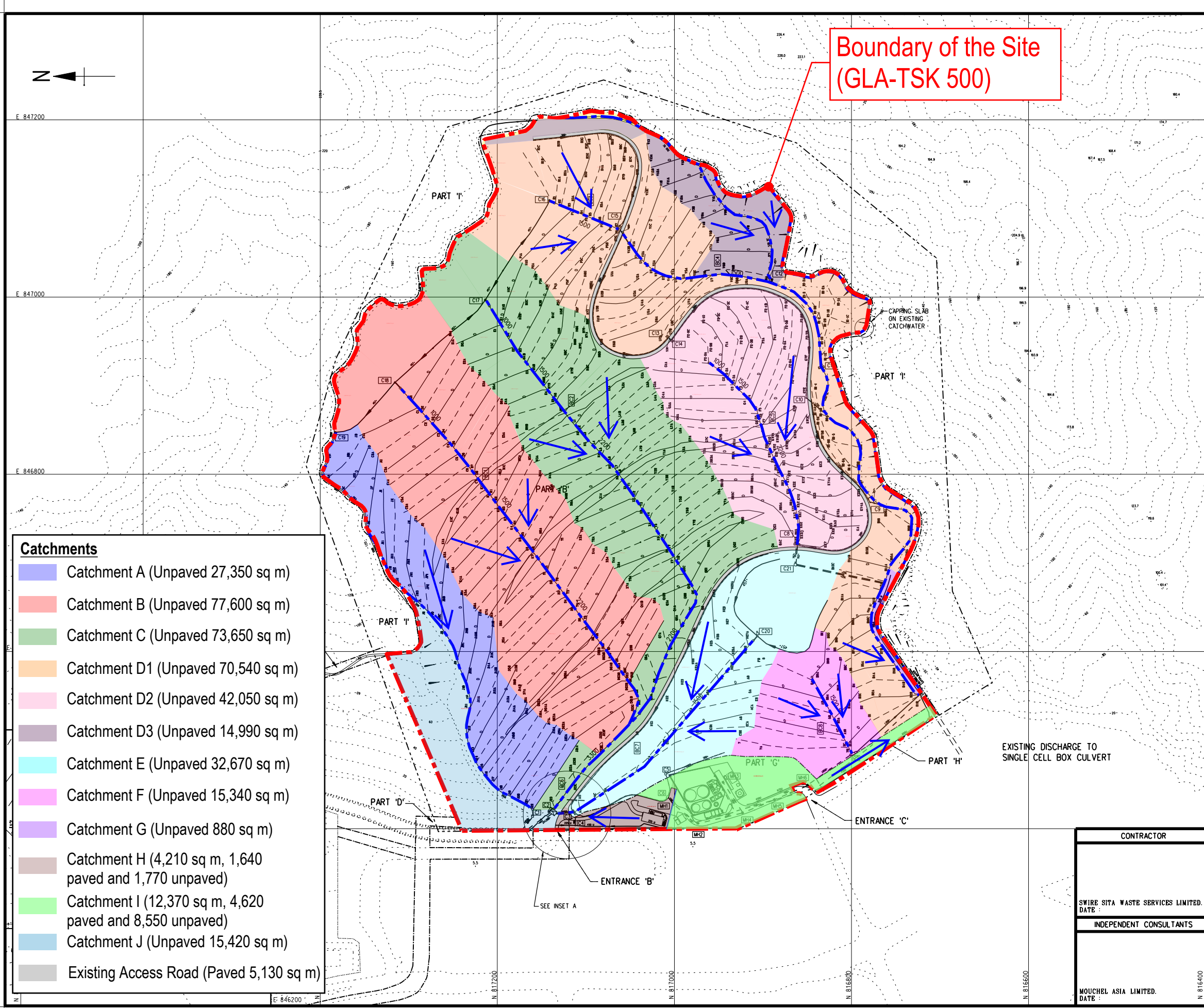
DIMENSIONS ARE IN
尺寸單位
METRES

' AS BUILT DRAWING

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Appendix C

Catchment Plans



Boundary of the Site
(GLA-TSK 500)

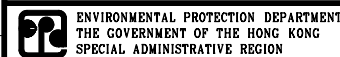
- NOTES:
1. ALL GRIDS ARE HONG KONG GRID 1980.
 2. ALL LEVEL ARE METRES ABOVE PRINCIPAL DATUM.
 3. FOR SURFACE WATER DETAILS REFER TO DRAWING NOS. GENL/SUR/DRW/001/R TO 008/R AND STG2/SUR/DRW/011/R TO 020/R.
 4. PLATFORM PERIMETER DRAINS LAID AT 1:125.
 5. FOR PRECAST CONCRETE PIPE, ALL PIPES BEDDINGS CLASS B AS PER DSD DRAWING NO. 1048.
 6. ALL PRECAST CONCRETE PIPES CLASS H TO BS 5911: PART 100: 1988 UNLESS OTHERWISE STATED.
 7. FOR AS-CONSTRUCTED DETAILS OF CATCHPITS AND MANHOLES, REFER TO STG2/SUR/DRW/002/R.

- LEGEND :
- SITE BOUNDARY
 - EXISTING STEPPED CHANNEL
 - BAFFLED CHANNEL OF BC1 WITH BASE WIDTH 1000mm
 - 250mm DIAMETER NETLON PIPE
 - NETLON WITH DAYLIGHT
 - PERIMETER DRAIN PERFORATED HDPE PIPE OF DIA. 457mm
 - STEPPED CHANNEL OF SIZE 1050mm
 - ROADWAY DRAIN 300mm DIA. PERFORATED PIPE
 - U-CHANNEL WITH SIZE 600mm
 - HDPE PIPE OF DIAMETER 300mm
 - PRECAST CONCRETE PIPE OF DIAMETER 300mm
 - RECTANGULAR CHANNEL WITH WIDTH 1200mm
 - PIPEWORK CONNECTION TO DOWNSLOPE SURFACE CHANNEL
 - CATCHPIT
 - CATCHPIT NUMBER
 - CONNECTION BETWEEN DIFFERENT SIZES OF BAFFLED CHANNELS / U-CHANNELS
 - TAPER SECTION / APRON STRUCTURE

Details of Revision			Date
Initial	Designed	Drawn	Checked
Date			

Amendment to the Registered Design approved

CAD ref. MAIN A2SUR001.DGN
REF: TKOSF-AB, SZ-PTD, SZTOPDRN & RTKO-ALDGN



Contract no. EP/SP/29/95

Contract title
TSEUNG KWAN O LANDFILLS RESTORATION

Drawing title

STAGE II/III
SURFACE WATER DRAINAGE
LAYOUT PLAN

AS CONSTRUCTED RECORD DRAWING

Drawing no. STG2/SUR/DRW/001/R
Scale 1:2000

CONTRACTOR		Binnie Black & Veatch Hong Kong Limited	
SWIRE SITA WASTE SERVICES LIMITED. DATE :		Construction Contractor CHUN WO CONSTRUCTION & ENGINEERING CO., LTD.	
INDEPENDENT CONSULTANTS		Environmental Consultants ERM (HK) LTD.	
MOUCHEL ASIA LIMITED. DATE :		Independent Consultants MOUCHEL ASIA LIMITED CONSULTING ENGINEERS	
SWIRE SITA WASTE SERVICES LTD.		SWIRE SITA WASTE SERVICES LTD.	

Catchments	
	Catchment A (Unpaved 27,350 sq m)
	Catchment B (Unpaved 77,600 sq m)
	Catchment C (Unpaved 73,650 sq m)
	Catchment D1 (Unpaved 70,540 sq m)
	Catchment D2 (Unpaved 42,050 sq m)
	Catchment D3 (Unpaved 14,990 sq m)
	Catchment E (Unpaved 32,670 sq m)
	Catchment F (Unpaved 15,340 sq m)
	Catchment G (Unpaved 880 sq m)
	Catchment H (4,210 sq m, 1,640 paved and 1,770 unpaved)
	Catchment I (12,370 sq m, 4,620 paved and 8,550 unpaved)
	Catchment J (Unpaved 15,420 sq m)
	Existing Access Road (Paved 5,130 sq m)

Boundary of the Site
(GLA-TSK 500)

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 4. PLATFORM PERIMETER DRAINS LAID AT 1:125.
 5. FOR PRECAST CONCRETE PIPE, ALL PIPES BEDDINGS CLASS B AS PER DSD DRAWING NO. 104B.
 6. ALL PRECAST CONCRETE PIPES CLASS H TO BS 5911: PART 100 : 1988 UNLESS OTHERWISE STATED.
 7. FOR AS-CONSTRUCTED DETAILS OF CATCHPITS AND MANHOLES, REFER TO STG2/SUR/DRW/002/R.
- LEGEND :
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 - BAFFLED CHANNEL OF BC1 WITH BASE WIDTH 1000mm
 - 250mm DIAMETER NETLON PIPE
 - NETLON WITH DAYLIGHT
 - PERIMETER DRAIN PERFORATED HDPE PIPE OF DIA. 457mm
 - STEPPED CHANNEL OF SIZE 1050mm
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 - HDPE PIPE OF DIAMETER 300mm
 - PRECAST CONCRETE PIPE OF DIAMETER 300mm
 - RECTANGULAR CHANNEL WITH WIDTH 1200mm
 - PIPEWORK CONNECTION TO DOWNSLOPE SURFACE CHANNEL
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 - CATCHPIT NUMBER
 - CONNECTION BETWEEN DIFFERENT SIZES OF BAFFLED CHANNELS / U-CHANNELS
 - TAPER SECTION / APRON STRUCTURE

Details of Revision		Date
Initial	Designed	Drawn

Amendment to the Registered Design approved

CAD ref. MAIN A2SUR001DGN
REF: TKOSF-AB, SZ-PTSD, SZTOPDRN & RTKO-ALDGN

ENVIRONMENTAL PROTECTION DEPARTMENT
THE GOVERNMENT OF THE HONG KONG
SPECIAL ADMINISTRATIVE REGION

Contract no. EP/SP/29/95

Contract title
TSEUNG KWAN O LANDFILLS RESTORATION

Drawing title

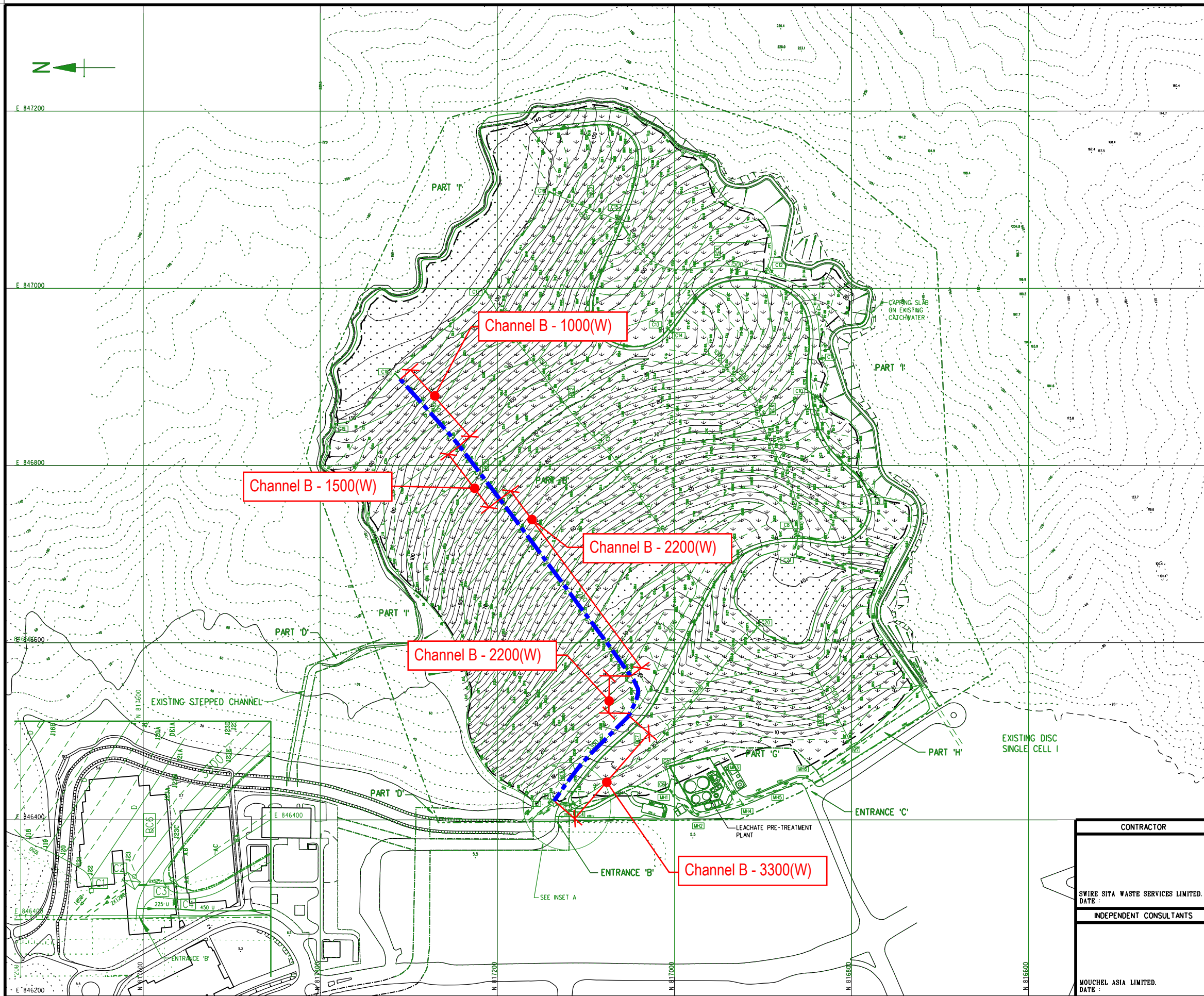
STAGE II/III
SURFACE WATER DRAINAGE
LAYOUT PLAN

AS CONSTRUCTED RECORD DRAWING

Drawing no. STG2/SUR/DRW/001/R
Scale 1:2000

CONTRACTOR	
 Binnie Black & Veatch Hong Kong Limited	
Construction Contractor CHUN WO CONSTRUCTION & ENGINEERING CO., LTD.	
Environmental Consultants ERM (HK) LTD.	
Independent Consultants MOUCHEL ASIA LIMITED CONSULTING ENGINEERS	
 SWIRE SITA WASTE SERVICES LTD.	

SWIRE SITA WASTE SERVICES LIMITED. DATE :	
INDEPENDENT CONSULTANTS	
MOUCHEL ASIA LIMITED. DATE :	



- NOTES:
1. ALL GRIDS ARE HONG KONG GRID 1980.
 2. ALL LEVELS ARE IN METRES ABOVE PRINCIPAL DATUM.
 3. FOR DETAILS OF CAP TYPES REFER TO DRAWING NO. GENL/STE/DRW/001/R & 002/R.

LEGEND:

	CAP TYPE 1
	CAP TYPE 2
	LIMIT OF LLDPE
	SITE BOUNDARY
	BOUNDARY BETWEEN SITE PARTS
	CONTOURS
	CAP CONTOURS

Details of Revision			Date
Initial	Designed	Drawn	Checked
Date			

Amendment to the Registered Design approved

CAD ref. MAN: A2STE003.DGN
REF: TKOSF-AB, S2-PTRO & RTKO-AIDGN



Contract no. EP/SP/29/95

Contract title
TSEUNG KWAN O LANDFILLS RESTORATION

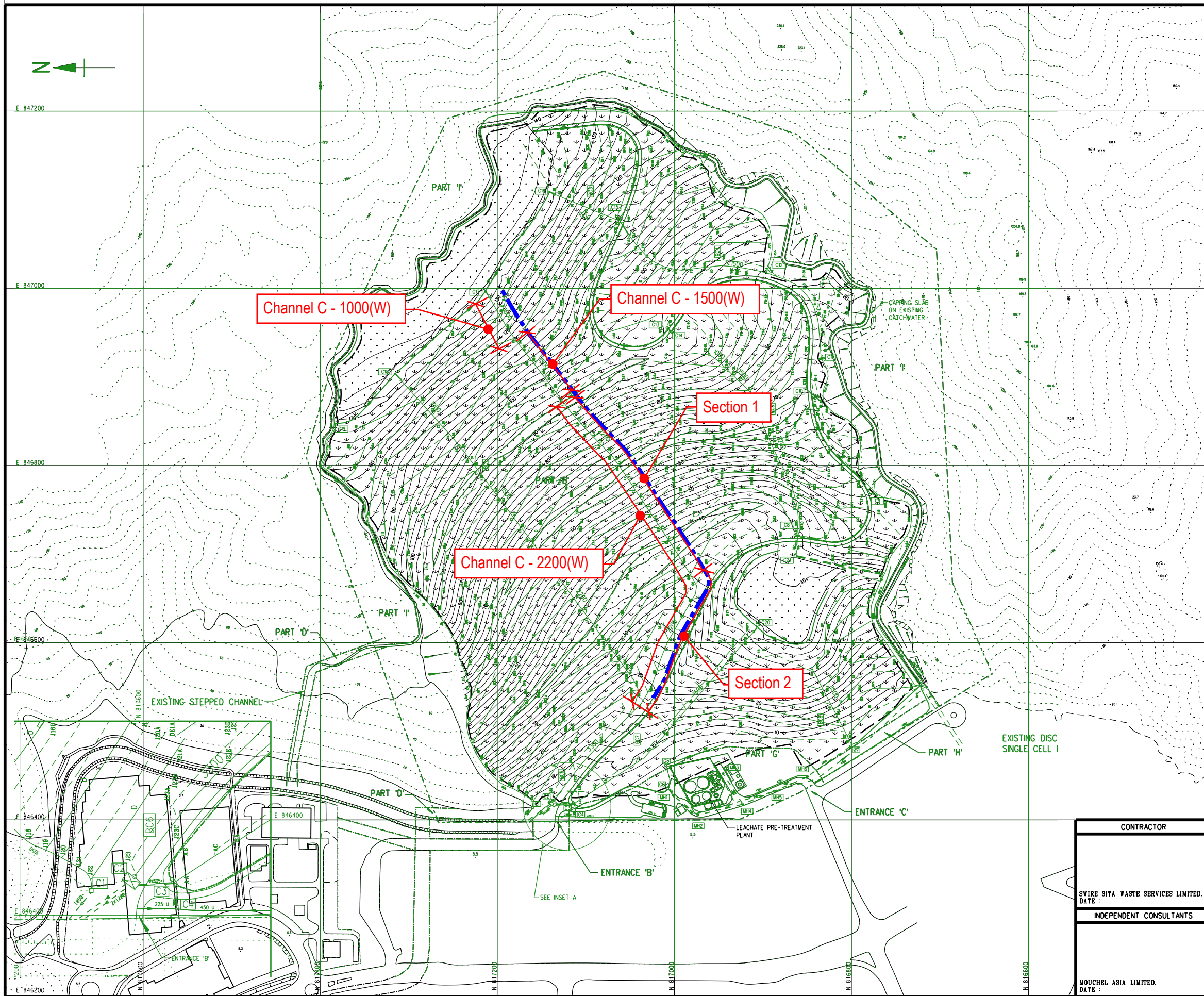
Drawing title

STAGE II/III CAP LAYOUT PLAN

AS CONSTRUCTED RECORD DRAWING

Drawing no.	Scale
STG2/STE/DRW/003/R	1:2000

CONTRACTOR	Binnie Black & Veatch Hong Kong Limited
Construction Contractor	CHUN WO CONSTRUCTION & ENGINEERING CO., LTD.
Environmental Consultants	ERM (HK) LTD.
Independent Consultants	MOUCHEL ASIA LIMITED CONSULTING ENGINEERS
MOUCHEL ASIA LIMITED. DATE :	SWIRE SITA WASTE SERVICES LTD.



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 3. FOR DETAILS OF CAP TYPES REFER TO DRAWING NO. GENL/STE/DRW/001/R & 002/R.

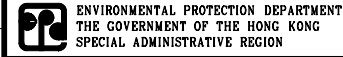
LEGEND:

	CAP TYPE 1
	CAP TYPE 2
	LIMIT OF LLDPE
	SITE BOUNDARY
	BOUNDARY BETWEEN SITE PARTS
	CONTOURS
	CAP CONTOURS

Details of Revision			Date
Initial	Designed	Drawn	Checked
Date			

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CAD ref. MAN-A2STE003.DGN
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Contract no. EP/SP/29/95

Contract title
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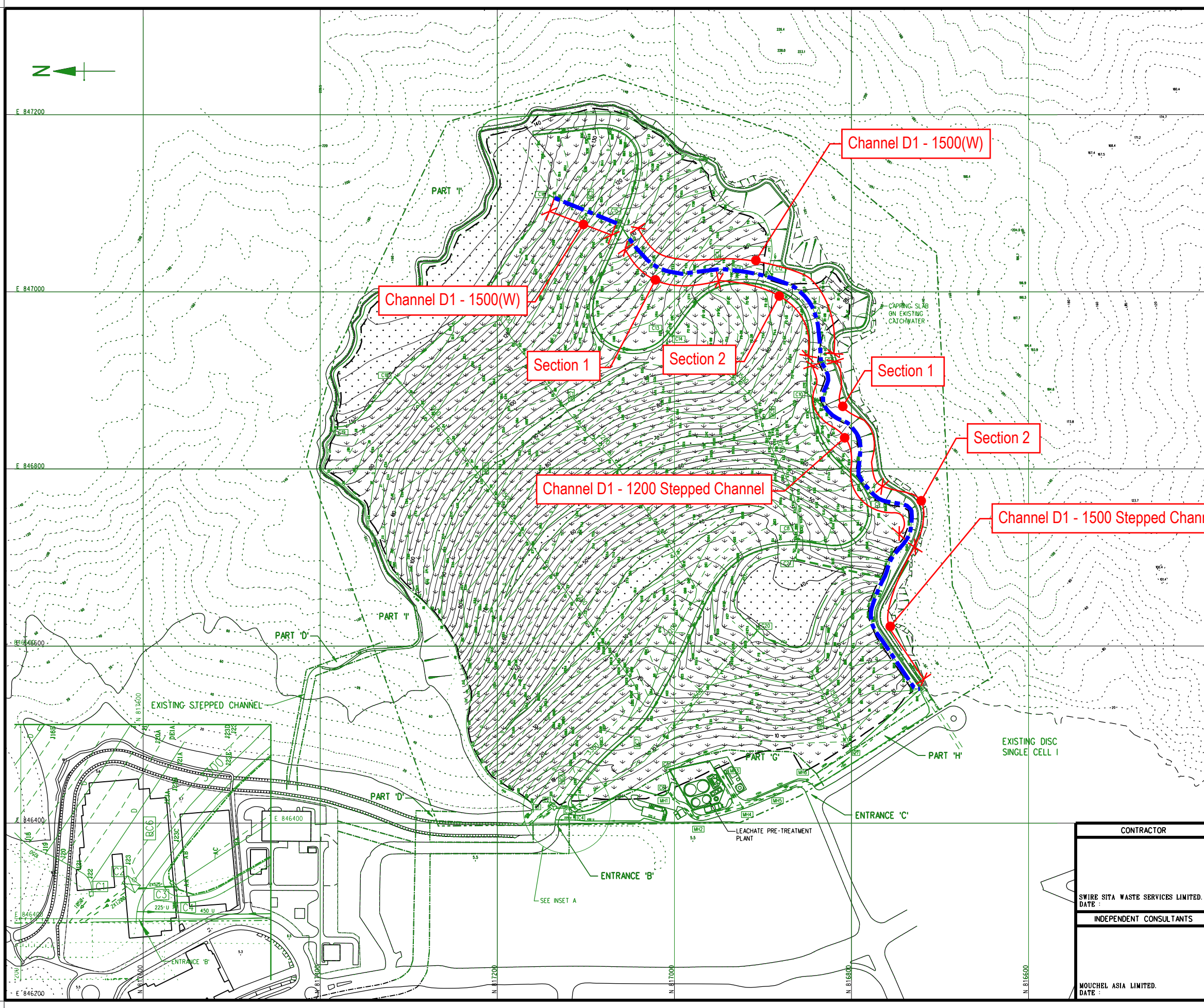
Drawing title

STAGE II/III
CAP LAYOUT PLAN

AS CONSTRUCTED RECORD DRAWING

Drawing no.	Scale
STG2/STE/DRW/003/R	1:2000

CONTRACTOR	Binnie Black & Veatch Hong Kong Limited
Construction Contractor	CHUN WO CONSTRUCTION & ENGINEERING CO., LTD.
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LEGEND:

	CAP TYPE 1
	CAP TYPE 2
	LIMIT OF LLDPE
	SITE BOUNDARY
	BOUNDARY BETWEEN SITE PARTS
	CONTOURS
	CAP CONTOURS

Details of Revision		Date
Designed	Drawn	Checked
Initial		
Date		

Amendment to the Registered Design approved

CAD ref. MAN: A2STE003.DGN
REF: TKOSF-AB, S2-PTRO & RTKO-AIDGN

ENVIRONMENTAL PROTECTION DEPARTMENT
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Contract no. EP/SP/29/95

Contract title
TSEUNG KWAN O LANDFILLS RESTORATION

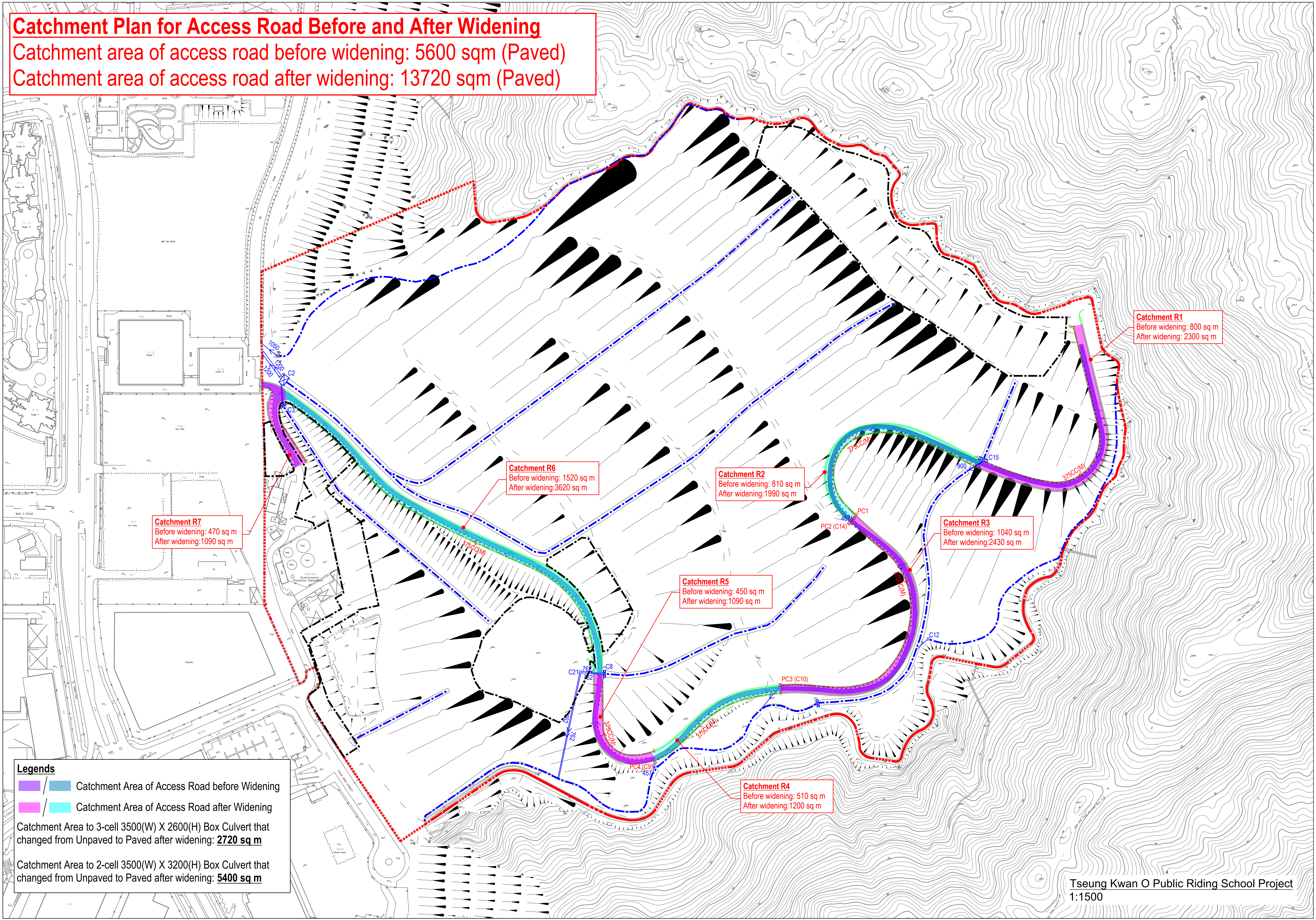
Drawing title
**STAGE II/III
CAP LAYOUT PLAN**

AS CONSTRUCTED RECORD DRAWING

Drawing no. STG2/STE/DRW/003/R	Scale 1:2000
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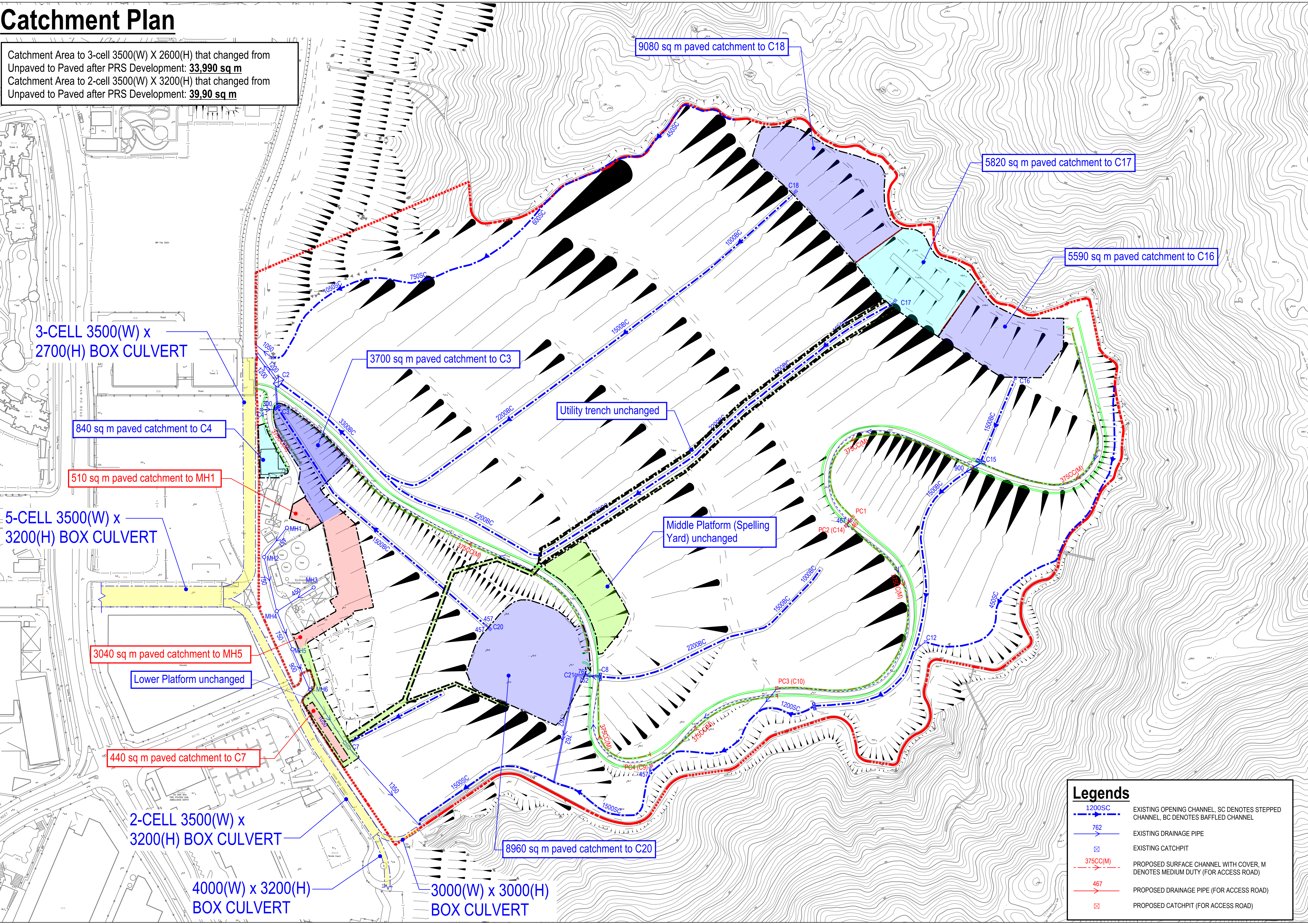
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Construction Contractor	CHUN WO CONSTRUCTION & ENGINEERING CO., LTD.
Environmental Consultants	ERM (HK) LTD.
Independent Consultants	MOUCHEL ASIA LIMITED CONSULTING ENGINEERS
MOUCHEL ASIA LIMITED. DATE :	SWIRE SITA WASTE SERVICES LTD.

Catchment Plan for Access Road Before and After Widening
Catchment area of access road before widening: 5600 sqm (Paved)
Catchment area of access road after widening: 13720 sqm (Paved)



Catchment Plan

Catchment Area to 3-cell 3500(W) X 2600(H) that changed from Unpaved to Paved after PRS Development: **33,990 sq m**
Catchment Area to 2-cell 3500(W) X 3200(H) that changed from Unpaved to Paved after PRS Development: **39,90 sq m**



Legends

1200SC

762

375CC(M)

467

EXISTING OPENING CHANNEL, SC DENOTES STEPPED CHANNEL, BC DENOTES BAFFLED CHANNEL

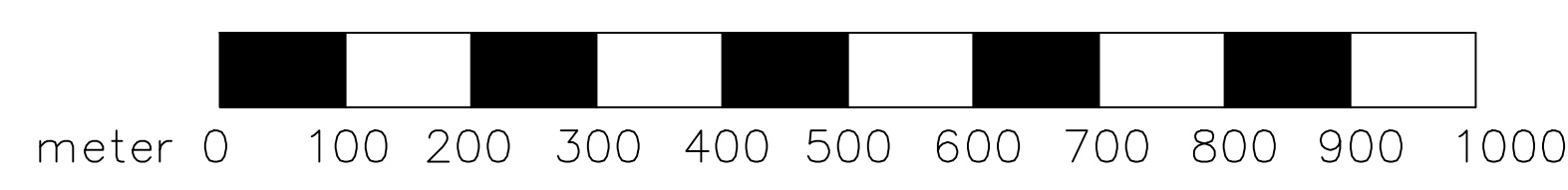
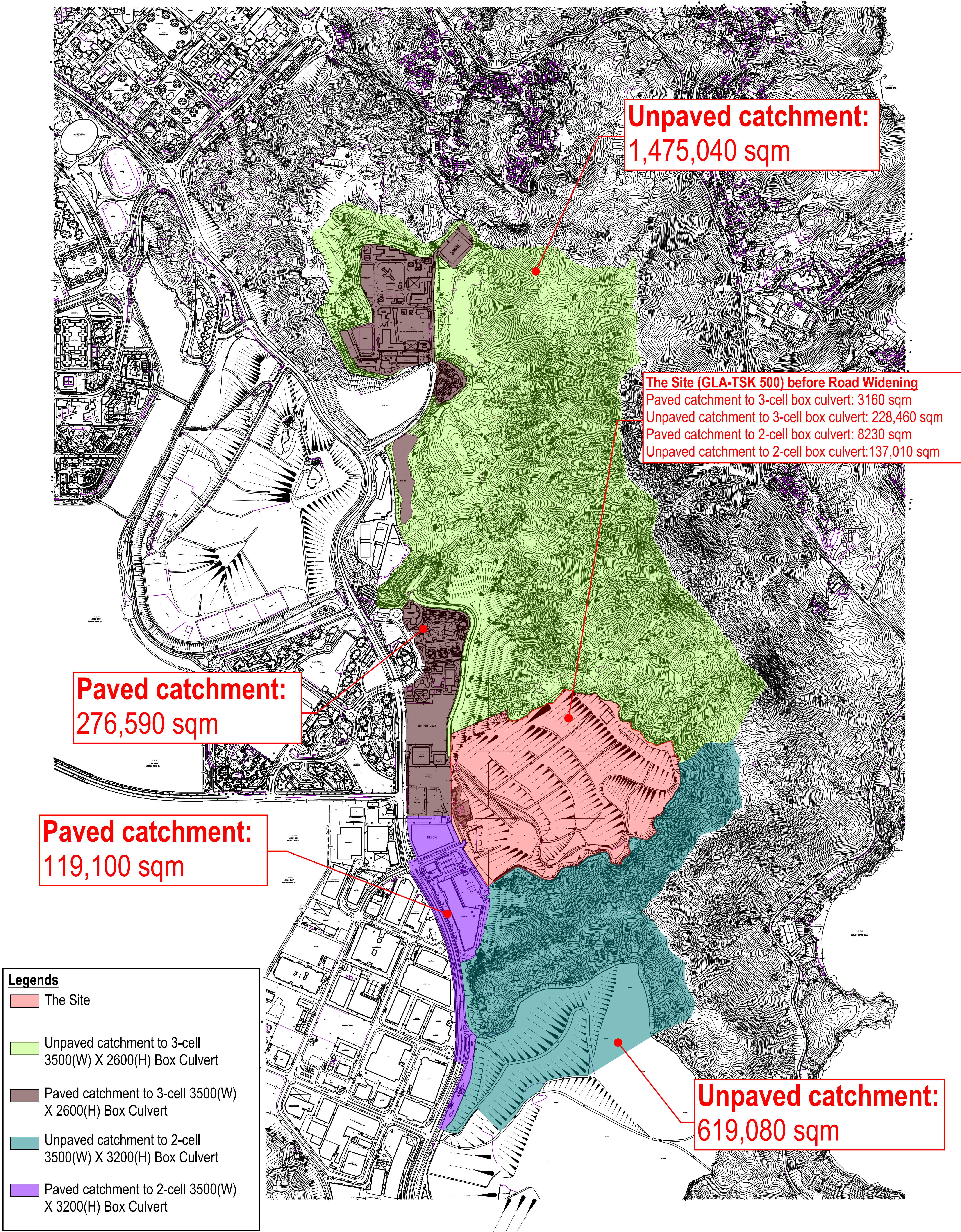
EXISTING DRAINAGE PIPE

EXISTING CATCHPIT

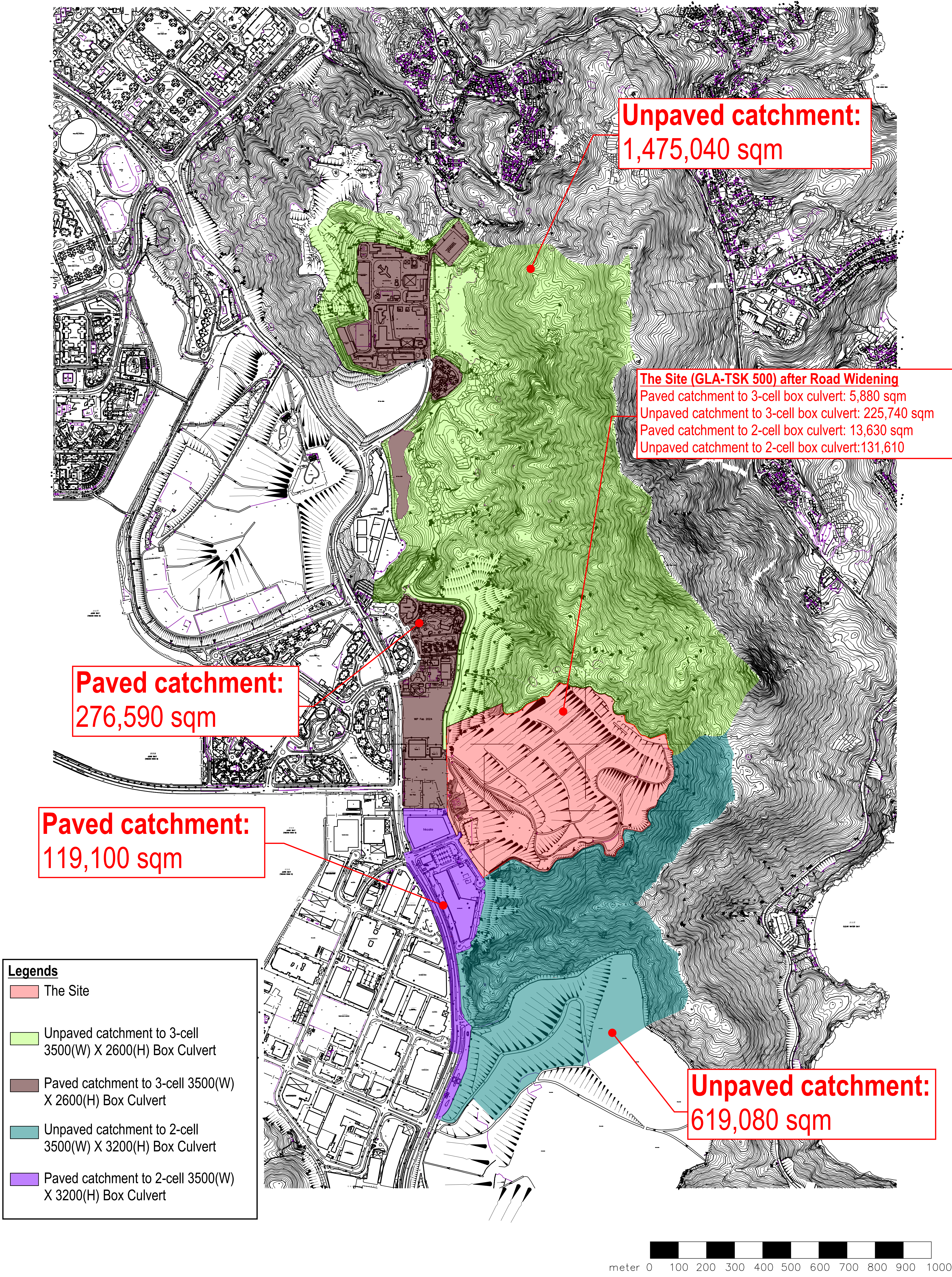
PROPOSED SURFACE CHANNEL WITH COVER, M DENOTES MEDIUM DUTY (FOR ACCESS ROAD)

PROPOSED DRAINAGE PIPE (FOR ACCESS ROAD)

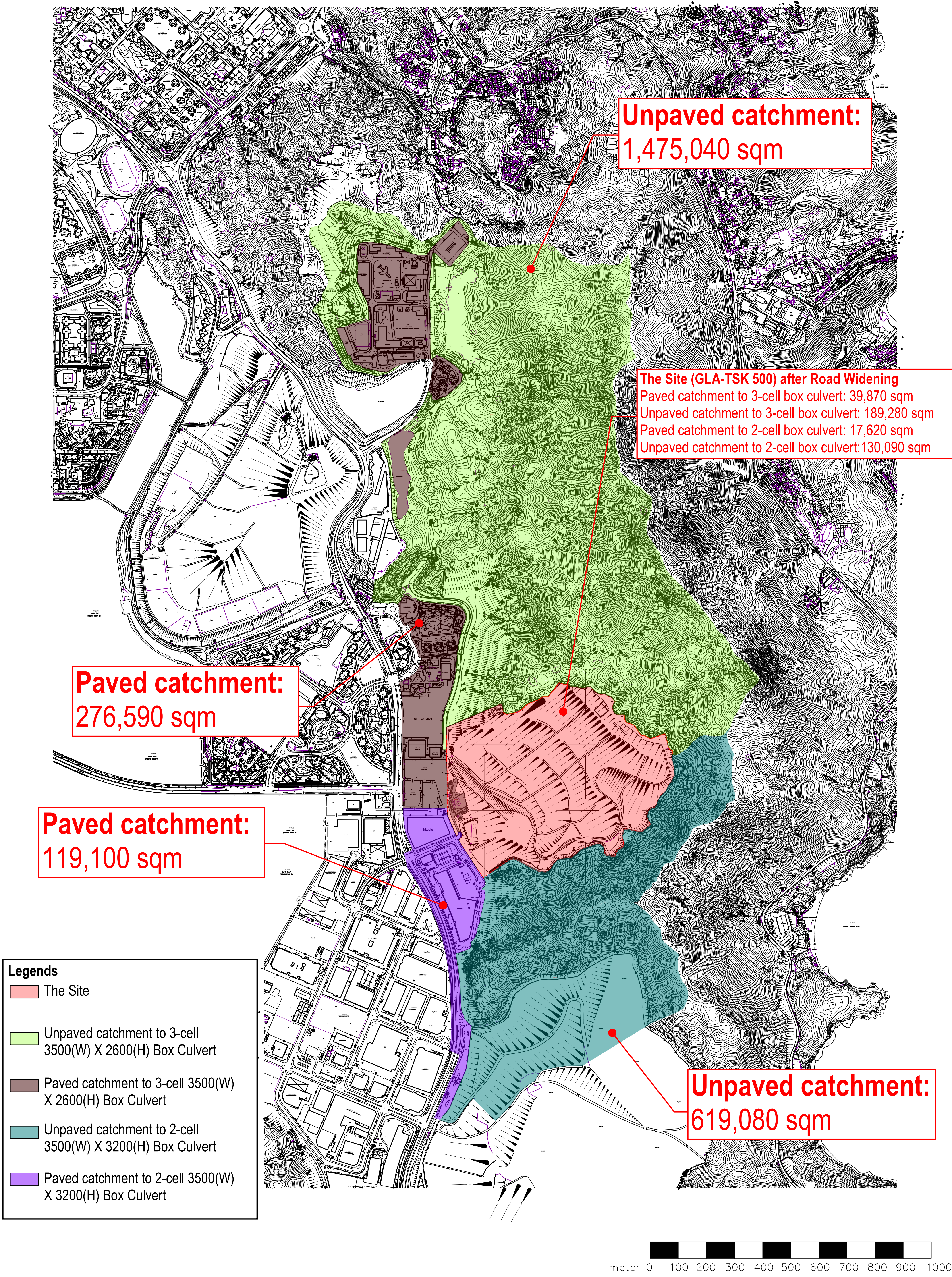
PROPOSED CATCHPIT (FOR ACCESS ROAD)



**Tseung Kwan O Sitewide Catchment Plan
before Road Widening and PRS Development**



Tseung Kwan O Sitewide Catchment Plan after Road Widening

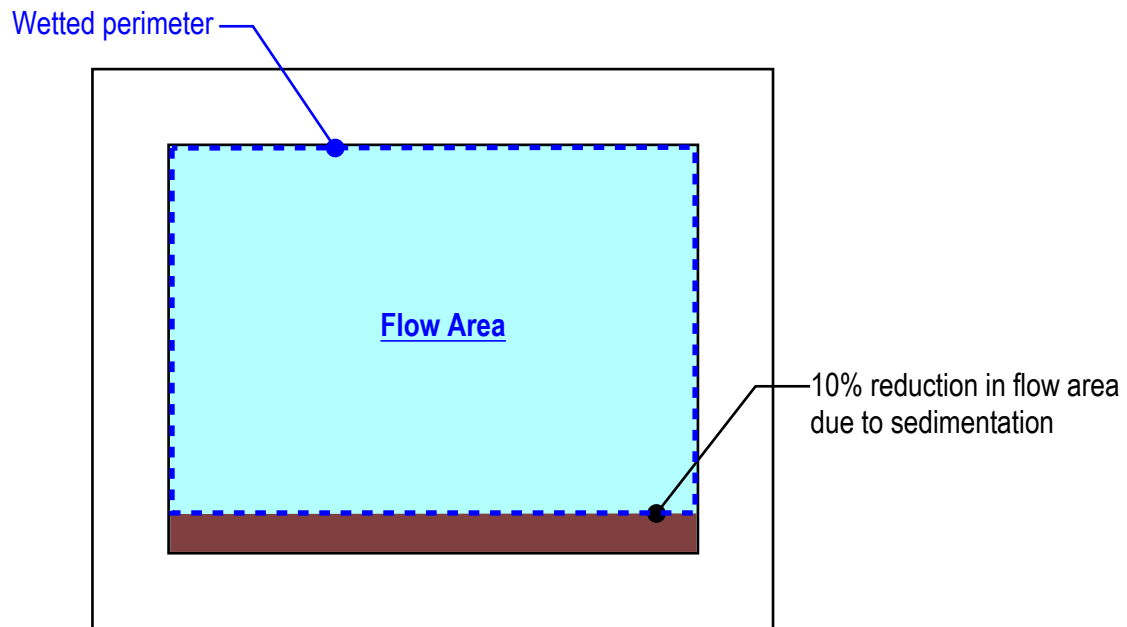


Tseung Kwan O Sitewide Catchment Plan after PRS Development

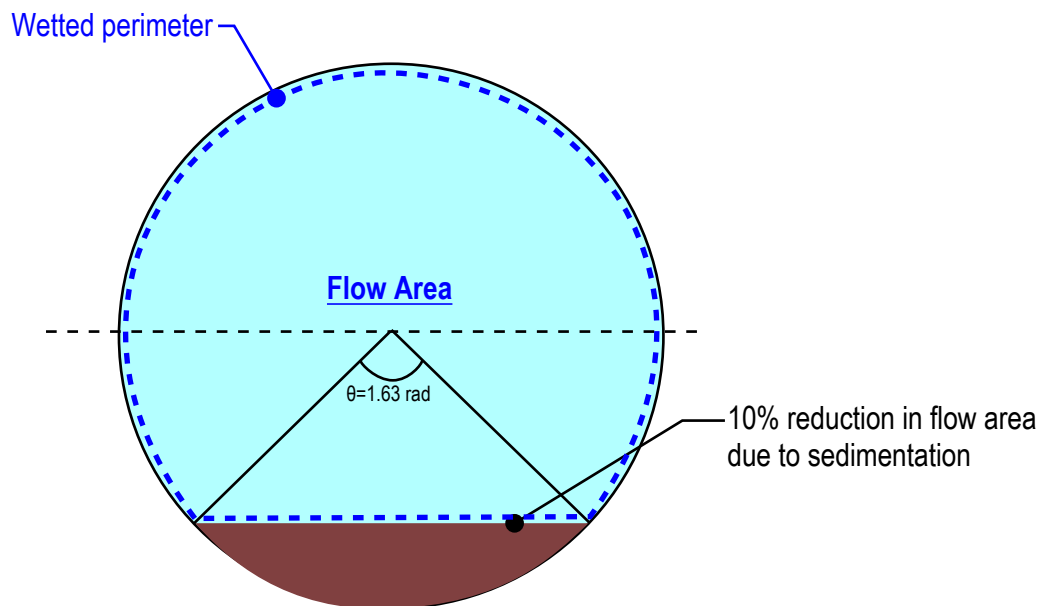
Appendix D

Hydraulic Calculations

DEPOSITION OF SEDIMENTS IN BOX CULVERT AND UNDERGROUND PIPE



TYPICAL SECTION OF BOX CULVERTS FOR HYDRAULIC CALCULATION



TYPICAL SECTION OF UNDERGROUND PIPE FOR HYDRAULIC CALCULATION

ARUP 4th Floor Proposed Public Riding School Development at the Restored Teung Kwan O Landfill Stage I/II (TKOL I/II) in TKO Area 105, Teung Kwan O (GLA TSK-500) Hydraulic Checking of Existing Drainage System	Job No.		
	Client Name		
	Site No.		
	Revision No.		
DL		Date	16 January 2026
		Drawn	CC

Table A1 Capacity Checking of Existing Drainage System before PRS Development and Road Widening

Column 1	Upstream Manhole/ Box Culvert Reference			
Column 2	Downstream Manhole/ Box Culvert Reference			
Column 3	Pipe/Box Culvert Length			
Column 4	Pipe Size in mm			
Column 5	Box Culvert Width and Height in mm			
Column 6	Channel or Pipe			
Column 7	Upstream Manhole/ Catchpit Ground Level in mPD			
Column 8	Downstream Manhole/ Catchpit Ground Level in mPD			
Column 9	Upstream Manhole/ Catchpit Invert Level in mPD			
Column 10	Downstream Manhole/ Catchpit Invert Level in mPD			
Column 11	Upstream Soil Cover to Pipe			
Column 12	Downstream Soil Cover to Pipe			
Column 13	Pipe/ Channel Gradient			
Column 14	Pipe/ Channel Gradient (1 in X) = 1 / Gradient from Column 12			
Column 15	Drain Flow Area in m ²			
Column 16	Wetted Perimeter in m			
Column 17	Hydraulic Radius in m (R=A/P)			
Column 18	Velocity at Full Bore from Manning Equation for Box Culvert/ Channels			
$V = \frac{1.49}{n} R^{2/3} S^{1/2}$		where	n ²	0.014 0.050
Velocity at Full Bore from Colebrook-White Equation for Pipe				Box Culvert Surface Channels Ballast Channel
$f = \frac{16}{Re^{1.1}} \log \left(\frac{14.8}{Re} + \frac{4.75}{\frac{R}{\epsilon}} \right)^{12.5}$		where	v ²	0.00001
Column 19	Time of Flow T _f (Length from Column 3/ Velocity at Full Bore from Column 18)			
Column 20	Time of Concentration T _c (Time of Inlet + Slen + Time of Flow from Column 19)			
Column 21	Rainfall Intensity in mm/hr			
$I = \frac{a}{b + T_c^c}$				
where,				
a=	50-Year 505.9	200-Year 508.8	(Extracted from DSD Stormwater Drainage Manual Table 3a)	
b=	3.29	3.46		
c=	0.355	0.322		

Column 22	Paved Catchment Area in m ²
Column 23	Runoff Coefficient of Paved Runoff Coefficient; K<0.90 for Paved Area
Column 24	Unpaved Area Catchment Area in m ²
Column 25	Runoff Coefficient of Unpaved Area Catchment Area in m ² ; K<0.35 for Unpaved Area
Column 26	Cumulative Effective Catchment Area (Effective Catchment Area + Catchment Area x Runoff Coefficient)
Column 27	Peak Runoff in m ³ /sec and l/sec
Column 28	Pipe/ Channel Capacity
Column 29	Percentage of Flow to Pipe/ Channel Capacity
Column 30	Remark

#REF1

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)																																		
US MH	DS MH	Length	Pipe Size (d)	Bottom Width	Channel Height	Side Slope (H:V)	Pipe/ Trapezoidal/ Box Culvert	US GL	DS GL	US IL	DS L	US Soil Cover	DS Soil Cover	Gradient	Gradient	Pipe/ Channel Area	Perimeter	R=A/P	Velocity at Full Bore	T _f	T _c	Intensity	Paved Area	Runoff Coefficient	Unpaved Area	Runoff Coefficient	Cumulative Effective Catchment Area	Q	Q	Capacity	Capacity	Percent of Flow to Capacity	Remark																														
(m)	(mm)	(mm)	(mm)	(mm)	(mm)	(K:1)		(mPD)	(mPD)	(mPD)	(mPD)	(mm)	(mm)		(1 in x)	(m ²)	(m)		(m/s)	(min)	(min)	(mm/hr)	(m ²)		(m ²)		(m ²)	(m ³ /sec)	(l/sec)	(m ³ /sec)	(l/sec)	(%)																															
Existing Channels within GLA TSK 500 - 50 Year																																																															
Channel B - 1000W	Channel B - 1000W	7.00	457	-	-	-	Pipe	132.39	131.00	130.73	130.50	1.29	0.54	0.104	9.59	0.15	1.40	0.11	7.42	0.02	5.50	264.82	0	0.90	10140	0.35	3540.00	0.26	2611.07	1.10	1096.07	23.82	Catchment B																														
	Channel B - 1500W	69.52	-	1000	1000	-	Trapezoidal	131.00	101.00	130.00	100.00	-	-	0.262	3.31	2.56	7.14	0.30	4.62	0.36	3.02	264.69	0	0.90	14899	0.35	4780.50	0.64	644.43	11.84	1183.01	6.44	Catchment B																														
	Channel B - 2200 W (Section 1)	76.36	-	1000	1000	-	Trapezoidal	101.00	82.00	100.00	81.00	-	-	0.249	4.02	2.86	6.44	0.34	4.04	0.31	6.37	269.91	0	0.90	12074.50	0.35	3584.50	0.94	938.61	11.56	1159.59	6.13	Catchment B																														
	Channel B - 2200 W (Section 2)	247.85	-	2200	1000	-	Trapezoidal	82.00	20.00	81.00	19.00	-	-	0.250	4.06	3.20	9.78	0.34	4.03	1.02	8.89	237.43	0	0.90	40620	0.35	27191.50	1.94	1844.40	13.26	13264.40	14.06	Catchment B																														
Channel B - 2200 W (Section 2)	Channel B - 3300 W	49.85	-	2200	1000	-	Trapezoidal	20.00	16.00	19.00	15.00	-	-	0.092	12.20	3.20	9.78	0.34	3.31	0.35	6.71	241.74	0	0.90	2119.50	0.35	27191.50	1.87	1871.50	7.50	7509.51	24.66	Catchment B																														
C17	Channel C - 1000W	4.65	457	-	-	-	Twin Pipe	133.78	131.00	130.74	130.50	2.58	0.54	0.109	6.28	0.15	1.40	0.11	9.18	0.01	5.00	264.82	0	0.90	5970	0.35	2095.50	0.15	153.71	2.71	2711.81	5.67	Catchment C																														
	Channel C - 1500W	54.60	-	1000	1000	-	Trapezoidal	131.00	115.00	130.00	114.00	-	-	0.288	3.48	2.56	7.14	0.36	4.51	0.21	5.01	264.73	0	0.90	7190	0.35	4595.50	0.34	337.63	11.55	11543.73	2.82	Catchment C																														
	Channel C - 1500W	87.00	-	1500	1000	-	Trapezoidal	115.00	92.00	114.00	91.00	-	-	0.295	3.57	2.86	6.44	0.34	4.59	0.32	5.21	265.44	0	0.90	11180	0.35	3501.50	0.82	819.76	12.27	12273.13	5.95	Catchment C																														
	Channel C - 2200 W (Section 1)	260.00	-	2200	1000	-	Trapezoidal	92.00	32.00	81.00	31.00	-	-	0.200	5.00	3.20	9.78	0.34	3.61	1.16	5.53	259.04	0	0.90	47450	0.35	25109.00	1.81	1803.72	11.86	11865.51	15.23	Catchment C																														
Channel C - 2200 W (Section 2)	Channel B - 3300 W	163.00	-	2200	1000	-	Trapezoidal	32.00	16.00	31.00	15.00	-	-	0.098	16.19	3.20	9.78	0.34	2.53	1.08	6.69	247.96	0	0.90	1910	0.35	2677.50	1.78	1775.90	8.31	8309.11	21.37	Catchment C																														
Channel B - 3300 W	C2	129.67	-	3300	1000	-	Trapezoidal	16.00	7.20	14.80	6.90	-	-	0.066	14.74	5.20	13.34	0.40	2.34	0.94	7.87	244.71	0	0.90	0	0.35	82969.00	3.60	3600.62	12.38	12383.20	29.98	Catchment B & C																														
C20	Channel E - 1000W (Section 1)	6.08	457	-	-	-	Twin Pipe	38.00	37.00	36.77	36.00	0.82	0.94	0.127	7.30	0.15	1.40	0.11	8.19	0.01	5.00	264.82	0	0.90	3620	0.35	3387.00	0.25	247.68	2.42	2417.27	10.25	Catchment E																														
	Channel E - 1000W (Section 2)	69.33	-	1000	1000	-	Trapezoidal	10.00	10.00	36.00	0.00	-	-	0.272	3.88	2.56	7.14	0.36	19.80	0.05	5.01	264.68	0	0.90	23000	0.35	61434.50	0.84	840.70	48.13	48130.80	1.75	Catchment E																														
	Channel E - 1000W (Section 2)	76.36	525	-	1000	1000	-	Trapezoidal	10.00	6.63	9.00	5.85	2.56	0.046	22.13	2.86	6.44	0.34	7.38	0.17	5.10	263.69	0	0.90	0	0.35	11434.50	0.84	837.56	2.12	2110.48	3.97	Catchment E																														
	C3	C2	19.83	525	-	-	-	Twin Pipe	5.83	5.70	3.95	3.15	2.56	2.03	0.240	24.54	0.19	1.60	0.12	5.00	0.07	5.27	261.80	1290	0.90	0	0.35	51650.00	1.03	1029.74	1.95	1949.96	62.83	Access Road R6 & R7-Catchment E																													
C2	3-Cel 3500(W) X 2700(H) BC	32.60	1200	-	-	-	Twin Pipe	7.20	5.70	2.82	2.23	3.18	2.27	0.618	56.25	1.02	3.67	0.28	5.52	0.10	7.99	237.40	1290	0.90	0	0.35	86250.00	4.50	4503.40	11.24	11242.37	40.50	Catchment B, C, E & H																														
C4	C3	11.80	300	-	-	-	Pipe	5.42	6.83	3.91	3.69	1.19	2.84	0.022	45.83	0.06	0.92	0.07	2.60	0.07	5.00	264.82	350	0.90	1770	0.35	934.56	0.07	68.74	0.17	165.11	41.64	Part of Catchment H																														
C16	Channel D1 - 1500W	4.30	457	-	-	-	Twin Pipe	133.45	132.00	131.80	131.00	1.14	0.54	0.108	5.08	0.15	1.40	0.11	10.24	0.01	5.00	264.82	0	0.90	7270	0.35	2644.50	0.19	187.18	3.02	3023.79	6.19	Catchment D1																														
	Channel D1 - 1500W	76.80	-	1500	1000	-	Trapezoidal	134.00	113.06	131.00	110.06	-	-	0.265	3.78	2.86	6.44	0.34	17.86	0.07	5.01	264.74	0	0.90	17658	0.35	8792.00	0.69	646.57	31.89	31086.12	1.27	Catchment D1																														
	C16	Channel D1 - 1800W (Section 1)	17.60	762	-	1500	1000	-	Twin Pipe	111.60	109.00	109.41	108.00	2.51	0.24	0.103	42.03	0.41	2.33	0.18	4.16	0.08	5.08	263.94	0	0.90	0	0.35	4792.00	0.64	644.50	3.91	3910.69	16.49	Catchment D1																												
	Channel D1 - 1800W (Section 2)	119.61	-	1500	1000	-	Trapezoidal	104.00	88.00	100.00	87.00	-	-	0.184	5.44	2.86	6.44	0.34	14.89	0.13	5.14	263.25	800	0.90	0	0.35	16850	0.35	16109.50	1.16	1178.01	42.59	42594.05	2.77	Catchment D1 and Access Road R1																												
Channel D1 - 1800W (Section 2)	C11	178.00	-	1500	1000	-	Trapezoidal	86.00	22.00	87.00	21.00	-	-	0.095	11.13	2.86	6.44	0.34	10.41	0.27	5.00	263.78	1770	0.90	0	0.35	24360.00	1.77	1172.86	20.77	20768.84	5.96	Catchment D1																														
C11	Channel D1 - 1200 Stepped Channel (Section 1)	182.79	-	1200	-	-	U-Shaped Stepped	72.00	56.00	70.80	54.80	-	-	0.088	11.42	1.29	3.08	0.42	11.79	0.26	5.56	258.76	1850	0.90	17930	0.35	32320.50	2.32	2323.10	15.16	15165.46	15.33	Access Road R2 and R3																														
Channel D1 - 1200 Stepped Channel (Section 1)	Channel D1 - 1200 Stepped Channel (Section 2)	78.49	-	1200	-	-	U-Shaped Stepped	56.00	54.00	54.80	52.80	-	-	0.025	39.25	1.29	3.08	0.42	6.36	0.21	5.82	256.13	510	0.90	0	0.35	32779.50	2.33	2332.14	8.18	8176.98	28.52	Access Road R4																														
Channel D1 - 1200 Stepped Channel (Section 2)	Channel D1 - 1500 Stepped Channel	195.24	-	1500	-	-	U-Shaped Stepped	54.00	6.00	52.50	4.50	-	-	0.246	4.07	2.01	3.86	0.52	22.93	0.14	6.02	254.10	450	0.90	42050	0.35	47902.00	3.38	3381.14	46.05	46051.97	7.34	Catchment D2 and Access Road R5																														
MH1	MH2	32.89	750	-	-	-	Pipe	6.02	5.99	3.78	3.37	1.49	1.47	0.012	80.22	0.40	2.29	0.17	3.44	0.16	5.00	264.82	4620	0.90	8550	0.35	7150.50	0.53	526.01	1.37	1367.27	38.47	Catchment I																														
MH2	MH4	49.84	750	-	-	-	Pipe	5.59	5.43	3.36	3.11	1.48	1.57	0.005	199.36	0.40	2.29	0.17	3.16	0.38	5.00	264.82	0	0.90	0	0.35	7150.50	0.53	526.01	0.88	863.76	61.11	Catchment I																														
MH3	MH5	39.76	750	-	-	-	Pipe	5.67	5.59	3.69	3.40	1.53	1.60	0.014	91.29	0.40	2.29	0.17	3.09	0.49	5.00	264.82	0	0.90	0	0.35	7150.50	0.53	526.01	1.22	1226.21	41.22	Catchment I																														
MH5	MH6	39.84	750	-	-	-	Pipe	5.59	5.36	2.36	2.32	1.81	2.14	0.009	114.91	0.57	2.75	0.21	3.00	0.26	5.00	264.82	0	0.90	0	0.35	7150.50	0.53	526.01	1.83	1833.98	28.68	Catchment I																														
MH6	MH8	17.60	1350	-	-	-	Pipe	6.66	6.66	3.98	3.98	1.20	1.28	0.001	120.30	0.78	2.75	0.21	3.00	0.26	5.00	264.82	0	0.90	0	0.35	7150.50	0.53	526.01	1.70	1702.01	26.26	Catchment I																														
C7	1-Cel 3000(W) X 3000(H) BC	99.00	1350	-	-	-	Pipe	6.66	6.66	3.79	1.38	3.55	-	-	0.004	260.53	0.81	4.12	0.17	3.31	2.70	0.61	5.00	264.82	0	0.90	13400	0.35	12519.50	0.92	920.86	3.48	3484.69	26.43	Catchment F																												
Existing Public Works - Road																																																															
1-Cel 3500(W) X 2700(H) BC	1-Cel 3500(W) X 2700(H) BC	-	-	-	3500	2700	-	-	-	-	-	-	-	-	-	0.002	500.00	1.29	8.36	1.02	3.23	-	-	5.00	264.82	272750	0.90	170350	0.35	84800.00	82.38	82444.41	75.66																														
1-Cel 3000(W) X 3000(H) BC	1-Cel 3000(W) X 3000(H) BC	22.65	-	-	3000	3000	-	-	-	-	-	-	-	-	-	0.005	185.00	0.10	8.40	0.96	5.13	0.07	5.00	264.82	8230	0.90	301890	0.35	120068.00	3.83	8832.50	41.52	41518.50	21.37																													
1-Cel 3000(W) X 3000(H) BC	2-Cel 3000(W) X 3000(H) BC	24.94	-	-	3000	3000	-	-	-	-	-	-	-	-	-	0.001	700.00	0.84	8.76	0.99	2.68	0.17	5.00	264.82	8230	0.90	0	0.35	120068.00	3.86	8804.83	23.11	23112.30	38.20																													
1-Cel 3000(W) X 3000(H) BC	1-Cel 3000(W) X 3000(H) BC	197.24	-	-	3000	3000	-	-	-	-	-	-	-	-	-	0.005	185.00	0.10	8.40	0.96	5.13	0.07	5.00	264.82	8230	0.90	301890	0.35	120068.00	3.83	8832.50	41.52	41518.50	21.37																													

ARUP	Job No.	Draw No.		Rev.
				02
	Project Location			
	Proj. Desc.			
Job Title	Proposed Public Riding School Development at the Restored Teung Kwan O Landfill Stage I/II (TKOL I/II) in TKO Area 105, Teung Kwan O (SLA TSK-000)			
Hydraulic	Checking of Existing Drainage System			
Drawn by	DL	Drawn by	DL	Check by
Issue Date	16 January 2026	Issue Date	16 January 2026	Issue Date

Table A1 Capacity Checking of Existing Drainage System before PRS Development and Road Widening

Column 1	Upstream Manhole/ Box Culvert Reference	Column 22	Paved Catchment Area in m ²																														
Column 2	Downstream Manhole/ Box Culvert Reference	Column 23	Runoff Coefficient of Paved Runoff Coefficient; K=0.90 for Paved Area																														
Column 3	Pipe/Box Culvert Length	Column 24	Unpaved Area Catchment Area in m ²																														
Column 4	Pipe Size in mm	Column 25	Runoff Coefficient of Unpaved Area Catchment Area in m ² ; K=0.35 for Unpaved Area																														
Column 5	Box Culvert Width and Height in mm	Column 26	Cumulative Effective Catchment Area (Effective Catchment Area + Catchment Area x Runoff Coefficient)																														
Column 6	Channel or Pipe	Column 27	Peak Runoff in m ³ /sec and l/sec																														
Column 7	Upstream Manhole/ Catchpit Ground Level in mPD	Column 28	Pipe/Channel Capacity																														
Column 8	Downstream Manhole/ Catchpit Ground Level in mPD	Column 29	Percentage of Flow to Pipe/Channel Capacity																														
Column 9	Upstream Manhole/ Catchpit Invert Level in mPD	Column 30	Remark																														
Column 10	Downstream Manhole/ Catchpit Invert Level in mPD																																
Column 11	Upstream Soil Cover to Pipe																																
Column 12	Downstream Soil Cover to Pipe																																
Column 13	Pipe/Channel Gradient																																
Column 14	Pipe/Channel Gradient (1 in X) = 1 / Gradient from Column 12																																
Column 15	Drain Flow Area in m ²																																
Column 16	Wetted Perimeter in m																																
Column 17	Hydraulic Radius in m (R=AP)																																
Column 18	Velocity at Full Bore from Manning Equation for Box Culvert/Channels																																
$V = \frac{1.49}{n} R^{2/3} S^{1/2}$ where n =		0.014 Box Culvert Surface Channels 0.060 Ballast Channel (Extracted DSD Stormwater Drainage Manual Table 13)																															
Velocity at Full bore from Colebrook-White Equation for Pipe		v = 0.00001																															
$V = \frac{1.49}{n} R^{2/3} S^{1/2} \log \left(\frac{K_s}{12R} + \frac{5.74}{R^{1/4} S^{1/4}} \right)$ where																																	
Time of Flow T _f (Length from Column 3/ Velocity at Full Bore from Column 18)																																	
Time of Concentration T _c (Time of Inlet + Inlet + Time of Flow from Column 19)																																	
Rainfall Intensity in mm/hr		#REF1																															
$I = \frac{1000}{9 + T_c^{0.77}}$																																	
where,																																	
a =	50-Year 506.5	200-Year 508.8	(Extracted from DSD Stormwater Drainage Manual Table 3a)																														
b =	3.29	3.46																															
c =	0.365	0.322																															
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)				
US MH	DS MH	Length	Pipe Size (d)	Bottom Width	Channel Height	Side Slope (H:V)	Pipe/ Trapezoidal/ Box Culvert	US GL	DS GL	US IL	DS L	US Soil Cover	DS Soil Cover	Gradient	Gradient	Pipe/ Channel Area	Perimeter	R = A/P	Velocity at Full Bore	T _f	Intensity	Paved Area	Runoff Coefficient	Unpaved Area	Runoff Coefficient	Cumulative Effective Catchment Area	Q	Q	Capacity	Capacity	Percent of Flow to Capacity	Remark	
(m)	(mm)	(mm)	(mm)	(mm)	(mm)	(K:1)	(mPD)	(mPD)	(mPD)	(mPD)	(m)	(m)	(m)	(1 in x)	(m ²)	(m)	(m)	(m)	(m/sec)	(mins)	(mm/hr)	(m ²)		(m ²)		(m ²)	(m ³ /sec)	(l/sec)	(m ³ /sec)	(l/sec)	(%)		
Existing Channels within (SLA-TSK) 200 Year																																	
C18	Channel B - 1000W	7.00	457	-	-	-	Pipe	132.39	131.00	130.73	130.00	1.20	0.54	0.104	9.59	0.15	1.40	0.11	7.42	0.02	5.00	281.96	0	0.90	10140	0.35	10435.00	0.28	2729.84	1.10	1006.07	25.54	Catchment B
Channel B - 1000W	Channel B - 1000W	69.52	-	1500	1000	2	Trapezoidal	131.00	101.00	130.00	100.00	-	-	0.240	3.31	2.56	7.14	0.36	4.52	0.36	3.02	283.79	0	0.90	14099	0.35	1700.50	0.69	601.60	11.84	1182.01	8.83	Catchment B
Channel B - 1500W	Channel B - 2200 W (Section 1)	78.36	-	1500	1000	2	Trapezoidal	101.00	82.00	100.00	81.00	-	-	0.240	4.02	2.56	6.44	0.34	4.04	0.31	5.37	285.04	0	0.90	12040	0.35	12074.50	0.91	1009.25	11.56	1150.59	8.73	Catchment B
Channel B - 2200 W (Section 1)	Channel B - 2200 W (Section 2)	247.85	-	2200	1000	2	Trapezoidal	82.00	20.00	81.00	15.00	-	-	0.250	4.00	3.20	9.78	0.34	4.03	1.02	5.89	276.89	0	0.90	40620	0.35	27191.50	2.02	2021.16	13.26	13264.46	16.77	Catchment B
Channel B - 2200 W (Section 2)	Channel B - 3300 W	49.85	-	2200	1000	2	Trapezoidal	20.00	16.00	19.00	15.00	-	-	0.085	19.20	3.20	9.78	0.34	3.31	0.35	6.71	281.09	0	0.90	2119.50	0.35	2021.16	7.50	750.91	29.60	Catchment B		
C17	Channel C - 1000W	4.65	457	-	-	-	Twin Pipe	133.78	131.00	130.74	130.00	2.58	0.54	0.150	6.28	0.15	1.40	0.11	9.18	0.01	5.00	283.96	0	0.90	5970	0.35	2089.50	0.16	164.81	2.71	2711.51	6.08	Catchment C
Channel C - 1000W	Channel C - 1500W	54.60	-	1000	1000	2	Trapezoidal	131.00	115.00	130.00	114.00	-	-	0.288	3.48	2.56	7.14	0.36	4.51	0.21	5.01	283.87	0	0.90	7190	0.35	4995.50	0.36	362.37	11.55	1154.71	3.14	Catchment C
Channel C - 1500W	Channel C - 2200 W (Section 1)	87.00	-	1500	1000	2	Trapezoidal	115.00	92.00	114.00	91.00	-	-	0.290	3.57	2.86	6.44	0.34	4.50	0.32	5.21	281.09	0	0.90	11180	0.35	8001.50	0.87	682.21	12.27	1227.13	5.24	Catchment C
Channel C - 2200 W (Section 1)	Channel B - 2200 W (Section 2)	250.00	-	2200	1000	2	Trapezoidal	92.00	32.00	81.00	31.00	-	-	0.200	5.00	3.20	9.78	0.34	3.61	1.16	5.53	278.44	0	0.90	47450	0.35	23108.00	1.84	1842.01	11.86	11862.51	16.37	Catchment C
Channel B - 2200 W (Section 2)	Channel B - 3300 W	163.00	-	2200	1000	2	Trapezoidal	32.00	16.00	31.00	15.00	-	-	0.098	16.19	3.20	9.78	0.34	2.53	1.08	6.68	267.80	0	0.90	1910	0.35	2677.50	1.92	1917.88	6.31	6308.11	23.08	Catchment C
Channel B - 3300 W	C2	129.67	-	3300	1000	2	Trapezoidal	16.00	7.20	14.80	6.00	-	-	0.066	14.14	5.20	13.38	0.40	2.34	0.92	7.07	264.67	0	0.90	0	0.35	62969.00	3.89	3894.27	12.38	12383.20	37.45	Catchment B & C
C20	Channel E - 1000W (Section 1)	6.08	457	-	-	-	Twin Pipe	38.00	37.00	36.77	36.00	0.82	0.94	0.127	7.86	0.15	1.40	0.11	8.10	0.01	5.00	283.96	0	0.90	3600	0.35	3887.00	0.27	265.58	2.24	2471.27	10.89	Catchment E
Channel E - 1000W (Section 1)	Channel E - 1000W (Section 2)	69.32	-	1000	1000	2	Trapezoidal	17.00	10.00	36.00	8.00	-	-	0.272	3.68	2.56	7.14	0.36	19.80	0.09	5.01	283.83	0	0.90	2300	0.35	1434.50	0.80	891.50	48.13	4813.86	1.87	Catchment E
Channel E - 1000W (Section 2)	C3	78.36	-	1500	1000	2	Trapezoidal	10.00	6.00	9.00	5.55	-	-	0.040	22.13	2.86	6.44	0.34	7.38	0.17	5.10	282.89	0	0.90	0	0.35	11434.50	0.90	888.51	21.11	2110.49	4.36	Catchment E
C3	C4	15.88	525	-	-	-	Twin Pipe	6.83	5.70	3.95	3.15	2.38	2.03	0.040	24.64	0.19	1.80	0.12	5.00	0.07	5.27	281.07	1690	0	0.35	11005.50	1.11	11005.50	1.85	1849.96	66.72	Access Road R6 & R7-Catchment E	
C4	3-Cul 3500(W) X 2700(H) BC	32.60	1200	-	-	-	Twin Pipe	7.20	5.70	2.82	2.23	3.18	2.27	0.018	95.25	1.02	3.67	0.28	5.52	0.10	7.59	257.60	1290	0.90	0	0.35	86250.00	4.88	4886.02	11.24	11242.37	33.47	Catchment B, C, E & H
C4	C3	11.00	300	-	-	-	Pipe	5.42	6.83	3.99	3.69	1.19	2.84	0.022	45.83	0.06	0.92	0.07	2.60	0.07	5.00	283.96	360	0.90	1770	0.35	934.50	0.07	73.71	0.17	165.11	44.64	Part of Catchment H
C16	Channel D1 - 1500W	4.30	457	-	-	-	Twin Pipe	133.45	132.00	131.80	131.00	1.14	0.54	0.198	5.08	0.15	1.40	0.11	10.24	0.01	5.00	283.96	0	0.90	7270	0.35	2644.50	0.20	200.70	3.02	3023.79	6.64	Catchment D1
Channel D1 - 1500W	Channel D1 - 1500W (Section 1)	17.60	762	-	-	-	Twin Pipe	111.60	109.00	108.41	108.00	2.51	0.24	0.093	42.03	0.41	2.33	0.18	4.76	0.08	5.00	283.11	0	0.90	0	0.35	8792.00	0.69	681.41	3.81	3810.66	17.68	Catchment D1
Channel D1 - 1500W (Section 1)	Channel D1 - 1500W (Section 2)	119.61	-	1500	1000	2	Trapezoidal	110.00	88.00	100.00	87.00	-	-	0.184	5.41	2.86	6.44	0.34	14.80	0.13	5.14	282.72	800	0.90	16850	0.35	16109.50	1.27	1205.11	42.59	42594.05	2.97	Catchment D1 and Access Road R1
Channel D1 - 1500W (Section 2)	C11	173.09	-	1500	1000	2	Trapezoidal	68.70	22.00	87.00	17.00	-	-	0.050	11.13	2.86	6.44	0.34	10.41	0.29	5.27	281.11	0	0.90	23830	0.35	23830.00	1.11	1005.11	20.17	2017.84	4.48	Catchment D1
C11	Channel D1 - 1200 Stepped Channel (Section 1)	182.79	-	1200	-	-	U-Shaped Stepped	72.00	56.00	70.80	54.80	-	-	0.088	11.42	1.29	3.08	0.42	11.79	0.26	5.56	278.42	1850	0.90	17930	0.35	32320.50	2.50	2499.61	15.16	15105.46	16.49	Access Road R2 and R3
Channel D1 - 1200 Stepped Channel (Section 1)	Channel D1 - 1200 Stepped Channel (Section 2)	78.49	-	1200	-	-	U-Shaped Stepped	56.00	54.00	54.80	52.80	-	-	0.029	39.25	1.29	3.08	0.42	6.36	0.21	5.82	276.90	510	0.90	0	0.35	32779.50	2.51	2512.16	8.18	8176.98	30.72	Access Road R4
Channel D1 - 1200 Stepped Channel (Section 2)	Channel D1 - 1500 Stepped Channel (Section 2)	195.24	-	1500	-	-	U-Shaped Stepped	54.00	60.00	52.50	4.50	-	-	0.246	40.27	2.01	3.86	0.52	22.93	0.14	6.02	273.96	450	0.90	42050	0.35	47902.00	3.65	3645.28	46.05	46051.97	7.92	Catchment D2 and Access Road R5
MH1	MH2	32.89	750	-	-	-	Pipe	6.02	5.59	3.78	3.37	1.49	1.47	0.012	80.22	0.40	2.29	0.17	3.44	0.16	5.00	283.96	4620	0.90	8950	0.35	7150.50	0.96	684.02	1.37	1367.27	41.25	Catchment I
MH3	MH4	49.84	750	-	-	-	Pipe	5.99	5.43	3.36	3.11	1.49	1.57	0.009	199.36	0.40	2.29	0.17	3.48	0.16	5.00	283.96	0	0.90	0	0.35	7150.50	0.96	684.02	0.80	800.76	65.03	Catchment I
MH4	MH5	36.76	750	-	-	-	Pipe	5.43	5.37	3.09	2.89	1.59	1.93	0.011	91.80	0.40	2.29	0.17	3.21	0.19	5.00	283.96	0	0.90	0	0.35	7150.50	0.96	684.02	0.80	800.76	65.03	Catchment I
MH5	MH6	33.07	800	-	-	-	Pipe	5.37	5.36	2.86	2.84	1.81	2.14	0.009	114.91	0.67	2.75	0.21	3.20	0.20	5.00	283.96	0	0.90	0	0.35	7150.50	0.96	684.02	1.83	1833.98	30.75	Catchment I
MH6	MH7	33.07	800	-	-	-	Pipe	5.36	5.36	2.86	2.86	1.81	2.14	0.009	114.91	0.67	2.75	0.21	3.20	0.20	5.00	283.96	0	0.90	0	0.35	7150.50	0.96	684.02	1.83	1833.98	30.75	Catchment I
C7	1-Cul 3000(W) X 3000(H) BC	99.00	1350	-	-	-	Pipe	6.66	6.66	2.76	1.58	0.55	0.28	0.004	260.53	1.29	4.12	0.51	2.70	0.01	5.00	283.96	0	0.90	13340	0.35	12519.50	0.99	887.51	5.48	5484.09	28.34	Catchment F
Existing Pipe and Drainage Network - 200 Year																																	
1-Cul 3000(W) X 2700(H) BC	1-Cul 3000(W) X 2700(H) BC	-	-	-	-	-	Box Culvert	-	-	-	-	-	-	0.004	500.00	8.51	8.38	1.92	1.33	-	-	5.00	284.22	2797.50									

Column 1	Upstream Manhole Box Culvert Reference
Column 2	Downstream Manhole Box Culvert Reference
Column 3	Pipe/Box Culvert Length
Column 4	Pipe Size in mm
Column 5	Box Culvert Width and Height in mm
Column 6	Channel or Pipe
Column 7	Upstream Manhole Catchpit Ground Level in mPD
Column 8	Downstream Manhole Catchpit Ground Level in mPD
Column 9	Upstream Manhole Catchpit Invert Level in mPD

$F = \frac{\rho \cdot V^2 \cdot C_d}{\gamma \cdot H}$	where $F = \frac{\rho \cdot V^2 \cdot C_d}{\gamma \cdot H}$	0.014	Box Culvert Surface Channels	(Extracted DSD Stormwater Drainage Manual Table 13)
Velocity at Full flow from Colebrook-White Equation for Pipe $V = \frac{1.49 R^{2/3} S^{1/2}}{K_s + \frac{1.49 R^{2/3} S^{1/2}}{14.83 \log \left(\frac{R}{3.7 K_s} \right)}}$	where $V = \frac{1.49 R^{2/3} S^{1/2}}{K_s + \frac{1.49 R^{2/3} S^{1/2}}{14.83 \log \left(\frac{R}{3.7 K_s} \right)}}$	0.060	Box Culvert Surface Channels Suffled Channel	
		v=	0.000001	

where,	50-Year	200-Year	
a=	505.5	508.8	(Extracted from DSD Stormwater Drainage Manual Table 3a)
b=	3.29	3.46	
c=	0.305	0.322	

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Table A2 Capacity Checking of Existing Drainage System after PRS Development and Road Widening

Column 22	Paved Catchment Area in m ²
Column 23	Runoff Coefficient of Paved Runoff Coefficient; K=0.90 for Paved Area
Column 24	Unpaved Area Catchment Area in m ²
Column 25	Runoff Coefficient of Unpaved Area Catchment Area in m ² ; K=0.35 for Unpaved Area
Column 26	Cumulative Effective Catchment Area (Effective Catchment Area = Catchment Area x Runoff Coefficient)
Column 27	Peak Runoff in m ³ /sec and l/sec
Column 28	Pipe/ Channel Capacity
Column 29	Percentage of Flow to Pipe/ Channel Capacity
Column 30	Remark

Velocity at Full bore from Colebrook-White Equation for Pipe

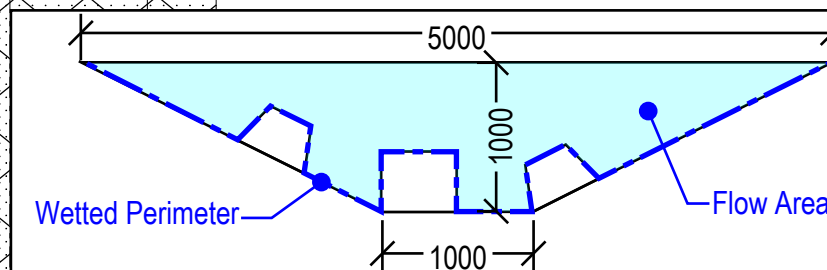
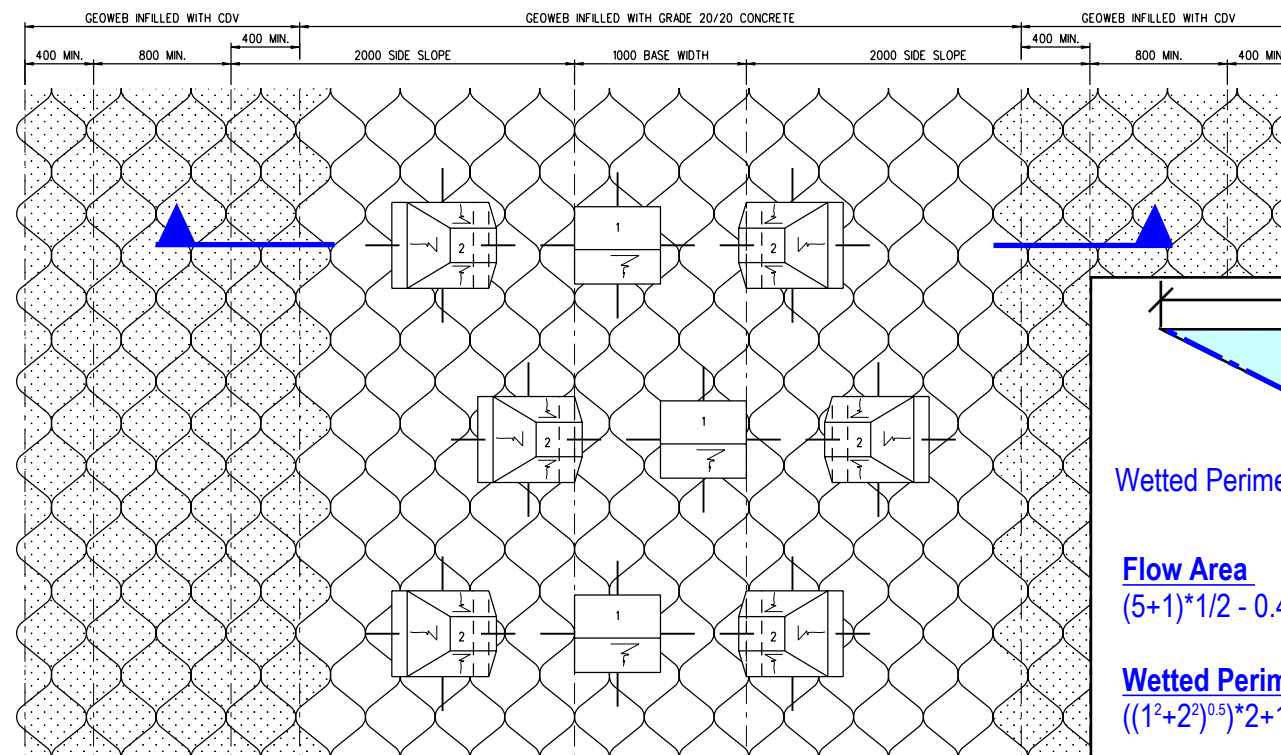
Column 20 Time of Concentration T_c (Time of Inlet = 5 min + Time of Flow from Column 19)

Column 21 Rainfall Intensity in mm/hr

	50-Year	200-Year
a=	505.5	508.8
b=	3.29	3.46
c=	0.355	0.322

(Extracted from DSD Stormwater Drainage Manual Table 3a)

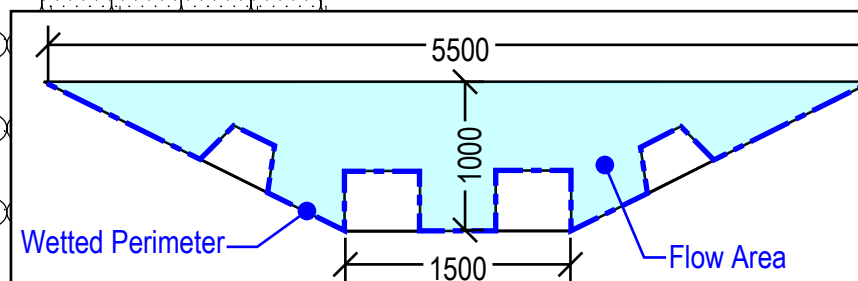
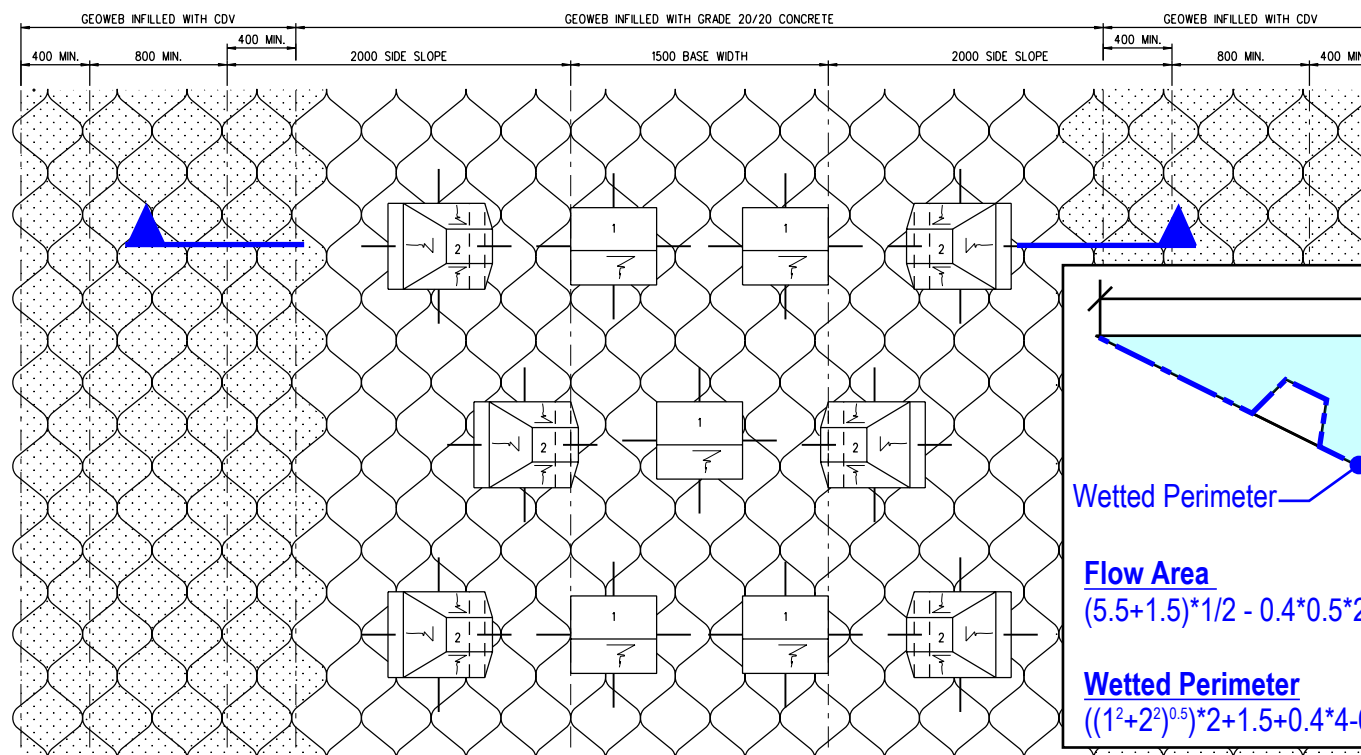
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Flow Area
 $(5+1)*1/2 - 0.4*0.5 - ((0.3+0.5)*0.3/2)*2 = 2.56 \text{ sq m}$

Wetted Perimeter
 $((1^2+2^2)^{0.5})*2+1+0.4*2-0.5*2+0.3*2+((0.1^2+0.3^2)^{0.5})*4=7.14 \text{ m}$

TYPE 1 BAFFLED CHANNEL
(BASE WIDTH = 1000mm)



Flow Area
 $(5.5+1.5)*1/2 - 0.4*0.5*2 - ((0.3+0.5)*0.3/2)*2 = 2.86 \text{ sq m}$

Wetted Perimeter
 $((1^2+2^2)^{0.5})*2+1.5+0.4*4-0.5*2+0.3*2+((0.1^2+0.3^2)^{0.5})*4 = 8.44 \text{ m}$

TYPE 2 BAFFLED CHANNEL
(BASE WIDTH = 1500mm)

- NOTE :
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
 2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH DRAWING NOS. GENL/SUR/DRW/002/R TO 009/R.
 3. BAFFLED CHANNEL IS FORMED BY GEOWEB INFILL WITH GRADE 20/20 CONCRETE.
 4. GEOWEB IS LARGE CELL A-SECTION 203 THICK.
 5. BAFFLE PIERS ARE PRECAST UNIT OF CONCRETE GRADE 30/20.
 6. FOR LAYOUT OF SURFACE WATER DRAINAGE REFER TO DRAWING NO. STG1/SUR/DRW/001 & STG2/SUR/DRW/001.
 7. TYPICAL SECTION OF CHANNEL REFER TO DRAWING NO. GENL/SUR/DRW/003/R.

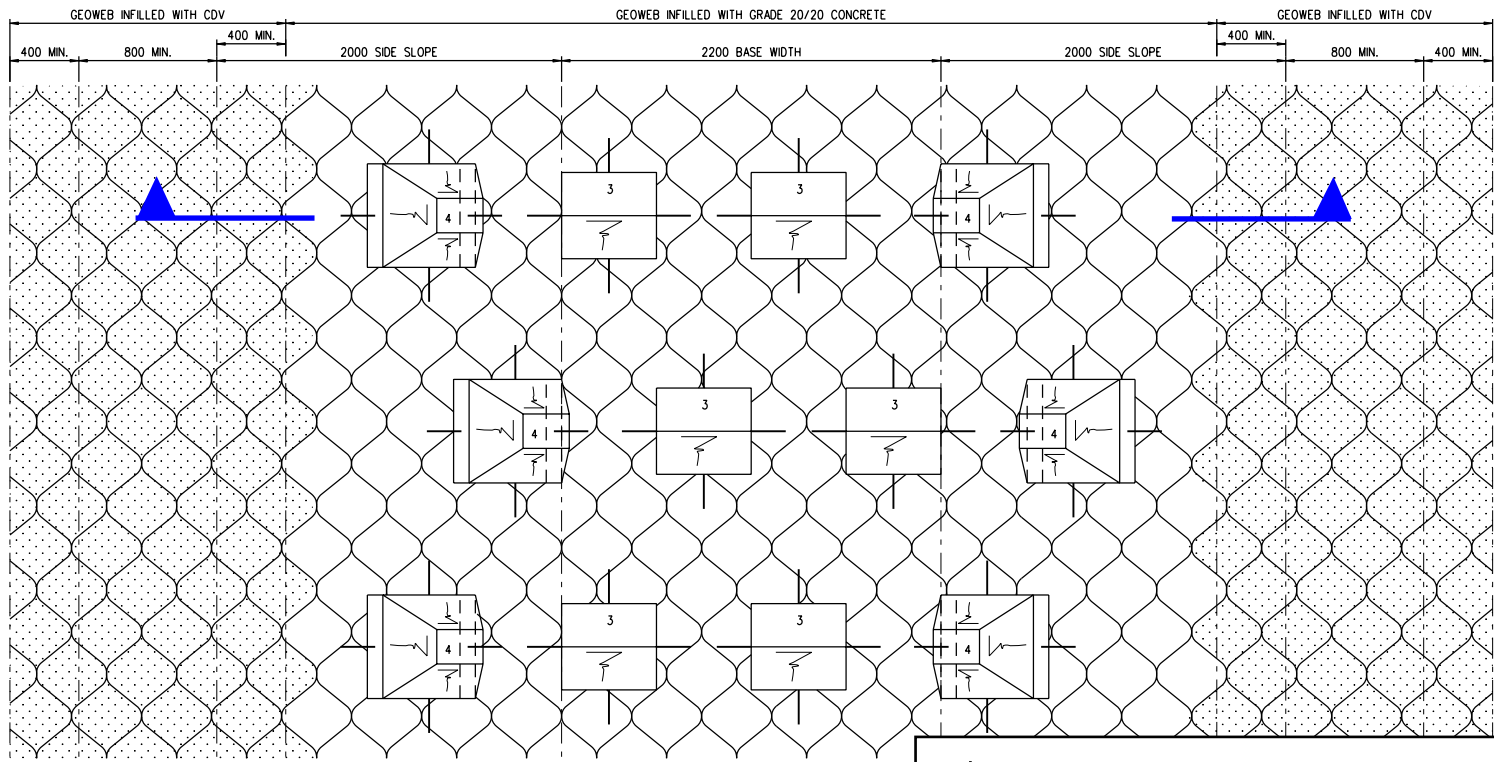
LEGEND :

INFILLED WITH CDV

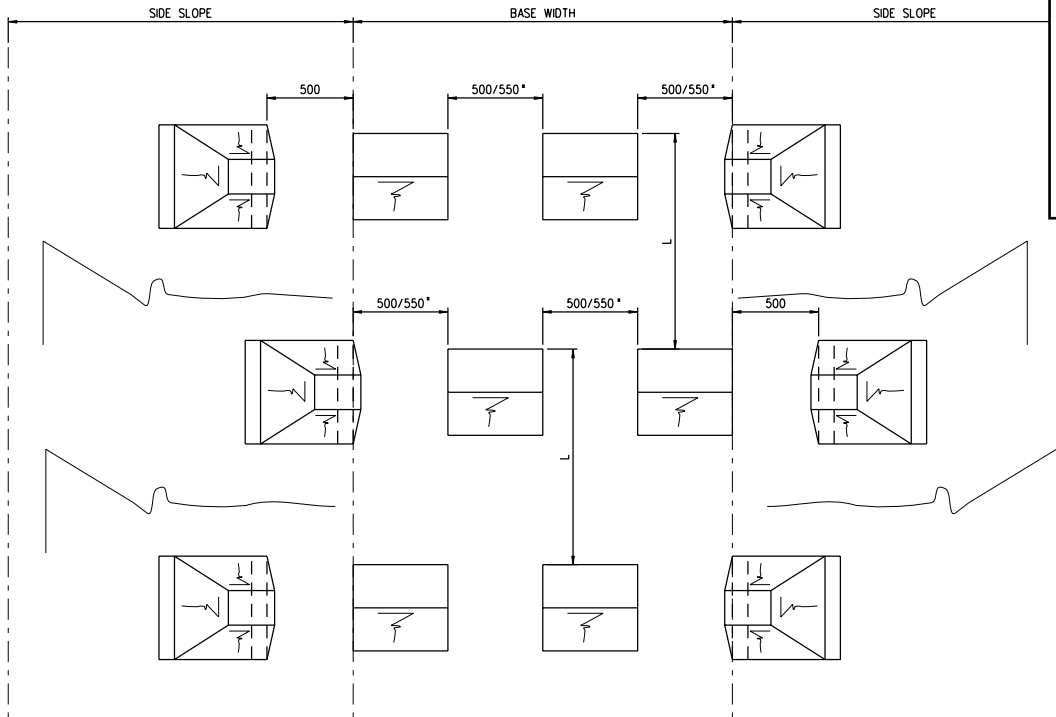
INFILLED WITH CONCRETE

Details of Revision		Date	
	Designed	Drawn	Checked
Initial			
Date			
Amendment to the Registered Design approved			
CAD ref. MAIN : ACSUR001.DGN REF : RTKO-AIDGN			
 ENVIRONMENTAL PROTECTION DEPARTMENT THE GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION			
Contract no.		EP/SP/29/95	
Contract title		TSEUNG KWAN O LANDFILLS RESTORATION	
Drawing title			
SURFACE WATER DRAINAGE GENERAL DETAILS SHEET 1 OF 9			
AS CONSTRUCTED RECORD DRAWING			
Drawing no.		Scale	
GENL/SUR/DRW/001/R		1 : 20	
		Binnie Black & Veatch Hong Kong Limited	
Construction Contractor			
CHUN WO CONSTRUCTION & ENGINEERING CO., LTD.			
Environmental Consultants			
ERM (HK) LTD.			
Independent Consultants			
MOUCHEL ASIA LIMITED CONSULTING ENGINEERS			
			
SWIRE SITA WASTE SERVICES LTD.			

SWIRE SITA WASTE SERVICES LIMITED.
DATE :
INDEPENDENT CONSULTANTS
MOUCHEL ASIA LIMITED.
DATE :

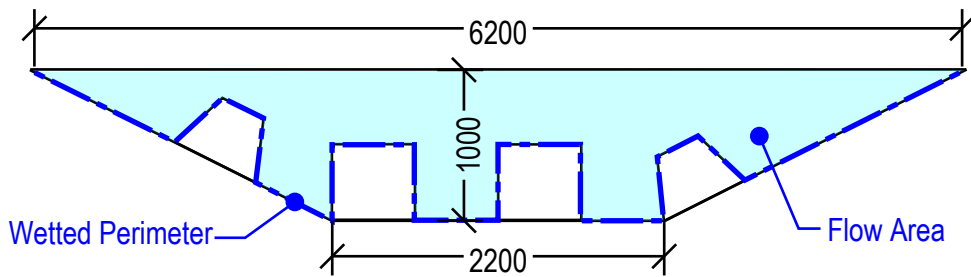


TYPE 3 BAFFLED CHANNEL
(BASE WIDTH = 2200mm)



* FOR TYPE 3 BAFFLE CHANNEL

ARRANGEMENT OF BAFFLE PIERS



Flow Area
$$(6.2+2.2)*1/2 - 0.55*0.5*2 - ((0.3+0.6)*0.4/2)*2 = 3.29 \text{ sq m}$$

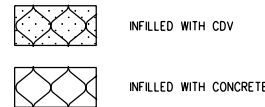
Wetted Perimeter
$$((1^2+2^2)^{0.5})*2+2.2+0.5*4-0.6*2+0.3*2+((0.15^2+0.4^2)^{0.5})*4 = 9.78 \text{ m}$$

CHANNEL GRADIENT	L (mm)	
	PIER HEIGHT 500mm	PIER HEIGHT 400mm
1 : 3	1580	1260
1 : 4	2060	1650
1 : 5	2550	2040
> 1 : 6	3040 MIN.	2430

NOTE : PIER HEIGHT REFER TO DRAWING GENL/SUR/DRW/003/R.

- NOTE :
- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
 - THIS DRAWING IS TO BE READ IN CONJUNCTION WITH DRAWING NOS. GENL/SUR/DRW/001/R, 003/R TO 009/R.
 - BAFFLED CHANNEL IS FORMED BY GEOWEB INFILL WITH GRADE 20/20 CONCRETE.
 - GEOWEB IS LARGE CELL A-SECTION 203 THICK.
 - BAFFLE PIERS ARE PRECAST UNIT OF CONCRETE GRADE 30/20.
 - DETAILS OF TRAPEZODIAL CHANNELS ARE SAME AS BAFFLED CHANNELS BUT WITHOUT BAFFLE PIERS.
 - FOR LAYOUT OF SURFACE WATER DRAINAGE REFER TO DRAWING NOS. STG1/SUR/DRW/001/R & STG2/SUR/DRW/001/R.
 - TYPICAL SECTION OF CHANNEL REFER TO DRAWING NO. GENL/SUR/DRW/003/R.
 - FOR DETAILS OF 3300mm INVERT BAFFLE CHANNEL (STAGE II/III ONLY) REFER TO DRAWING STG2/SUR/DRW/011/R.

LEGEND :



Details of Revision		Date
Initial	Designed	Drawn
Date	Checked	

Amendment to the Registered Design approved

CAD ref. MAN : ACSUR002.DGN
REF : RTKO-ALDGN

ENVIRONMENTAL PROTECTION DEPARTMENT
THE GOVERNMENT OF THE HONG KONG
SPECIAL ADMINISTRATIVE REGION

Contract no. EP/SP/29/95

Contract title TSEUNG KWAN O LANDFILLS RESTORATION

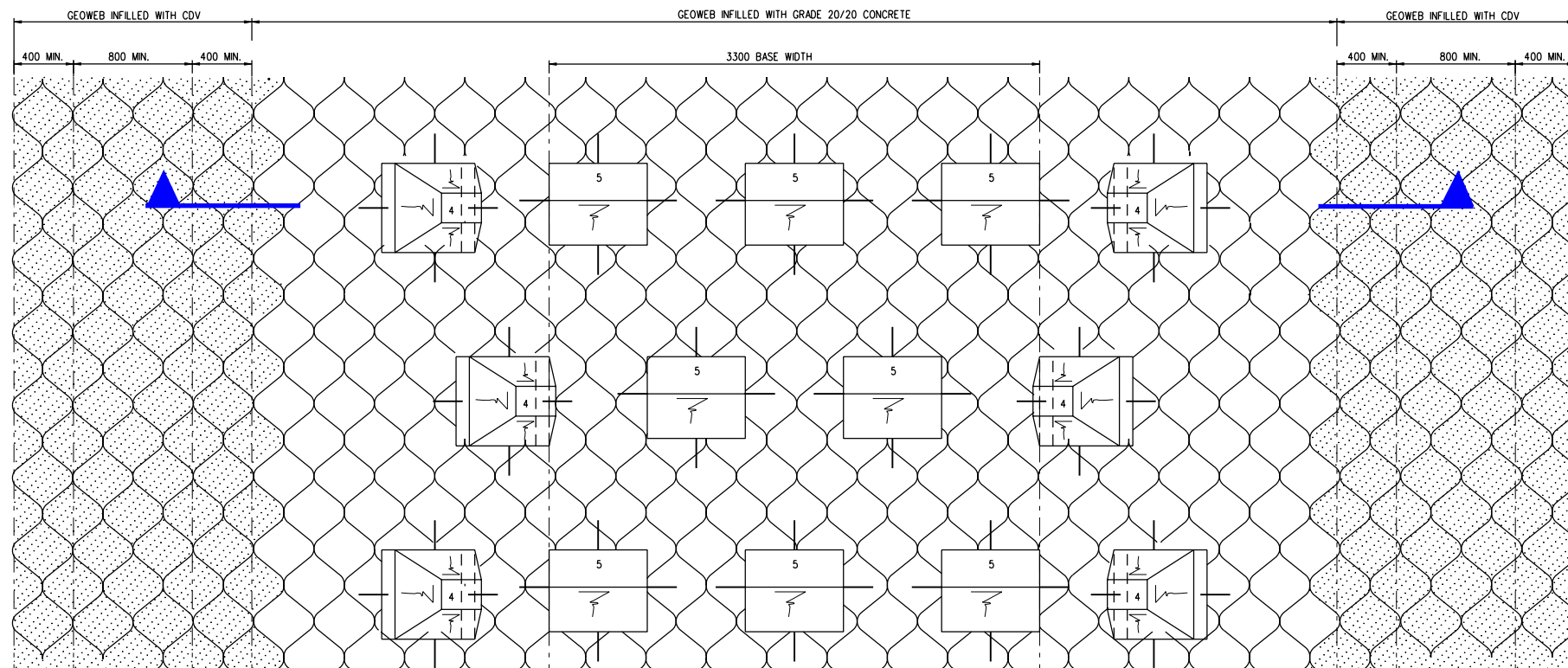
Drawing title

SURFACE WATER
DRAINAGE GENERAL DETAILS
SHEET 2 OF 9

AS CONSTRUCTED RECORD DRAWING

Drawing no. GENL/SUR/DRW/002/R
Scale 1 : 20

CONTRACTOR	
Binnie Black & Veatch Hong Kong Limited	
Construction Contractor CHUN WO CONSTRUCTION & ENGINEERING CO., LTD.	
Environmental Consultants BRM (HK) LTD.	
Independent Consultants MOUCHEL ASIA LIMITED CONSULTING ENGINEERS	
SWIRE SITA WASTE SERVICES LTD.	



BAFFLED CHANNEL
(BASE WIDTH = 3300mm)

NOTES :

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH DRAWING NOS. STG2/SUR/DRW/012/R TO 017/R, 019/R & 020/R.
3. BAFFLED CHANNEL IS FORMED BY GEOWEB INFILLED WITH GRADE 20/20 CONCRETE.
4. GEOWEB IS LARGE CELL A-SECTION 203 THICK.
5. BAFFLE PIERS ARE PRECAST UNITS OF CONCRETE GRADE 30/20.
6. FOR LAYOUT OF SURFACE WATER DRAINAGE REFER TO DRAWING NO. STG2/SUR/DRW/001/R.
7. FOR BAFFLE PIERS ROW SPACING, AND DETAILS OF PIERS REFER TO DRAWING NO. STG2/SUR/DRW/012/R.
8. FOR DOWEL BAR DETAILS REFER TO DRAWING NO. GENL/SUR/DRW/003/R.

LEGEND :



INFILLED WITH CDV



INFILLED WITH CONCRETE

Details of Revision			Date
Initial	Designed	Drawn	Checked
Date			

Amendment to the Registered Design approved

CAD ref. MAIN : A2SUR01.DGN
REF : RTKO-A1DGN

ENVIRONMENTAL PROTECTION DEPARTMENT
THE GOVERNMENT OF THE HONG KONG
SPECIAL ADMINISTRATIVE REGION

Contract no. EP/SP/29/95

Contract title
TSEUNG KWAN O LANDFILLS RESTORATION

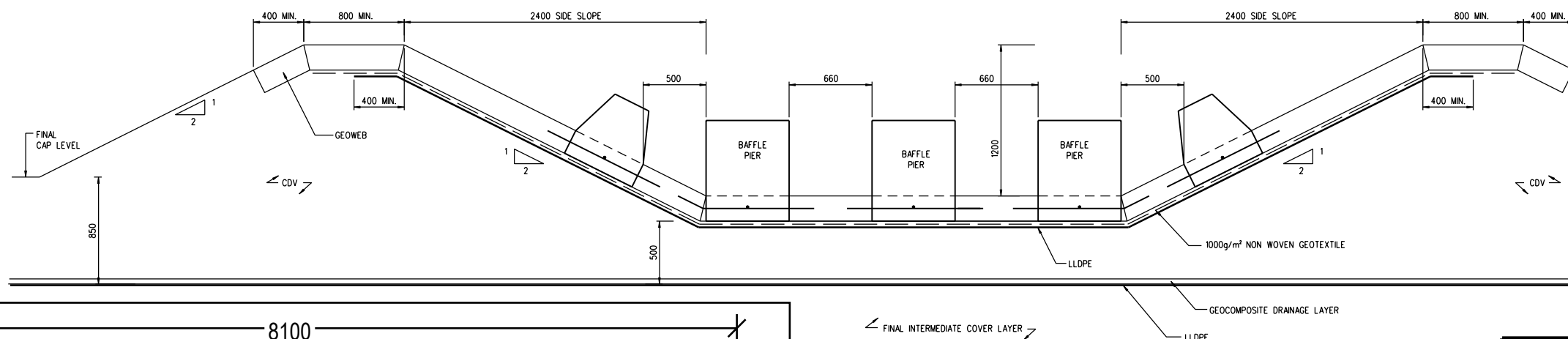
Drawing title

**STAGE II/III
SURFACE WATER
DRAINAGE DETAILS
SHEET 1 OF 10**

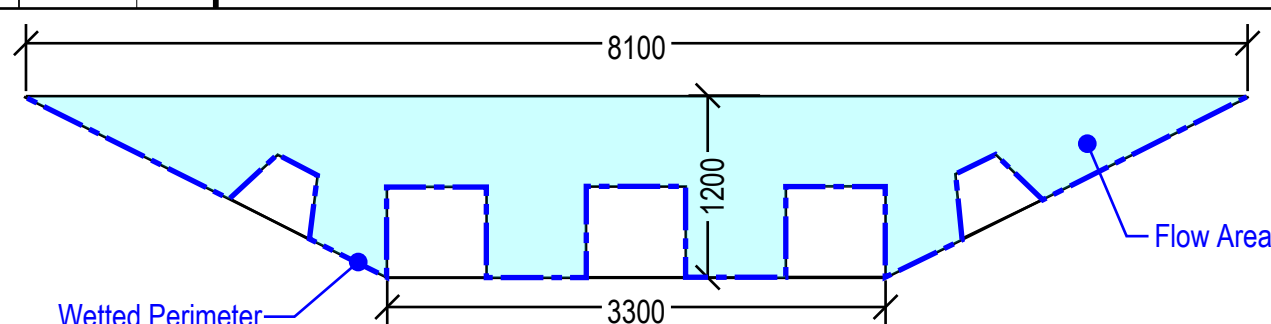
AS CONSTRUCTED RECORD DRAWING

Drawing no. STG2/SUR/DRW/011/R
Scale 1 : 20

CONTRACTOR		Binnie Black & Veatch Hong Kong Limited	
Construction Contractor		CHUN WO CONSTRUCTION & ENGINEERING CO., LTD.	
SWIRE SITA WASTE SERVICES LIMITED. DATE :		Environmental Consultants ERM (HK) LTD.	
INDEPENDENT CONSULTANTS		Independent Consultants MOUCHEL ASIA LIMITED CONSULTING ENGINEERS	
MOUCHEL ASIA LIMITED. DATE :		SWIRE SITA WASTE SERVICES LTD.	



CROSS SECTION OF BAFFLED CHANNEL



Wetted Perimeter

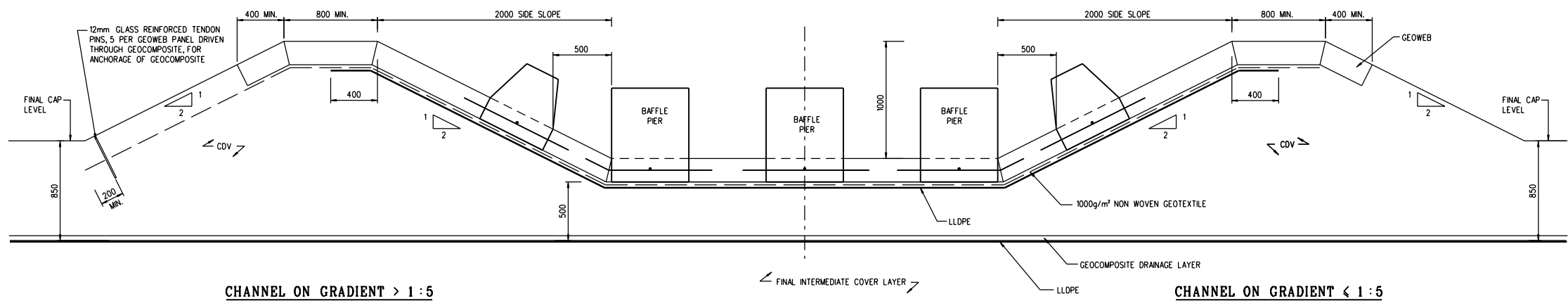
Flow Area

Flow Area

$$(8.1+3.3)^2 \times 1.2/2 - 0.66 \times 0.6 \times 3 - ((0.3+0.6) \times 0.4/2) \times 2 = 5.292 \text{ sq m}$$

Wetted Perimeter

$$((1.2^2 + 2.4^2)^{0.5}) \times 2 + 3.3 + 0.6 \times 6 - 0.6 \times 2 + 0.3 \times 2 + ((0.15^2 + 0.4^2)^{0.5}) \times 4 = 13.38 \text{ m}$$



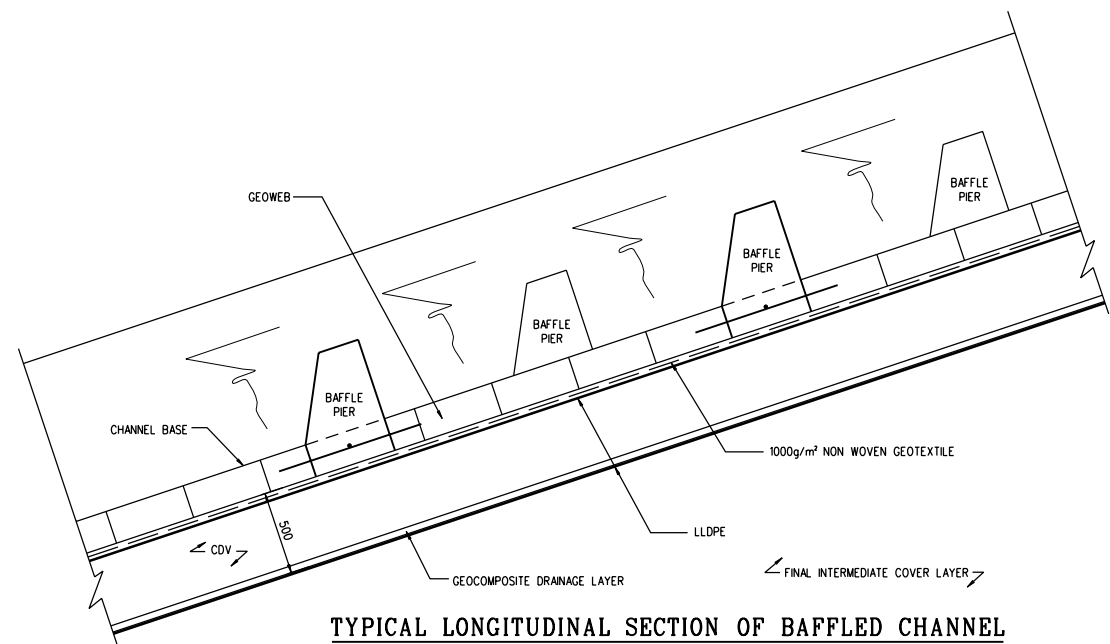
CHANNEL ON GRADIENT > 1 : 5

TYPICAL TRANSVERSE SECTION OF BAFFLED CHANNEL

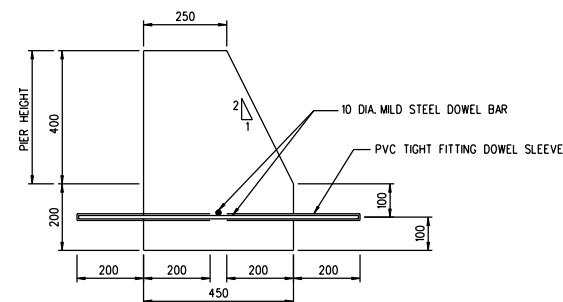
CHANNEL ON GRADIENT < 1 : 5

BAFFLE PIER TYPE	PLAN	SECTION A - A	SECTION B - B
1			
2			
3			
4			

NOTE : DOWEL BAR NOT SHOWN.
PARTICULAR DETAILS OF BAFFLES REFER TO DRAWING STG/SUR/DRW/012/R.



TYPICAL LONGITUDINAL SECTION OF BAFFLED CHANNEL



DOWEL BARS DETAILS

1 : 10

NOTE :

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH DRAWING NOS. GENL/SUR/DRW/001/R, 002/R, 004/R TO 009/R.
3. BAFFLED CHANNEL IS FORMED BY GEOWEB FILLED WITH GRADE 20/20 CONCRETE.
4. GEOWEB IS LARGE CELL A-SECTION 203 THICK.
5. BAFFLE PIERS ARE PRECAST UNITS OF CONCRETE GRADE 30/20.
6. NOT USED.
7. FOR LAYOUT OF SURFACE WATER DRAINAGE REFER TO DRAWING NOS. STG1/SUR/DRW/001/R AND STG2/SUR/DRW/001/R.
8. FOR DIMENSIONS OF CHANNEL BASE WIDTH REFER TO DRAWING NOS. GENL/SUR/DRW/001/R AND GENL/SUR/DRW/002/R.

Details of Revision		Date
Initial	Designed	Drawn

Amendment to the Registered Design approved

CAD ref. MAIN : ACSUR003.DGN
REF : RTKO-ALDON

ENVIRONMENTAL PROTECTION DEPARTMENT
THE GOVERNMENT OF THE HONG KONG
SPECIAL ADMINISTRATIVE REGION

Contract no. EP/SP/29/95

Contract title
TSEUNG KWAN O LANDFILLS RESTORATION

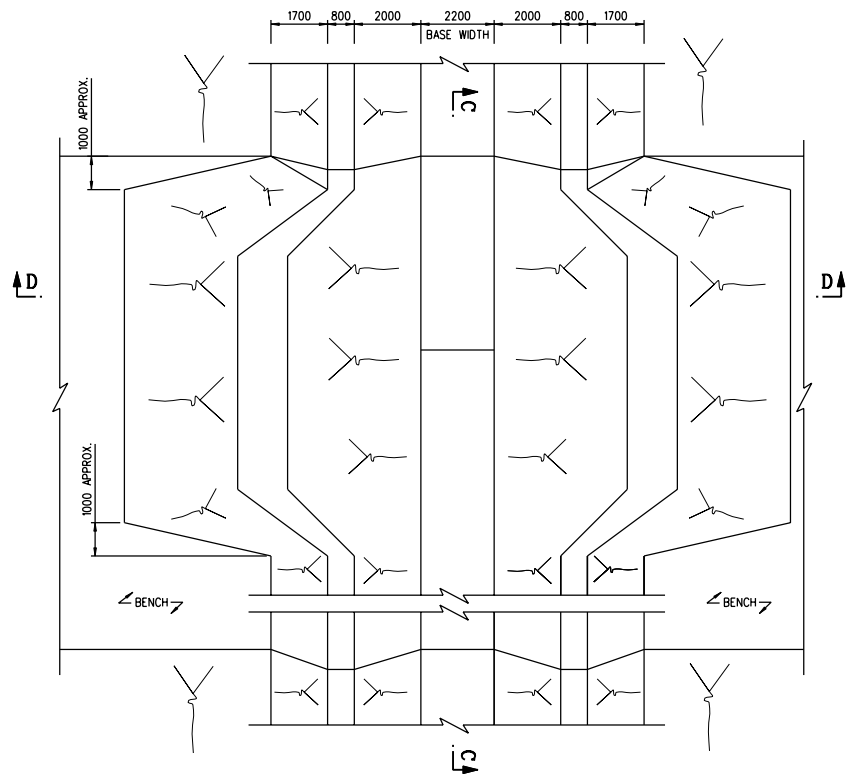
Drawing title

SURFACE WATER
DRAINAGE GENERAL DETAILS
SHEET 3 OF 9

AS CONSTRUCTED RECORD DRAWING

Drawing no. GENL/SUR/DRW/003/R
Scale 1 : 20

CONTRACTOR	
& Binnie Binnie Black & Veatch Hong Kong Limited	
Construction Contractor CHUN WO CONSTRUCTION & ENGINEERING CO., LTD.	
SWIRE SITA WASTE SERVICES LIMITED. DATE :	
INDEPENDENT CONSULTANTS	
BRM (HK) LTD.	
Independent Consultants MOUHEL ASIA LIMITED CONSULTING ENGINEERS	
MOUHEL ASIA LIMITED. DATE :	
SWIRE SITA WASTE SERVICES LTD.	



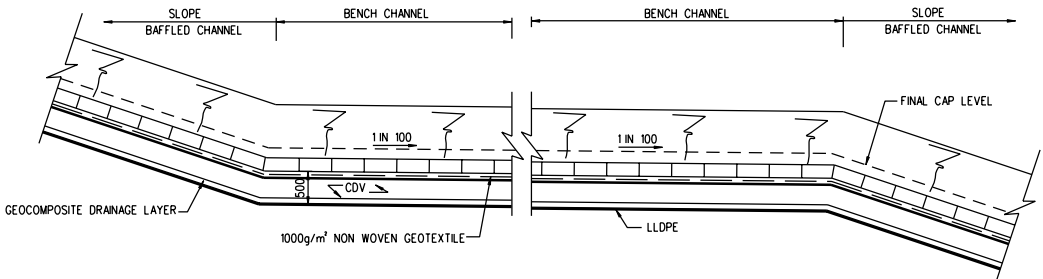
DETAILS OF BAFFLED CHANNEL CROSSING BENCH
1:100

DETAILS OF BAFFLE PIERS AND SPACING FOR 3300 mm BAFFLE CHANNEL
REFER TO DRAWING NO. STG2/SUR/DRW/011/R.

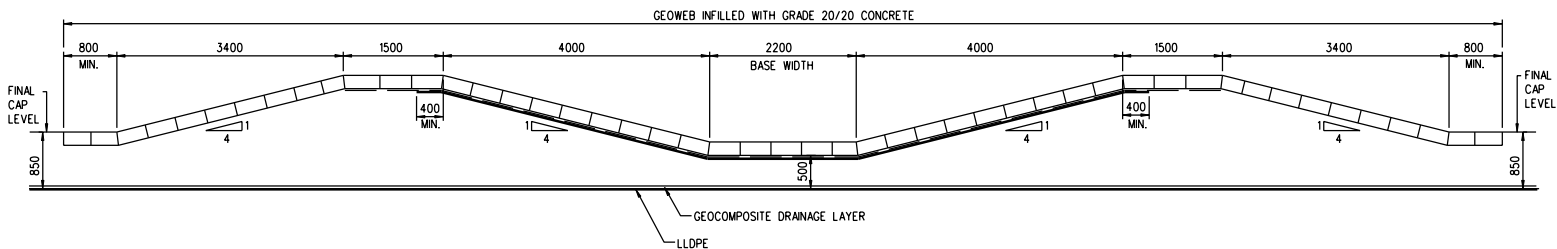
BAFFLE PIER TYPE	PLAN	SECTION A - A	SECTION B - B
4			
5			

NOTE: DOWEL BAR NOT SHOWN

CHANNEL GRADIENT	L (mm) (REFER TO DRAWING NO. GENL/SUR/DRW/002 FOR L)
1:3	1700
1:4	2220
1:5	2740
> 1:6	3270



SECTION C - C
1:50



SECTION D - D
1:50

NOTES:

- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH DRAWING NOS. STG2/SUR/DRW/011/R, 013/R TO 017/R, 019/R & 020/R.
- FOR LOCATIONS OF BENCH REFER TO DRAWING NO. STG2/SUR/DRW/001/R.

Details of Revision	Date
Designed	Drawn
Initial	Checked
Date	

Amendment to the Registered Design approved

CAD ref. MAN: A2SUR012.DGN
REF: RTKO-ALDGN

ENVIRONMENTAL PROTECTION DEPARTMENT
THE GOVERNMENT OF THE HONG KONG
SPECIAL ADMINISTRATIVE REGION

Contract no. EP/SP/29/95

Contract title
TSEUNG KWAN O LANDFILLS RESTORATION

Drawing title

STAGE II/III
SURFACE WATER
DRAINAGE DETAILS
SHEET 2 OF 10

AS CONSTRUCTED RECORD DRAWING

Drawing no. STG2/SUR/DRW/012/R
Scale AS SHOWN

CONTRACTOR	Binnie Black & Veatch Hong Kong Limited
SWIRE SITA WASTE SERVICES LIMITED. DATE:	Construction Contractor CHUN WO CONSTRUCTION & ENGINEERING CO., LTD.
INDEPENDENT CONSULTANTS	Environmental Consultants BRM (HK) LTD.
MOUHEL ASIA LIMITED. DATE:	Independent Consultants MOUHEL ASIA LIMITED CONSULTING ENGINEERS
	SWIRE SITA WASTE SERVICES LTD.