

Democratic Socialist Republic of Sri Lanka

## Ministry of Defence



National Building Research Organization (NBRO)



**Reduction of Landslide Vulnerability by Mitigation Measures Project (RLVMMP) funded by  
Asian Infrastructure Investment Bank (AIIB)**

(Loan No: L0124A)

# DRAWINGS

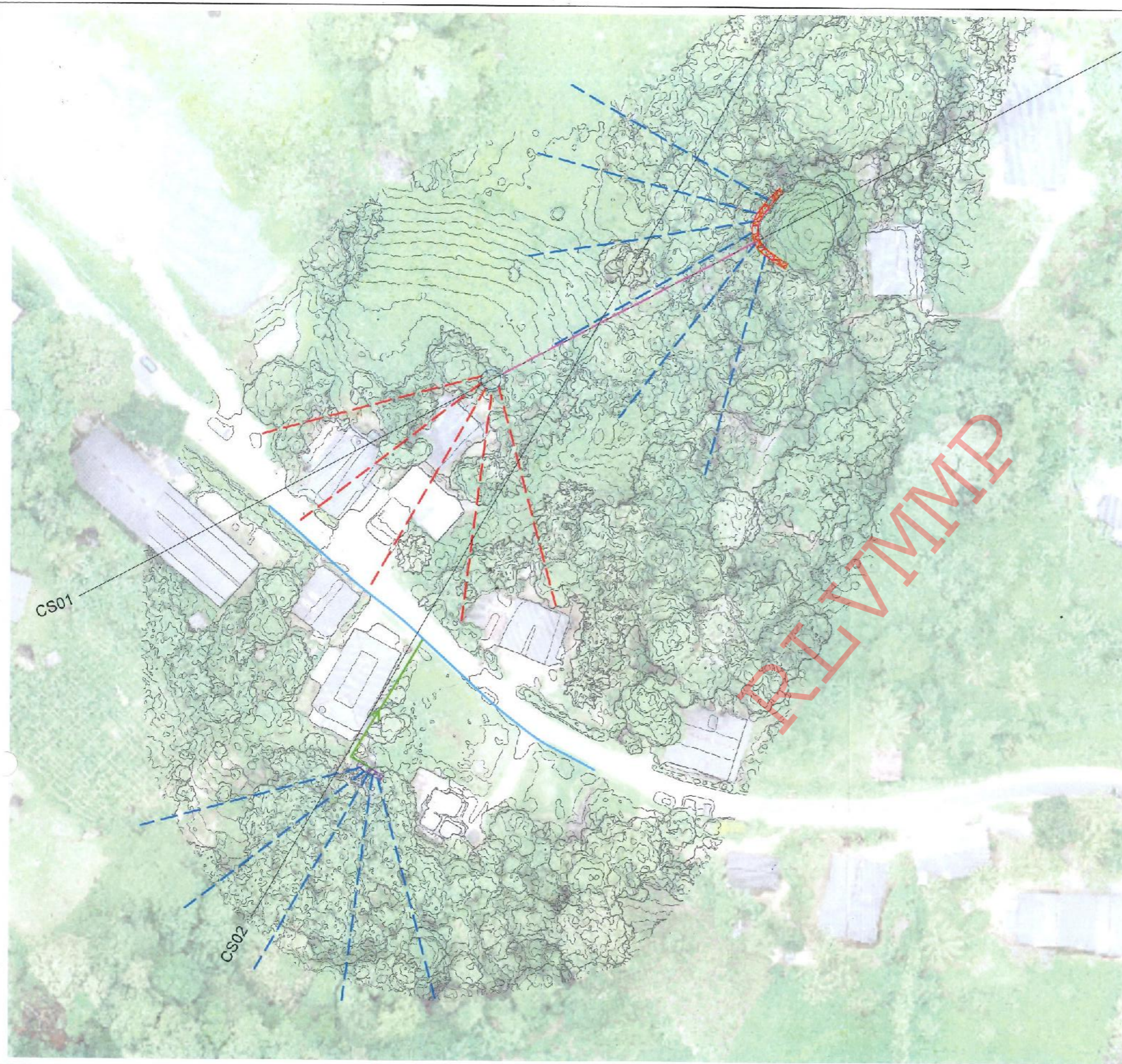
**Landslide Mitigation Measures at 06 Location in Ratnapura District**  
**(Site No. 62,65,66,70,71,106) under Package 6C of**  
**Reduction of Landslide Vulnerability by Mitigation Measures Project (RLVMMP)**

Contract No: RLVMMP/WORKS/06C

March. 2024

# DESIGN DRAWINGS

REVAMP



REFERENCE


- P - PERMENT BUILDING
- CDN - CONCRETE DRAIN
- RDA - RDA BOUNDARY MARK
- WF - WIRE FENCE
- BT - BANK TOP
- BB - BOTTOM OF BANK
- BW - BOUNDARY WALL
- RW - RETAINING WALL
- EP - ELECTRIC POST
- WC - WATER CLOSET
- CUL - CULVERT
- G - GATE
- ST - SEPTIC TANK


DESIGN NOTATION

-  - DRAINAGE WELL ( DIA. 3.5m)
-  - GABION WALL (TYPE II)
-  - GABION WALL (TYPE V)
-  - DS (M) - A - WITH SUB SURFACE DRAIN
-  - DS (M) - B - WITH SUB SURFACE DRAIN
-  - DRAINAGE WELL DISCHARGE PIPE ( DIA. 90mm)
-  - HORIZONTAL DRAIN ( 40m , DIA. 75mm )
-  - HORIZONTAL DRAIN ( 40m , DIA. 90mm )

NOTES

1. SURFACE AND CASCADE DRAIN LOCATIONS (PATH) & LENGTHS MIGHT BE VARIED ACCORDING TO ACTUAL SITE CONDITION.
2. LOCATION OF THE CATCHPITS MIGHT BE VARIED ACCORDING TO THE ACTUAL SITE CONDITION.

EMPLOYER  
  
 DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

DESIGNER  
  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

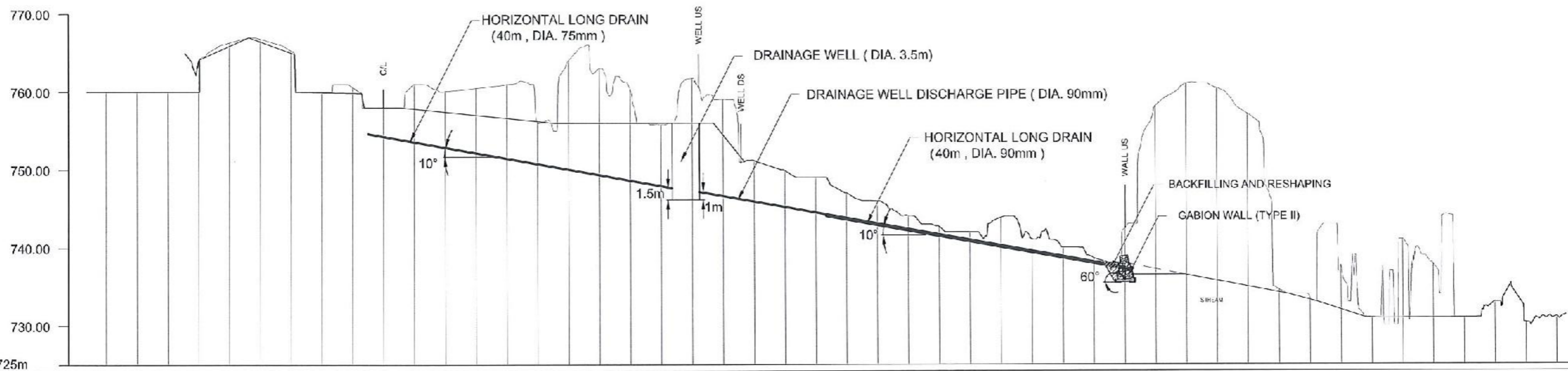
REV	DATE	REV'S ION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 WALEBODA SCHOOL  
 AT RATHNAPURA

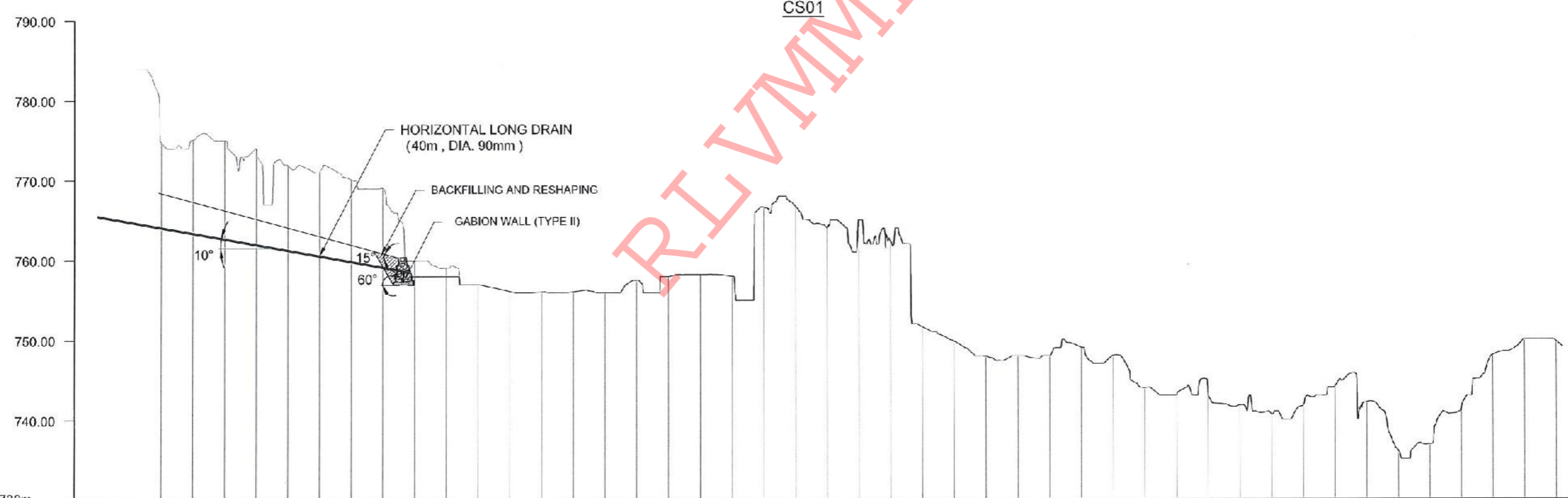
TITLE  
 DESIGN PLAN VIEW

SCALE 1:750  
 PROJECT / DRAWING No. R\_VMMMP/WORKS/NCB/PHII/062-WE/DR-03

DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	
DESIGNER	T. THILAKARATHNA	
CHECKED	B.I. KUMARAGE	
RECOMMENDED	Prof. S.A.S. KULATHILAKA	
APPROVED	K.N. BANDARA	




DATUM 725m	
GROUND LEVEL (m)	764.01, 766.32, 766.80, 765.30, 760.00, 760.62, 757.99, 761.00, 760.10, 760.48, 760.97, 756.17, 764.05, 763.00, 760.34, 756.76, 761.74, 759.01, 751.18, 749.88, 749.00, 747.00, 745.96, 744.05, 742.70, 741.98, 743.83, 741.09, 740.00, 738.63, 742.46, 758.11, 761.01, 760.41, 757.09, 734.53, 733.41, 737.67, 730.89, 741.00, 737.82, 730.93, 732.99, 730.38, 731.11
DISTANCE (m)	36.00, 32.00, 28.00, 24.00, 20.00, 16.00, 12.00, 8.00, 4.00, 0, -4.00, -8.00, -12.00, -16.00, -20.00, -24.00, -28.00, -32.00, -36.00, -40.00, -44.00, -48.00, -52.00, -56.00, -60.00, -64.00, -68.00, -72.00, -76.00, -80.00, -84.00, -88.00, -92.00, -96.00, -100.00, -104.00, -108.00, -112.00, -116.00, -120.00, -124.00, -128.00, -132.00, -136.00, -140.00, -144.00, -148.00, -152.00



DATUM 730m	
GROUND LEVEL (m)	774.72, 775.10, 775.00, 774.00, 771.93, 771.00, 770.15, 769.07, 759.99, 759.08, 757.00, 756.17, 756.08, 756.10, 756.00, 757.53, 758.00, 758.25, 758.01, 766.63, 766.75, 764.02, 765.00, 762.33, 751.63, 749.82, 747.96, 748.00, 748.00, 749.01, 748.03, 743.94, 743.00, 742.99, 741.82, 740.60, 741.79, 744.14, 742.16, 736.04, 736.86, 741.22, 748.03, 750.00, 749.76
DISTANCE (m)	56.00, 52.00, 48.00, 44.00, 40.00, 36.00, 32.00, 28.00, 24.00, 20.00, 16.00, 12.00, 8.00, 4.00, 0, -4.00, -8.00, -12.00, -16.00, -20.00, -24.00, -28.00, -32.00, -36.00, -40.00, -44.00, -48.00, -52.00, -56.00, -60.00, -64.00, -68.00, -72.00, -76.00, -80.00, -84.00, -88.00, -92.00, -96.00, -100.00, -104.00, -108.00, -112.00, -116.00, -120.00

CS02


**DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA**  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05





**DESIGN UNIT**  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

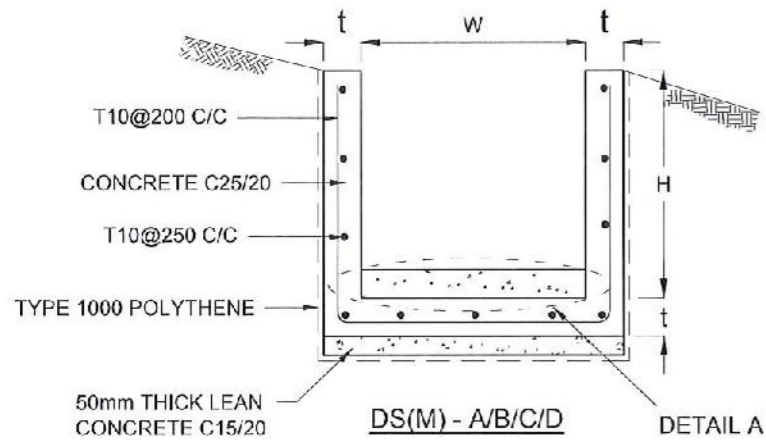
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
**REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 WALEBODA SCHOOL  
 AT RATHNAPURA**

TITLE  
**DESIGN CROSS SECTION**

SCALE	1:600	DATE	04.07.2022
PROJECT / DRAWING No.	RI/VMM/WORKS/NCB/PHI/062-WB/DR-01	REVISION	00

DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	
DESIGNER	T. TIILAKARATHNA	
CHECKED	B.I. KUMARAGE	
RECOMMENDED	Prof. S.A.S. KULATHILAKA	
APPROVED	K.N. BANDARA	



DRAIN TYPE	W (mm)	H (mm)	t (mm)
DS (M) - A /P	300	300	100
DS (M) - B/R	450	450	100
DS (M) - C/Q	600	600	100
DS (M) - D	750	750	125
DS (M) - E	900	900	150
DS (M) - F	1000	1000	150

**NOTES**

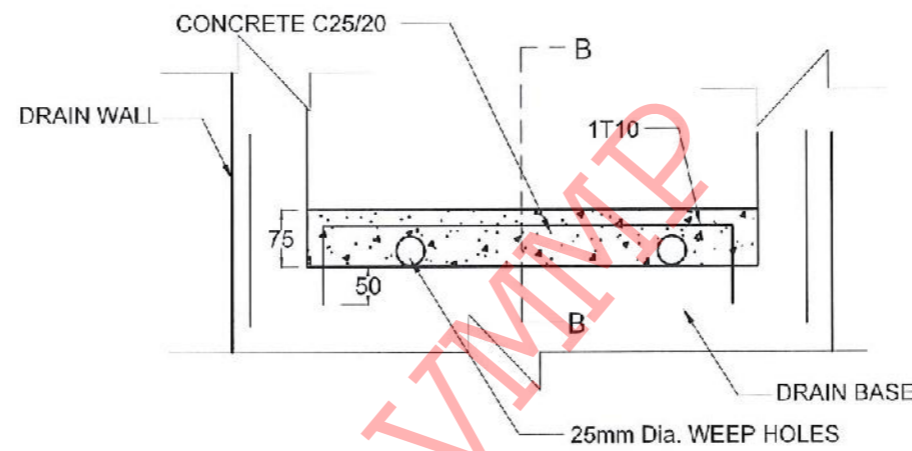
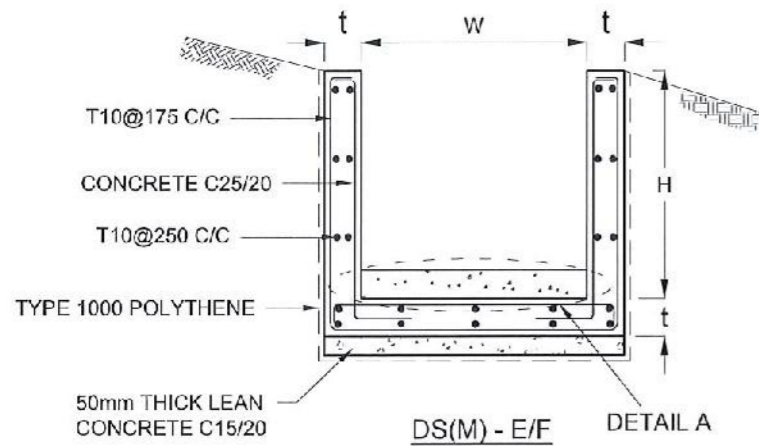
- DEPTH OF EXCAVATION MAY VARY ACCORDING TO SITE CONDITIONS.
- STEPS SHALL BE CONSTRUCTED AT SURFACE DRAIN ON SLOPING GROUND ACCORDING TO THE SITE CONDITIONS AS INSTRUCTED BY THE ENGINEER.
- ENERGY BREAKERS SHALL BE CONSTRUCTED AT THE STEEP DRAIN SEGMENTS AS PER THE INSTRUCTIONS OF THE ENGINEER.
- DOWELS SHALL BE INSTALLED ACCORDING TO THE GROUND CONDITIONS AS INSTRUCTED BY THE ENGINEER.
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED.
- 10 mm THICK EXPANSION JOINT SHALL BE INTRODUCED IN EVERY 5m INTERVAL.

**CONCRETE**

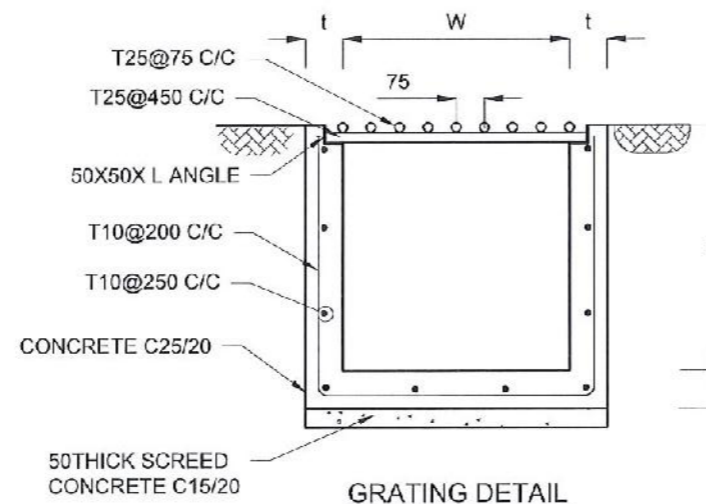
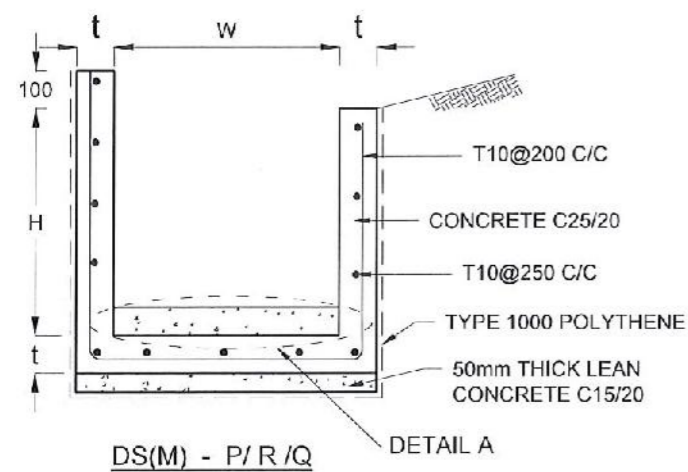
- USE FOLLOWING CONCRETE GRADES FOR STRUCTURE
  - [a] SCREED - C. 15/20
  - [b] WALLS / BASE / ENERGY BREAKERS - C. 25/20

**REINFORCEMENT**

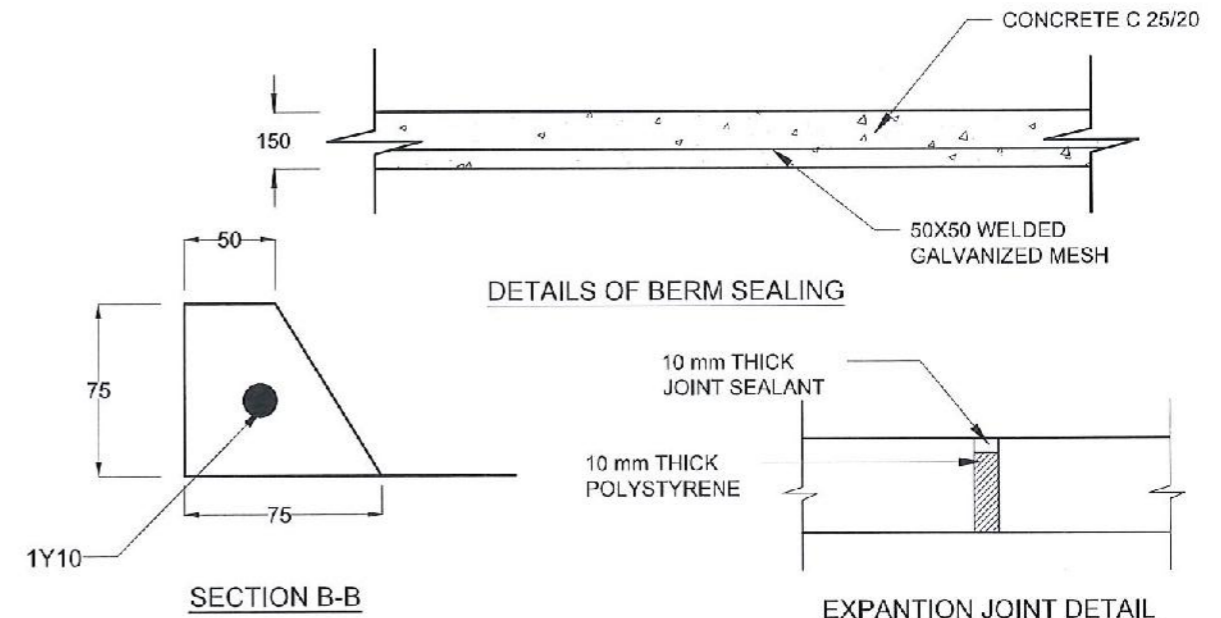
- ALL BARS MARKED "T" SHALL BE HIGH YIELD DEFORMED BARS OF YIELD STRENGTH NOT LESS THAN 460N/mm<sup>2</sup>.
- BARS OF CUT LENGTH LARGER THAN THE SUPPLIED LENGTH TO BE LAPPED FOR A LENGTH OF 50 x BAR DIA. AND LAPPING SHOULD BE STAGGERED.
- ANCHORAGE LENGTH SHOULD BE 40X BAR DIA.
- REINFORCEMENT BARS SHALL BE BENT IN ACCORDANCE WITH STANDARD SPECIFICATIONS.
- COVER TO REINFORCEMENT
  - [a] BURIED FACES AND DRAIN INVERTS - 40 mm
  - [b] ALL OTHER FACES - 25 mm



**DETAIL A - (ENERGY BREAKER AT 3M)**



**GRATING DETAIL**



**DETAILS OF BERM SEALING**

**SECTION B-B**

**EXPANSION JOINT DETAIL**

EMPLOYER  
 DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

DESIGNER  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

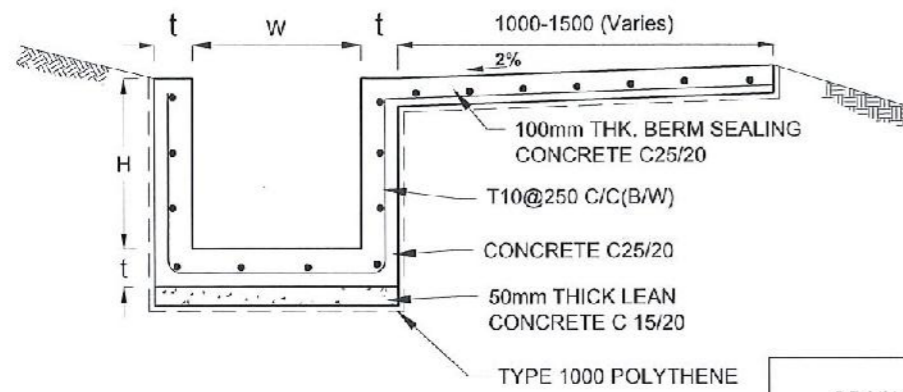
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 WALEBODA SCHOOL  
 AT RATHNAPURA

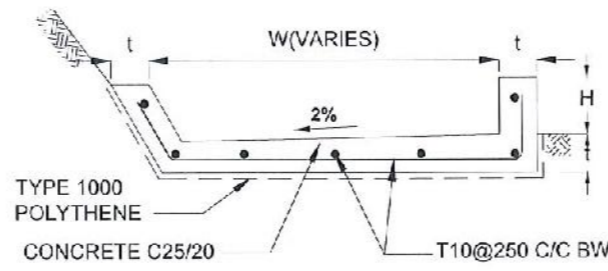
TITLE  
 DETAILS OF DRAINS  
 (SURFACE DRAIN -1 OF 2)

SCALE	N.T.S.	DATE	04.07.2022
PROJECT / DRAWING No.	RLV/M/P/WORKS/NCB/PHIU062-WB/DR-05a	REVISION	00

DESCRIPTION	NAME	SIGNATURE
DRAWN	K.M.D. NISHANTHI	<i>[Signature]</i>
DESIGNER	T. THILAKARATHNA	<i>[Signature]</i>
CHECKED	G.D.W.N. GALHENA	<i>[Signature]</i>
RECOMMENDED	Prof. S.A.S. KULATHILAKA	<i>[Signature]</i>
APPROVED	K.N. BANDARA	<i>[Signature]</i>



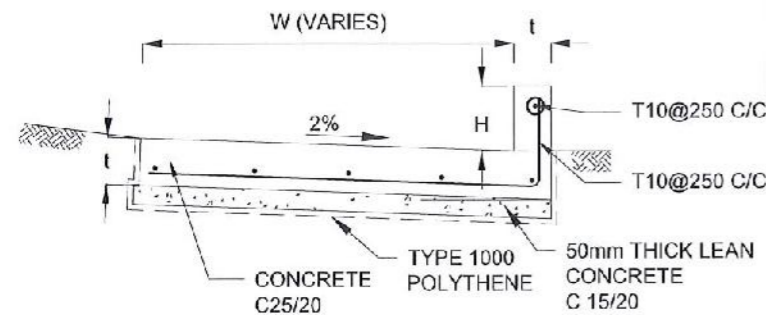
DS (B) - (TYPE I)



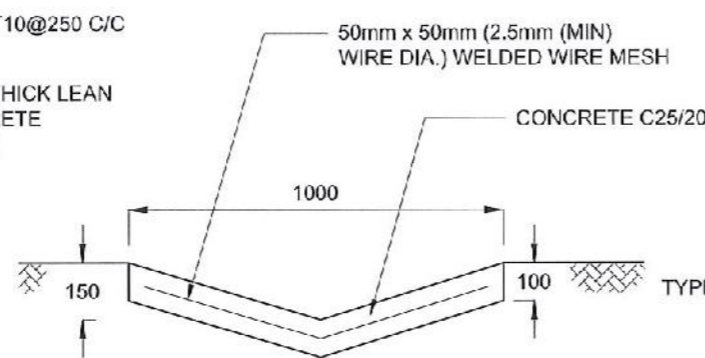
DS (B) - (TYPE II)

DRAIN TYPE	W (mm)	H (mm)	t (mm)
DS (B) - A	300	300	100
DS (B) - B	450	450	100
DS (B) - C	1000	150	100
DS (B) - D	1500	150	100
DS (B) - E	2000	150	100

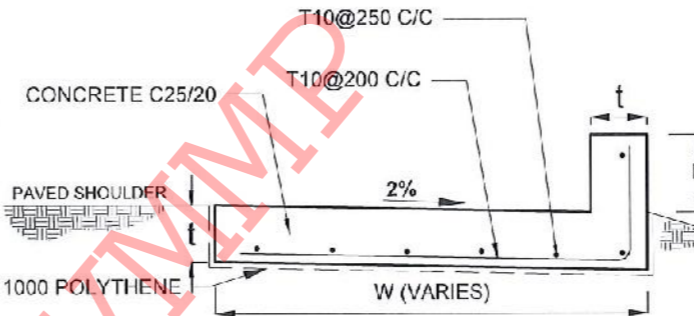
DRAIN TYPE	W (mm)	H (mm)	t (mm)
DS (K) - A	1000	200	100
DS (K) - B	1000	300	100
DS (K) - C	1150	200	200



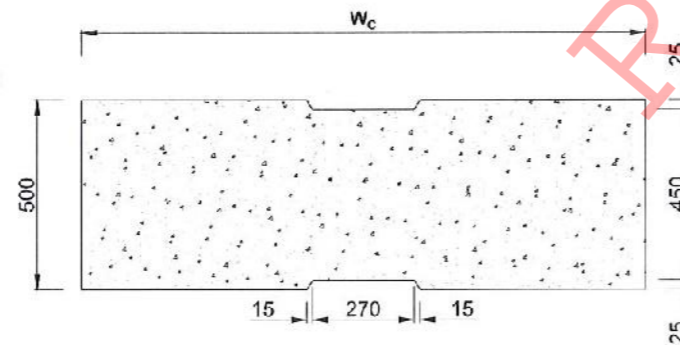
DS (K) - TYPE I



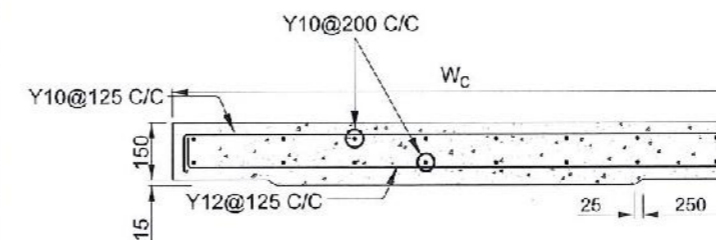
DS (D) - A (DISH DRAIN)



DS (K) - TYPE II

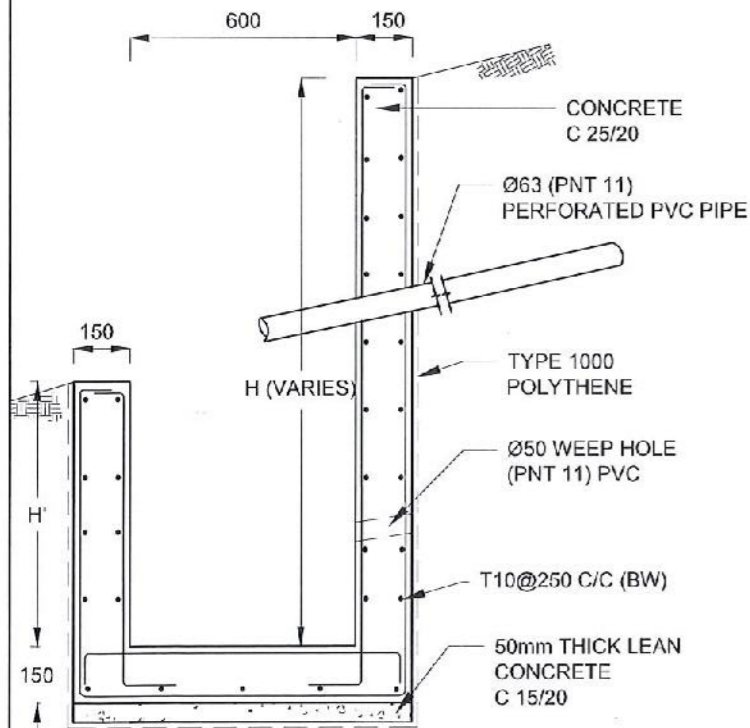


PLAN VIEW OF COVER SLAB



ACCESS & HEAVY DUTY COVER SLAB  
SECTION OF (W<sub>c</sub> x 500 x 150mm)

DS(M) - L	W (mm)	H' (mm)	t (mm)
TYPE I	600	600	150
TYPE II	800	800	150



DS (M) - L

NOTES

- DEPTH OF EXCAVATION MAY VARY ACCORDING TO SITE CONDITIONS.
- STEPS SHALL BE CONSTRUCTED AT SURFACE DRAIN ON SLOPING GROUND ACCORDING TO THE SITE CONDITIONS AS INSTRUCTED BY THE ENGINEER.
- ENERGY BREAKERS SHALL BE CONSTRUCTED AT THE STEEP DRAIN SEGMENTS AS PER THE INSTRUCTIONS OF THE ENGINEER.
- DOWELS SHALL BE INSTALLED ACCORDING TO THE GROUND CONDITIONS AS INSTRUCTED BY THE ENGINEER.
- COVER SLABS NEED TO BE PROVIDED ONLY FOR THE REGIONS AS INSTRUCTED BY THE ENGINEER.
- COVER SLAB WIDTH (W<sub>c</sub>) SHOULD BE TAKEN AS THE SUM OF DRAIN WIDTH AND 2x DRAIN WALL THICKNESS. [W<sub>c</sub> = W+2xt]
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED.
- 10 mm THICK EXPANSION JOINT SHALL BE INTRODUCED IN EVERY 5m INTERVAL.

CONCRETE

- USE FOLLOWING CONCRETE GRADES FOR STRUCTURE
  - [a] SCREED - C. 15/20
  - [b] WALLS / BASE / ENERGY BREAKERS - C. 25/20

REINFORCEMENT

- ALL BARS MARKED "T" SHALL BE HIGH YIELD DEFORMED BARS OF YIELD STRENGTH NOT LESS THAN 460N/mm<sup>2</sup>.
- BARS OF CUT LENGTH LARGER THAN THE SUPPLIED LENGTH TO BE LAPPED FOR A LENGTH OF 50 x BAR DIA. AND LAPPING SHOULD BE STAGGERED.
- ANCHORAGE LENGTH SHOULD BE 40X BAR DIA.
- REINFORCEMENT BARS SHALL BE BENT IN ACCORDANCE WITH STANDARD SPECIFICATIONS.
- COVER TO REINFORCEMENT
  - [a] BURIED FACES AND DRAIN INVERTS - 40 mm
  - [b] ALL OTHER FACES - 25 mm

EMPLOYER  
 DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

DESIGNER  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
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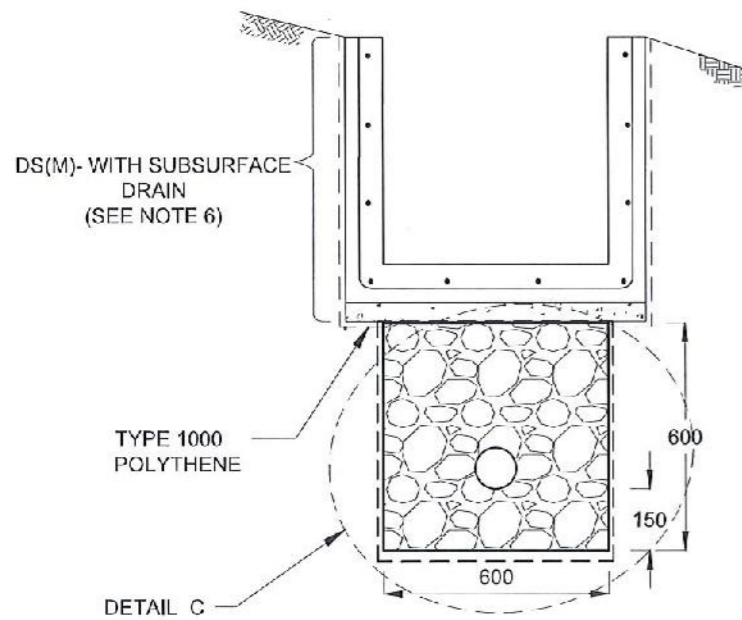
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
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 VULNERABILITY BY MITIGATION MEASURES  
 WALEBODA SCHOOL  
 AT RATHNAPURA

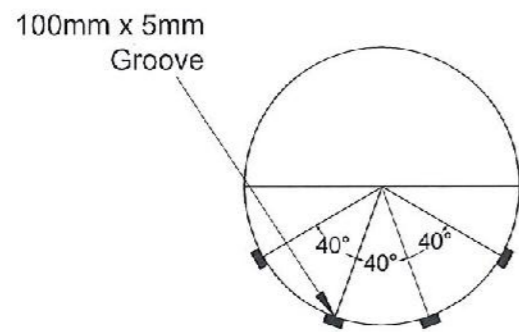
TITLE  
 DETAILS OF DRAINS  
 (SURFACE DRAIN - 2 OF 2)

SCALE N.T.S. DATE 04.07.2022  
 PROJECT / DRAWING No. RLVMPWORKS/NCB/PHII/082-WB/DR-05b REVISION 00

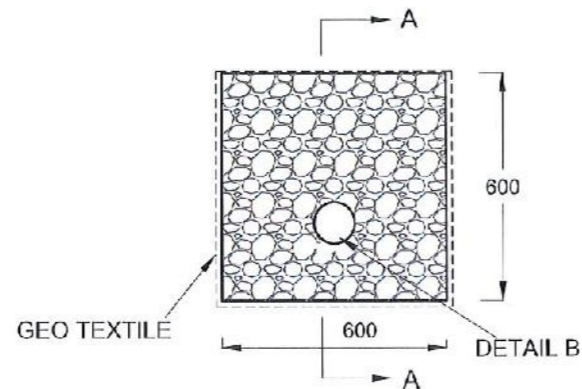
DESCRIPTION	NAME	SIGNATURE
DRAWN	K.M.D. NISHANTHI	<i>[Signature]</i>
DESIGNER	T. THILAKARATHNA	<i>[Signature]</i>
CHECKED	G.D.W.N. GALHENA	<i>[Signature]</i>
RECOMMENDED	Prof. S.A.S. KULATI ILLAKA	<i>[Signature]</i>
APPROVED	K.N. BANDARA	<i>[Signature]</i>



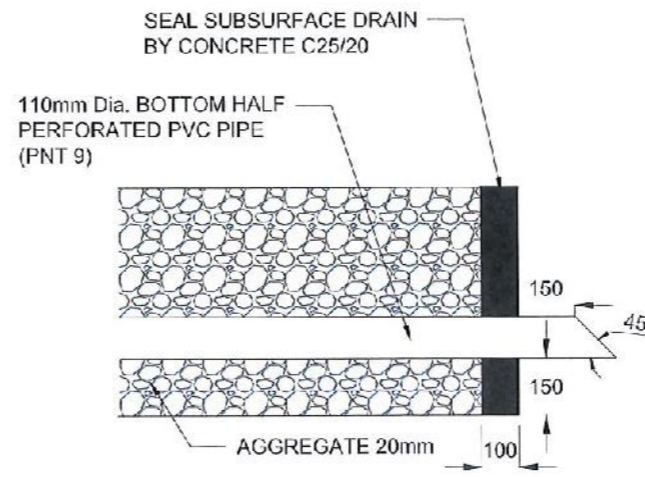
**SUBSURFACE DRAIN [DS (S) -A]**



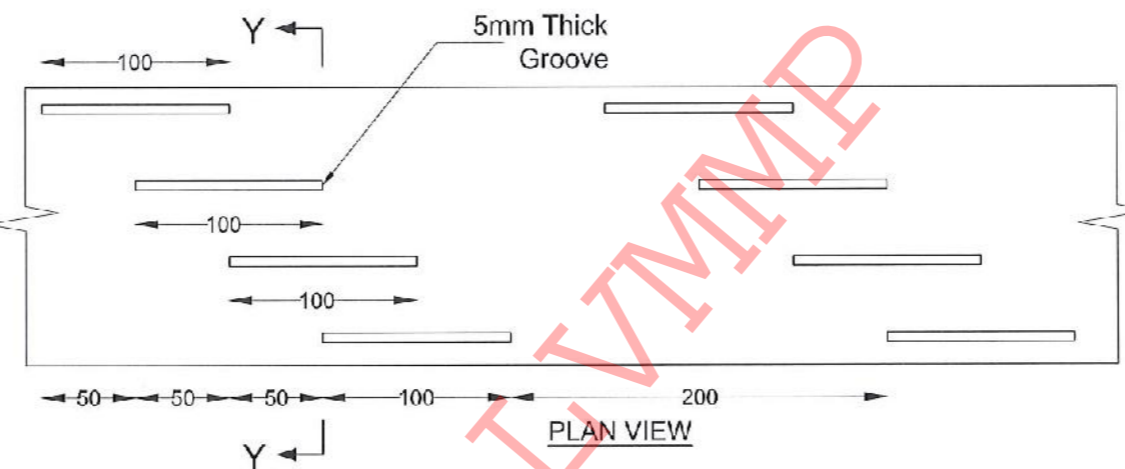
**SECTION Y - Y**



**DETAIL C / DS (S) -A**

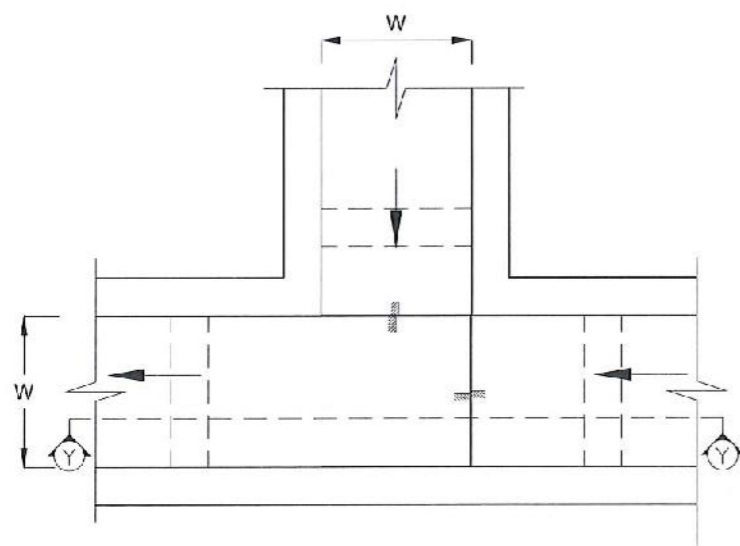


**SECTION A-A (OUTLET DETAIL SUBSURFACE DRAIN)**

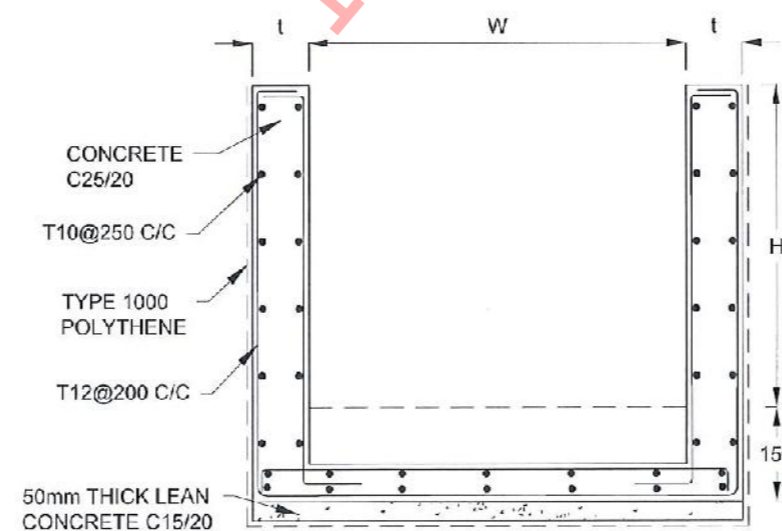


**PLAN VIEW**

**DETAIL - B (PERFORATED PIPE FOR SUB-SURFACE DRAINS)**



**PLAN VIEW OF CATCH PIT (CP)**



**SECTION Y-Y (CP - R)**

**NOTES**

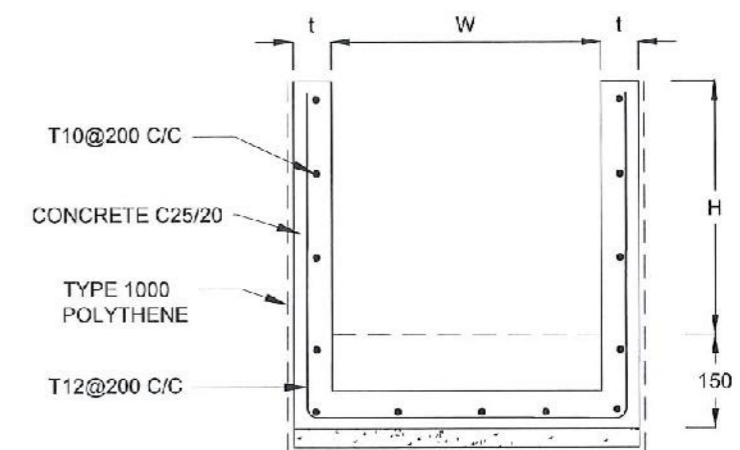
1. W,H,t; SHALL BE THE SAME AS RESPECTIVE DRAIN SECTION.
2. CP - R SHALL BE USED WHERE H >= 900mm
3. DEPTH OF EXCAVATION MAY VARY ACCORDING TO SITE CONDITIONS.
4. DOWELS SHALL BE INSTALLED ACCORDING TO THE GROUND CONDITIONS AS INSTRUCTED BY THE ENGINEER.
5. 10 mm THICK EXPANSION JOINT SHALL BE INTRODUCED IN EVERY 5m INTERVAL.
6. DETAILS OF SURFACE DRAIN PORTION OF THE SUBSURFACE DRAINS SHALL BE AS PER DS(M), DS(B), DS(K) OR DS(C) SECTIONS ACCORDINGLY.
7. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED.

**CONCRETE**

8. USE FOLLOWING CONCRETE GRADES FOR STRUCTURE
  - [a] SCREED - C. 15/20
  - [b] WALLS / BASE / ENERGY BREAKERS - C. 25/20

**REINFORCEMENT**

9. ALL BARS MARKED "T" SHALL BE HIGH YIELD DEFORMED BARS OF YIELD STRENGTH NOT LESS THAN 460N/mm<sup>2</sup>.
10. BARS OF CUT LENGTH LARGER THAN THE SUPPLIED LENGTH TO BE LAPPED FOR A LENGTH OF 50 x BAR DIA. AND LAPPING SHOULD BE STAGGERED.
11. ANCHORAGE LENGTH SHOULD BE 40X BAR DIA.
12. REINFORCEMENT BARS SHALL BE BENT IN ACCORDANCE WITH STANDARD SPECIFICATIONS.
13. COVER TO REINFORCEMENT
  - [a] BURIED FACES AND DRAIN INVERTS - 40 mm
  - [b] ALL OTHER FACES - 25 mm



**SECTION Y - Y**

EMPLOYER  
 DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

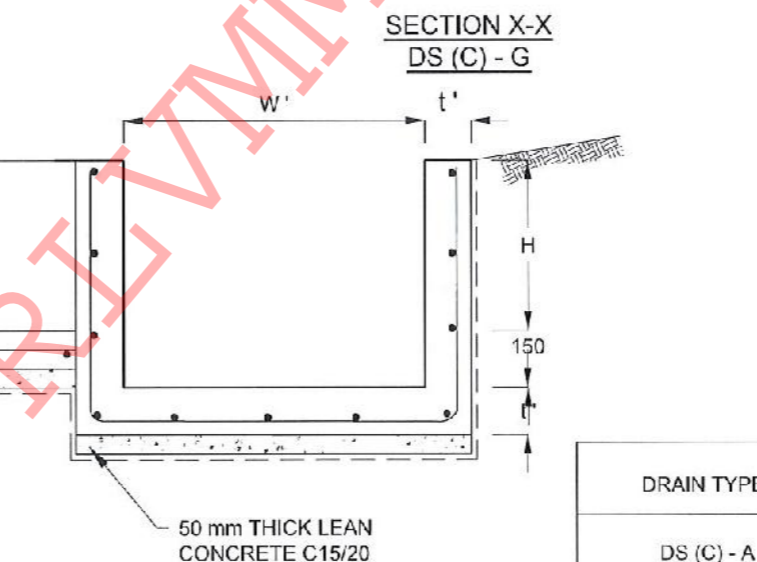
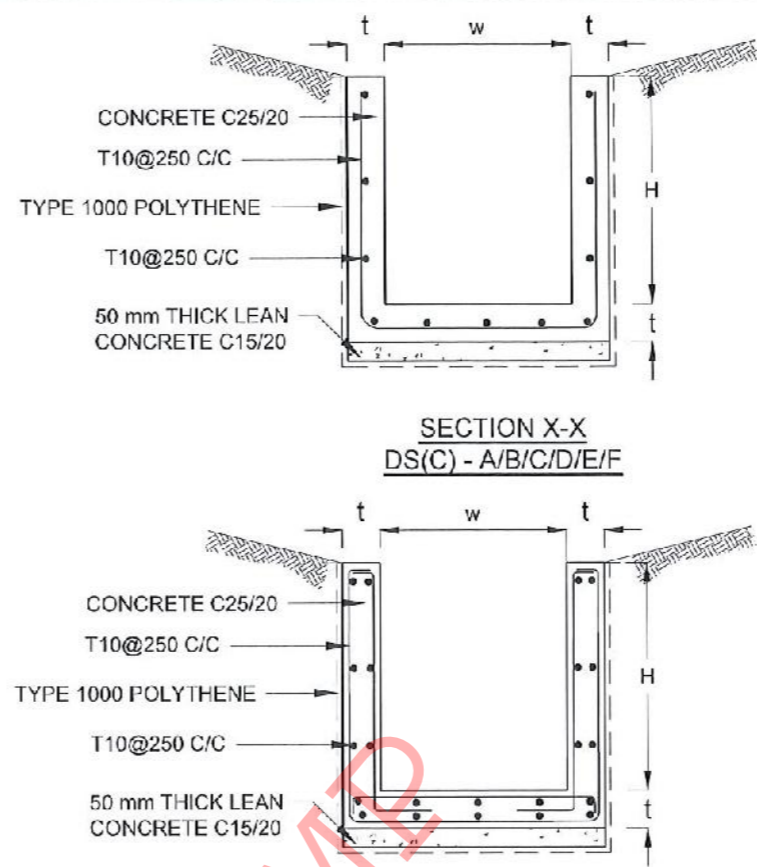
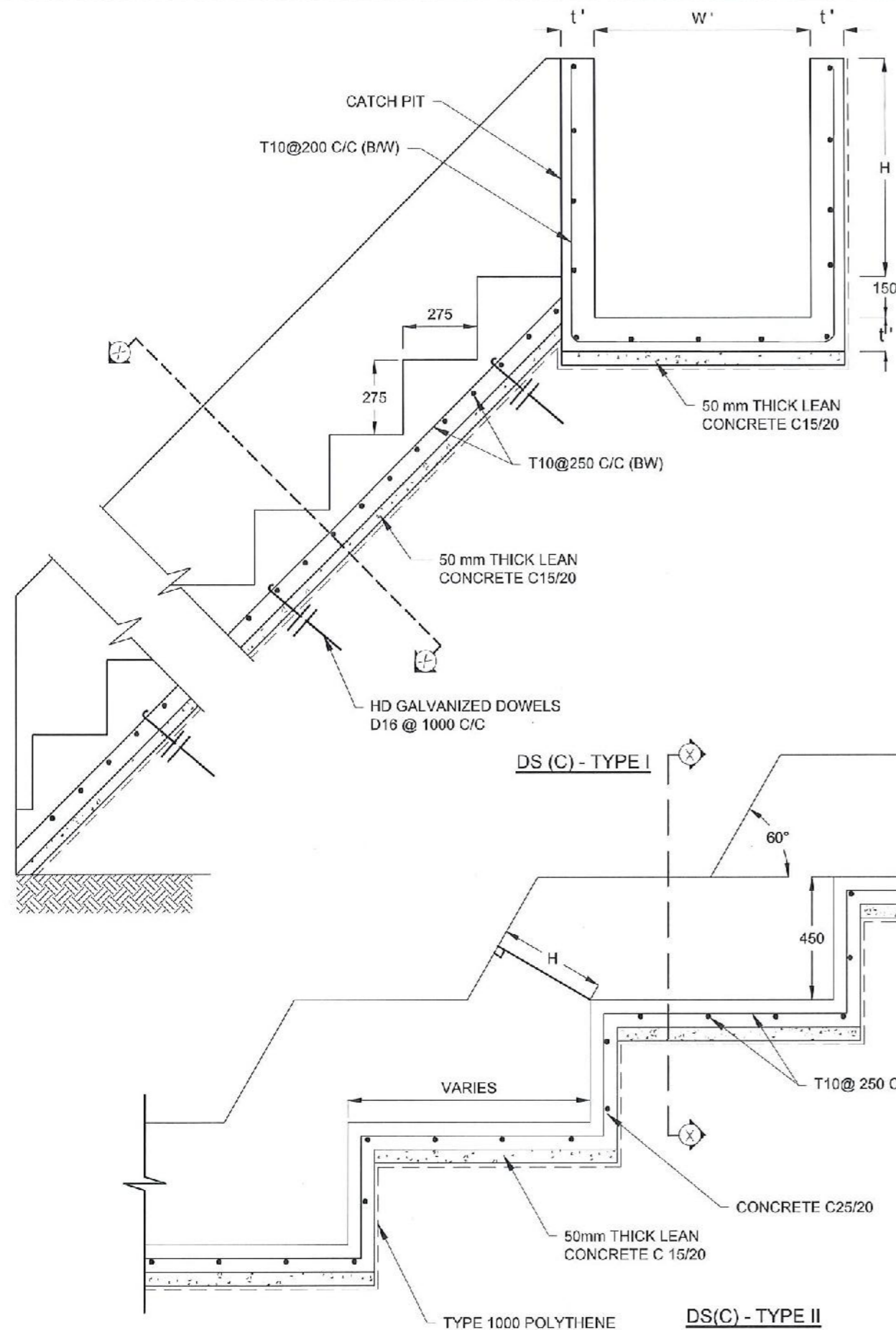
DESIGNER  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 WALEBODA SCHOOL  
 AT RATHNAPURA

TITLE	DESCRIPTION	NAME	SIGNATURE
DETAILS OF DRAINS (SUBSURFACE DRAIN AND CATCHPIT)	DRAWN	K.M.D. NISHANTHI	<i>[Signature]</i>
	DESIGNER	T. THILAKARATHNA	<i>[Signature]</i>
	CHECKED	G.D.W.N. GALHENA	<i>[Signature]</i>
	RECOMMENDED	Prof. S.A.S. KULATHILAKA	<i>[Signature]</i>
	APPROVED	K.N. BANDARA	<i>[Signature]</i>

SCALE	DATE	REVISION
N.T.S.	04.07.2022	00
PROJECT / DRAWING No.	RLVMMPW/WORKS/NCB/PHII/062-WB/DR-05c	



**NOTES**

1. USE EITHER TYPE I OR TYPE II CASCADE DRAIN ACCORDING TO THE ACTUAL GROUND CONDITION AS INSTRUCTED BY THE ENGINEER.
2. LENGTH OF THE STEPS OF CASCADE WILL BE VARIED ACCORDING TO THE SITE CONDITIONS.
3. DEPTH OF EXCAVATION SHALL BE VARIED ACCORDING TO SITE CONDITIONS.
4. DOWELS SHALL BE INSTALLED ACCORDING TO THE GROUND CONDITIONS AS INSTRUCTED BY THE ENGINEER.
5. 10 mm THICK EXPANSION JOINT SHALL BE INTRODUCED IN EVERY 5m INTERVAL.
6. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED.

**CONCRETE**

7. USE FOLLOWING CONCRETE GRADES FOR STRUCTURE
  - [a] SCREED - C. 15/20
  - [b] WALLS / BASE / ENERGY BREAKERS - C. 25/20

**REINFORCEMENT**

8. ALL BARS MARKED "T" SHALL BE HIGH YIELD DEFORMED BARS OF YIELD STRENGTH NOT LESS THAN 460N/mm<sup>2</sup>.
9. BARS OF CUT LENGTH LARGER THAN THE SUPPLIED LENGTH TO BE LAPPED FOR A LENGTH OF 50 x BAR DIA. AND LAPPING SHOULD BE STAGGERED.
10. ANCHORAGE LENGTH SHOULD BE 40X BAR DIA.
11. REINFORCEMENT BARS SHALL BE BENT IN ACCORDANCE WITH STANDARD SPECIFICATIONS.
12. COVER TO REINFORCEMENT
  - [a] BURIED FACES AND DRAIN INVERTS - 40 mm
  - [b] ALL OTHER FACES - 25 mm

DRAIN TYPE	W (mm)	H (mm)	t (mm)	W' (mm)	t' (mm)
DS (C) - A	450	450	100	600	100
DS (C) - B	450	600	100	750	100
DS (C) - C	600	600	100	800	100
DS (C) - D	750	750	100	800	100
DS (C) - E	800	800	125	1000	125
DS (C) - F	1000	750	125	1200	125
DS (C) - G	1200	1000	125	1300	125

EMPLOYER  
 DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

DESIGNER  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

REV	DATE	REVISION DESCRIPTION	APPROVAL

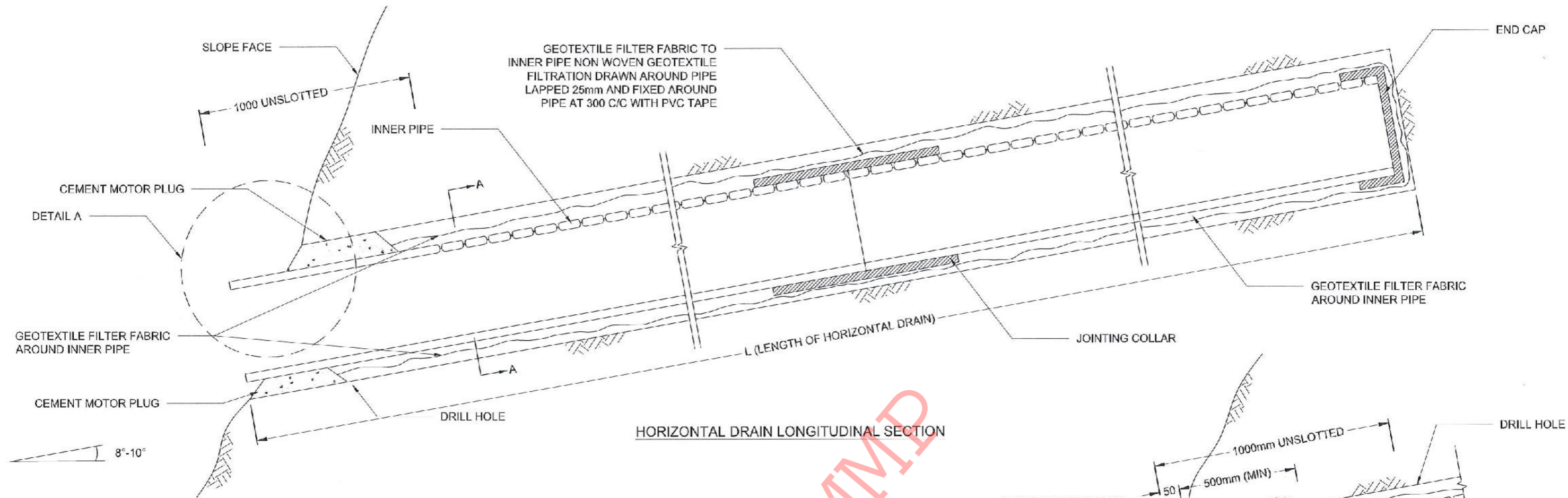
PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 WALEBODA SCHOOL  
 AT RATHNAPURA

TITLE  
 DETAILS OF DRAINS  
 (CASCADE DRAIN)

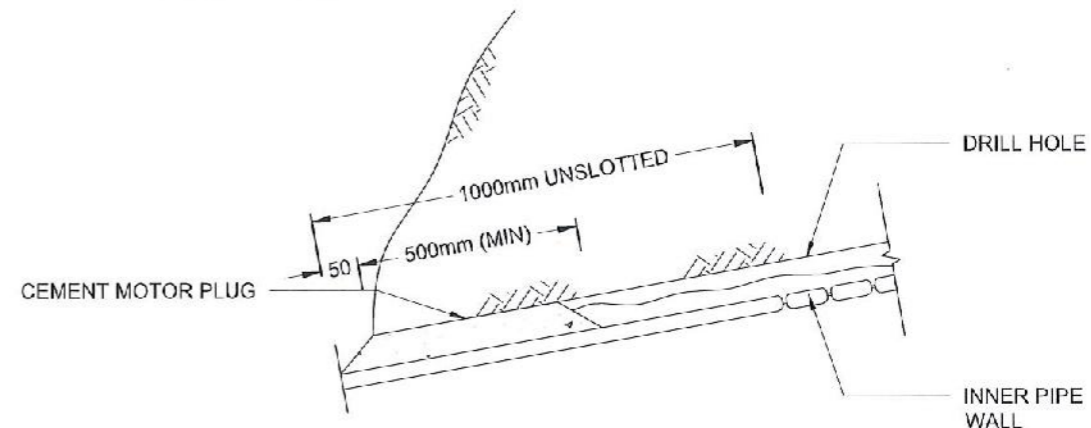
SCALE	N.T.S.	DATE	04.07.2022
PROJECT / DRAWING No.		REVISION	00
RLVMMP/WORKS/NCB/PH11062-WB/DR-05d			

DESCRIPTION	NAME	SIGNATURE
DRAWN	K.M.D. NISHANTHI	<i>K.M.D. Nishanthi</i>
DESIGNER	T. THILAKARATHNA	<i>T. Thilakarathna</i>
CHECKED	G.D.W.N. GALHENA	<i>G.D.W.N. Galhena</i>
RECOMMENDED	Prof. S.A.S. KULATHILAKA	<i>S.A.S. Kulathilaka</i>
APPROVED	K.N. BANDARA	<i>K.N. Bandara</i>

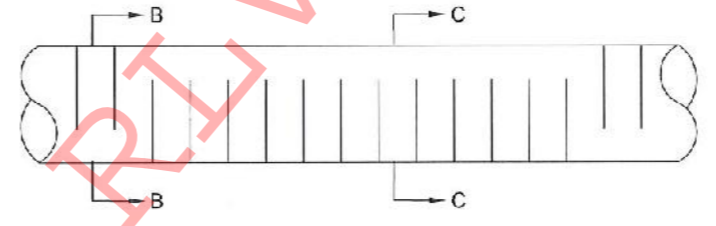
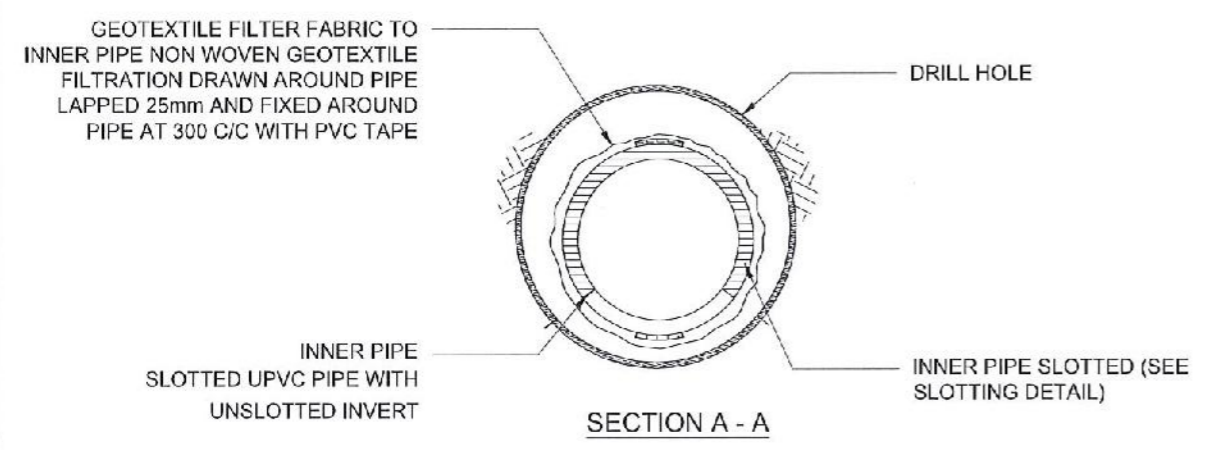




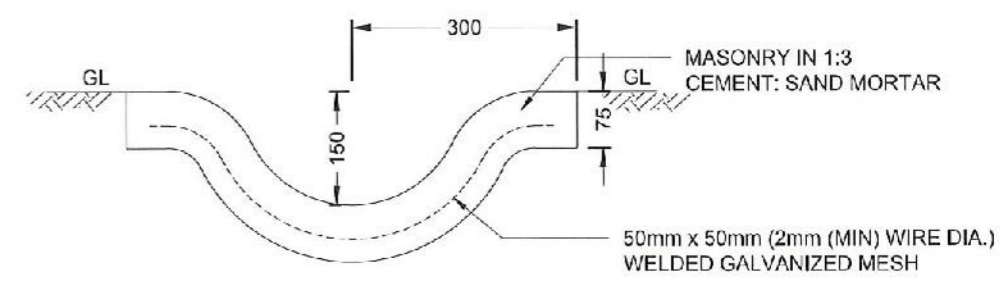
HORIZONTAL DRAIN LONGITUDINAL SECTION



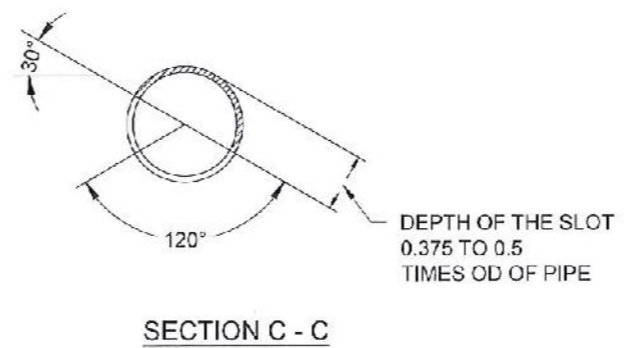
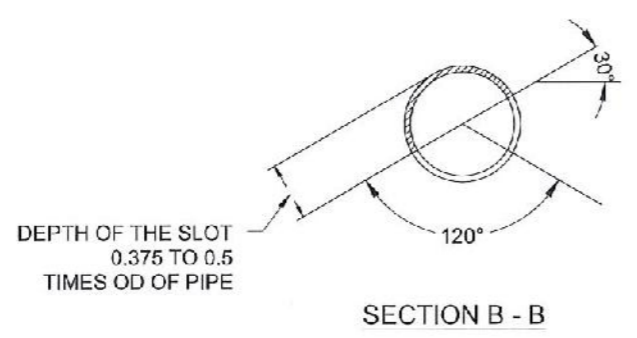
DETAIL A



INNER AND OUTER PIPE SLOTTING DETAIL (TOP VIEW)



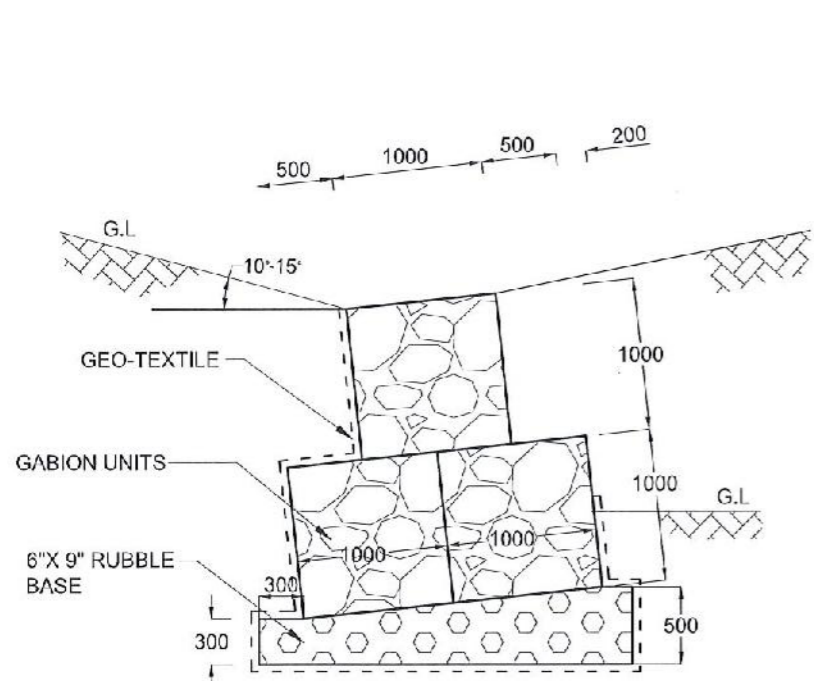
DETAIL OF GUIDE DRAIN



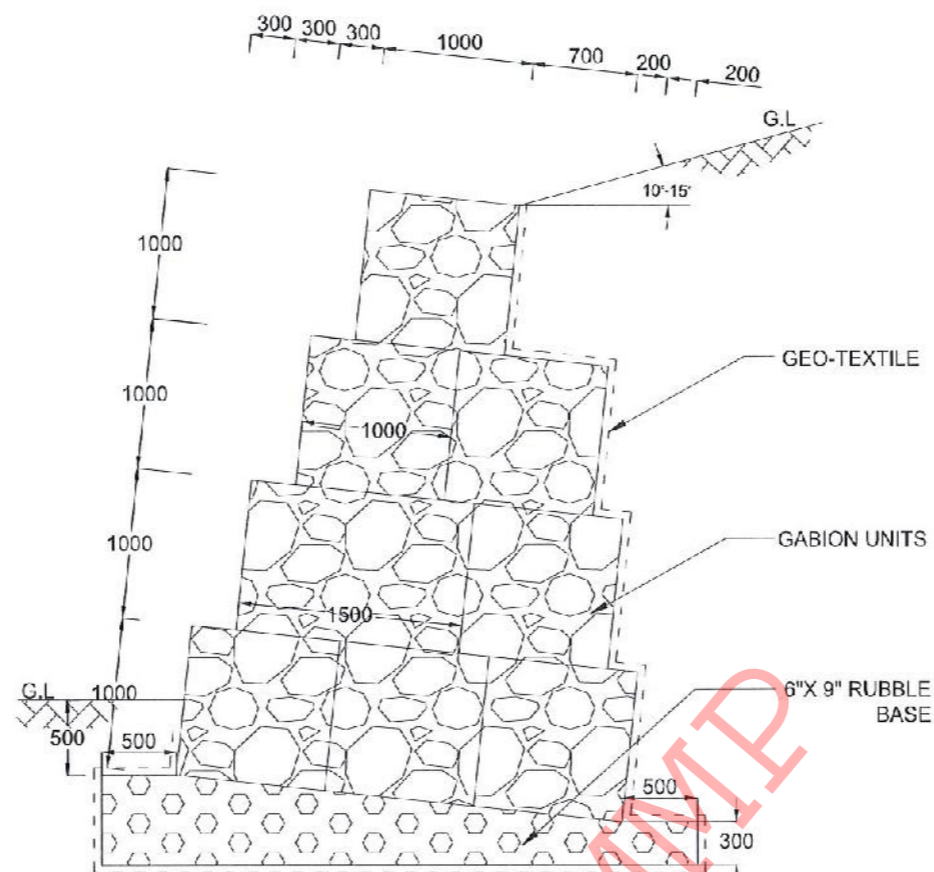
NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. PIPE DIAMETERS, ANGLE & LENGTHS AS SPECIFIED IN DRAWINGS.
3. ALL MATERIALS SHALL CONFORM TO PROJECT SPECIFICATION

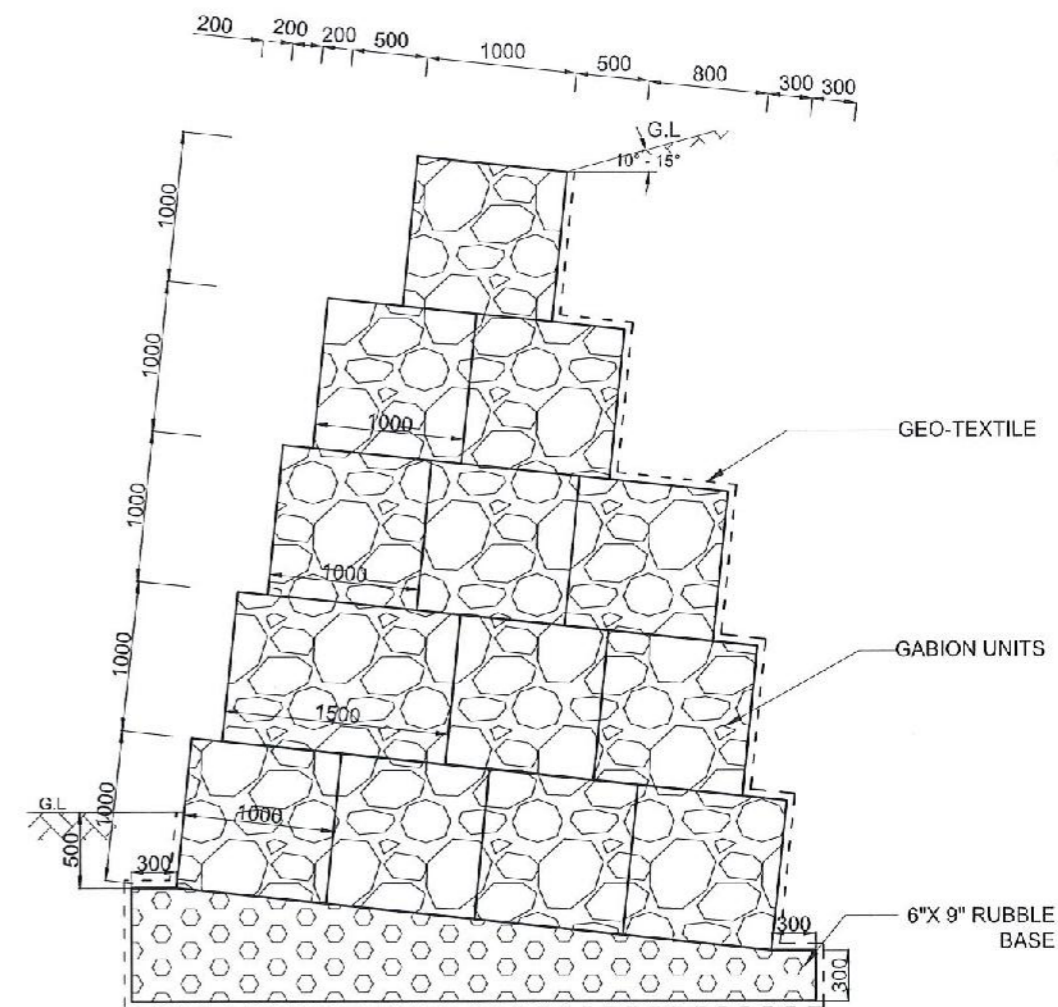
EMPLOYER  DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT NATIONAL BUILDING RESEARCH ORGANISATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	DESIGNER  DESIGN UNIT NATIONAL BUILDING RESEARCH ORGANIZATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	REV	DATE	REVISION DESCRIPTION	APPROVAL	PROJECT TITLE REDUCTION OF LANDSLIDE VULNERABILITY BY MITIGATION MEASURES WALEBODA SCHOOL AT RATHNAPURA	TITLE		DESCRIPTION	NAME	SIGNATURE
								DETAILS OF HORIZONTAL DRAIN SECTIONS		DRAWN DESIGNER CHECKED RECOMMENDED APPROVED	K.M.D. NISHIANTHI T. THILAKARATHNA G.D.W.N. GALHENA Prof. S.A.S. KULATHILAKA K.N. BANDARA
		SCALE	N.T.S	DATE	04.07.2022		PROJECT / DRAWING No. RLVIMP/WORKS/NCB/PHI/062-W3/DR-06		REVISION	00	



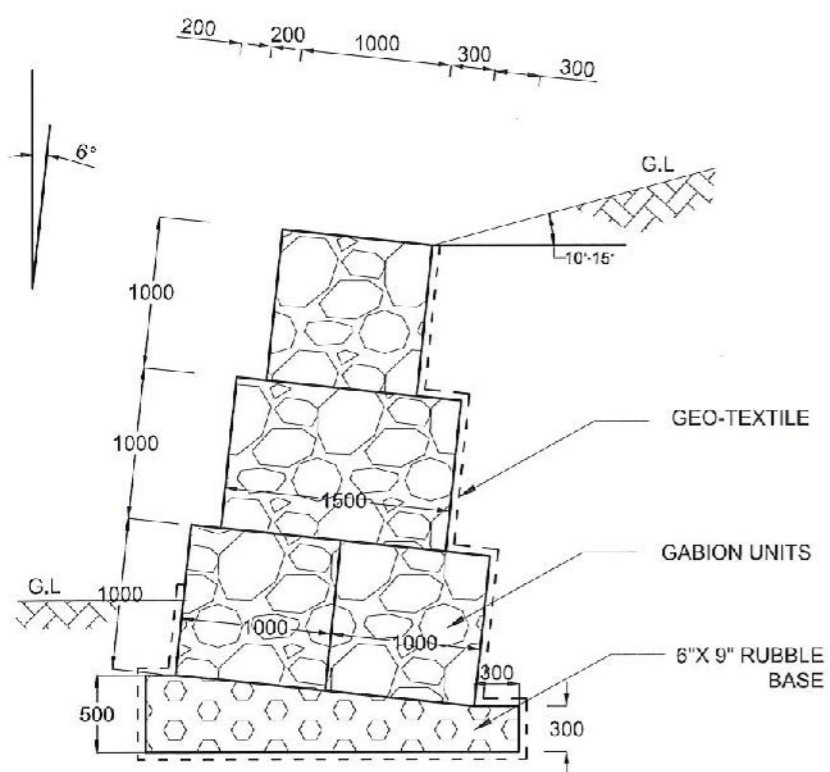
GABION WALL  
TYPE I



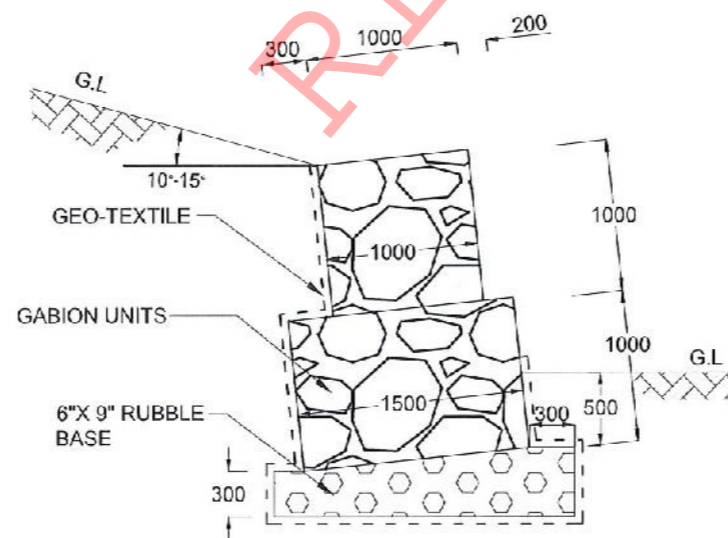
GABION WALL  
TYPE III



GABION WALL  
TYPE IV




GABION WALL  
TYPE II



GABION WALL  
TYPE V

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. BACKSLOPE ANGLE, LEVEL AND FORM MAY VARY AS PER THE DESIGN AT EACH SITE.

EMPLOYER  
  
 DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
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 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

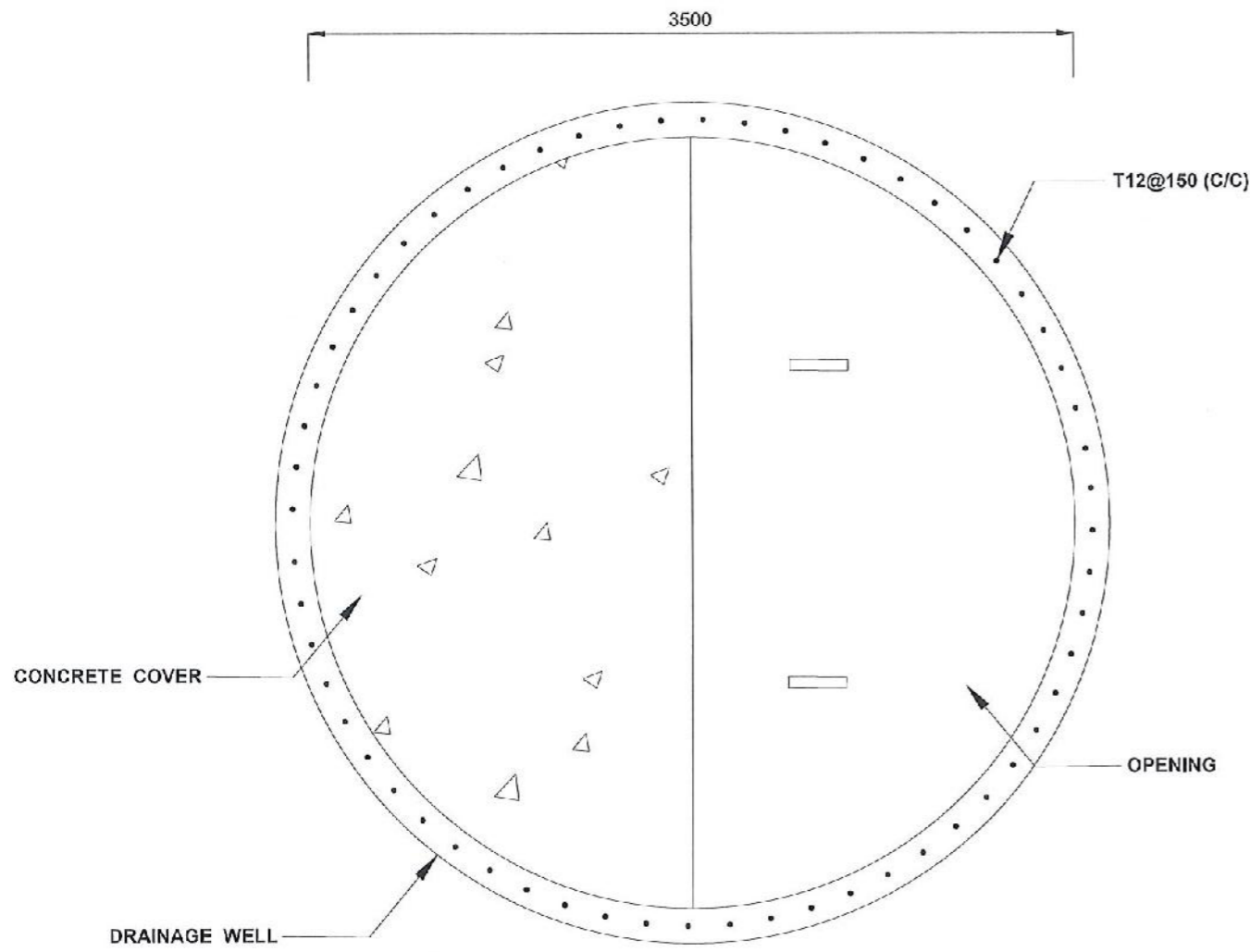
DESIGNER  
  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

REV	DATE	REVISION DESCRIPTION	APPROVAL

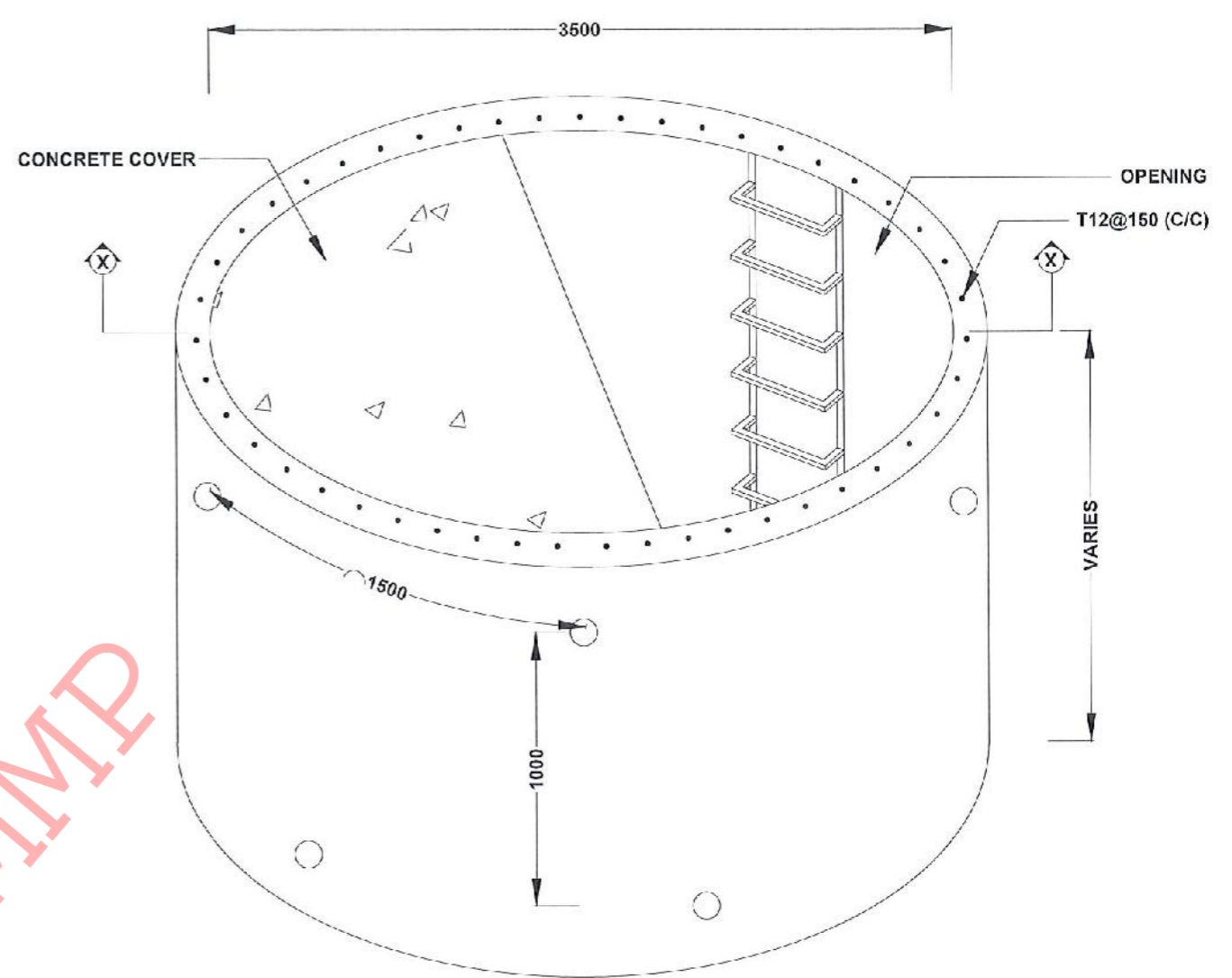
PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 WALEBODA SCHOOL  
 AT RATHNAPURA

TITLE	DESCRIPTION	NAME	SIGNATURE
DETAILS OF GABION WALL	DRAWN	K.M.D. NISHANTHI	
	DESIGNER	T. THILAKARATHNA	
	CHECKED	G.D.W.N. GALHENA	
	RECOMMENDED	Prof. S.A.S. KULATHILAKA	
	APPROVED	K.N. BANDARA	

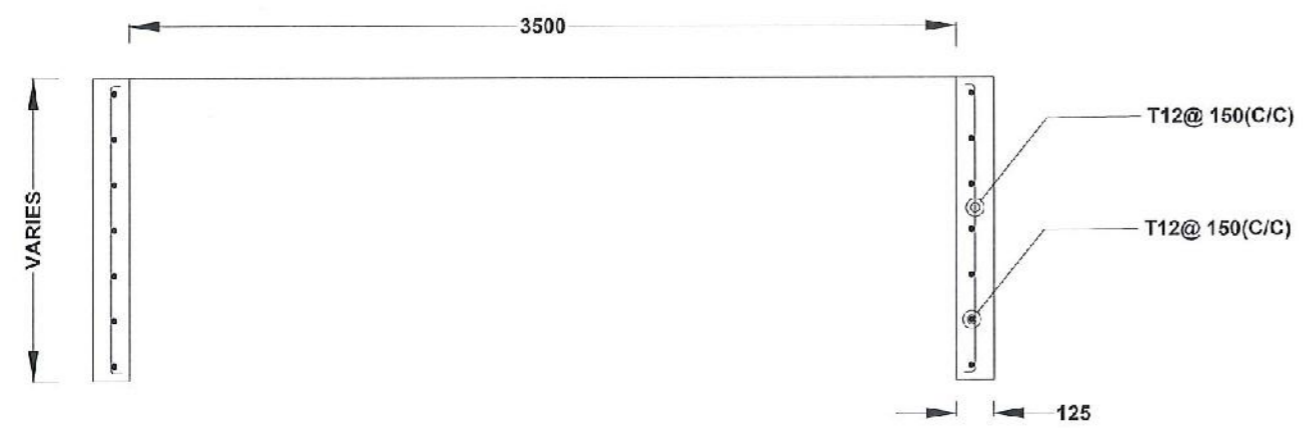
SCALE	DATE	REVISION
N.T.S	04.07.2022	00
PROJECT / DRAWING No.	RLVMP/WORKS/NCB/PH/11/032-WB/DR-07	



**PLAN VIEW OF DRAINAGE WELL**



**ELEVATION OF DRAINAGE WELL**



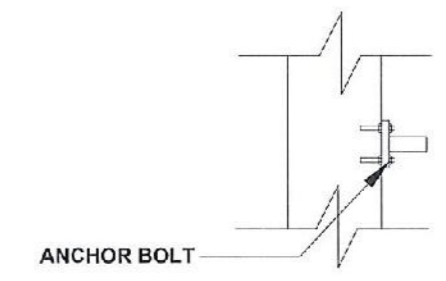
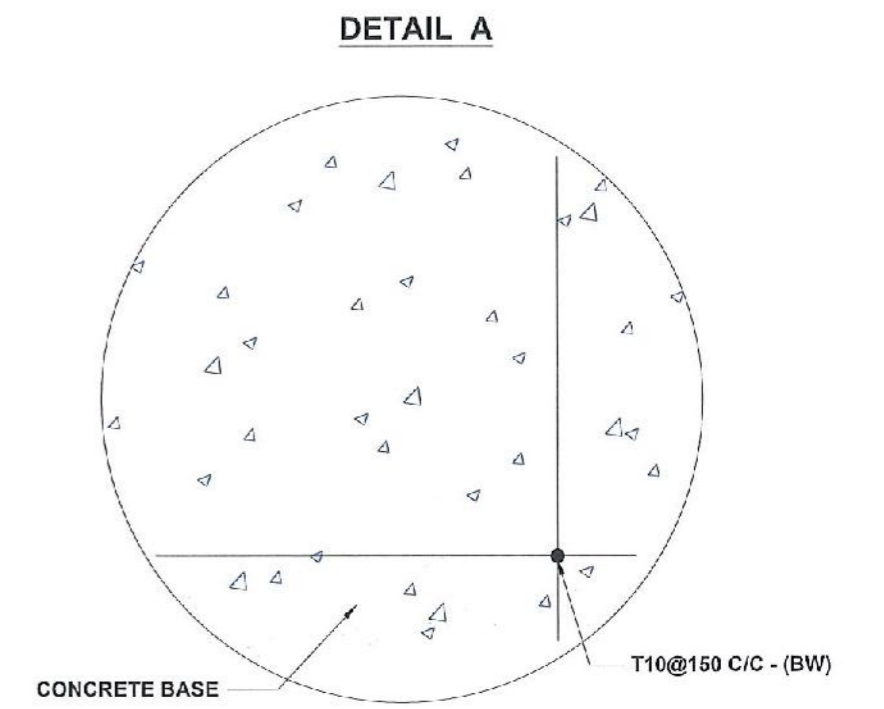
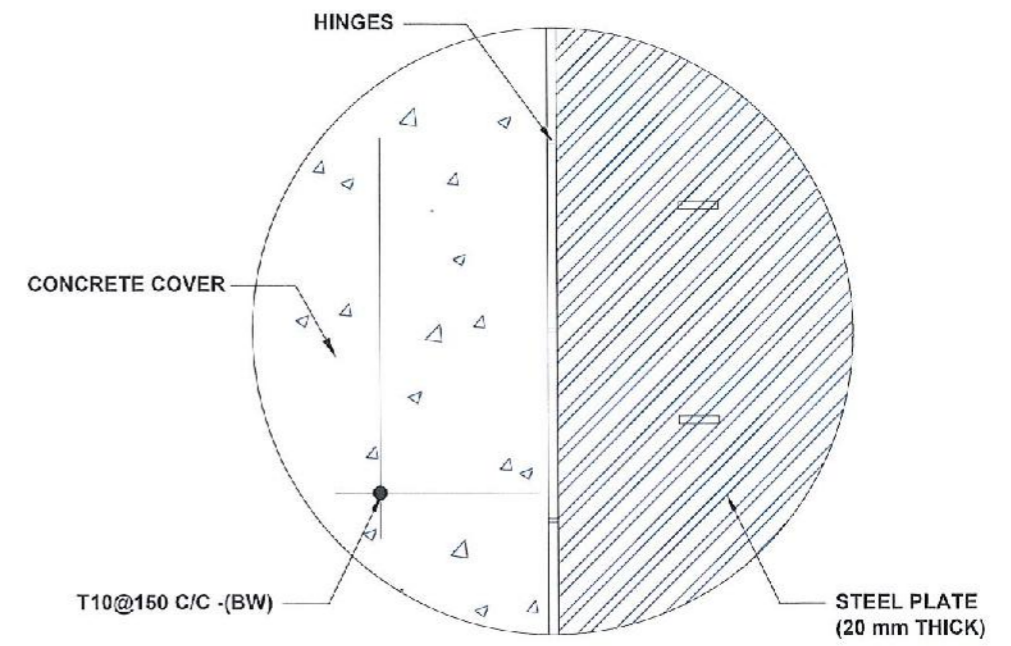
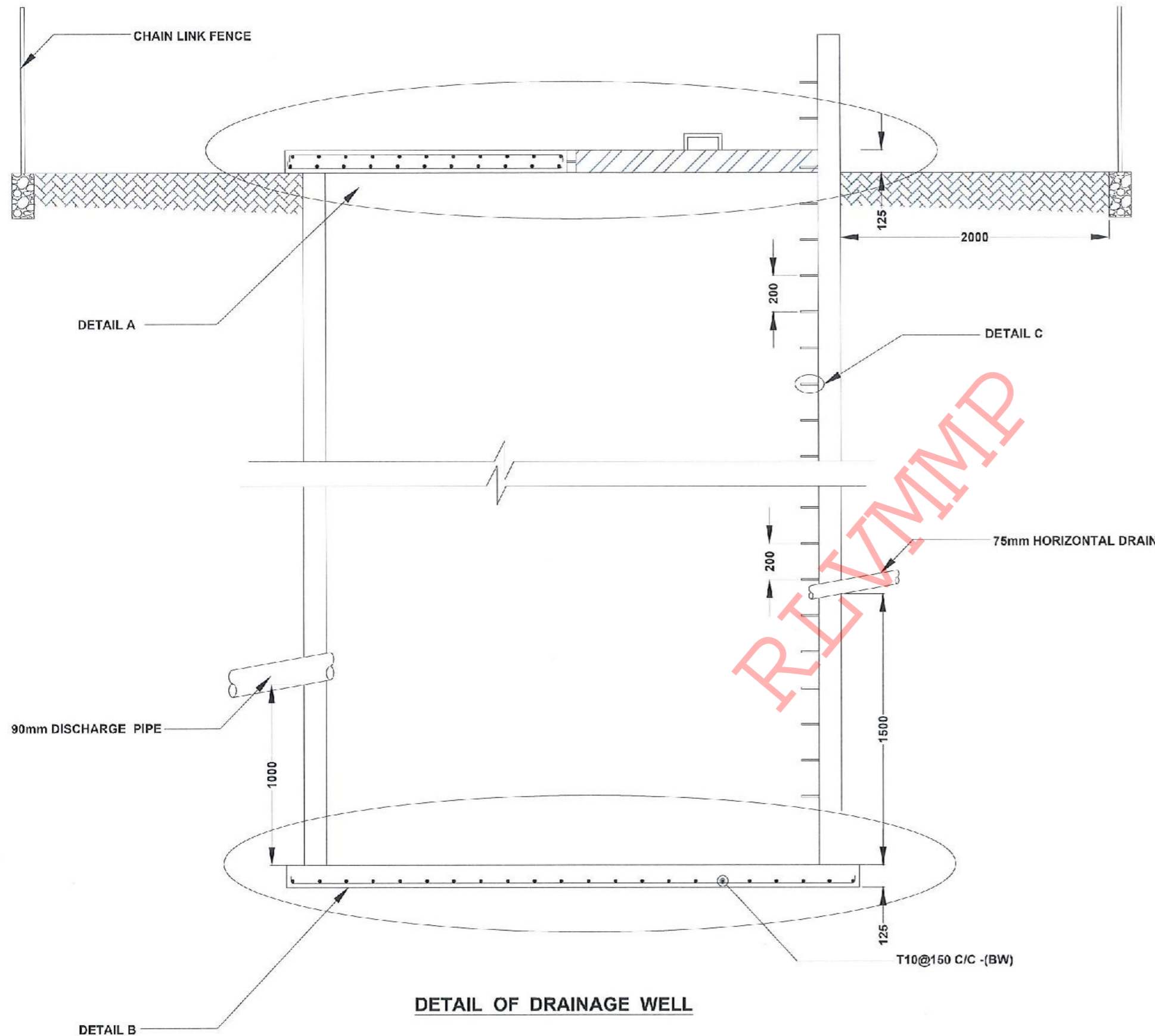
**SECTION X - X**

RLVMMP

**NOTES**

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED
2. USE FOLLOWING CONCRETE GRADES FOR STRUCTURE
  - [a] SCREED - C. 15/20
  - [b] WALLS / BASE / ENERGY BREAKERS - C. 25/20
3. ALL BARS MARKED "T" SHALL BE HIGH YIELD DEFORMED BARS OF YIELD STRENGTH NOT LESS THAN 460N/mm<sup>2</sup>.
4. BARS OF CUT LENGTH LARGER THAN THE SUPPLIED LENGTH TO BE LAPPED FOR A LENGTH OF 50 x BAR DIA. AND LAPPING SHOULD BE STAGGERED.
5. ANCHORAGE LENGTH SHOULD BE 40X BAR DIA.
6. REINFORCEMENT BARS SHALL BE BENT IN ACCORDANCE WITH STANDARD SPECIFICATIONS.
7. COVER TO REINFORCEMENT
  - [a] BURIED FACES AND DRAIN INVERTS - 40 mm
  - [b] ALL OTHER FACES - 25 mm
8. STEEL PLATE SHALL CONFORM TO S275JR STEEL TO EN1025
9. PLATE SHALL BE COATED WITH AN APPROVED EPOXY COATING

 <b>DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA</b> STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT NATIONAL BUILDING RESEARCH ORGANIZATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	 <b>DESIGN UNIT</b> NATIONAL BUILDING RESEARCH ORGANIZATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	REV	DATE	REVISION DESCRIPTION	APPROVAL	PROJECT TITLE	TITLE	DESCRIPTION	NAME	SIGNATURE
						REDUCTION OF LANDSLIDE VULNERABILITY BY MITIGATION MEASURES WALEBODA SCHOOL AT RATHNAPURA	DETAILS OF DRAINAGE WELL	DRAWN	S.A.G.D. SENANAYAKA	
								DESIGNER	T. THILAKARATHNA	
								CHECKED	B.I. KUMARAGE	
								RECOMMENDED	Prof. S.A.S. KULATHILAKA	
								APPROVED	K.N. BANDARA	
						SCALE	N.T.S.	DATE	04.07.2022	
						PROJECT / DRAWING No.	RLVMMP/WORKS/NCB/PH11/062-WB/DR-08a	REVISION	00	




**DETAIL OF DRAINAGE WELL**

**DETAIL A**

**DETAIL B**

**DETAIL C**

EMPLOYER  
  
**DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA**  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

DESIGNER  
  
**DESIGN UNIT**  
**NATIONAL BUILDING RESEARCH ORGANIZATION**  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

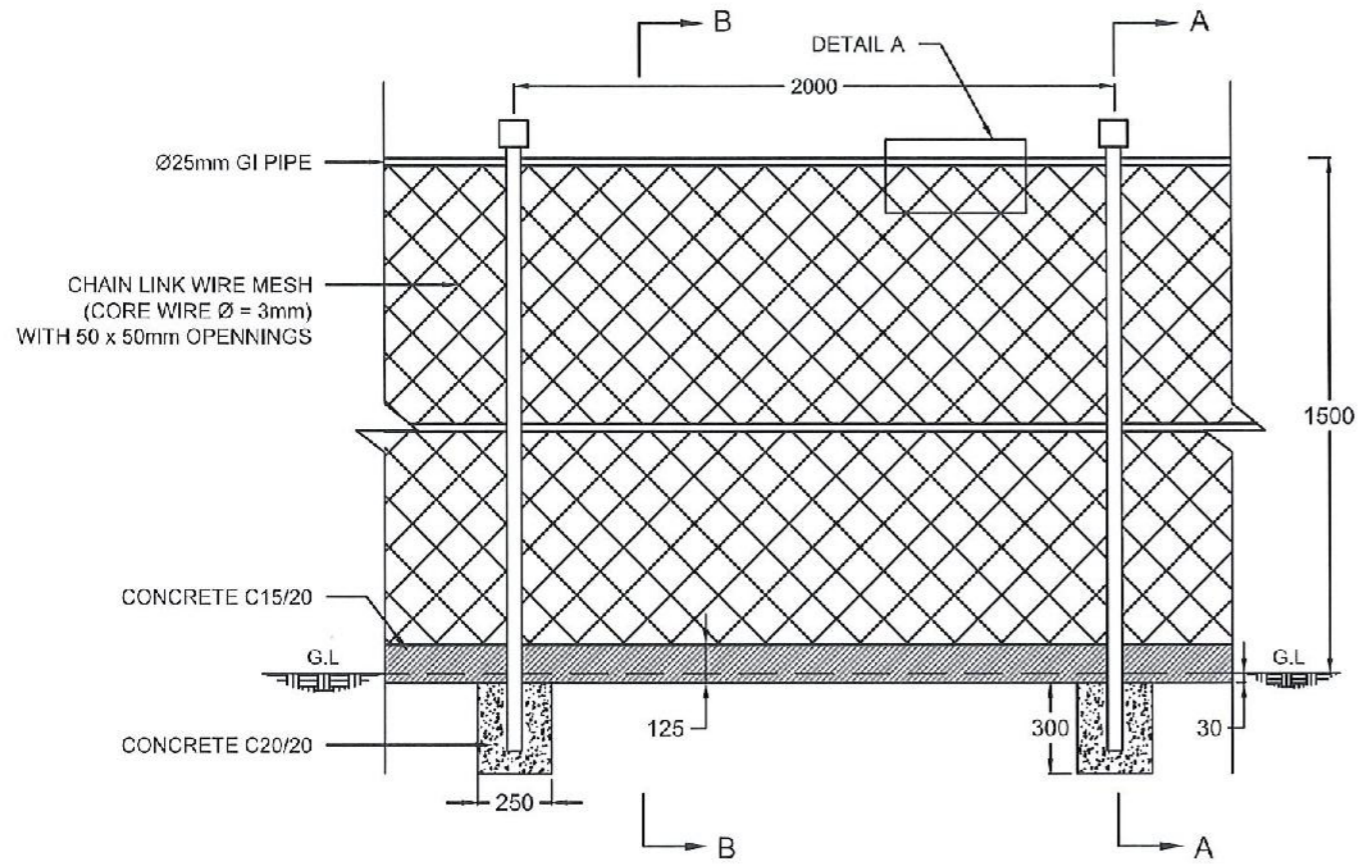
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
**REDUCTION OF LANDSLIDE**  
**VULNERABILITY BY MITIGATION MEASURES**  
**WALEBODA SCHOOL**  
**AT RATHNAPURA**

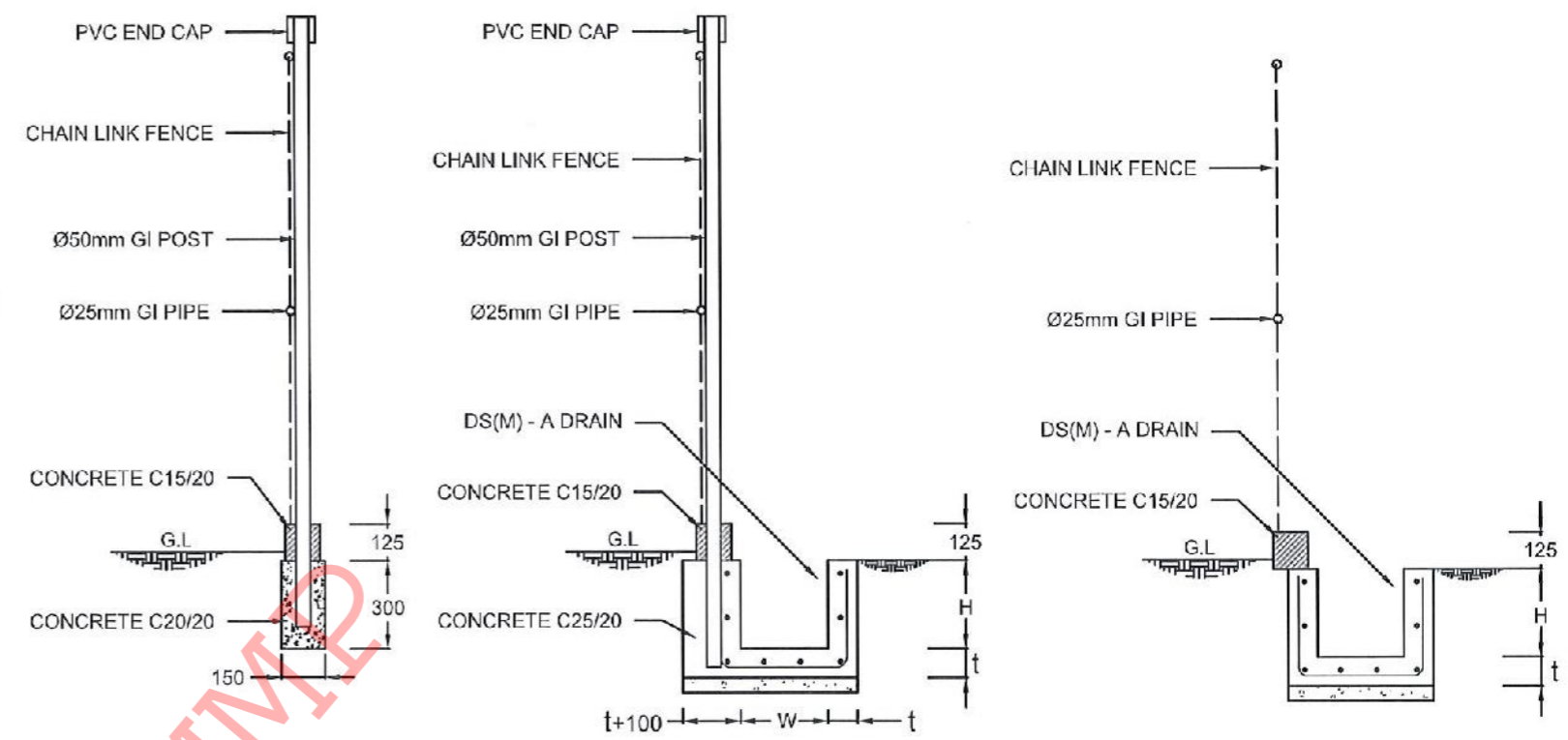
TITLE  
**DETAILS OF DRAINAGE WELL**

SCALE	N.T.S.	DATE	04.07.2022
PROJECT / DRAWING No.	RLVM/MP/WORKS/NCB/PHI/032-WB/DR-08b	REVISION	00

DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	
DESIGNER	T. THILAKARATHNA	
CHECKED	B.I. KUMARAGE	
RECOMMENDED	Prof. S.A.S. KULATHILAKA	
APPROVED	K.N. BANDARA	



FRONT ELEVATION

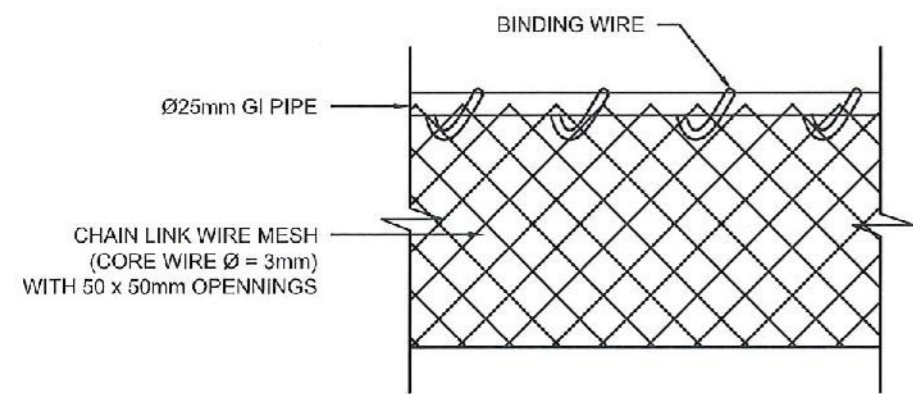


SECTION A - A

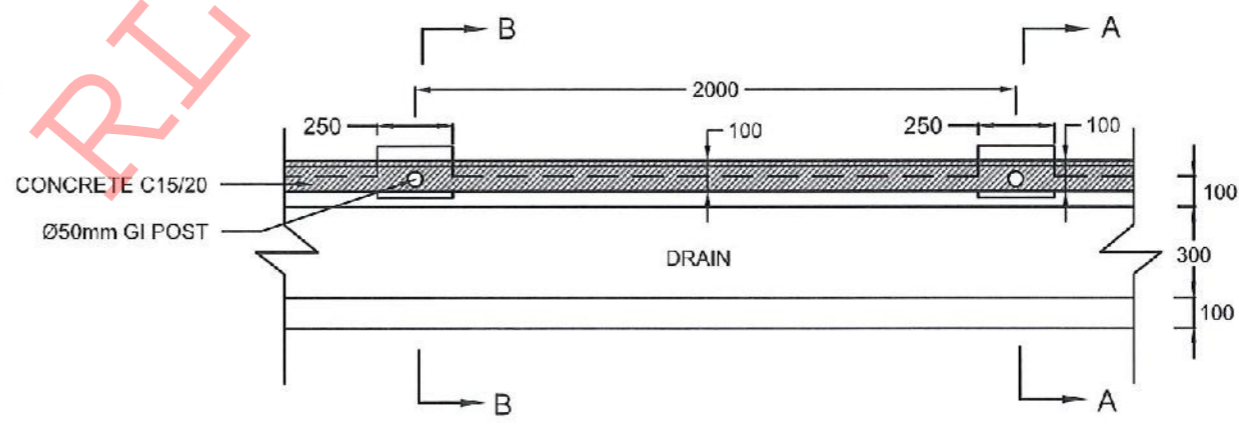
SECTION A - A

SECTION B - B

DETAIL OF FIXING FENCE




DETAIL A



PLAN VIEW OF CHAIN LINK FENCE

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS
2. GI POST SHOULD BE COVERED WITH GREEN COLOUR ANTI-CORROSIVE PAINT.
3. PRIOR APPROVAL IS REQUIRED FOR CHAIN LINK WIRE MESH, GI POST AND PVC CAP.

EMPLOYER  
  
 DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
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 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

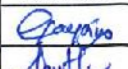




DESIGNER  
  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

REV	DATE	REVISION DESCRIPTION	APPROVAL

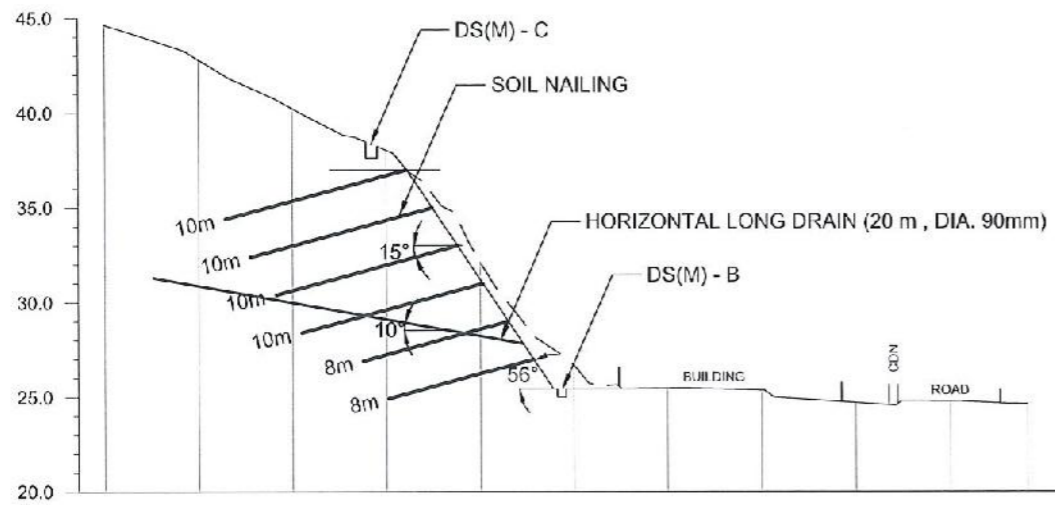
PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 WALEBODA SCHOOL  
 AT RATHNAPURA

TITLE  
 DETAILS OF CHAIN LINK FENCE

SCALE	N.T.S.	DATE	04.07.2022
PROJECT / DRAWING No.	RLVMP/WORKS/NCB/PHI/CG2-WB/DR-09	REVISION	00

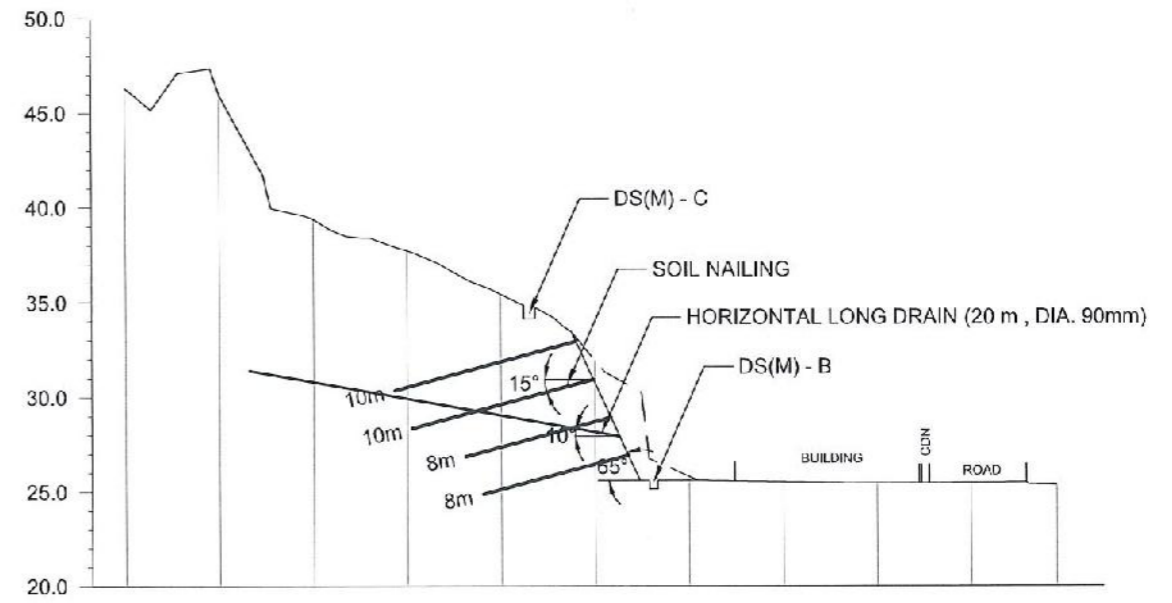
DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	
DESIGNER	T. THILAKARATHNA	
CHECKED	B.I. KUMARAGE	
RECOMMENDED	Prof. S.A.S. KULATHILAKA	
APPROVED	K.N. BANDARA	





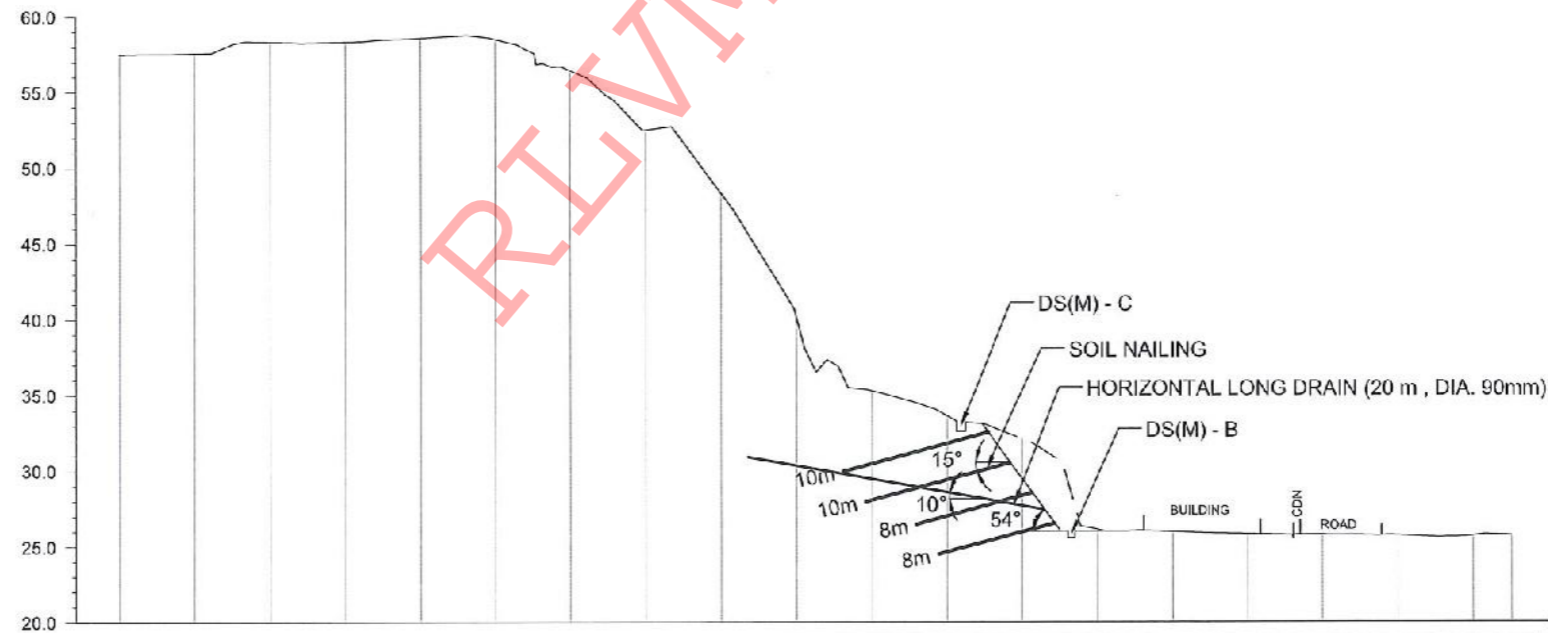
GROUND LEVEL (m)	44.626	42.819	40.230	38.018	32.140	26.680	25.462	25.352	24.694	24.779	24.620
DISTANCE (m)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	49.10

CS03




GROUND LEVEL (m)	46.288	46.037	39.379	37.700	35.420	31.933	25.793	25.501	25.438	25.447	25.332
DISTANCE (m)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	49.60

CS05



GROUND LEVEL (m)	57.515	57.585	56.336	56.340	58.602	58.506	56.441	52.503	48.316	40.111	35.259	33.625	32.101	26.112	25.948	25.807	25.742	25.715	25.888	25.868
DISTANCE (m)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	60.00	65.00	70.00	75.00	80.00	85.00	90.00	92.56

CS08


**DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA**  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

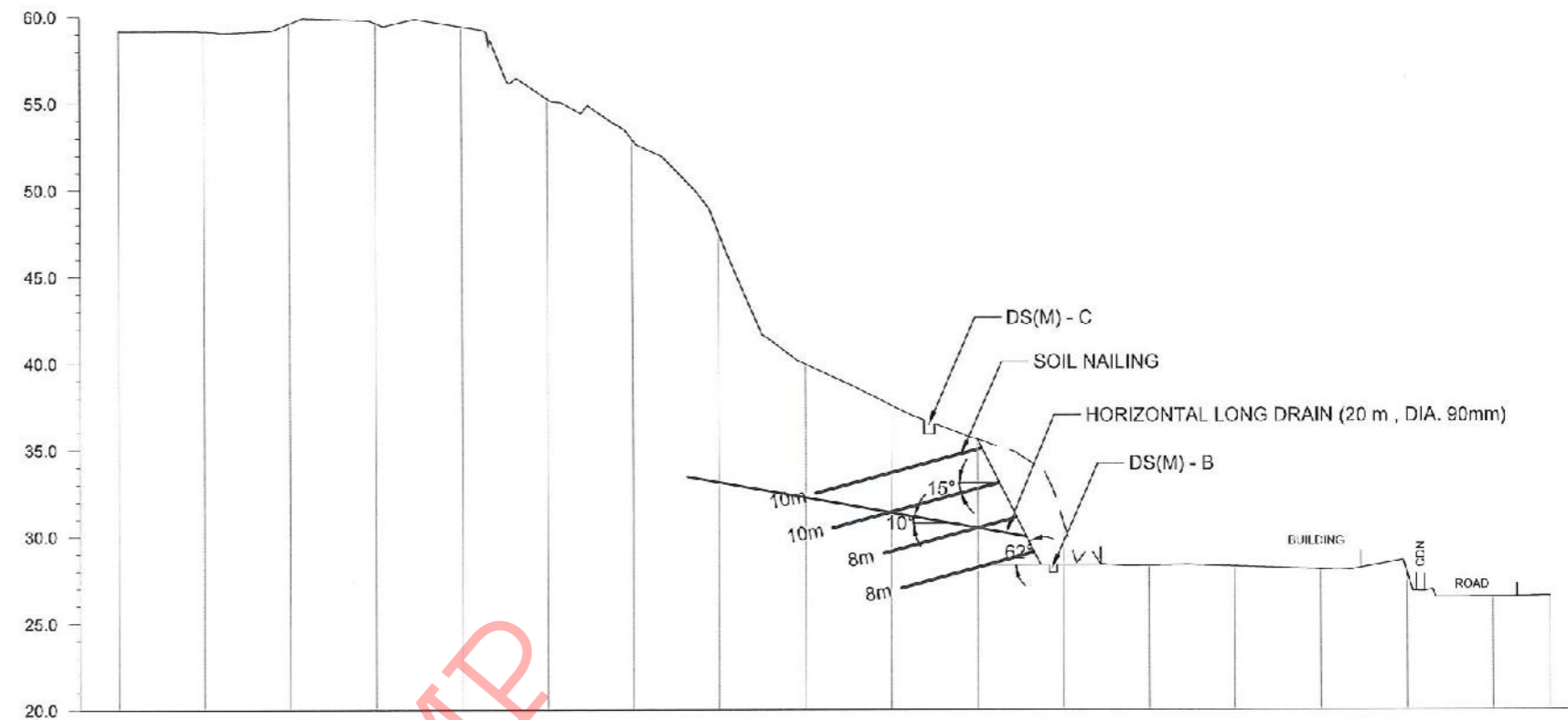

**DESIGN UNIT**  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 FOREST OFFICE - RATHINAPURA

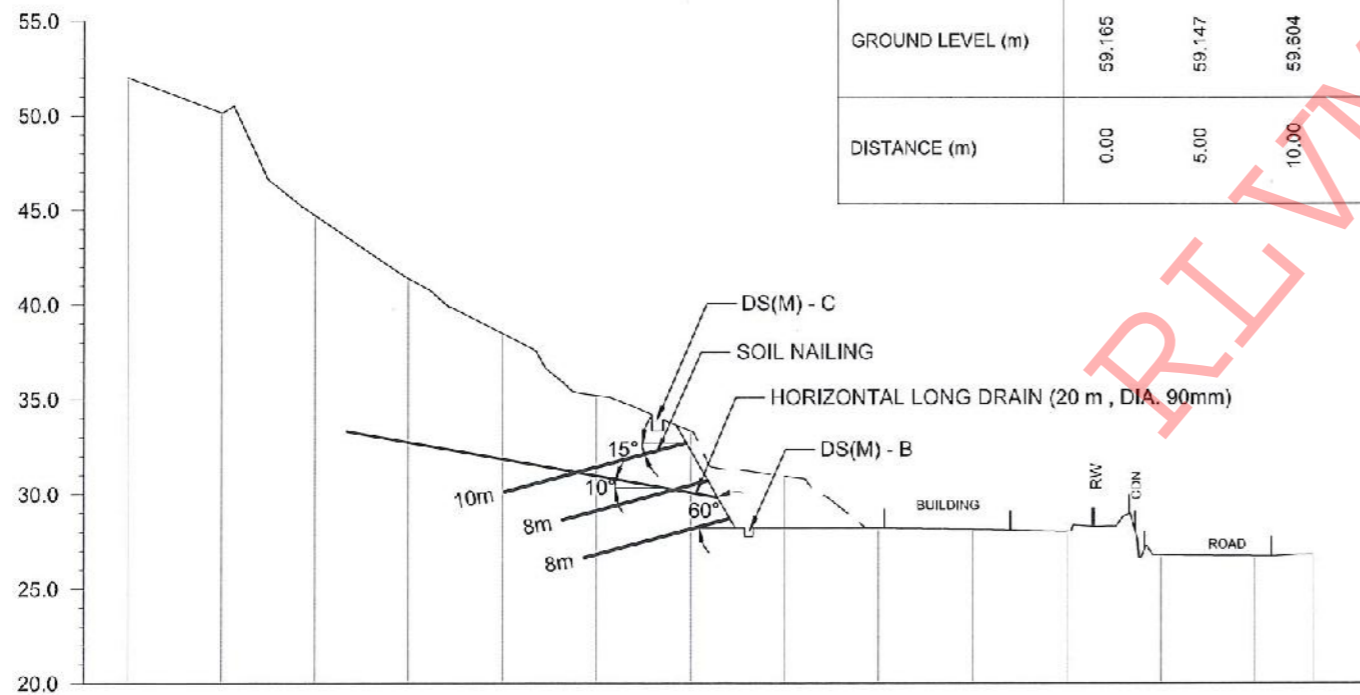
TITLE  
 DESIGN CROSS SECTION  
 SCALE 1:400, 1:500  
 PROJECT / DRAWING No. RLV/MMP/WORKS/NCB/PIII/065-FO/DR-04a  
 DATE 25.04.2022  
 REVISION 00

DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	
DESIGNER	M.H.M. HARSHANI	
CHECKED	B.I. KUMARAGE	
RECOMMENDED	Prof. S.A.S. KULATHILAKA	
APPROVED	K.N. BANDARA	




GROUND LEVEL (m)	59.165	59.147	59.504	59.630	59.412	55.258	52.912	47.588	39.957	37.574	35.593	30.846	28.314	28.269	28.081	27.910	26.504	25.564
DISTANCE (m)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	60.00	65.00	70.00	75.00	80.00	83.35

CS10



GROUND LEVEL (m)	58.002	50.144	44.720	41.391	38.490	35.210	33.339	30.949	28.205	28.136	28.038	26.784	26.734	26.734
DISTANCE (m)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	60.00	63.12

CS12


**DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA**  
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 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

  
**DESIGN UNIT**  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
**REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES**  
 FOREST OFFICE - RATHNAPURA

TITLE	<b>DESIGN CROSS SECTION</b>		
SCALE	1:400	DATE	25.04.2022
PROJECT / DRAWING No.	RI/VMMP/WORKS/NCB/PH/11/035 FQ/DR-04b	REVISION	00

DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	
DESIGNER	M.H.M. HARSHANI	
CHECKED	B.I. KUMARAGE	
RECOMMENDED	Prof. S.A.S. KULATHILAKA	
APPROVED	K.N. BANDARA	






FRONT ELEVATION

LEGEND

- SOIL NAILING - TOTAL SOIL NAIL LENGTH = 08m  
NO OF SOIL NAIL = 116  
REINFORCEMENT DIAMETER = 32 mm  
DIAMETER OF DRILLED HOLE = 125mm  
NAIL SPACING = 2m (BW)
- SOIL NAILING - TOTAL SOIL NAIL LENGTH = 10m  
NO OF SOIL NAIL = 121  
REINFORCEMENT DIAMETER = 32 mm  
DIAMETER OF DRILLED HOLE = 125mm  
NAIL SPACING = 2m (BW)
- HORIZONTAL LONG DRAIN - HORIZONTAL LONG DRAIN LENGTH = 20 m  
NO'S OF LONG DRAIN = 15  
DIAMETER = 90 mm  
SPACING = 08 m
- ▨ BOUNDARY BEAM

NOTES





1. LOCATION AND ANGLE OF THE HORIZONTAL LONG DRAINS MIGHT BE VARIED ACCORDING TO THE ACTUAL SITE CONDITION.
2. LOCATION AND NUMBER OF SOIL NAILS MIGHT BE VARIED ACCORDING TO THE ACTUAL SITE CONDITION.

EMPLOYER  

**DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA**  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

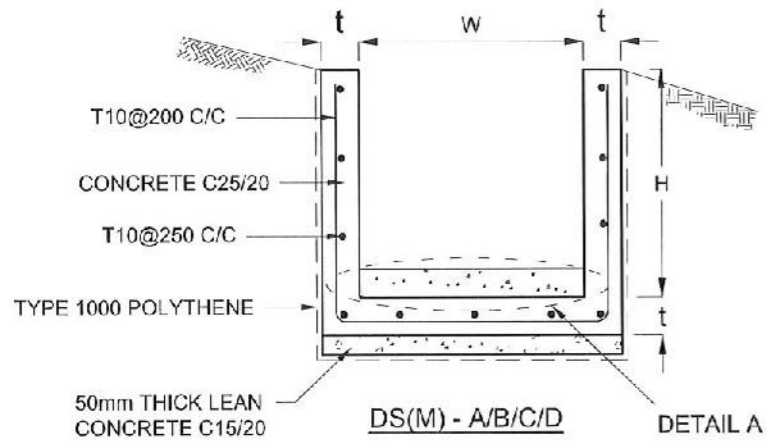
DESIGNER  
  
**DESIGN UNIT**  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 FOREST OFFICE - RATHNAPURA

TITLE	DESCRIPTION	NAME	SIGNATURE
FRONT ELEVATION	DRAWN	S.A.G.D. SENANAYAKA	
	DESIGNER	M.H.M. HARSHANI	
	CHECKED	B.I. KUMARAGE	
	RECOMMENDED	Prof. S.A.S. KULATHILAKA	
	APPROVED	K.N. BANDARA	

SCALE	DATE	REVISION
1:400	25.04.2022	00
PROJECT / DRAWING No.	RI/VMMMP/WORKS/NCB/PHI/065-FO/DR-05	



DRAIN TYPE	W (mm)	H (mm)	t (mm)
DS (M) - A /P	300	300	100
DS (M) - B/R	450	450	100
DS (M) - C/Q	600	600	100
DS (M) - D	750	750	125
DS (M) - E	900	900	150
DS (M) - F	1000	1000	150

**NOTES**

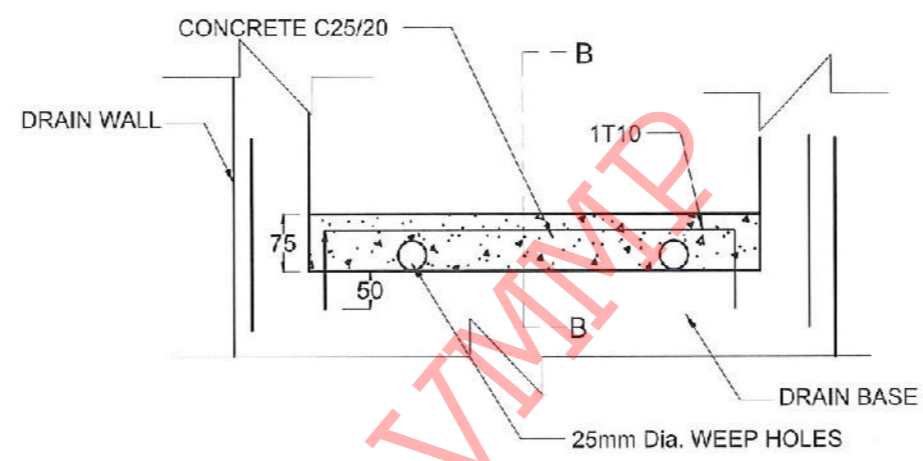
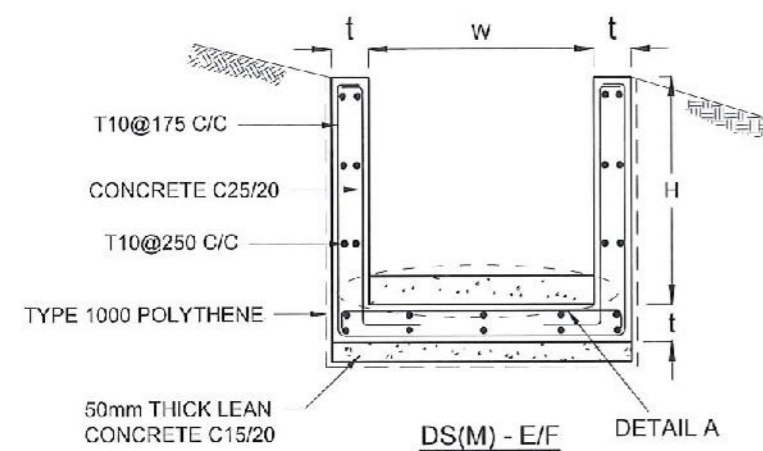
- DEPTH OF EXCAVATION MAY VARY ACCORDING TO SITE CONDITIONS.
- STEPS SHALL BE CONSTRUCTED AT SURFACE DRAIN ON SLOPING GROUND ACCORDING TO THE SITE CONDITIONS AS INSTRUCTED BY THE ENGINEER.
- ENERGY BREAKERS SHALL BE CONSTRUCTED AT THE STEEP DRAIN SEGMENTS AS PER THE INSTRUCTIONS OF THE ENGINEER.
- DOWELS SHALL BE INSTALLED ACCORDING TO THE GROUND CONDITIONS AS INSTRUCTED BY THE ENGINEER.
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED.
- 10 mm THICK EXPANSION JOINT SHALL BE INTRODUCED IN EVERY 5m INTERVAL.

**CONCRETE**

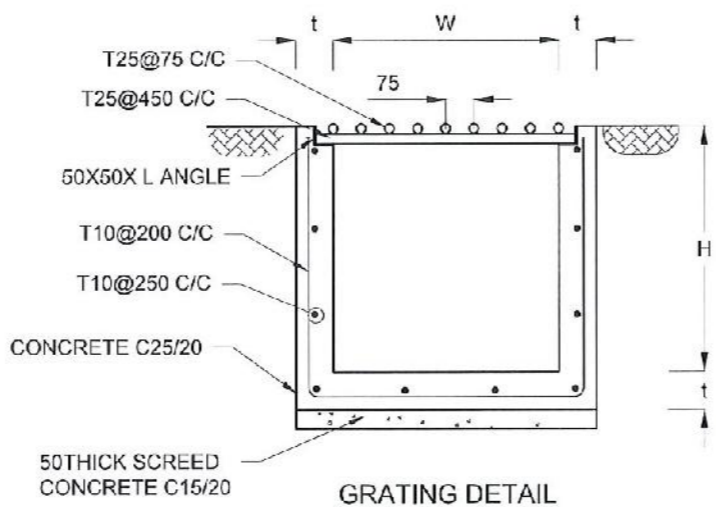
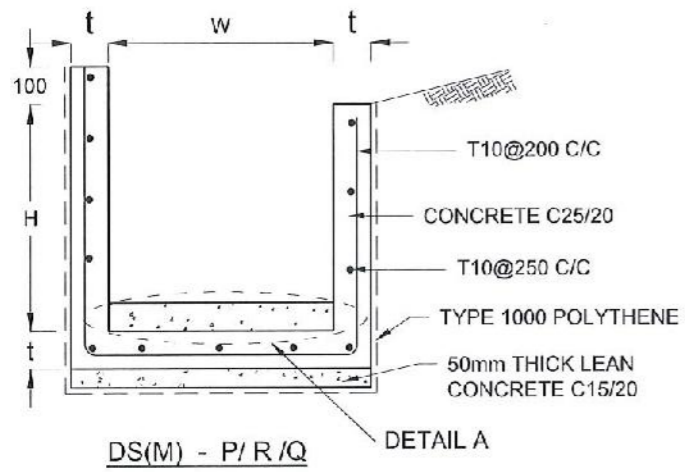
- USE FOLLOWING CONCRETE GRADES FOR STRUCTURE
  - [a] SCREED - C. 15/20
  - [b] WALLS / BASE / ENERGY BREAKERS - C. 25/20

**REINFORCEMENT**

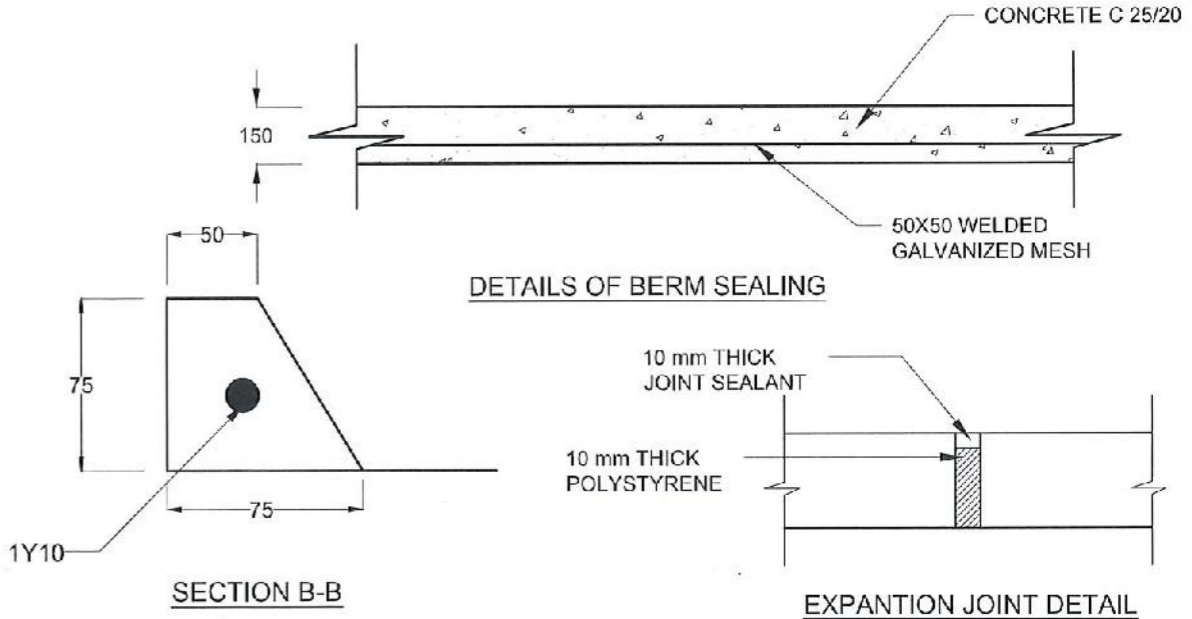
- ALL BARS MARKED "T" SHALL BE HIGH YIELD DEFORMED BARS OF YIELD STRENGTH NOT LESS THAN 460N/mm<sup>2</sup>.
- BARS OF CUT LENGTH LARGER THAN THE SUPPLIED LENGTH TO BE LAPPED FOR A LENGTH OF 50 x BAR DIA. AND LAPPING SHOULD BE STAGGERED.
- ANCHORAGE LENGTH SHOULD BE 40X BAR DIA.
- REINFORCEMENT BARS SHALL BE BENT IN ACCORDANCE WITH STANDARD SPECIFICATIONS.
- COVER TO REINFORCEMENT
  - [a] BURIED FACES AND DRAIN INVERTS - 40 mm
  - [b] ALL OTHER FACES - 25 mm



**DETAIL A - (ENERGY BREAKER AT 3M)**



**GRATING DETAIL**



**DETAILS OF BERM SEALING**

**SECTION B-B**

**EXPANSION JOINT DETAIL**

EMPLOYER  
 DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

DESIGNER  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

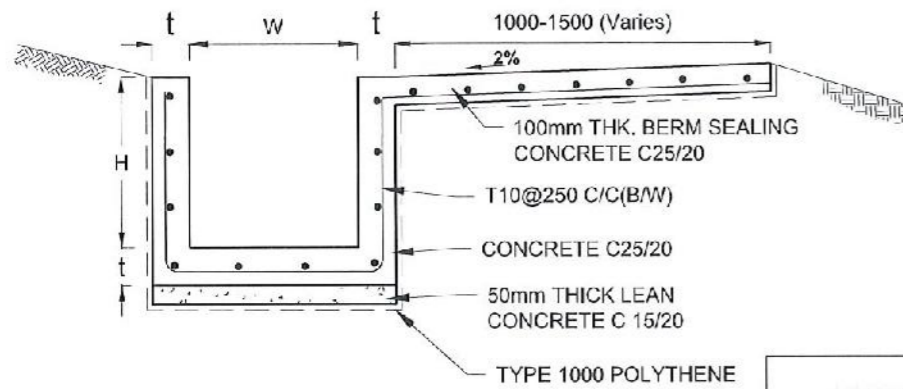
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 FOREST OFFICE - RATHINAPURA

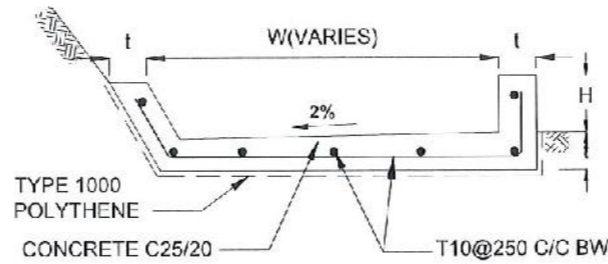
TITLE  
 DETAILS OF DRAINS  
 (SURFACE DRAIN - 1 OF 2)

SCALE N.T.S. DATE 25.04.2022  
 PROJECT / DRAWING No. RLVMMMP/WORKS/NCB/PH/11/035-FO/DR-06a REVISION 00

DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	
DESIGNER	M.H.M. HARSHANI	
CHECKED	B.I. KUMARAGE	
RECOMMENDED	Prof. S.A.S. KULATHILAKA	
APPROVED	K.N. BANDARA	



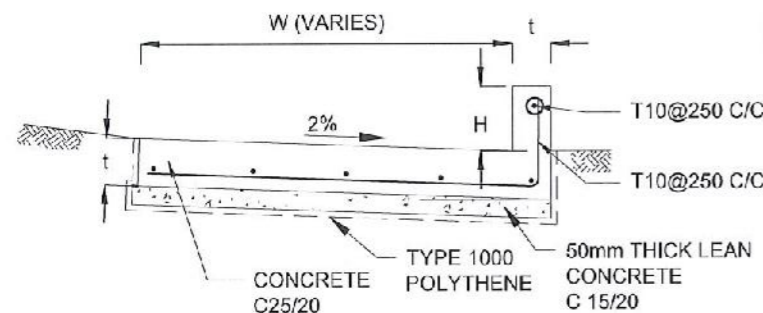
DS (B) - (TYPE I)



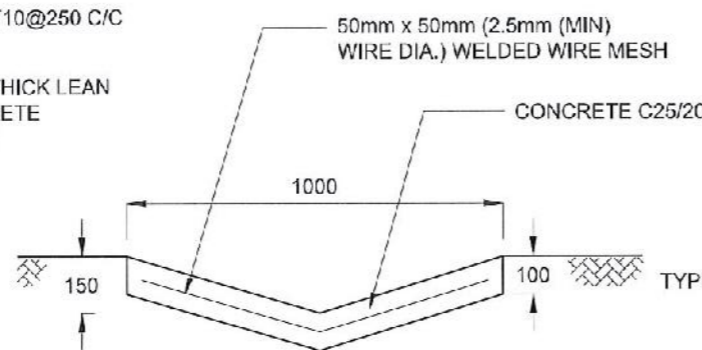
DS (B) - (TYPE II)

DRAIN TYPE	W (mm)	H (mm)	t (mm)
DS (K) - A	1000	200	100
DS (K) - B	1000	300	100
DS (K) - C	1150	200	200

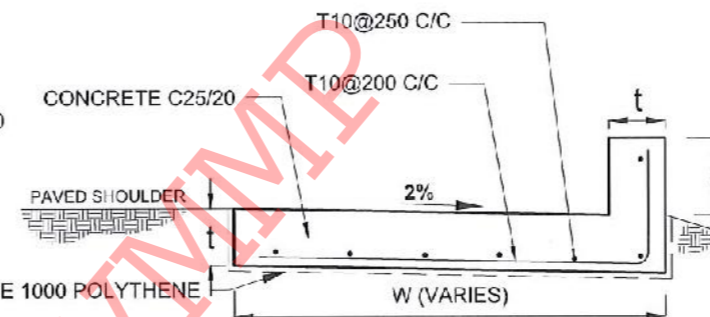
DRAIN TYPE	W (mm)	H (mm)	t (mm)
DS (B) - A	300	300	100
DS (B) - B	450	450	100
DS (B) - C	1000	150	100
DS (B) - D	1500	150	100
DS (B) - E	2000	150	100



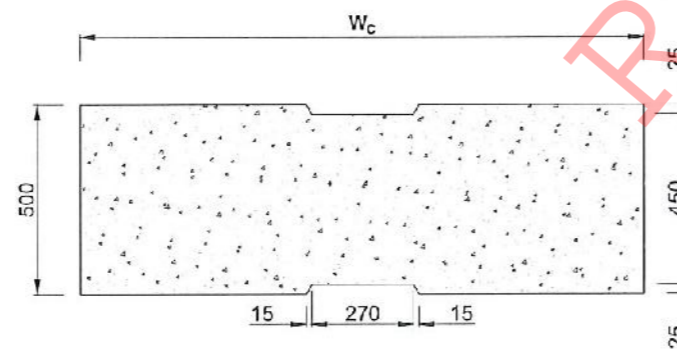
DS (K) - TYPE I



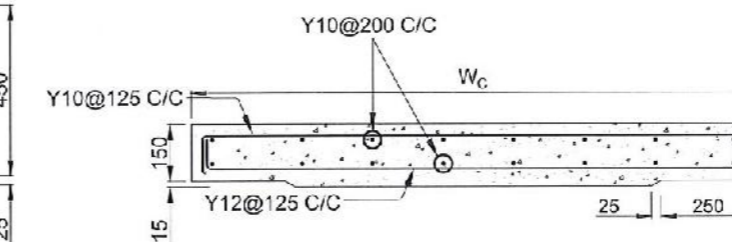
DS (D) - A (DISH DRAIN)



DS (K) - TYPE II

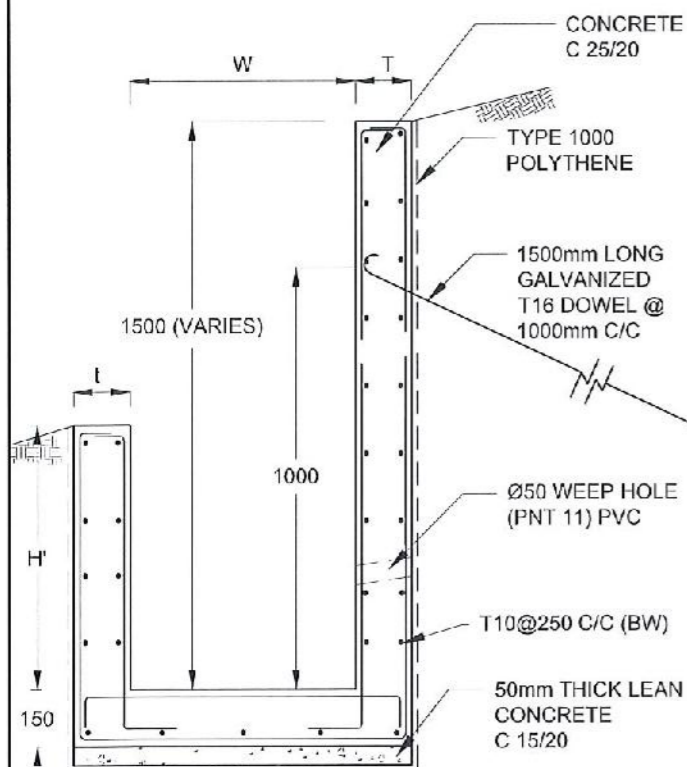


PLAN VIEW OF COVER SLAB



ACCESS & HEAVY DUTY COVER SLAB  
SECTION OF (W<sub>c</sub> x 500 x 150mm)

DS(M) - L	W (mm)	H' (mm)	t (mm)
TYPE I	600	600	150
TYPE II	800	800	150



DS (M) - L

NOTES


- DEPTH OF EXCAVATION MAY VARY ACCORDING TO SITE CONDITIONS.
- STEPS SHALL BE CONSTRUCTED AT SURFACE DRAIN ON SLOPING GROUND ACCORDING TO THE SITE CONDITIONS AS INSTRUCTED BY THE ENGINEER.
- ENERGY BREAKERS SHALL BE CONSTRUCTED AT THE STEEP DRAIN SEGMENTS AS PER THE INSTRUCTIONS OF THE ENGINEER.
- DOWELS SHALL BE INSTALLED ACCORDING TO THE GROUND CONDITIONS AS INSTRUCTED BY THE ENGINEER.
- COVER SLABS NEED TO BE PROVIDED ONLY FOR THE REGIONS AS INSTRUCTED BY THE ENGINEER.
- COVER SLAB WIDTH (W<sub>c</sub>) SHOULD BE TAKEN AS THE SUM OF DRAIN WIDTH AND 2x DRAIN WALL THICKNESS. [W<sub>c</sub> = W+2xt]
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED.
- 10 mm THICK EXPANSION JOINT SHALL BE INTRODUCED IN EVERY 5m INTERVAL.

CONCRETE

- USE FOLLOWING CONCRETE GRADES FOR STRUCTURE
  - [a] SCREED - C. 15/20
  - [b] WALLS / BASE / ENERGY BREAKERS - C. 25/20

REINFORCEMENT

- ALL BARS MARKED "T" SHALL BE HIGH YIELD DEFORMED BARS OF YIELD STRENGTH NOT LESS THAN 460N/mm<sup>2</sup>.
- BARS OF CUT LENGTH LARGER THAN THE SUPPLIED LENGTH TO BE LAPPED FOR A LENGTH OF 50 x BAR DIA. AND LAPPING SHOULD BE STAGGERED.
- ANCHORAGE LENGTH SHOULD BE 40X BAR DIA.
- REINFORCEMENT BARS SHALL BE BENT IN ACCORDANCE WITH STANDARD SPECIFICATIONS.
- COVER TO REINFORCEMENT
  - [a] BURIED FACES AND DRAIN INVERTS - 40 mm
  - [b] ALL OTHER FACES - 25 mm

EMPLOYER  
  
 DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

DESIGNER  
  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

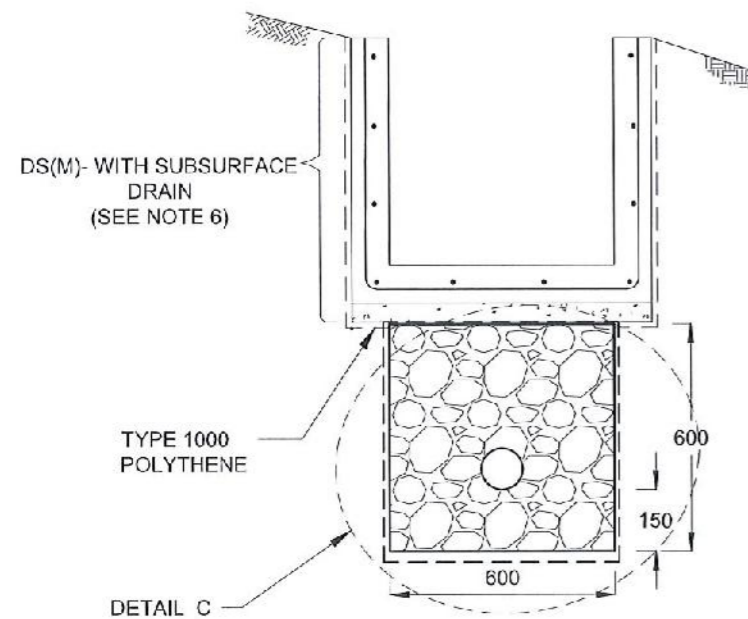
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 FOREST OFFICE - RATHNAPURA

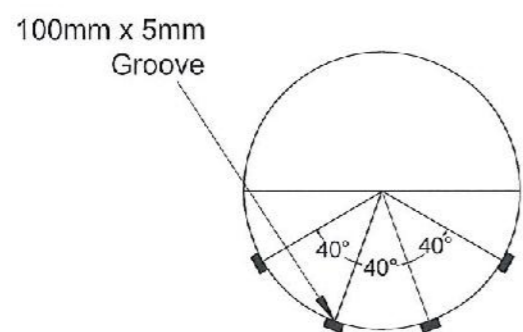
TITLE  
 DETAILS OF DRAINS  
 (SURFACE DRAIN - 2 OF 2)

SCALE: N.T.S. DATE: 25.04.2022  
 PROJECT / DRAWING No. REVISION: 00  
 RLVMM/WORKS/NCB/PH/11/065 FO/DR 06b

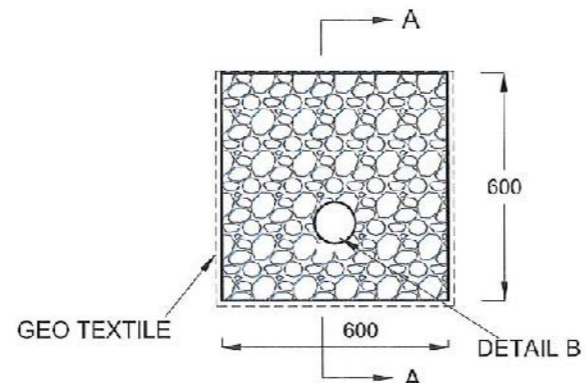
DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	
DESIGNER	M.H.M. HARSHANI	
CHECKED	B.I. KUMARAGE	
RECOMMENDED	Prof. S.A.S. KULATHILAKA	
APPROVED	K.N. BANDARA	



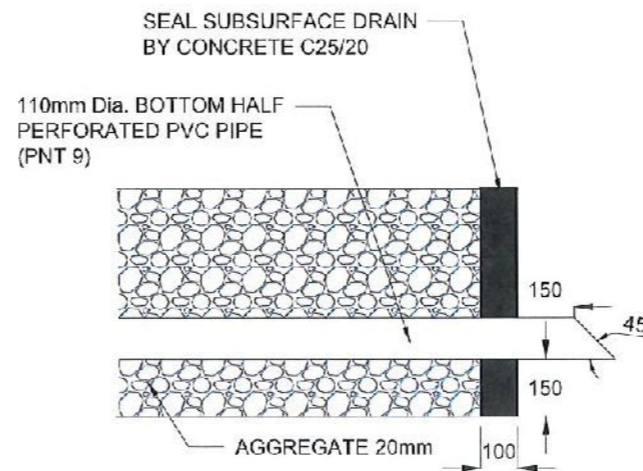
**SUBSURFACE DRAIN  
[DS (S) -A]**



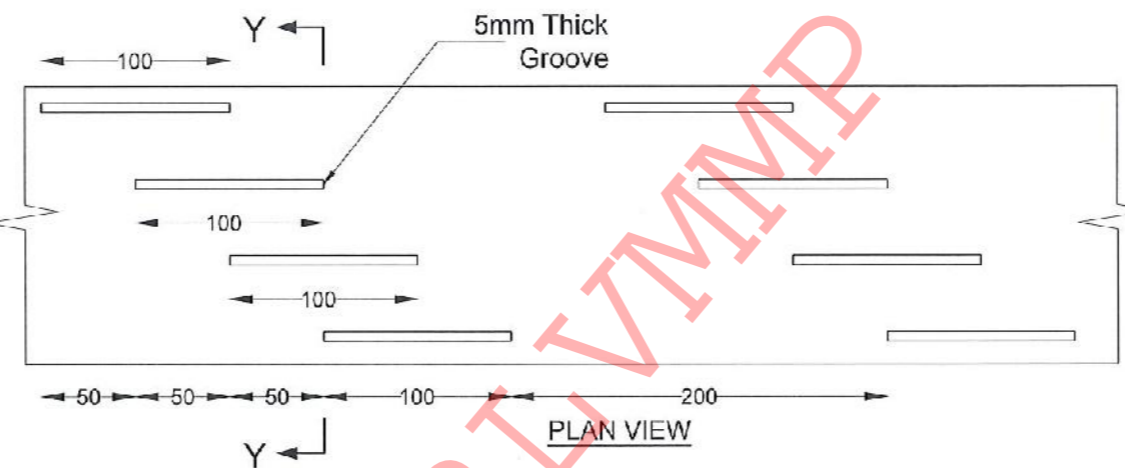
**SECTION Y - Y**



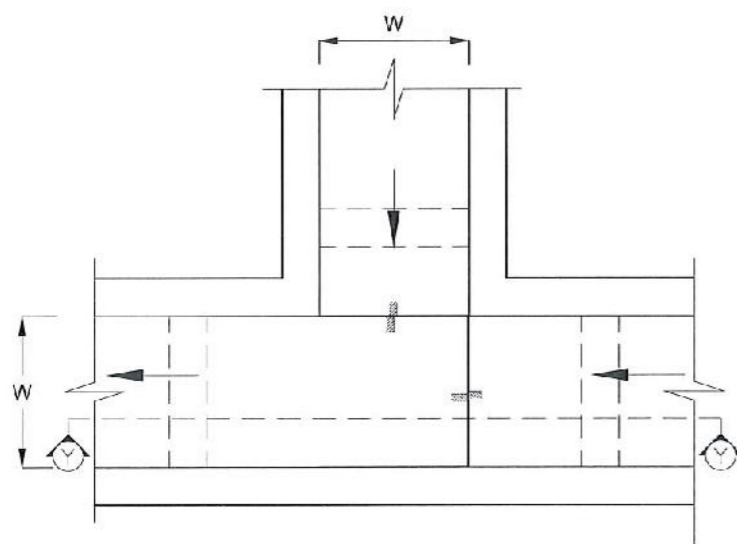
**DETAIL C / DS (S) -A**



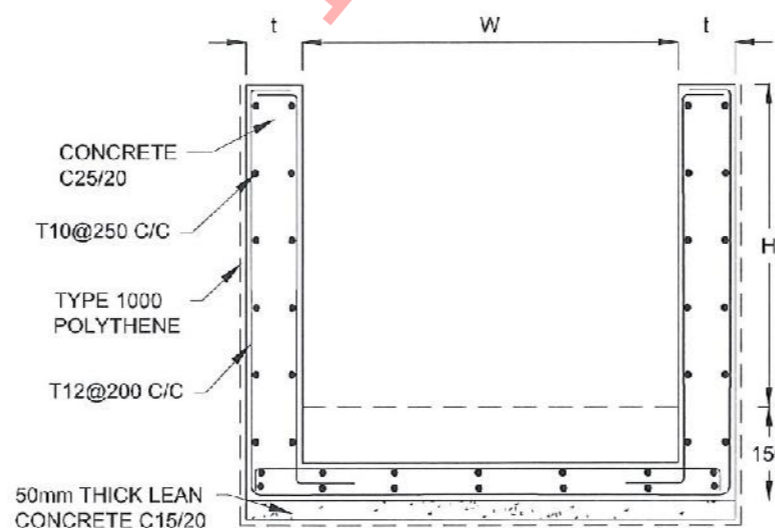
**SECTION A-A  
(OUTLET DETAIL SUBSURFACE DRAIN)**



**DETAIL - B (PERFORATED PIPE FOR SUB-SURFACE DRAINS)**



**PLAN VIEW OF CATCH PIT (CP)**



**SECTION Y-Y (CP-R)**

**NOTES**

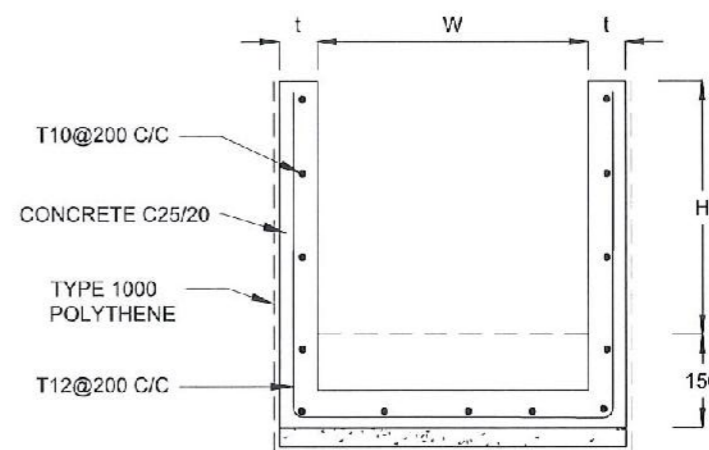
1. W,H,t ; SHALL BE THE SAME AS RESPECTIVE DRAIN SECTION.
2. CP - R SHALL BE USED WHERE H >= 900mm
3. DEPTH OF EXCAVATION MAY VARY ACCORDING TO SITE CONDITIONS.
4. DOWELS SHALL BE INSTALLED ACCORDING TO THE GROUND CONDITIONS AS INSTRUCTED BY THE ENGINEER.
5. 10 mm THICK EXPANSION JOINT SHALL BE INTRODUCED IN EVERY 5m INTERVAL.
6. DETAILS OF SURFACE DRAIN PORTION OF THE SUBSURFACE DRAINS SHALL BE AS PER DS(M), DS(B), DS(K) OR DS(C) SECTIONS ACCORDINGLY.
7. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED.

**CONCRETE**


8. USE FOLLOWING CONCRETE GRADES FOR STRUCTURE
  - [a] SCREED - C. 15/20
  - [b] WALLS / BASE / ENERGY BREAKERS - C. 25/20

**REINFORCEMENT**

9. ALL BARS MARKED "T" SHALL BE HIGH YIELD DEFORMED BARS OF YIELD STRENGTH NOT LESS THAN 460N/mm<sup>2</sup>.
10. BARS OF CUT LENGTH LARGER THAN THE SUPPLIED LENGTH TO BE LAPPED FOR A LENGTH OF 50 x BAR DIA. AND LAPPING SHOULD BE STAGGERED.
11. ANCHORAGE LENGTH SHOULD BE 40X BAR DIA.
12. REINFORCEMENT BARS SHALL BE BENT IN ACCORDANCE WITH STANDARD SPECIFICATIONS.
13. COVER TO REINFORCEMENT
  - [a] BURIED FACES AND DRAIN INVERTS - 40 mm
  - [b] ALL OTHER FACES - 25 mm



**SECTION Y - Y**

EMPLOYER  
  
 DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

DESIGNER  
  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

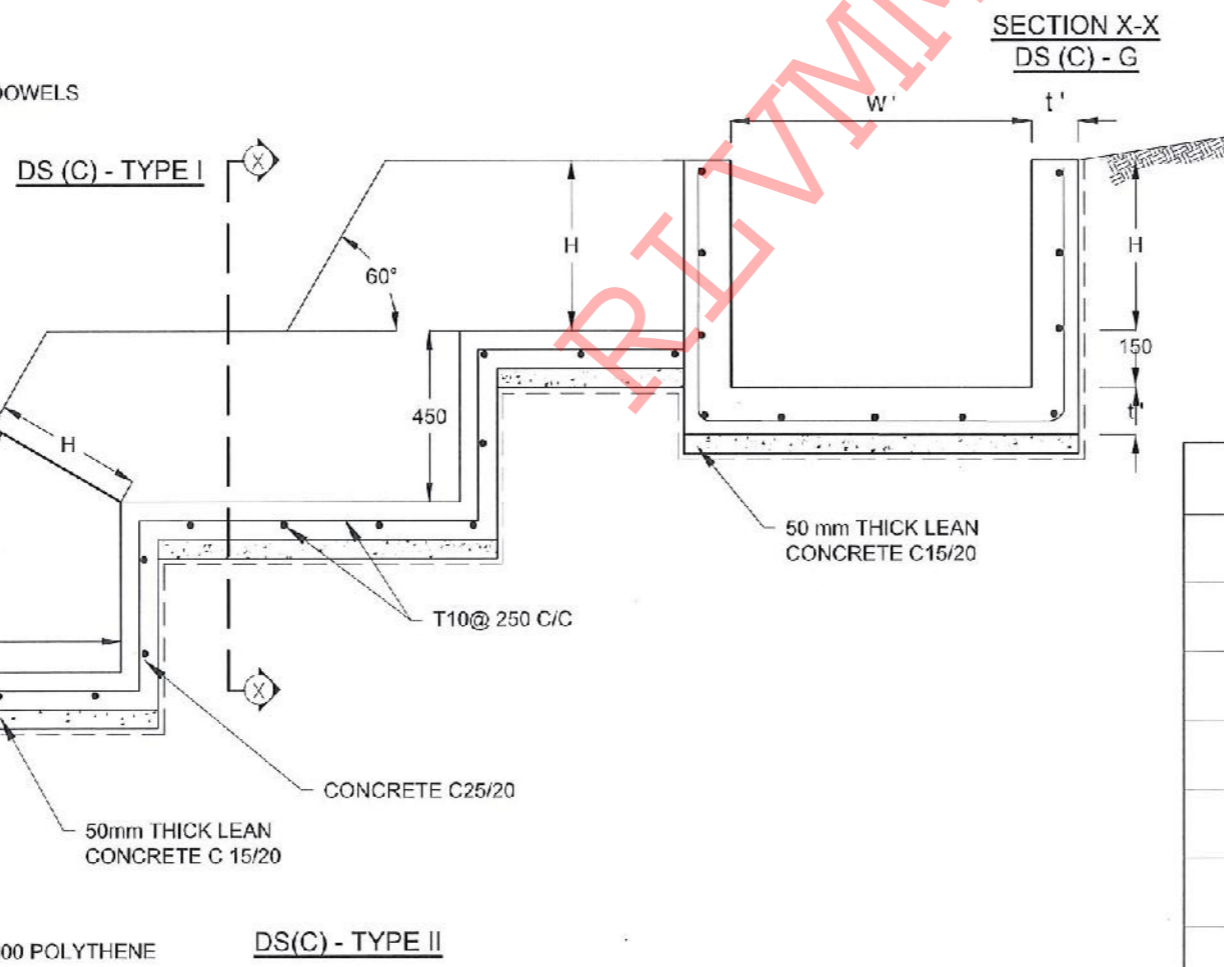
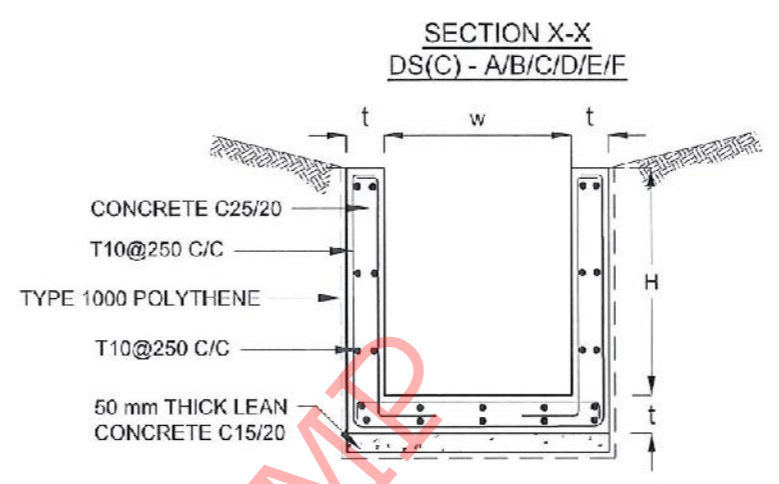
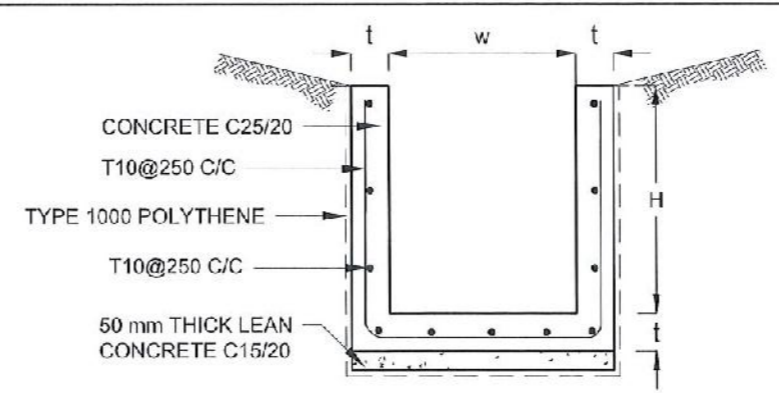
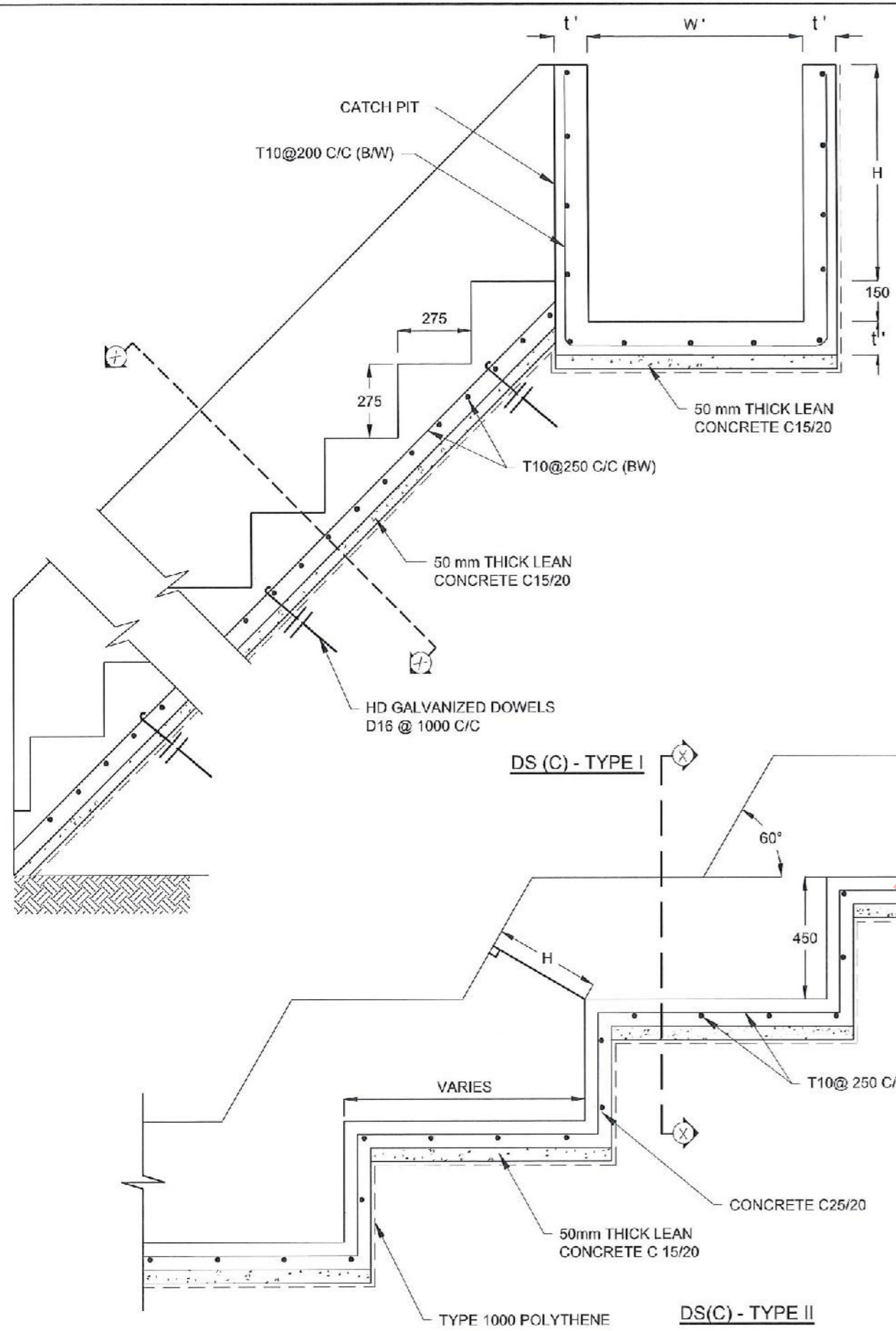
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 FOREST OFFICE - RATHNAPURA

TITLE  
 DETAILS OF DRAINS  
 (SUBSURFACE DRAIN AND CATCHPIT)

SCALE	N.T.S	DATE	25.04.2022
PROJECT / DRAWING No.	RLVMMP/WORKS/NCB/PHI/065-FO/DR-06c	REVISION	00

DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	
DESIGNER	M.H.M. HARSHANI	
CHECKED	B.I. KUMARAGE	
RECOMMENDED	Prof. S.A.S. KULATHILAKA	
APPROVED	K.N. BANDARA	



**NOTES**

1. USE EITHER TYPE I OR TYPE II CASCADE DRAIN ACCORDING TO THE ACTUAL GROUND CONDITION AS INSTRUCTED BY THE ENGINEER.
2. LENGTH OF THE STEPS OF CASCADE WILL BE VARIED ACCORDING TO THE SITE CONDITIONS.
3. DEPTH OF EXCAVATION SHALL BE VARIED ACCORDING TO SITE CONDITIONS.
4. DOWELS SHALL BE INSTALLED ACCORDING TO THE GROUND CONDITIONS AS INSTRUCTED BY THE ENGINEER.
5. 10 mm THICK EXPANSION JOINT SHALL BE INTRODUCED IN EVERY 5m INTERVAL.
6. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED.

**CONCRETE**

7. USE FOLLOWING CONCRETE GRADES FOR STRUCTURE
  - [a] SCREED - C. 15/20
  - [b] WALLS / BASE / ENERGY BREAKERS - C. 25/20

**REINFORCEMENT**

8. ALL BARS MARKED "T" SHALL BE HIGH YIELD DEFORMED BARS OF YIELD STRENGTH NOT LESS THAN 460N/mm<sup>2</sup>.
9. BARS OF CUT LENGTH LARGER THAN THE SUPPLIED LENGTH TO BE LAPPED FOR A LENGTH OF 50 x BAR DIA. AND LAPPING SHOULD BE STAGGERED.
10. ANCHORAGE LENGTH SHOULD BE 40X BAR DIA.
11. REINFORCEMENT BARS SHALL BE BENT IN ACCORDANCE WITH STANDARD SPECIFICATIONS.
12. COVER TO REINFORCEMENT
  - [a] BURIED FACES AND DRAIN INVERTS - 40 mm
  - [b] ALL OTHER FACES - 25 mm

DRAIN TYPE	W (mm)	H (mm)	t (mm)	W' (mm)	t' (mm)
DS (C) - A	450	450	100	600	100
DS (C) - B	450	600	100	750	100
DS (C) - C	600	600	100	800	100
DS (C) - D	750	750	100	800	100
DS (C) - E	800	800	125	1000	125
DS (C) - F	1000	750	125	1200	125
DS (C) - G	1200	1000	125	1300	125

EMPLOYER  
 DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

DESIGNER  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

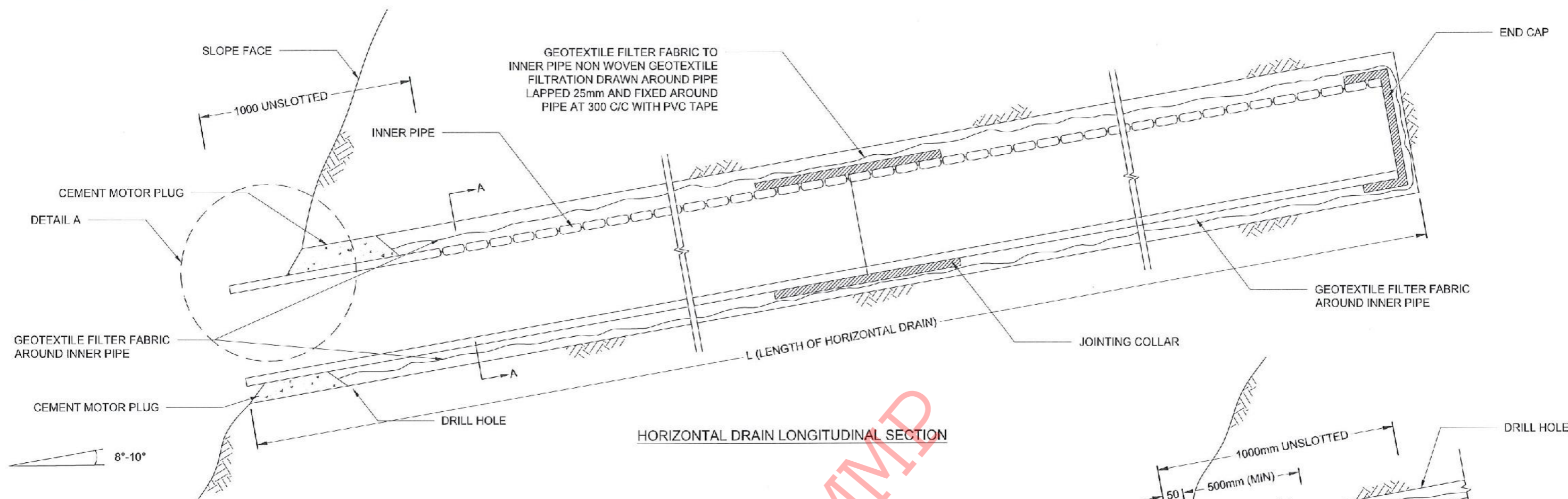
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 FOREST OFFICE - RATHINAPURA

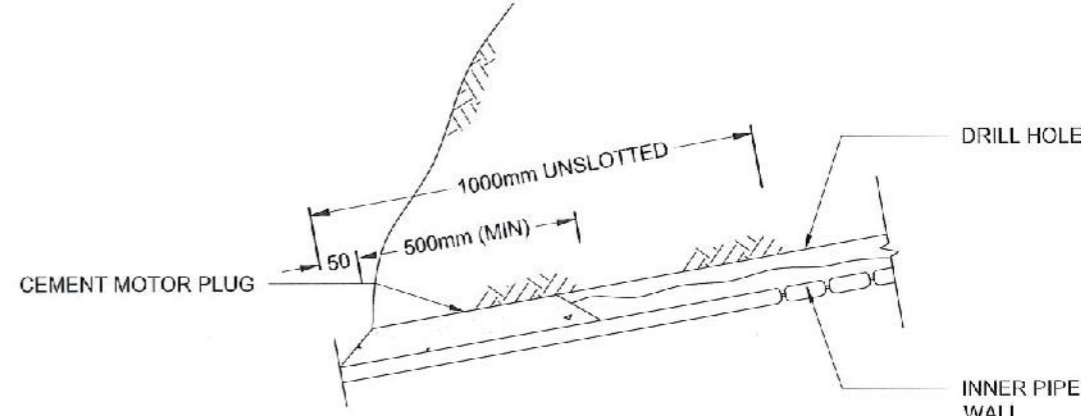
TITLE  
 DETAILS OF DRAINS  
 (CASCADE DRAIN)

SCALE: N.T.S. DATE: 25.04.2022  
 PROJECT / DRAWING No. RLVMP/WORKS/NCB/PHI/065-FO/DR-03d REVISION: 00

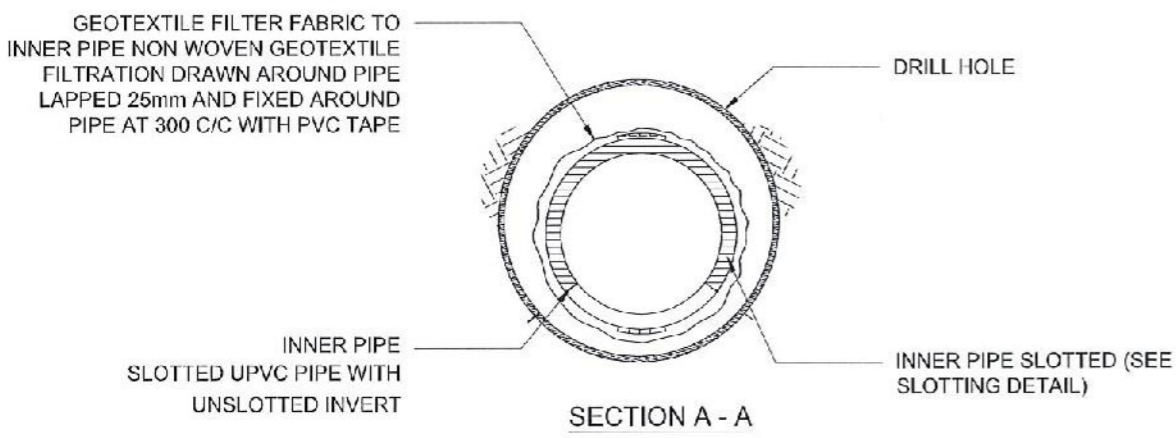
DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	
DESIGNER	M.H.M. HARSHANI	
CHECKED	B.I. KUMARAGE	
RECOMMENDED	Prof. S.A.S. KULATHILAKA	
APPROVED	K.N. BANDARA	



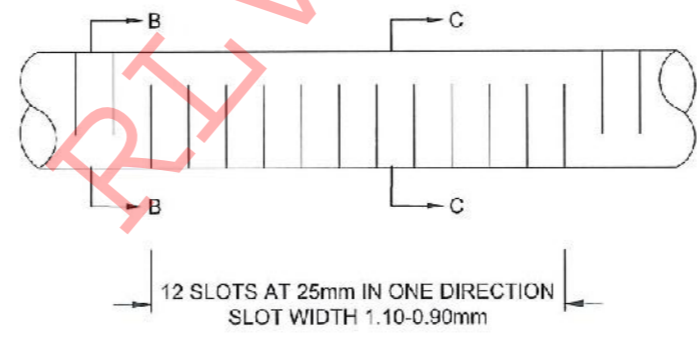
HORIZONTAL DRAIN LONGITUDINAL SECTION



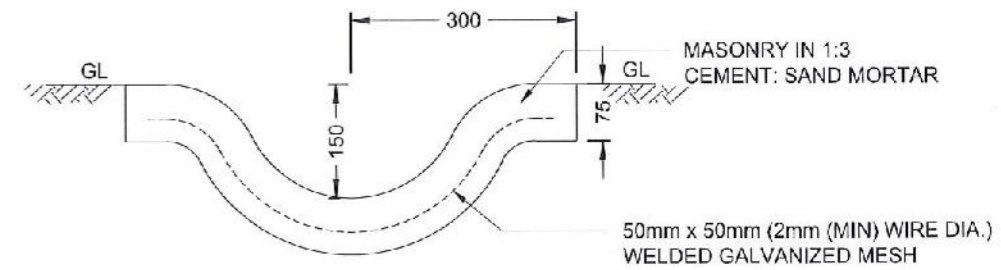
DETAIL A



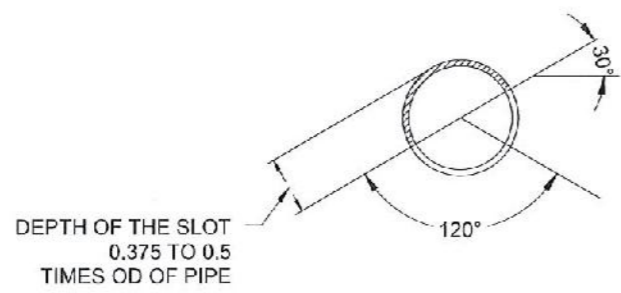
SECTION A - A



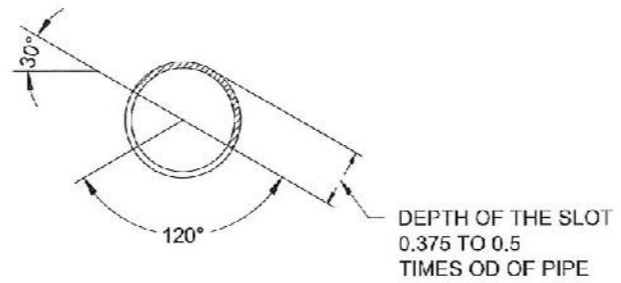
INNER AND OUTER PIPE SLOTTING DETAIL (TOP VIEW)



DETAIL OF GUIDE DRAIN



SECTION B - B



SECTION C - C

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. PIPE DIAMETERS, ANGLE & LENGTHS AS SPECIFIED IN DRAWINGS.
3. ALL MATERIALS SHALL CONFORM TO PROJECT SPECIFICATION

EMPLOYER

DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
NATIONAL BUILDING RESEARCH ORGANISATION  
No. 99/1, JAWATTA ROAD,  
COLOMBO - 05

DESIGNER

DESIGN UNIT  
NATIONAL BUILDING RESEARCH ORGANIZATION  
No. 99/1, JAWATTA ROAD,  
COLOMBO - 05

REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE

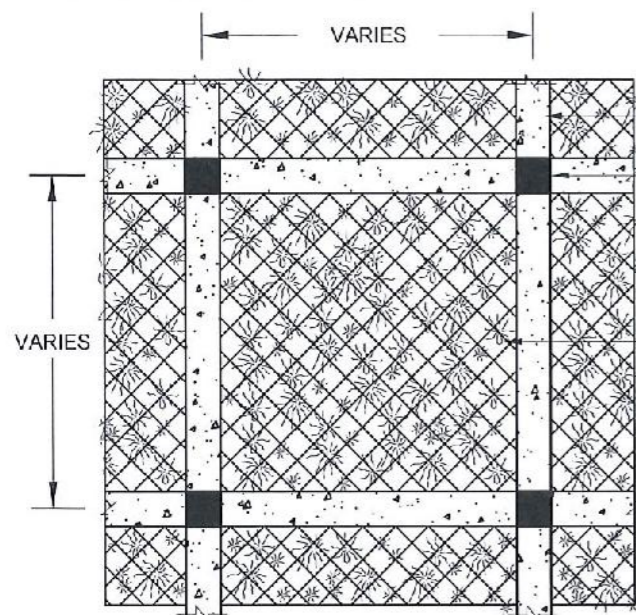
REDUCTION OF LANDSLIDE  
VULNERABILITY BY MITIGATION MEASURES  
FOREST OFFICE - RATHNAPURA

TITLE

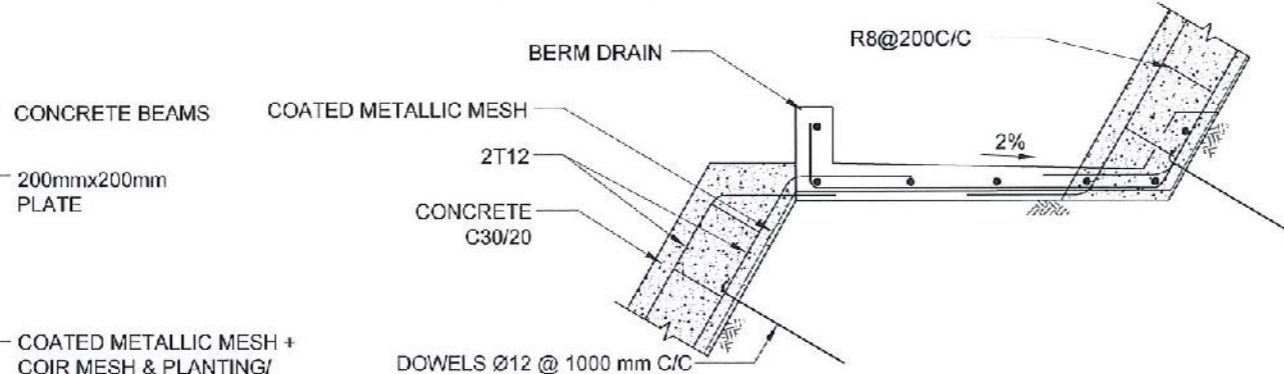
DETAILS OF HORIZONTAL DRAIN  
SECTIONS

SCALE	N.T.S	DATE	25.04.2022
PROJECT / DRAWING No.	RLVMMP/WORKS/NCE/PH/11005-FC/DR-07	REVISION	00

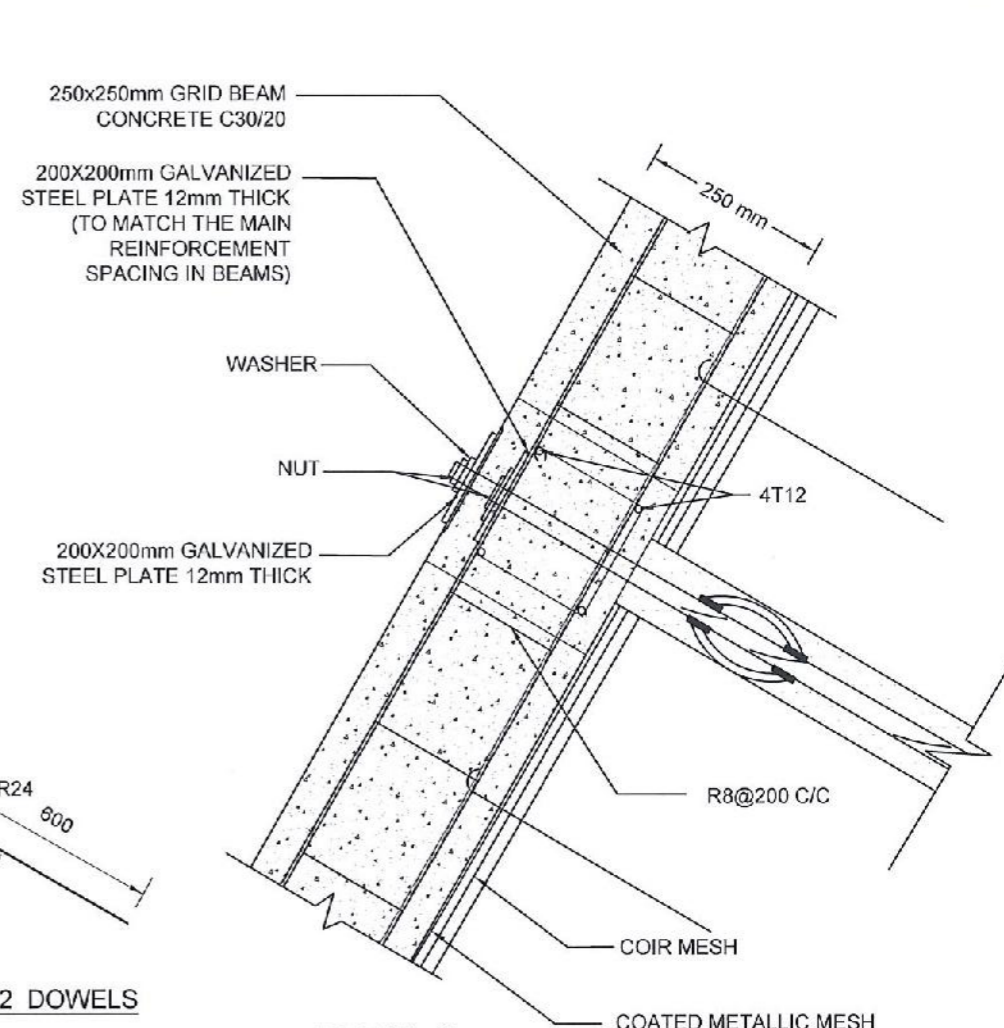
DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	
DESIGNER	M.H.M. HARSHANI	
CHECKED	B.I. KUMARAGE	
RECOMMENDED	Prof. S.A.S. KULATHILAKA	
APPROVED	K.N. BANDARA	



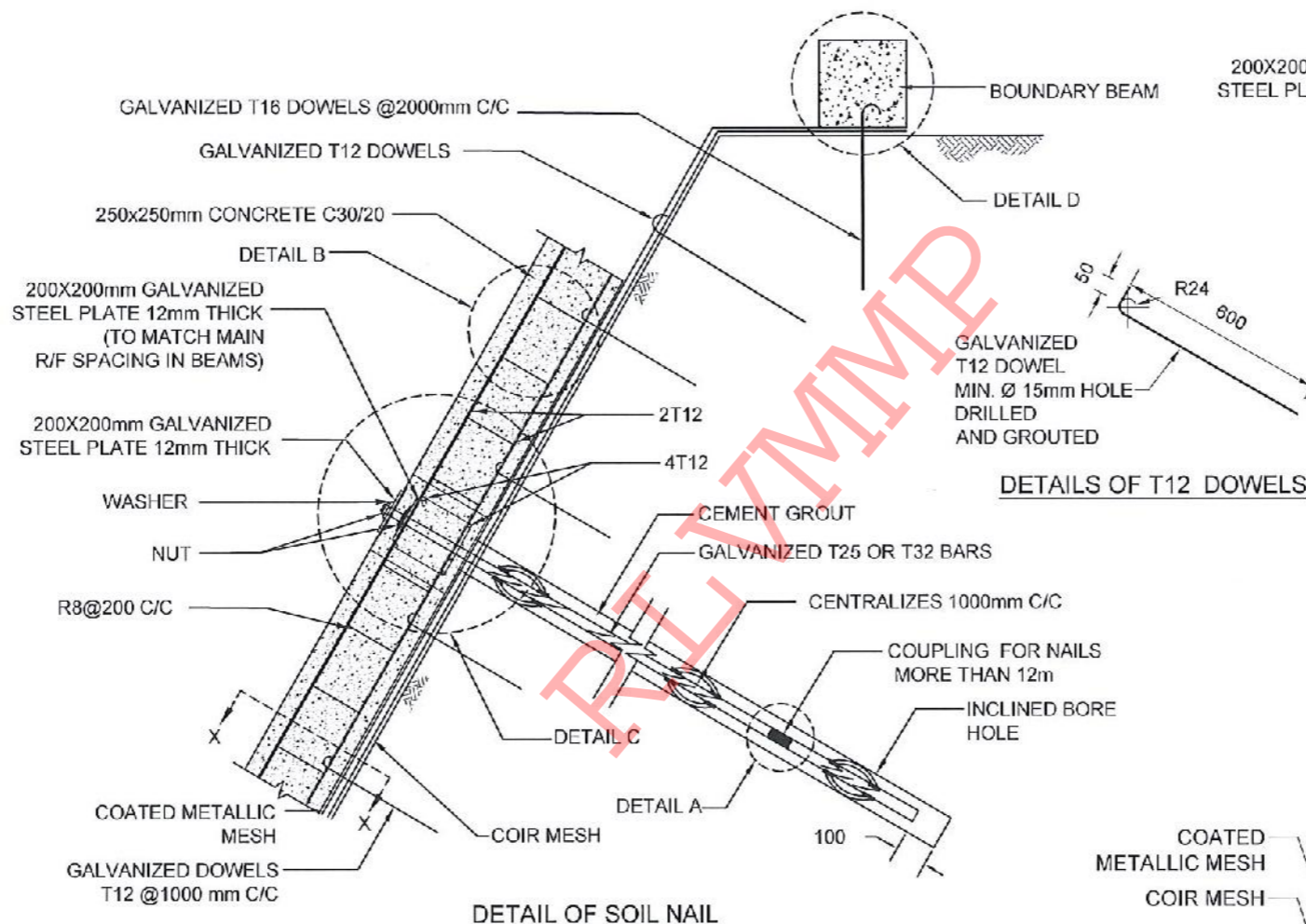
DETAIL - B



DETAIL OF FACING AT BERM

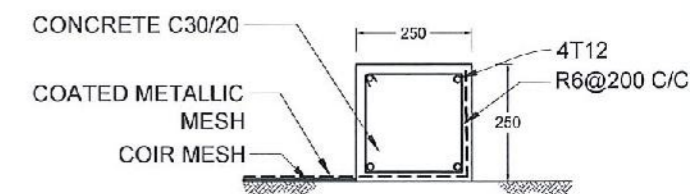


DETAIL C

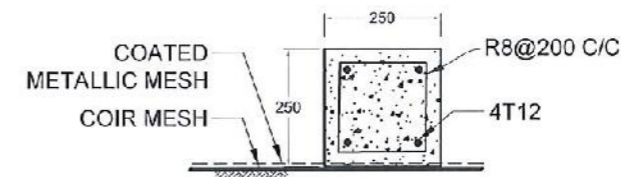


DETAIL OF SOIL NAIL

DETAILS OF T12 DOWELS



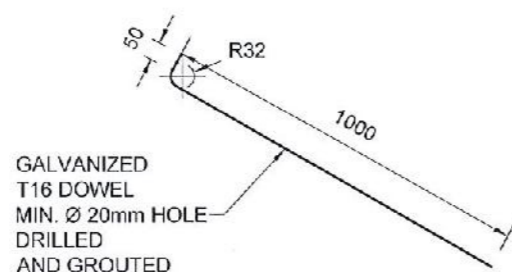
DETAIL D



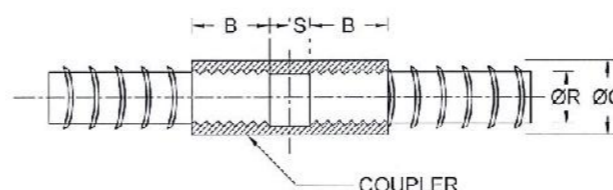
SECTION X-X

NOTES

1. ALL DIMENSIONS ARE IN mm.
2. ALL CONSTRUCTIONS SHALL BE AS PER SPECIFICATION
3. MINIMUM CLEAR COVER TO R/F - 20mm TO 30mm
4. LAP LENGTH FOR R/F BARS 40 x BAR DIA.
5. TURFING / SODDING / SEEDING / PLANTING USED FOR VEGETATION COVER
6. THE BAR COUPLER SHALL ONLY BE USE FOR SOIL NAILING OF MORE THAN 12m LONG UNLESS OTHERWISE SPECIFIED
7. THE TENSILE STRENGTH OF THE BAR COUPLER SHALL BE CAPABLE TO DEVELOP AT LEAST 95% OF TENSILE STRENGTH OF THE REBAR AS TESTED AND CERTIFIED BY THE MANUFACTURE
8. SPACING BETWEEN NAIL HEAD ARE VARIED ACCORDING TO THE GROUND CONDITION
9. BOUNDARY BEAM SHALL BE STRUCTURALLY CONNECTED TO ALREADY CONSTRUCTED GRID BEAMS AT EACH JUNCTION
10. BOUNDARY BEAM SHALL BE FOUNDED ON SLOPES  $\leq 30^\circ$  AT CROWN AREAS.
11. MINIMUM OF 2 DOWELS SHALL BE TYPICALLY USED TO FIX THE COATED METALLIC MESH AGAINST THE SLOPE AT EACH SLOPE SPACE IN BETWEEN THE GRID BEAMS, AS SHOWN IN THE DRAWING
12. SPACING AND LOCATIONS OF DOWELS INSTALLED TO FIX THE COATED METALLIC MESH AGAINST THE SLOPE SHALL BE VARIED ACCORDING TO THE SITE CONDITION



DETAILS OF T16 DOWELS



COUPLER DETAILS - A (NAIL LENGTH > 12m)

REINFORCEMENT BAR DIAMETER (ØR)	COUPLER OUTER BAR DIAMETER (ØC)	MIN - THREADED LENGTH OF COUPLER (B)	NON - THREADED LENGTH OF COUPLER (S)
25 mm	36 mm	50 mm	2.5 mm
32 mm	46 mm	64 mm	2.5 mm

EMPLOYER  
  
 DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

DESIGNER  
  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 FOREST OFFICE - RATHNAPURA

TITLE  
 DETAILS OF SOIL NAILING WITH  
 NON EMBEDDED GRID BEAM

SCALE | N.T.S. | DATE | 25.04.2022  
 PROJECT / DRAWING No. | RLVMM/WORKS/NCB/PHI/065-FO/DR-08 | REVISION | 00

DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	
DESIGNER	M.H.M. HARSHANI	
CHECKED	B.I. KUMARAGE	
RECOMMENDED	Prof. S.A.S. KULATHILAKA	
APPROVED	K.N. BANDARA	



REFERENCE

- P - PERMENT BUILDING
- CDN - CONCRETE DRAIN
- RDA - RDA BOUNDARY MARK
- WF - WIRE FENCE
- BT - BANK TOP
- BB - BOTTOM OF BANK
- BW - BOUNDARY WALL
- RW - RETAINING WALL
- EP - ELECTRIC POST
- WC - WATER CLOSET
- CUL - CULVERT
- G - GATE
- ST - SEPTIC TANK

DESIGN NOTATION

- SOIL NAILING AREA
- DS (M) - B
- DS (M) - B WITH COVER SLAB
- DS (C) - C (TYPE II)
- CATCH PIT
- DS(K) - B (TYPE II) WITH CHAIN LINK FENCE

NOTES

1. SURFACE AND CASCADE DRAIN LOCATIONS (PATH) & LENGTHS MIGHT BE VARIED ACCORDING TO ACTUAL SITE CONDITION.
2. LOCATION OF THE CATCHPITS MIGHT BE VARIED ACCORDING TO THE ACTUAL SITE CONDITION.

EMPLOYER  
  
**DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA**  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

DESIGNER  
  
**DESIGN UNIT**  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 AREA BETWEEN ST LUKE'S COLLEGE ,  
 BAPTIST CHURCH , ST LUKE'S CHURCH,  
 AND FERGUSON HIGH SCHOOL

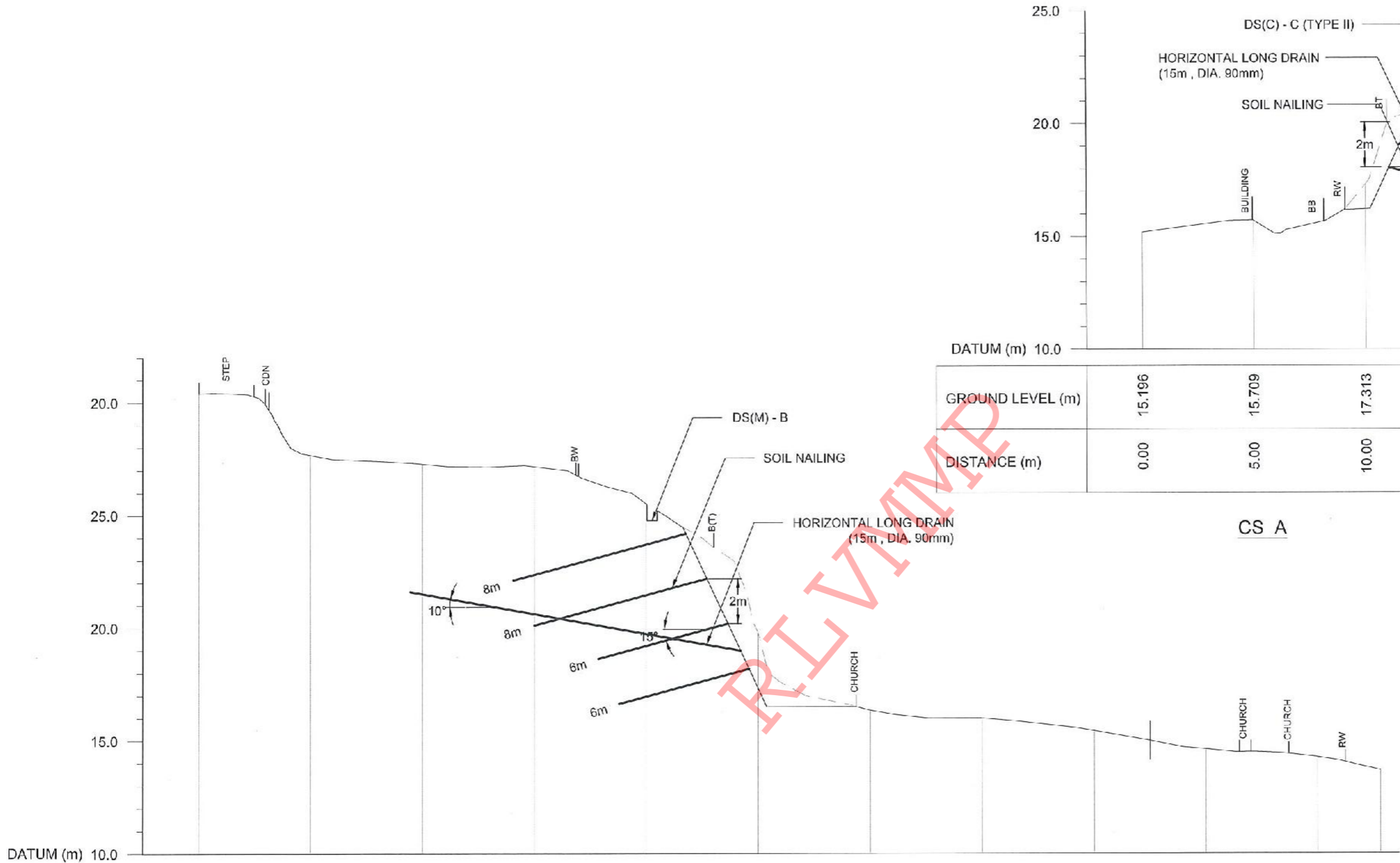
TITLE  
 DESIGN PLAN VIEW

SCALE 1:400  
 PROJECT / DRAWING No. RLV/M/P/WORKS/NCB/PH/066-LU/DR-03

DATE 28.04.2022  
 REVISION 00

DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	
DESIGNER	C. T. MAMPITIYAARACHCHI	
CHECKED	B. I. KUMARAGE	
RECOMMENDED	Prof. S.A.S. KULATHILAKA	
APPROVED	K.N. BANDARA	






GROUND LEVEL (m)	15.196	15.709	17.313	21.367	22.007
DISTANCE (m)	0.00	5.00	10.00	15.00	

GROUND LEVEL (m)	30.41	27.70	27.29	27.18	25.49	19.77	16.35	15.99	15.42	14.61	14.26	13.68
DISTANCE (m)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	52.78

CS B


**DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA**  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

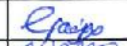




DESIGNER  
  
**DESIGN UNIT**  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

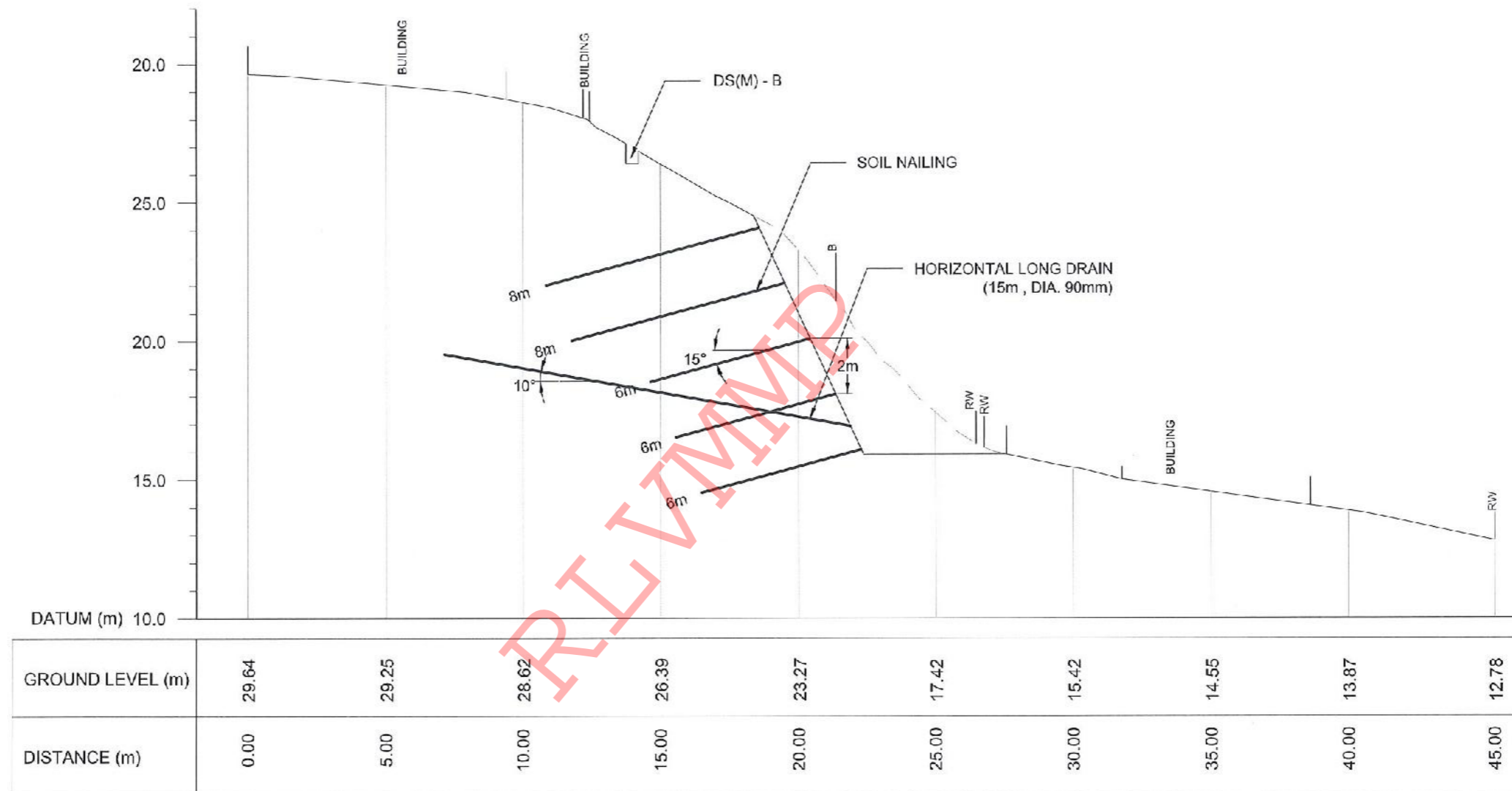
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
**REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES**  
 AREA BETWEEN ST LUKE'S COLLEGE,  
 BAPTIST CHURCH, ST LUKE'S CHURCH,  
 AND FERGUSON HIGH SCHOOL


TITLE  
**DESIGN CROSS SECTION**

SCALE	1:200	DATE	28.04.2022
PROJECT / DRAWING No.	RLV/M/P/WORKS/NCB/PHI/066-LU/DR-04a	REVISION	00

DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAICA	
DESIGNER	C. T. MAMPITIYAARACHCHI	
CHECKED	R. I. KUMARAGE	
RECOMMENDED	Prof. S.A.S. KULATHILAKA	
APPROVED	K.N. BANDARA	



CS C

EMPLOYER  

**DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA**  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

DESIGNER  

**DESIGN UNIT**  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

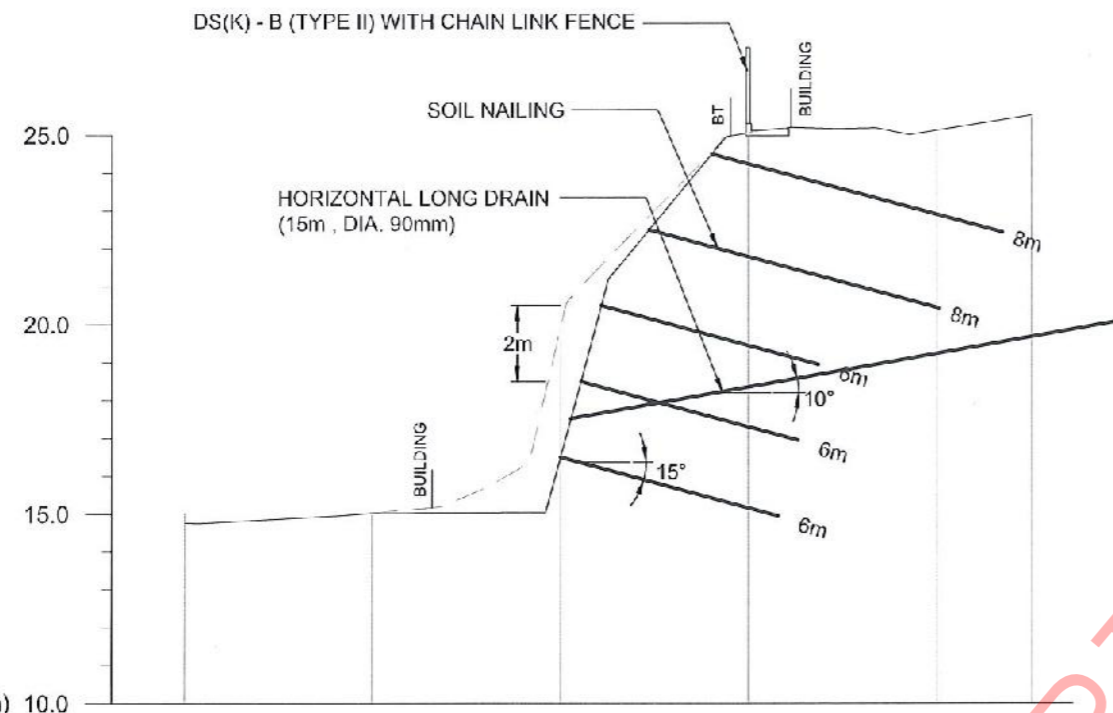
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 AREA BETWEEN ST LUKE'S COLLEGE ,  
 BAPTIST CHURCH , ST LUKE'S CHURCH,  
 AND FERGUSON HIGH SCHOOL

TITLE  
 DESIGN CROSS SECTION

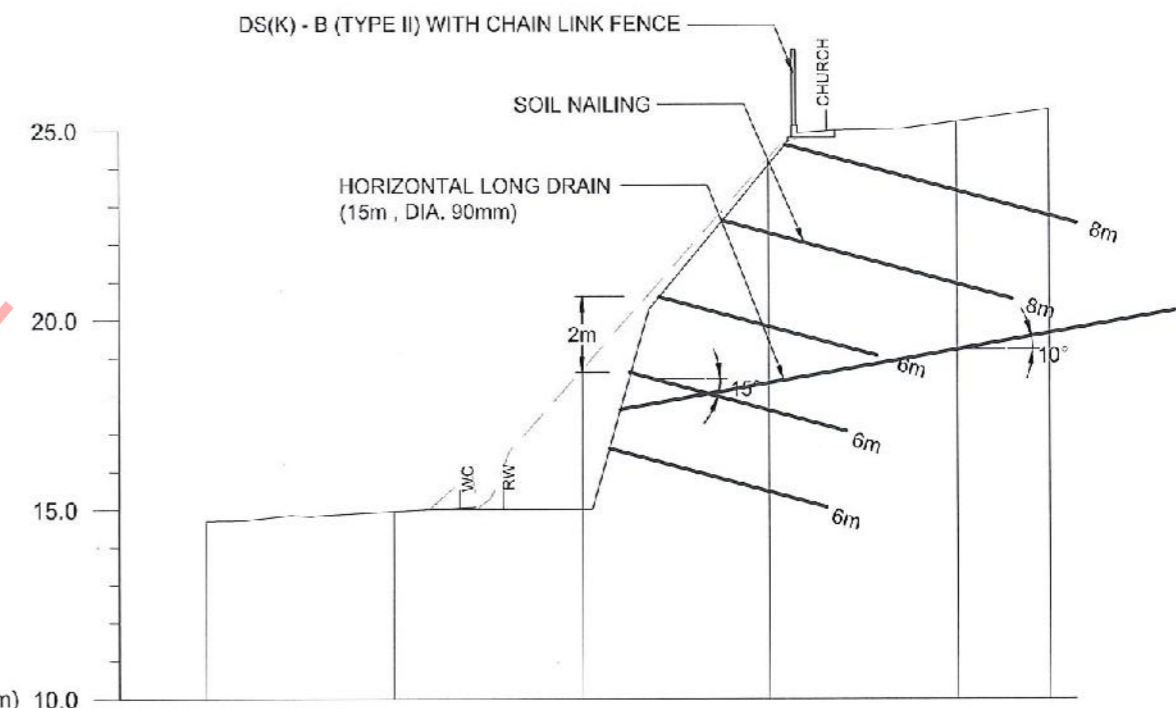
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 PROJECT / DRAWING No.      REVISION  
 RLV/MMP/WORKS/NCB/PH1/066-I U/DR-04b      00

DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	
DESIGNER	C. T. MAMPITIYAARACHCHI	
CHECKED	B.I. KUMARAGE	
RECOMMENDED	Prof. S.A.S. KULATHILAKA	
APPROVED	K.N. BANDARA	




GROUND LEVEL (m)	14.773	15.032	19.939	25.054	25.129	25.525
DISTANCE (m)		5.00	10.00	15.00	20.00	

CS D



GROUND LEVEL (m)	14.703	14.955	18.889	24.260	25.229	25.553
DISTANCE (m)		5.00	10.00	15.00	20.00	

CS E

EMPLOYER  
  
 DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05






DESIGNER  
  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

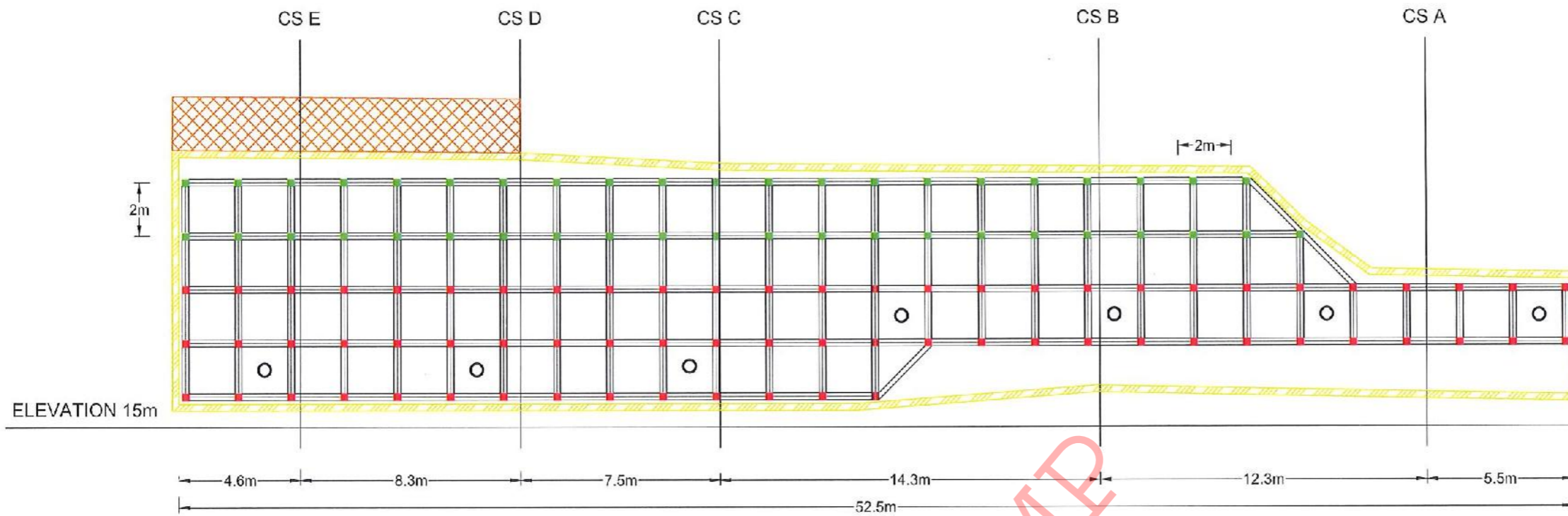
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 AREA BETWEEN ST LUKE'S COLLEGE ,  
 BAPTIST CHURCH , ST LUKE'S CHURCH,  
 AND FERGUSON HIGH SCHOOL

TITLE  
 DESIGN CROSS SECTION

SCALE	1:200	DATE	28.04.2022
PROJECT / DRAWING No	RLV/MMP/WORKS/NCB/PH/11/066-I U/DR-04c	REVISION	00

DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	
DESIGNER	C. T. MAMPITIYARACHCHI	
CHECKED	B.I. KUMARAGE	
RECOMMENDED	Prof. S.A.S. KULATHILAKA	
APPROVED	K.N. BANDARA	



FRONT ELEVATION OF SOIL NAILING AREA

LEGEND



SOIL NAILING



SOIL NAILING



HORIZONTAL LONG DRAIN



BOUNDARY BEAM



CHAIN LINK FENCE


TOTAL SOIL NAIL LENGTH = 06m  
 NO OF SOIL NAIL = 68  
 REINFORCEMENT DIAMETER = 32 mm  
 DIAMETER OF DRILLED HOLE = 125mm  
 NAIL SPACING = 2m (BW)

TOTAL SOIL NAIL LENGTH = 08m  
 NO OF SOIL NAIL = 43  
 REINFORCEMENT DIAMETER = 32 mm  
 DIAMETER OF DRILLED HOLE = 125mm  
 NAIL SPACING = 2m (BW)

HORIZONTAL LONG DRAIN LENGTH = 15 m  
 NO'S OF LONG DRAIN = 07  
 DIAMETER = 90 mm  
 SPACING = 08 m

NOTES

1. LOCATION AND ANGLE OF THE HORIZONTAL LONG DRAINS MIGHT BE VARIED ACCORDING TO THE ACTUAL SITE CONDITION.
2. LOCATION AND NUMBER OF SOIL NAILS MIGHT BE VARIED ACCORDING TO THE ACTUAL SITE CONDITION.




EMPLOYER  
  
 DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
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 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
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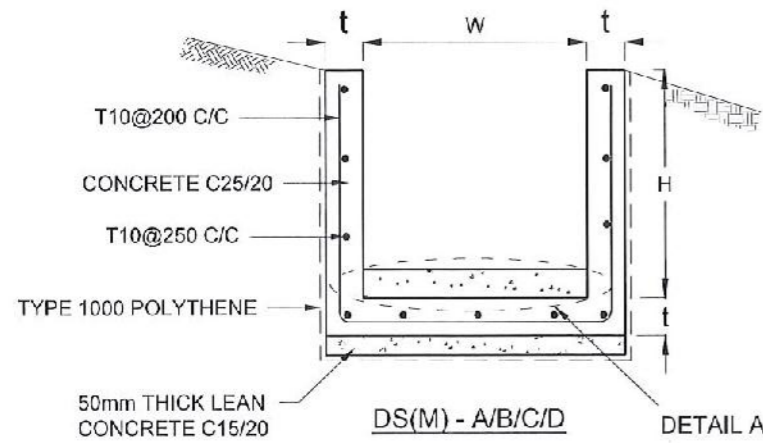
DESIGNER  
  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 AREA BETWEEN ST LUKE'S COLLEGE ,  
 BAPTIST CHURCH , ST LUKE'S CHURCH,  
 AND FERGUSON HIGH SCHOOL

TITLE	SCALE	DATE
FRONT ELEVATION	1:200	28.04.2022
PROJECT / DRAWING No.	RLVMMP/WORKS/NCB/FI/11066-LU/DR-05	REVISION 00

DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	
DESIGNER	C. T. MAMPITIYARACHCHI	
CHECKED	B.I. KUMARAGE	
RECOMMENDED	Prof. S.A.S. KULATHILAKA	
APPROVED	K.N. BANDARA	



DRAIN TYPE	W (mm)	H (mm)	t (mm)
DS (M) - A/P	300	300	100
DS (M) - B/R	450	450	100
DS (M) - C/Q	600	600	100
DS (M) - D	750	750	125
DS (M) - E	900	900	150
DS (M) - F	1000	1000	150

**NOTES**

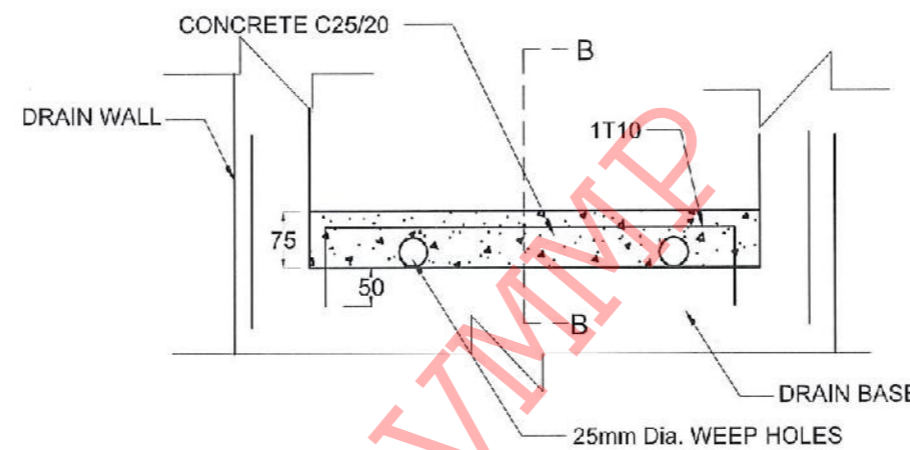
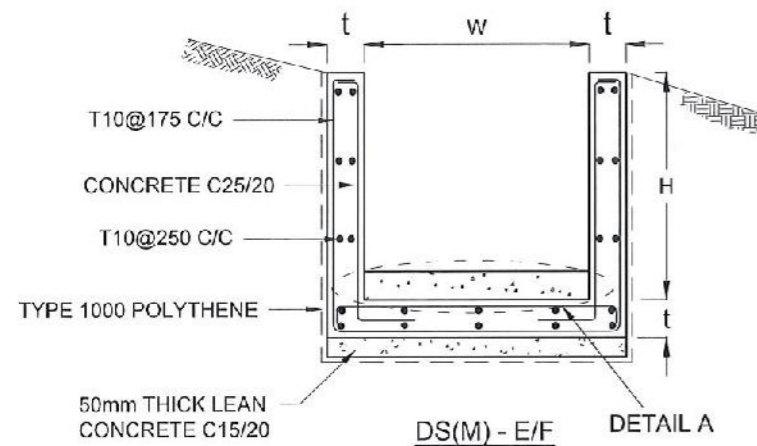
- DEPTH OF EXCAVATION MAY VARY ACCORDING TO SITE CONDITIONS.
- STEPS SHALL BE CONSTRUCTED AT SURFACE DRAIN ON SLOPING GROUND ACCORDING TO THE SITE CONDITIONS AS INSTRUCTED BY THE ENGINEER.
- ENERGY BREAKERS SHALL BE CONSTRUCTED AT THE STEEP DRAIN SEGMENTS AS PER THE INSTRUCTIONS OF THE ENGINEER.
- DOWELS SHALL BE INSTALLED ACCORDING TO THE GROUND CONDITIONS AS INSTRUCTED BY THE ENGINEER.
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED.
- 10 mm THICK EXPANSION JOINT SHALL BE INTRODUCED IN EVERY 5m INTERVAL.

**CONCRETE**

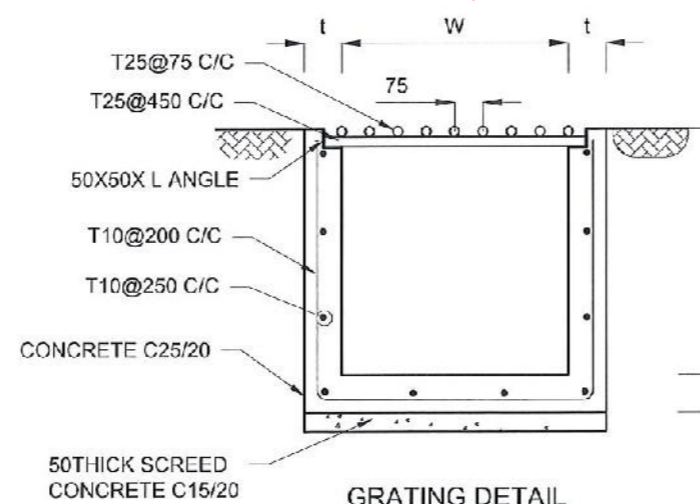
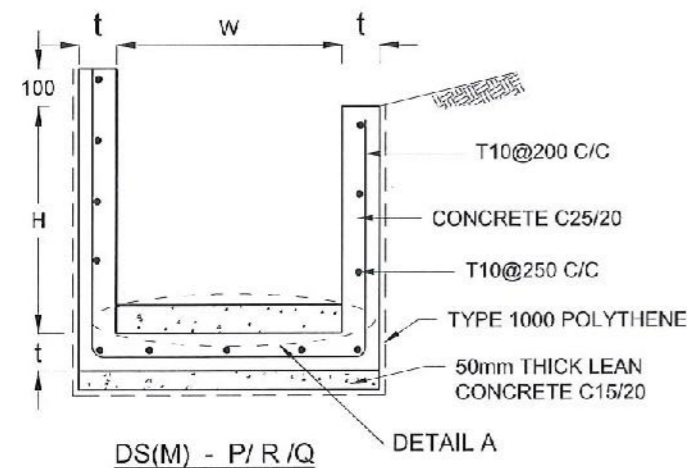
- USE FOLLOWING CONCRETE GRADES FOR STRUCTURE
  - [a] SCREED - C. 15/20
  - [b] WALLS / BASE / ENERGY BREAKERS - C. 25/20

**REINFORCEMENT**

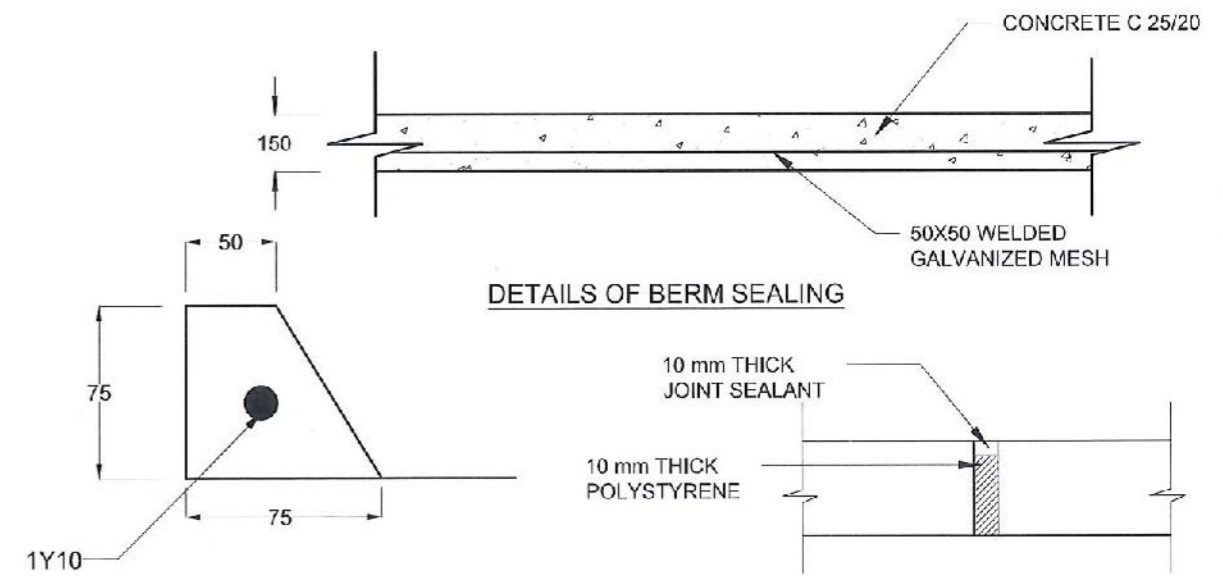
- ALL BARS MARKED "T" SHALL BE HIGH YIELD DEFORMED BARS OF YIELD STRENGTH NOT LESS THAN 460N/mm<sup>2</sup>.
- BARS OF CUT LENGTH LARGER THAN THE SUPPLIED LENGTH TO BE LAPPED FOR A LENGTH OF 50 x BAR DIA. AND LAPPING SHOULD BE STAGGERED.
- ANCHORAGE LENGTH SHOULD BE 40X BAR DIA.
- REINFORCEMENT BARS SHALL BE BENT IN ACCORDANCE WITH STANDARD SPECIFICATIONS.
- COVER TO REINFORCEMENT
  - [a] BURIED FACES AND DRAIN INVERTS - 40 mm
  - [b] ALL OTHER FACES - 25 mm



**DETAIL A - (ENERGY BREAKER AT 3M)**



**GRATING DETAIL**



**DETAILS OF BERM SEALING**

**SECTION B-B**

**EXPANSION JOINT DETAIL**

EMPLOYER  
**DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA**  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

DESIGNER  
**DESIGN UNIT**  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

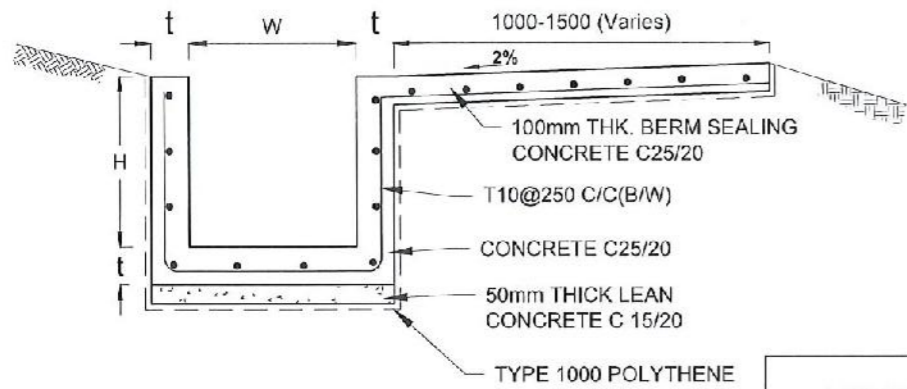
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 AREA BETWEEN ST LUKE'S COLLEGE,  
 BAPTIST CHURCH, ST LUKE'S CHURCH,  
 AND FERGUSON HIGH SCHOOL

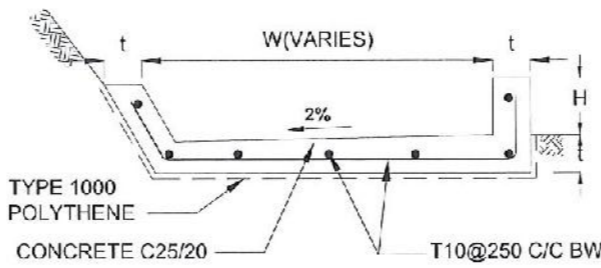
TITLE  
**DETAILS OF DRAINS**  
 (SURFACE DRAIN - 1 OF 2)

SCALE | N.T.S | DATE | 28.04.2022  
 PROJECT / DRAWING No. | RLVMM/P/WORKS/NCB/PH1/066-LU/DR-06a | REVISION | 00

DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	<i>[Signature]</i>
DESIGNER	C.T. MAMPITIYAARACHCHI	<i>[Signature]</i>
CHECKED	B.I. KUMARAGE	<i>[Signature]</i>
RECOMMENDED	Prof. S.A.S. KULATHILAKA	<i>[Signature]</i>
APPROVED	K.N. BANDARA	<i>[Signature]</i>



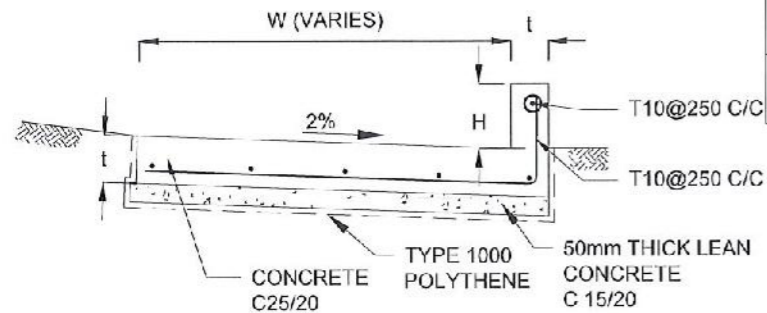
DS (B) - (TYPE I)



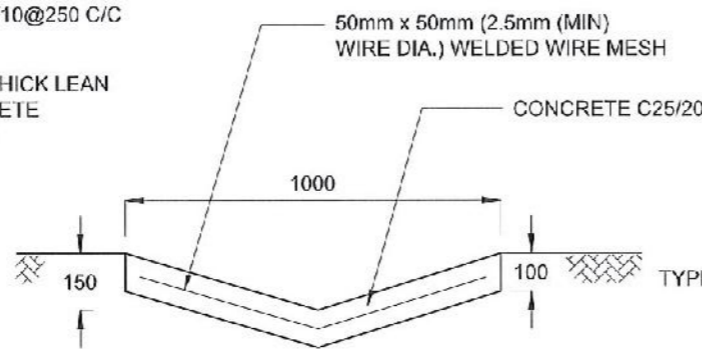
DS (B) - (TYPE II)

DRAIN TYPE	W (mm)	H (mm)	t (mm)
DS (B) - A	300	300	100
DS (B) - B	450	450	100
DS (B) - C	1000	150	100
DS (B) - D	1500	150	100
DS (B) - E	2000	150	100

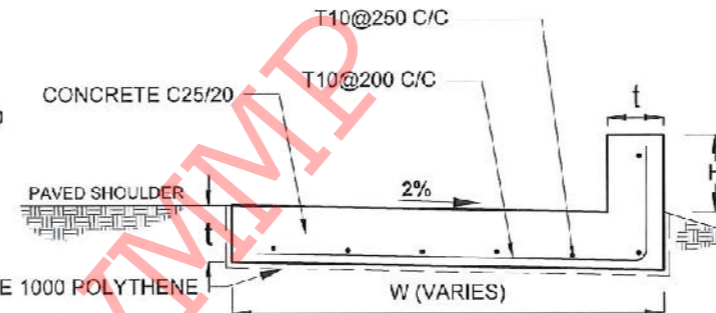
DRAIN TYPE	W (mm)	H (mm)	t (mm)
DS (K) - A	1000	200	100
DS (K) - B	1000	300	100
DS (K) - C	1150	200	200



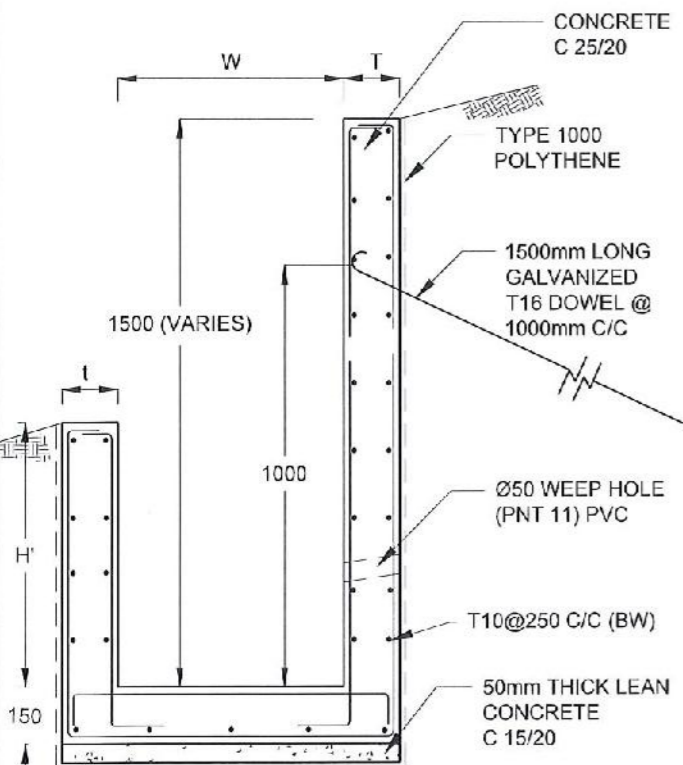
DS (K) - TYPE I



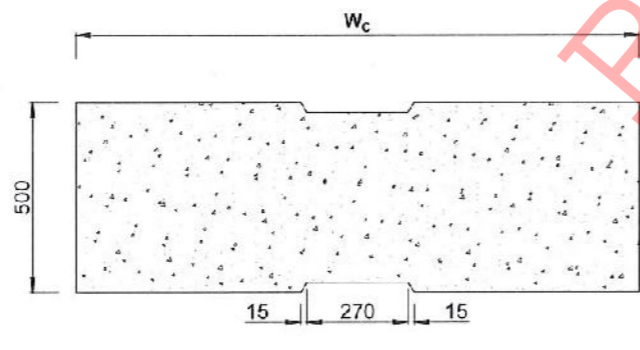
DS (D) - A (DISH DRAIN)



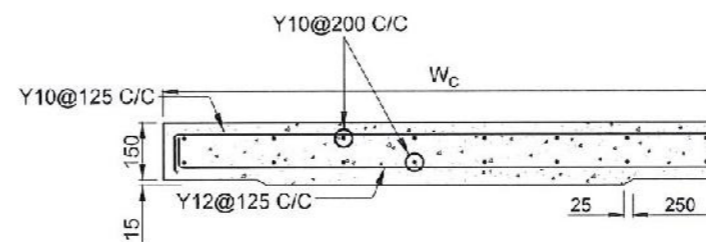
DS (K) - TYPE II



DS (M) - L



PLAN VIEW OF COVER SLAB



ACCESS & HEAVY DUTY COVER SLAB  
SECTION OF (W<sub>c</sub> x 500 x 150mm)

DS(M) - L	W (mm)	H' (mm)	t (mm)
TYPE I	600	600	150
TYPE II	800	800	150

NOTES


- DEPTH OF EXCAVATION MAY VARY ACCORDING TO SITE CONDITIONS.
- STEPS SHALL BE CONSTRUCTED AT SURFACE DRAIN ON SLOPING GROUND ACCORDING TO THE SITE CONDITIONS AS INSTRUCTED BY THE ENGINEER.
- ENERGY BREAKERS SHALL BE CONSTRUCTED AT THE STEEP DRAIN SEGMENTS AS PER THE INSTRUCTIONS OF THE ENGINEER.
- DOWELS SHALL BE INSTALLED ACCORDING TO THE GROUND CONDITIONS AS INSTRUCTED BY THE ENGINEER.
- COVER SLABS NEED TO BE PROVIDED ONLY FOR THE REGIONS AS INSTRUCTED BY THE ENGINEER.
- COVER SLAB WIDTH (W<sub>c</sub>) SHOULD BE TAKEN AS THE SUM OF DRAIN WIDTH AND 2x DRAIN WALL THICKNESS. [W<sub>c</sub> = W+2xt]
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED.
- 10 mm THICK EXPANSION JOINT SHALL BE INTRODUCED IN EVERY 5m INTERVAL.

CONCRETE

- USE FOLLOWING CONCRETE GRADES FOR STRUCTURE
  - [a] SCREED - C. 15/20
  - [b] WALLS / BASE / ENERGY BREAKERS - C. 25/20

REINFORCEMENT

- ALL BARS MARKED "T" SHALL BE HIGH YIELD DEFORMED BARS OF YIELD STRENGTH NOT LESS THAN 460N/mm<sup>2</sup>.
- BARS OF CUT LENGTH LARGER THAN THE SUPPLIED LENGTH TO BE LAPPED FOR A LENGTH OF 50 x BAR DIA. AND LAPPING SHOULD BE STAGGERED.
- ANCHORAGE LENGTH SHOULD BE 40X BAR DIA.
- REINFORCEMENT BARS SHALL BE BENT IN ACCORDANCE WITH STANDARD SPECIFICATIONS.
- COVER TO REINFORCEMENT
  - [a] BURIED FACES AND DRAIN INVERTS - 40 mm
  - [b] ALL OTHER FACES - 25 mm

EMPLOYER  
  
 DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

DESIGNER  
  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

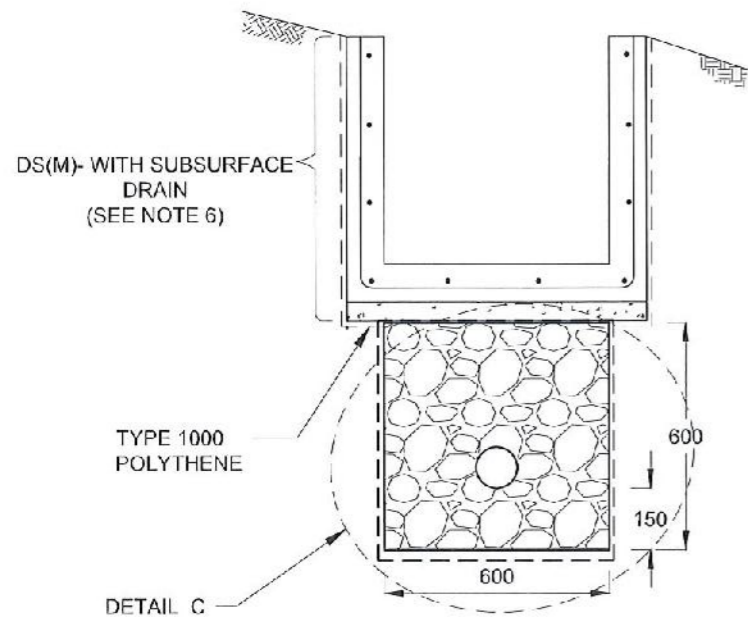
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 AREA BETWEEN ST LUKE'S COLLEGE,  
 BAPTIST CHURCH, ST LUKE'S CHURCH,  
 AND FERGUSON HIGH SCHOOL

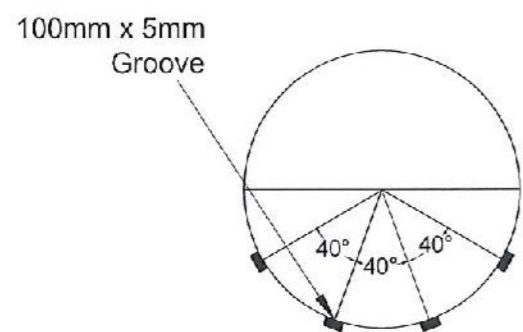
TITLE  
 DETAILS OF DRAINS  
 (SURFACE DRAIN - 2 OF 2)

SCALE N.T.S. DATE 28.04.2022  
 PROJECT / DRAWING No. RLVMM/P/WORKS/NCB/PHI/066-LU/DR-06b REVISION 00

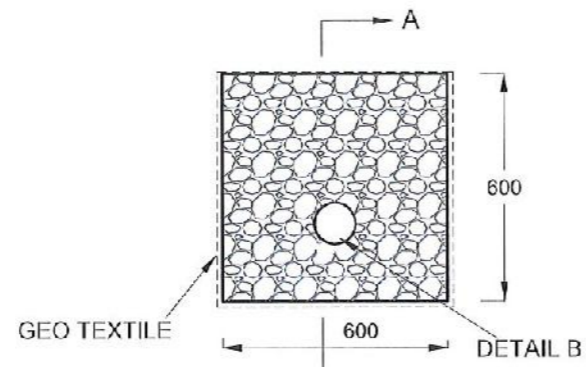
DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	
DESIGNER	C. T. MAMPITTYAARACHCHI	
CHECKED	B.I. KUMARAGE	
RECOMMENDED	Prof. S.A.S. KULATHILAKA	
APPROVED	K.N. BANDARA	



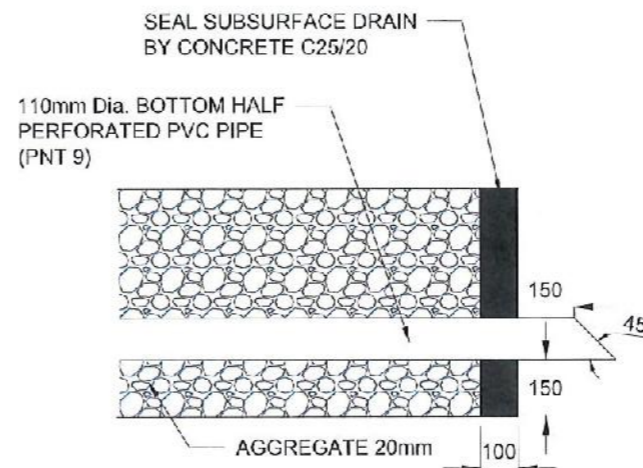
**SUBSURFACE DRAIN  
[DS (S) -A]**



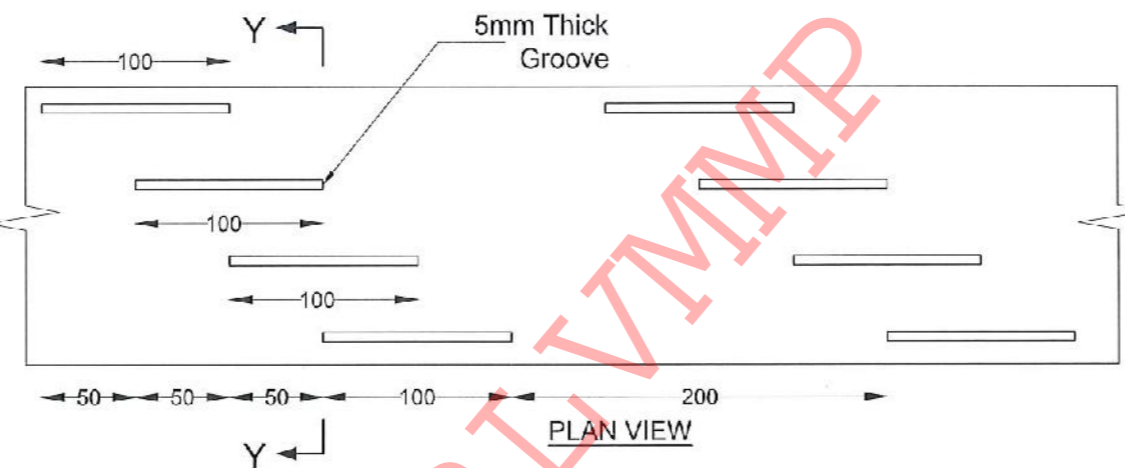
**SECTION Y - Y**



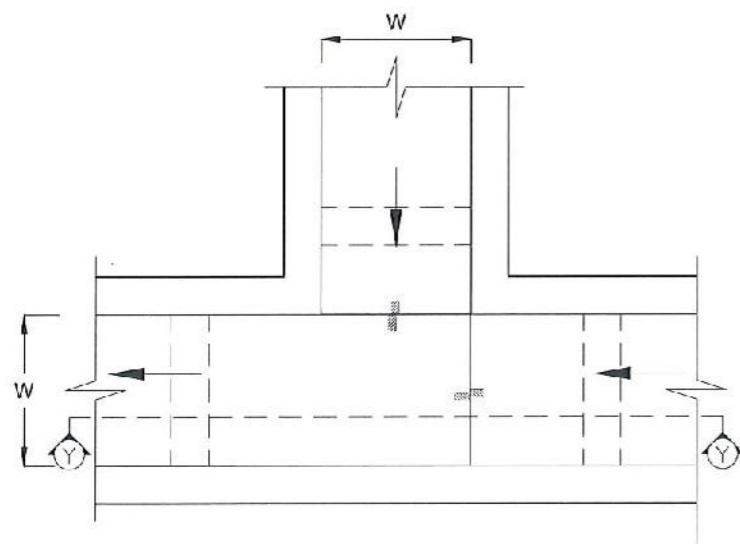
**DETAIL C / DS (S) -A**



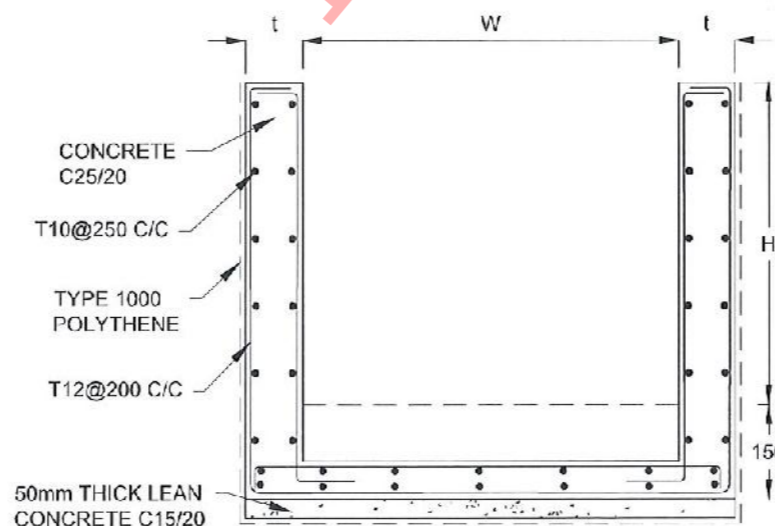
**SECTION A-A  
(OUTLET DETAIL SUBSURFACE DRAIN)**



**DETAIL - B (PERFORATED PIPE FOR SUB-SURFACE DRAINS)**



**PLAN VIEW OF CATCH PIT (CP)**



**SECTION Y-Y (CP - R)**

**NOTES**

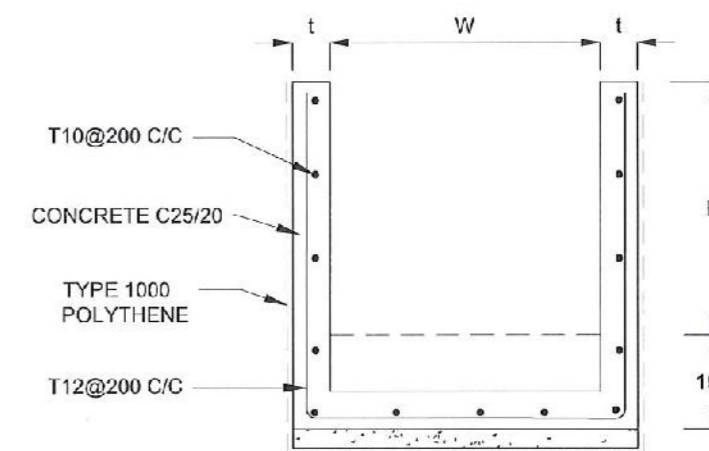
1. W,H,t; SHALL BE THE SAME AS RESPECTIVE DRAIN SECTION.
2. CP - R SHALL BE USED WHERE H > 900mm
3. DEPTH OF EXCAVATION MAY VARY ACCORDING TO SITE CONDITIONS.
4. DOWELS SHALL BE INSTALLED ACCORDING TO THE GROUND CONDITIONS AS INSTRUCTED BY THE ENGINEER.
5. 10 mm THICK EXPANSION JOINT SHALL BE INTRODUCED IN EVERY 5m INTERVAL.
6. DETAILS OF SURFACE DRAIN PORTION OF THE SUBSURFACE DRAINS SHALL BE AS PER DS(M), DS(B), DS(K) OR DS(C) SECTIONS ACCORDINGLY.
7. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED.

**CONCRETE**

8. USE FOLLOWING CONCRETE GRADES FOR STRUCTURE
  - [a] SCREED - C. 15/20
  - [b] WALLS / BASE / ENERGY BREAKERS - C. 25/20

**REINFORCEMENT**

9. ALL BARS MARKED "T" SHALL BE HIGH YIELD DEFORMED BARS OF YIELD STRENGTH NOT LESS THAN 460N/mm<sup>2</sup>.
10. BARS OF CUT LENGTH LARGER THAN THE SUPPLIED LENGTH TO BE LAPPED FOR A LENGTH OF 50 x BAR DIA. AND LAPPING SHOULD BE STAGGERED.
11. ANCHORAGE LENGTH SHOULD BE 40X BAR DIA.
12. REINFORCEMENT BARS SHALL BE BENT IN ACCORDANCE WITH STANDARD SPECIFICATIONS.
13. COVER TO REINFORCEMENT
  - [a] BURIED FACES AND DRAIN INVERTS - 40 mm
  - [b] ALL OTHER FACES - 25 mm



**SECTION Y - Y**

EMPLOYER  
**DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA**  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

DESIGNER  
**DESIGN UNIT**  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

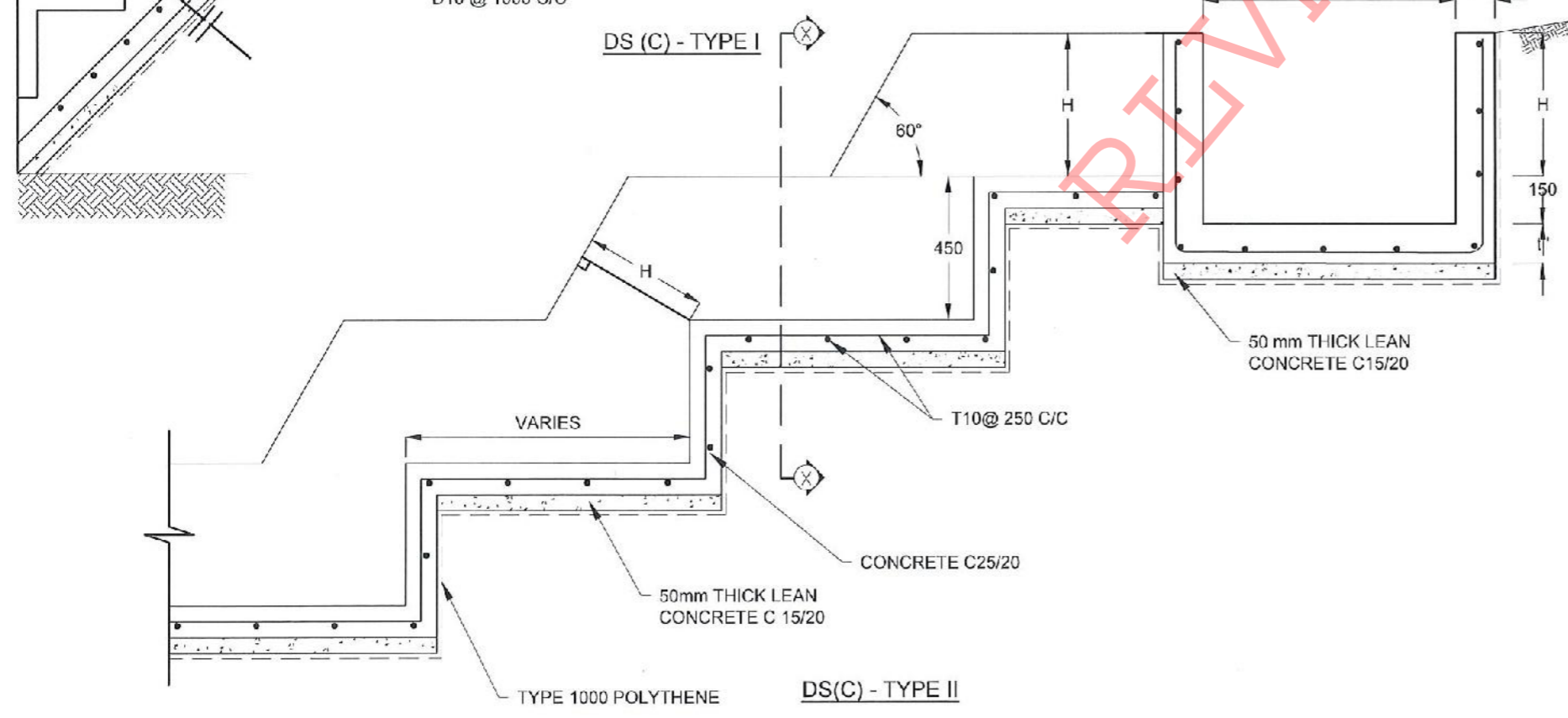
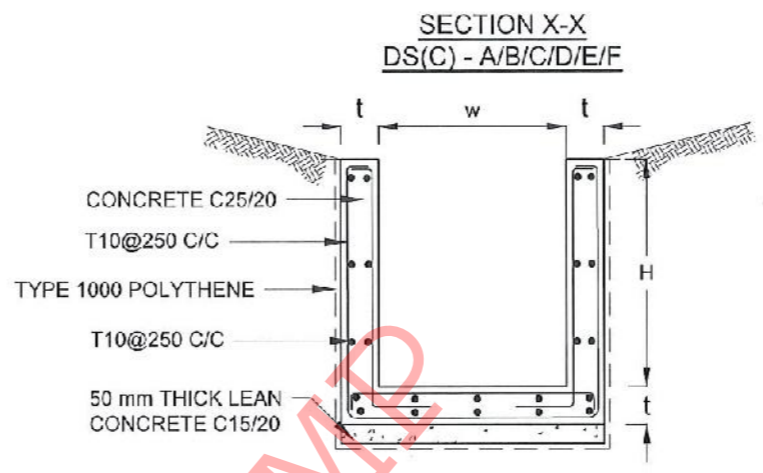
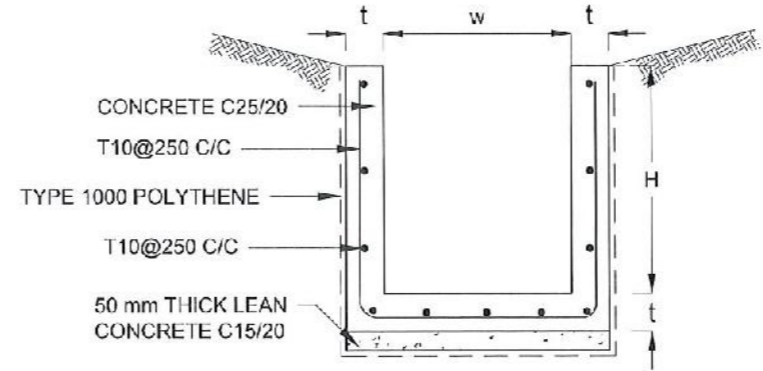
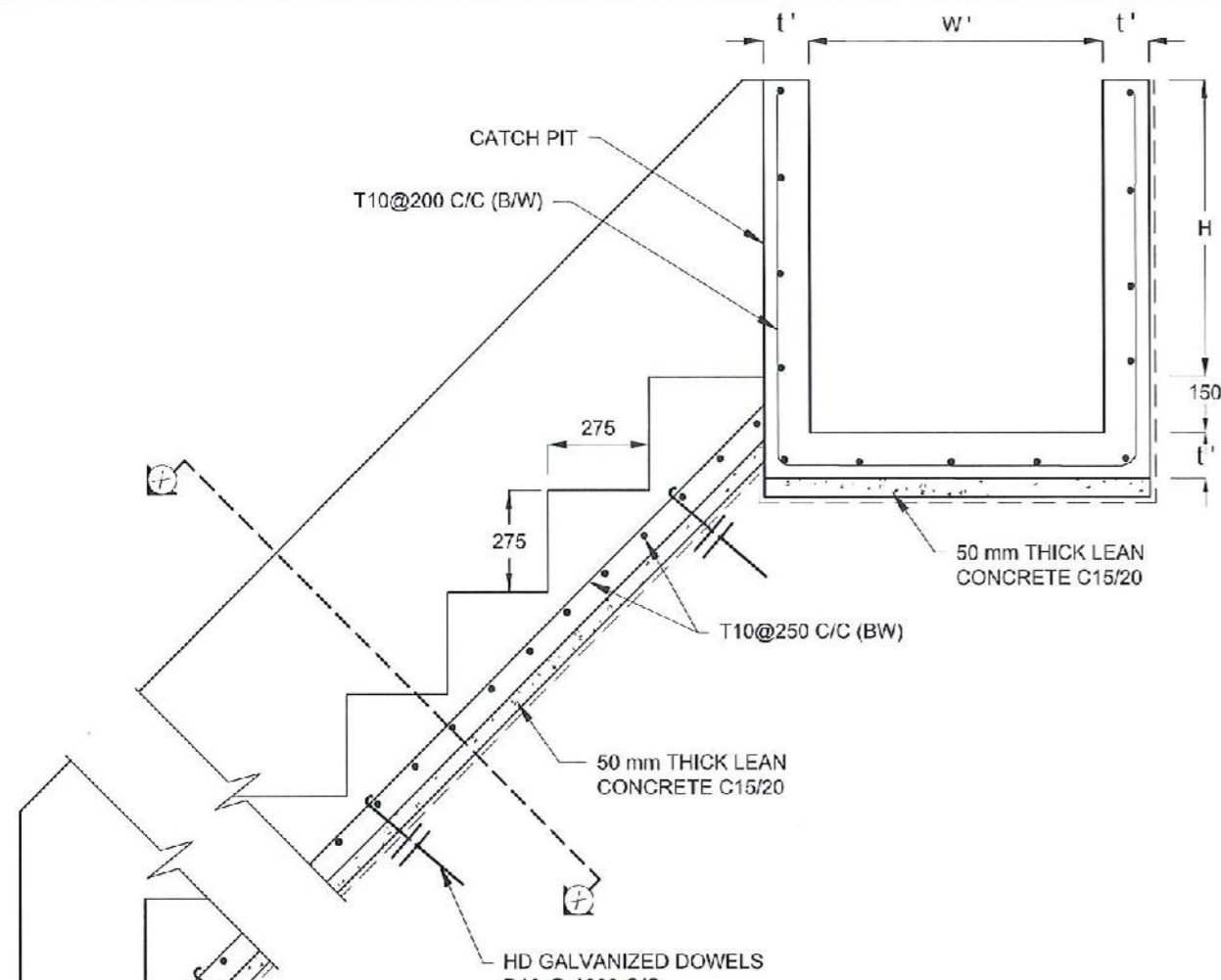
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 AREA BETWEEN ST LUKE'S COLLEGE,  
 BAPTIST CHURCH, ST LUKE'S CHURCH,  
 AND FERGUSON HIGH SCHOOL

TITLE  
 DETAILS OF DRAINS  
 (SURFACE DRAIN - 2 OF 2)

SCALE: N.T.S. DATE: 28.04.2022  
 PROJECT / DRAWING No. RLV/MMP/WORKS/NCB/PHII/066-LU/DR-06c REVISION: 00

DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	<i>[Signature]</i>
DESIGNER	C. T. MAMPITIYAARACHCHI	<i>[Signature]</i>
CHECKED	B.I. KUMARAGE	<i>[Signature]</i>
RECOMMENDED	Prof. S.A.S. KULATHILAKA	<i>[Signature]</i>
APPROVED	K.N. BANDARA	<i>[Signature]</i>



**NOTES**

1. USE EITHER TYPE I OR TYPE II CASCADE DRAIN ACCORDING TO THE ACTUAL GROUND CONDITION AS INSTRUCTED BY THE ENGINEER.
2. LENGTH OF THE STEPS OF CASCADE WILL BE VARIED ACCORDING TO THE SITE CONDITIONS.
3. DEPTH OF EXCAVATION SHALL BE VARIED ACCORDING TO SITE CONDITIONS.
4. DOWELS SHALL BE INSTALLED ACCORDING TO THE GROUND CONDITIONS AS INSTRUCTED BY THE ENGINEER.
5. 10 mm THICK EXPANSION JOINT SHALL BE INTRODUCED IN EVERY 5m INTERVAL.
6. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED.


**CONCRETE**

7. USE FOLLOWING CONCRETE GRADES FOR STRUCTURE
  - [a] SCREED - C. 15/20
  - [b] WALLS / BASE / ENERGY BREAKERS - C. 25/20

**REINFORCEMENT**

8. ALL BARS MARKED "T" SHALL BE HIGH YIELD DEFORMED BARS OF YIELD STRENGTH NOT LESS THAN 460N/mm<sup>2</sup>.
9. BARS OF CUT LENGTH LARGER THAN THE SUPPLIED LENGTH TO BE LAPPED FOR A LENGTH OF 50 x BAR DIA. AND LAPPING SHOULD BE STAGGERED.
10. ANCHORAGE LENGTH SHOULD BE 40X BAR DIA.
11. REINFORCEMENT BARS SHALL BE BENT IN ACCORDANCE WITH STANDARD SPECIFICATIONS.
12. COVER TO REINFORCEMENT
  - [a] BURIED FACES AND DRAIN INVERTS - 40 mm
  - [b] ALL OTHER FACES - 25 mm

DRAIN TYPE	W (mm)	H (mm)	t (mm)	W' (mm)	t' (mm)
DS (C) - A	450	450	100	600	100
DS (C) - B	450	600	100	750	100
DS (C) - C	600	600	100	800	100
DS (C) - D	750	750	100	800	100
DS (C) - E	800	800	125	1000	125
DS (C) - F	1000	750	125	1200	125
DS (C) - G	1200	1000	125	1300	125

EMPLOYER  
  
 DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

DESIGNER  
  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

REV	DATE	REVISION DESCRIPTION	APPROVAL

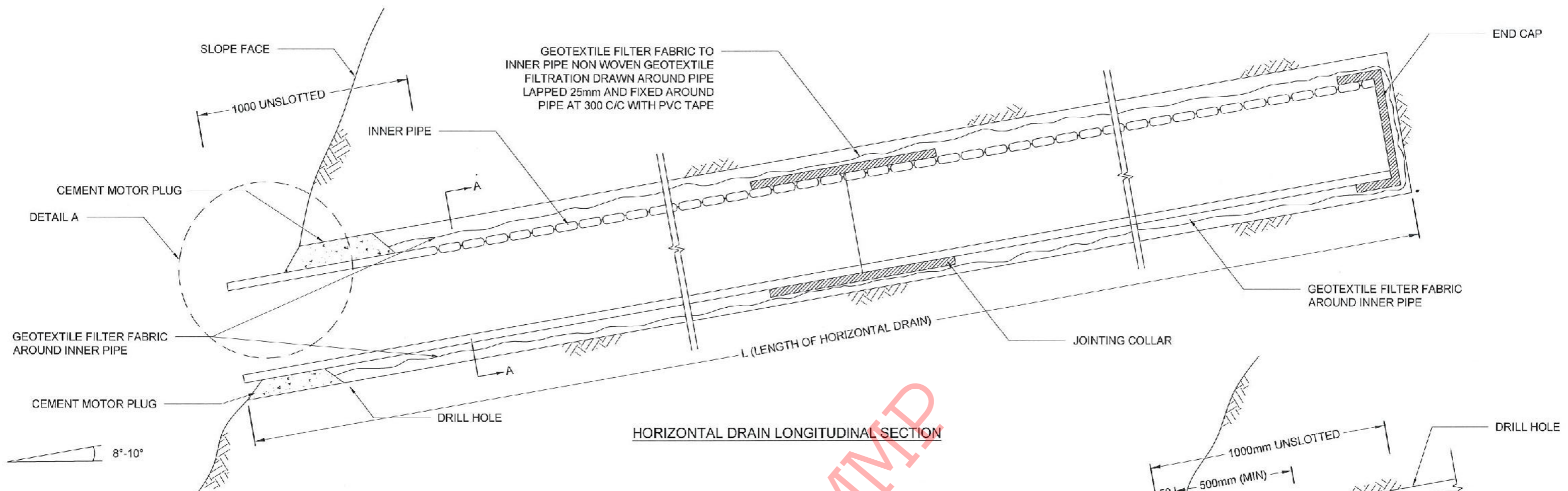
PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 AREA BETWEEN ST LUKE'S COLLEGE,  
 BAPTIST CHURCH, ST LUKE'S CHURCH,  
 AND FERGUSON HIGH SCHOOL

TITLE  
 DETAILS OF DRAINS  
 (CASCADE DRAIN)

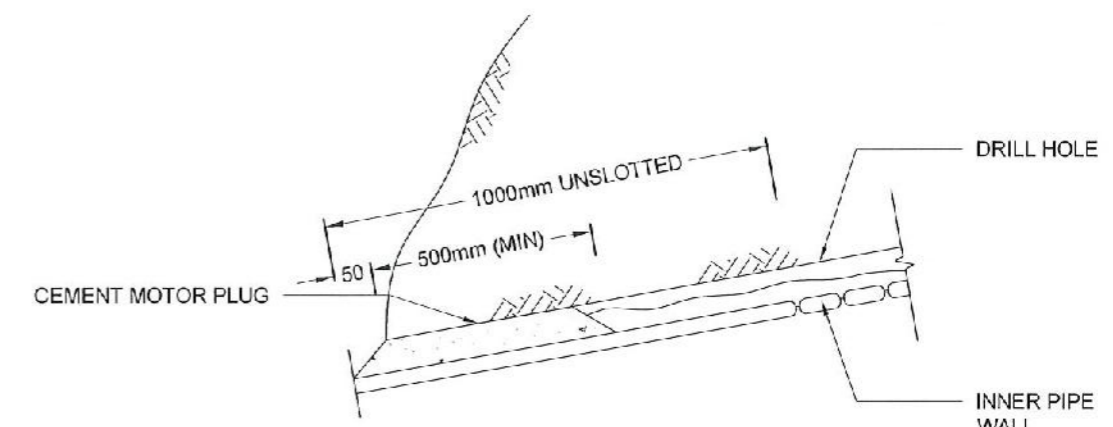
SCALE | N.T.S | DATE | 28.04.2022  
 PROJECT / DRAWING No. | REVISION |  
 RI VMMP/WORKS/NCB/PHI/066 LU/DR 06d | 00

DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	
DESIGNER	G. T. MAMPITIYAARACHCHI	
CHECKED	B.I. KUMARAGE	
RECOMMENDED	Prof. S.A.S. KULATHILAKA	
APPROVED	K.N. BANDARA	

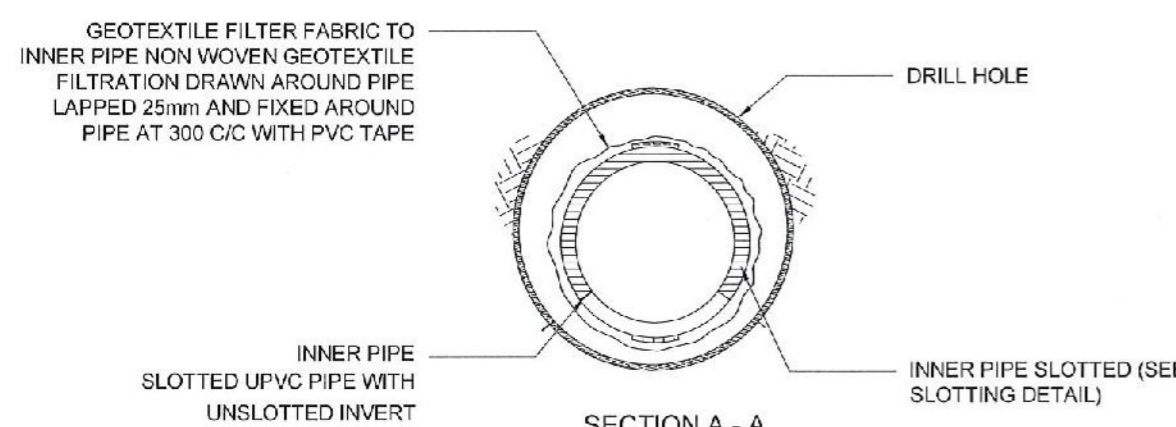




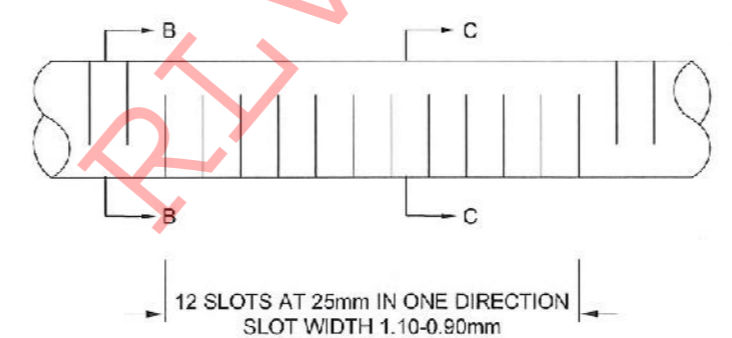
HORIZONTAL DRAIN LONGITUDINAL SECTION



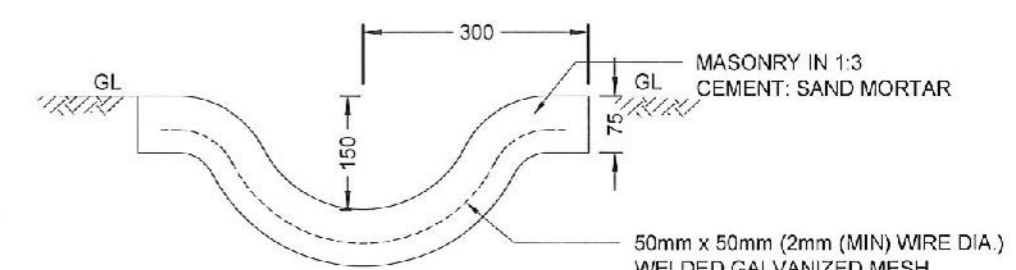
DETAIL A



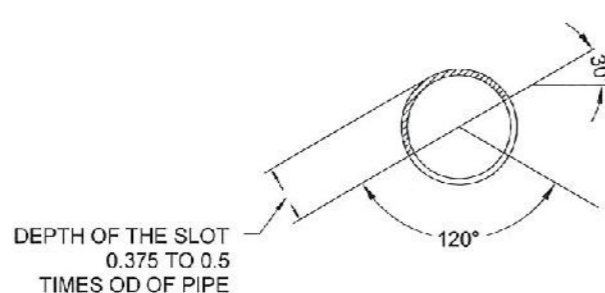
SECTION A - A



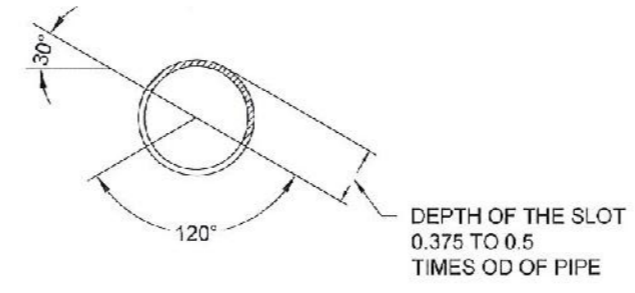
INNER AND OUTER PIPE SLOTTING DETAIL (TOP VIEW)



DETAIL OF GUIDE DRAIN



SECTION B - B

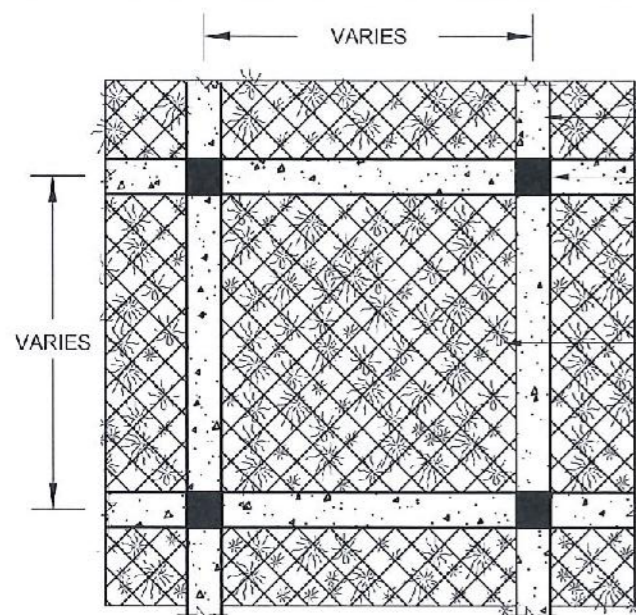


SECTION C - C

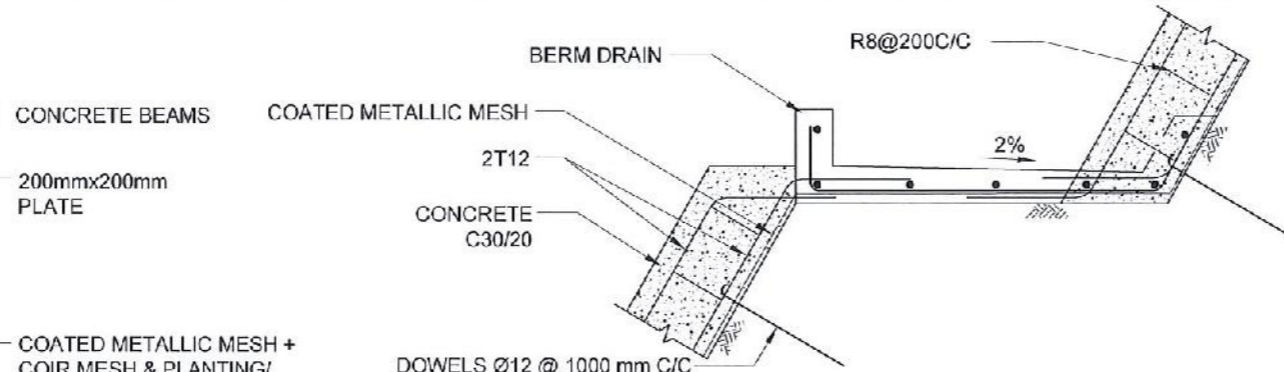
NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. PIPE DIAMETERS, ANGLE & LENGTHS AS SPECIFIED IN DRAWINGS.
3. ALL MATERIALS SHALL CONFORM TO PROJECT SPECIFICATION

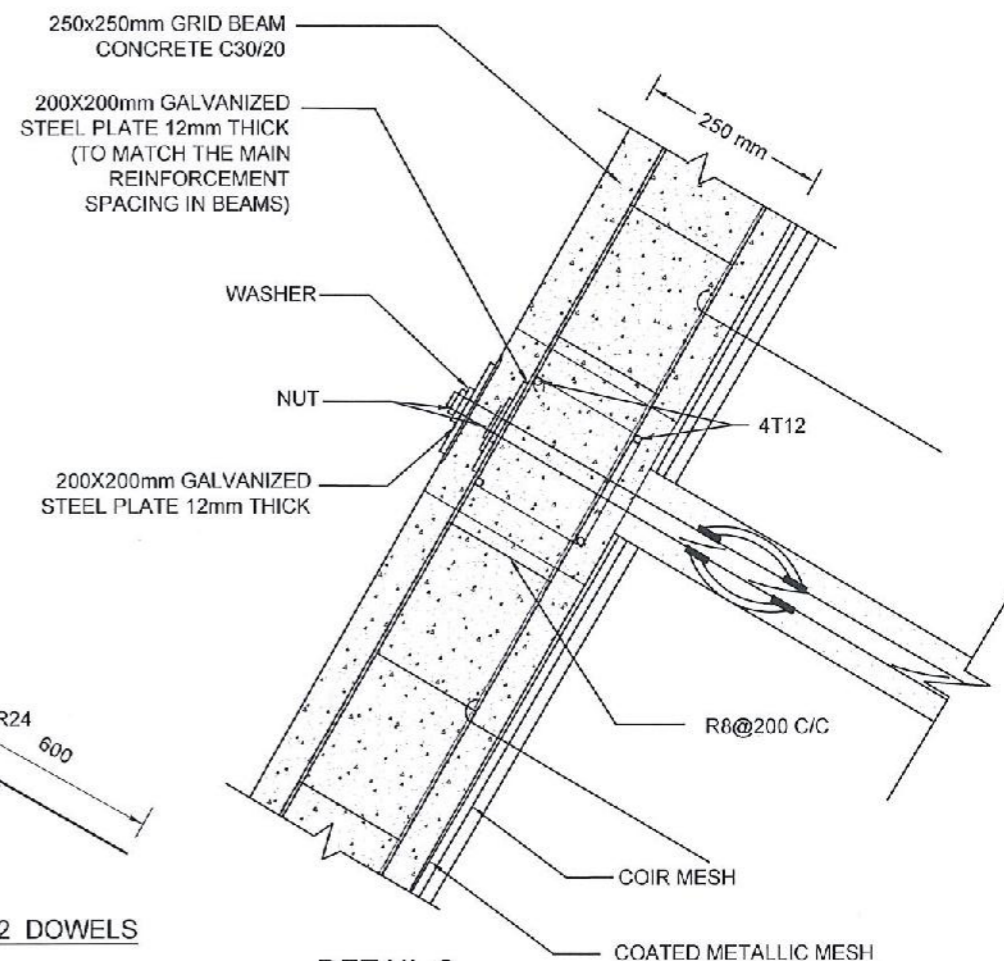
EMPLOYER  DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT NATIONAL BUILDING RESEARCH ORGANISATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	DESIGNER  DESIGN UNIT NATIONAL BUILDING RESEARCH ORGANIZATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	REV	DATE	REVISION DESCRIPTION	APPROVAL	PROJECT TITLE REDUCTION OF LANDSLIDE VULNERABILITY BY MITIGATION MEASURES AREA BETWEEN ST LUKE'S COLLEGE, BAPTIST CHURCH, ST LUKE'S CHURCH, AND FERGUSON HIGH SCHOOL	TITLE DETAILS OF HORIZONTAL DRAIN SECTIONS	DESCRIPTION	NAME	SIGNATURE		
									SCALE	N.T.S	DATE	28.04.2022



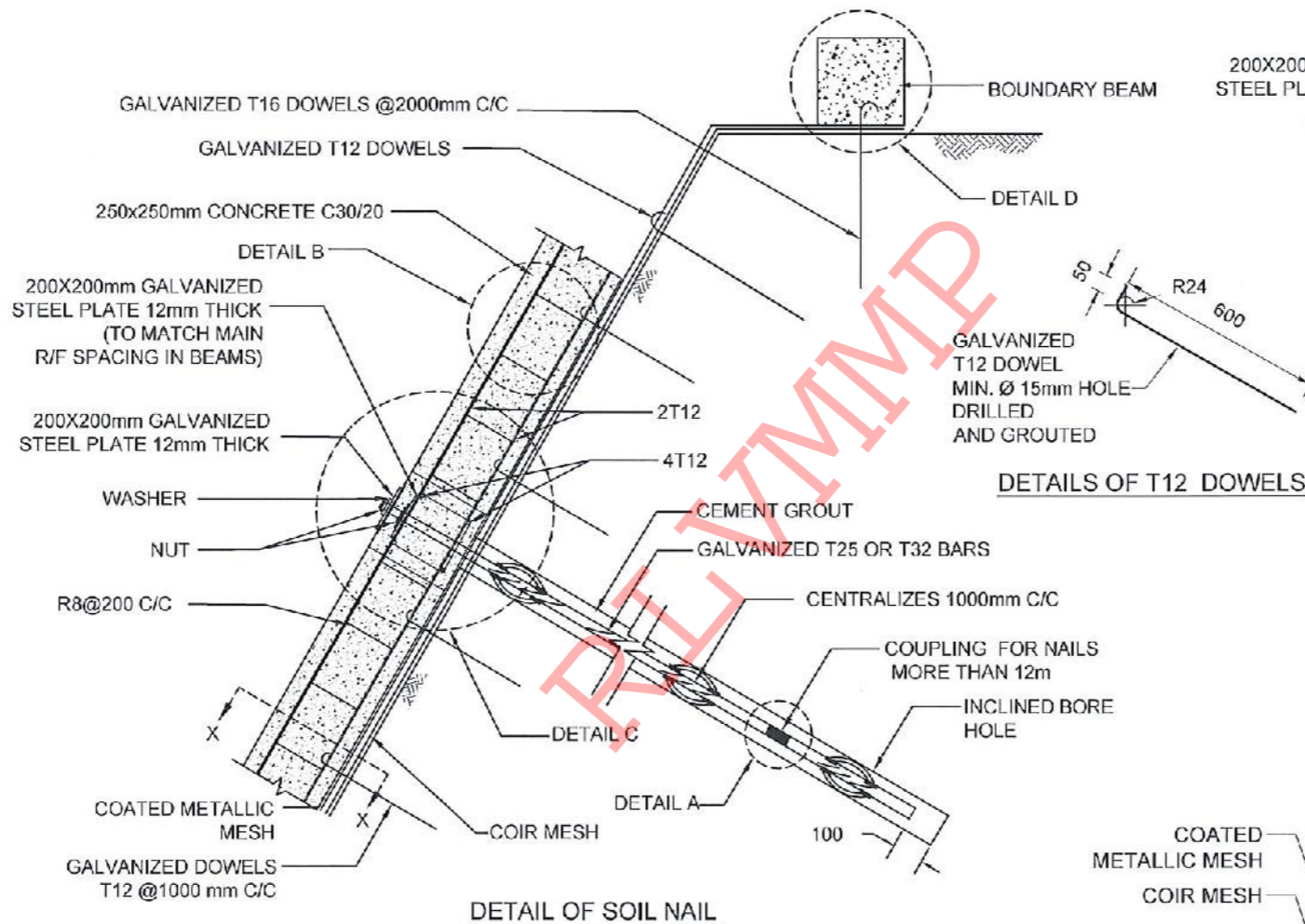
DETAIL - B



DETAIL OF FACING AT BERM

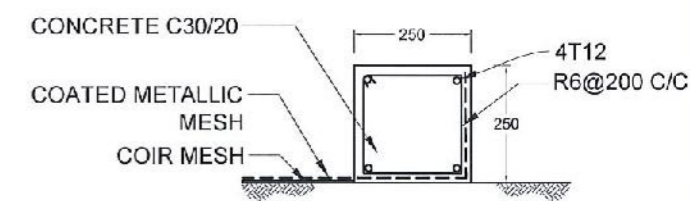


DETAIL C



DETAIL OF SOIL NAIL

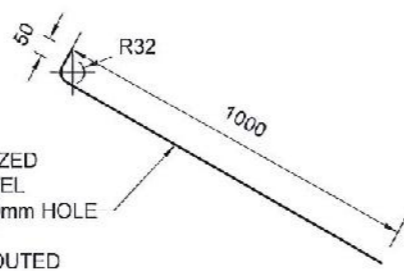
DETAILS OF T12 DOWELS



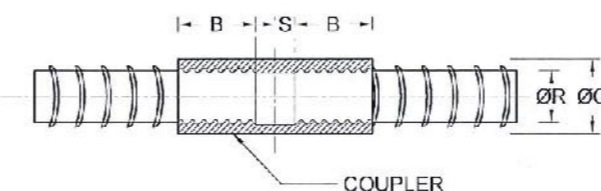
DETAIL D



SECTION X-X



DETAILS OF T16 DOWELS




COUPLER DETAILS - A (NAIL LENGTH > 12m)

NOTES

1. ALL DIMENSIONS ARE IN mm.
2. ALL CONSTRUCTIONS SHALL BE AS PER SPECIFICATION
3. MINIMUM CLEAR COVER TO R/F - 20mm TO 30mm
4. LAP LENGTH FOR R/F BARS 40 x BAR DIA.
5. TURFING / SODDING / SEEDING / PLANTING USED FOR VEGETATION COVER
6. THE BAR COUPLER SHALL ONLY BE USE FOR SOIL NAILING OF MORE THAN 12m LONG UNLESS OTHERWISE SPECIFIED
7. THE TENSILE STRENGTH OF THE BAR COUPLER SHALL BE CAPABLE TO DEVELOP AT LEAST 95% OF TENSILE STRENGTH OF THE REBAR AS TESTED AND CERTIFIED BY THE MANUFACTURE
8. SPACING BETWEEN NAIL HEAD ARE VARIED ACCORDING TO THE GROUND CONDITION
9. BOUNDARY BEAM SHALL BE STRUCTURALLY CONNECTED TO ALREADY CONSTRUCTED GRID BEAMS AT EACH JUNCTION
10. BOUNDARY BEAM SHALL BE FOUNDED ON SLOPES  $\leq 30^\circ$  AT CROWN AREAS.
11. MINIMUM OF 2 DOWELS SHALL BE TYPICALLY USED TO FIX THE COATED METALLIC MESH AGAINST THE SLOPE AT EACH SLOPE SPACE IN BETWEEN THE GRID BEAMS, AS SHOWN IN THE DRAWING
12. SPACING AND LOCATIONS OF DOWELS INSTALLED TO FIX THE COATED METALLIC MESH AGAINST THE SLOPE SHALL BE VARIED ACCORDING TO THE SITE CONDITION

REINFORCEMENT BAR DIAMETER (ØR)	COUPLER OUTER BAR DIAMETER (ØC)	MIN - THREADED LENGTH OF COUPLER (B)	NON - THREADED LENGTH OF COUPLER (S)
25 mm	36 mm	50 mm	2.5 mm
32 mm	46 mm	64 mm	2.5 mm

EMPLOYER  
  
 DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

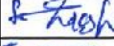
DESIGNER  
  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

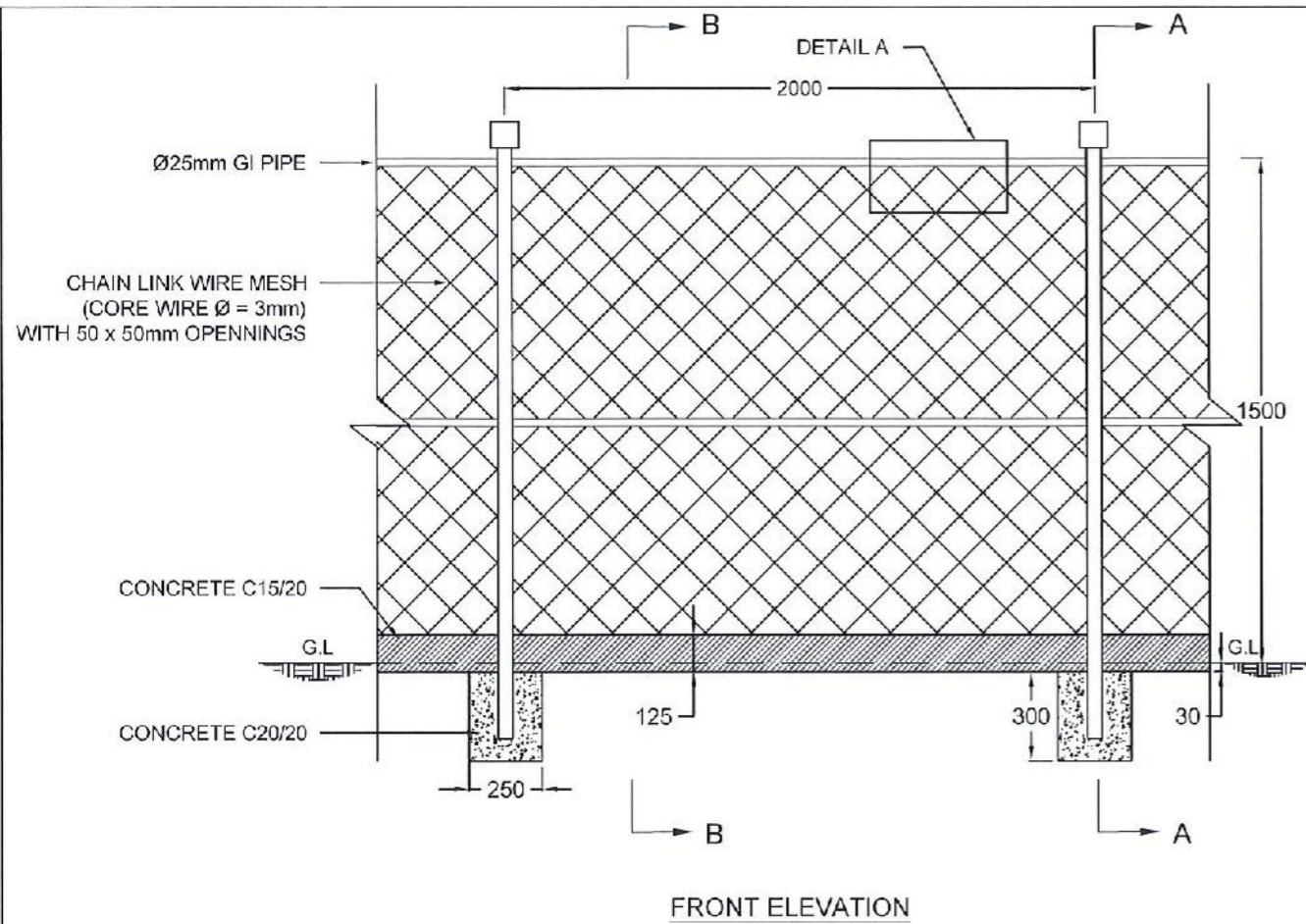
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 AREA BETWEEN ST LUKE'S COLLEGE,  
 BAPTIST CHURCH, ST LUKE'S CHURCH,  
 AND FERGUSON HIGH SCHOOL

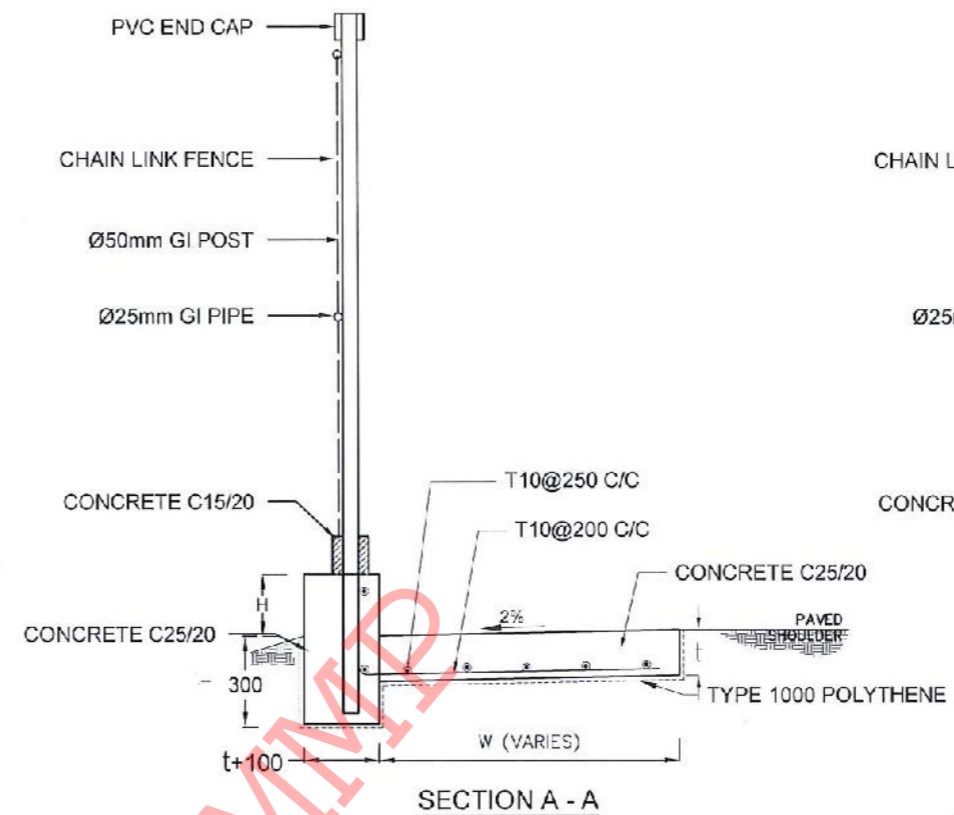
TITLE  
 DETAILS OF SOIL NAILING WITH  
 GRID BEAM

SCALE: N.T.S. DATE: 28.04.2022  
 PROJECT / DRAWING No. RLV/MMP/WORKS/NCB/PHI/066 LU/DR.08 REVISION: 00

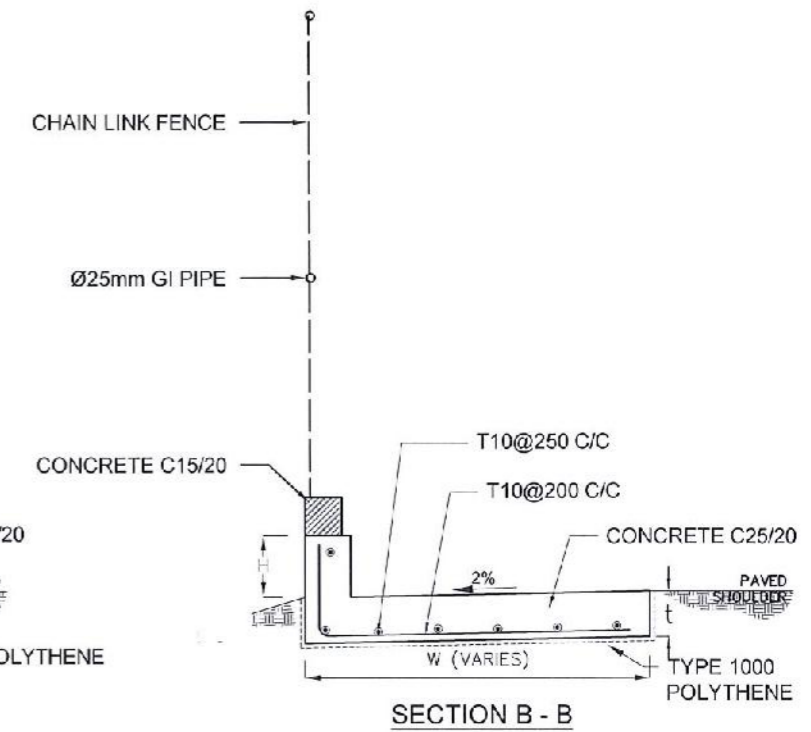
DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	
DESIGNER	C. T. MAMPITIYARACHCHI	
CHECKED	B.I. KUMARAGE	
RECOMMENDED	Prof. S.A.S. KULATHILAKA	
APPROVED	K.N. BANDARA	



FRONT ELEVATION

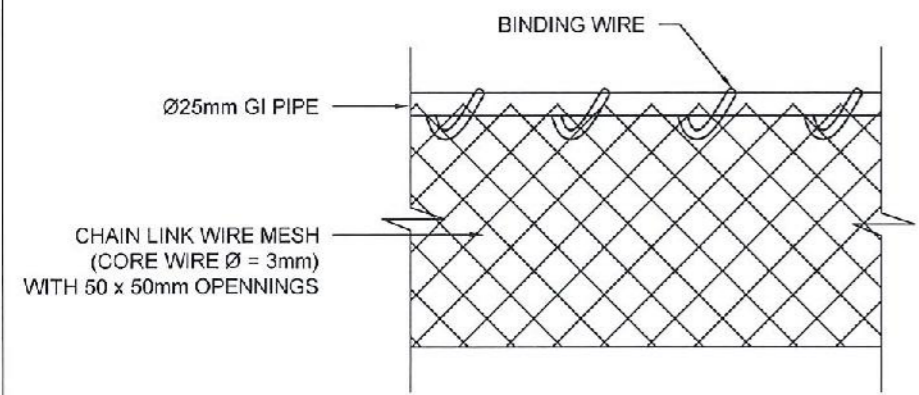


SECTION A - A

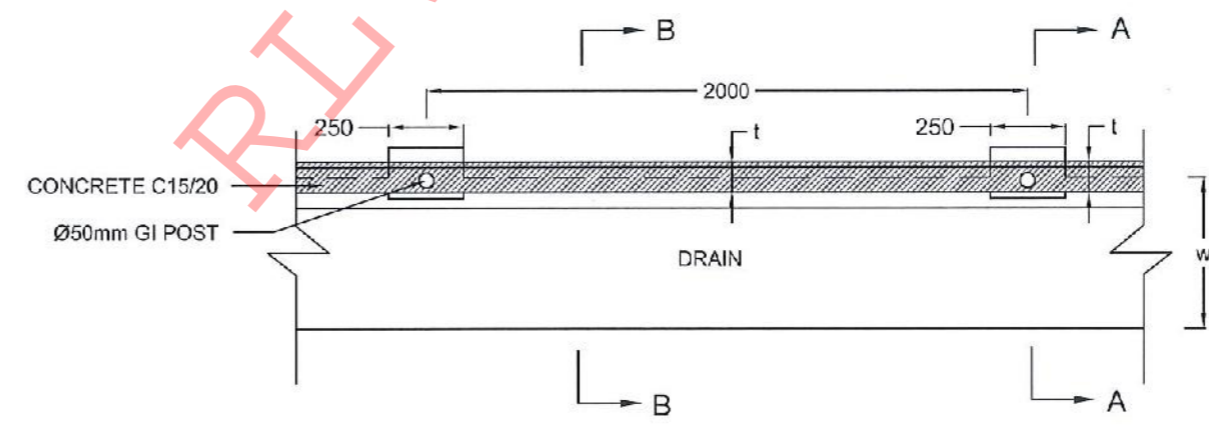


SECTION B - B

DETAIL OF FIXING FENCE




DETAIL A



PLAN VIEW OF CHAIN LINK FENCE

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS
2. GI POST SHOULD BE COVERED WITH GREEN COLOUR ANTI-CORROSIVE PAINT.
3. PRIOR APPROVAL IS REQUIRED FOR CHAIN LINK WIRE MESH, GI POST AND PVC CAP.

EMPLOYER  
  
 DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

DESIGNER  
  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 AREA BETWEEN ST LUKE'S COLLEGE,  
 BAPTIST CHURCH, ST LUKE'S CHURCH,  
 AND FERGUSON HIGH SCHOOL

TITLE	DESCRIPTION	NAME	SIGNATURE
DETAILS OF CHAIN LINK FENCE	DRAWN	S.A.G.D. SENANAYAKA	
	DESIGNED	C. T. MAMPITIYAARACHCHI	
	CHECKED	B.I. KUMARAGE	
	RECOMMENDED	PROF. S. A. S. KULATHILAKA	
	APPROVED	K.N. BANDARA	




SCALE	N.T.S	DATE	28.04.2022
PROJECT / DRAWING No.	RLVMP/WORKS/NCB/PHII/086-LU/DR-09	REVISION	00



REFERENCE







- P - PERMENT BUILDING
- CDN - CONCRETE DRAIN
- RDA - RDA BOUNDARY MARK
- WF - WIRE FENCE
- BT - BANK TOP
- BB - BOTTOM OF BANK
- BW - BOUNDARY WALL
- RW - RETAINING WALL
- EP - ELECTRIC POST
- WC - WATER CLOSET
- CUL - CULVERT
- G - GATE
- ST - SEPTIC TANK

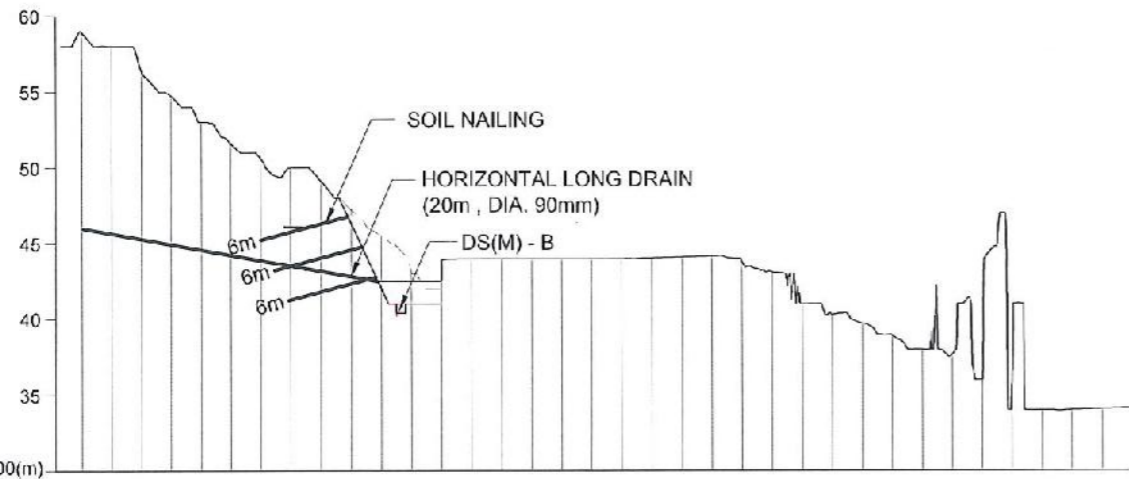
DESIGN NOTATION

-  - DS(M) - A
-  - DS(M) - B
-  - DS(M) - C
-  - DS(M) - C WITH COVER SLAB
-  - DS(C) - C
-  - DS(C) - D
-  - EXISTING DRAIN
-  - SOIL NAILING AREA
-  - CATCH PIT

NOTES

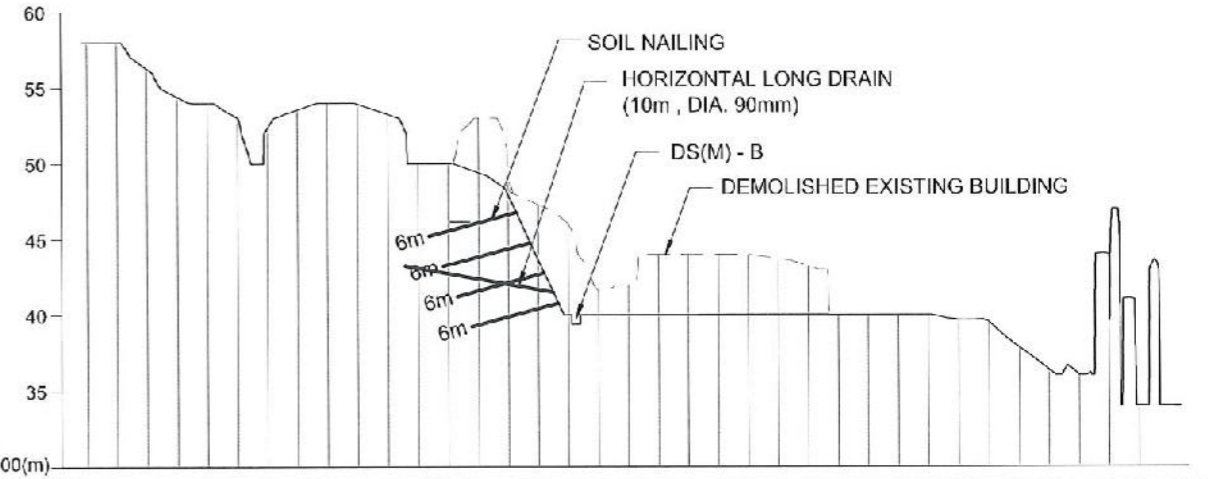
1. LOCATION AND NUMBER OF SOIL NAILS MIGHT BE VARIED ACCORDING TO THE ACTUAL SITE CONDITION.
2. SURFACE AND CASCADE DRAIN LOCATIONS (PATH) & LENGTHS MIGHT BE VARIED ACCORDING TO ACTUAL SITE CONDITION.
3. LOCATION OF THE CATCHPITS MIGHT BE VARIED ACCORDING TO THE ACTUAL SITE CONDITION.

EMPLOYER  DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT NATIONAL BUILDING RESEARCH ORGANISATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	DESIGNER  DESIGN UNIT NATIONAL BUILDING RESEARCH ORGANIZATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	REV	DATE	REVISION DESCRIPTION	APPROVAL	PROJECT TITLE REDUCTION OF LANDSLIDE VULNERABILITY BY MITIGATION MEASURES PRIMARY AND SECONDARY TAMIL SCHOOL RATHNAPURA	TITLE		DESCRIPTION	NAME	SIGNATURE
								DESIGN PLAN VIEW		DRAWN	S.A.C.D. SENANAYAKA
							SCALE 1:750	DATE 30.06.2022	DESIGNER	T. THILAKARATHNA	
							PROJECT / DRAWING No. RLVMMPWORKS/NCB/PHU/70-RT/DR-03	REVISION 00	CHECKED	B.I. KUMARAGE	
									RECOMMENDED	Prof. S.A.S. KULATHILAKA	
									APPROVED	K.N. BANDARA	



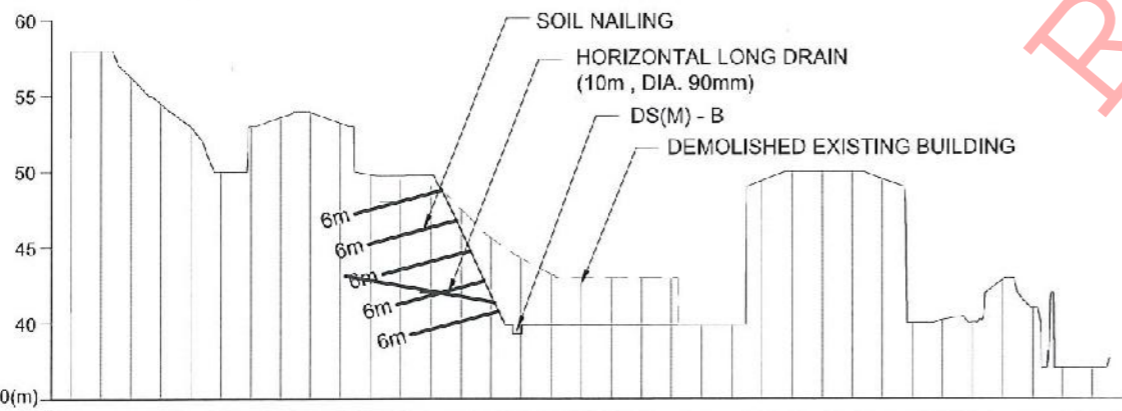
GROUND LEVEL (m)	DISTANCE (m)
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58.00	18.00
55.43	15.00
54.74	14.00
53.00	12.00
51.59	10.00
50.63	9.00
49.99	8.00
49.13	7.00
47.22	6.00
46.51	5.00
43.12	4.00
43.83	3.00
44.00	2.00
44.00	1.00
44.00	0.00
44.00	-1.00
44.00	-2.00
44.00	-3.00
44.00	-4.00
44.00	-5.00
44.00	-6.00
44.00	-7.00
44.00	-8.00
44.00	-9.00
44.00	-10.00
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44.00	-42.00
44.00	-43.00
44.00	-44.00
44.00	-45.00
44.00	-46.00
44.00	-47.00
44.00	-48.00

CS01



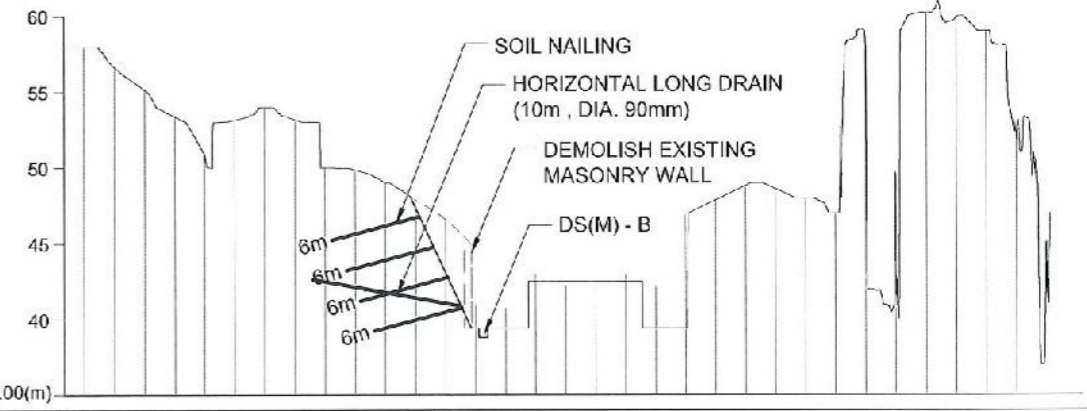
GROUND LEVEL (m)	DISTANCE (m)
58.00	30.00
56.29	28.00
54.42	26.00
54.00	24.00
53.04	22.00
52.34	20.00
53.54	18.00
54.00	16.00
53.83	14.00
53.28	12.00
50.00	10.00
50.00	8.00
53.00	6.00
48.91	4.00
47.80	2.00
46.01	0.00
41.60	-2.00
41.99	-4.00
44.00	-6.00
44.00	-8.00
44.00	-10.00
44.00	-12.00
43.73	-14.00
43.24	-16.00
40.00	-18.00
40.00	-20.00
40.00	-22.00
40.00	-24.00
39.67	-26.00
39.54	-28.00
37.86	-30.00
36.37	-32.00
36.08	-34.00
43.98	-36.00
34.00	-38.00
33.96	-40.00
	-42.00

CS02



GROUND LEVEL (m)	DISTANCE (m)
58.00	28.00
56.25	26.00
54.49	24.00
53.00	22.00
50.00	20.00
53.01	18.00
53.59	16.00
53.94	14.00
53.21	12.00
49.82	10.00
49.46	8.00
49.10	6.00
47.54	4.00
45.63	2.00
44.31	0.00
43.24	-2.00
43.00	-4.00
43.01	-6.00
43.01	-8.00
43.00	-10.00
43.00	-12.00
43.26	-14.00
49.40	-16.00
50.00	-18.00
50.00	-20.00
50.00	-22.00
49.53	-24.00
40.00	-26.00
40.21	-28.00
40.02	-30.00
42.85	-32.00
41.00	-34.00
37.00	-36.00
37.00	-38.00
37.00	-40.00
37.00	-42.00

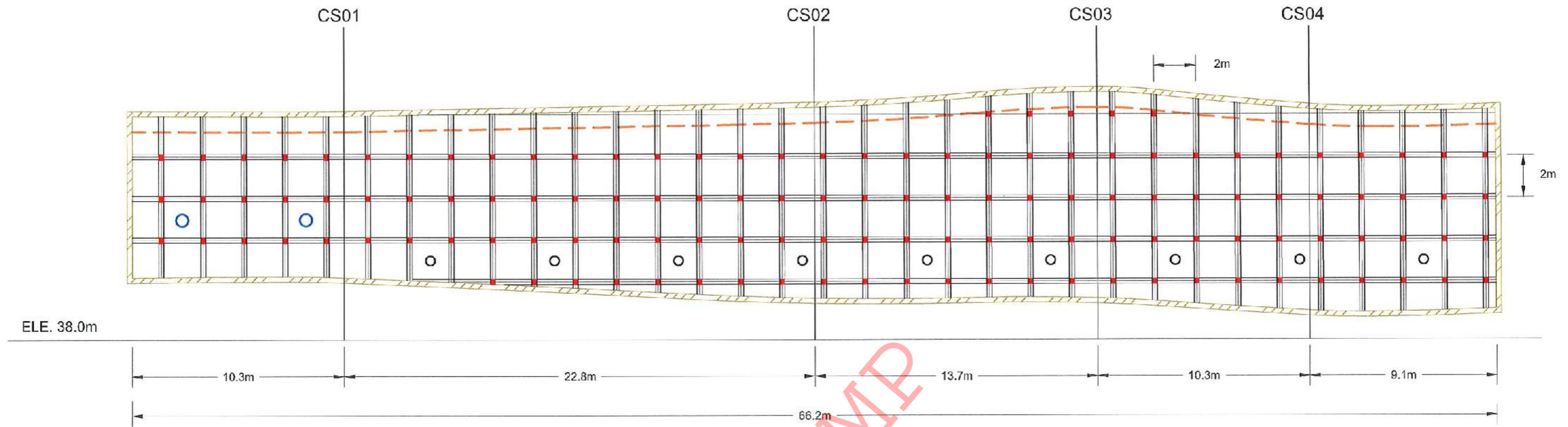
CS03



GROUND LEVEL (m)	DISTANCE (m)
56.00	26.00
56.66	24.00
55.15	22.00
53.39	20.00
50.99	18.00
53.16	16.00
54.00	14.00
53.19	12.00
50.00	10.00
49.87	8.00
49.00	6.00
47.89	4.00
45.88	2.00
41.00	0.00
40.80	-2.00
43.00	-4.00
42.27	-6.00
42.09	-8.00
43.00	-10.00
42.15	-12.00
45.90	-14.00
47.86	-16.00
48.82	-18.00
48.51	-20.00
47.99	-22.00
47.00	-24.00
58.13	-26.00
47.74	-28.00
60.19	-30.00
59.88	-32.00
59.00	-34.00
52.23	-36.00
41.87	-38.00

CS04

<p>DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT NATIONAL BUILDING RESEARCH ORGANISATION No. 99/1, JAWATTA ROAD, COLOMBO - 05</p>	<p>DESIGN UNIT NATIONAL BUILDING RESEARCH ORGANIZATION No. 99/1, JAWATTA ROAD, COLOMBO - 05</p>	REV	DATE	REVISION DESCRIPTION	APPROVAL	<p>REDUCTION OF LANDSLIDE VULNERABILITY BY MITIGATION MEASURES PRIMARY AND SECONDARY TAMIL SCHOOL RATHNAPURA</p>	<p>TITLE DESIGN CROSS SECTION</p>	<p>DESCRIPTION DRAWN DESIGNER CHECKED RECOMMENDED APPROVED</p>	<p>NAME S.A.G.D. SENANAYAKA T. THILAKARATHNA B.I. KUMARAGE Prof. S.A.S. KULATHILAKA K.N. BANDARA</p>	<p>SIGNATURE</p>	
											SCALE 1:500
						PROJECT / DRAWING No. RLVMP/WORKS/INCB/PI III/70-RT/DR-04	REVISION 00				




FRONT ELEVATION

LEGEND

- SOIL NAILING - TOTAL SOIL NAIL LENGTH = 6 m  
 NO OF SOIL NAIL = 124  
 REINFORCEMENT DIAMETER = 32 mm  
 DIAMETER OF DRILLED HOLE = 125 mm  
 NAIL SPACING = 2m (BW)
- HORIZONTAL LONG DRAIN - HORIZONTAL LONG DRAIN LENGTH = 10 m  
 NO'S OF LONG DRAIN = 02  
 DIAMETER = 90 mm  
 SPACING = 06 m
- HORIZONTAL LONG DRAIN - HORIZONTAL LONG DRAIN LENGTH = 20 m  
 NO'S OF LONG DRAIN = 09  
 DIAMETER = 90 mm  
 SPACING = 06 m
- BOUNDARY BEAM
- - - EXCAVATION BANK TOP

NOTES

1. LOCATION AND ANGLE OF THE HORIZONTAL LONG DRAINS MIGHT BE VARIED ACCORDING TO THE ACTUAL SITE CONDITION.
2. LOCATION AND NUMBER OF SOIL NAILS MIGHT BE VARIED ACCORDING TO THE ACTUAL SITE CONDITION.





EMPLOYER  
  
 DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

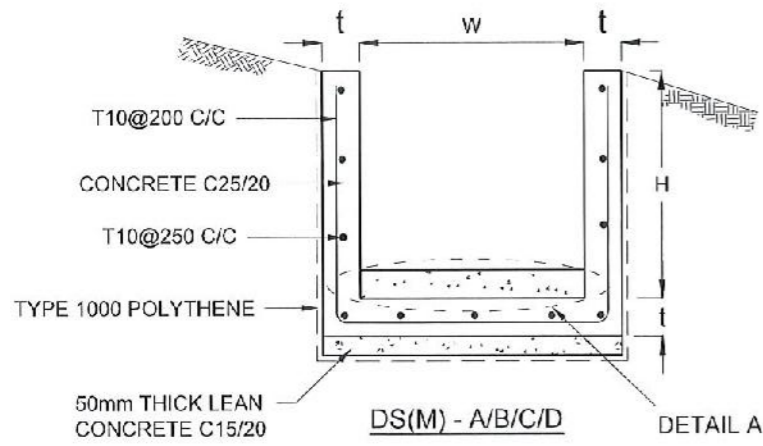
DESIGNER  
  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 PRIMARY AND SECONDARY TAMIL SCHOOL  
 RATHNAPURA

TIT F  
 FRONT ELEVATION  
 SCALE 1:500  
 DATE 30.06.2022  
 PROJECT / DRAWING No. RLV/MMP/WORKS/NCB/PHI/70-RT/DR-05  
 REVISION 00

DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	
DESIGNER	T. THILAKARATHNA	
CHECKED	B.I. KUMARAGE	
RECOMMENDED	Prof. S.A.S. KULATHILAKA	
APPROVED	K.N. BANDARA	



DRAIN TYPE	W (mm)	H (mm)	t (mm)
DS (M) - A /P	300	300	100
DS (M) - B/R	450	450	100
DS (M) - C/Q	600	600	100
DS (M) - D	750	750	125
DS (M) - E	900	900	150
DS (M) - F	1000	1000	150

**NOTES**

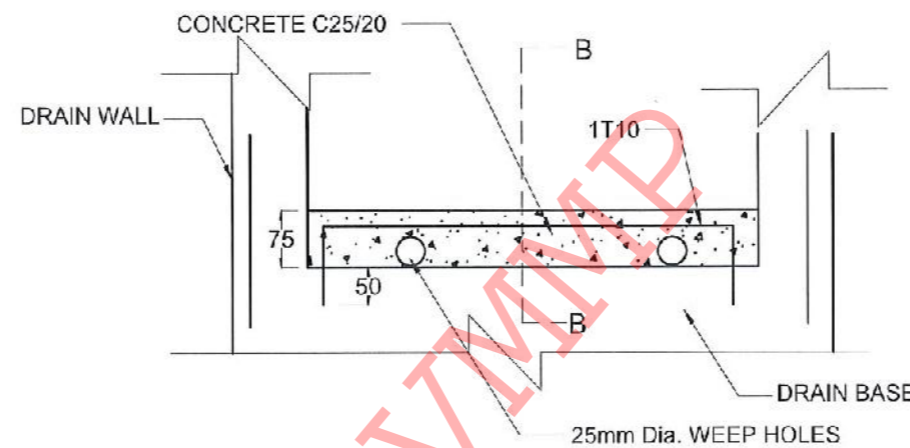
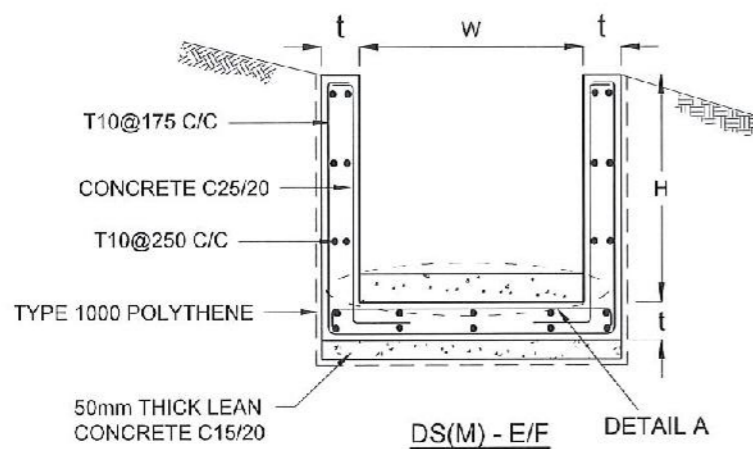
- DEPTH OF EXCAVATION MAY VARY ACCORDING TO SITE CONDITIONS.
- STEPS SHALL BE CONSTRUCTED AT SURFACE DRAIN ON SLOPING GROUND ACCORDING TO THE SITE CONDITIONS AS INSTRUCTED BY THE ENGINEER.
- ENERGY BREAKERS SHALL BE CONSTRUCTED AT THE STEEP DRAIN SEGMENTS AS PER THE INSTRUCTIONS OF THE ENGINEER.
- DOWELS SHALL BE INSTALLED ACCORDING TO THE GROUND CONDITIONS AS INSTRUCTED BY THE ENGINEER.
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED.
- 10 mm THICK EXPANSION JOINT SHALL BE INTRODUCED IN EVERY 5m INTERVAL.

**CONCRETE**

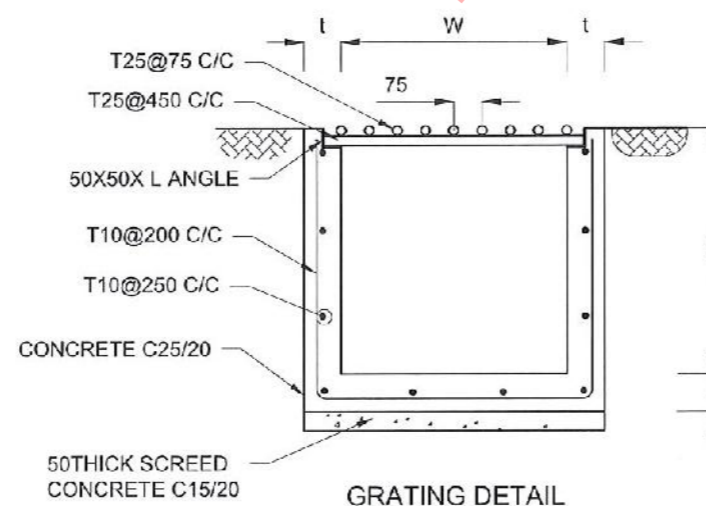
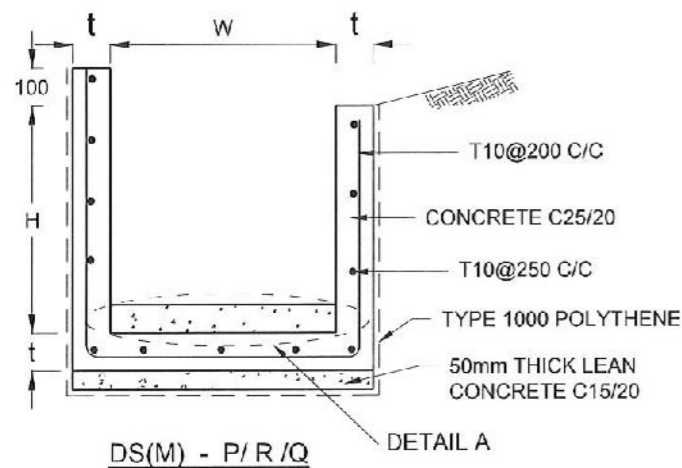
- USE FOLLOWING CONCRETE GRADES FOR STRUCTURE
  - [a] SCREED - C. 15/20
  - [b] WALLS / BASE / ENERGY BREAKERS - C. 25/20

**REINFORCEMENT**

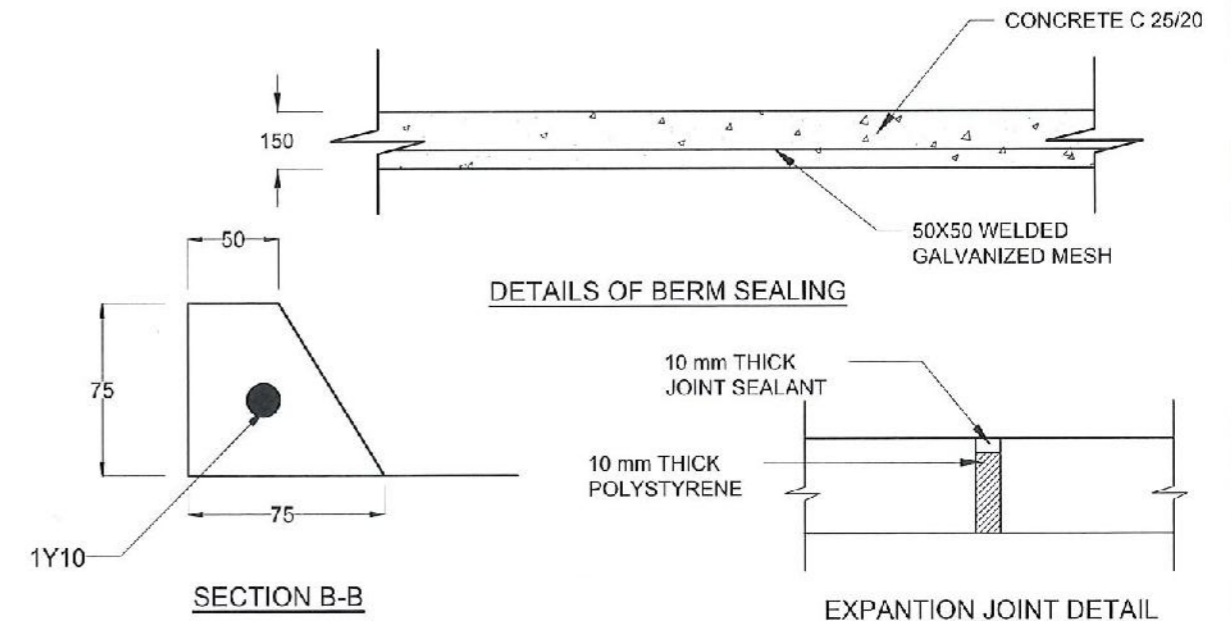
- ALL BARS MARKED "T" SHALL BE HIGH YIELD DEFORMED BARS OF YIELD STRENGTH NOT LESS THAN 460N/mm<sup>2</sup>.
- BARS OF CUT LENGTH LARGER THAN THE SUPPLIED LENGTH TO BE LAPPED FOR A LENGTH OF 50 x BAR DIA. AND LAPPING SHOULD BE STAGGERED.
- ANCHORAGE LENGTH SHOULD BE 40X BAR DIA.
- REINFORCEMENT BARS SHALL BE BENT IN ACCORDANCE WITH STANDARD SPECIFICATIONS.
- COVER TO REINFORCEMENT
  - [a] BURIED FACES AND DRAIN INVERTS - 40 mm
  - [b] ALL OTHER FACES - 25 mm



**DETAIL A - (ENERGY BREAKER AT 3M)**



**GRATING DETAIL**



**SECTION B-B**

**EXPANSION JOINT DETAIL**

**EMPLOYER**  
 DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

**DESIGNER**  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

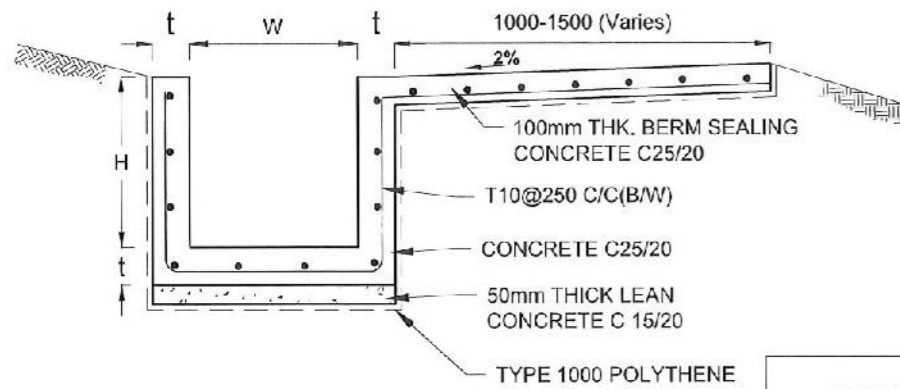
REV	DATE	REVISION DESCRIPTION	APPROVAL

**PROJECT TITLE**  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 PRIMARY AND SECONDARY TAMIL SCHOOL  
 RATHNAPURA

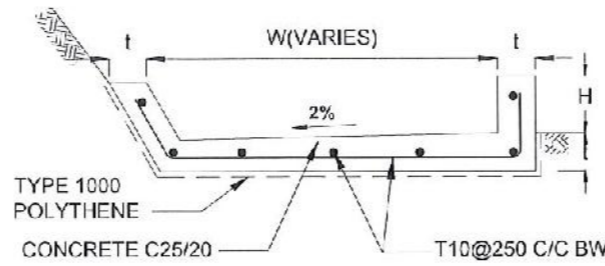
**TITLE**  
 DETAILS OF DRAINS  
 (SURFACE DRAIN -1 OF 2)

SCALE	N.T.S	DATE	30.06.2022
PROJECT / DRAWING No.	RLV/MMP/WORKS/NCB/PH/11/70-RT/DR.06a	REVISION	00

DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	<i>[Signature]</i>
DESIGNER	T. THILAKARATHNA	<i>[Signature]</i>
CHECKED	B.I. KUMARAGE	<i>[Signature]</i>
RECOMMENDED	Prof. S.A.S. KULATHILAKA	<i>[Signature]</i>
APPROVED	K.N. BANDARA	<i>[Signature]</i>



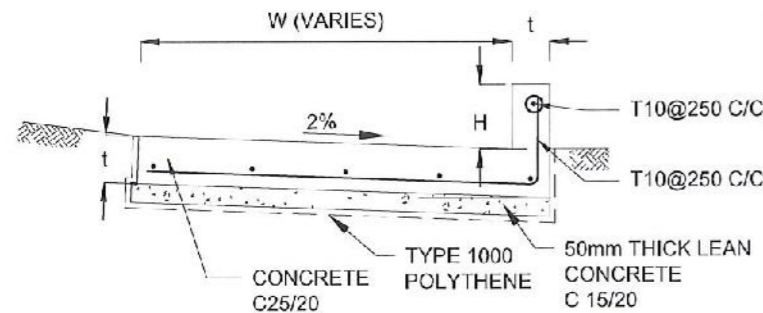
DS (B) - (TYPE I)



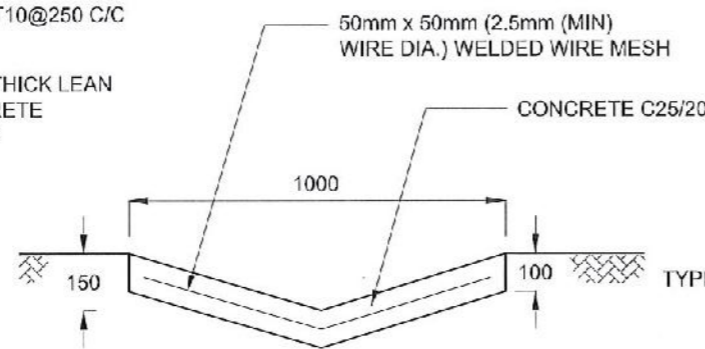
DS (B) - (TYPE II)

DRAIN TYPE	W (mm)	H (mm)	t (mm)
DS (K) - A	1000	200	100
DS (K) - B	1000	300	100
DS (K) - C	1150	200	200

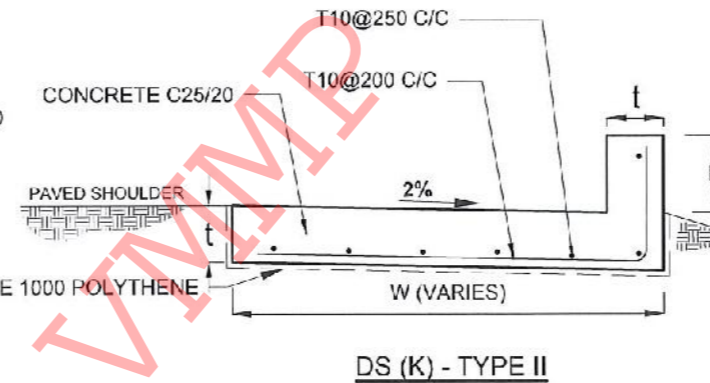
DRAIN TYPE	W (mm)	H (mm)	t (mm)
DS (B) - A	300	300	100
DS (B) - B	450	450	100
DS (B) - C	1000	150	100
DS (B) - D	1500	150	100
DS (B) - E	2000	150	100



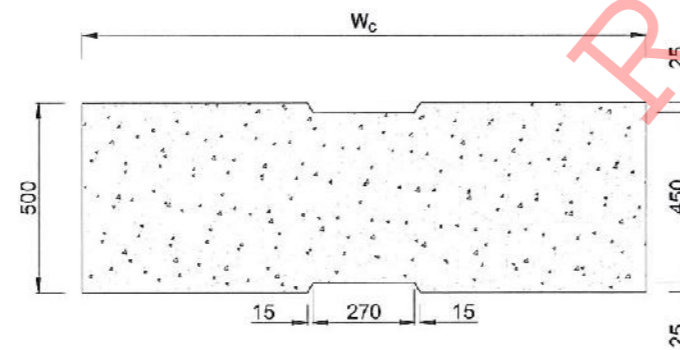
DS (K) - TYPE I



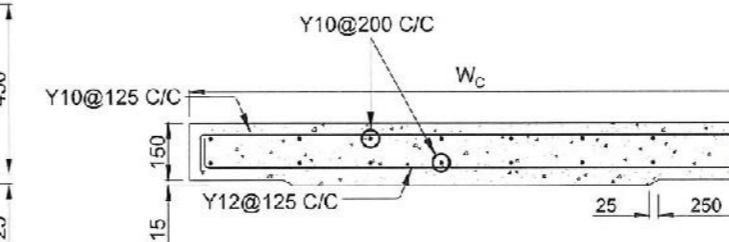
DS (D) - A (DISH DRAIN)



DS (K) - TYPE II



PLAN VIEW OF COVER SLAB



ACCESS & HEAVY DUTY COVER SLAB  
SECTION OF (W<sub>c</sub> x 500 x 150mm)

DS(M) - L	W (mm)	H' (mm)	t (mm)
TYPE I	600	600	150
TYPE II	800	800	150

NOTES

- DEPTH OF EXCAVATION MAY VARY ACCORDING TO SITE CONDITIONS.
- STEPS SHALL BE CONSTRUCTED AT SURFACE DRAIN ON SLOPING GROUND ACCORDING TO THE SITE CONDITIONS AS INSTRUCTED BY THE ENGINEER.
- ENERGY BREAKERS SHALL BE CONSTRUCTED AT THE STEEP DRAIN SEGMENTS AS PER THE INSTRUCTIONS OF THE ENGINEER.
- DOWELS SHALL BE INSTALLED ACCORDING TO THE GROUND CONDITIONS AS INSTRUCTED BY THE ENGINEER.
- COVER SLABS NEED TO BE PROVIDED ONLY FOR THE REGIONS AS INSTRUCTED BY THE ENGINEER.
- COVER SLAB WIDTH (W<sub>c</sub>) SHOULD BE TAKEN AS THE SUM OF DRAIN WIDTH AND 2x DRAIN WALL THICKNESS. [W<sub>c</sub> = W+2xt]
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED.
- 10 mm THICK EXPANSION JOINT SHALL BE INTRODUCED IN EVERY 5m INTERVAL.

CONCRETE

- USE FOLLOWING CONCRETE GRADES FOR STRUCTURE
  - [a] SCREED - C. 15/20
  - [b] WALLS / BASE / ENERGY BREAKERS - C. 25/20

REINFORCEMENT

- ALL BARS MARKED "T" SHALL BE HIGH YIELD DEFORMED BARS OF YIELD STRENGTH NOT LESS THAN 460N/mm<sup>2</sup>.
- BARS OF CUT LENGTH LARGER THAN THE SUPPLIED LENGTH TO BE LAPPED FOR A LENGTH OF 50 x BAR DIA. AND LAPPING SHOULD BE STAGGERED.
- ANCHORAGE LENGTH SHOULD BE 40X BAR DIA.
- REINFORCEMENT BARS SHALL BE BENT IN ACCORDANCE WITH STANDARD SPECIFICATIONS.
- COVER TO REINFORCEMENT
  - [a] BURIED FACES AND DRAIN INVERTS - 40 mm
  - [b] ALL OTHER FACES - 25 mm

EMPLOYER  
 DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

DESIGNER  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

REV	DATE	REVISION DESCRIPTION	APPROVAL

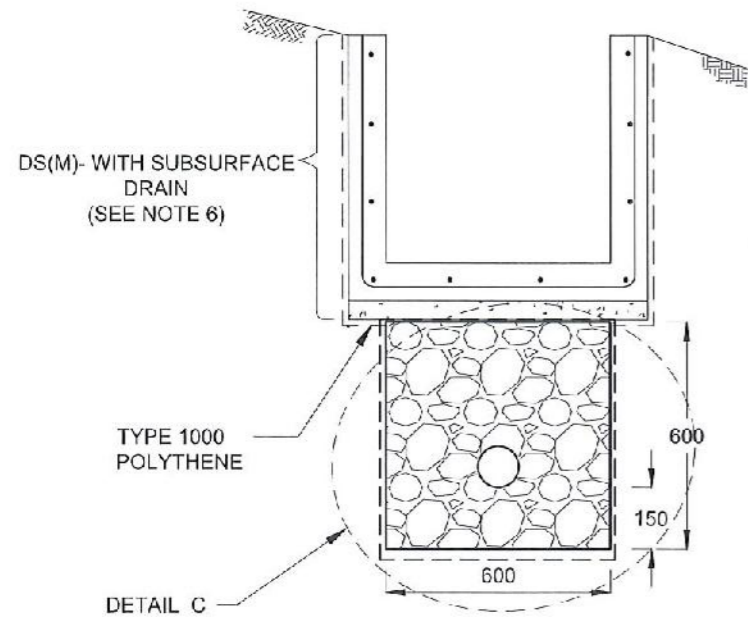
PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 PRIMARY AND SECONDARY TAMIL SCHOOL  
 RATHNAPURA

TITLE  
 DETAILS OF DRAINS  
 (SURFACE DRAIN - 2 OF 2)

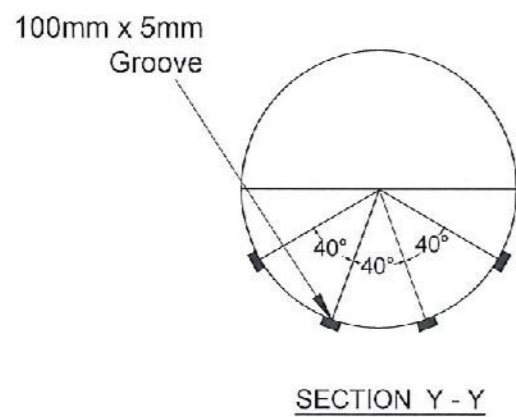
SCALE N.T.S. DATE  
 PROJECT / DRAWING No. RLV/MMP/WORKS/NCE/PHI/70-RT/DR-06b REVISION 00

DESCRIPTION	NAME	SIGNATURE
DRAWN	S A G.D. SENANAYAKA	<i>[Signature]</i>
DESIGNER	T. THILAKARATHNA	<i>[Signature]</i>
CHECKED	B.I. KUMARAGE	<i>[Signature]</i>
RECOMMENDED	Prof. S.A.S. KULATHILAKA	<i>[Signature]</i>
APPROVED	K N. BANDARA	<i>[Signature]</i>

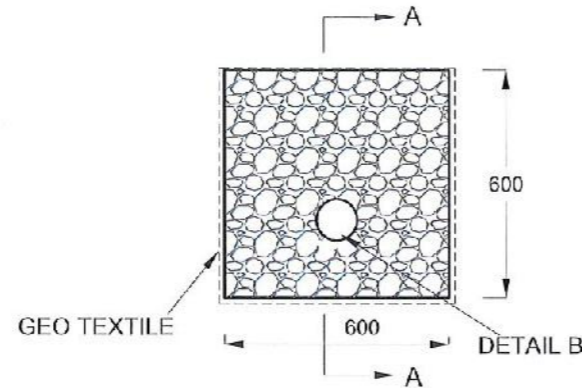




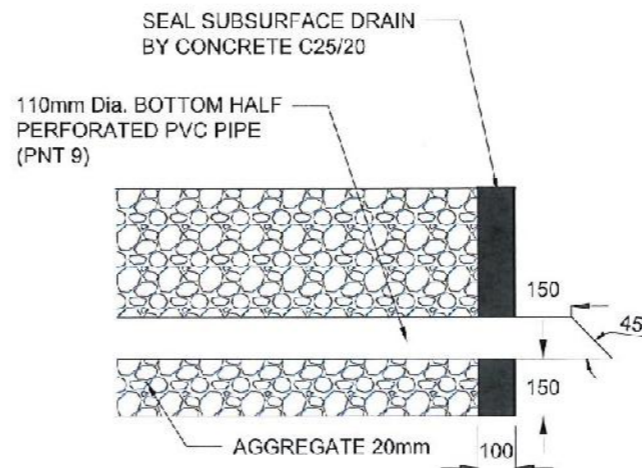
**SUBSURFACE DRAIN  
[DS (S) -A]**



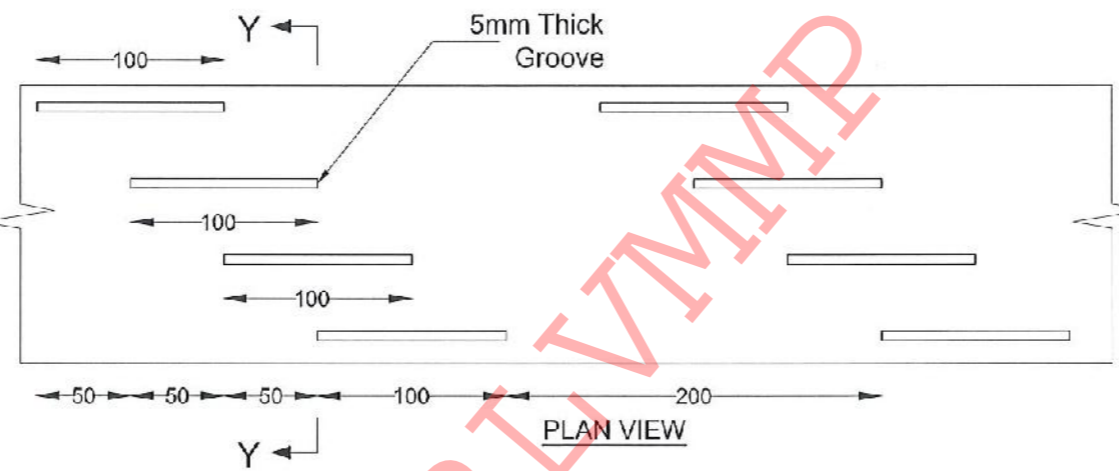
**SECTION Y - Y**



**DETAIL C / DS (S) -A**

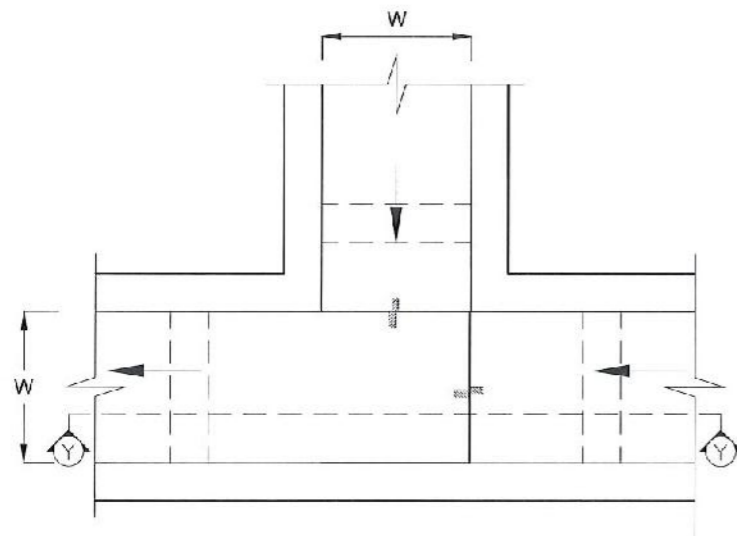


**SECTION A-A  
(OUTLET DETAIL SUBSURFACE DRAIN)**

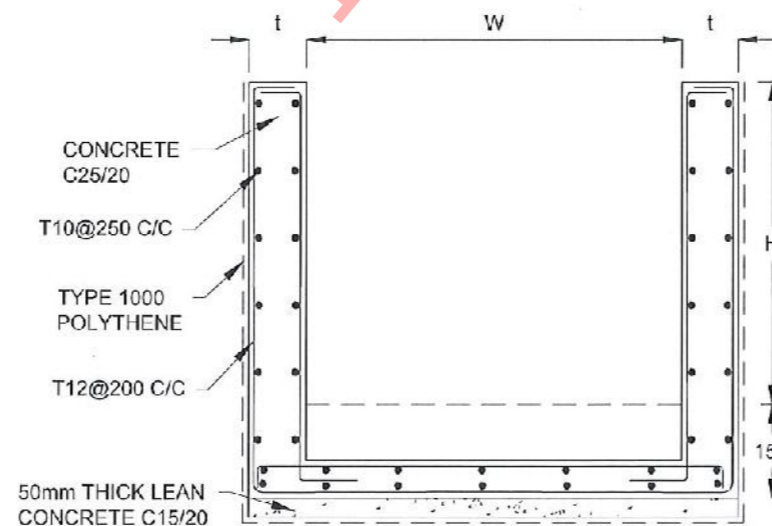


**PLAN VIEW**

**DETAIL - B (PERFORATED PIPE FOR SUB-SURFACE DRAINS)**



**PLAN VIEW OF CATCH PIT (CP)**



**SECTION Y-Y (CP - R)**

**NOTES**

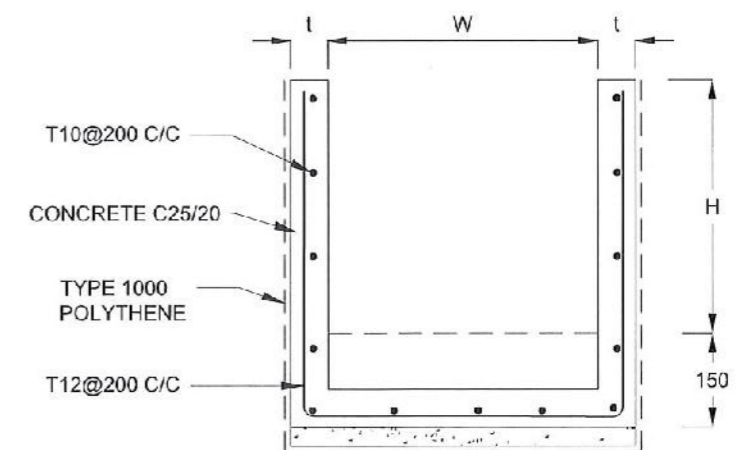
1. W,H,t ; SHALL BE THE SAME AS RESPECTIVE DRAIN SECTION.
2. CP - R SHALL BE USED WHERE H > = 900mm
3. DEPTH OF EXCAVATION MAY VARY ACCORDING TO SITE CONDITIONS.
4. DOWELS SHALL BE INSTALLED ACCORDING TO THE GROUND CONDITIONS AS INSTRUCTED BY THE ENGINEER.
5. 10 mm THICK EXPANSION JOINT SHALL BE INTRODUCED IN EVERY 5m INTERVAL.
6. DETAILS OF SURFACE DRAIN PORTION OF THE SUBSURFACE DRAINS SHALL BE AS PER DS(M), DS(B), DS(K) OR DS(C) SECTIONS ACCORDINGLY.
7. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED.

**CONCRETE**


8. USE FOLLOWING CONCRETE GRADES FOR STRUCTURE
  - [a] SCREED - C. 15/20
  - [b] WALLS / BASE / ENERGY BREAKERS - C. 25/20

**REINFORCEMENT**

9. ALL BARS MARKED "T" SHALL BE HIGH YIELD DEFORMED BARS OF YIELD STRENGTH NOT LESS THAN 460N/mm<sup>2</sup>.
10. BARS OF CUT LENGTH LARGER THAN THE SUPPLIED LENGTH TO BE LAPPED FOR A LENGTH OF 50 x BAR DIA. AND LAPPING SHOULD BE STAGGERED.
11. ANCHORAGE LENGTH SHOULD BE 40X BAR DIA.
12. REINFORCEMENT BARS SHALL BE BENT IN ACCORDANCE WITH STANDARD SPECIFICATIONS.
13. COVER TO REINFORCEMENT
  - [a] BURIED FACES AND DRAIN INVERTS - 40 mm
  - [b] ALL OTHER FACES - 25 mm



**SECTION Y - Y**

EMPLOYER  
  
 DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

DESIGNER  
  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

REV	DATE	REVISION DESCRIPTION	APPROVAL

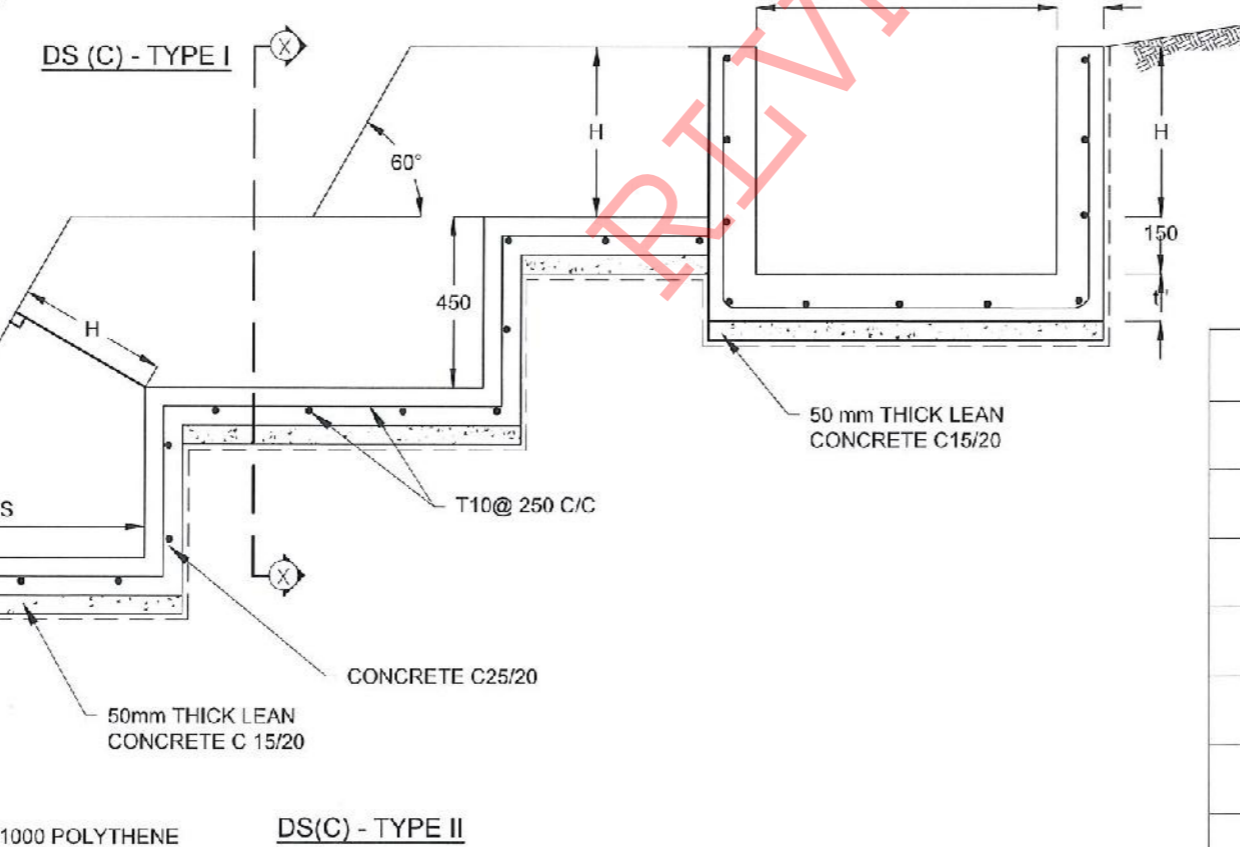
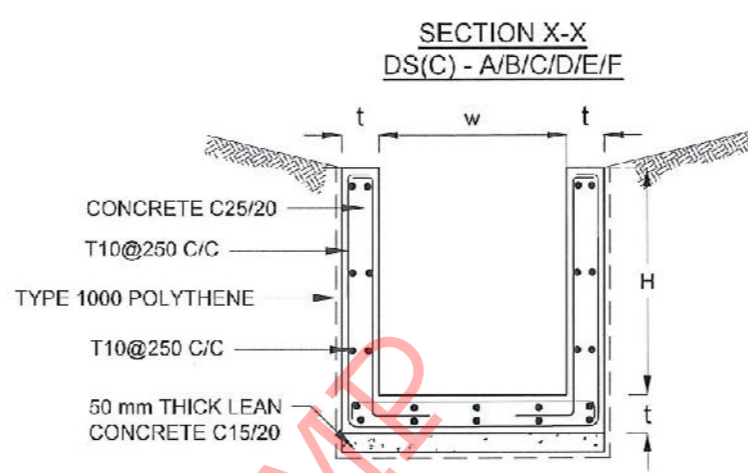
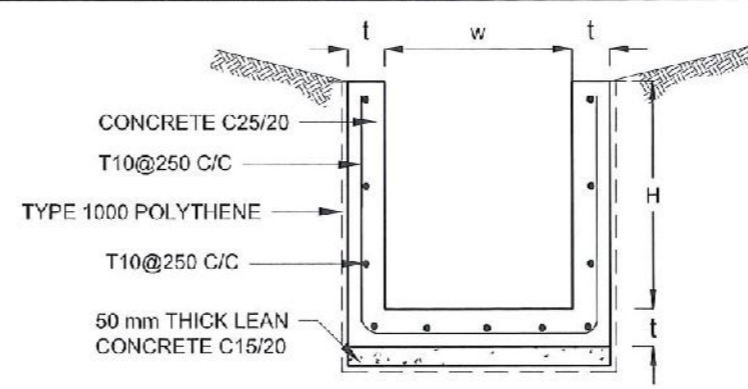
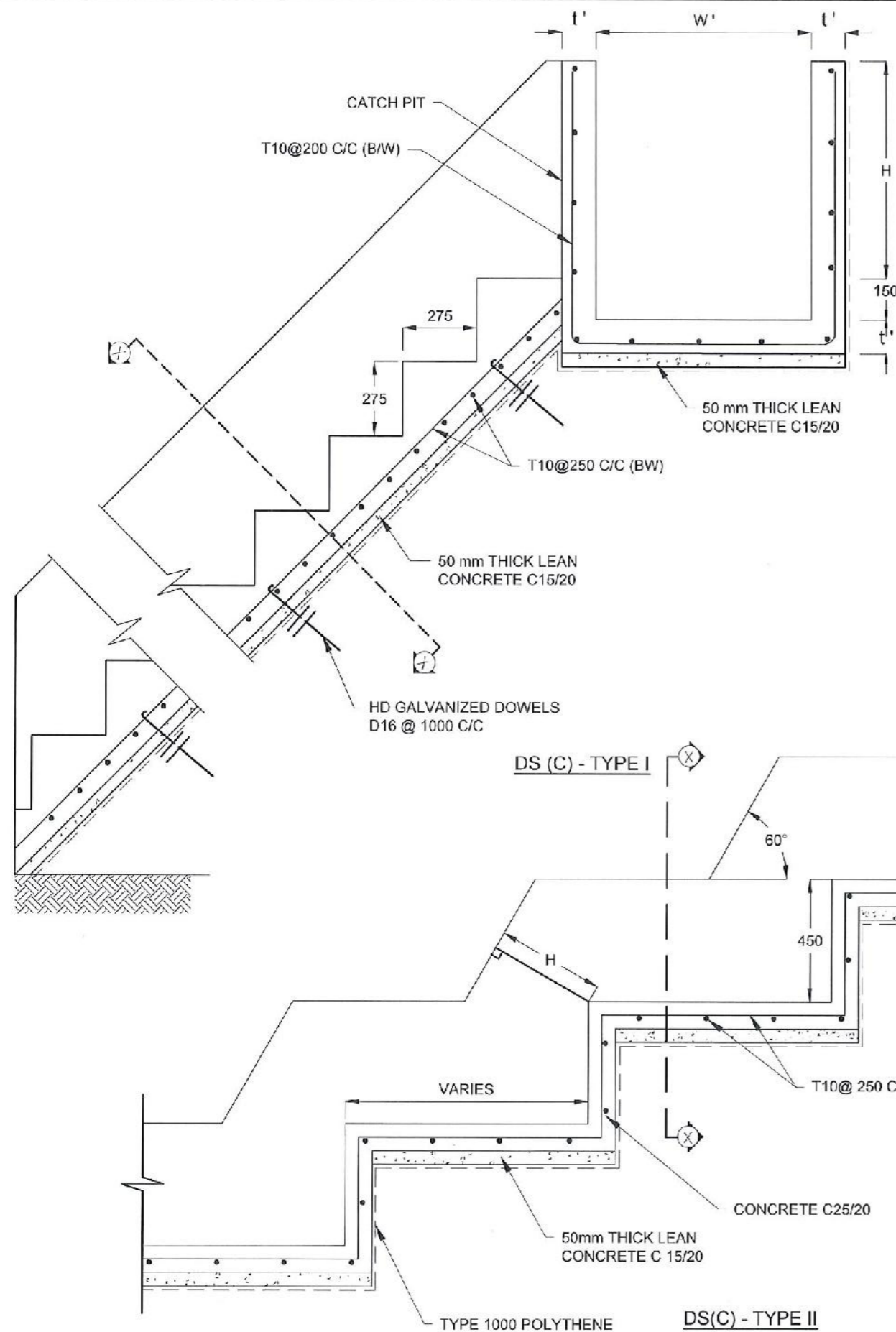
PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 PRIMARY AND SECONDARY TAMIL SCHOOL  
 RATHNAPURA

TITLE  
 DETAILS OF DRAINS  
 (SURFACE DRAIN - 2 OF 2)

SCALE: N.T.S.      DATE:      REVISION: 00

PROJECT / DRAWING No. RLVNMP/WORKS/NCB/PH11/70-RT/DR-06c

DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	
DESIGNER	T. THILAKARATHNA	
CHECKED	B.I. KUMARAGE	
RECOMMENDED	Prof. S.A.S. KUIATHILAKA	
APPROVED	K.N. BANDARA	



**NOTES**

1. USE EITHER TYPE I OR TYPE II CASCADE DRAIN ACCORDING TO THE ACTUAL GROUND CONDITION AS INSTRUCTED BY THE ENGINEER.
2. LENGTH OF THE STEPS OF CASCADE WILL BE VARIED ACCORDING TO THE SITE CONDITIONS.
3. DEPTH OF EXCAVATION SHALL BE VARIED ACCORDING TO SITE CONDITIONS.
4. DOWELS SHALL BE INSTALLED ACCORDING TO THE GROUND CONDITIONS AS INSTRUCTED BY THE ENGINEER.
5. 10 mm THICK EXPANSION JOINT SHALL BE INTRODUCED IN EVERY 5m INTERVAL.
6. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED.

**CONCRETE**

7. USE FOLLOWING CONCRETE GRADES FOR STRUCTURE
  - [a] SCREED - C. 15/20
  - [b] WALLS / BASE / ENERGY BREAKERS - C. 25/20

**REINFORCEMENT**

8. ALL BARS MARKED "T" SHALL BE HIGH YIELD DEFORMED BARS OF YIELD STRENGTH NOT LESS THAN 460N/mm<sup>2</sup>.
9. BARS OF CUT LENGTH LARGER THAN THE SUPPLIED LENGTH TO BE LAPPED FOR A LENGTH OF 50 x BAR DIA. AND LAPPING SHOULD BE STAGGERED.
10. ANCHORAGE LENGTH SHOULD BE 40X BAR DIA.
11. REINFORCEMENT BARS SHALL BE BENT IN ACCORDANCE WITH STANDARD SPECIFICATIONS.
12. COVER TO REINFORCEMENT
  - [a] BURIED FACES AND DRAIN INVERTS - 40 mm
  - [b] ALL OTHER FACES - 25 mm

DRAIN TYPE	W (mm)	H (mm)	t (mm)	W' (mm)	t' (mm)
DS (C) - A	450	450	100	600	100
DS (C) - B	450	600	100	750	100
DS (C) - C	600	600	100	800	100
DS (C) - D	750	750	100	800	100
DS (C) - E	800	800	125	1000	125
DS (C) - F	1000	750	125	1200	125
DS (C) - G	1200	1000	125	1300	125

EMPLOYER  
 DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

DESIGNER  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

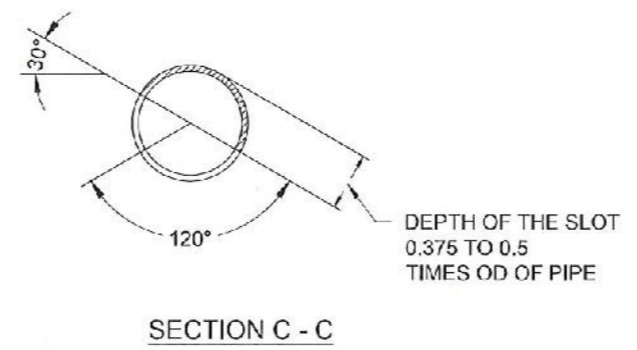
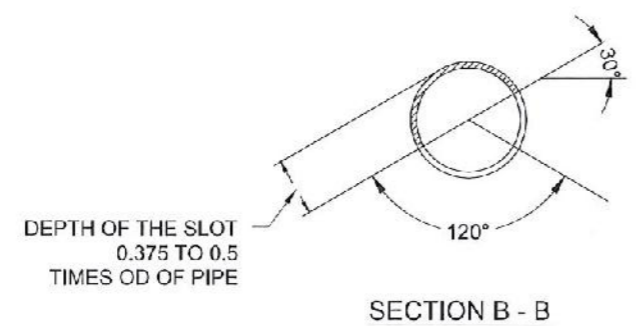
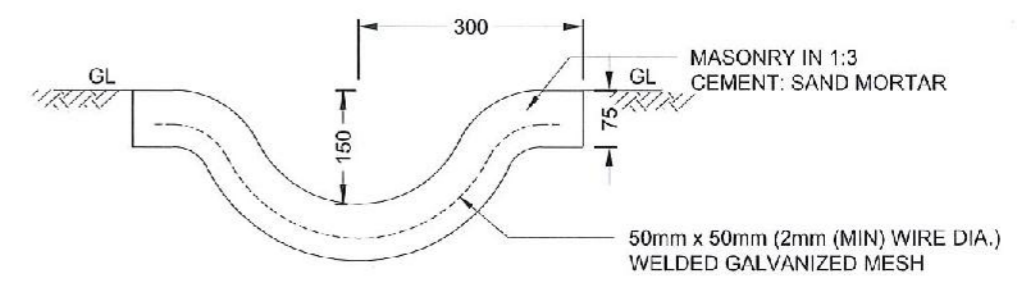
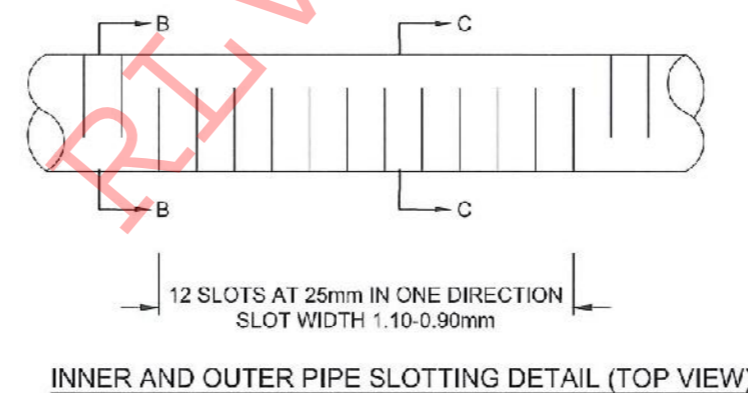
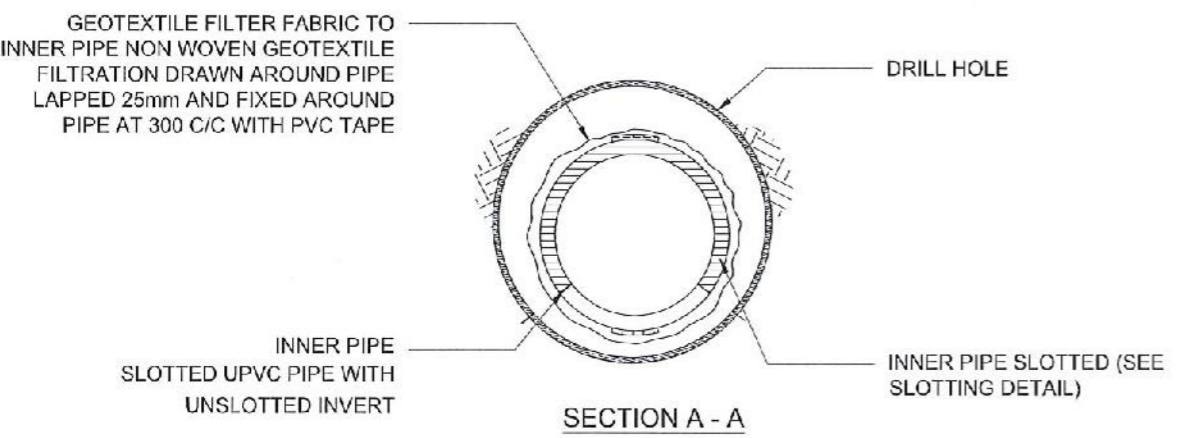
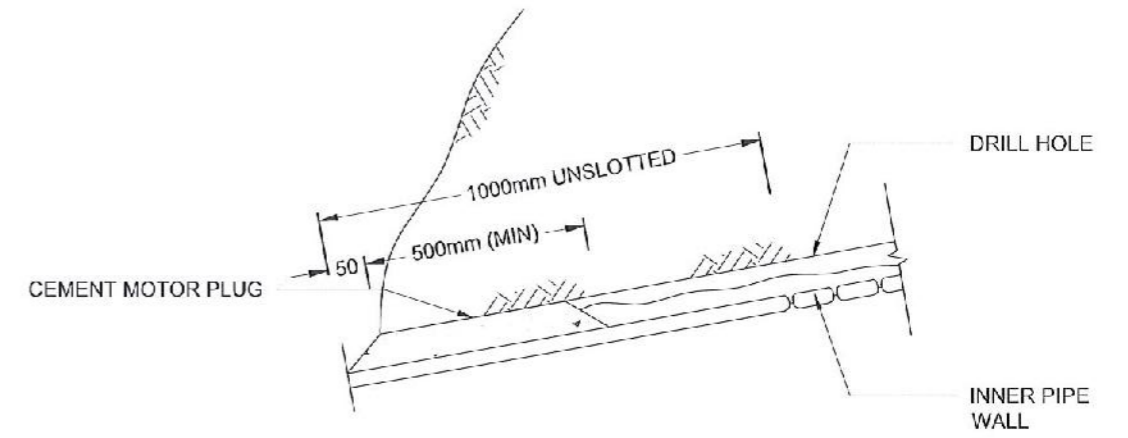
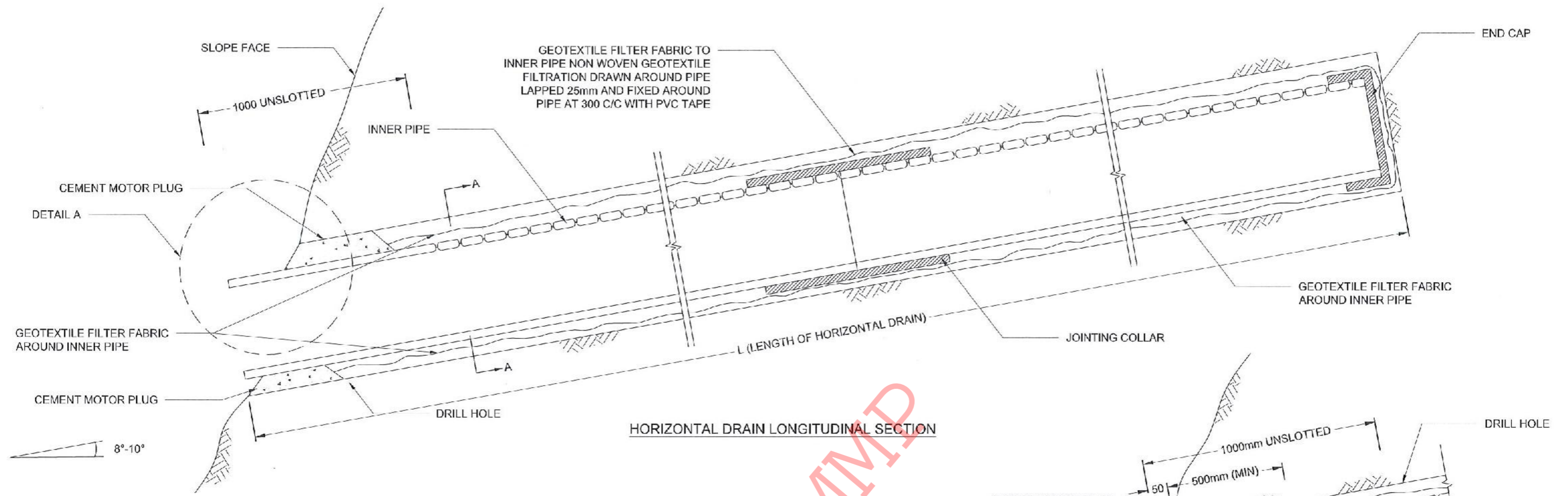
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 PRIMARY AND SECONDARY TAMIL SCHOOL  
 RATHNAPURA


TITLE  
 DETAILS OF DRAINS  
 (CASCADE DRAIN)

SCALE N.T.S. DATE  
 PROJECT / DRAWING No. RLVMM/WORKS/NCB/PHI/70-RT/DR-06d REVISION 00

DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	<i>[Signature]</i>
DESIGNER	T. THILAKARATHNA	<i>[Signature]</i>
CHECKED	B.I. KUMARAGE	<i>[Signature]</i>
RECOMMENDED	Prof. S.A.S. KULATHILAKA	<i>[Signature]</i>
APPROVED	K.N. BANDARA	<i>[Signature]</i>



- NOTES**
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
  2. PIPE DIAMETERS, ANGLE & LENGTHS AS SPECIFIED IN DRAWINGS.
  3. ALL MATERIALS SHALL CONFORM TO PROJECT SPECIFICATION

EMPLOYER  
  
 DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 06

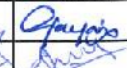

DESIGNER  
  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

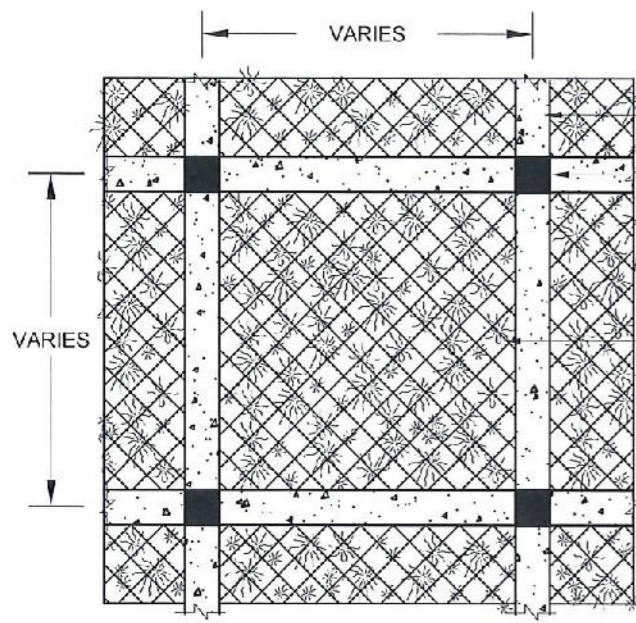
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 PRIMARY AND SECONDARY TAMIL SCHOOL  
 RATHNAPURA

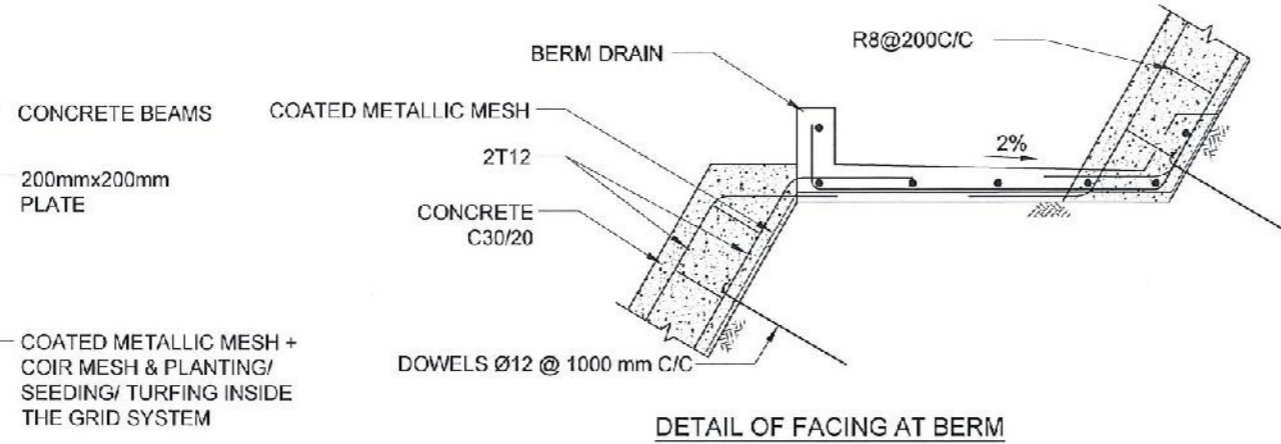
TITLE  
 DETAILS OF HORIZONTAL DRAIN  
 SECTIONS

SCALE	N.T.S	DATE	30.08.2022
PROJECT / DRAWING No.	RLVMP/WORKS/NCB/PH/170-RT/DR-07	REVISION	03

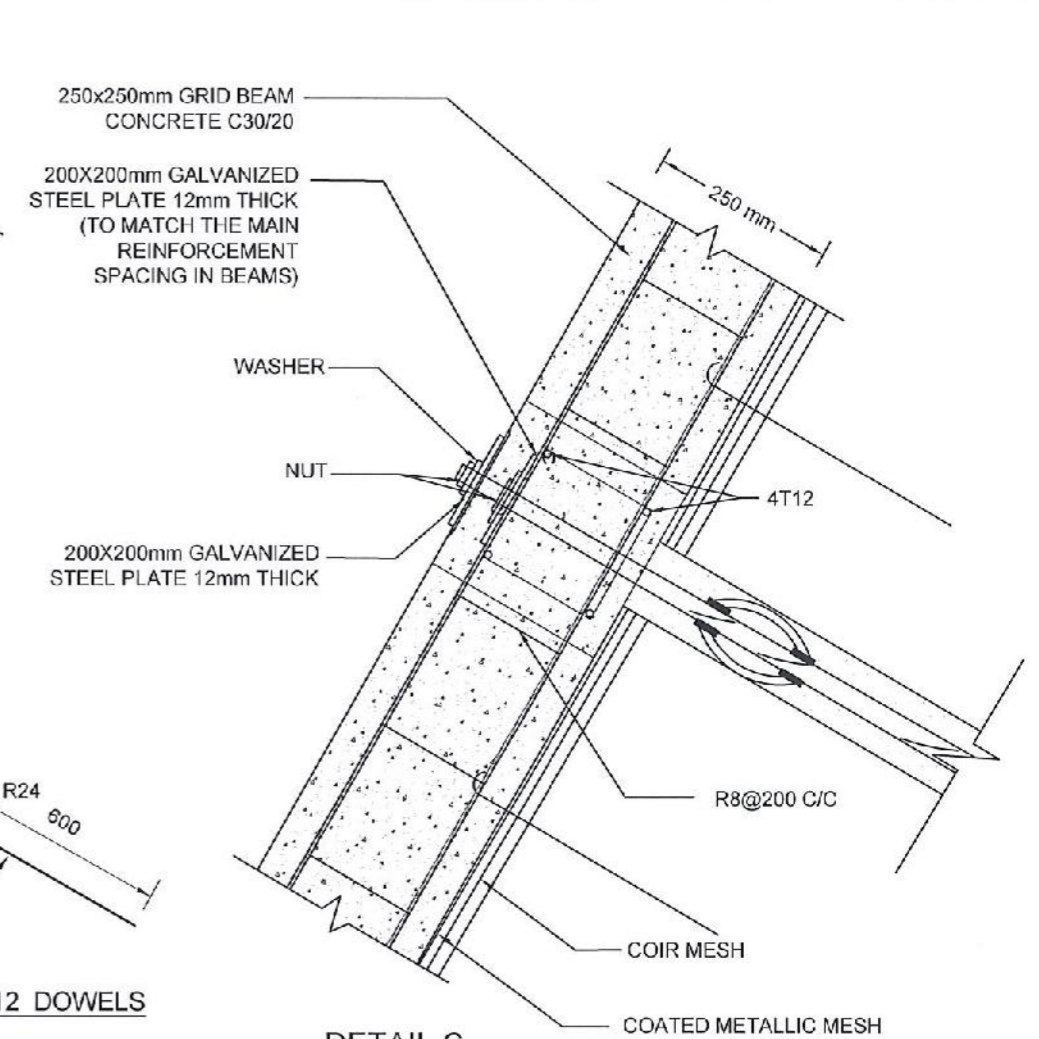
DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	
DESIGNER	T. THILAKARATHNA	
CHECKED	B.I. KUMARAGE	
RECOMMENDED	Prof. S.A.S. KUIATHILAKA	
APPROVED	K.N. BANDARA	



DETAIL - B



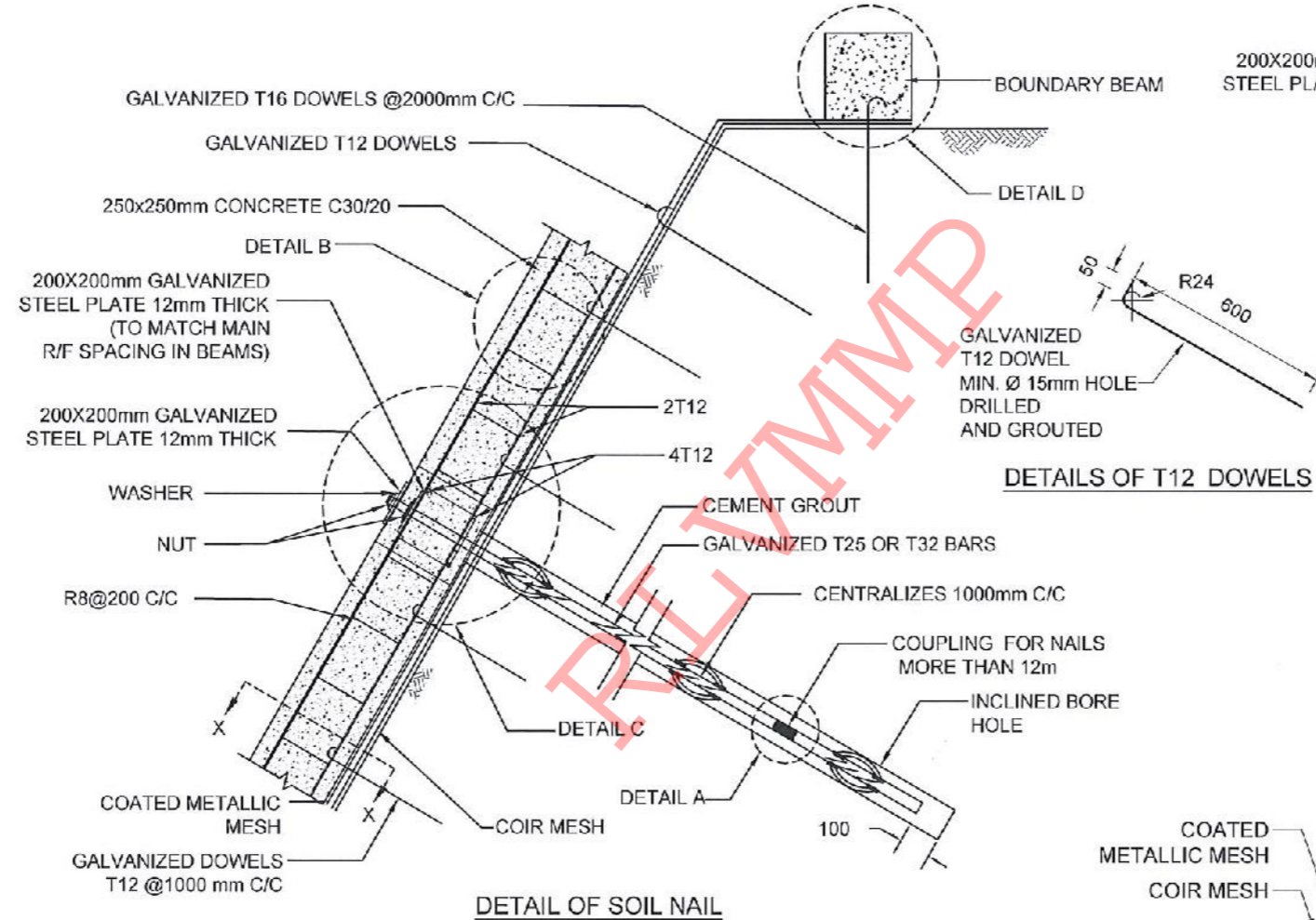
DETAIL OF FACING AT BERM



DETAIL C

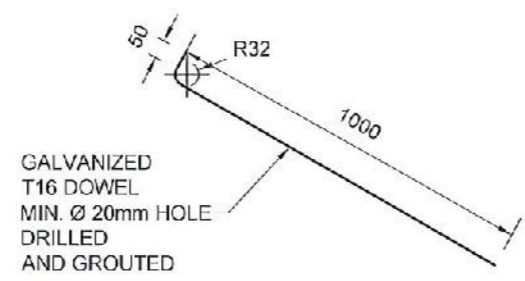
NOTES

1. ALL DIMENSIONS ARE IN mm.
2. ALL CONSTRUCTIONS SHALL BE AS PER SPECIFICATION
3. MINIMUM CLEAR COVER TO R/F - 20mm TO 30mm
4. LAP LENGTH FOR R/F BARS 40 x BAR DIA.
5. TURFING / SODDING / SEEDING / PLANTING USED FOR VEGETATION COVER
6. THE BAR COUPLER SHALL ONLY BE USE FOR SOIL NAILING OF MORE THAN 12m LONG UNLESS OTHERWISE SPECIFIED
7. THE TENSILE STRENGTH OF THE BAR COUPLER SHALL BE CAPABLE TO DEVELOP AT LEAST 95% OF TENSILE STRENGTH OF THE REBAR AS TESTED AND CERTIFIED BY THE MANUFACTURE
8. SPACING BETWEEN NAIL HEAD ARE VARIED ACCORDING TO THE GROUND CONDITION
9. BOUNDARY BEAM SHALL BE STRUCTURALLY CONNECTED TO ALREADY CONSTRUCTED GRID BEAMS AT EACH JUNCTION
10. BOUNDARY BEAM SHALL BE FOUNDED ON SLOPES  $\leq 30^\circ$  AT CROWN AREAS.
11. MINIMUM OF 2 DOWELS SHALL BE TYPICALLY USED TO FIX THE COATED METALLIC MESH AGAINST THE SLOPE AT EACH SLOPE SPACE IN BETWEEN THE GRID BEAMS, AS SHOWN IN THE DRAWING
12. SPACING AND LOCATIONS OF DOWELS INSTALLED TO FIX THE COATED METALLIC MESH AGAINST THE SLOPE SHALL BE VARIED ACCORDING TO THE SITE CONDITION

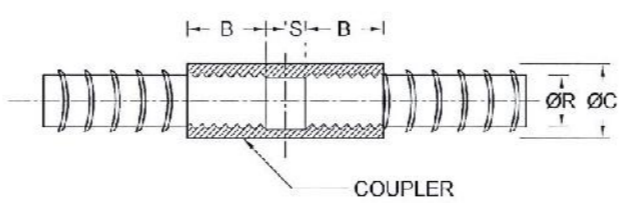


DETAIL OF SOIL NAIL

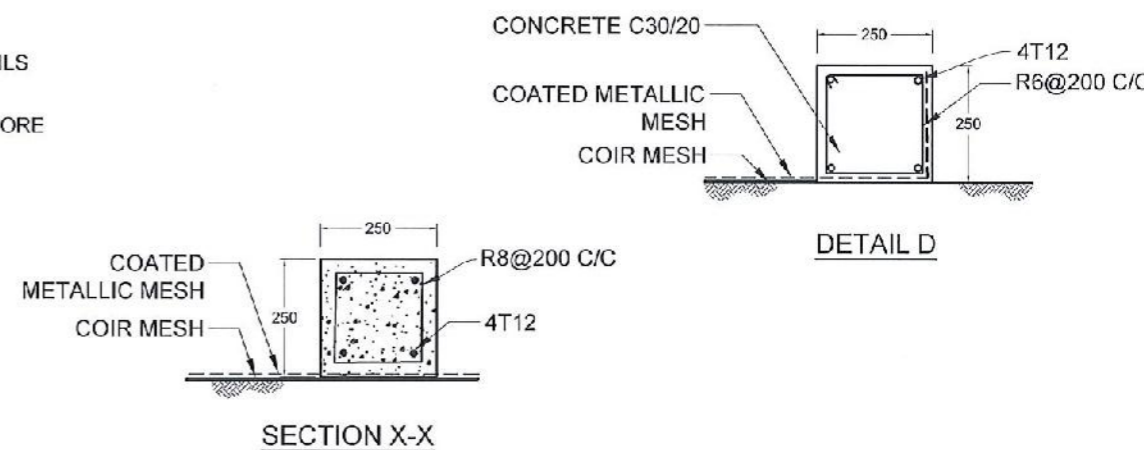
DETAILS OF T12 DOWELS



DETAILS OF T16 DOWELS



COUPLER DETAILS - A (NAIL LENGTH > 12m)



SECTION X-X

REINFORCEMENT BAR DIAMETER (ØR)	COUPLER OUTER BAR DIAMETER (ØC)	MIN - THREADED LENGTH OF COUPLER (B)	NON - THREADED LENGTH OF COUPLER (S)
25 mm	36 mm	50 mm	2.5 mm
32 mm	46 mm	64 mm	2.5 mm

EMPLOYER  
 DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

DESIGNER  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 PRIMARY AND SECONDARY TAMIL SCHOOL  
 RATHNAPURA

TITLE  
 DETAILS OF SOIL NAILING WITH  
 NON EMBEDDED GRID BEAM

SCALE N.T.S. DATE 30.06.2022  
 PROJECT / DRAWING No. RLVMP/WORKS/NCB/PH11/70-RT/DR-08 REVISION 00

DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	
DESIGNER	T. THILAKARATHINA	
CHECKED	B.I. KUMARAGE	
RECOMMENDED	Prof. S.A.S. KULATHILAKA	
A-PROVED	K.N. BANDARA	



REFERENCE

- P - PERMENT BUILDING
- CDN - CONCRETE DRAIN
- RE - ROAD EDGE(WHITE LINE)
- WF - WIRE FENCE
- BT - BANK TOP
- BB - BOTTOM OF BANK
- RW - RETAINING WALL
- EP - ELECTRIC POST

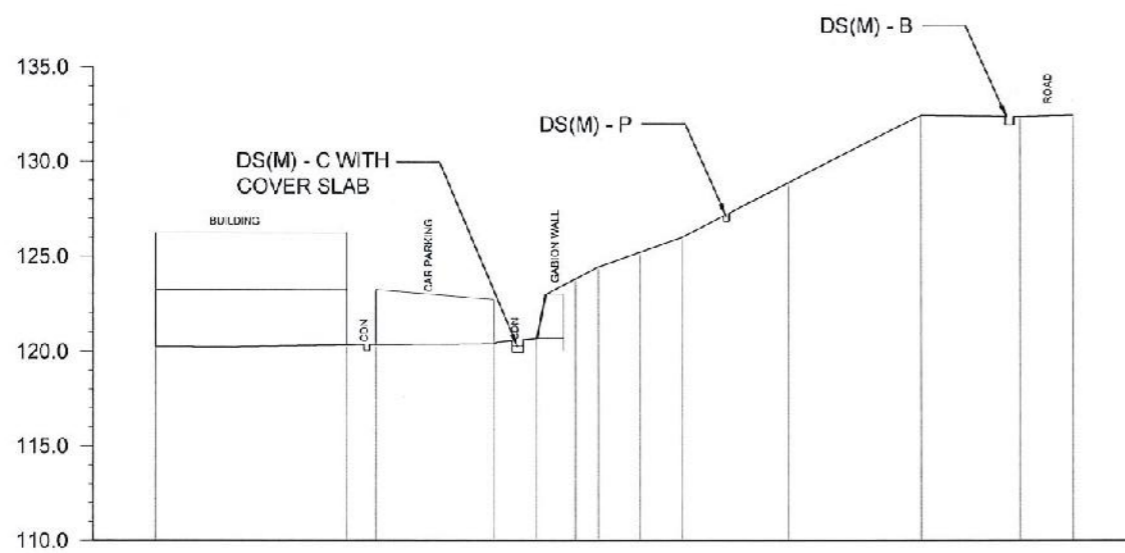
DESIGN NOTATION

- - DS (M) - P
- - DS (M) - B
- - DS (M) - C WITH COVER SLAB
- - DS(C) - C
- GABION WALL (TYPE V)
- BACKFILLING AND TURFING
- CATCH PIT

NOTES

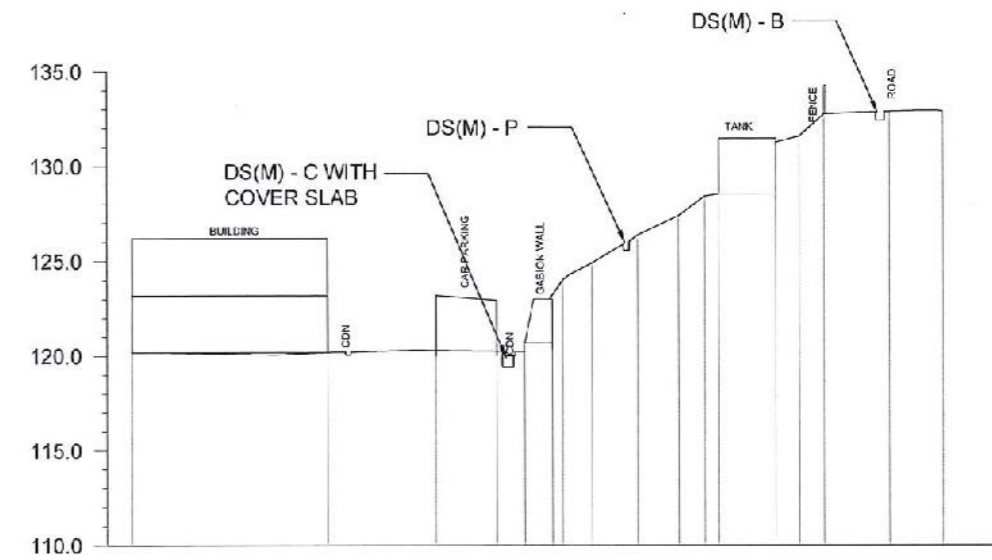
1. SURFACE AND CASCADE DRAIN LOCATIONS (PATH) & LENGTHS MIGHT BE VARIED ACCORDING TO ACTUAL SITE CONDITION.
2. LOCATION OF THE CATCHPITS MIGHT BE VARIED ACCORDING TO THE ACTUAL SITE CONDITION.

<p>DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT NATIONAL BUILDING RESEARCH ORGANISATION No. 99/1, JAWATTA ROAD, COLOMBO - 05</p>	<p>DESIGN UNIT NATIONAL BUILDING RESEARCH ORGANIZATION No. 99/1, JAWATTA ROAD, COLOMBO - 05</p>	REV	DATE	REVISION DESCRIPTION	APPROVAL	PROJECT TITLE  REDUCTION OF LANDSLIDE VULNERABILITY BY MITIGATION MEASURES AG OFFICE - RAHNAPURA	TITLE  DESIGN PLAN VIEW	DESCRIPTION	NAME	SIGNATURE	
SCALE: 1:400      DATE: 28.04.2022							PROJECT / DRAWING No.	REVISION			
RLVMMMP/WORKS/NCB/PHI/071-AG/DR-03								00	RECOMMENDED	Prof. S.A.S. KULATHILAKA	
									APPROVED	K.N. BANDARA	



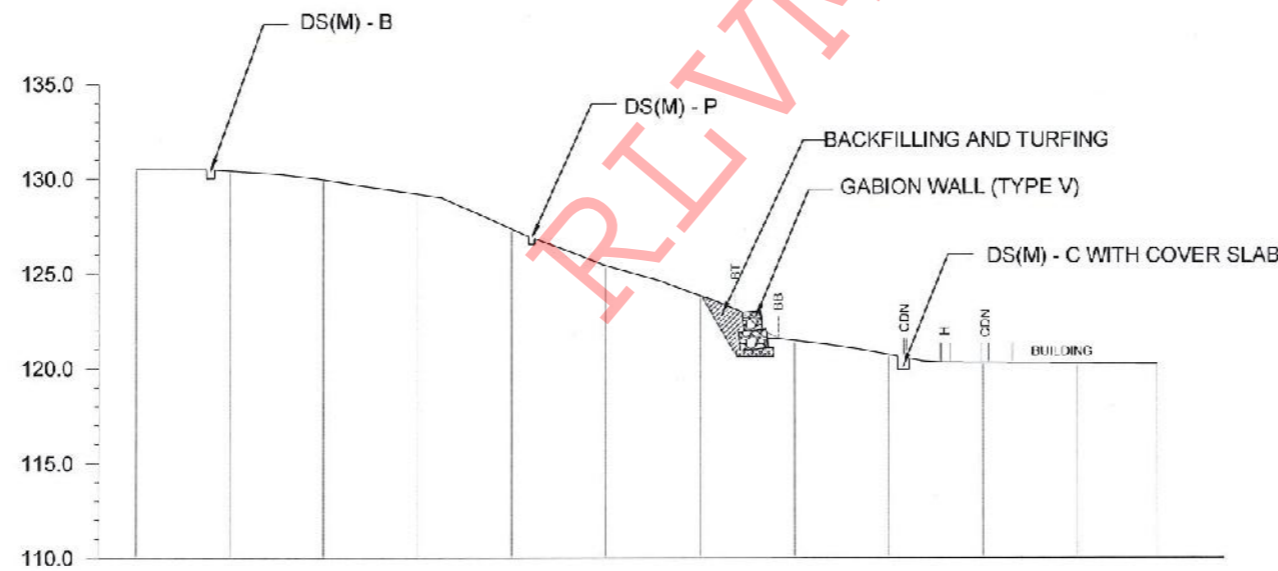
GROUND LEVEL (m)	120.243	120.321	120.344	120.392	20.684	123.803	123.436	125.217	125.998	128.875	132.433	132.367	132.427
DISTANCE (m)	0.000	10.218	11.786	18.043	20.293	21.354	23.609	25.824	28.040	33.731	40.817	46.104	48.929

CS01



GROUND LEVEL (m)	120.189	120.189	120.291	120.240	120.217	123.800	124.885	126.359	127.394	128.405	131.460	131.580	132.752	132.869	132.886	
DISTANCE (m)	0.000	10.417	16.175	19.396	20.926	22.367	24.476	26.900	29.054	30.470	31.236	34.268	35.531	36.832	40.313	43.158

CS02



GROUND LEVEL (m)	130.507	130.424	129.957	129.195	127.376	125.433	123.838	121.476	120.711	120.245	120.250	120.220
DISTANCE (m)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	54.26

CS03

EMPLOYER  
 DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

DESIGNER  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

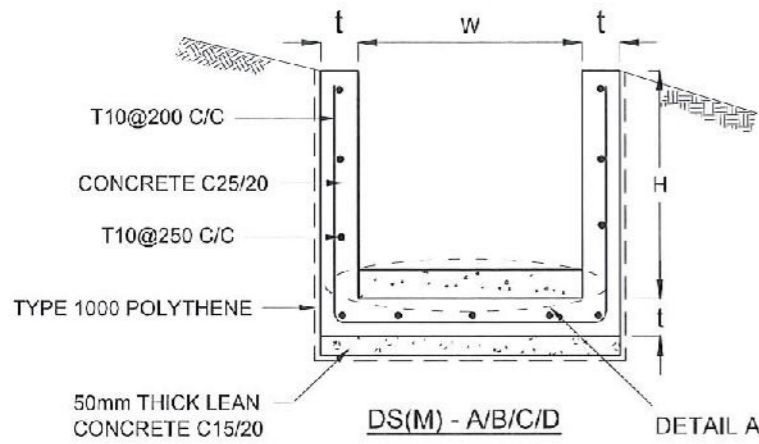
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 AG OFFICE - RAHNAPURA

TITLE  
 DESIGN CROSS SECTION

SCALE 1:400  
 PROJECT / DRAWING No. RLVMMP/WORKS/NCB/PH11/071-AG/DR-04  
 DATE 28.04.2022  
 REVISION 00

DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	<i>[Signature]</i>
DESIGNER	D.M.D.T. DASANAYAKA	<i>[Signature]</i>
CHECKED	B.I. KUMARAGE	<i>[Signature]</i>
RECOMMENDED	Prof. S.A.S. KULATHILAKA	<i>[Signature]</i>
APPROVED	K.N. BANDARA	<i>[Signature]</i>



DRAIN TYPE	W (mm)	H (mm)	t (mm)
DS (M) - A/P	300	300	100
DS (M) - B/R	450	450	100
DS (M) - C/Q	600	600	100
DS (M) - D	750	750	125
DS (M) - E	900	900	150
DS (M) - F	1000	1000	150

**NOTES**

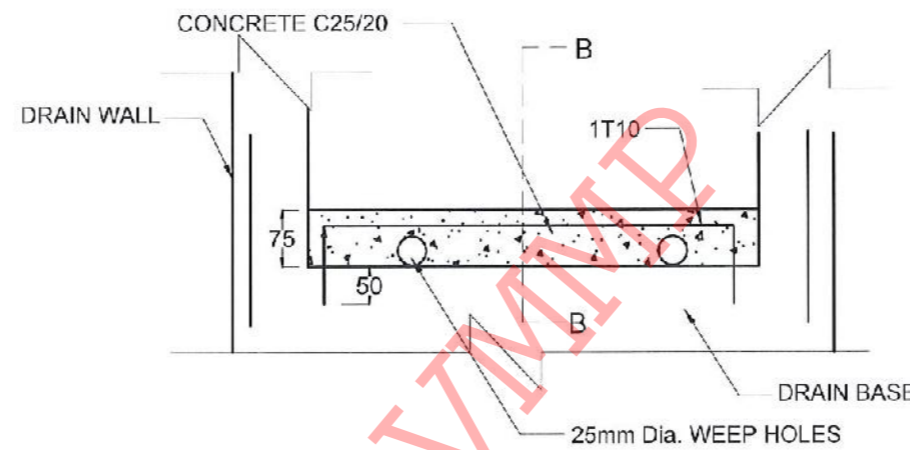
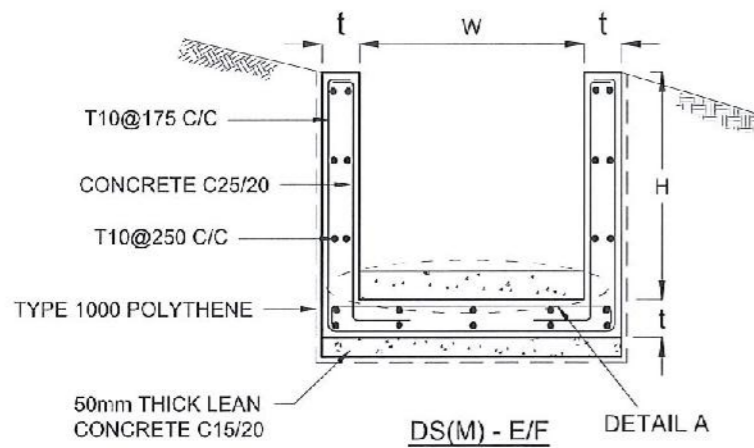
- DEPTH OF EXCAVATION MAY VARY ACCORDING TO SITE CONDITIONS.
- STEPS SHALL BE CONSTRUCTED AT SURFACE DRAIN ON SLOPING GROUND ACCORDING TO THE SITE CONDITIONS AS INSTRUCTED BY THE ENGINEER.
- ENERGY BREAKERS SHALL BE CONSTRUCTED AT THE STEEP DRAIN SEGMENTS AS PER THE INSTRUCTIONS OF THE ENGINEER.
- DOWELS SHALL BE INSTALLED ACCORDING TO THE GROUND CONDITIONS AS INSTRUCTED BY THE ENGINEER.
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED.
- 10 mm THICK EXPANSION JOINT SHALL BE INTRODUCED IN EVERY 5m INTERVAL.

**CONCRETE**

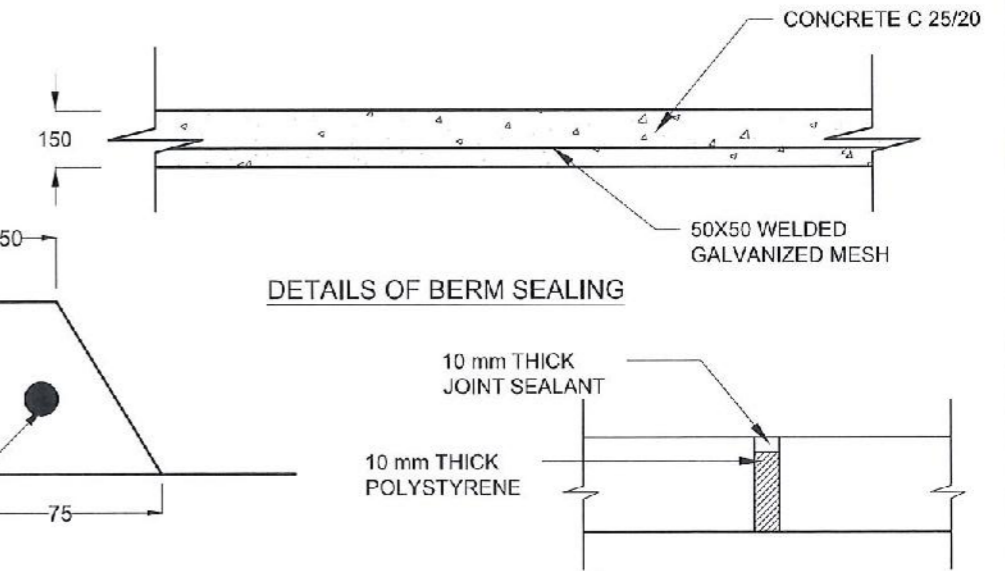
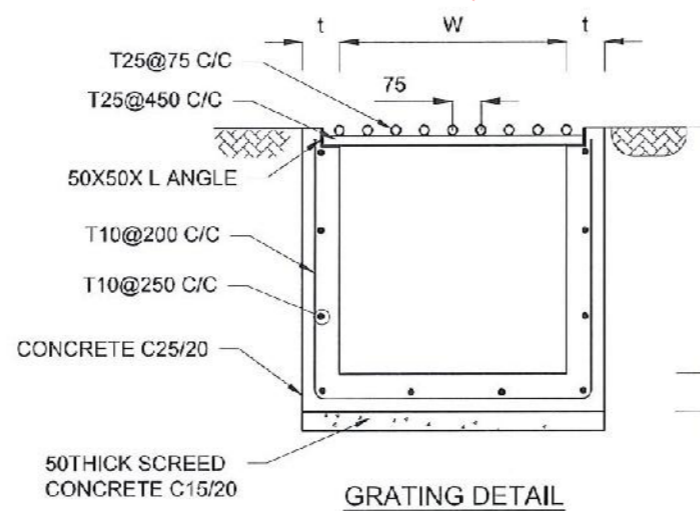
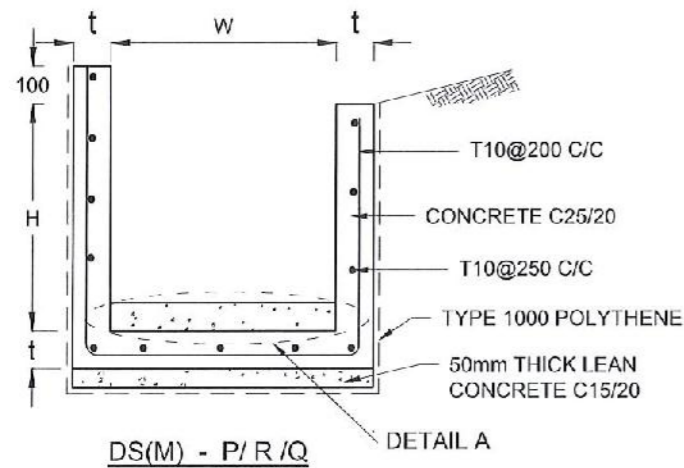
- USE FOLLOWING CONCRETE GRADES FOR STRUCTURE
  - [a] SCREED - C. 15/20
  - [b] WALLS / BASE / ENERGY BREAKERS - C. 25/20

**REINFORCEMENT**

- ALL BARS MARKED "T" SHALL BE HIGH YIELD DEFORMED BARS OF YIELD STRENGTH NOT LESS THAN 460N/mm<sup>2</sup>.
- BARS OF CUT LENGTH LARGER THAN THE SUPPLIED LENGTH TO BE LAPPED FOR A LENGTH OF 50 x BAR DIA. AND LAPPING SHOULD BE STAGGERED.
- ANCHORAGE LENGTH SHOULD BE 40X BAR DIA.
- REINFORCEMENT BARS SHALL BE BENT IN ACCORDANCE WITH STANDARD SPECIFICATIONS.
- COVER TO REINFORCEMENT
  - [a] BURIED FACES AND DRAIN INVERTS - 40 mm
  - [b] ALL OTHER FACES - 25 mm



**DETAIL A - (ENERGY BREAKER AT 3M)**



**SECTION B-B**

**EXPANSION JOINT DETAIL**

EMPLOYER  
 DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

DESIGNER  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

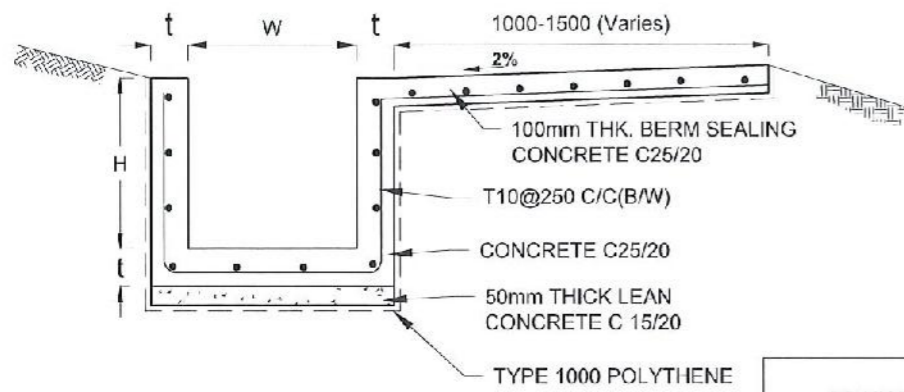
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 AG OFFICE - RAI INAPURA

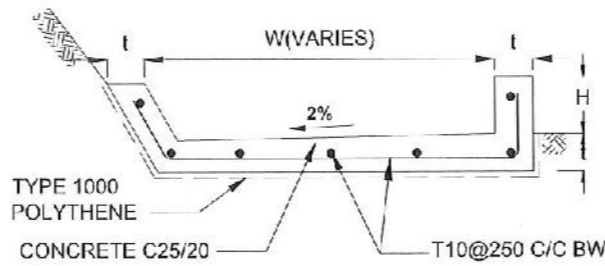
TITLE  
 DETAILS OF DRAINS  
 (SURFACE DRAIN -1 OF 2)

SCALE | N.T.S | DATE | 28.04.2022  
 PROJECT / DRAWING No. | RLVM/MP/WORKS/NCE/FH/071-AG/DR-05a | REVISION | 00

DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	<i>[Signature]</i>
DESIGNER	D.M.D.T. DASANAYAKA	<i>[Signature]</i>
CHECKED	B.J. KUMARAGE	<i>[Signature]</i>
RECOMMENDED	Prof. S.A.S. KULATHILAKA	<i>[Signature]</i>
APPROVED	K.N. BANDARA	<i>[Signature]</i>



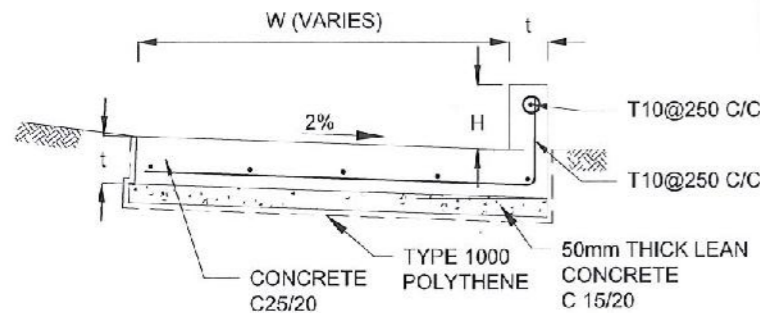
DS (B) - (TYPE I)



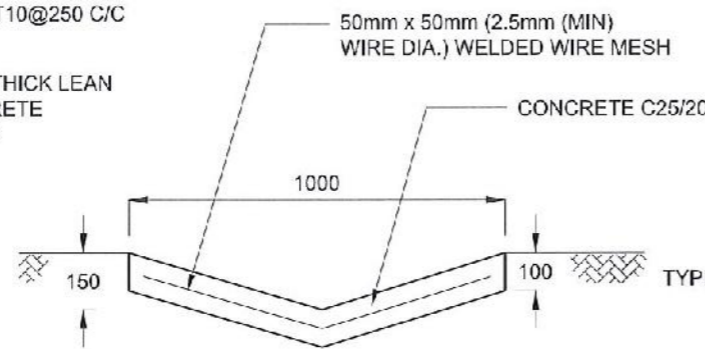
DS (B) - (TYPE II)

DRAIN TYPE	W (mm)	H (mm)	t (mm)
DS (K) - A	1000	200	100
DS (K) - B	1000	300	100
DS (K) - C	1150	200	200

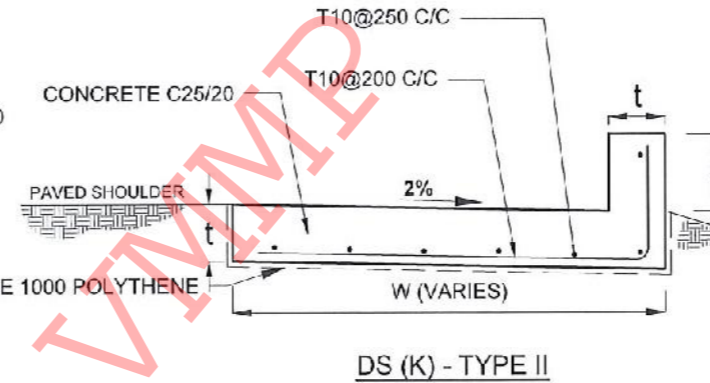
DRAIN TYPE	W (mm)	H (mm)	t (mm)
DS (B) - A	300	300	100
DS (B) - B	450	450	100
DS (B) - C	1000	150	100
DS (B) - D	1500	150	100
DS (B) - E	2000	150	100



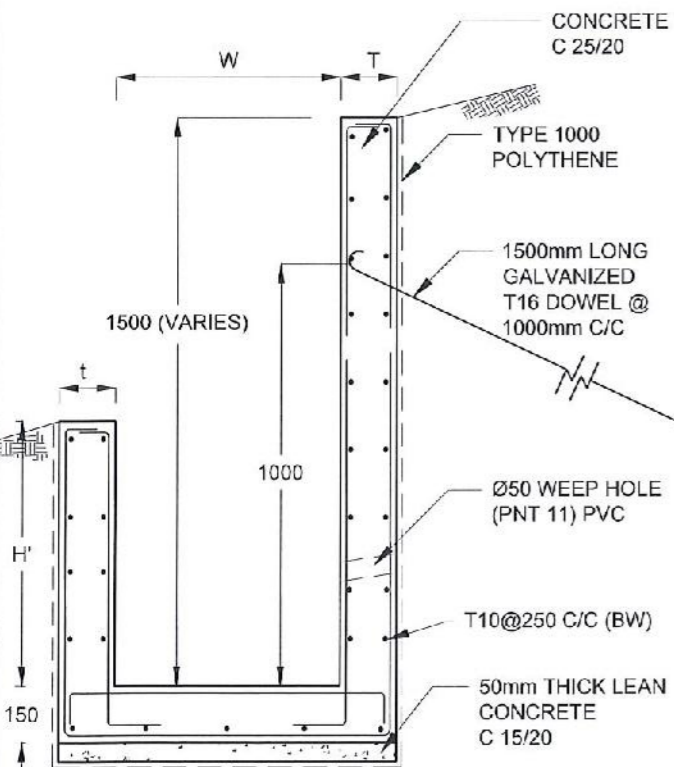
DS (K) - TYPE I



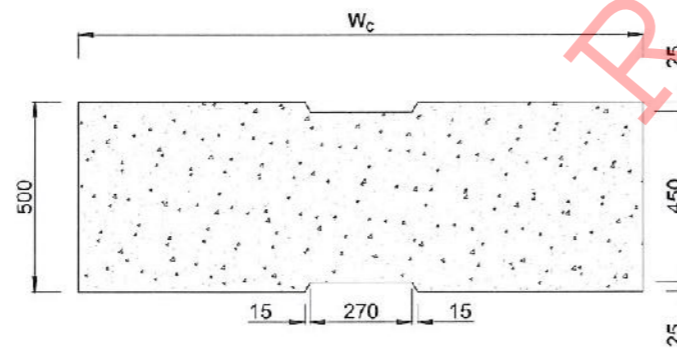
DS (D) - A (DISH DRAIN)



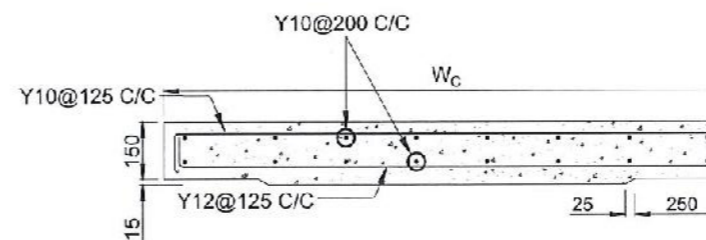
DS (K) - TYPE II



DS (M) - L



PLAN VIEW OF COVER SLAB



ACCESS & HEAVY DUTY COVER SLAB  
SECTION OF (W<sub>c</sub> x 500 x 150mm)

DS(M) - L	W (mm)	H' (mm)	t (mm)
TYPE I	600	600	150
TYPE II	800	800	150

NOTES

- DEPTH OF EXCAVATION MAY VARY ACCORDING TO SITE CONDITIONS.
- STEPS SHALL BE CONSTRUCTED AT SURFACE DRAIN ON SLOPING GROUND ACCORDING TO THE SITE CONDITIONS AS INSTRUCTED BY THE ENGINEER.
- ENERGY BREAKERS SHALL BE CONSTRUCTED AT THE STEEP DRAIN SEGMENTS AS PER THE INSTRUCTIONS OF THE ENGINEER.
- DOWELS SHALL BE INSTALLED ACCORDING TO THE GROUND CONDITIONS AS INSTRUCTED BY THE ENGINEER.
- COVER SLABS NEED TO BE PROVIDED ONLY FOR THE REGIONS AS INSTRUCTED BY THE ENGINEER.
- COVER SLAB WIDTH (W<sub>c</sub>) SHOULD BE TAKEN AS THE SUM OF DRAIN WIDTH AND 2x DRAIN WALL THICKNESS. [W<sub>c</sub> = W+2x]
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED.
- 10 mm THICK EXPANSION JOINT SHALL BE INTRODUCED IN EVERY 5m INTERVAL.

CONCRETE

- USE FOLLOWING CONCRETE GRADES FOR STRUCTURE
  - [a] SCREED - C. 15/20
  - [b] WALLS / BASE / ENERGY BREAKERS - C. 25/20

REINFORCEMENT

- ALL BARS MARKED "T" SHALL BE HIGH YIELD DEFORMED BARS OF YIELD STRENGTH NOT LESS THAN 460N/mm<sup>2</sup>.
- BARS OF CUT LENGTH LARGER THAN THE SUPPLIED LENGTH TO BE LAPPED FOR A LENGTH OF 50 x BAR DIA. AND LAPPING SHOULD BE STAGGERED.
- ANCHORAGE LENGTH SHOULD BE 40X BAR DIA.
- REINFORCEMENT BARS SHALL BE BENT IN ACCORDANCE WITH STANDARD SPECIFICATIONS.
- COVER TO REINFORCEMENT
  - [a] BURIED FACES AND DRAIN INVERTS - 40 mm
  - [b] ALL OTHER FACES - 25 mm

EMPLOYER  
 DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

DESIGNER  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

REV	DATE	REVISION DESCRIPTION	APPROVAL

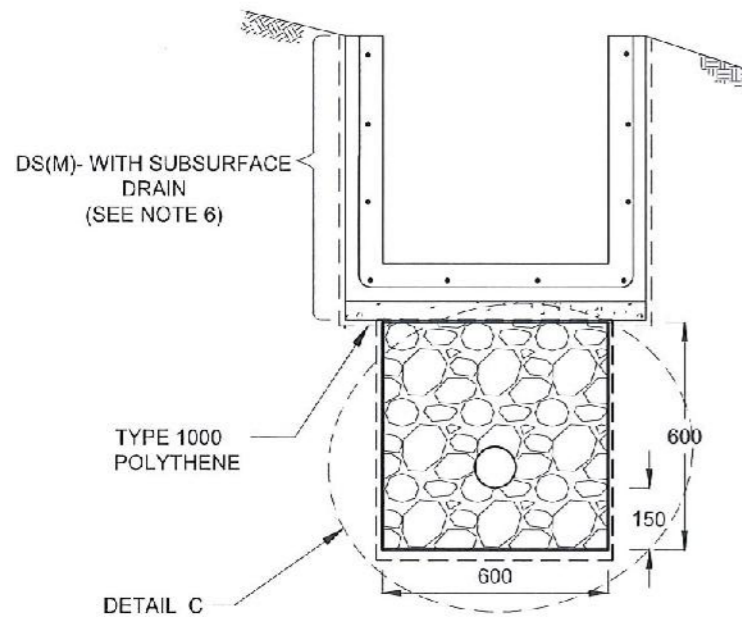
PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 AG OFFICE - RAHNAPURA

TITLE  
 DETAILS OF DRAINS  
 (SURFACE DRAIN - 2 OF 2)

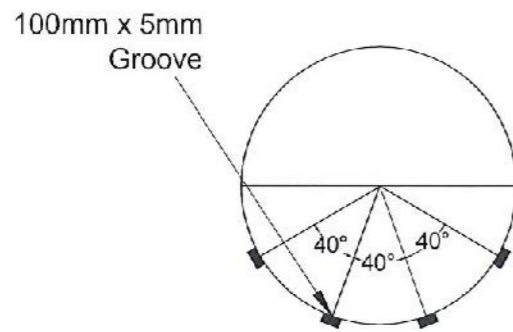
SCALE: N.T.S. DATE: 28.04.2022  
 PROJECT / DRAWING No. REVISION: 00  
 RLVMMP/WORKS/NCB/PHII/071-AG/DR-05b

DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	<i>[Signature]</i>
DESIGNER	D.M.D.T. DASANAYAKA	<i>[Signature]</i>
CHECKED	B.I. KUMARAGE	<i>[Signature]</i>
RECOMMENDED	Prof. S.A.S. KULATHILAKA	<i>[Signature]</i>
APPROVED	K.N. BANDARA	<i>[Signature]</i>

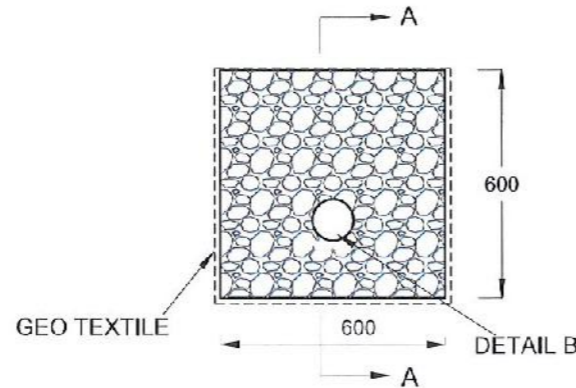




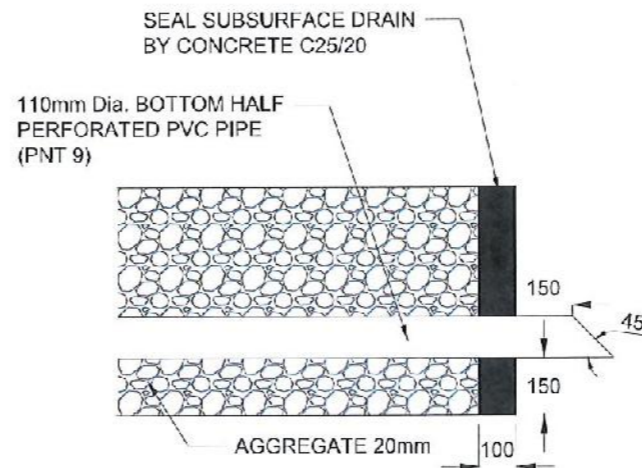
**SUBSURFACE DRAIN  
[DS (S) -A]**



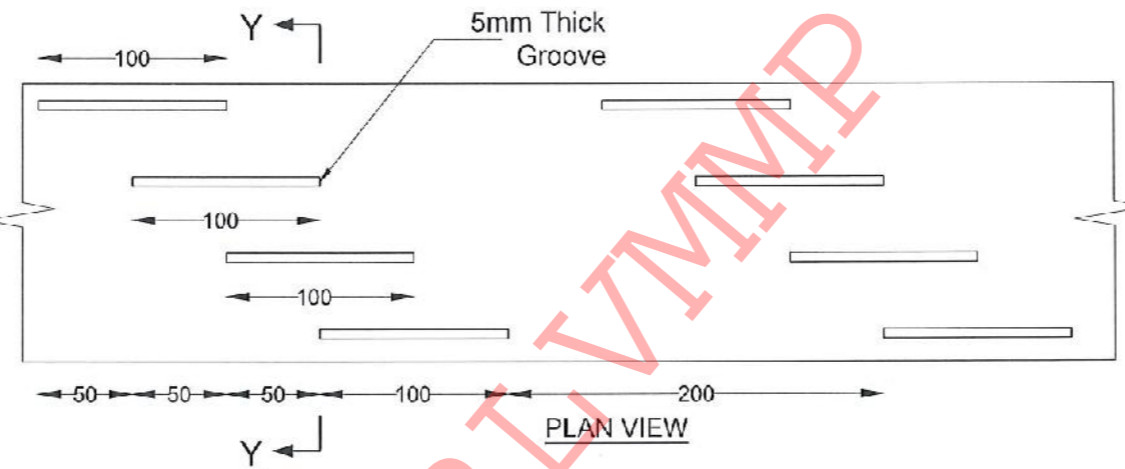
**SECTION Y - Y**



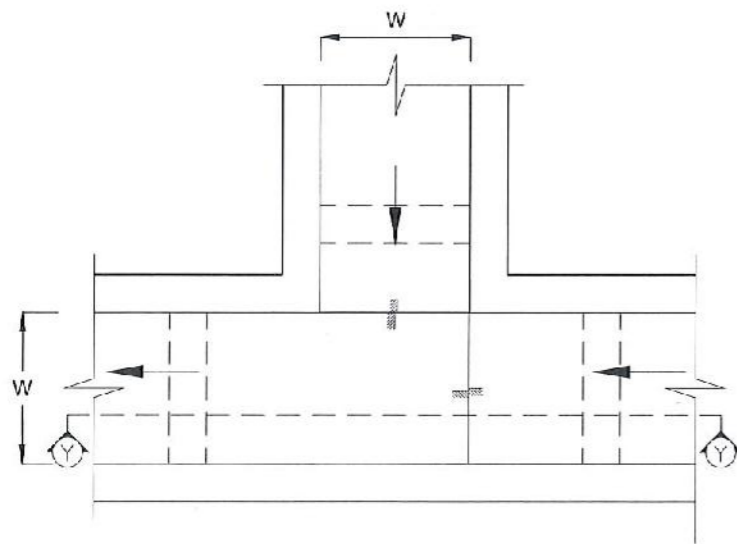
**DETAIL C / DS (S) -A**



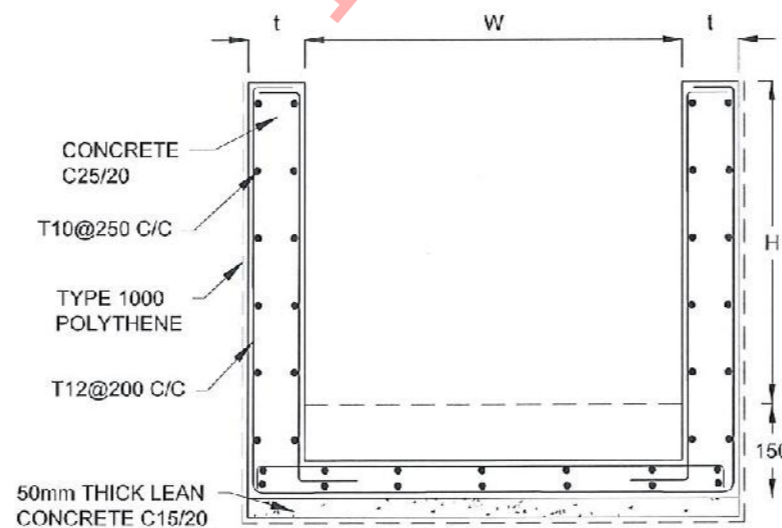
**SECTION A-A  
(OUTLET DETAIL SUBSURFACE DRAIN)**



**DETAIL - B (PERFORATED PIPE FOR SUB-SURFACE DRAINS)**



**PLAN VIEW OF CATCH PIT (CP)**



**SECTION Y-Y (CP-R)**

**NOTES**

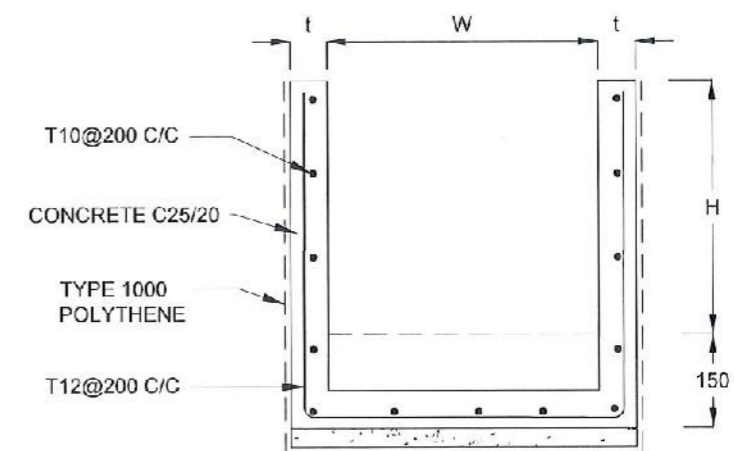
1. W,H,t ; SHALL BE THE SAME AS RESPECTIVE DRAIN SECTION.
2. CP - R SHALL BE USED WHERE H > = 900mm
3. DEPTH OF EXCAVATION MAY VARY ACCORDING TO SITE CONDITIONS.
4. DOWELS SHALL BE INSTALLED ACCORDING TO THE GROUND CONDITIONS AS INSTRUCTED BY THE ENGINEER.
5. 10 mm THICK EXPANSION JOINT SHALL BE INTRODUCED IN EVERY 5m INTERVAL.
6. DETAILS OF SURFACE DRAIN PORTION OF THE SUBSURFACE DRAINS SHALL BE AS PER DS(M), DS(B), DS(K) OR DS(C) SECTIONS ACCORDINGLY.
7. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED.

**CONCRETE**


8. USE FOLLOWING CONCRETE GRADES FOR STRUCTURE
  - [a] SCREED - C. 15/20
  - [b] WALLS / BASE / ENERGY BREAKERS - C. 25/20

**REINFORCEMENT**

9. ALL BARS MARKED "T" SHALL BE HIGH YIELD DEFORMED BARS OF YIELD STRENGTH NOT LESS THAN 460N/mm<sup>2</sup>.
10. BARS OF CUT LENGTH LARGER THAN THE SUPPLIED LENGTH TO BE LAPPED FOR A LENGTH OF 50 x BAR DIA. AND LAPPING SHOULD BE STAGGERED.
11. ANCHORAGE LENGTH SHOULD BE 40X BAR DIA.
12. REINFORCEMENT BARS SHALL BE BENT IN ACCORDANCE WITH STANDARD SPECIFICATIONS.
13. COVER TO REINFORCEMENT
  - [a] BURIED FACES AND DRAIN INVERTS - 40 mm
  - [b] ALL OTHER FACES - 25 mm



**SECTION Y - Y**

EMPLOYER  
  
 DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05



DESIGNER  
  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

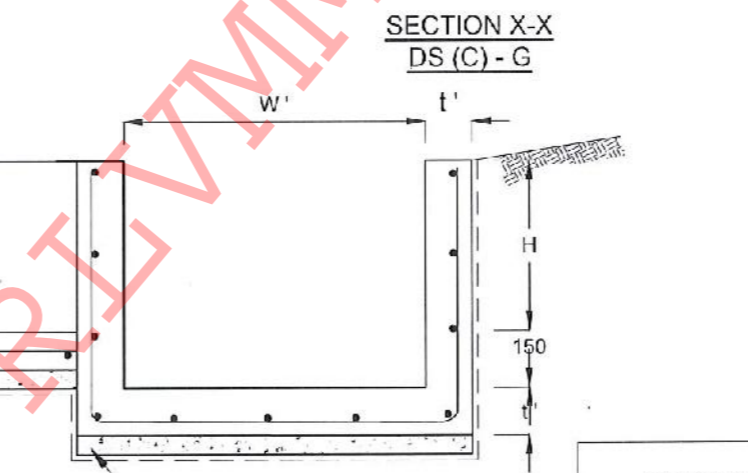
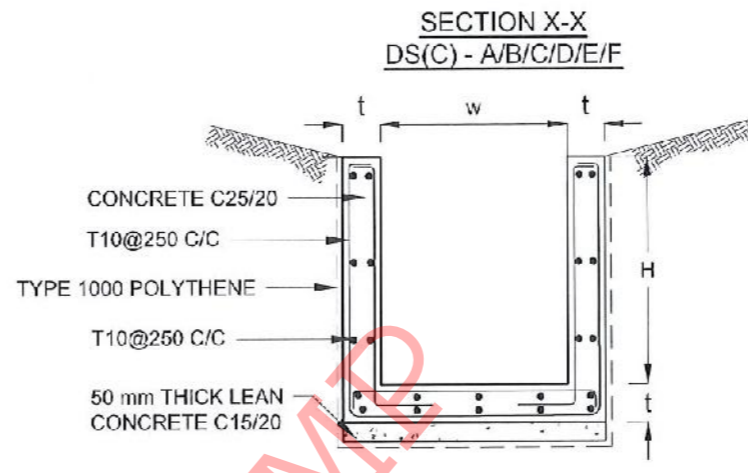
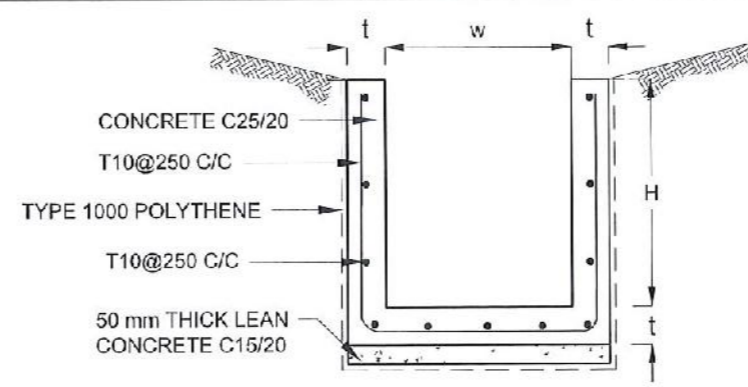
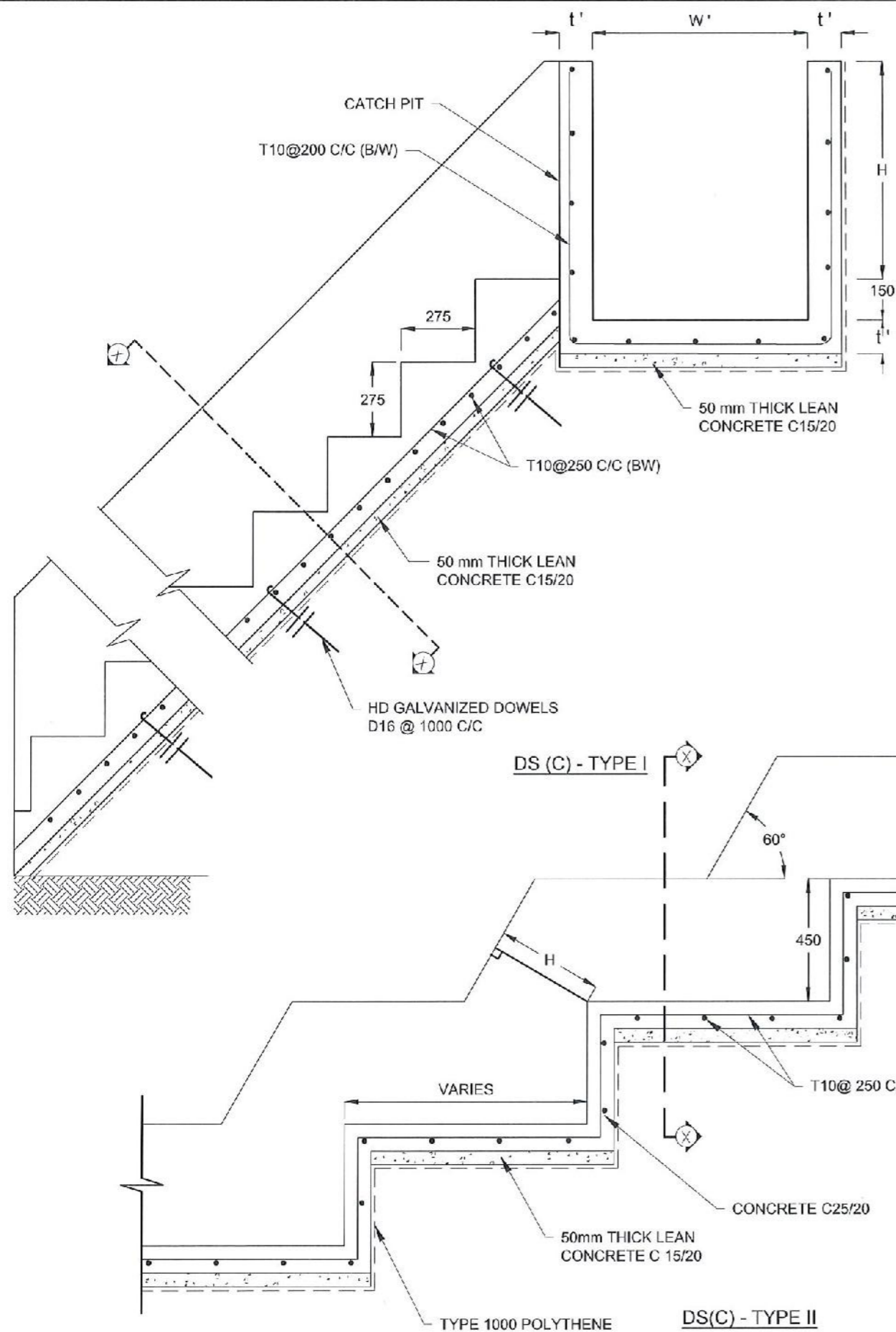
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 AG OFFICE - RAHNAPURA

TITLE  
 DETAILS OF DRAINS  
 (SUBSURFACE DRAIN AND CATCHPIT)

SCALE | N.T.S | DATE | 28.04.2022  
 PROJECT / DRAWING No. | RLV/MMP/WORKS/NCE/PHI/071-AG/DR-05c | REVISION | 00

DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	
DESIGNER	D.M.D.T. DASANAYAKA	
CHECKED	B.I. KUMARAGE	
RECOMMENDED	Prof. S.A.S. KULATHILAKA	
APPROVED	K.N. BANDARA	



**NOTES**

- USE EITHER TYPE I OR TYPE II CASCADE DRAIN ACCORDING TO THE ACTUAL GROUND CONDITION AS INSTRUCTED BY THE ENGINEER.
- LENGTH OF THE STEPS OF CASCADE WILL BE VARIED ACCORDING TO THE SITE CONDITIONS.
- DEPTH OF EXCAVATION SHALL BE VARIED ACCORDING TO SITE CONDITIONS.
- DOWELS SHALL BE INSTALLED ACCORDING TO THE GROUND CONDITIONS AS INSTRUCTED BY THE ENGINEER.
- 10 mm THICK EXPANSION JOINT SHALL BE INTRODUCED IN EVERY 5m INTERVAL.
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED.

**CONCRETE**

- USE FOLLOWING CONCRETE GRADES FOR STRUCTURE
  - [a] SCREED - C. 15/20
  - [b] WALLS / BASE / ENERGY BREAKERS - C. 25/20

**REINFORCEMENT**

- ALL BARS MARKED "T" SHALL BE HIGH YIELD DEFORMED BARS OF YIELD STRENGTH NOT LESS THAN 460N/mm<sup>2</sup>.
- BARS OF CUT LENGTH LARGER THAN THE SUPPLIED LENGTH TO BE LAPPED FOR A LENGTH OF 50 x BAR DIA. AND LAPPING SHOULD BE STAGGERED.
- ANCHORAGE LENGTH SHOULD BE 40X BAR DIA.
- REINFORCEMENT BARS SHALL BE BENT IN ACCORDANCE WITH STANDARD SPECIFICATIONS.
- COVER TO REINFORCEMENT
  - [a] BURIED FACES AND DRAIN INVERTS - 40 mm
  - [b] ALL OTHER FACES - 25 mm

DRAIN TYPE	W (mm)	H (mm)	t (mm)	W' (mm)	t' (mm)
DS (C) - A	450	450	100	600	100
DS (C) - B	450	600	100	750	100
DS (C) - C	600	600	100	800	100
DS (C) - D	750	750	100	800	100
DS (C) - E	800	800	125	1000	125
DS (C) - F	1000	750	125	1200	125
DS (C) - G	1200	1000	125	1300	125

EMPLOYER  
 DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

DESIGNER  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

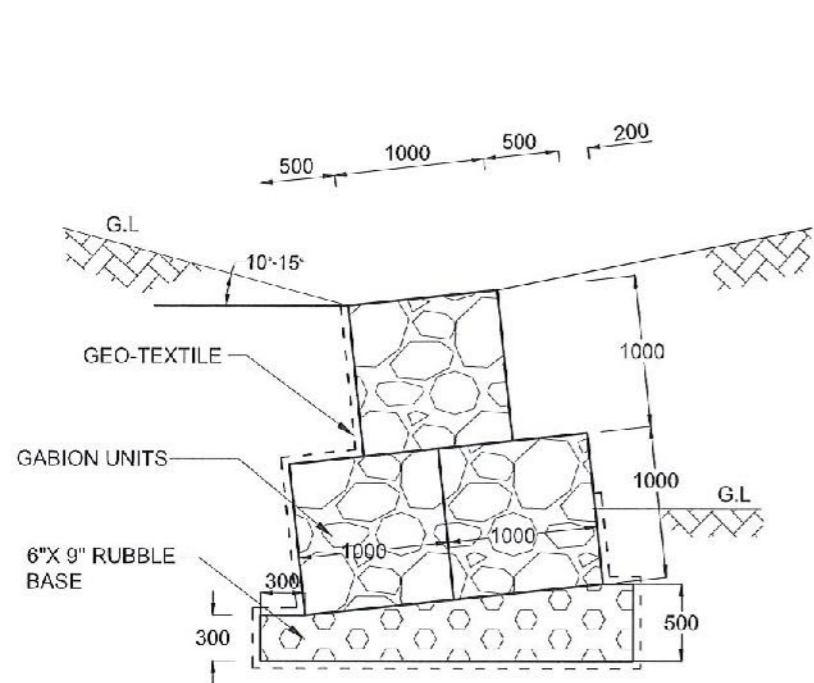
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 AG OFFICE - RAHNAPURA

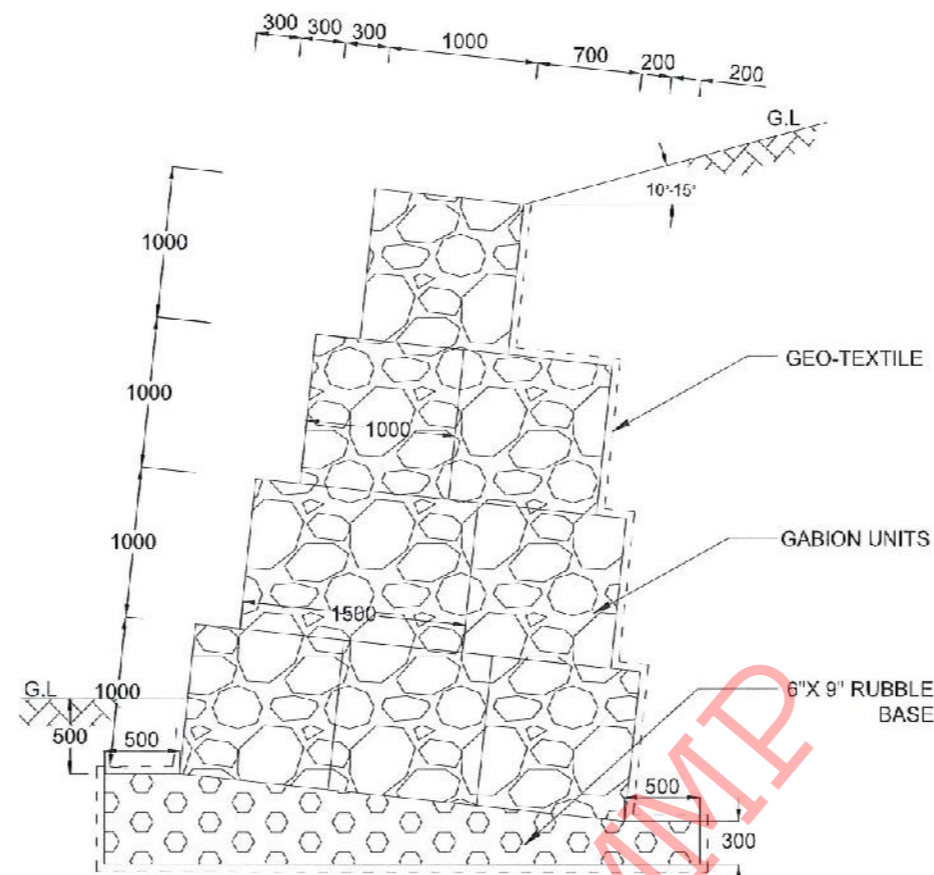
TITLE  
 DETAILS OF DRAINS  
 (CASCADE DRAIN)

SCALE | N.T.S | DATE | 28.04.2022  
 PROJECT / DRAWING No. | REVISION | 00  
 RLVMM/WORKS/NCB/PHI/071-AG/DR-05d

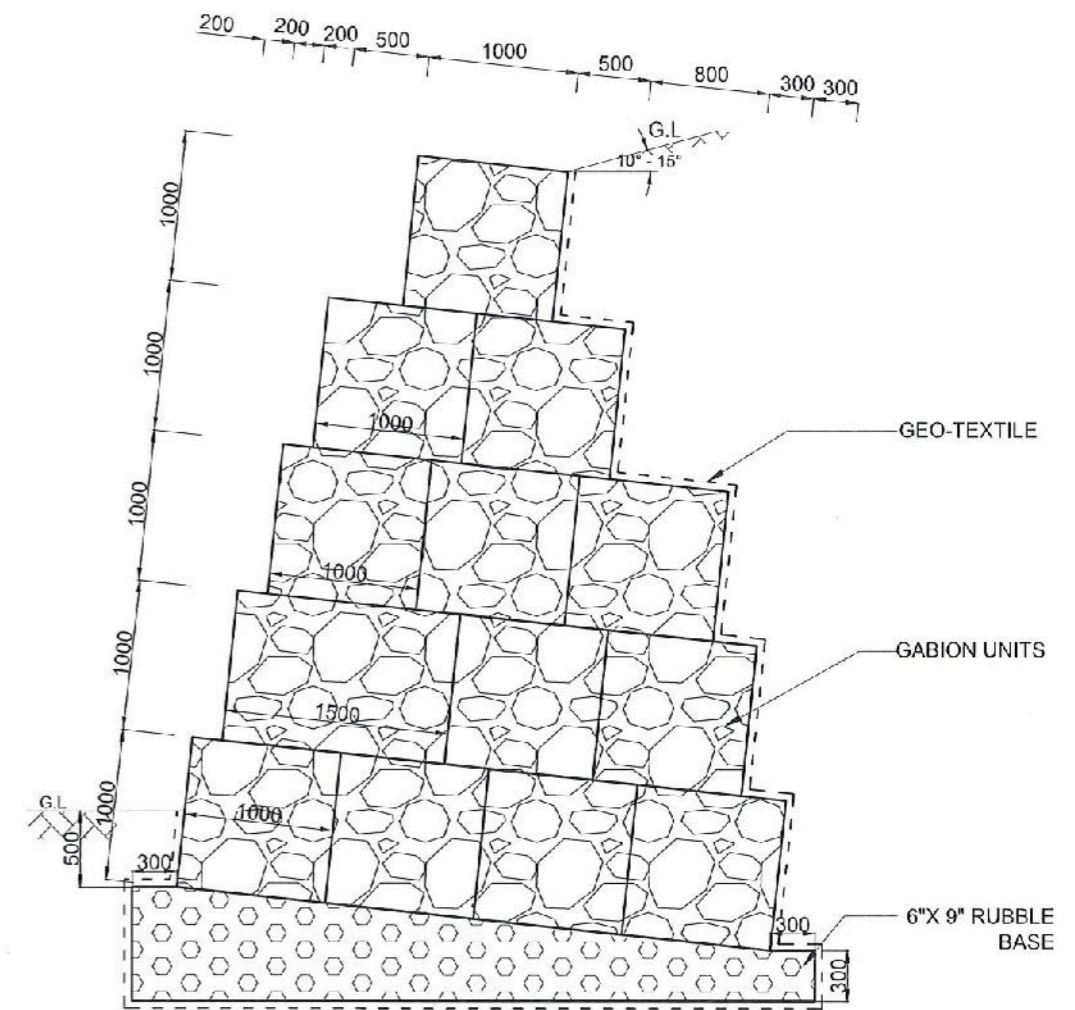
DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	<i>[Signature]</i>
DESIGNER	D.M.D.T. DASANAYAKA	<i>[Signature]</i>
CHECKED	B.I. KUMARAGE	<i>[Signature]</i>
RECOMMENDED	Prof. S.A.S. KULATHILAKA	<i>[Signature]</i>
APPROVED	K.N. BANDARA	<i>[Signature]</i>



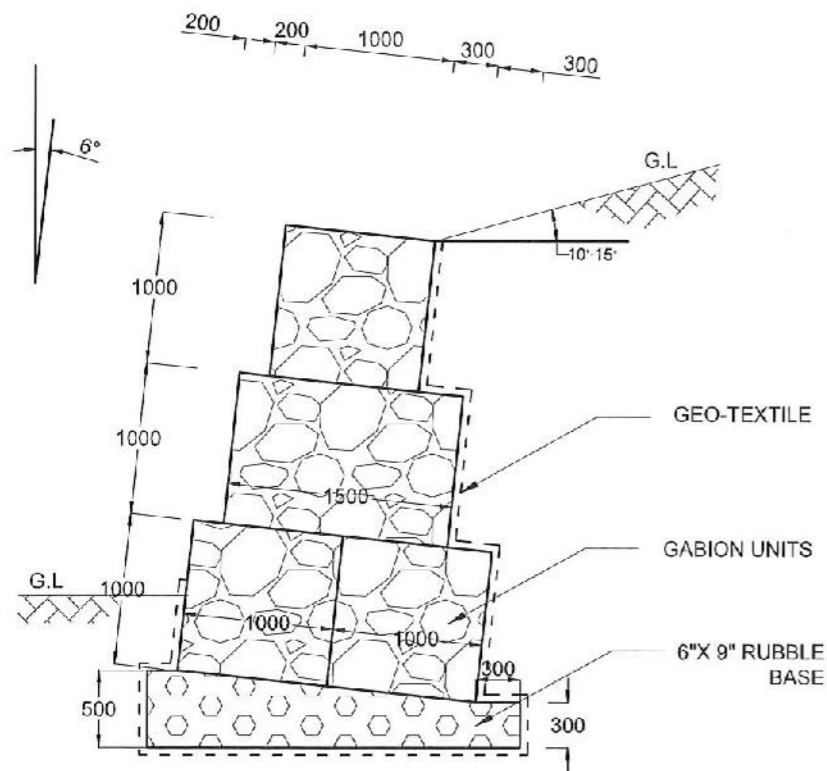
GABION WALL  
TYPE I



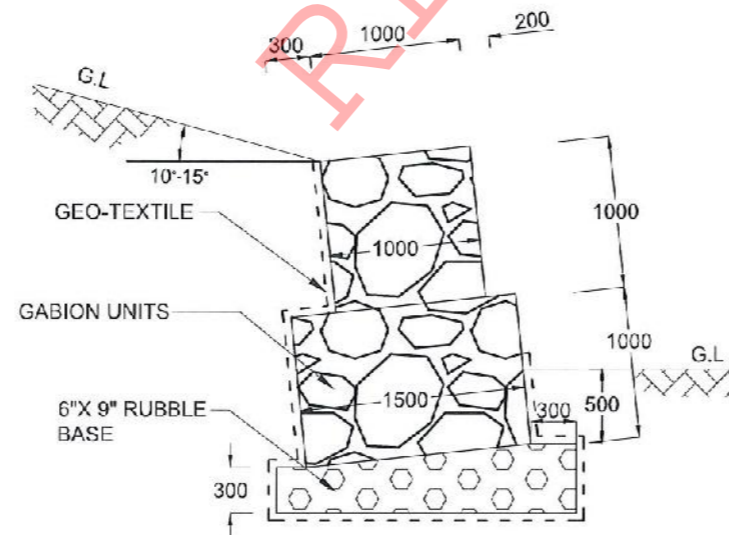
GABION WALL  
TYPE III



GABION WALL  
TYPE IV




GABION WALL  
TYPE II



GABION WALL  
TYPE V

NOTES

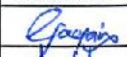




1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. BACKSLOPE ANGLE, LEVEL AND FORM MAY VARY AS PER THE DESIGN AT EACH SITE.

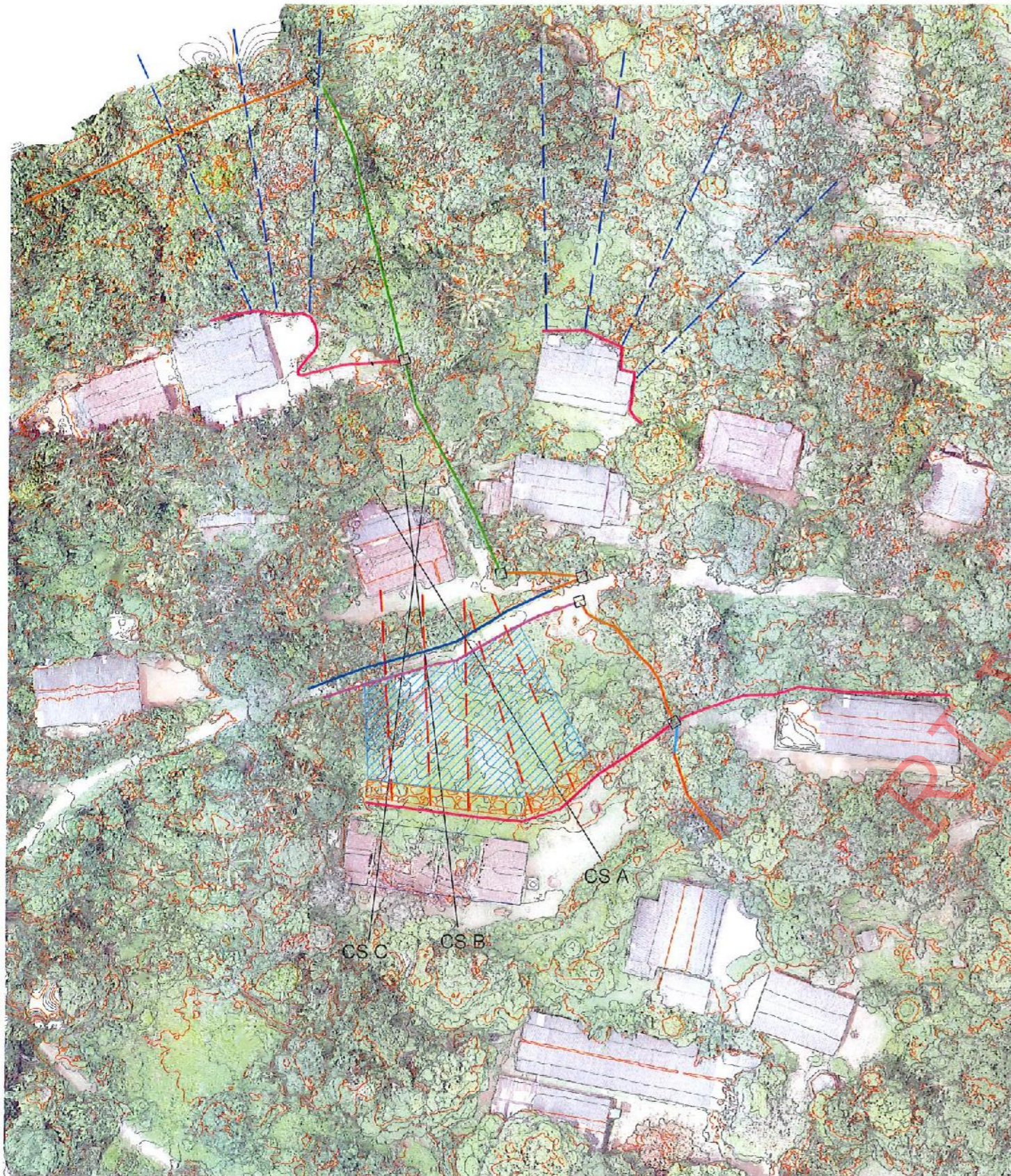
EMPLOYER  
  
 DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

DESIGNER  
  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 AG OFFICE - RAHNAPURA

TIT F	DESCRIPTION	NAME	SIGNATURE
SCALE	N.T.S		
PROJECT / DRAWING No.	RLV/MMP/WORKS/NCB/PIII/071-AG/DR-06		
DATE	28.04.2022		
REVISION	00		
DRAWN		S.A.G.D. SENANAYAKA	
DESIGNER		D.M.D.T. DASANAYAKA	
CHECKED		B.I. KUMARAGE	
RECOMMENDED		Prof. S.A.S. KULATHILAKA	
APPROVED		K.N. BANDARA	



DESIGN NOTATION

- - DS (M) - B
- - DS (M) - C
- - DS (M) - C WITH COVER SLAB
- - DS (M) - L (TYPE I)
- - DS (K) - A (TYPE I)
- - REHABILITATION OF EXISTING MASONRY DRAIN
- - - - HORIZONTAL LONG DRAIN (30m , DIA. 90mm)
- - - - HORIZONTAL LONG DRAIN (40m , DIA. 90mm)
- GABION WALL (TYPE IV)
- BACKFILLING AND TURFING
- CATCH PIT

NOTES

1. SURFACE AND CASCADE DRAIN LOCATIONS (PATH) & LENGTHS MIGHT BE VARIED ACCORDING TO ACTUAL SITE CONDITION.
2. LOCATION OF THE CATCHPITS MIGHT BE VARIED ACCORDING TO THE ACTUAL SITE CONDITION.
3. LOCATION AND LENGTH OF THE HORIZONTAL DRAINS MIGHT BE VARY ACCORDING TO THE ACTUAL SITE CONDITION.

EMPLOYER  
  
 DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

DESIGNER  
  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

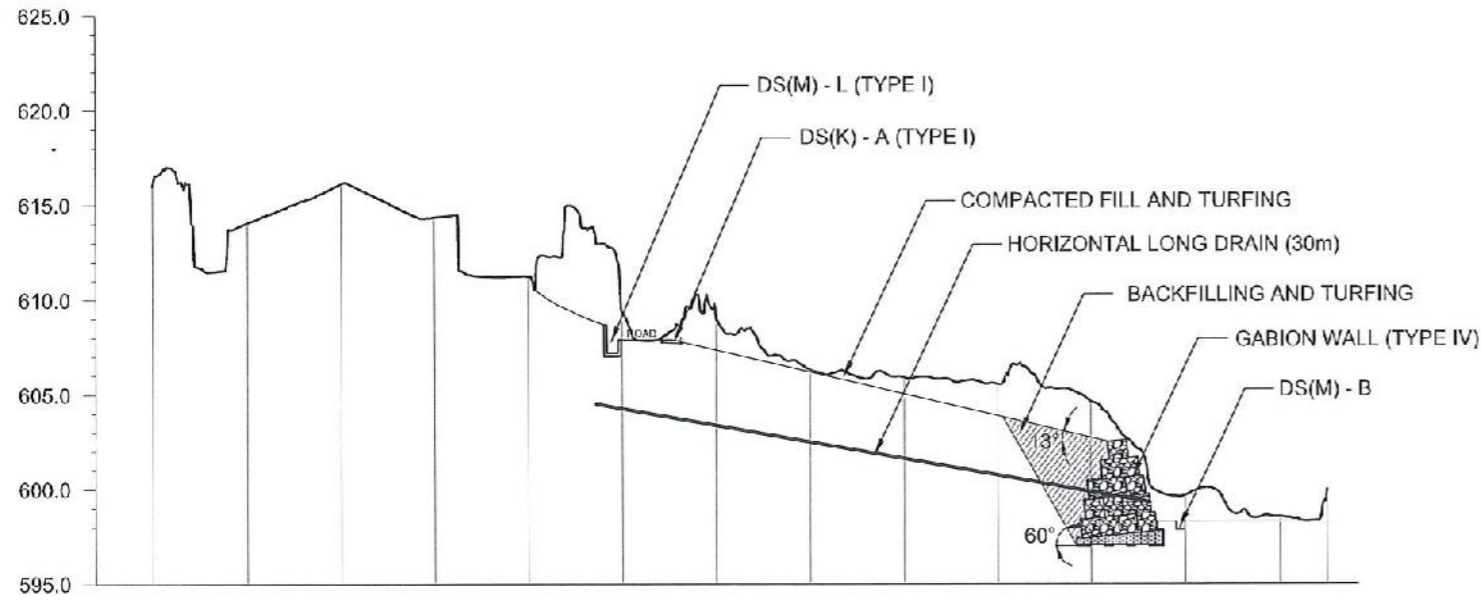
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 MASSANNA SCHOOL - RATHNAPURA

TITLE  
 DESIGN PLAN VIEW

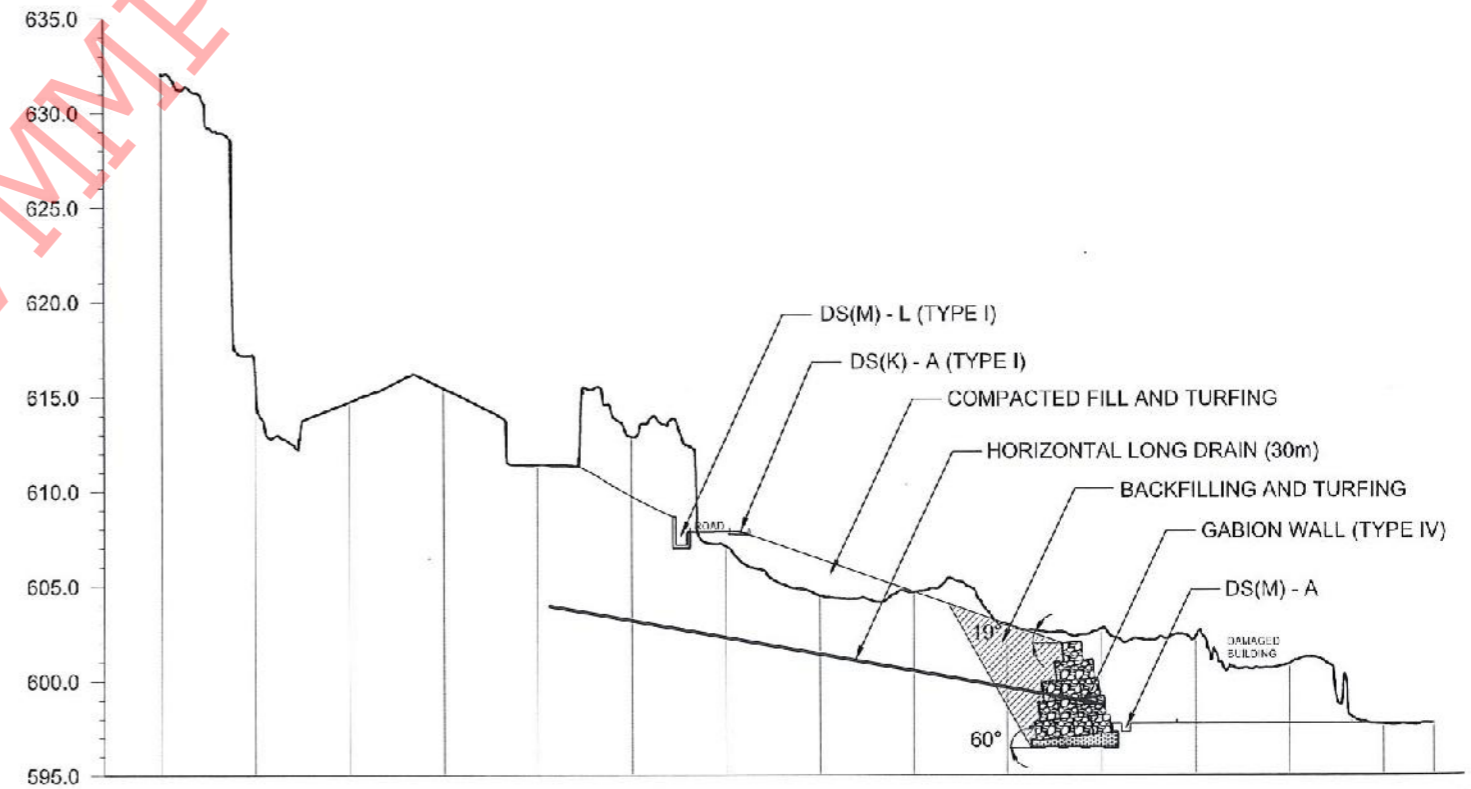
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PROJECT / DRAWING No.	RLV/MMP/WORKS/NCB/PHII/106-M/SDR-03	REVISION	00

DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	
DESIGNER	M.J.I.M. HARSHANI	
CHECKED	B.I. KUMARAGE	
RECOMMENDED	Prof. S.A.S. KULATHILAKA	
APPROVED	K.N. BANDARA	




GROUND LEVEL (m)	616.00	614.04	616.09	614.35	611.22	609.37	609.11	606.33	605.92	605.57	604.65	599.68	598.55	600.00
DISTANCE (m)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	60.00	62.53

CS A



GROUND LEVEL (m)	632.03	615.77	614.67	615.43	611.40	612.87	607.11	604.48	604.67	602.96	602.73	602.28	600.87	597.70	597.73
DISTANCE (m)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	60.00	65.00	67.66

CS B


**DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA**  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

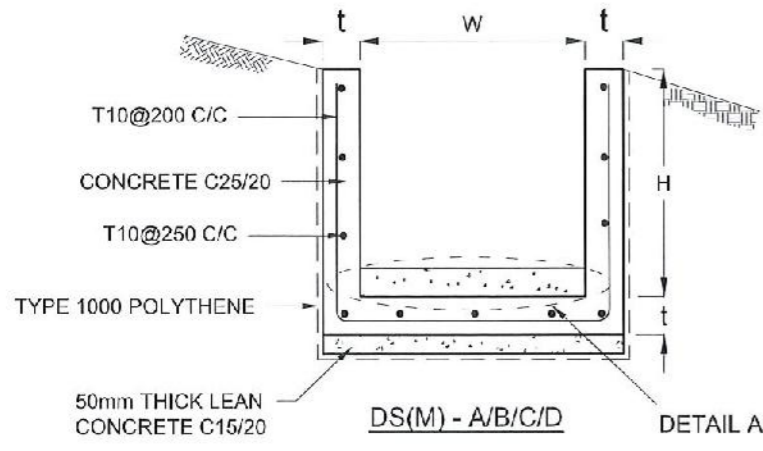
DESIGNER  
  
**DESIGN UNIT**  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 MASSANNA SCHOOL - RATINAPURA

TITLE  
 DESIGN CROSS SECTION  
 SCALE 1:600  
 DATE 15.06.2022  
 PROJECT / DRAWING No. RLVMM/WORKS/NCB/PHII/106-MS/DR-04  
 REVISION 00

DESCRIPTION	NAME	SIGNATURE
DRAWN	S A G.D. SENANAYAKA	
DESIGNER	M.H.M. HARSHANI	
CHECKED	B.I. KUMARAGE	
RECOMMENDED	Prof. S.A.S. KULATHILAKA	
APPROVED	K.N. BANDARA	



DRAIN TYPE	W (mm)	H (mm)	t (mm)
DS (M) - A/P	300	300	100
DS (M) - B/R	450	450	100
DS (M) - C/Q	600	600	100
DS (M) - D	750	750	125
DS (M) - E	900	900	150
DS (M) - F	1000	1000	150

**NOTES**

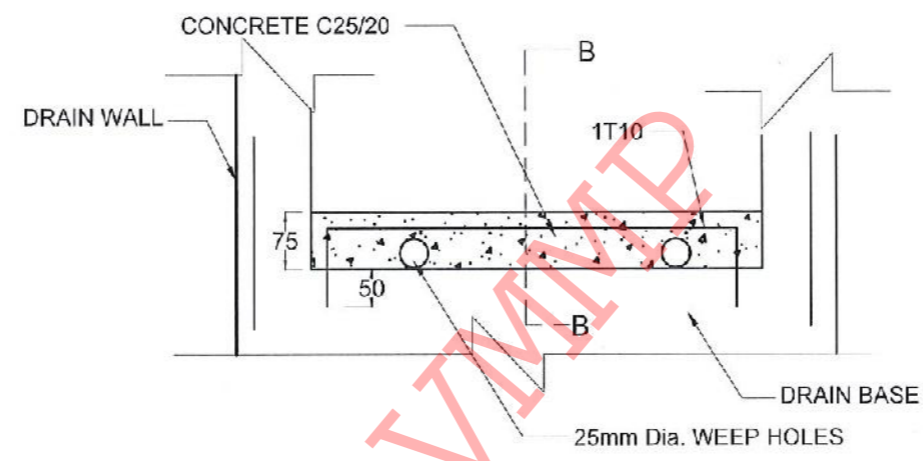
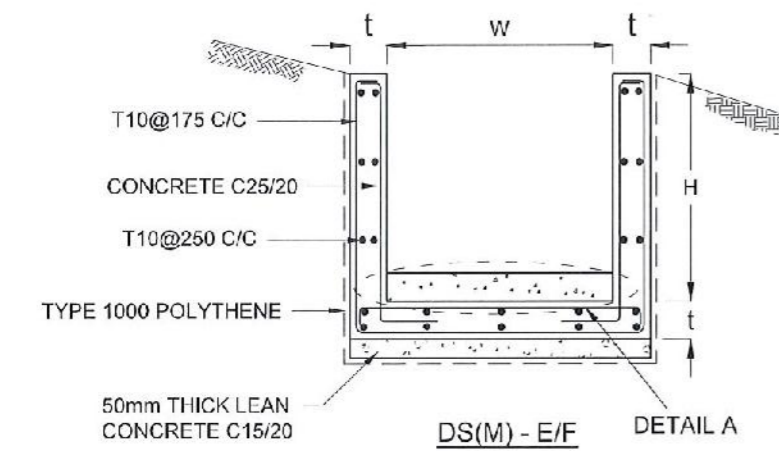
- DEPTH OF EXCAVATION MAY VARY ACCORDING TO SITE CONDITIONS.
- STEPS SHALL BE CONSTRUCTED AT SURFACE DRAIN ON SLOPING GROUND ACCORDING TO THE SITE CONDITIONS AS INSTRUCTED BY THE ENGINEER.
- ENERGY BREAKERS SHALL BE CONSTRUCTED AT THE STEEP DRAIN SEGMENTS AS PER THE INSTRUCTIONS OF THE ENGINEER.
- DOWELS SHALL BE INSTALLED ACCORDING TO THE GROUND CONDITIONS AS INSTRUCTED BY THE ENGINEER.
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED.
- 10 mm THICK EXPANSION JOINT SHALL BE INTRODUCED IN EVERY 5m INTERVAL.

**CONCRETE**

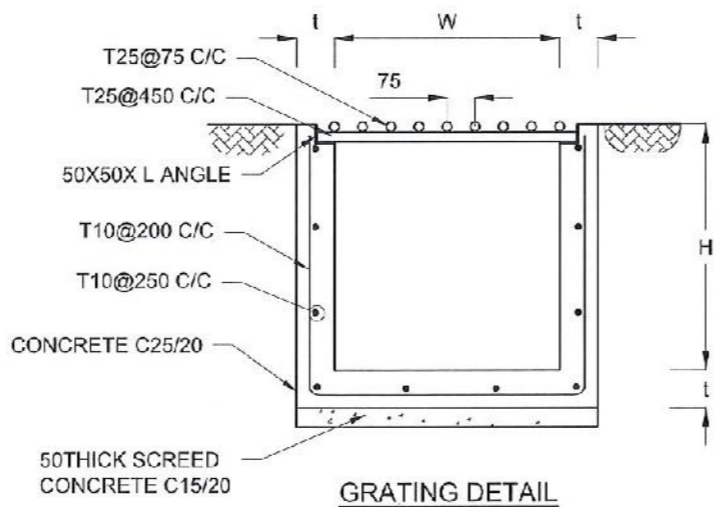
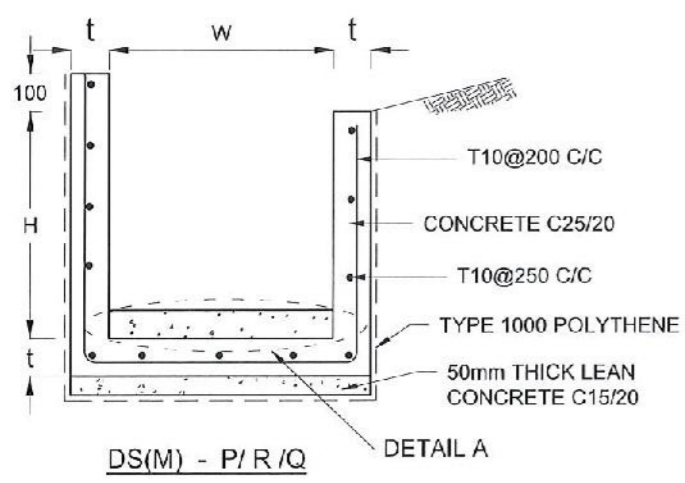
- USE FOLLOWING CONCRETE GRADES FOR STRUCTURE
  - [a] SCREED - C. 15/20
  - [b] WALLS / BASE / ENERGY BREAKERS - C. 25/20

**REINFORCEMENT**

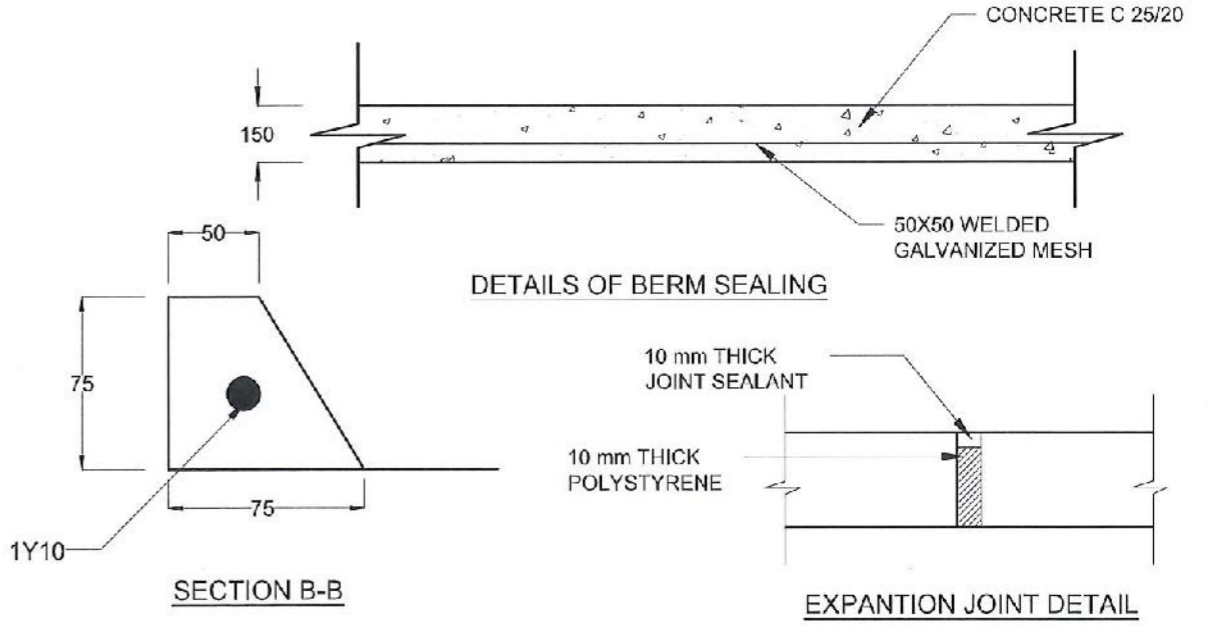
- ALL BARS MARKED "T" SHALL BE HIGH YIELD DEFORMED BARS OF YIELD STRENGTH NOT LESS THAN 460N/mm<sup>2</sup>.
- BARS OF CUT LENGTH LARGER THAN THE SUPPLIED LENGTH TO BE LAPPED FOR A LENGTH OF 50 x BAR DIA. AND LAPPING SHOULD BE STAGGERED.
- ANCHORAGE LENGTH SHOULD BE 40X BAR DIA.
- REINFORCEMENT BARS SHALL BE BENT IN ACCORDANCE WITH STANDARD SPECIFICATIONS.
- COVER TO REINFORCEMENT
  - [a] BURIED FACES AND DRAIN INVERTS - 40 mm
  - [b] ALL OTHER FACES - 25 mm



**DETAIL A - (ENERGY BREAKER AT 3M)**



**GRATING DETAIL**



**DETAILS OF BERM SEALING**

**SECTION B-B**

**EXPANSION JOINT DETAIL**

**EMPLOYER**  
 DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

**DESIGNER**  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

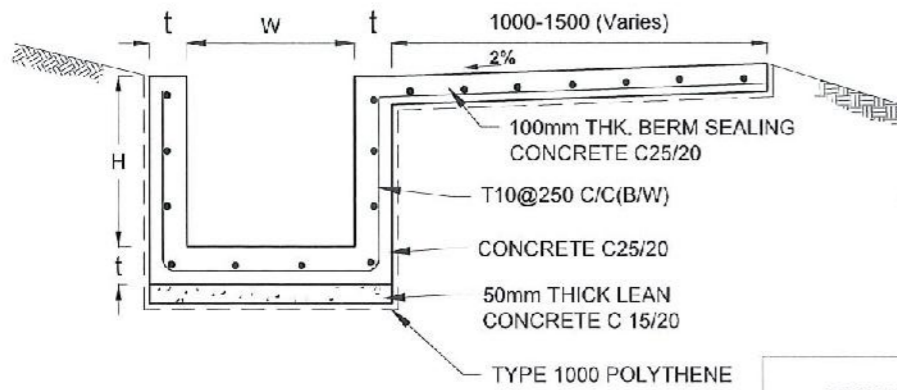
REV	DATE	REVISION DESCRIPTION	APPROVAL

**PROJECT TITLE**  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 MASSANNA SCHOOL - RATHNAPURA

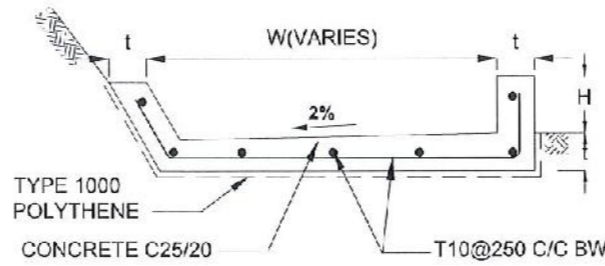
**TITLE**  
 DETAILS OF DRAINS  
 (SURFACE DRAIN -1 OF 2)

SCALE: N.T.S.      DATE: 15.06.2022  
 PROJECT / DRAWING No. RLVMP/WORKS/NCB/PHI/106-MS/DR-05a      REVISION: 00

DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	<i>[Signature]</i>
DESIGNER	M.H.M. HARSHANI	<i>[Signature]</i>
CHECKED	B.I. KUMARAGE	<i>[Signature]</i>
RECOMMENDED	Prof. S.A.S. KULATHILAKA	<i>[Signature]</i>
APPROVED	K.N. BANDARA	<i>[Signature]</i>



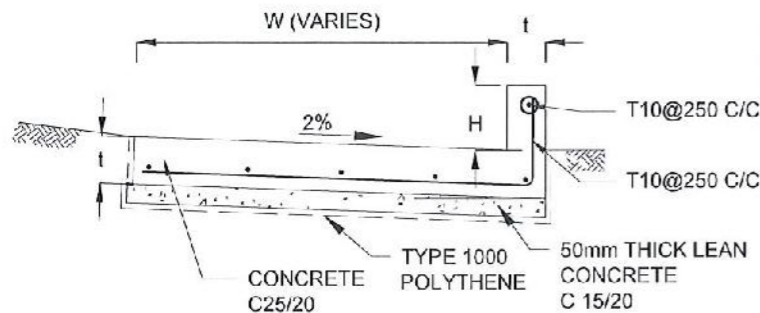
DS (B) - (TYPE I)



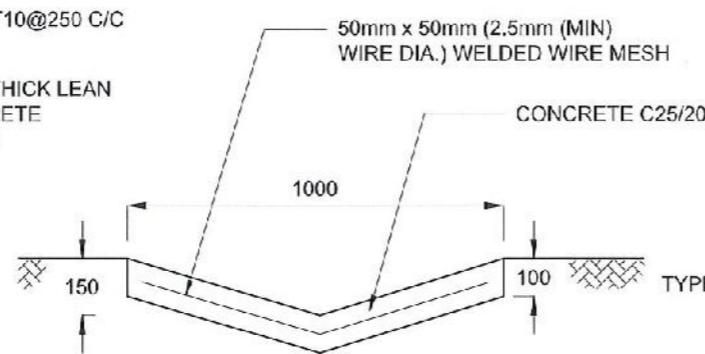
DS (B) - (TYPE II)

DRAIN TYPE	W (mm)	H (mm)	t (mm)
DS (K) - A	1000	200	100
DS (K) - B	1000	300	100
DS (K) - C	1150	200	200

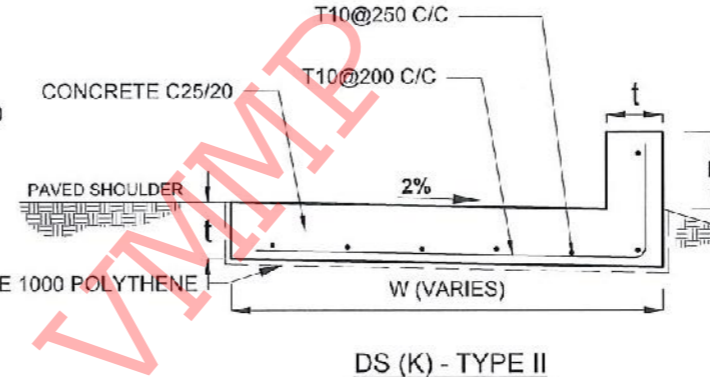
DRAIN TYPE	W (mm)	H (mm)	t (mm)
DS (B) - A	300	300	100
DS (B) - B	450	450	100
DS (B) - C	1000	150	100
DS (B) - D	1500	150	100
DS (B) - E	2000	150	100



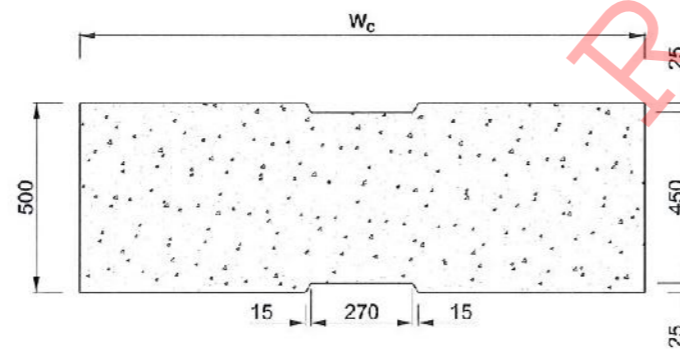
DS (K) - TYPE I



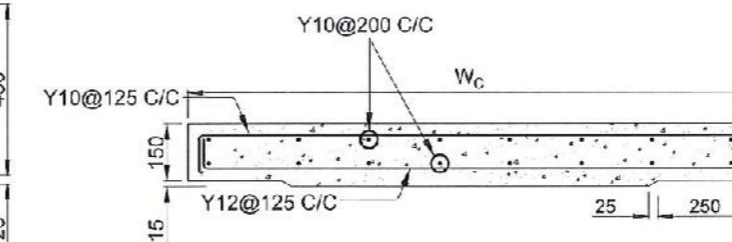
DS (D) - A (DISH DRAIN)



DS (K) - TYPE II



PLAN VIEW OF COVER SLAB



ACCESS & HEAVY DUTY COVER SLAB SECTION OF (W<sub>c</sub> x 500 x 150mm)

DS(M) - L	W (mm)	H' (mm)	l (mm)
TYPE I	600	600	150
TYPE II	800	800	150

NOTES

- DEPTH OF EXCAVATION MAY VARY ACCORDING TO SITE CONDITIONS.
- STEPS SHALL BE CONSTRUCTED AT SURFACE DRAIN ON SLOPING GROUND ACCORDING TO THE SITE CONDITIONS AS INSTRUCTED BY THE ENGINEER.
- ENERGY BREAKERS SHALL BE CONSTRUCTED AT THE STEEP DRAIN SEGMENTS AS PER THE INSTRUCTIONS OF THE ENGINEER.
- DOWELS SHALL BE INSTALLED ACCORDING TO THE GROUND CONDITIONS AS INSTRUCTED BY THE ENGINEER.
- COVER SLABS NEED TO BE PROVIDED ONLY FOR THE REGIONS AS INSTRUCTED BY THE ENGINEER.
- COVER SLAB WIDTH (W<sub>c</sub>) SHOULD BE TAKEN AS THE SUM OF DRAIN WIDTH AND 2x DRAIN WALL THICKNESS. [W<sub>c</sub> = W+2x t]
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED.
- 10 mm THICK EXPANSION JOINT SHALL BE INTRODUCED IN EVERY 5m INTERVAL.

CONCRETE

- USE FOLLOWING CONCRETE GRADES FOR STRUCTURE
  - [a] SCREED - C. 15/20
  - [b] WALLS / BASE / ENERGY BREAKERS - C. 25/20

REINFORCEMENT

- ALL BARS MARKED "T" SHALL BE HIGH YIELD DEFORMED BARS OF YIELD STRENGTH NOT LESS THAN 460N/mm<sup>2</sup>.
- BARS OF CUT LENGTH LARGER THAN THE SUPPLIED LENGTH TO BE LAPPED FOR A LENGTH OF 50 x BAR DIA. AND LAPPING SHOULD BE STAGGERED.
- ANCHORAGE LENGTH SHOULD BE 40X BAR DIA.
- REINFORCEMENT BARS SHALL BE BENT IN ACCORDANCE WITH STANDARD SPECIFICATIONS.
- COVER TO REINFORCEMENT
  - [a] BURIED FACES AND DRAIN INVERTS - 40 mm
  - [b] ALL OTHER FACES - 25 mm

EMPLOYER  
 DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

DESIGNER  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

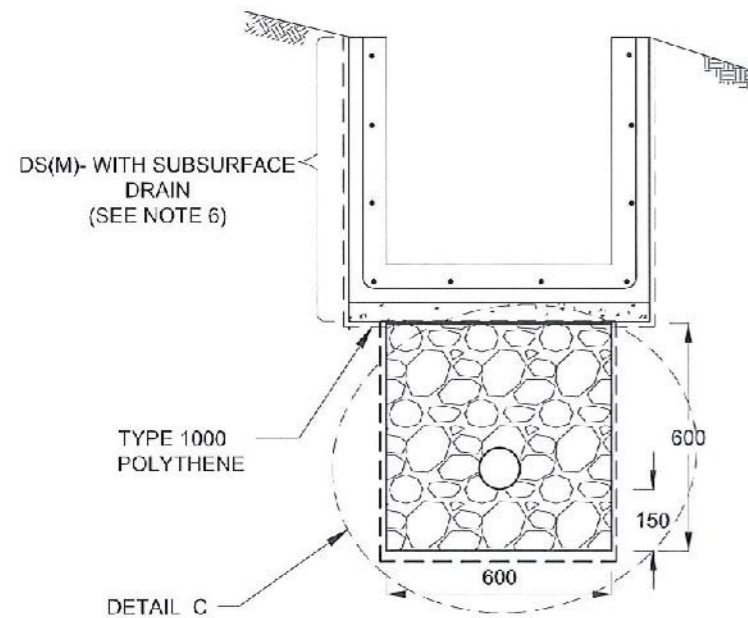
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 MASSANNA SCHOOL - RATHNAPURA

TITLE  
 DETAILS OF DRAINS  
 (SURFACE DRAIN - 2 OF 2)

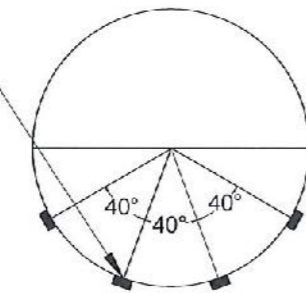
SCALE | N.T.S | DATE | 15.06.2022  
 PROJECT / DRAWING No. | RLVWMP/WORKS/NCB/PH11/106-MS/DR-05b | REVISION | 00

DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	
DESIGNER	M.H.M. HARSHANI	
CHECKED	B.I. KUMARAGE	
RECOMMENDED	Prof. S.A.S. KULATHILAKA	
APPROVED	K.N. BANDARA	

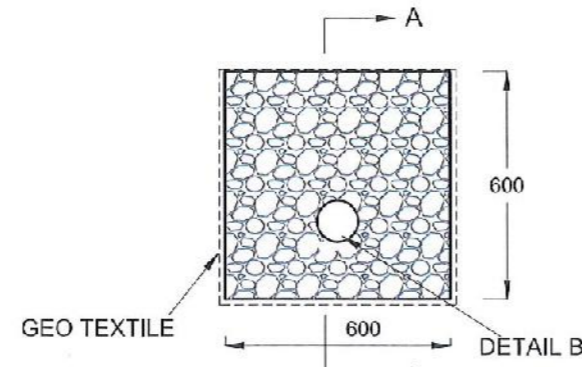


**SUBSURFACE DRAIN  
[DS (S) -A]**

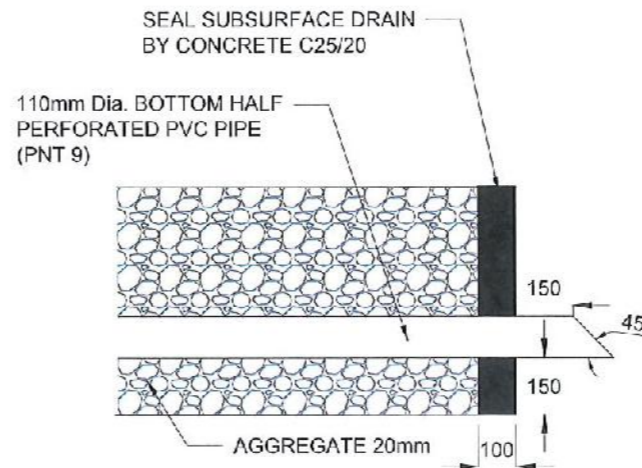
100mm x 5mm  
Groove



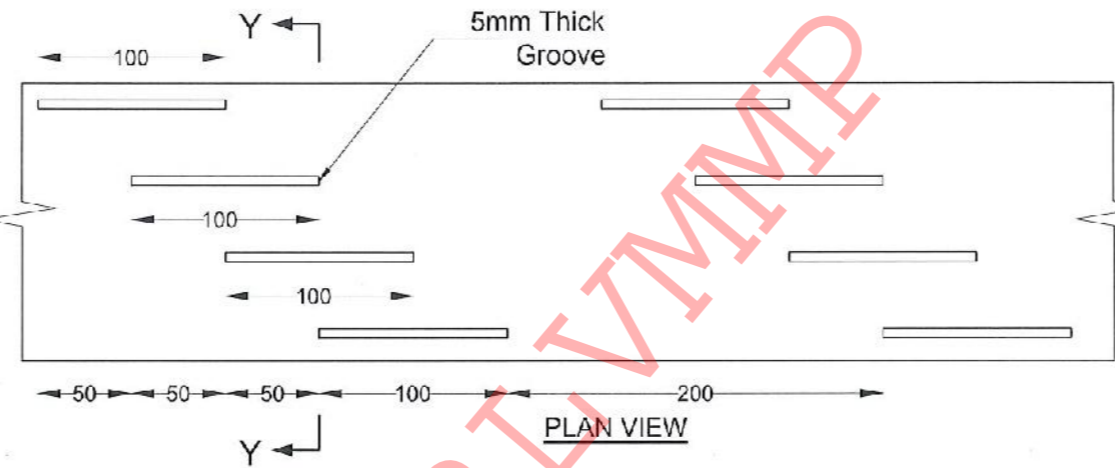
**SECTION Y - Y**



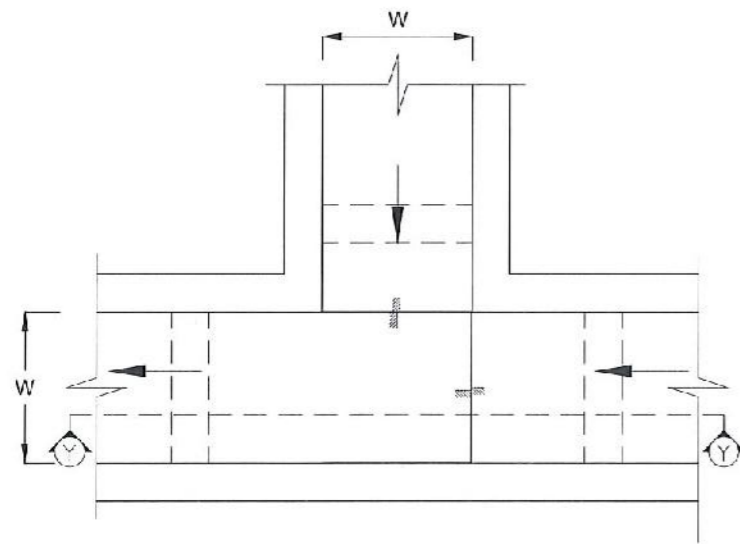
**DETAIL C / DS (S) -A**



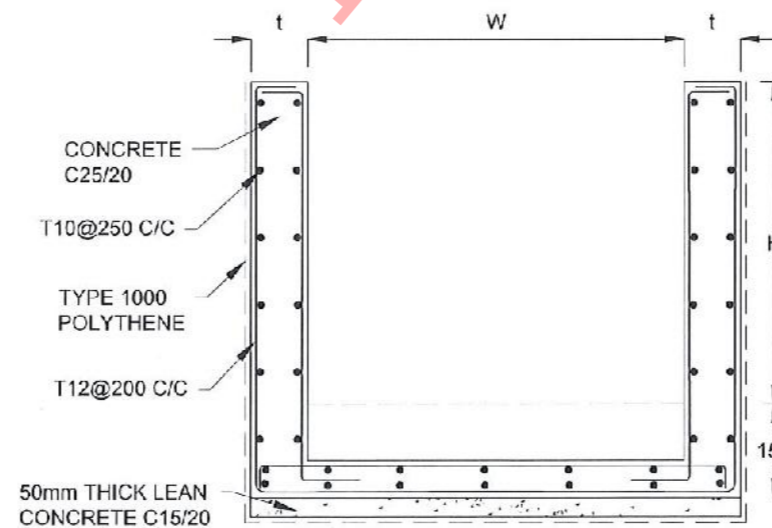
**SECTION A-A  
(OUTLET DETAIL SUBSURFACE DRAIN)**



**DETAIL - B (PERFORATED PIPE FOR SUB-SURFACE DRAINS)**



**PLAN VIEW OF CATCH PIT (CP)**



**SECTION Y-Y (CP - R)**

**NOTES**

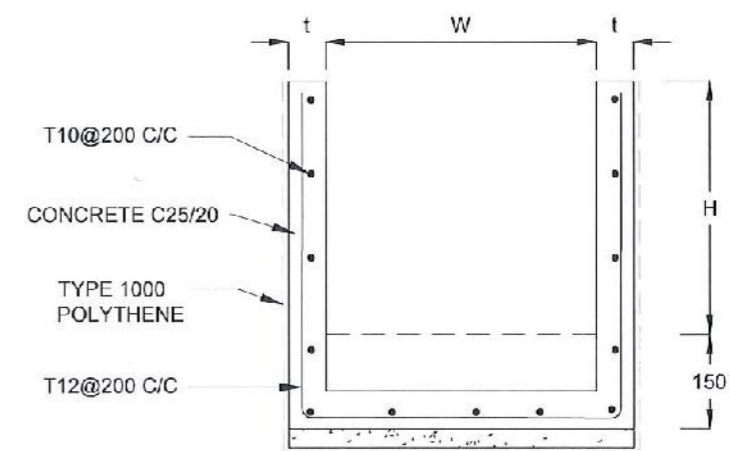
1. W,H,t : SHALL BE THE SAME AS RESPECTIVE DRAIN SECTION.
2. CP - R SHALL BE USED WHERE H > = 900mm
3. DEPTH OF EXCAVATION MAY VARY ACCORDING TO SITE CONDITIONS.
4. DOWELS SHALL BE INSTALLED ACCORDING TO THE GROUND CONDITIONS AS INSTRUCTED BY THE ENGINEER.
5. 10 mm THICK EXPANSION JOINT SHALL BE INTRODUCED IN EVERY 5m INTERVAL.
6. DETAILS OF SURFACE DRAIN PORTION OF THE SUBSURFACE DRAINS SHALL BE AS PER DS(M), DS(B), DS(K) OR DS(C) SECTIONS ACCORDINGLY.
7. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED.

**CONCRETE**

8. USE FOLLOWING CONCRETE GRADES FOR STRUCTURE
  - [a] SCREED - C. 15/20
  - [b] WALLS / BASE / ENERGY BREAKERS - C. 25/20

**REINFORCEMENT**

9. ALL BARS MARKED "T" SHALL BE HIGH YIELD DEFORMED BARS OF YIELD STRENGTH NOT LESS THAN 460N/mm<sup>2</sup>.
10. BARS OF CUT LENGTH LARGER THAN THE SUPPLIED LENGTH TO BE LAPPED FOR A LENGTH OF 50 x BAR DIA. AND LAPPING SHOULD BE STAGGERED.
11. ANCHORAGE LENGTH SHOULD BE 40X BAR DIA.
12. REINFORCEMENT BARS SHALL BE BENT IN ACCORDANCE WITH STANDARD SPECIFICATIONS.
13. COVER TO REINFORCEMENT
  - [a] BURIED FACES AND DRAIN INVERTS - 40 mm
  - [b] ALL OTHER FACES - 25 mm



**SECTION Y - Y**

**EMPLOYER**  
 DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

**DESIGNER**  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

REV	DATE	REVISION DESCRIPTION	APPROVAL

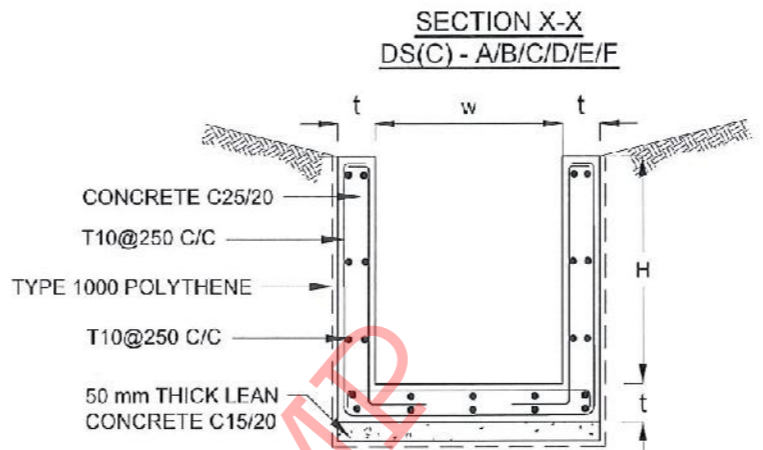
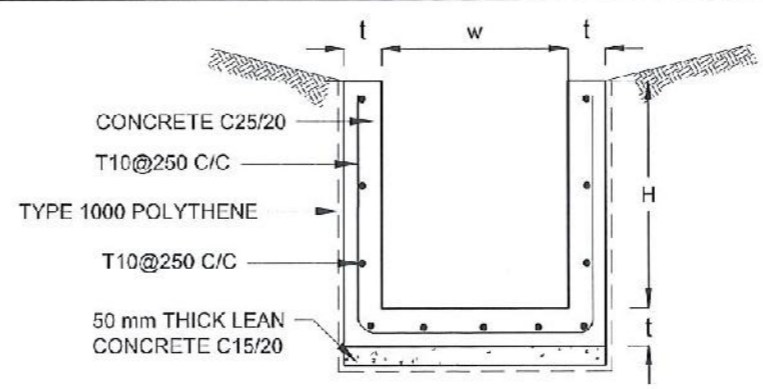
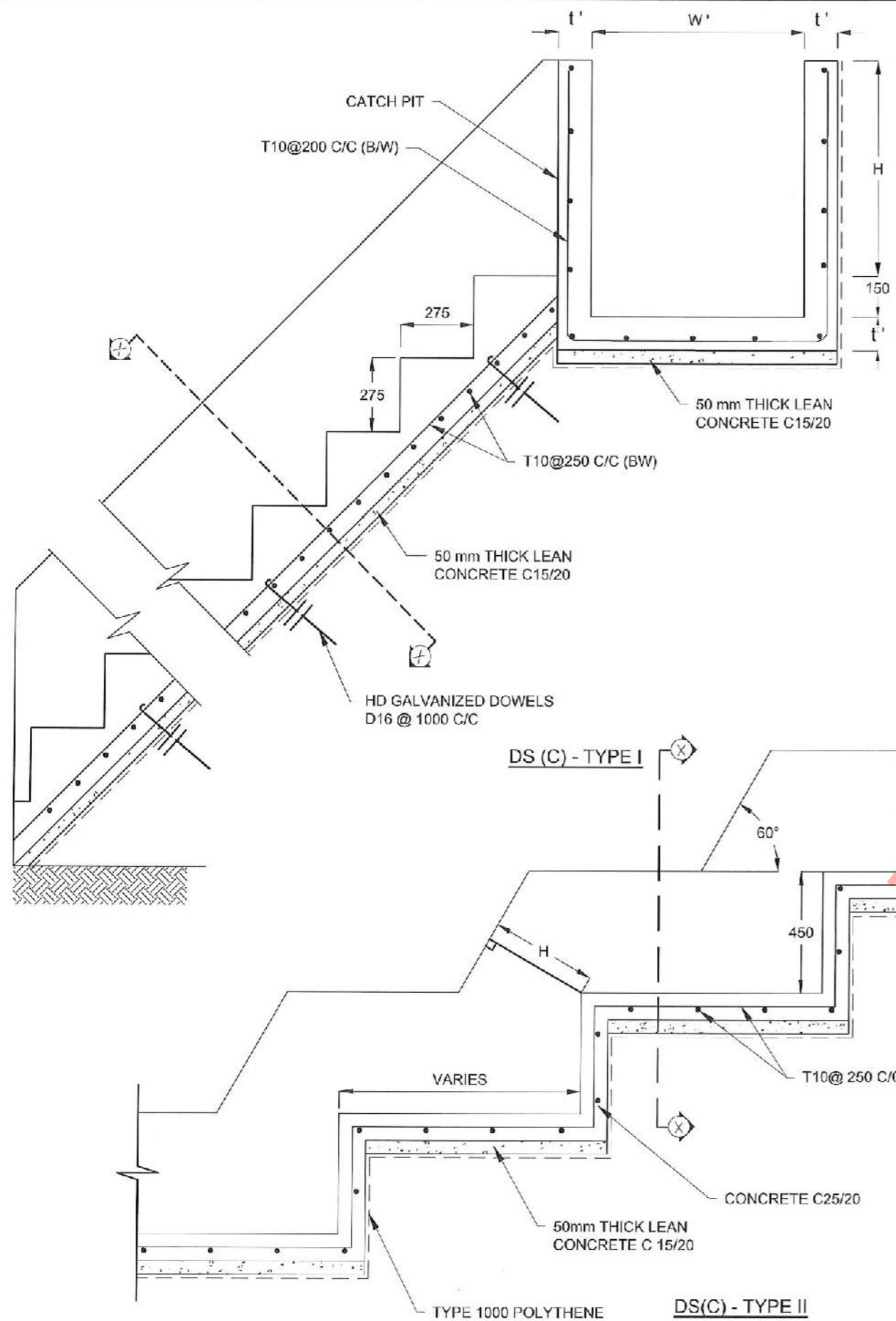
**PROJECT TITLE**  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 MASSANNA SCHOOL - RATHNAPURA

**TITLE**  
 DETAILS OF DRAINS  
 (SUBSURFACE DRAIN AND CATCHPIT)

SCALE: N.T.S. DATE: 15.05.2022  
 PROJECT / DRAWING No. RLVMMP/WORKS/NCE/PHI/103-MS/DR-05c REVISION: 00

DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	
DESIGNER	M.H.M. HARSHANI	
CHECKED	B.I. KUMARAGE	
RECOMMENDED	Prof. S.A.S. KULATHILAKA	
APPROVED	K.N. BANDARA	





**NOTES**

1. USE EITHER TYPE I OR TYPE II CASCADE DRAIN ACCORDING TO THE ACTUAL GROUND CONDITION AS INSTRUCTED BY THE ENGINEER.
2. LENGTH OF THE STEPS OF CASCADE WILL BE VARIED ACCORDING TO THE SITE CONDITIONS.
3. DEPTH OF EXCAVATION SHALL BE VARIED ACCORDING TO SITE CONDITIONS.
4. DOWELS SHALL BE INSTALLED ACCORDING TO THE GROUND CONDITIONS AS INSTRUCTED BY THE ENGINEER.
5. 10 mm THICK EXPANSION JOINT SHALL BE INTRODUCED IN EVERY 5m INTERVAL.
6. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED.

**CONCRETE**

7. USE FOLLOWING CONCRETE GRADES FOR STRUCTURE
  - [a] SCREED - C. 15/20
  - [b] WALLS / BASE / ENERGY BREAKERS - C. 25/20

**REINFORCEMENT**

8. ALL BARS MARKED "T" SHALL BE HIGH YIELD DEFORMED BARS OF YIELD STRENGTH NOT LESS THAN 460N/mm<sup>2</sup>.
9. BARS OF CUT LENGTH LARGER THAN THE SUPPLIED LENGTH TO BE LAPPED FOR A LENGTH OF 50 x BAR DIA. AND LAPPING SHOULD BE STAGGERED.
10. ANCHORAGE LENGTH SHOULD BE 40X BAR DIA.
11. REINFORCEMENT BARS SHALL BE BENT IN ACCORDANCE WITH STANDARD SPECIFICATIONS.
12. COVER TO REINFORCEMENT
  - [a] BURIED FACES AND DRAIN INVERTS - 40 mm
  - [b] ALL OTHER FACES - 25 mm

DRAIN TYPE	W (mm)	H (mm)	t (mm)	W' (mm)	t' (mm)
DS (C) - A	450	450	100	600	100
DS (C) - B	450	600	100	750	100
DS (C) - C	600	600	100	800	100
DS (C) - D	750	750	100	800	100
DS (C) - E	800	800	125	1000	125
DS (C) - F	1000	750	125	1200	125
DS (C) - G	1200	1000	125	1300	125

EMPLOYER  
  
 DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

DESIGNER  
  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

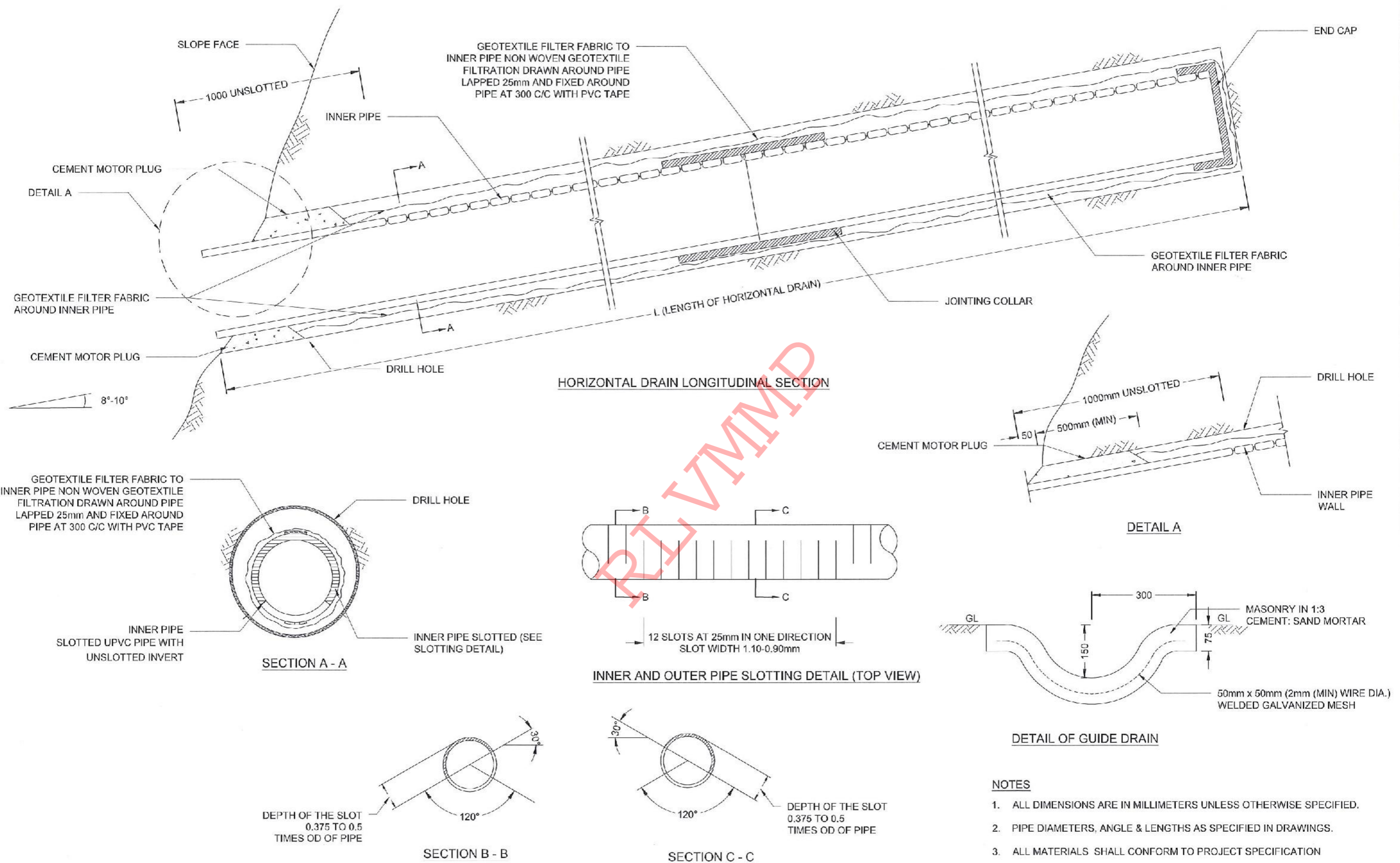
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 MASSANNA SCHOOL - RATHINAPURA

TITLE  
 DETAILS OF DRAINS  
 (CASCADE DRAIN)


DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	
DESIGNER	M.H.M. HARSHANI	
CHECKED	B.I. KUMARAGE	
RECOMMENDED	Prof. S.A.S. KULATHILAKA	
APPROVED	K.N. BANDARA	

SCALE | N.T.S. | DATE | 15.06.2022  
 PROJECT / DRAWING No. | RLVMMP/WORKS/NCB/FH/105-MS/DR-05d | REVISION | 00



**NOTES**

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. PIPE DIAMETERS, ANGLE & LENGTHS AS SPECIFIED IN DRAWINGS.
3. ALL MATERIALS SHALL CONFORM TO PROJECT SPECIFICATION

EMPLOYER  
  
**DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA**  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

DESIGNER  
  
**DESIGN UNIT**  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

REV	DATE	REVISION DESCRIPTION	APPROVAL

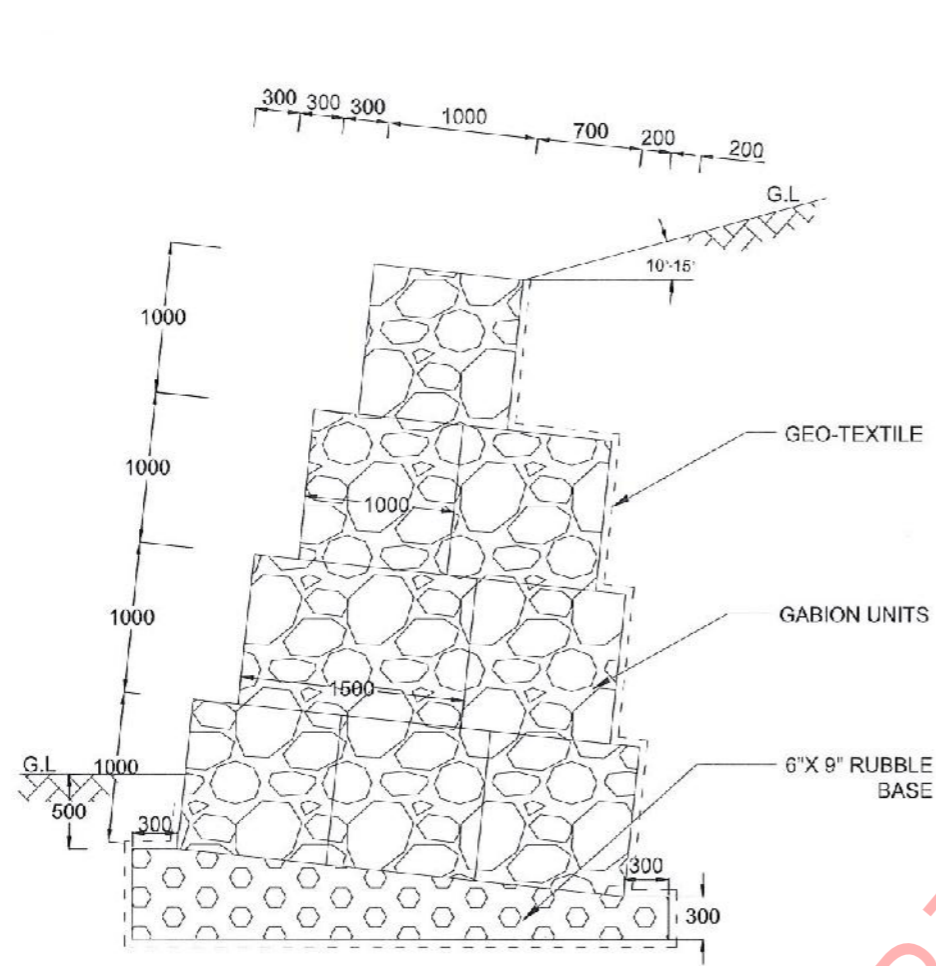
PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 MASSANNA SCHOOL - RATHNAPURA

TITLE  
 DETAILS OF HORIZONTAL DRAIN  
 SECTIONS

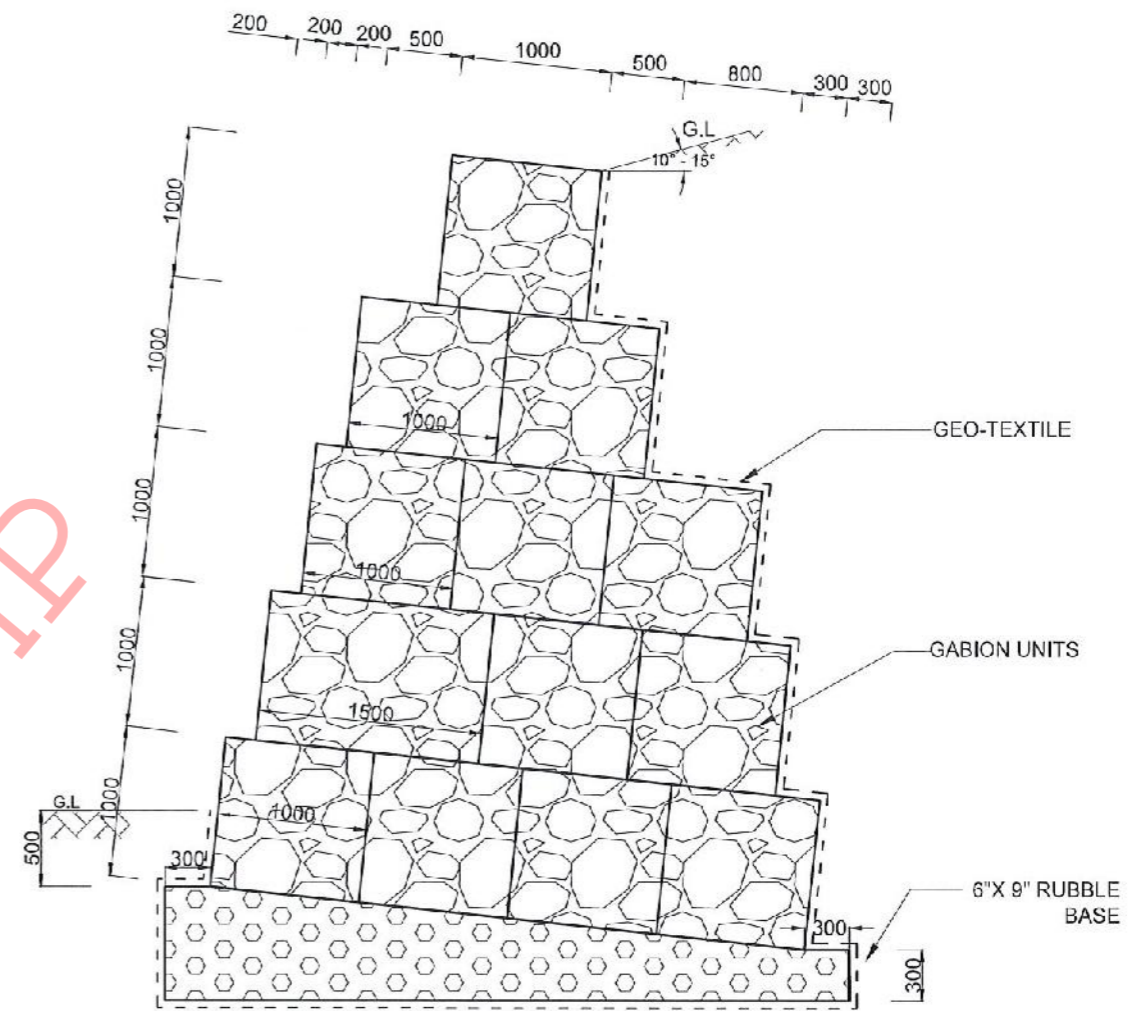
SCALE	N.T.S	DATE	15.06.2022
PROJECT / DRAWING No.	RI/VMMPW/WORKS/NCB/PHII/106 MS/DR-06	REVISION	00

DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	
DESIGNER	M.H.M. HARSHANI	
CHECKED	R.I. KUMARAGE	
RECOMMENDED	Prof. S.A.S. KULATHILAKA	
APPROVED	K.N. BANDARA	

E  
E



GABION WALL  
TYPE III





GABION WALL  
TYPE IV

RLVMMP

NOTES

1. ALL DIMENSIONS ARE IN MILIMETERS.
2. BACKSLOPE ANGLE , LEVEL AND FORM MAY VARY AS PER THE DESIGN AT EACH SITE.

EMPLOYER  DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT NATIONAL BUILDING RESEARCH ORGANISATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	DESIGNER  DESIGN UNIT NATIONAL BUILDING RESEARCH ORGANIZATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	REV	DATE	REVISION DESCRIPTION	APPROVAL	PROJECT TITLE REDUCTION OF LANDSLIDE VULNERABILITY BY MITIGATION MEASURES MASSANNA SCHOOL - RATHNAPURA	TITLE DETAILS OF GABION WALL	DESCRIPTION	NAME	SIGNATURE				
									SCALE	N.T.S	DATE	15.05.2022		
								PROJECT / DRAWING No.	RLVMMP/WORKS/NCB/PH/III/105-MS/DR-07	REVISION	00			
								RECOMMENDED	Prof. S.A.S. KULATHILAKA					
								APPROVED	K.N. BANDARA					


# SURVEY DRAWINGS

RLVIMP



REFERENCE

- P - PERMENENT BUILDING
- CDN - CONCRETE DRAIN
- RDA - RDA BOUNDARY MARK
- WF - WIRE FENCE
- BT - BANK TOP
- BB - BOTTOM OF BANK
- BW - BOUNDARY WALL
- RW - RETAINING WALL
- EP - ELECTRIC POST
- WC - WATER CLOSET
- CUL - CULVERT
- G - GATE
- ST - SEPTIC TANK

EMPLOYER  
  
**DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA**  
**STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT**  
**NATIONAL BUILDING RESEARCH ORGANISATION**  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

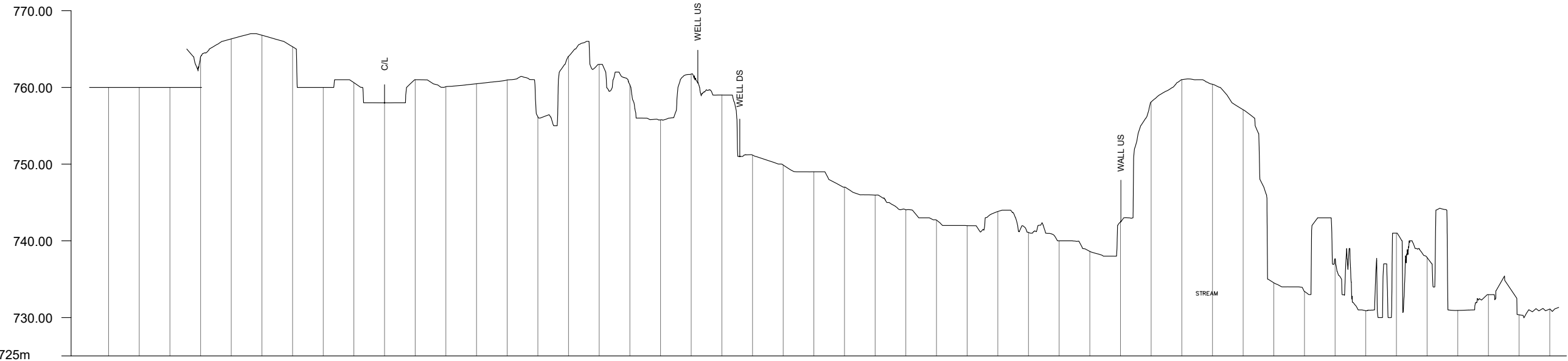
DESIGNER  
  
**DESIGN UNIT**  
**NATIONAL BUILDING RESEARCH ORGANIZATION**  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

REV	DATE	REVISION DESCRIPTION	APPROVAL

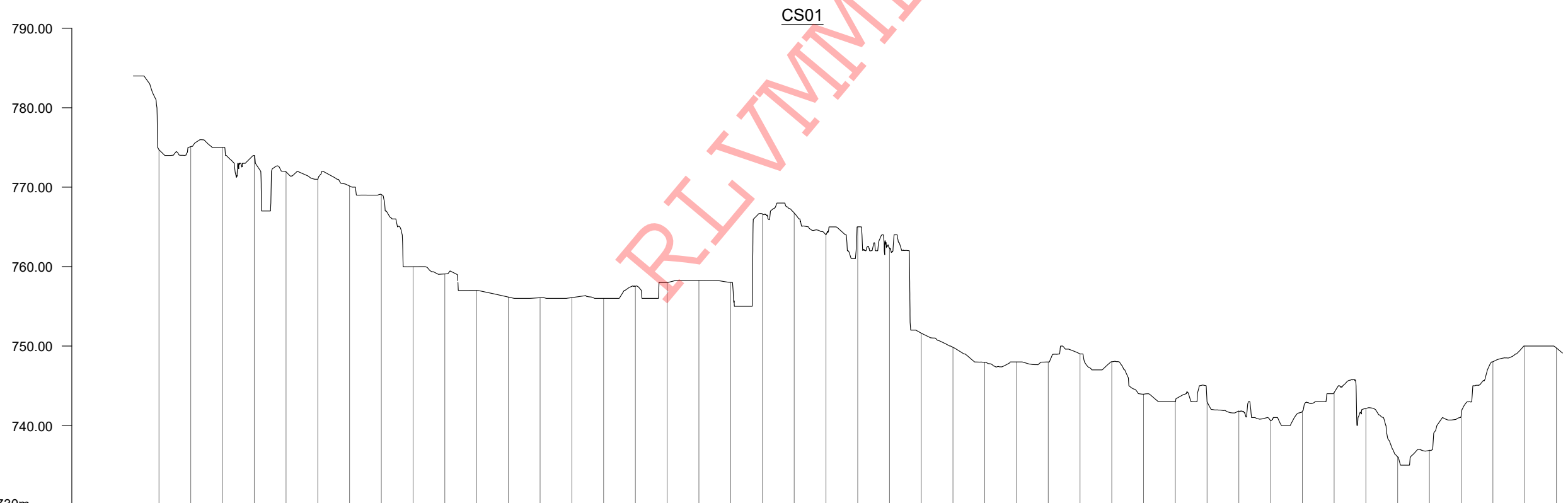
PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
**WALEBODA SCHOOL**  
**AT RATHNAPURA**

TITLE		DATE	
SURVEY PLAN VIEW		04.07.2022	
SCALE	1:750	PROJECT / DRAWING No.	REVISION
		RLVMMMP/WORKS/NCB/PH11/062-WB/DR-01	00

DESCRIPTION	NAME	SIGNATURE
CHECKED	T. THILAKARATHNA	




DATUM 725m	
GROUND LEVEL (m)	764.01, 766.32, 766.80, 765.30, 760.00, 760.62, 757.99, 761.00, 760.10, 760.48, 760.97, 756.17, 764.05, 763.00, 760.34, 755.76, 761.74, 759.01, 751.18, 749.88, 749.00, 747.00, 745.96, 744.05, 742.70, 741.98, 743.83, 741.09, 740.00, 738.63, 742.46, 758.11, 761.01, 760.41, 757.09, 734.53, 733.41, 737.67, 730.89, 741.00, 737.82, 730.93, 732.99, 730.36, 731.11
DISTANCE (m)	36.00, 32.00, 28.00, 24.00, 20.00, 16.00, 12.00, 8.00, 4.00, 0, -4.00, -8.00, -12.00, -16.00, -20.00, -24.00, -28.00, -32.00, -36.00, -40.00, -44.00, -48.00, -52.00, -56.00, -60.00, -64.00, -68.00, -72.00, -76.00, -80.00, -84.00, -88.00, -92.00, -96.00, -100.00, -104.00, -108.00, -112.00, -116.00, -120.00, -124.00, -128.00, -132.00, -136.00, -140.00, -144.00, -148.00, -152.00



DATUM 730m	
GROUND LEVEL (m)	774.72, 775.10, 775.00, 774.00, 771.93, 771.00, 770.15, 769.07, 759.99, 759.08, 757.00, 756.17, 756.08, 756.10, 756.00, 757.53, 758.00, 758.25, 758.01, 766.63, 766.75, 764.02, 765.00, 762.33, 751.63, 749.82, 747.96, 748.00, 748.00, 749.01, 748.03, 743.94, 743.00, 742.99, 741.82, 740.60, 741.79, 744.14, 742.16, 736.04, 736.86, 741.22, 748.03, 750.00, 749.76
DISTANCE (m)	56.00, 52.00, 48.00, 44.00, 40.00, 36.00, 32.00, 28.00, 24.00, 20.00, 16.00, 12.00, 8.00, 4.00, 0, -4.00, -8.00, -12.00, -16.00, -20.00, -24.00, -28.00, -32.00, -36.00, -40.00, -44.00, -48.00, -52.00, -56.00, -60.00, -64.00, -68.00, -72.00, -76.00, -80.00, -84.00, -88.00, -92.00, -96.00, -100.00, -104.00, -108.00, -112.00, -116.00, -120.00

CS02

EMPLOYER



**DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA**  
**STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT**  
**NATIONAL BUILDING RESEARCH ORGANISATION**  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

DESIGNER



**DESIGN UNIT**  
**NATIONAL BUILDING RESEARCH ORGANIZATION**  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE

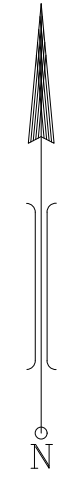
REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
**WALEBODA SCHOOL**  
**AT RATHNAPURA**

TITLE

SURVEY CROSS SECTION

SCALE	1:600	DATE	04.07.2022
PROJECT / DRAWING No.	RLVMMP/WORKS/NCB/PHII/062-WB/DR-02	REVISION	00

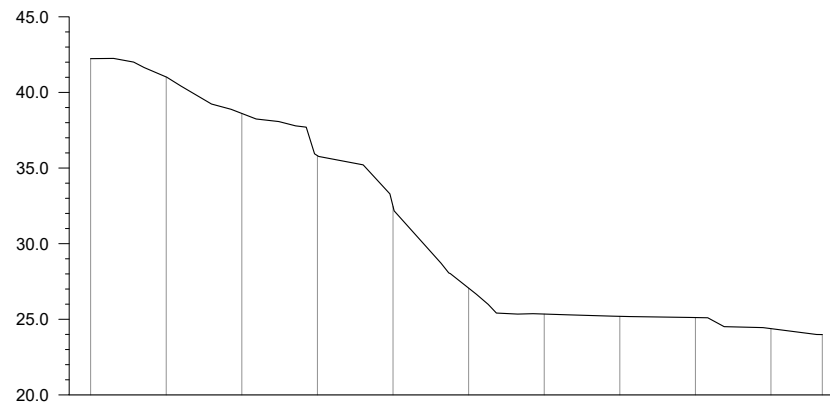
DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	
DESIGNER	T. THILAKARATHNA	
CHECKED	B.I. KUMARAGE	
RECOMMENDED	Prof. S.A.S. KULATHILAKA	
APPROVED	K.N. BANDARA	



**REFERENCE**

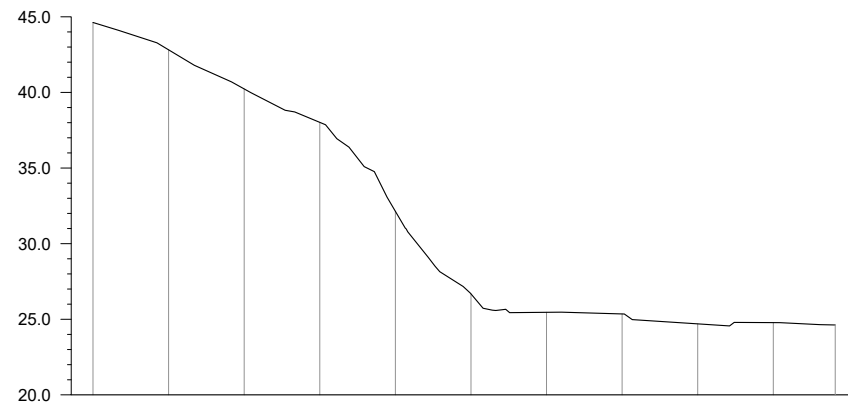
- P - PERMANENT BUILDING
- BB - BOTTOM OF BANK
- BT - TOP OF BANK
- CDN - CONCRETE DRAIN
- ST - SEPTIC TANK
- WC - WATER CLOSET
- RW - RETAINING WALL
- BM - BOUNDARY MARK
- CUL - CULVERT
- EP - ELECTRIC POLE
- BW - BOUNDARY WALL
- CP - CONCRETE POST

<b>DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA</b> STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT NATIONAL BUILDING RESEARCH ORGANISATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	<b>DESIGN UNIT</b> NATIONAL BUILDING RESEARCH ORGANIZATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	REV	DATE	REVISION DESCRIPTION	APPROVAL	PROJECT TITLE  REDUCTION OF LANDSLIDE VULNERABILITY BY MITIGATION MEASURES FOREST OFFICE - RATHNAPURA	TITLE  SURVEY PLAN VIEW	DESCRIPTION	NAME	SIGNATURE	
								SCALE	1:600	DATE	25.04.2022
								PROJECT / DRAWING No.	RLVMP/WORKS/NCB/PHII/065-FO/DR-01	REVISION	00



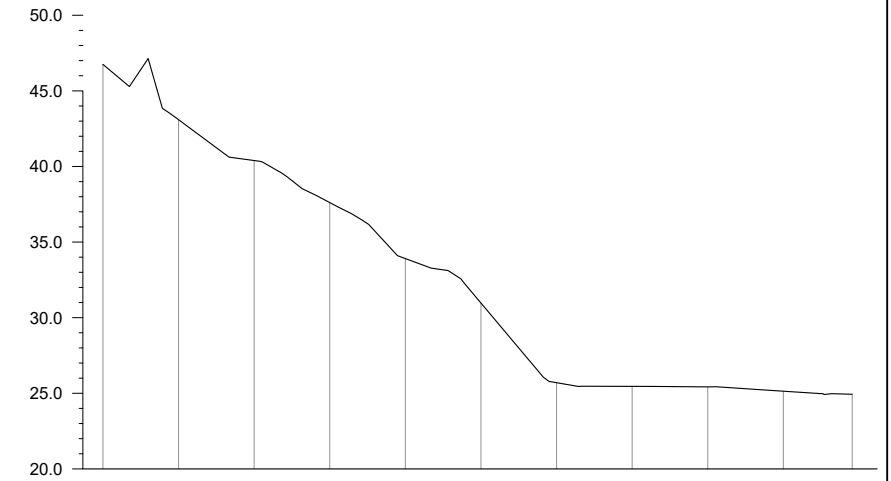
GROUND LEVEL (m)	42.234	41.019	38.609	35.818	32.463	27.059	25.343	25.195	25.114	24.381	23.985
DISTANCE (m)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	48.40

CS02

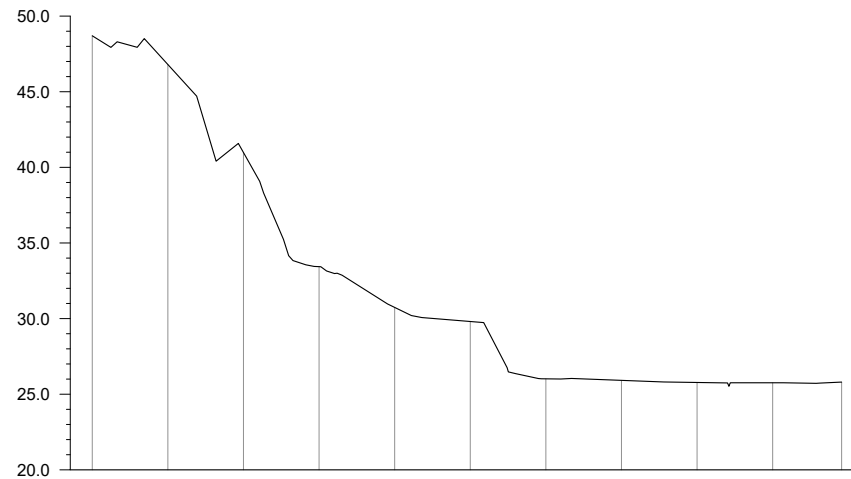


GROUND LEVEL (m)	44.626	42.819	40.230	38.018	32.140	26.680	25.462	25.352	24.694	24.779	24.620
DISTANCE (m)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	49.10

CS03

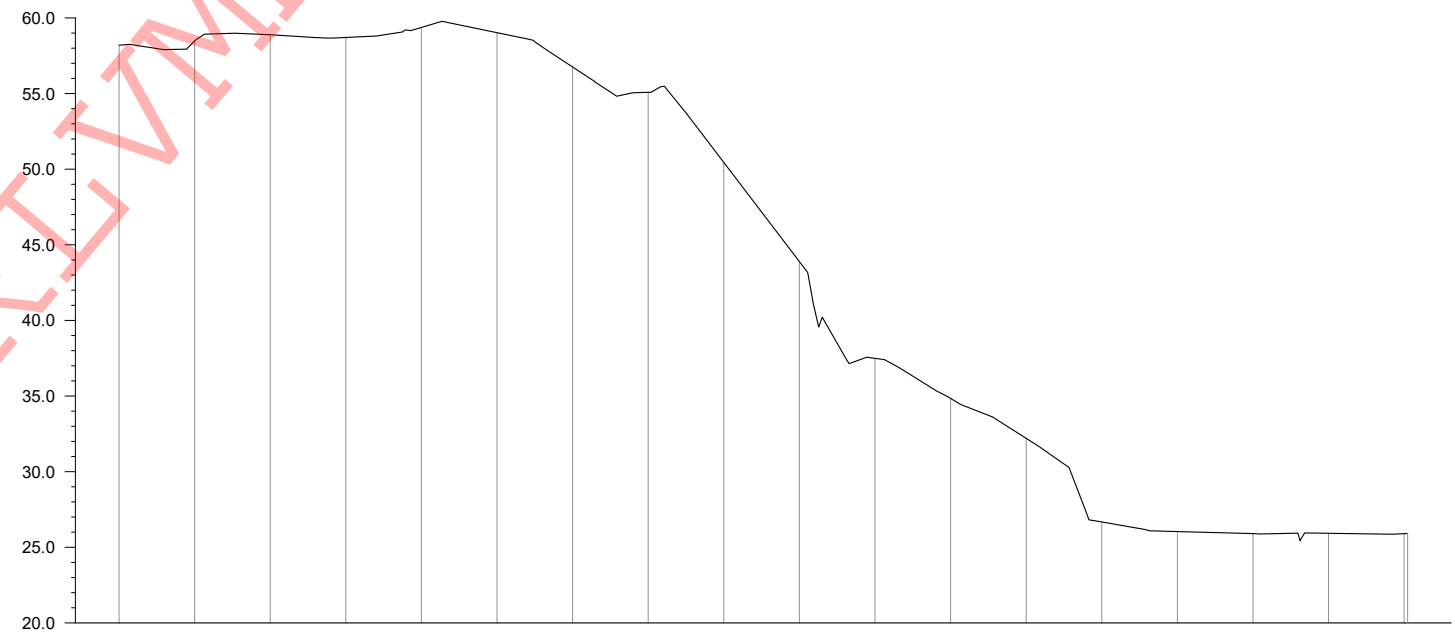


GROUND LEVEL (m)	44.749	43.097	40.395	37.613	33.910	30.968	25.700	25.457	25.423	25.139	24.939
DISTANCE (m)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	49.10



GROUND LEVEL (m)	48.702	46.802	40.982	33.437	30.739	29.809	26.019	25.917	25.777	25.756	25.800
DISTANCE (m)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	49.56


CS06



GROUND LEVEL (m)	58.195	58.485	58.891	58.709	59.374	59.028	56.758	55.082	50.446	43.892	37.491	34.840	32.203	26.676	26.039	25.901	25.926	25.900	25.911
DISTANCE (m)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	60.00	65.00	70.00	75.00	80.00	85.00	85.23

CS07

EMPLOYER



**DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA**  
**STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT**  
**NATIONAL BUILDING RESEARCH ORGANISATION**  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

DESIGNER



**DESIGN UNIT**  
**NATIONAL BUILDING RESEARCH ORGANIZATION**  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE

**REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 FOREST OFFICE - RATHNAPURA**

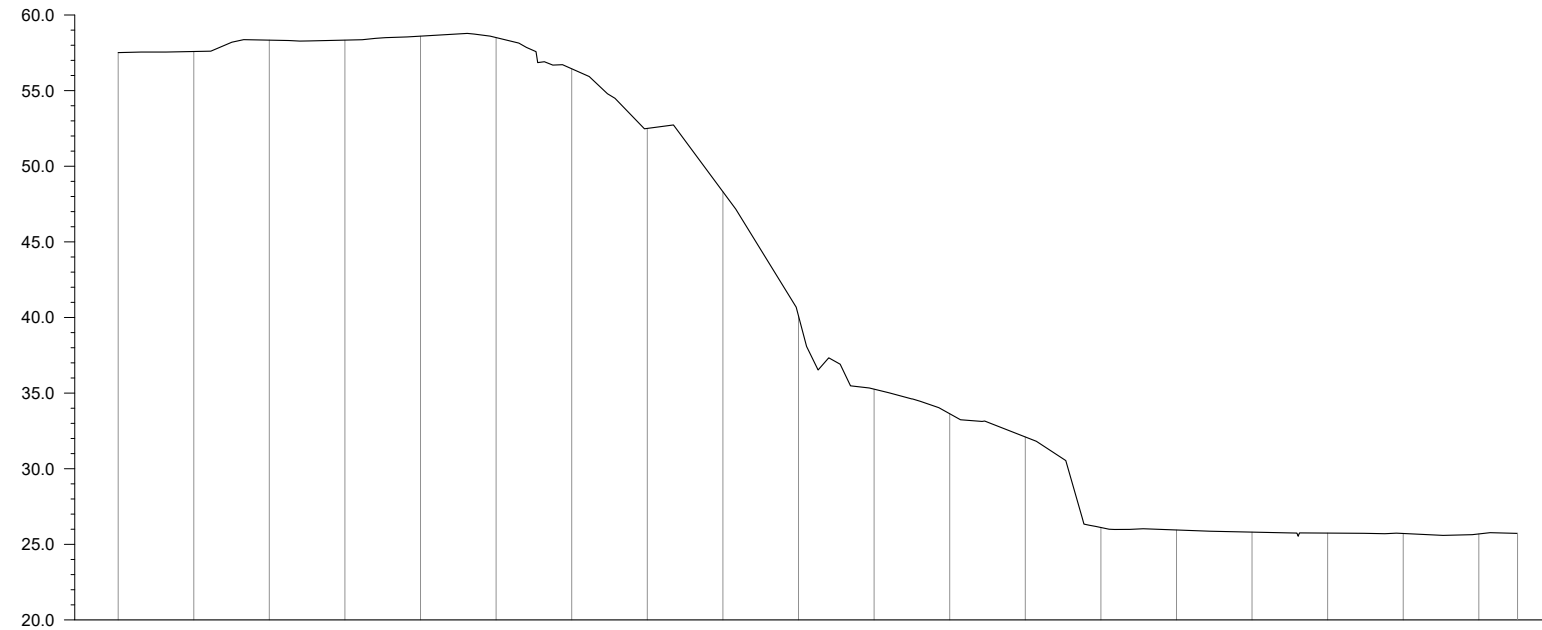
TITLE

**SURVEY CROSS SECTION**

SCALE	1:500	DATE	25.04.2022
PROJECT / DRAWING No.		REVISION	00
RLVMMP/WORKS/NCB/PHII/065-FO/DR-02a			

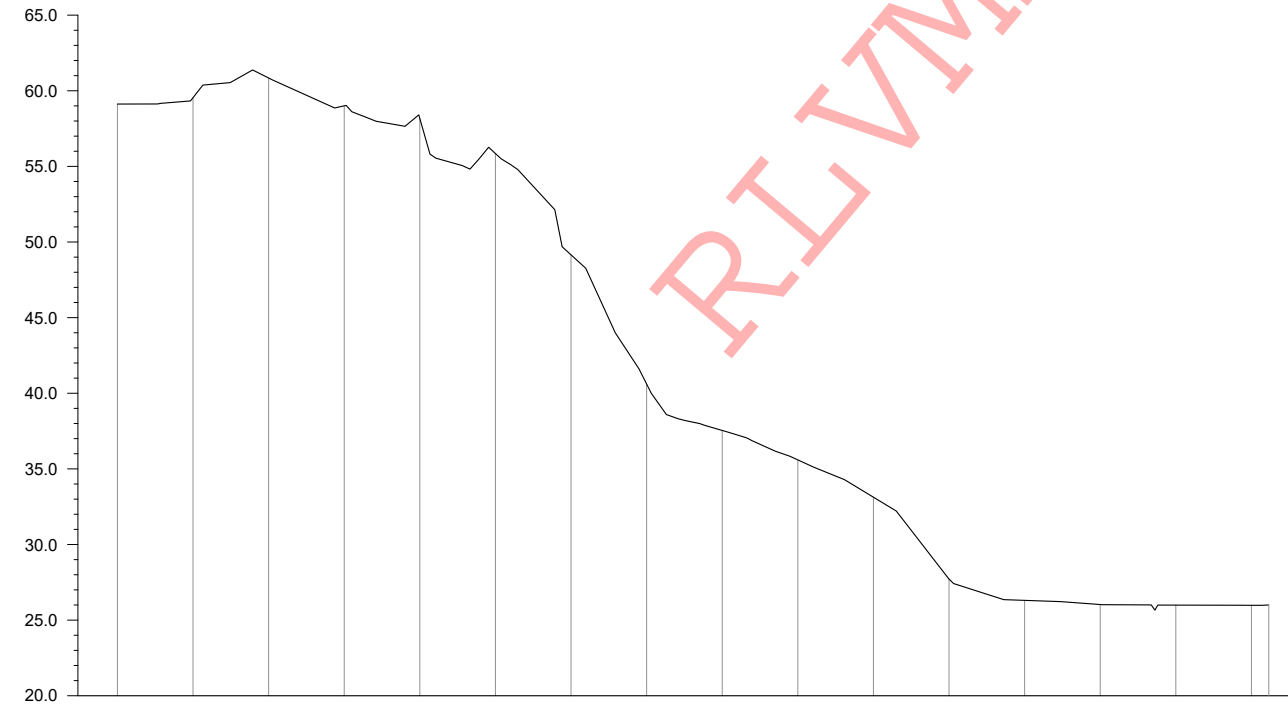
DESCRIPTION	NAME	SIGNATURE
SURVEYED	B.K.K.D.JAYASINGHE	
CHECKED	M.H.M. HARSHANI	







GROUND LEVEL (m)	57.515	57.585	58.338	58.340	58.602	58.506	56.441	52.503	48.316	40.111	35.259	33.625	32.101	26.112	25.948	25.807	25.742	25.715	25.688	25.688
DISTANCE (m)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	60.00	65.00	70.00	75.00	80.00	85.00	90.00	92.56

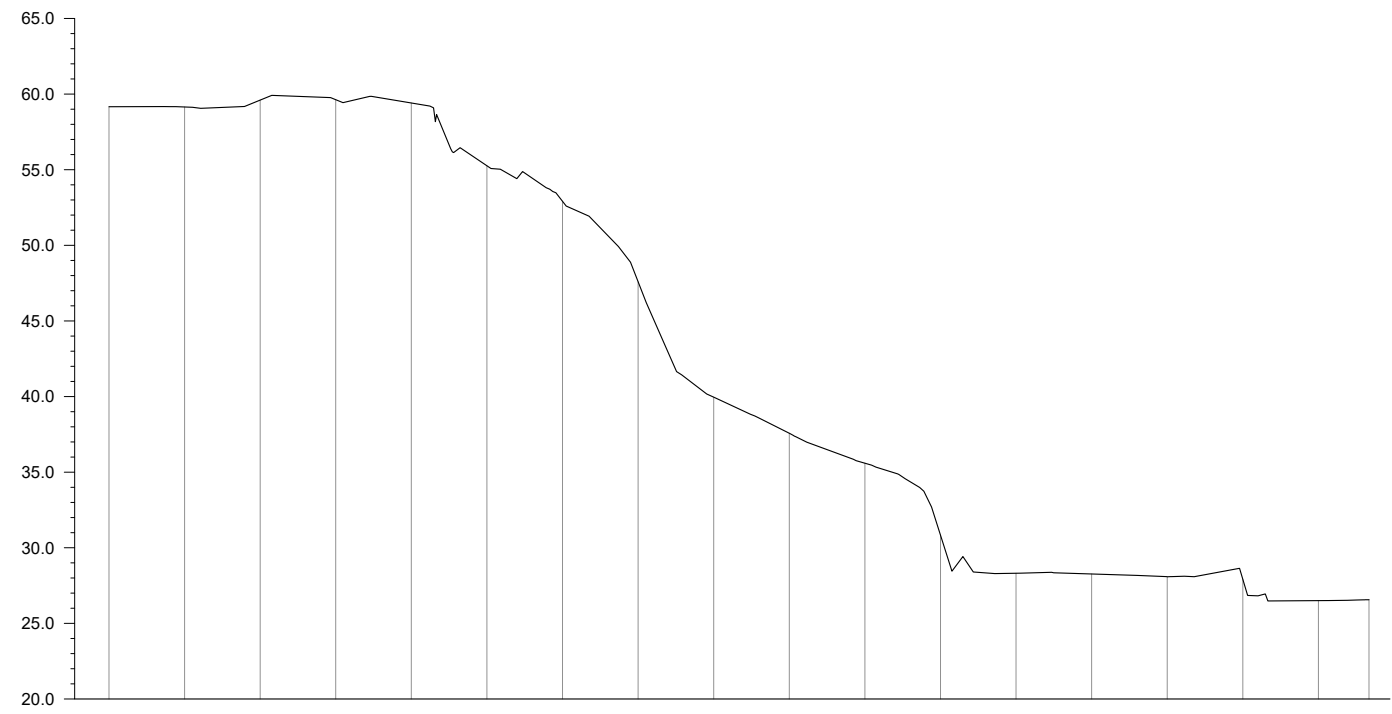
CS08



GROUND LEVEL (m)	59.123	59.551	60.844	59.004	58.170	55.848	49.154	40.605	37.540	35.595	33.128	27.716	26.307	26.031	25.991	25.981	25.981
DISTANCE (m)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	60.00	65.00	70.00	75.00	78.41

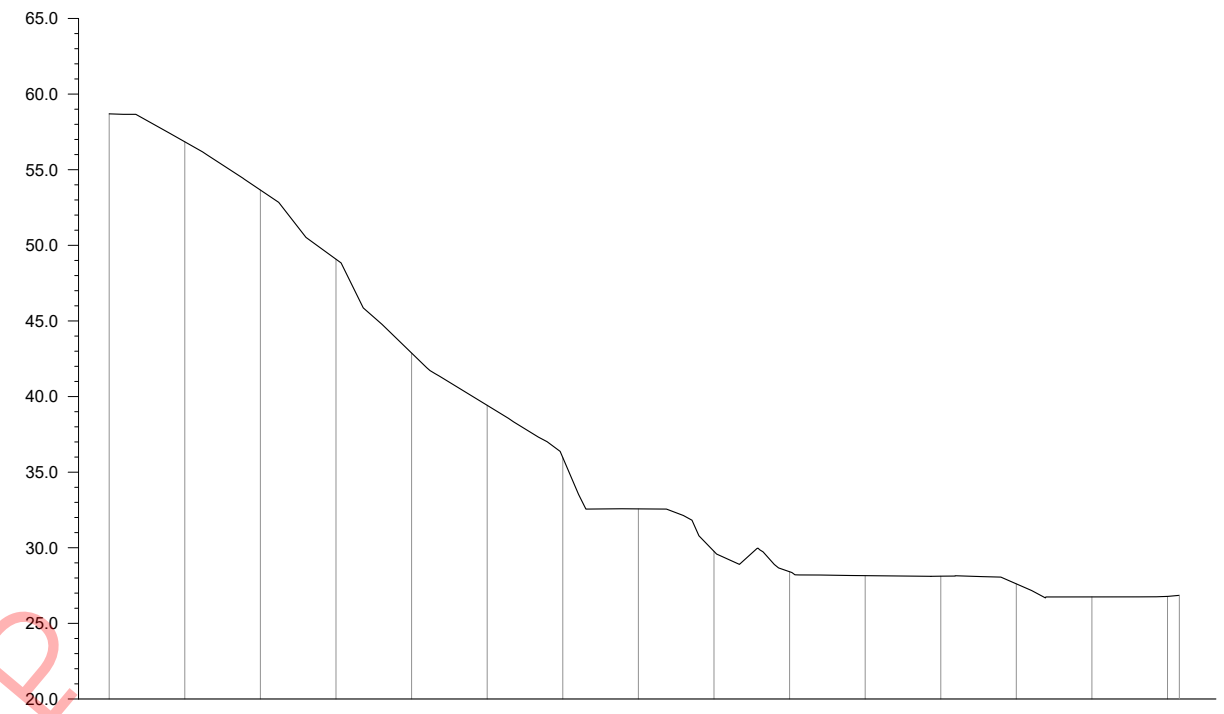
CS09

 <b>DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA</b> STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT NATIONAL BUILDING RESEARCH ORGANISATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	 <b>DESIGN UNIT</b> NATIONAL BUILDING RESEARCH ORGANIZATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	REV	DATE	REVISION DESCRIPTION	APPROVAL	PROJECT TITLE  REDUCTION OF LANDSLIDE VULNERABILITY BY MITIGATION MEASURES FOREST OFFICE - RATHNAPURA	TITLE  SURVEY CROSS SECTION	DESCRIPTION	NAME	SIGNATURE
								SURVEYED	B.K.K.D.JAYASINGHE	
								CHECKED	M.H.M. HARSHANI	
				SCALE	1:500	DATE	25.04.2022			
				PROJECT / DRAWING No.		REVISION				
				RLVMMP/WORKS/NCB/PHII/065-FO/DR-02a		00				



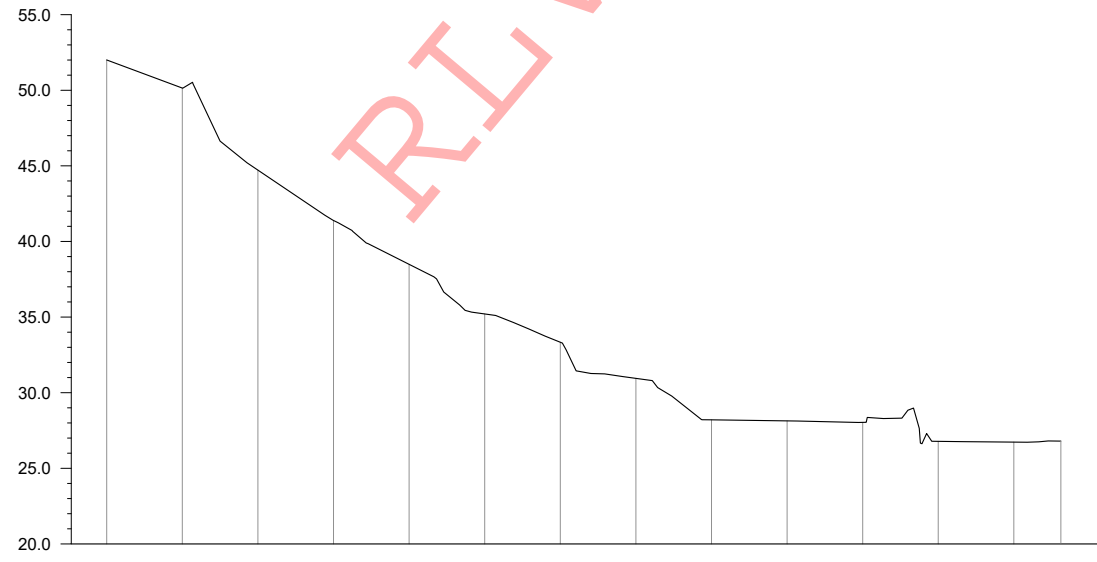
GROUND LEVEL (m)	59.165	59.147	59.604	59.630	59.412	55.258	52.912	47.588	39.957	37.574	35.593	30.846	28.314	28.268	28.081	27.910	26.504	25.564
DISTANCE (m)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	60.00	65.00	70.00	75.00	80.00	83.35

CS10



GROUND LEVEL (m)	58.690	56.843	53.655	49.078	42.878	39.422	35.966	55.082	50.446	43.892	37.491	28.124	27.614	26.725	26.625
DISTANCE (m)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	60.00	65.00	78.98

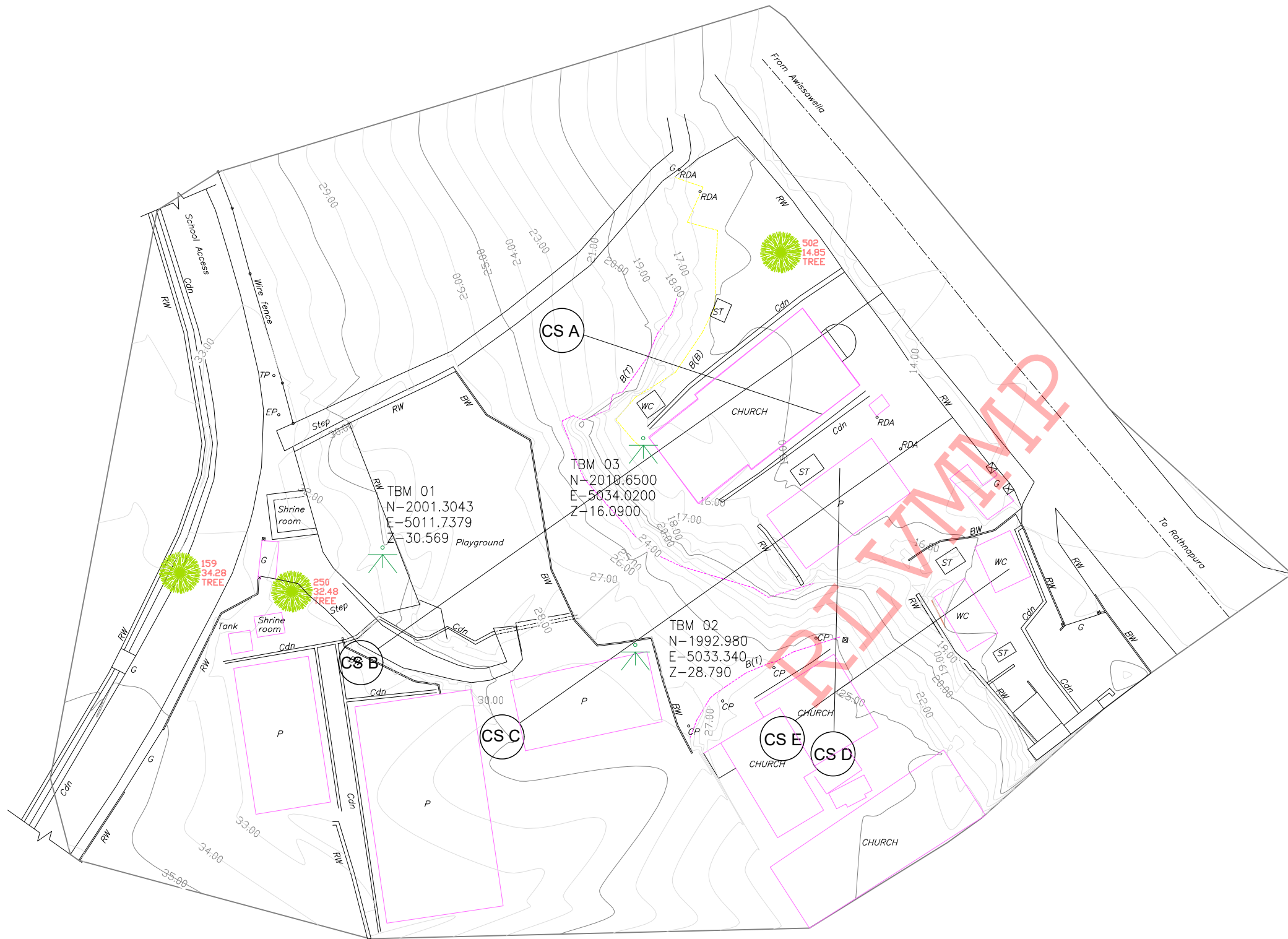
CS11



GROUND LEVEL (m)	58.002	50.144	44.720	41.391	38.490	35.210	33.339	30.949	28.205	28.136	28.038	26.784	26.734	26.734
DISTANCE (m)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	60.00	63.12


CS12

<p>DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT NATIONAL BUILDING RESEARCH ORGANISATION No. 99/1, JAWATTA ROAD, COLOMBO - 05</p>	<p>DESIGN UNIT NATIONAL BUILDING RESEARCH ORGANIZATION No. 99/1, JAWATTA ROAD, COLOMBO - 05</p>	REV	DATE	REVISION DESCRIPTION	APPROVAL	PROJECT TITLE  REDUCTION OF LANDSLIDE VULNERABILITY BY MITIGATION MEASURES FOREST OFFICE - RATHNAPURA	TITLE  DESIGN PLAN VIEW	DESCRIPTION	NAME	SIGNATURE	
								SCALE	1:500	DATE	25.04.2022
								PROJECT / DRAWING No.	RLVMP/WORKS/NCB/PHII/065-FO/DR-03	REVISION	00



**REFERENCE**

- P - PERMENENT BUILDING
- CDN - CONCRETE DRAIN
- RDA - RDA BOUNDARY MARK
- WF - WIRE FENCE
- BT - BANK TOP
- BB - BOTTOM OF BANK
- BW - BOUNDARY WALL
- RW - RETAINING WALL
- EP - ELECTRIC POST
- WC - WATER CLOSET
- CUL - CULVERT
- G - GATE
- ST - SEPTIC TANK

EMPLOYER  
  
**DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA**  
**STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT**  
**NATIONAL BUILDING RESEARCH ORGANISATION**  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

DESIGNER  
  
**DESIGN UNIT**  
**NATIONAL BUILDING RESEARCH ORGANIZATION**  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

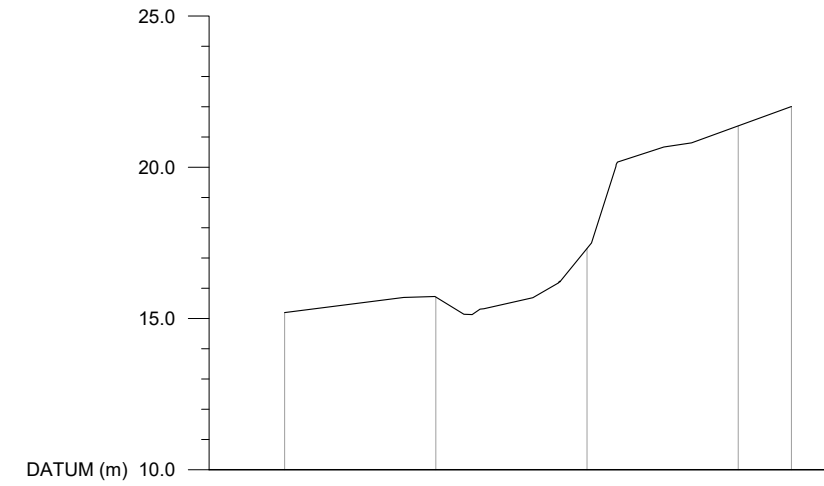
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 AREA BETWEEN ST LUKE'S COLLEGE ,  
 BAPTIST CHURCH , ST LUKE'S CHURCH,  
 AND FERGUSON HIGH SCHOOL

TITLE  
 SURVEY PLAN VIEW

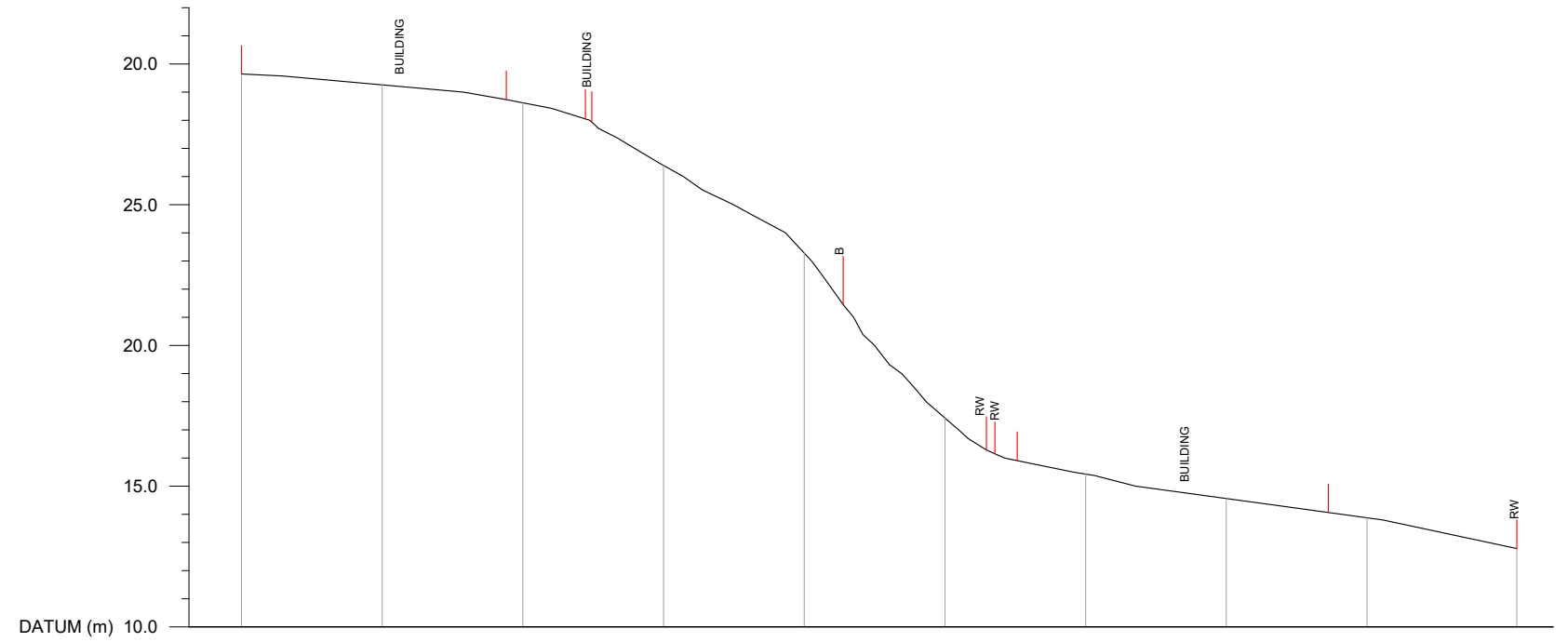
SCALE	1:400	DATE	28.04.2022
PROJECT / DRAWING No.	RLVMMP/WORKS/NCB/PHII/066-LU/DR-01	REVISION	00

DESCRIPTION	NAME	SIGNATURE
SURVEYED	B.K.K.D.JAYASINGHE	
CHECKED	C. T. MAMPITIYAARACHCHI	



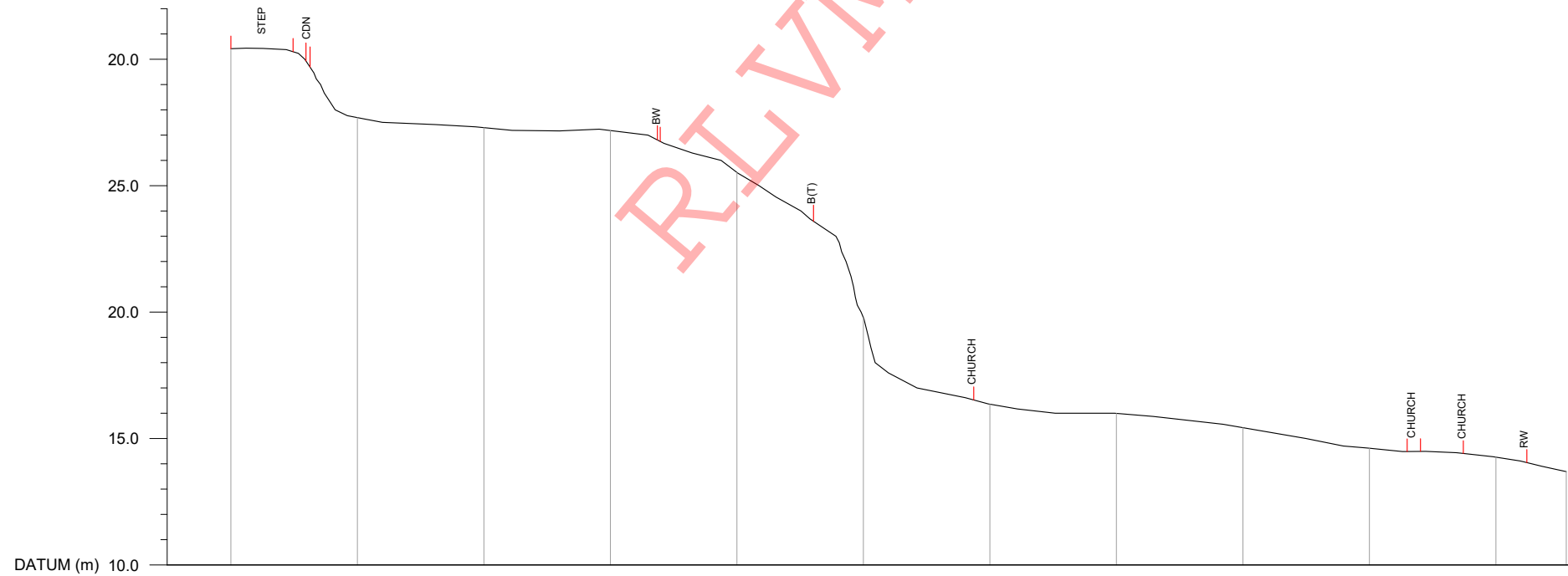
GROUND LEVEL (m)	15.196	15.709	17.313	21.367	22.007
DISTANCE (m)	0.00	5.00	10.00	15.00	

CS A



GROUND LEVEL (m)	29.64	29.25	28.62	26.39	23.27	17.42	15.42	14.55	13.87	12.78
DISTANCE (m)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00


CS B



GROUND LEVEL (m)	30.41	27.70	27.29	27.18	25.49	19.77	16.35	15.99	15.42	14.61	14.26	13.68
DISTANCE (m)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	52.78

CS C

EMPLOYER



**DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA**  
**STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT**  
**NATIONAL BUILDING RESEARCH ORGANISATION**  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

DESIGNER



**DESIGN UNIT**  
**NATIONAL BUILDING RESEARCH ORGANIZATION**  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE

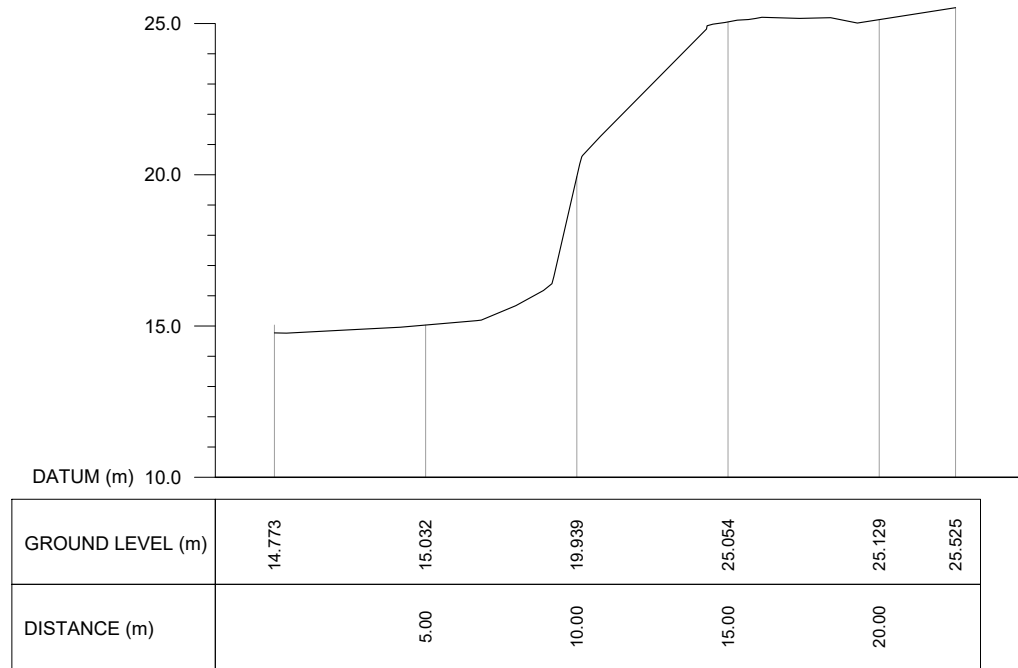
REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 AREA BETWEEN ST LUKE'S COLLEGE ,  
 BAPTIST CHURCH , ST LUKE'S CHURCH,  
 AND FERGUSON HIGH SCHOOL

TITLE

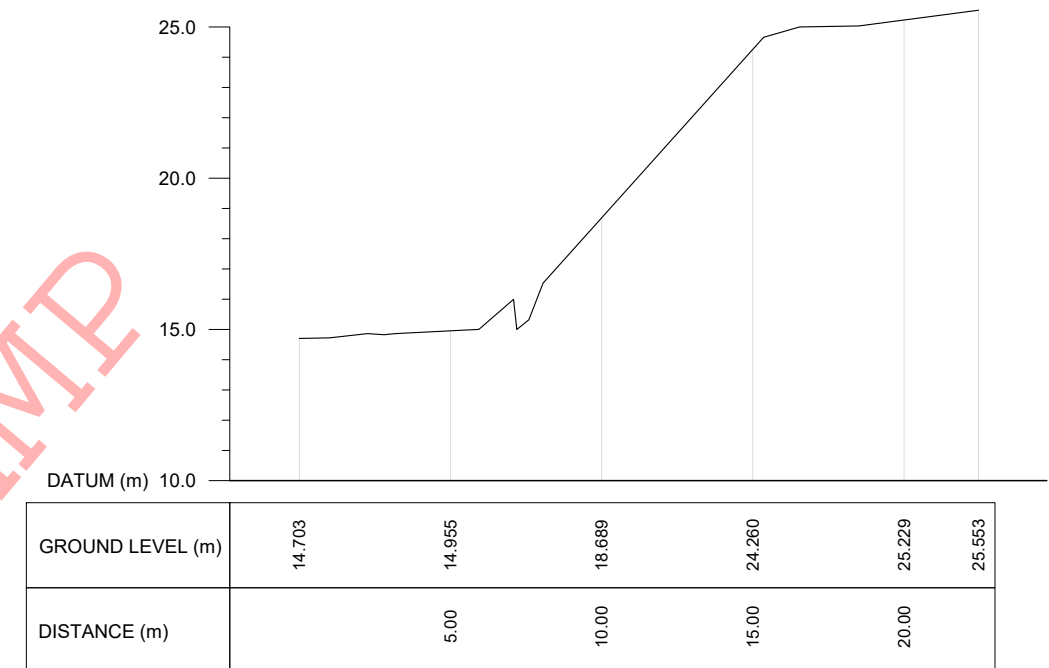
SURVEY CROSS SECTION

SCALE	1:250	DATE	28.04.2022
PROJECT / DRAWING No.	RLVMM/WORKS/NCB/PHII/066-LU/DR-02	REVISION	00

DESCRIPTION	NAME	SIGNATURE
SURVEYED	B.K.K.D.JAYASINGHE	
CHECKED	C. T. MAMPITIYAARACHCHI	



CS D



CS E


RLVMMP

 <b>DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA</b> STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT NATIONAL BUILDING RESEARCH ORGANISATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	 <b>DESIGN UNIT</b> NATIONAL BUILDING RESEARCH ORGANIZATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	REV	DATE	REVISION DESCRIPTION	APPROVAL	PROJECT TITLE  REDUCTION OF LANDSLIDE VULNERABILITY BY MITIGATION MEASURES AREA BETWEEN ST LUKE'S COLLEGE , BAPTIST CHURCH , ST LUKE'S CHURCH, AND FERGUSON HIGH SCHOOL	TITLE  SURVEY CROSS SECTION	DESCRIPTION	NAME	SIGNATURE	
								SURVEYED	B.K.K.D.JAYASINGHE		
								CHECKED	C. T. MAMPITIYAARACHCHI		
						SCALE	1:200	DATE	28.04.2022		
						PROJECT / DRAWING No.	RLVMMP/WORKS/NCB/PHII/066-LU/DR-02b		REVISION	00	



**REFERENCE**

- P - PERMENENT BUILDING
- CDN - CONCRETE DRAIN
- RDA - RDA BOUNDARY MARK
- WF - WIRE FENCE
- BT - BANK TOP
- BB - BOTTOM OF BANK
- BW - BOUNDARY WALL
- RW - RETAINING WALL
- EP - ELECTRIC POST
- WC - WATER CLOSET
- CUL - CULVERT
- G - GATE
- ST - SEPTIC TANK

EMPLOYER  
  
**DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA**  
**STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT**  
**NATIONAL BUILDING RESEARCH ORGANISATION**  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

DESIGNER  
  
**DESIGN UNIT**  
**NATIONAL BUILDING RESEARCH ORGANIZATION**  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

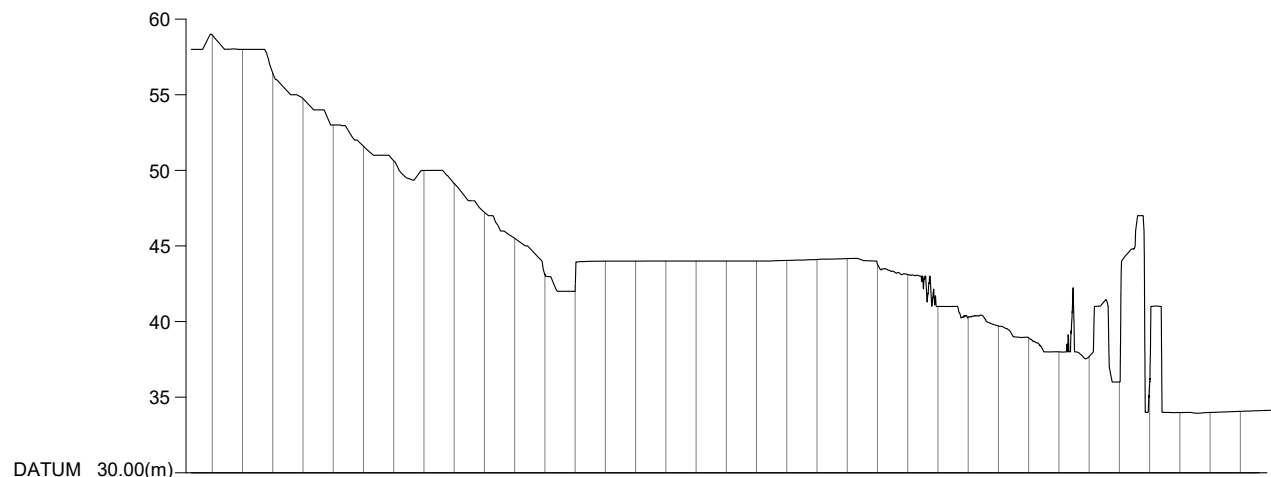
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 PRIMARY AND SECONDARY TAMIL SCHOOL  
 RATHNAPURA

TITLE  
 SURVEY PLAN VIEW

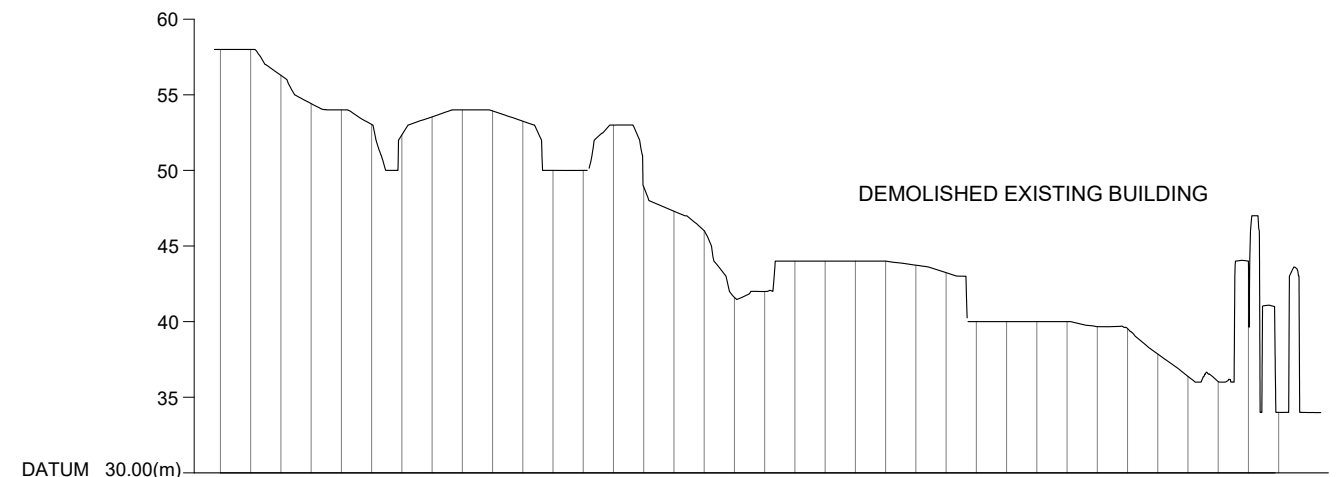
SCALE	1:750	DATE	30.06.2022
PROJECT / DRAWING No.	RLVMM/WORKS/NCB/PH11/70-RT/DR-01	REVISION	00

DESCRIPTION	NAME	SIGNATURE
SURVEYED		
CHECKED	T. THILAKARATHNA	



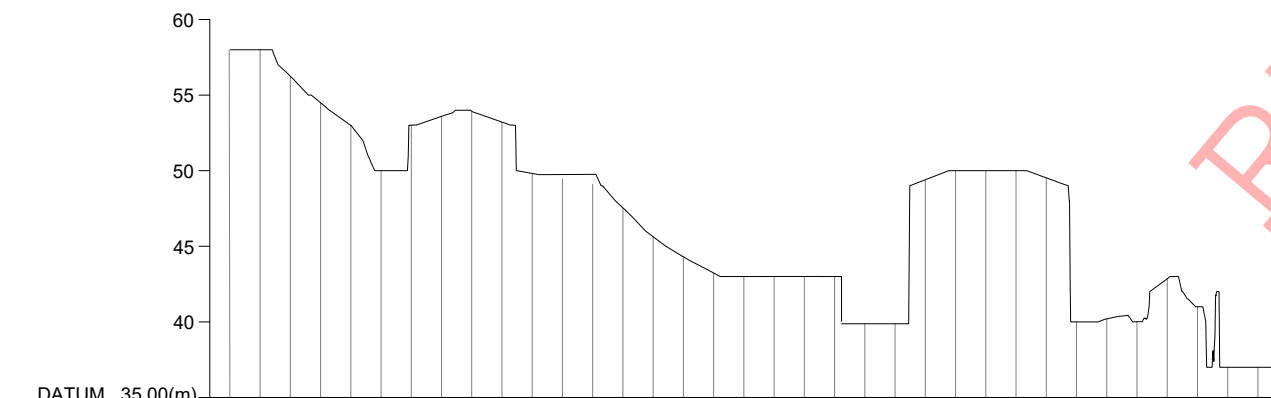
GROUND LEVEL (m)	DISTANCE (m)
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58.00	18.00
56.43	16.00
54.74	14.00
53.00	12.00
51.59	10.00
50.63	8.00
49.99	6.00
49.13	4.00
47.22	2.00
45.51	0
43.12	-2.00
43.83	-4.00
44.00	-6.00
44.00	-8.00
44.00	-10.00
44.00	-12.00
44.00	-14.00
44.00	-16.00
44.04	-18.00
44.11	-20.00
44.16	-22.00
43.79	-24.00
43.11	-26.00
41.00	-28.00
40.29	-30.00
39.71	-32.00
38.92	-34.00
38.00	-36.00
37.69	-38.00
36.00	-40.00
35.86	-42.00
33.98	-44.00
	-46.00
	-48.00

CS01



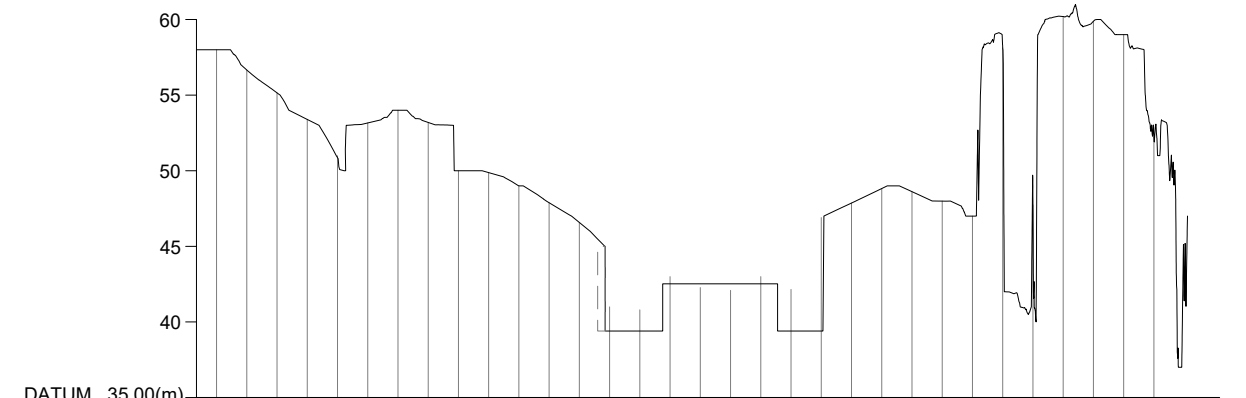
GROUND LEVEL (m)	DISTANCE (m)
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56.29	28.00
54.42	26.00
54.00	24.00
53.04	22.00
52.34	20.00
53.54	18.00
54.00	16.00
53.93	14.00
53.26	12.00
50.00	10.00
50.00	8.00
53.00	6.00
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44.00	-8.00
44.00	-10.00
44.00	-12.00
43.73	-14.00
43.24	-16.00
40.00	-18.00
40.00	-20.00
40.00	-22.00
40.00	-24.00
39.67	-26.00
39.54	-28.00
37.86	-30.00
36.37	-32.00
36.03	-34.00
43.93	-36.00
34.00	-38.00
33.99	-40.00
	-42.00

CS02




GROUND LEVEL (m)	DISTANCE (m)
58.00	28.00
56.25	26.00
54.49	24.00
53.00	22.00
50.00	20.00
53.01	18.00
53.59	16.00
53.94	14.00
53.21	12.00
49.82	10.00
49.46	8.00
49.10	6.00
47.54	4.00
45.63	2.00
44.31	0
43.24	-2.00
43.00	-4.00
43.01	-6.00
43.01	-8.00
43.00	-10.00
43.00	-12.00
43.26	-14.00
49.40	-16.00
50.00	-18.00
50.00	-20.00
50.00	-22.00
49.53	-24.00
40.00	-26.00
40.21	-28.00
40.02	-30.00
42.85	-32.00
41.00	-34.00
37.00	-36.00
37.00	-38.00
	-40.00
	-42.00

CS03



GROUND LEVEL (m)	DISTANCE (m)
58.00	26.00
56.66	24.00
55.15	22.00
53.39	20.00
50.99	18.00
53.16	16.00
54.00	14.00
53.19	12.00
50.00	10.00
49.87	8.00
49.00	6.00
47.89	4.00
46.58	2.00
41.00	0
40.80	-2.00
43.00	-4.00
42.27	-6.00
42.09	-8.00
43.00	-10.00
42.15	-12.00
46.90	-14.00
47.86	-16.00
48.82	-18.00
48.61	-20.00
47.99	-22.00
47.00	-24.00
58.13	-26.00
47.74	-28.00
60.19	-30.00
59.88	-32.00
59.00	-34.00
52.23	-36.00
41.67	-38.00

CS04

EMPLOYER  
  
**DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA**  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

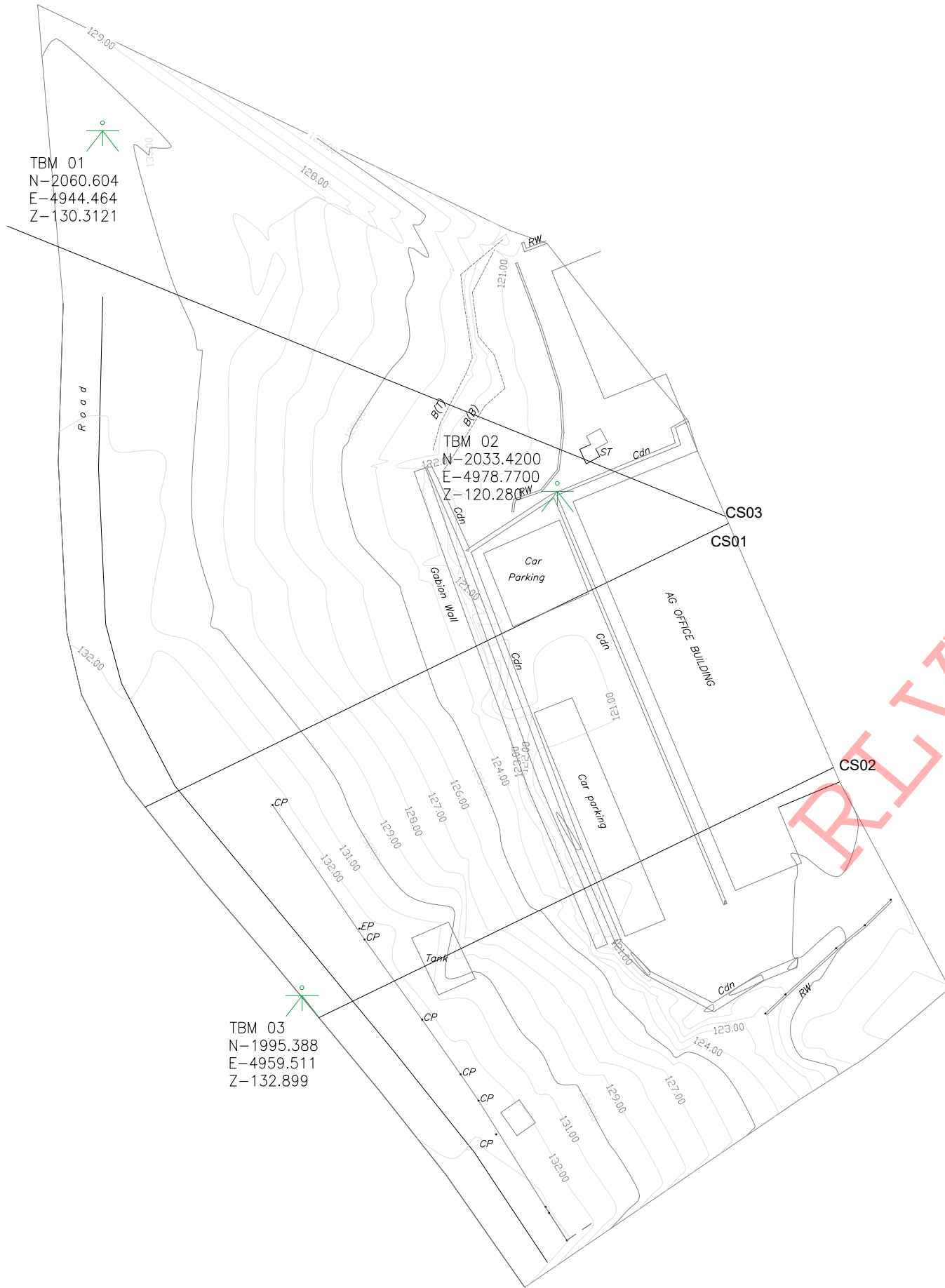
DESIGNER  
  
**DESIGN UNIT**  
**NATIONAL BUILDING RESEARCH ORGANIZATION**  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 PRIMARY AND SECONDARY TAMIL SCHOOL  
 RATHNAPURA


TITLE			
SURVEY CROSS SECTION			
SCALE	1:500	DATE	30.06.2022
PROJECT / DRAWING No.		REVISION	
RLVMMP/WORKS/NCB/PHII/70-RT/DR-02		00	

DESCRIPTION	NAME	SIGNATURE
SURVEYED		
CHECKED	T. THILAKARATHNA	



**REFERENCE**

- P - PERMENENT BUILDING
- CDN - CONCRETE DRAIN
- RE - ROAD EDGE(WHITE LINE)
- WF - WIRE FENCE
- BT - BANK TOP
- BB - BOTTOM OF BANK
- RW - RETAINING WALL
- EP - ELECTRIC POST

EMPLOYER  
  
**DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA**  
**STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT**  
**NATIONAL BUILDING RESEARCH ORGANISATION**  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

DESIGNER  
  
**DESIGN UNIT**  
**NATIONAL BUILDING RESEARCH ORGANIZATION**  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

REV	DATE	REVISION DESCRIPTION	APPROVAL

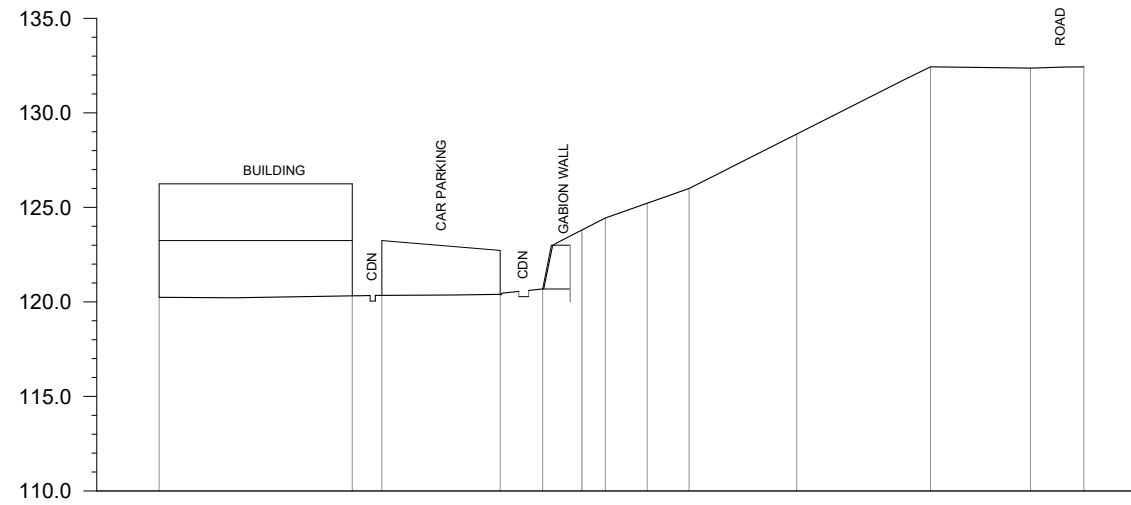
PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 AG OFFICE - RAHNPURA

TITLE  
 SURVEY PLAN VIEW

SCALE	1:400	DATE	28.04.2022
PROJECT / DRAWING No.	RLVMMP/WORKS/NCB/PHII/071-AG/DR-01	REVISION	00

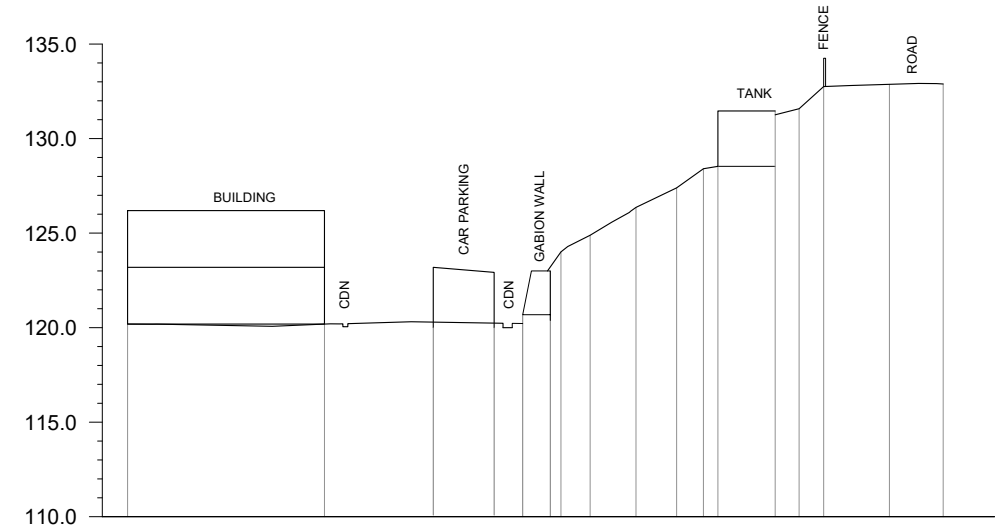
DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	
DESIGNER	D.M.D.T. DASANAYAKA	
CHECKED	B.I. KUMARAGE	
RECOMMENDED	Prof. S.A.S. KULATHILAKA	
APPROVED	K.N. BANDARA	





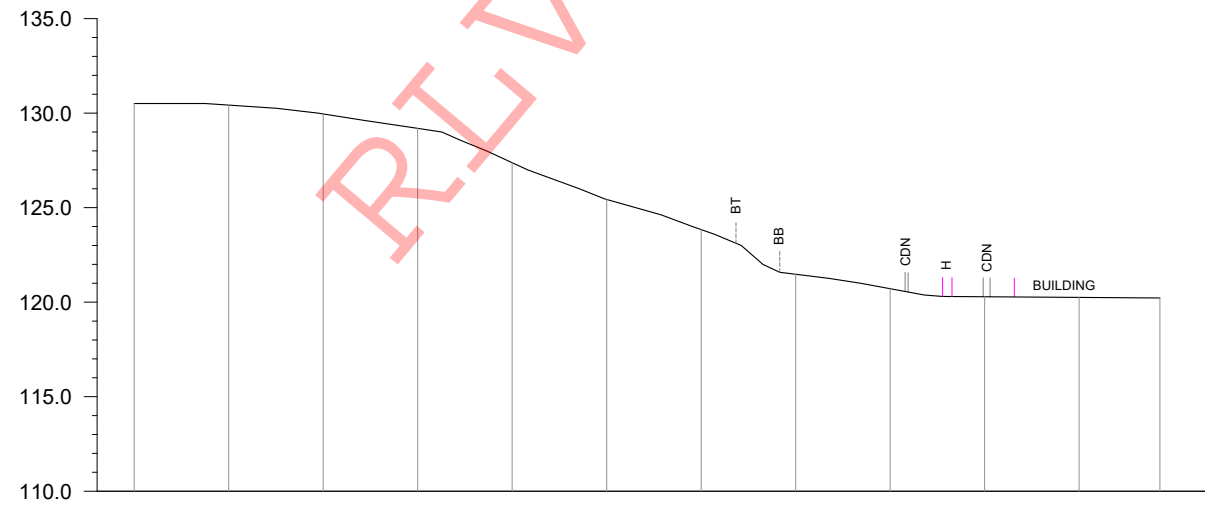
GROUND LEVEL (m)	120.243	120.321	120.344	120.392	20.684	23.809	23.609	123.436	125.217	125.998	128.875	132.433	132.367	132.427
DISTANCE (m)	0.000	10.218	11.786	18.043	20.293	21.374	23.609	23.609	25.824	28.040	33.731	40.817	46.104	48.929

CS01





GROUND LEVEL (m)	120.189	120.189	120.291	120.240	120.217	123.000	124.885	126.359	127.394	128.495	131.460	131.580	132.752	132.869	132.886	
DISTANCE (m)	0.000	10.417	16.175	19.396	20.926	22.367	24.476	26.900	29.054	30.470	31.236	34.268	35.531	36.832	40.313	43.158

CS02




GROUND LEVEL (m)	130.507	130.424	129.957	129.195	127.376	125.433	123.838	121.476	120.711	120.245	120.250	120.220
DISTANCE (m)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	10.00	15.00	20.00	25.00

CS03

EMPLOYER  <b>DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA</b> <b>STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT</b> <b>NATIONAL BUILDING RESEARCH ORGANISATION</b> No. 99/1, JAWATTA ROAD, COLOMBO - 05	DESIGNER  <b>DESIGN UNIT</b> <b>NATIONAL BUILDING RESEARCH ORGANIZATION</b> No. 99/1, JAWATTA ROAD, COLOMBO - 05	REV	DATE	REVISION DESCRIPTION	APPROVAL	PROJECT TITLE REDUCTION OF LANDSLIDE VULNERABILITY BY MITIGATION MEASURES AG OFFICE - RAHNPURA	TITLE		DESCRIPTION	NAME	SIGNATURE	
								SURVEY CROSS SECTION		DRAWN	S.A.G.D. SENANAYAKA	
							SCALE	1:400	DATE	28.04.2022	DESIGNER	D.M.D.T. DASANAYAKA
							PROJECT / DRAWING No.		REVISION	00	CHECKED	B.I. KUMARAGE
							RLVMM/WORKS/NCB/PHII/071-AG/DR-02				RECOMMENDED	Prof. S.A.S. KULATHILAKA
											APPROVED	K.N. BANDARA



EMPLOYER


**DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA**  
**STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT**  
**NATIONAL BUILDING RESEARCH ORGANISATION**  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

DESIGNER

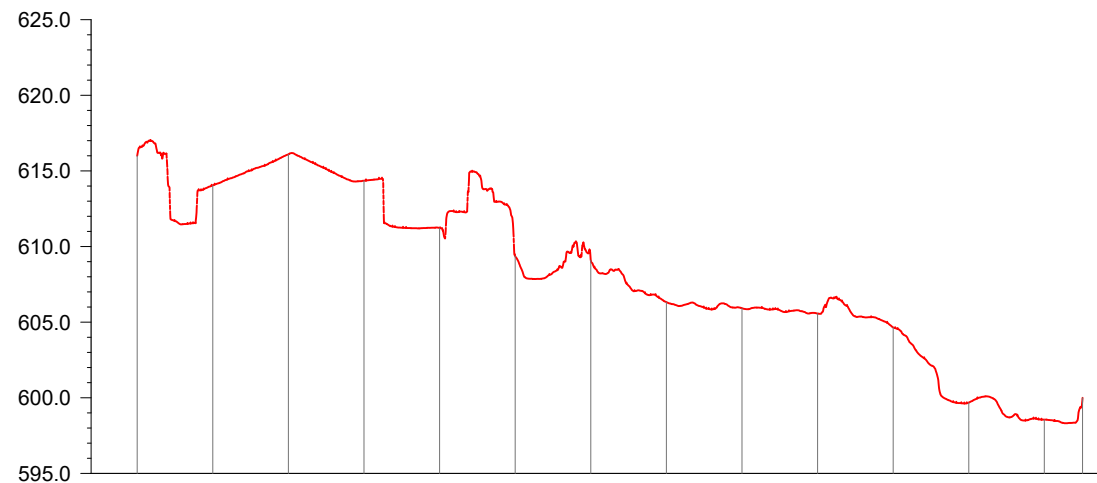

**DESIGN UNIT**  
**NATIONAL BUILDING RESEARCH ORGANIZATION**  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 MASSANNA SCHOOL - RATHNAPURA

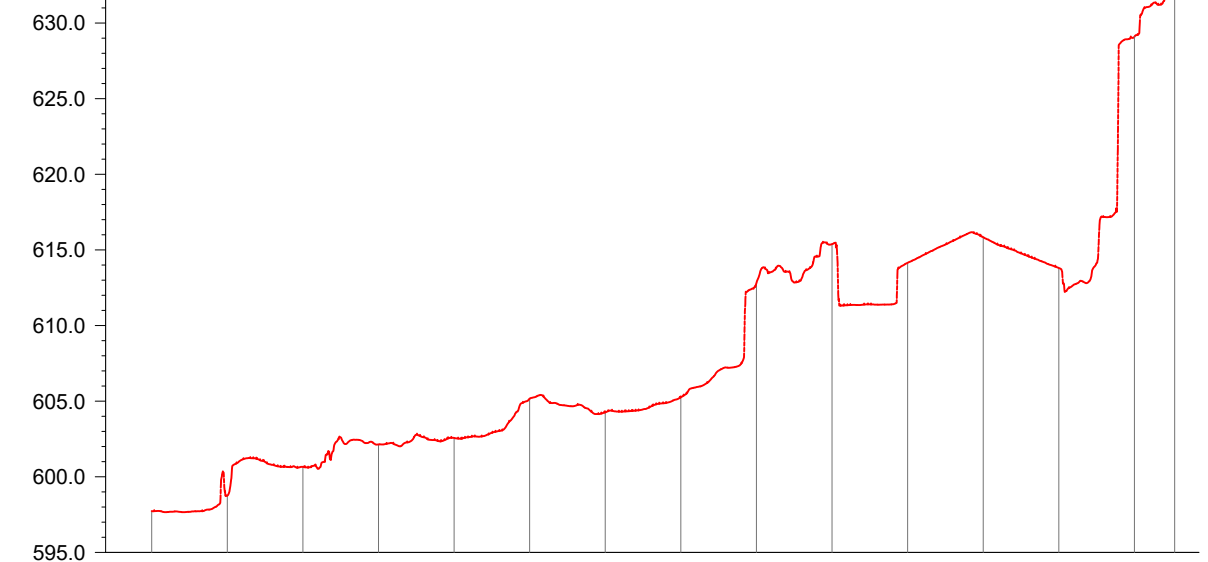
TITLE		DATE	
SURVEY PLAN VIEW		25.04.2022	
SCALE	1:750	PROJECT / DRAWING No.	REVISION
		RLVMMP/WORKS/NCB/PHII/106-MS/DR-01	00

DESCRIPTION	NAME	SIGNATURE
SURVEYED		
CHECKED	M.H.M. HARSHANI	



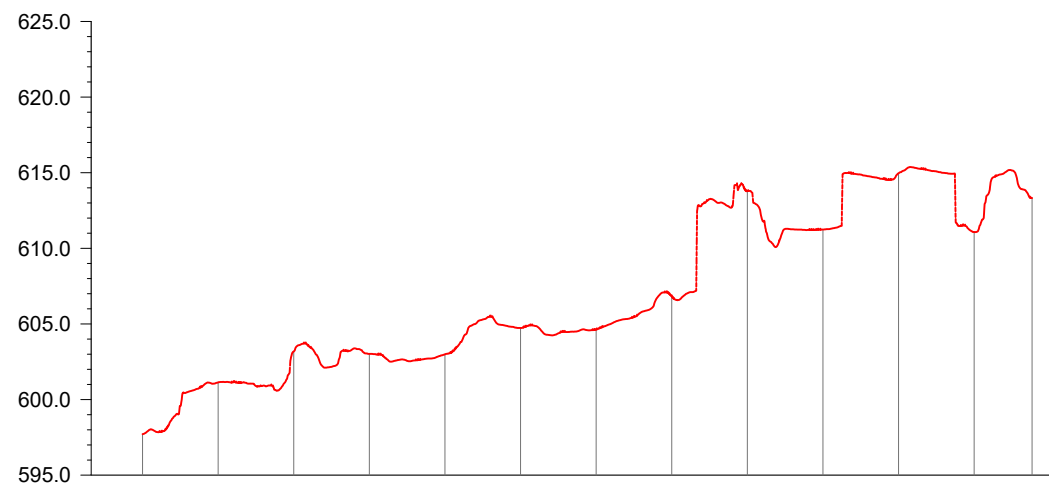
GROUND LEVEL (m)	616.00	614.04	616.09	614.35	611.22	609.37	609.11	606.33	605.92	605.57	604.65	599.68	598.55	600.00
DISTANCE (m)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	60.00	62.53

CSA



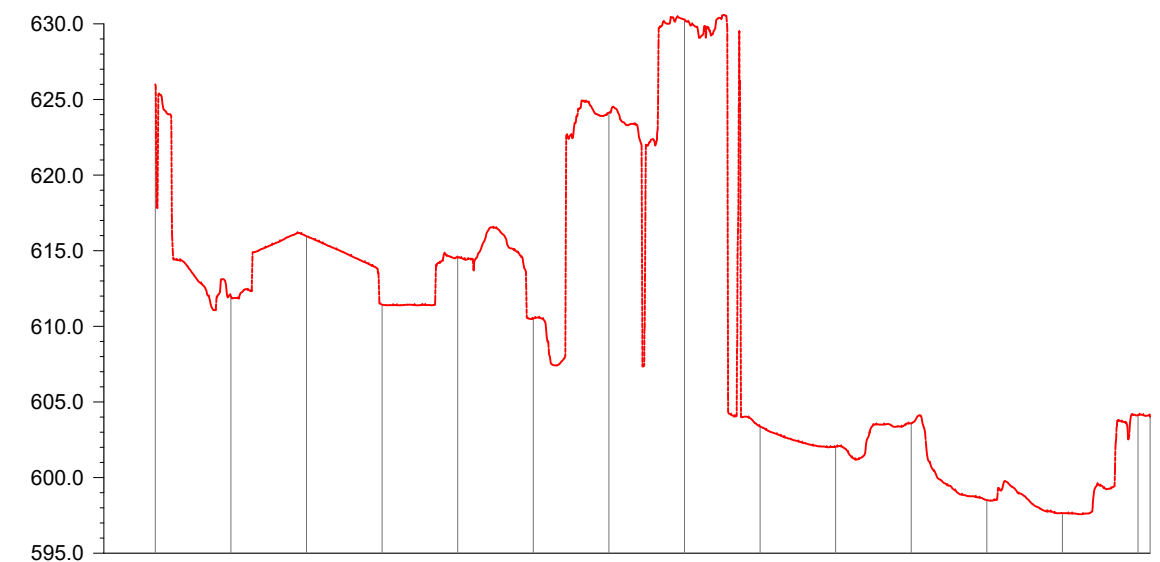
GROUND LEVEL (m)	597.73	598.75	600.65	602.14	602.57	605.17	604.26	605.26	612.81	615.38	614.15	615.84	613.80	629.06	632.03
DISTANCE (m)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	60.00	65.00	67.66

CS B



GROUND LEVEL (m)	597.71	601.14	603.18	603.02	602.99	604.73	604.63	606.82	613.79	611.24	614.96	611.08	613.32
DISTANCE (m)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	58.83



CSC



GROUND LEVEL (m)	626.00	611.97	615.96	611.44	614.55	610.52	624.13	630.29	603.38	602.03	603.58	603.51	602.65	604.16
DISTANCE (m)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	55.00	55.00

CS D

RLVMMP

EMPLOYER  <b>DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA</b> STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT NATIONAL BUILDING RESEARCH ORGANISATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	DESIGNER  <b>DESIGN UNIT</b> NATIONAL BUILDING RESEARCH ORGANIZATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	REV	DATE	REVISION DESCRIPTION	APPROVAL	PROJECT TITLE REDUCTION OF LANDSLIDE VULNERABILITY BY MITIGATION MEASURES MASSANNA SCHOOL - RATHNAPURA	TITLE SURVEY CROSS SECTION	DESCRIPTION	NAME	SIGNATURE	
								SURVEYED			
								CHECKED	M.H.M. HARSHANI		
							SCALE	1:500	DATE	25.04.2022	
							PROJECT / DRAWING No.	RLVMMP/WORKS/NCB/PHII/106-MS/DR-03	REVISION	00	