



DRAINAGE IMPACT ASSESSMENTS REPORT

For Planning Application A/YL/-SK/381

Revision C

1. Introduction

The aim of this Drainage Impact Assessment (DIA) Report is to estimate the runoff and drainage impacts associated with the Site and to propose drainage mitigation to facilitate the Planning Application.

2. Project Outline and Description

Project Title:	Planning application A/YL-SK/381
Nature and Description:	The Site would be developed into a temporary open storage area of vehicles and vehicle parts and vehicle repair workshop for a period of 3 years.
Location:	At land lot 1069 S.A RP in D.D. 106 adjacent to Kam Shui South Road, Shek Kong, Yuen Long.
Site Area:	About 531 m ²

3. Methodology

3.1. Design Assumptions and Parameters

The drainage impacts arising from the Site is assessed with reference to the Stormwater Drainage Manual (SDM), fifth edition with its corrigendum up to No. 2/2024.

The following parameters are adopted for hydraulic calculations in this report:

- Runoff coefficients = 1 for paved and 0.35 for unpaved surface.
- Return period = 50 years for Main Rural Catchment Drainage Channels
- Increase of rainfall due to climate change = 11.1% for mid-21st century
- Time of concentration = 5 mins (Assumed)
- Roughness for existing concrete pipe in poor condition = 0.6mm
- Manning number for concrete U-channel = 0.016

4. Drainage Impact Assessments

4.1. Existing Development

The Site is located at land lot 1069 S.A RP in D.D. 106 adjacent to Kam Shui South Road and it is currently a paved concrete land without internal drainage facilities.

4.2. Existing Drainage Facilities

The existing drainage network and photo of existing drainage facilities are shown in **Appendix A**.

At the south of the Site, there is an existing catchpit SCH1028262 with upstream 450mm and 525mm U-channel on the left- and right-hand side respectively

connecting to it. The outlet pipe of the existing catchpit SCH1028262 is a 750mm dia. pipe and it connects to the existing manhole with another 600mm dia. inlet pipe collecting runoff from the carriageway of Kam Shui South Road. Further downstream of the manhole is a 750mm dia. pipe connecting to the existing 20m width trapezoidal channel.

4.3. Drainage Flow Estimation

4.3.1. Runoff Generation from Existing Site

No drainage facility is within the existing Site; the surface runoff is discharging to the existing 450mm and 525mm U-channel at the south of the Site (overland flow).

4.3.2. Runoff Estimation from the Proposed Site

For conservative purposes, 1 in 50 years return period of rainfall is adopted in the runoff calculations. **Table 4.1** shows the runoff estimated from the Site and the land north of the Site. The runoff generated from the northern land is also estimated for checking of the proposed drainage system since no drainage system exists within that land. 100mm high slot at the bottom of hoardings is added to allow interception of the existing overland flow passing through the site. A typical detail is attached in **Appendix C**. The runoff calculations refer to **Appendix B**.

Table 4.1: Runoff Estimates from the Site

Location	Catchment	Catchment Area (m ²)	Runoff Coefficient	Peak Runoff (m ³ /s)
The Site (left)	C1	340	1	0.025
The Site (right)	C2	233	1	0.017
Land north of the Site (left)	D1	520	1	0.038
Land north of the Site (right)	D2	495	1	0.036

4.4. Drainage Impact and Discharge

The surface runoff from the Site is proposed to be discharged into the existing catchpit SCH1028262 through 300mm U-channels and 375mm dia. concrete pipe surrounding the Site. The proposed drainage layout plan and associated details are shown in **Drawing Nos. DIA/001, 002 and 003**.

The capacities of the proposed channels and pipe are checked in **Appendix B** and summarized in **Table 4.2** below.

Table 4.2: Drainage Capacity Check of Proposed U-Channels

U/S Catchpit	D/S Catchpit	Channel Size (mm)	Min. Gradient	Capacity (m ³ /s)	Catchment	Peak Flow (m ³ /s)	Utilization Ratio in %
CP-01	TCP-04	300	1 in 200	0.079	C1, D1	0.063	81%
CP-05a	TCP-04	300	1 in 200	0.079	C2, D2	0.054	68%

Table 4.2A: Drainage Capacity Check of Proposed Pipe

U/S Catchpit	D/S Manhole	Pipe Size (mm)	Min. Gradient	Capacity (m ³ /s)	Catchment	Peak Flow (m ³ /s)	Utilization Ratio in %
TCP-04	SMH1047780	375	1 in 200	0.141	C1, C2, D1, D2	0.117	83%

The capacity of the 750mm dia. drain connecting to the trapezoidal channel is also checked in **Appendix B** and summarized in **Table 4.3** below.

Table 4.3: Drainage Capacity Check of Existing 750mm dia. Pipe

U/S Manhole	D/S Manhole	Pipe Size (mm)	Gradient	Capacity (m ³ /s)	Catchment	Peak Flow (m ³ /s)	Utilization Ratio in %
SMH1047780	Ex. 20m(W) trapezoidal channel	750	1 in 100	1.24	A, B, C1, C2, D1, D2, E, F, G	0.71	58%

According to the calculations above, there is **no adverse impact to the existing drainage network** arising from the Site.

5. Construction, Operation and Maintenance of New Drainage Facilities

The proposed drainage works within the Site, and the connection to the public drainage system would be constructed, operated and maintained by the Applicant. The construction of the drainage connection from the proposed terminal manhole/catchpit within the Site to the existing public drainage system will also be undertaken by the Applicant. Form HBP1 would be submitted for the proposed connection works.

The drain downstream of the terminal manhole/catchpit will be handed over to DSD upon the completion of the proposed drainage works for future maintenance as part of the public drainage network.

6. Conclusion

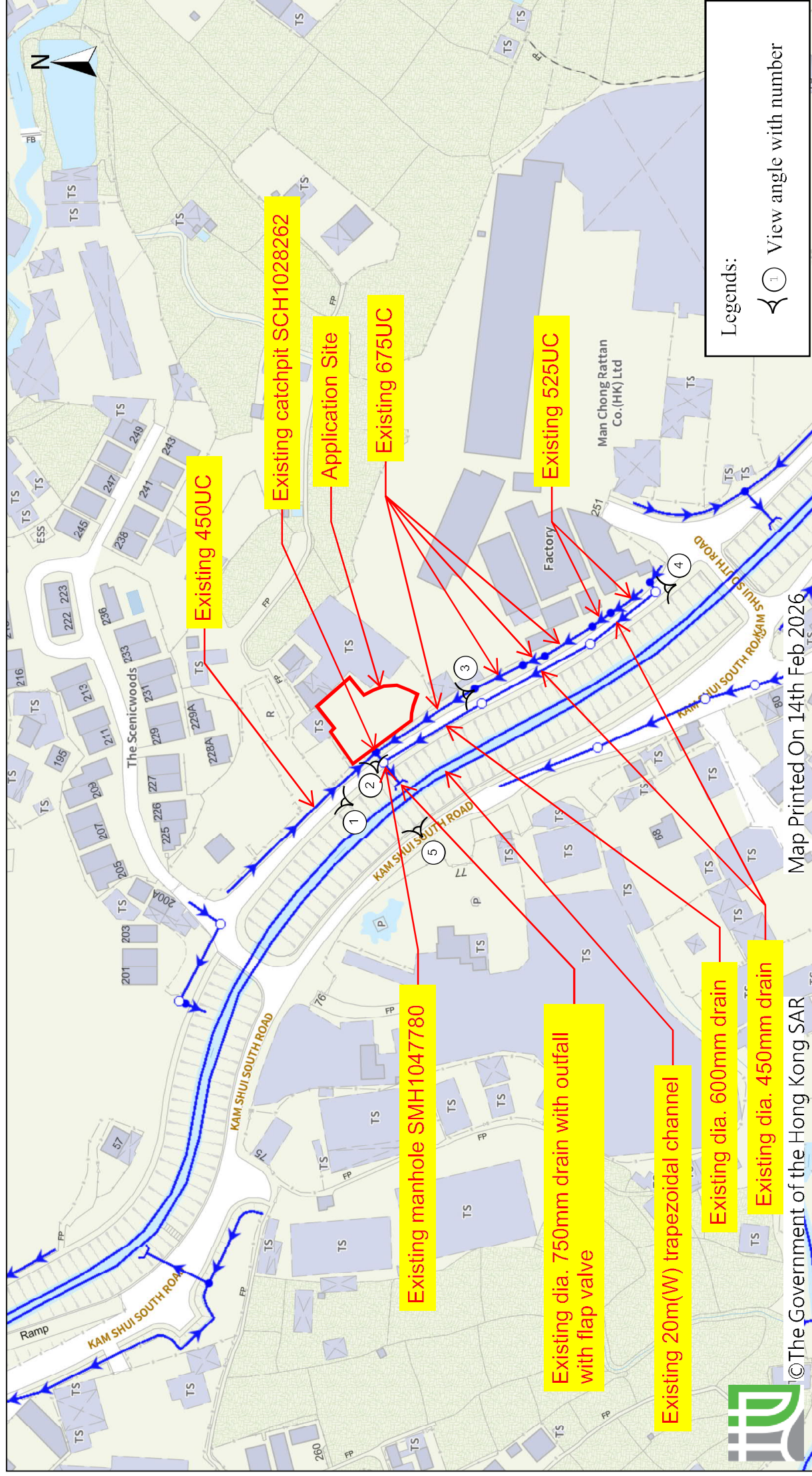
In conclusion, the proposed 300mm U-channel surrounding the Site, shown in **Drawing No. DIA/001** is adequate to convey surface runoffs generated from the Site and land north of the Site, based on rainfall return period 50 years, which is a conservative assumption for drainage system in rural area. The existing dia. 750mm drain is also checked adequate to convey upstream surface runoffs to the existing 20m trapezoidal channel.

The proposed drainage works within the Site would be constructed, operated and maintained by the Applicant. Connection to the public drainage system is also undertaken by the Applicant. The drain downstream of the terminal manhole/catchpit will be handed over to DSD upon the completion of the proposed drainage works for future maintenance as part of the public drainage network.

Drawings

Appendix A - Existing drainage network and photo of existing drainage facilities

Appendix A - Existing Drainage Network and Site Photos



View 1



View 2

Existing stormwater manhole SMH1047780

Existing catchpit SCH1028262

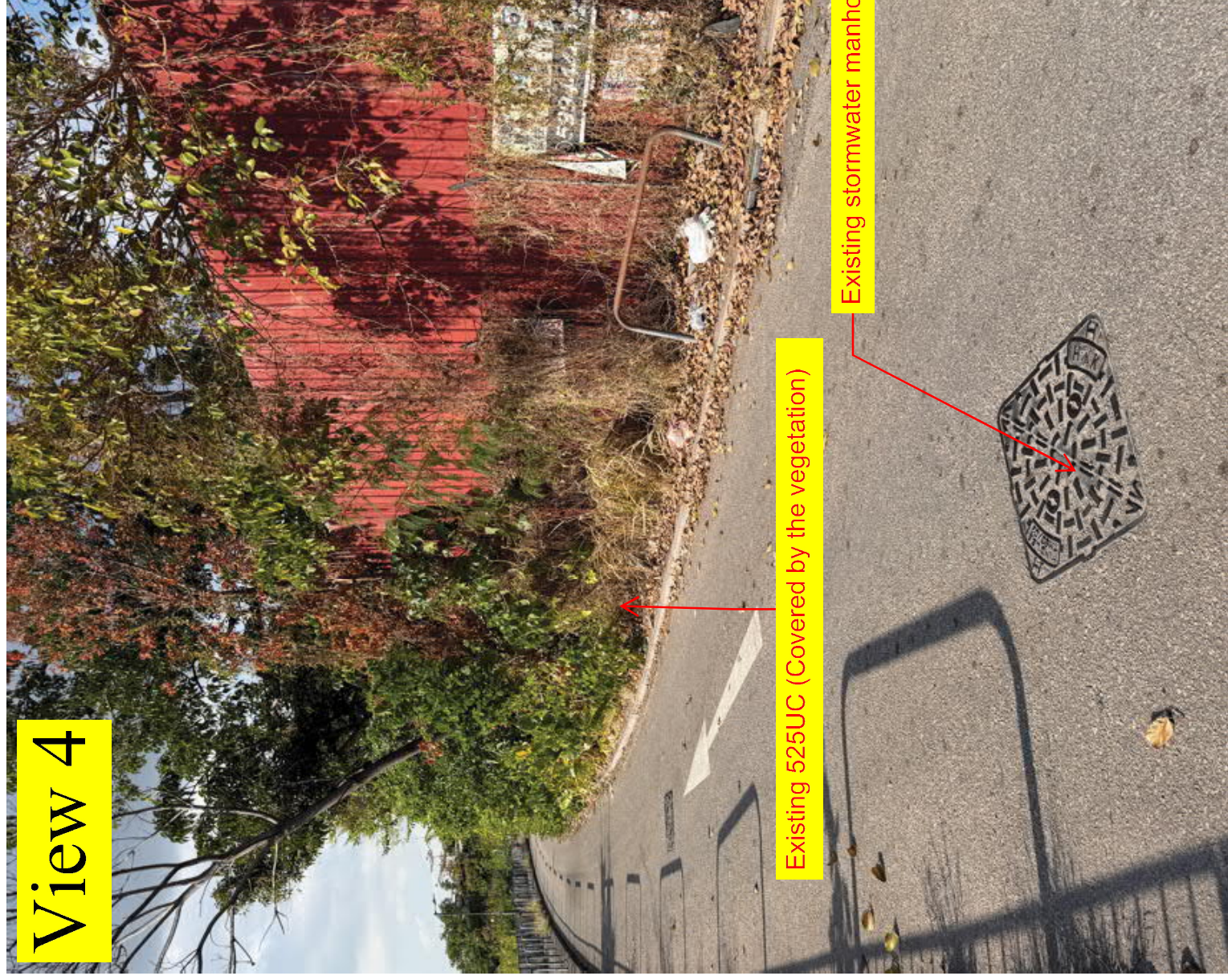


View 3

Existing 675UC



View 4



Existing 525UC (Covered by the vegetation)

Existing stormwater manhole SMH1047784

View 5



Appendix B – Catchment Plan and Hydraulic Calculations

Appendix B

1. Catchment Plan (Upstream up existing 750mm dia. drain pipe)

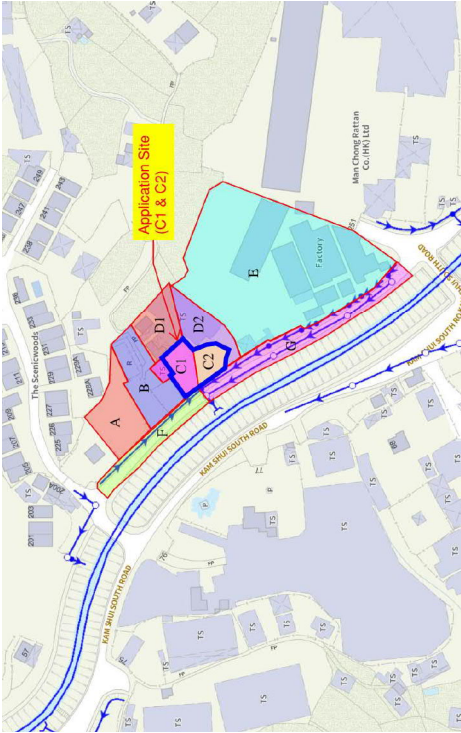


Table 1 - Catchment Area and Peak Flow

Catchment No. (Use)	Area (m ²)	Runoff coefficient	C x A (km ²)	Peak Flow (m ³ /s)
A (Storage area)	713	1	0.00071	0.053
B (Storage area)	750	1	0.00075	0.055
C1 (Application Site)	340	1	0.00034	0.025
C2 (Application Site)	233	1	0.00023	0.017
D1 (Storage area)	520	1	0.00052	0.038
D2 (Storage area)	495	1	0.00050	0.036
E (Workshop area)	5070	1	0.00507	0.374
F (Carriageway)	565	1	0.00057	0.042
G (Carriageway)	1000	1	0.00100	0.074
Sum	9686		0.00969	0.714

https://www.dsd.gov.hk/EN/Files/Technical_Manual/dsd_guideline/Drainage_Submission.pdf

2. Calculation of Rainfall Intensity:

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

- where
- i = extreme mean intensity in mm/hr,
 - t_d = duration in minutes (t_d ≤ 240), and
 - a, b, c = storm constants given in Tables 3a, 3b, 3c and 3d.

Table 3a for HKO Headquarter in SDM Corrigendum No. 1/2024 is adopted for the site, where
(Main Rural Catchment Drainage Channels)

Return Period = 50 years

a= 505.5

b= 3.29

c= 0.355

Time of Concentration (min) = 5 mins (assumed)

Rainfall Intensity i = 238.5801469 mm/hr

Rainfall increase due to climate change = 11.1 % (Mid-21st Century)

Rainfall Intensity i with climate change = 265.0625432 mm/hr

3. Calculation of Peak Flow by Rational Method:

Qp = 0.278 C i A

where Qp = peak runoff in m³/s
C = runoff coefficient (dimensionless)
i = rainfall intensity in mm/hr
A = catchment area in km²

Peak flows refer to Table 1.

4. Drainage Capacity Check of Proposed U-Channels

By using Manning's Equation, where

n= 0.016 (Concrete surface)

Gradient = 0.005 (1 in 200)

U-channel size = 300 mm

Velocity = 0.98 m/s

Capacity = 0.079 m³/s

U/S Catchpit	D/S Catchpit	Channel Size (mm)	Min. Gradient	Capacity (m3/s)	Catchment	Peak Flow (m3/s)	Utilization Ratio in %
CP-01	TCP-04	300	1 in 200	0.079	C1, D1	0.063	81%
CP-03a	TCP-04	300	1 in 200	0.079	C2, D2	0.054	68%

4a. Drainage Capacity Check of Proposed 375mm dia. Pipe

By using Colebrook-White Equation, where

ks =

v =

0.6 mm (for concrete pipe poor condition)

0.000001 m²/s

U/S Manhole	D/S Manhole	Pipe Size (mm)	U/S IL	D/S IL	Gradient	Velocity (m/s)	Capacity (m³/s)	Catchment	Peak Flow (m³/s)	Utilization Ratio in %
SMH1047780	Ex. 20m(W) trapezoidal channel	375	11.18	11.17	1 in 200	1.28	0.141	C1, C2, D1, D2	0.117	83%

5. Drainage Capacity Check of Existing 750mm dia. Pipe

By using Colebrook-White Equation, where

ks =

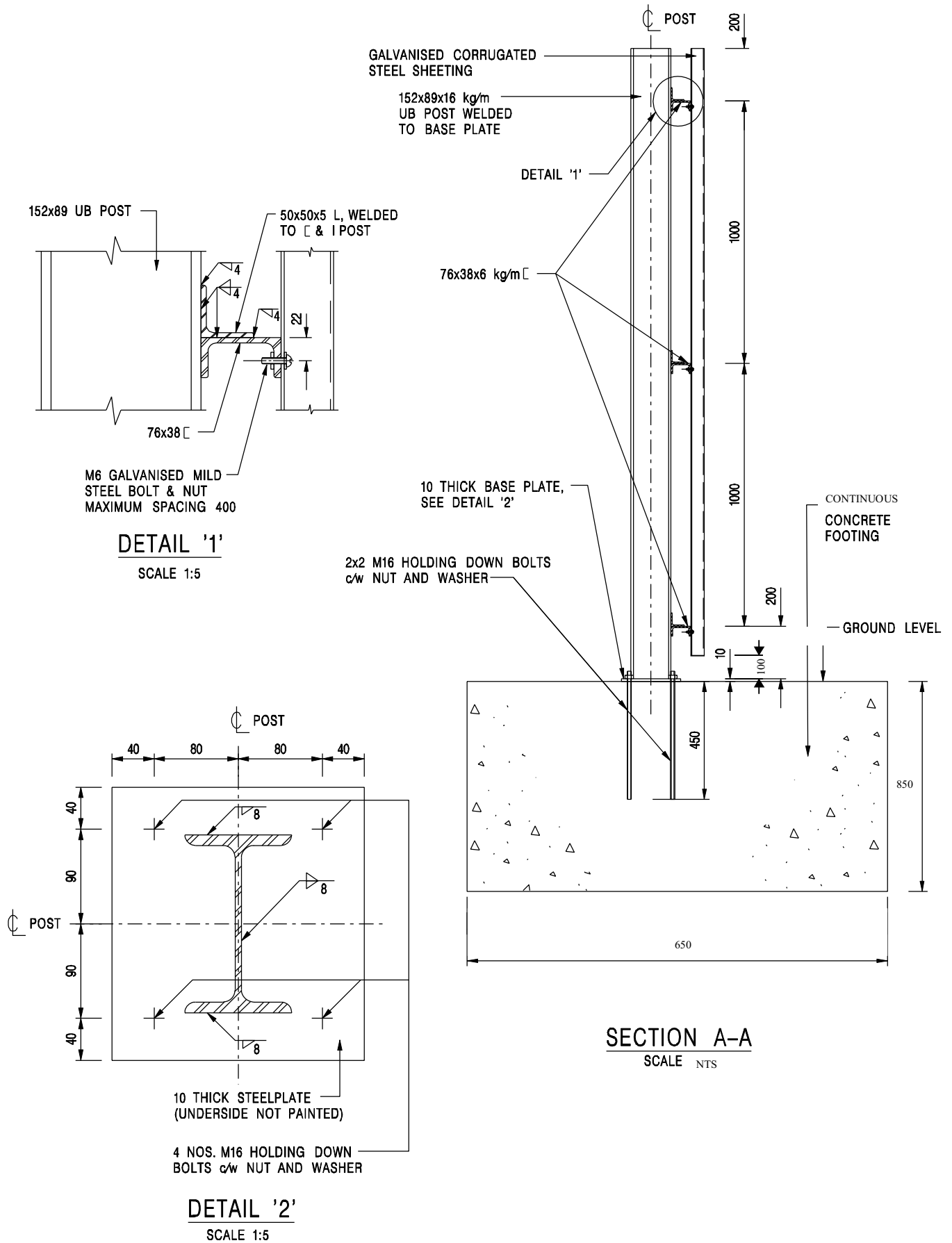
v =

0.6 mm (for concrete pipe poor condition)

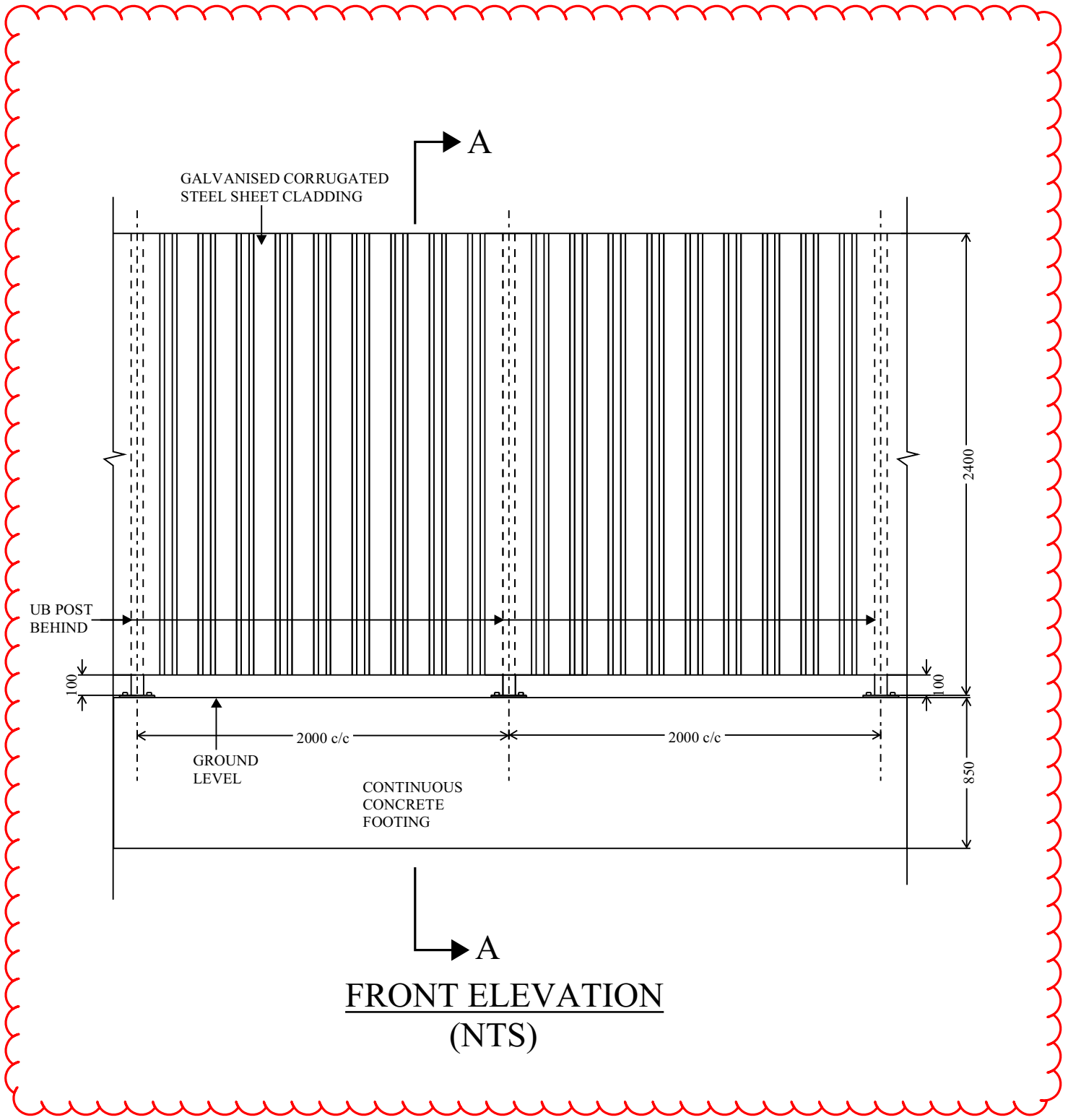
0.000001 m²/s

U/S Manhole	D/S Manhole	Pipe Size (mm)	U/S IL	D/S IL	Gradient	Velocity (m/s)	Capacity (m³/s)	Catchment	Peak Flow (m³/s)	Utilization Ratio in %
SMH1047780	Ex. 20m(W) trapezoidal channel	750	9.81	9.80	1 in 100	2.80	1.236	A, B, C1, C2, D1, D2, E, F, G	0.714	58%

Appendix C – Typical Hoarding Details (For information)



Typical details for hoarding



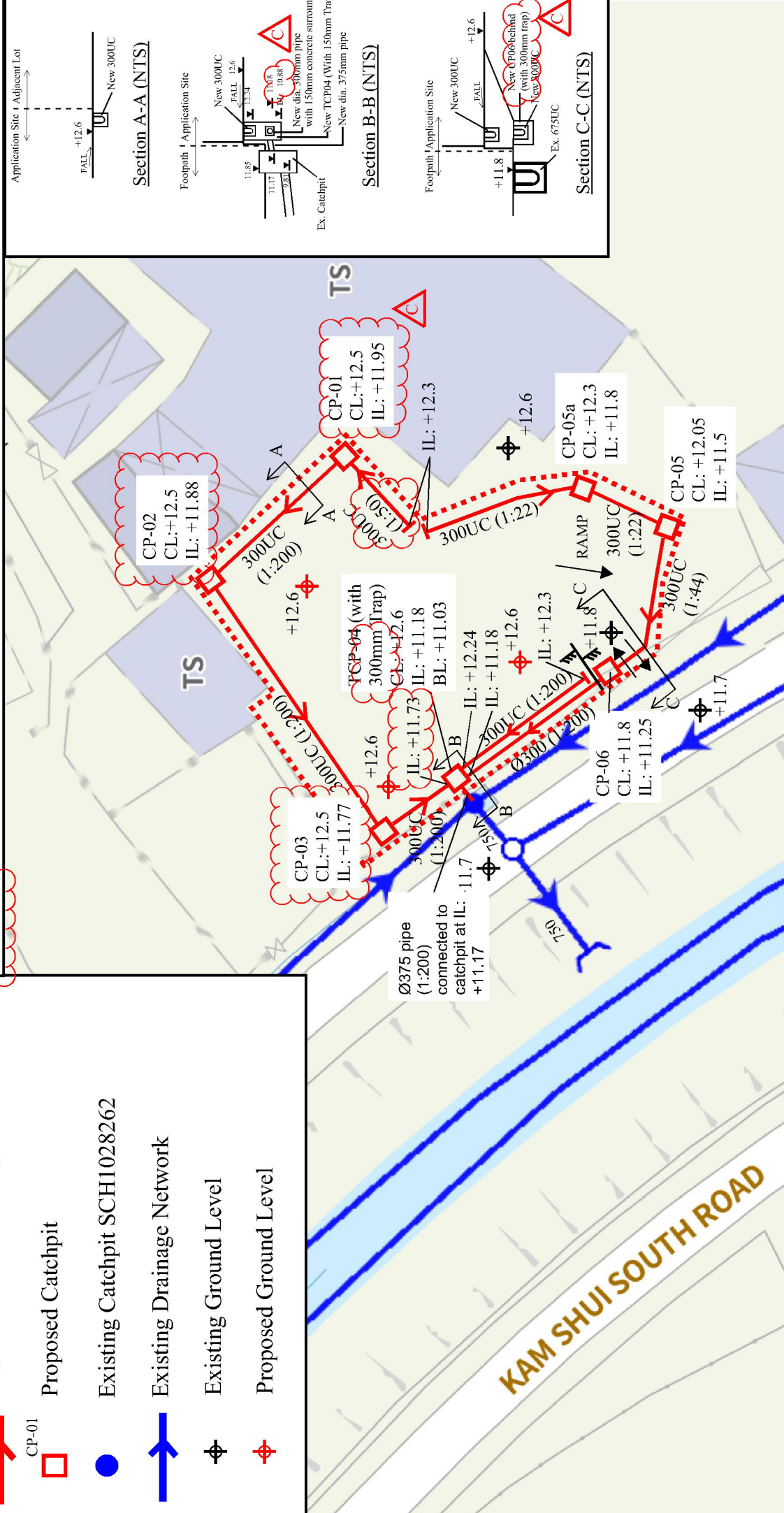
Typical details for hoarding

Legends:

- Application Site Boundary
- Size (Gradient)
300UC (1:200)
Proposed U-Channel with Cast Iron Cover
- Size (Gradient)
Ø375 (1:200)
Proposed dia. 375mm Pipe
- CP-01
Proposed Catchpit
- Existing Catchpit SCH1028262
- Existing Drainage Network
- Existing Ground Level
- Proposed Ground Level

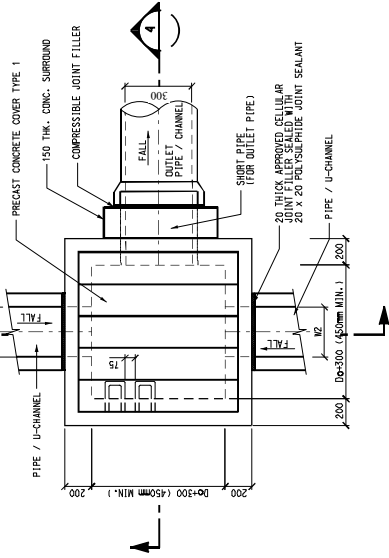
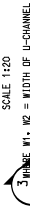
Notes:

- All dimensions are in millimeters unless otherwise specified.
- All levels are in meters above the principal datum
- All lot boundaries, dimensions and levels are for indication only. Exact values to be verified on site.
- Catchpit schedule and details refer to Drawing Nos. DIA/002 and 003.
- No works or structure will be placed within 3m from the top of the bank of the existing 20m width trapezoidal channel.



1. All dimensions are in millimeters unless otherwise specified.
2. All levels are in meters above the principal datum.

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SCALE 1:20

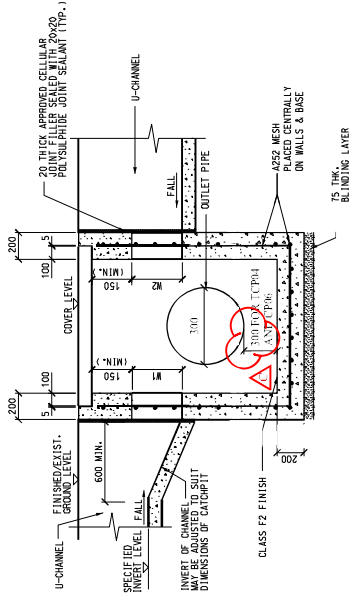
Technical drawing of a manhole structure, showing cross-section and plan views with dimensions and material specifications.

Cross-section details:

- Top layer: 20 THICK APPROVED CELLULAR JOINT FILLER SOLID WITH 20% POLYSTYRENE JOINT SEPARATOR (TYP.)
- Structure: U-CHANNEL
- Inner lining: 75 THK. BLINDING LAYER
- Outer lining: 75 THK. BLINDING LAYER
- Reinforcement: 1252 MESH
- Mesh placement: PLACED CENTRALLY ON WALLS & BASE
- Concrete: CLASS F2 FINISH
- Minimum height: 600 MIN.
- Labels: COVER LEVEL, FINISHED/EXIST. GROUND LEVEL, SPECIFIED INVERT LEVEL, FALL, INVERT OF CHANNELED TO SUIT DIMENSIONS OF CATPIT

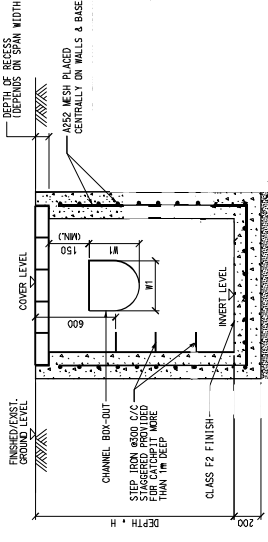
Plan view details:

- Overall width: 200
- Overall depth: 200
- Inner width: 100
- Inner depth: 100
- Wall thickness: 5
- Clearance from walls: 150
- Clearance from base: 150
- Labels: COVER LEVEL, FINISHED/EXIST. GROUND LEVEL, SPECIFIED INVERT LEVEL, FALL



SCALE 1:20

GRADE 20/20 CONCRETE WITH
ONE LAYER OF A252 MESH
REINFORCEMENT PLACED
CENTRALLY F2 AND U2 FINISH

[illegible]

SCALE 1:20

[illegible]

U-CHANNEL DIMENSIONS

NOMINAL WIDTH OF CHANNEL W_C	T	B	REINFORCEMENT B.S. 4483 REF.
≤300	100	100	A252 MESH TO BE PLACED CENTRALLY ONLY WHEN DEPTH (D) EXCEEDS 650mm

CATCHPIT SCHEDULE

Catchpit Ref.	Type	Cover Level (mPD)	Inlet Pipe/Channel			Outlet Pipe/Channel	
			Pipe/Channel No.	Size	Invert Level (mPD)	Size (mm)	Invert Level (mPD) To Manhole/Catchpit
CP01	A	12.5	A1	300UC	12.17	300UC	11.95 CP02
CP02	A	12.5	A1	300UC	11.88	300UC	11.88 CP03
CP03	A	12.5	A1	300UC	11.77	300UC	11.77 TCP04
TCP04 (With 300mm trap)	B	12.6	A1	300UC	11.73	Ø375 Pipe	11.18 Ex. SCH1028262
			A2	300UC	12.24		
			A3	Ø300 Pipe	11.18		
CP05a	A	12.3	A1	300UC	11.80	300UC	11.80 CP05
CP05	A	12.05	A1	300UC	11.75	300UC	11.50 CP06
CP06 (With 300mm trap)	B	11.80	A1	300UC	11.50	Ø300 Pipe with Concrete Surround	11.25 TCP04

Legends:

Application Site Boundary

Existing Ground Level

Proposed Ground Level

+12.6 (+12.5)

New level (Ex. level)

Notes:

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