

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**

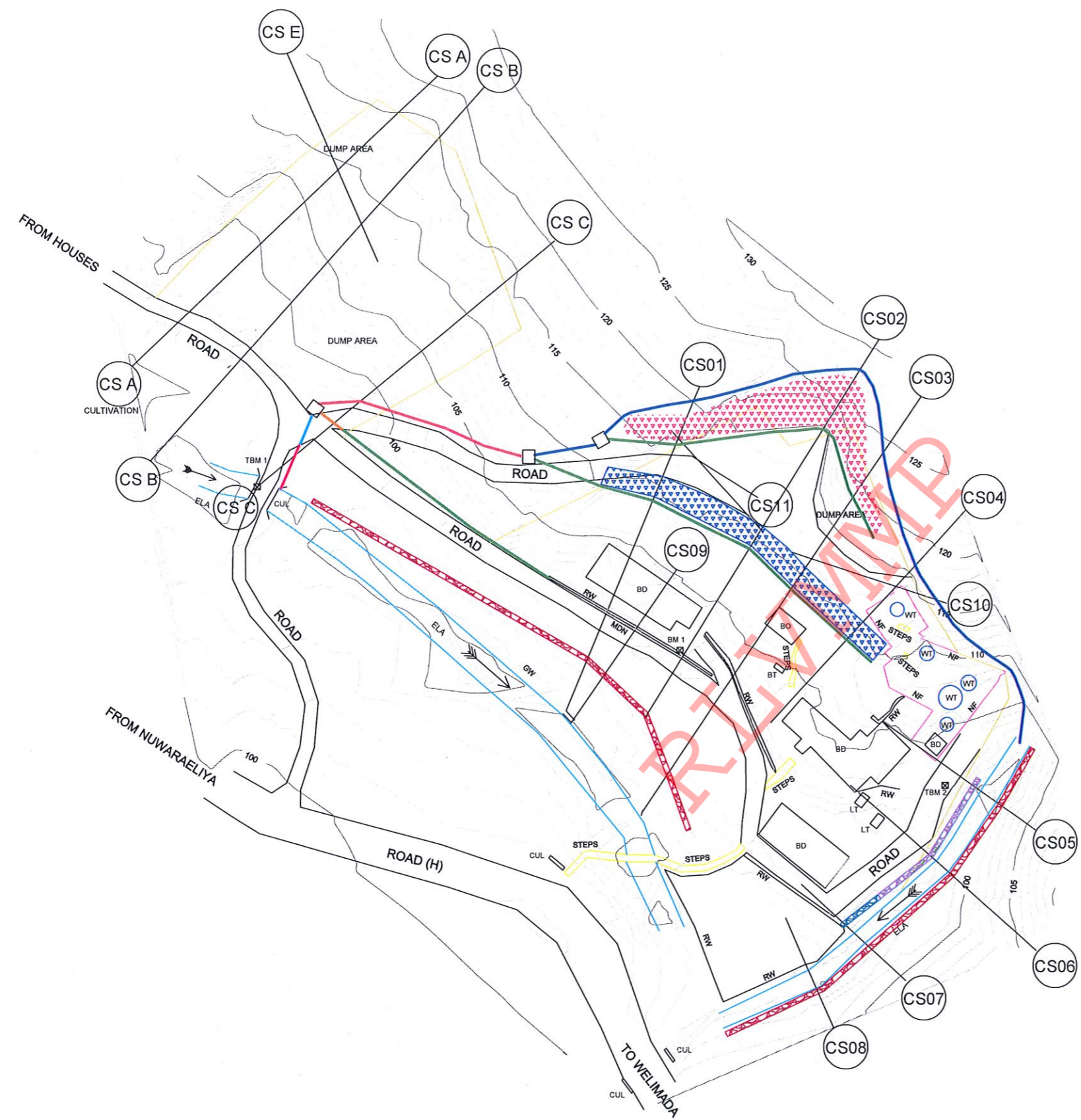
**Landslide Mitigation Measures at 05 Locations in Nuwara Eliya District (Site no. 42, 43, 44, 101 & 103)  
under Package 6A of Reduction of Landslide Vulnerability by Mitigation Measures Project (RLVMMP)**

**RFT No: RLVMMP/WORKS/06A**

March. 2024

# DESIGN DRAWINGS

REVAMP



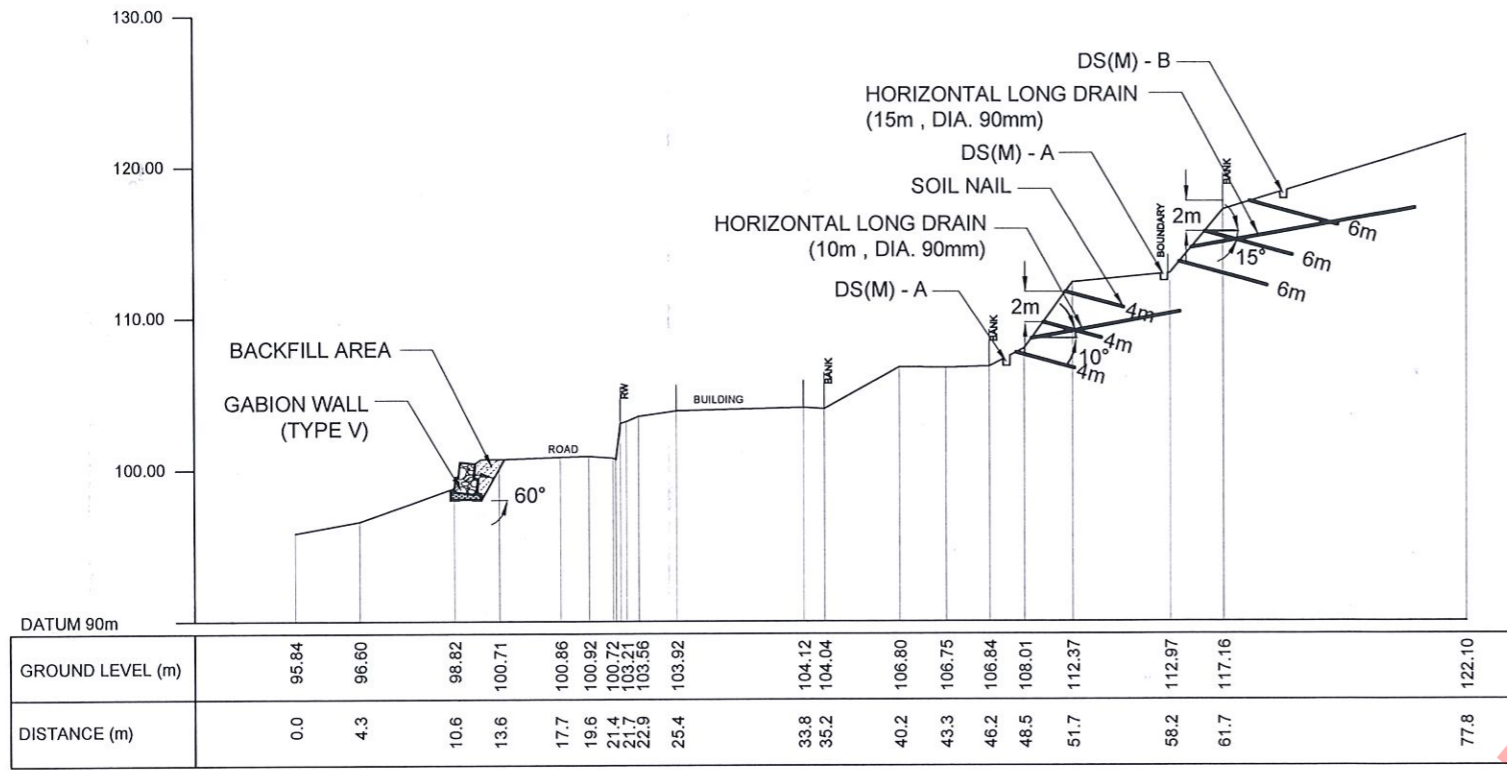
DESIGN NOTATION

- SOIL NAILING AREA I
- SOIL NAILING AREA II
- GABION WALL (TYPE II)
- GABION WALL (TYPE III)
- GABION WALL (TYPE V)
- DS (M) - A
- DS (M) - A (WITH COVER SLAB)
- DS (M) - B
- DS (M) - C
- DS (M) - C (WITH COVER SLAB)
- CATCH PIT

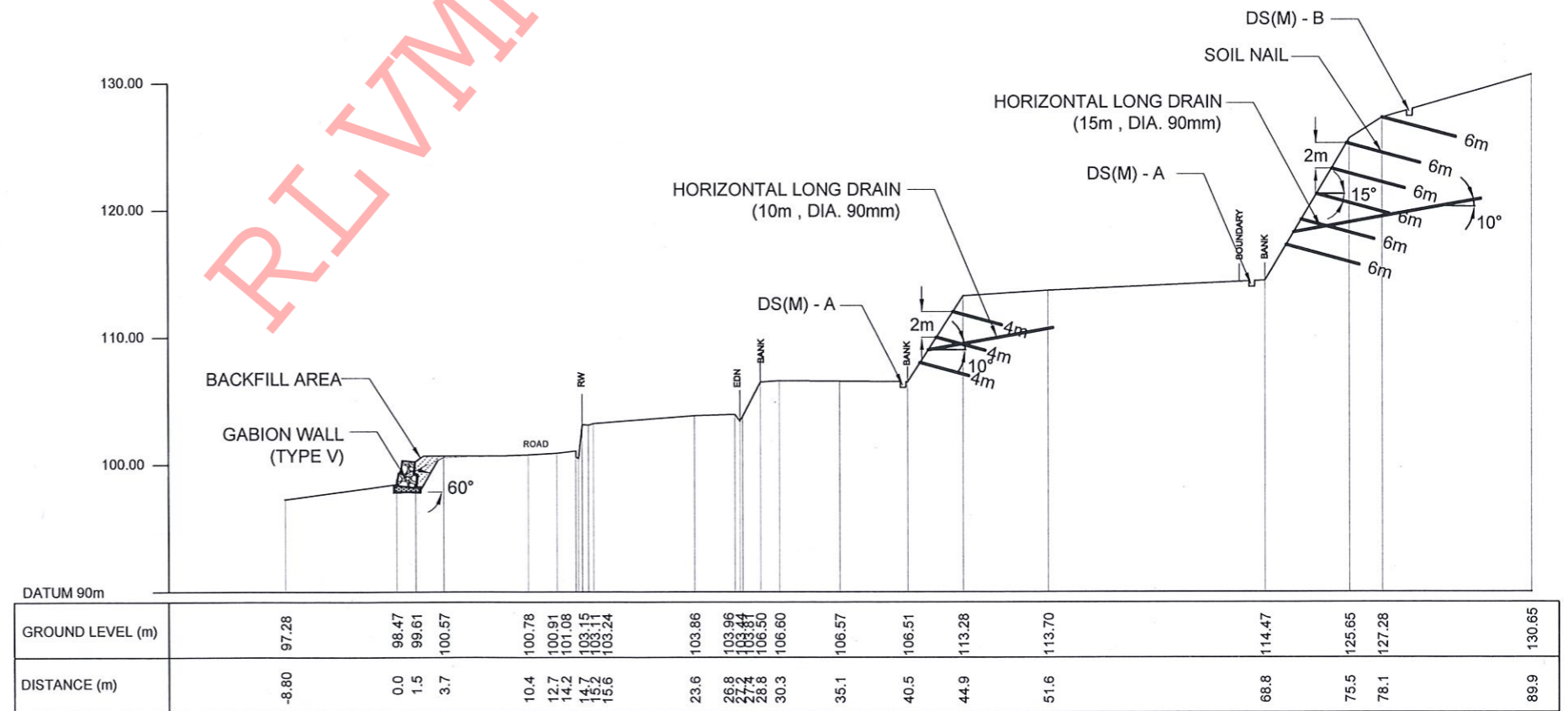
NOTES

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.


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 SEETHA - ELIYA TEMPLE NUWARAELIYA	TITLE  DESIGN PLAN VIEW			DESCRIPTION	NAME	SIGNATURE
						SCALE 1:1000	DATE 01.02.2024			REVISION 00		
						PROJECT / DRAWING No. RLVMP/WORKS/NCB/PH11/042-HP/DR-03			APPROVED	K.N. BANDARA		



CS01



CS02

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

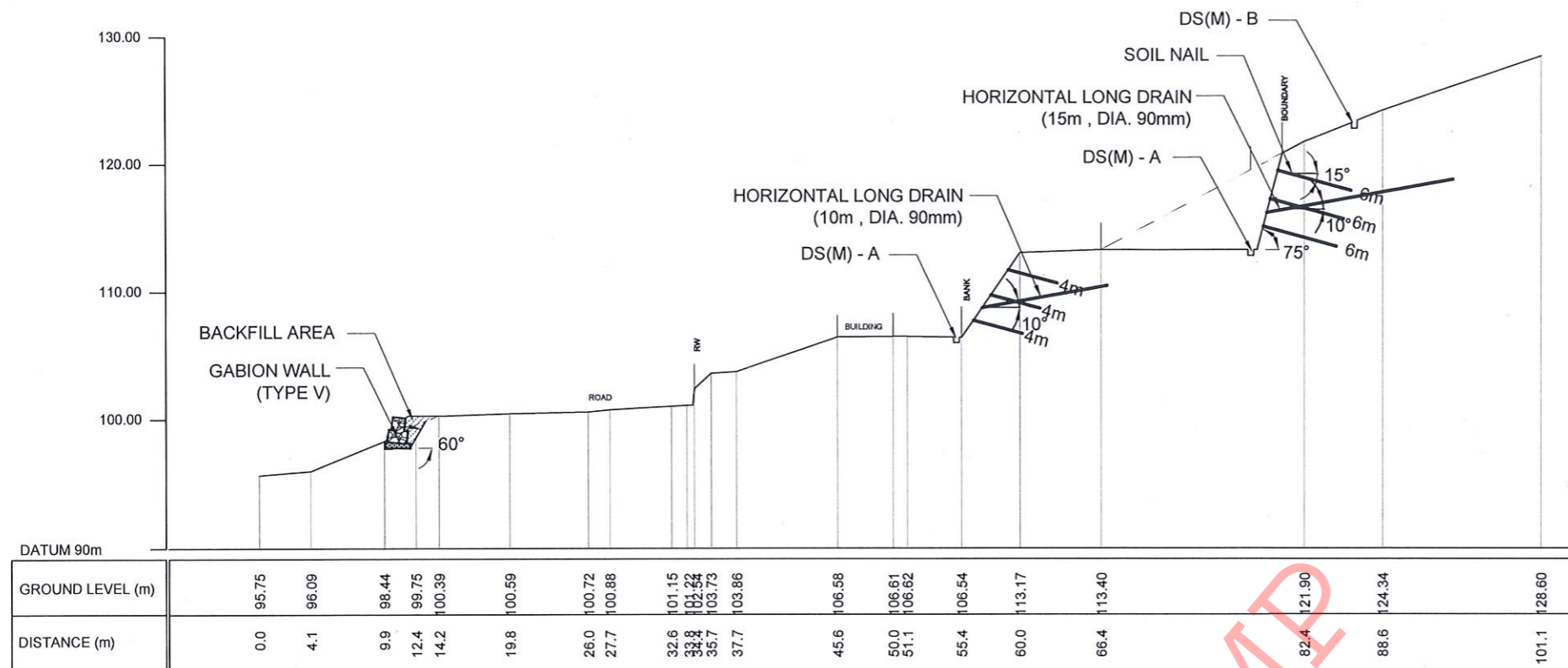
DESIGNER  
  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

REV	DATE	REVISION DESCRIPTION	APPROVAL

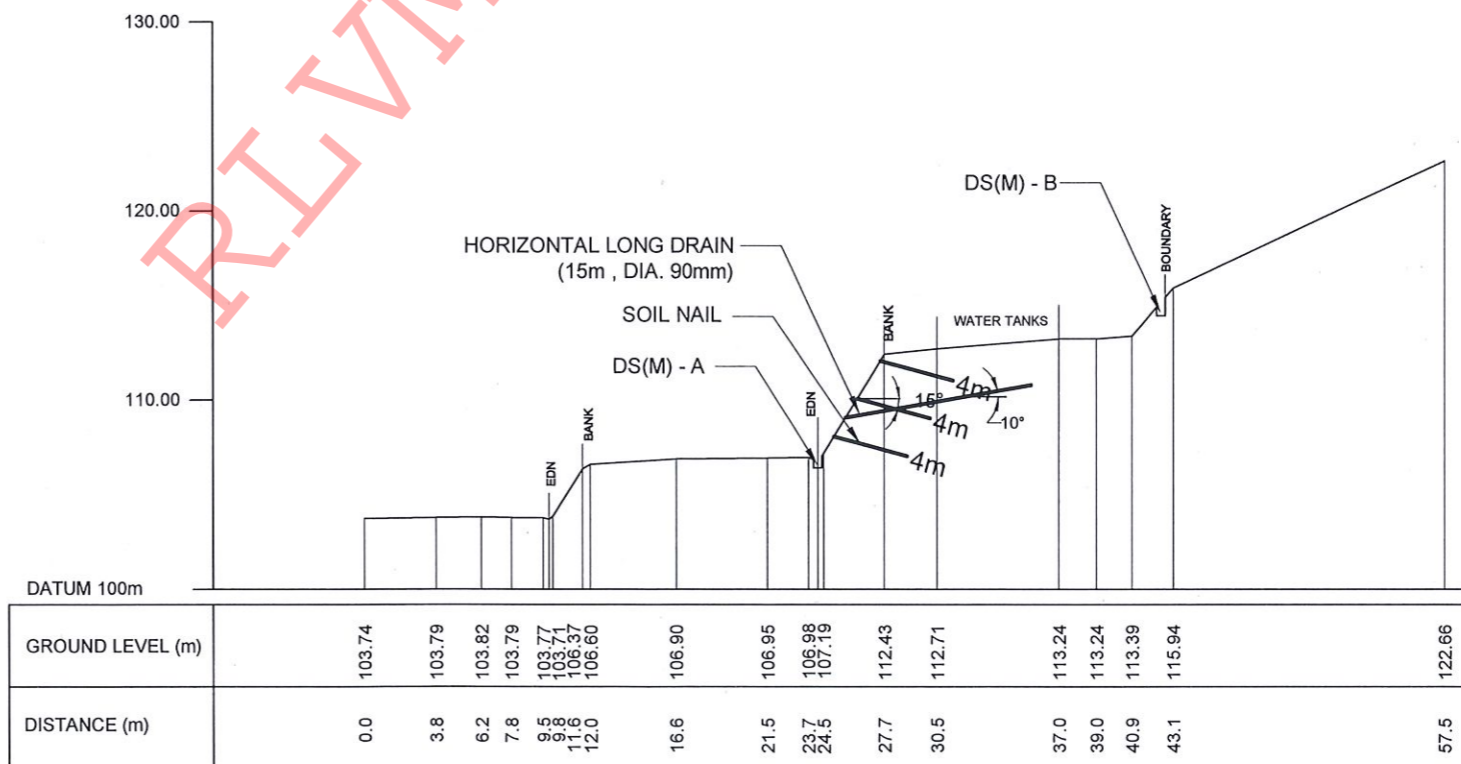
PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 SEETHA - ELIYA TEMPLE  
 NUWARAEIYA

TITLE  
 DESIGN CROSS SECTION  
 SCALE 1:500  
 DATE 01.02.2024  
 PROJECT / DRAWING No. RLVMP/WORKS/NCB/PHII/042-HP/DR-04a  
 REVISION 00

DESCRIPTION	NAME	SIGNATURE
DRAWN	K.M.D. NISHANTHI	
DESIGNED	P.A.D.L.S. CHANDRASIRI	
CHECKED	H. R. MADURANGA	
APPROVED	K.N. BANDARA	

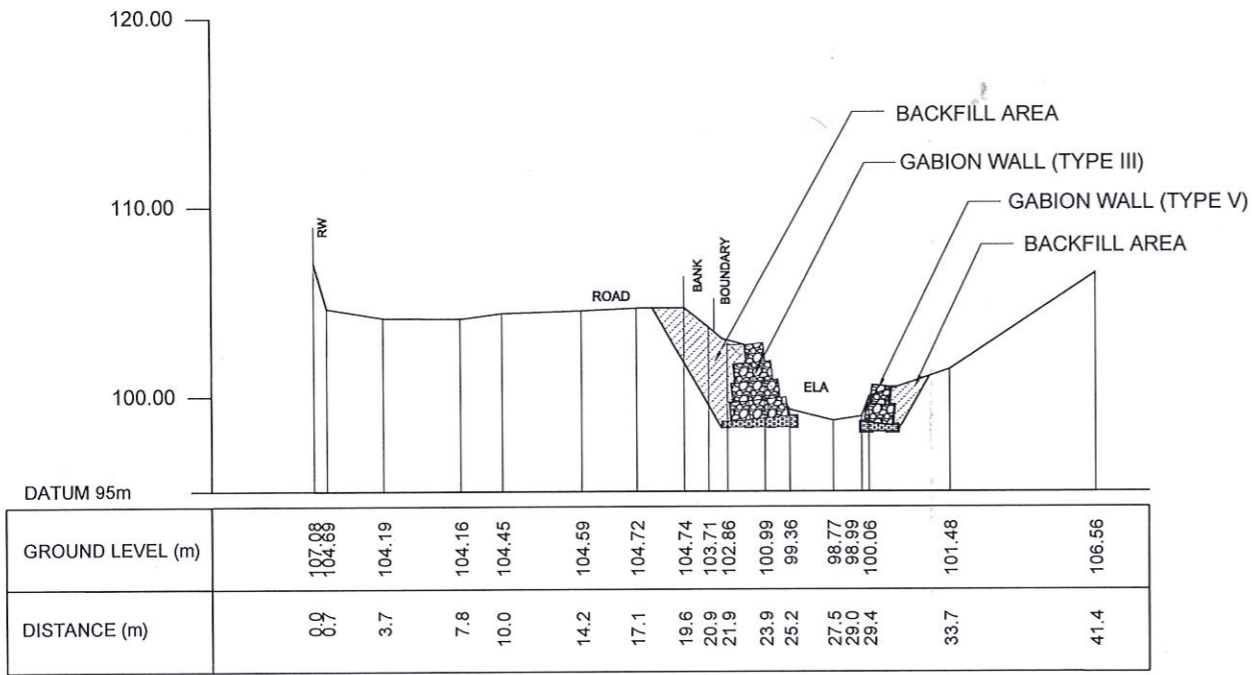


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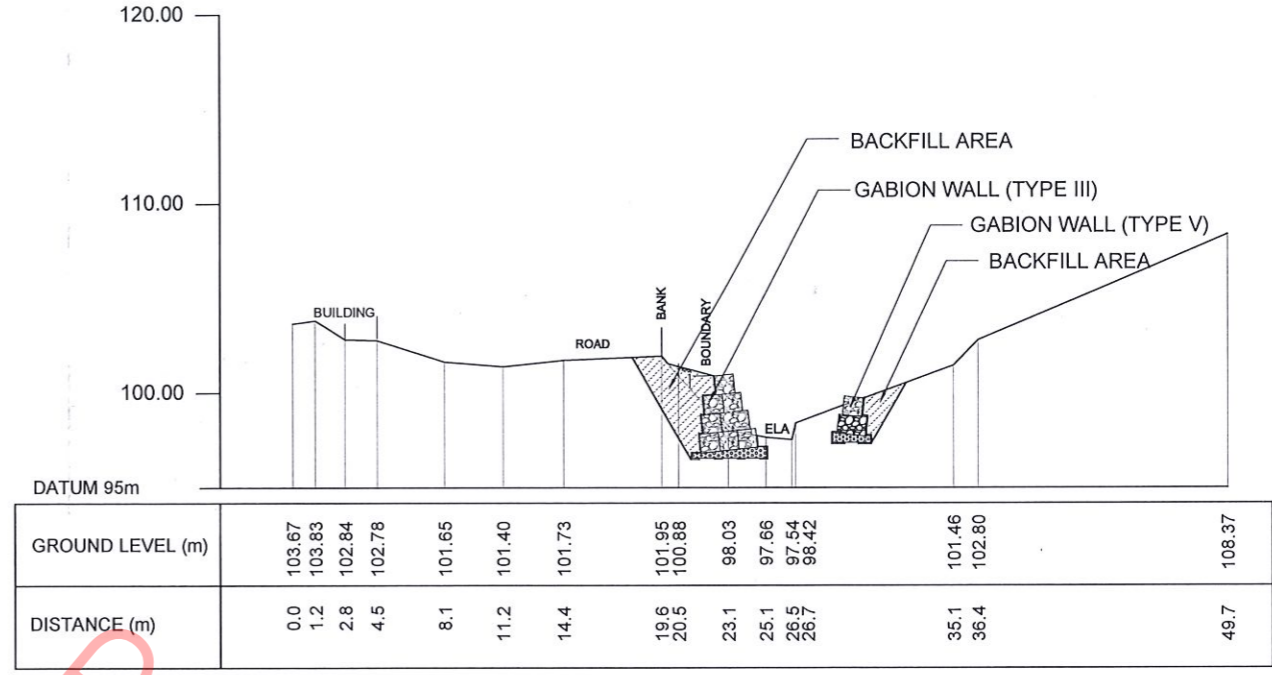


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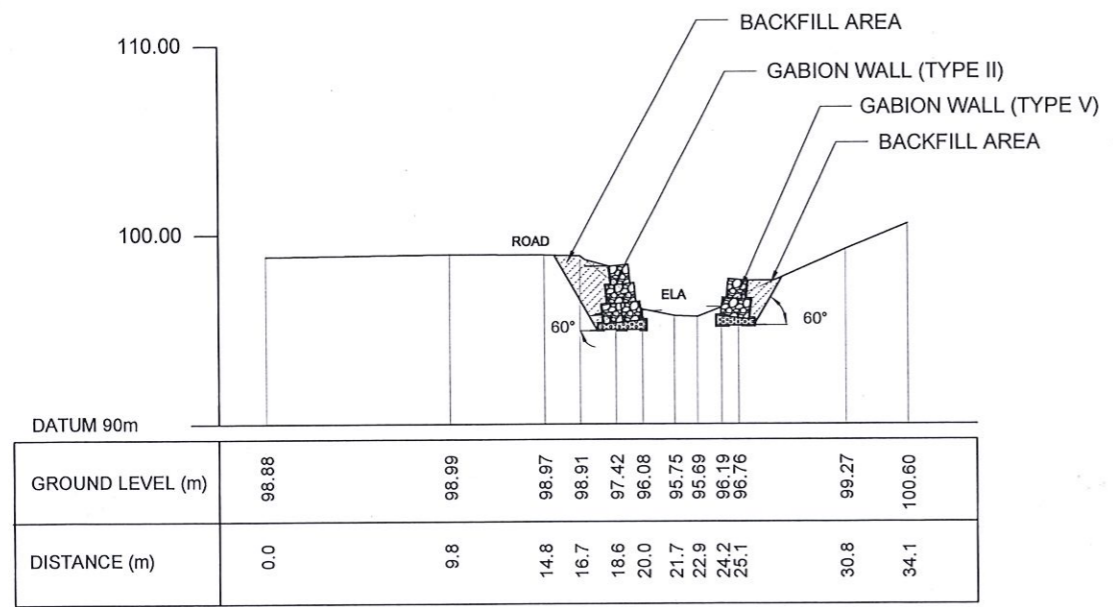
EMPLOYER DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT NATIONAL BUILDING RESEARCH ORGANISATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	DESIGNER DESIGN UNIT NATIONAL BUILDING RESEARCH ORGANIZATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	REV	DATE	REVISION DESCRIPTION	APPROVAL	PROJECT TITLE REDUCTION OF LANDSLIDE VULNERABILITY BY MITIGATION MEASURES SEETHA - ELIYA TEMPLE NUWARAELIYA	TITLE		DESCRIPTION DRAWN DESIGNED CHECKED APPROVED	NAME K.M.D. NISHANTHI P.A.D.L.S. CHANDRASIRI H. R. MADURANGA K.N. BANDARA	SIGNATURE 
		SCALE 1:400, 1:500		DATE	01.02.2024		PROJECT / DRAWING No. RLVMMP/WORKS/NCB/PHII/042-HP/DR-04b				



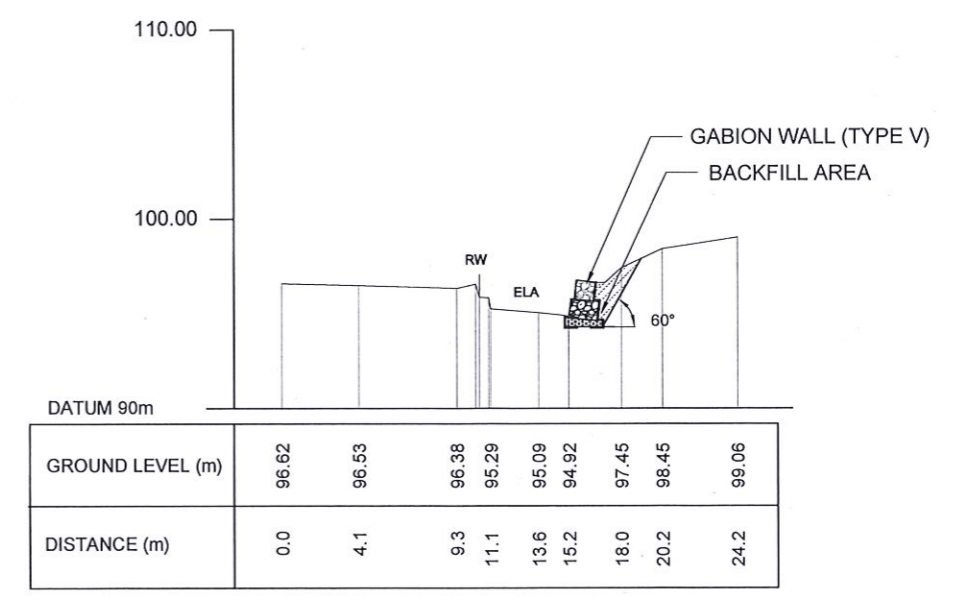
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CS06








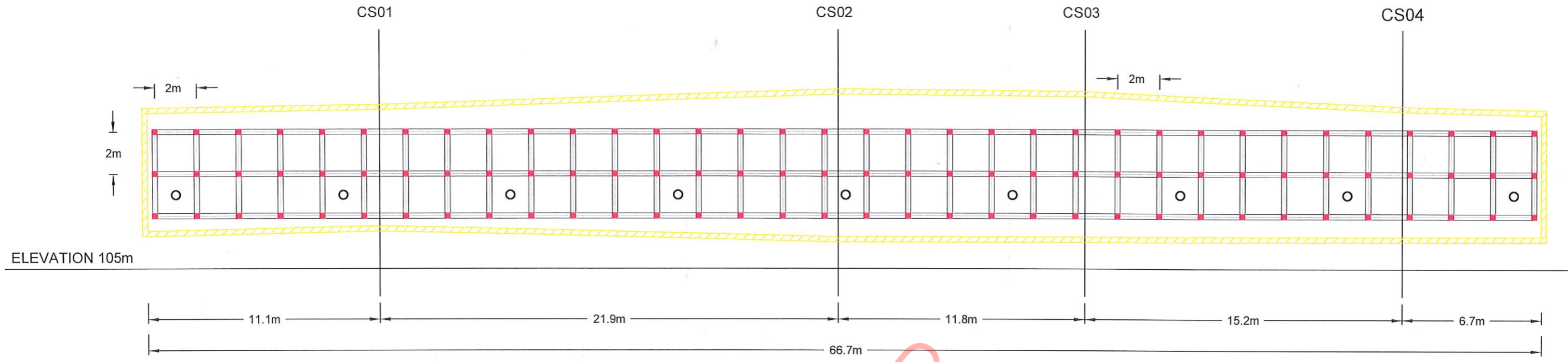
CS07



CS08

RLVMMP


<b>EMPLOYER</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	<b>DESIGNER</b>  DESIGN UNIT NATIONAL BUILDING RESEARCH ORGANIZATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	REV	DATE	REVISION DESCRIPTION	APPROVAL	<b>PROJECT TITLE</b> REDUCTION OF LANDSLIDE VULNERABILITY BY MITIGATION MEASURES SEETHA - ELIYA TEMPLE NUWARAELIYA	<b>TITLE</b> DESIGN CROSS SECTION		DESCRIPTION	NAME	SIGNATURE
								SCALE 1:400	DATE 01.02.2024	DRAWN	K.M.D. NISHANTHI
						PROJECT / DRAWING No. RLVMP/WORKS/NCB/PHII/042-HP/DR-04c	REVISION 00	DESIGNED	P.A.D.L.S. CHANDRASIRI		
								CHECKED	H. R. MADURANGA		
								APPROVED	K.N. BANDARA		



FRONT ELEVATION OF SOIL NAILING AREA I

LEGEND

- SOIL NAILING - TOTAL SOIL NAIL LENGTH = 04m  
NO OF SOIL NAIL = 102  
REINFORCEMENT DIAMETER = 32 mm  
DIAMETER OF DRILLED HOLE = 125mm  
NAIL SPACING = 2m (BW)
- HORIZONTAL LONG DRAIN - HORIZONTAL LONG DRAIN LENGTH = 10 m  
NO'S OF LONG DRAIN = 09  
DIAMETER = 90 mm  
SPACING = 08 m
- ▨ BOUNDARY BEAM

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 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

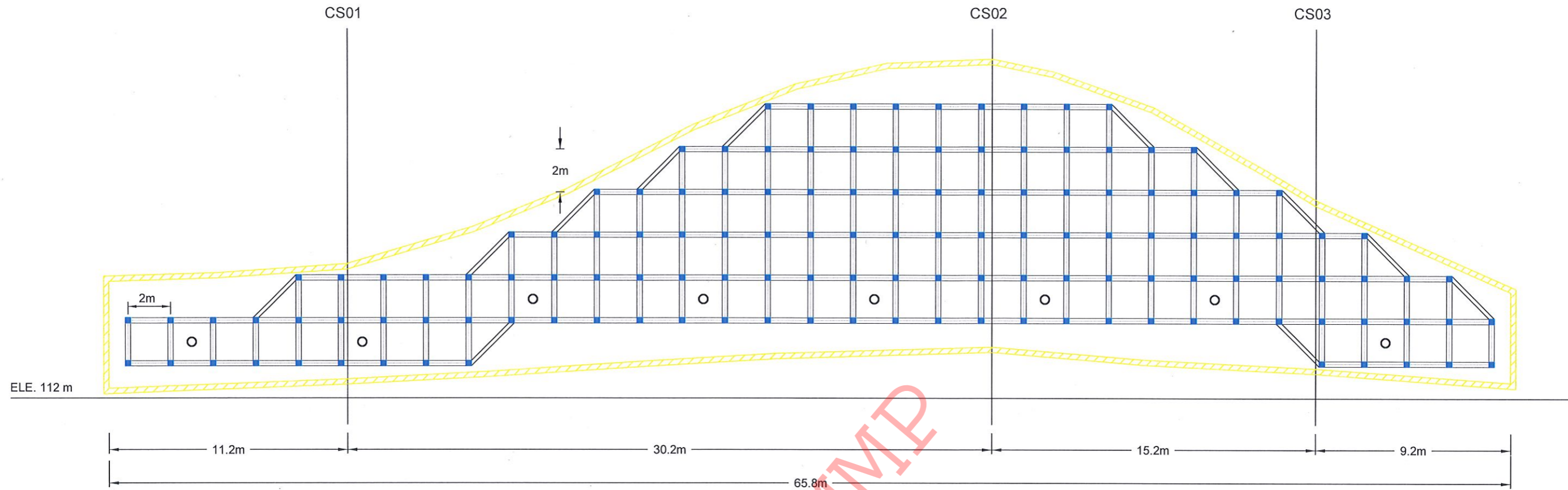
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 SEETHA - ELIYA TEMPLE  
 NUWARAELIYA

TITLE  
 FRONT ELEVATION

SCALE	1:200	DATE	01.02.2024
PROJECT / DRAWING No.	RLVMMP/WORKS/NCB/PHII/042-HP/DR-05a	REVISION	00

DESCRIPTION	NAME	SIGNATURE
DRAWN	K.M.D. NISHANTHI	
DESIGNED	P.A.D.L.S. CHANDRASIRI	
CHECKED	H. R. MADURANGA	
APPROVED	K.N. BANDARA	



FRONT ELEVATION OF SOIL NAILING AREA II

LEGEND

- SOIL NAILING
  - TOTAL SOIL NAIL LENGTH = 6m
  - NO OF SOIL NAIL = 135
  - REINFORCEMENT DIAMETER = 32 mm
  - DIAMETER OF DRILLED HOLE = 125mm
  - NAIL SPACING = 2m (BW)
  
- HORIZONTAL LONG DRAIN
  - HORIZONTAL LONG DRAIN LENGTH = 15 m
  - NO'S OF LONG DRAIN = 08
  - DIAMETER = 90 mm
  - SPACING = 08 m
  
- BOUNDARY BEAM

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

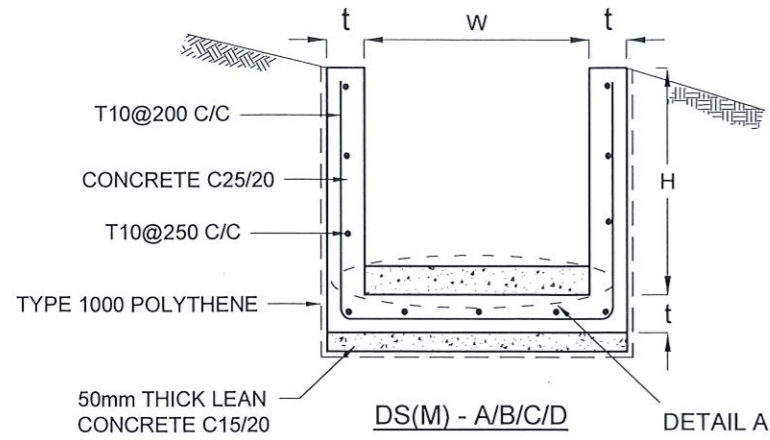
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 SEETHA - ELIYA TEMPLE  
 NUWARAELIYA

TITLE  
 FRONT ELEVATION  
 SCALE | 1:200 | DATE | 01.02.2024  
 PROJECT / DRAWING No. | RLVMP/WORKS/NCB/PHI/042-HP/DR-05b | REVISION | 00

DESCRIPTION	NAME	SIGNATURE
DRAWN	K.M.D. NISHANTHI	
DESIGNED	P.A.D.L.S. CHANDRASIRI	
CHECKED	H. R. MADURANGA	
APPROVED	K.N. BANDARA	

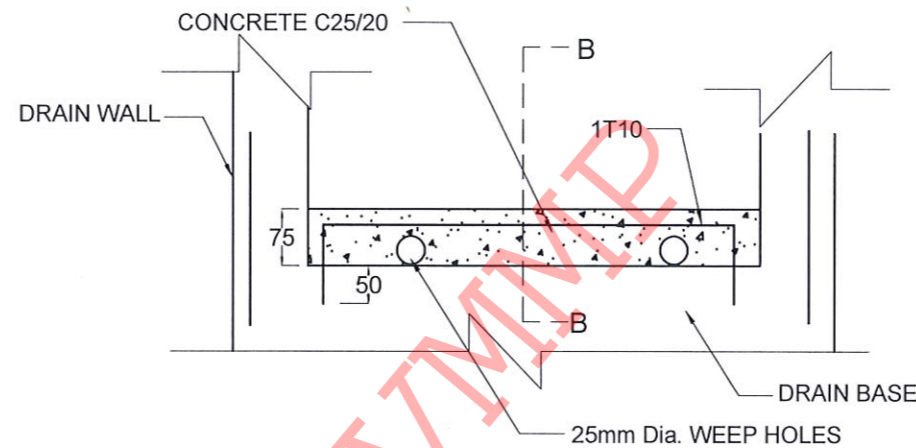
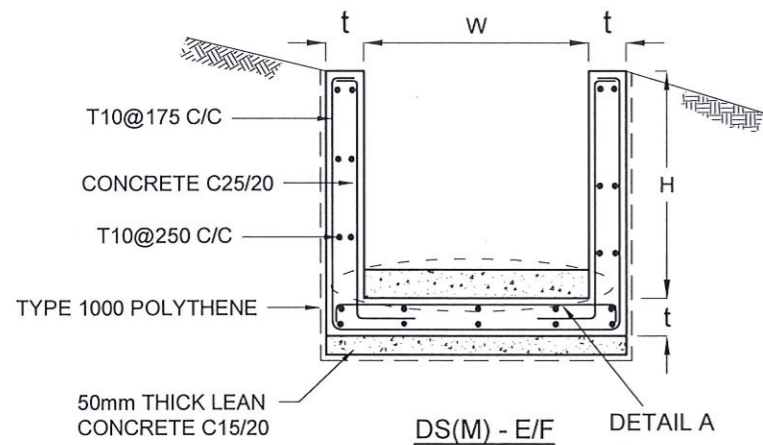




DRAIN TYPE	W (mm)	H (mm)	t (mm)
DS (M) - A /P	300	300	100
DS (M) - B/R	450	450	100
DS (M) - C/Q	600	600	100
DS (M) - D	750	750	125
DS (M) - E	900	900	150
DS (M) - F	1000	1000	150

**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.



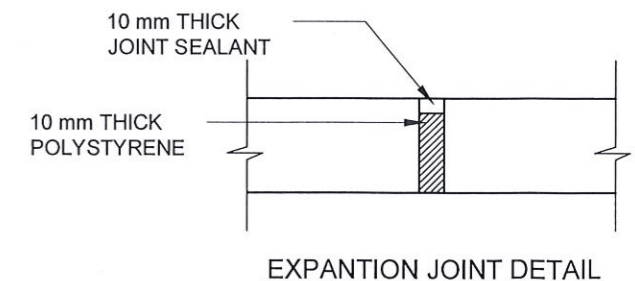
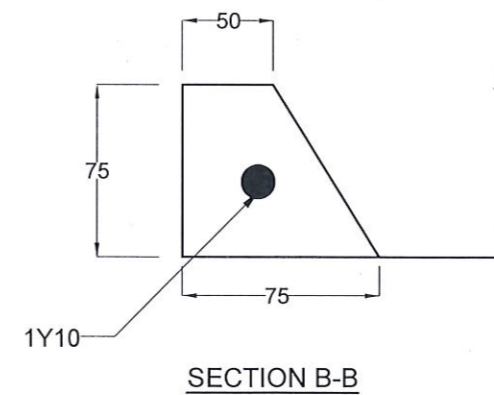
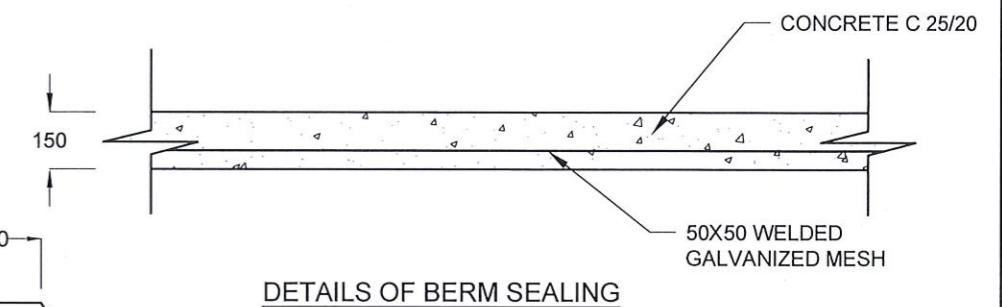
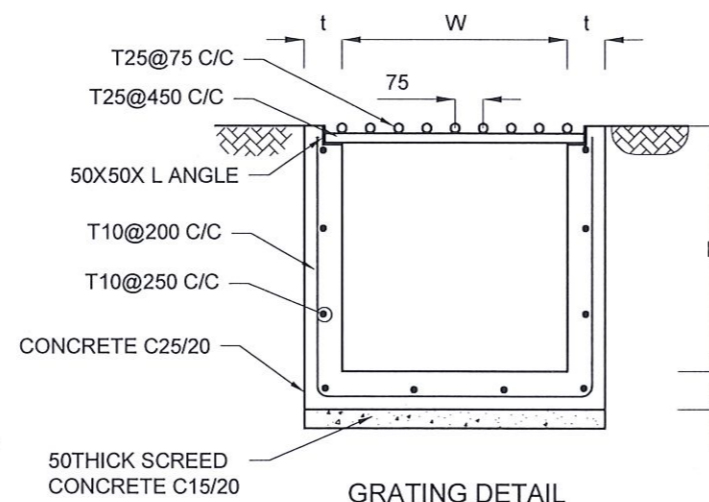
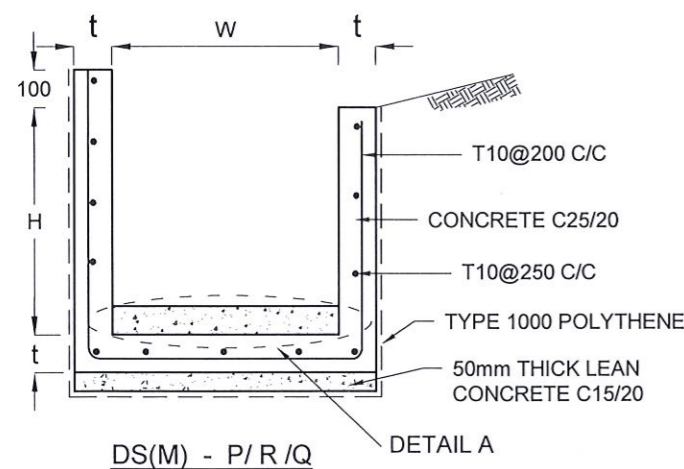
**CONCRETE**





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

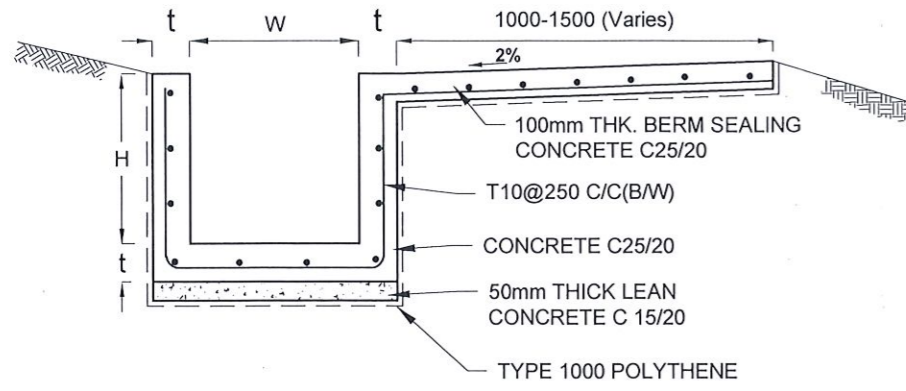
**REINFORCEMENT**

- 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

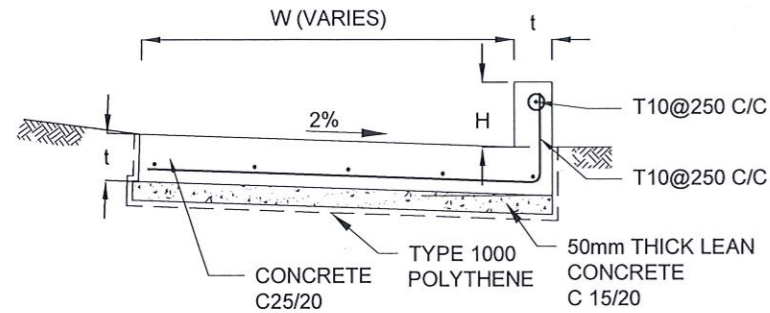
DETAIL A - (ENERGY BREAKER AT 3M)



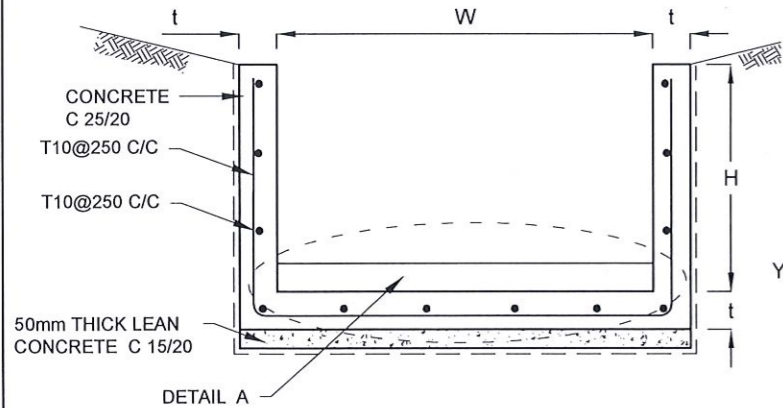
EMPLOYER  DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA MINISTRY OF DEFENCE NATIONAL BUILDING RESEARCH ORGANISATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	DESIGNER  DESIGN UNIT NATIONAL BUILDING RESEARCH ORGANISATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	REV	DATE	REVISION DESCRIPTION	APPROVAL	PROJECT TITLE REDUCTION OF LANDSLIDE VULNERABILITY BY MITIGATION MEASURES SEETHA - ELIYA TEMPLE NUWARAELIYA	TITLE		DESCRIPTION	NAME	SIGNATURE
								DETAILS OF DRAINS (SURFACE DRAIN -1 OF 2)		DRAWN	K.M.D. NISHANTHI
							SCALE	N.T.S.	DATE	01.02.2024	
							PROJECT / DRAWING No.	RLVMMP/WORKS/NCB/PHII/042-HP/DR-06a	REVISION	00	
									CHECKED	H. R. MADURANGA	
									APPROVED	K.N. BANDARA	



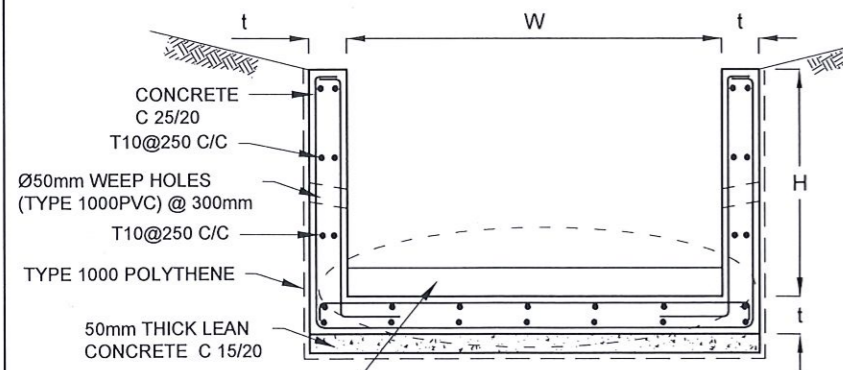
DS (B) - (TYPE I)



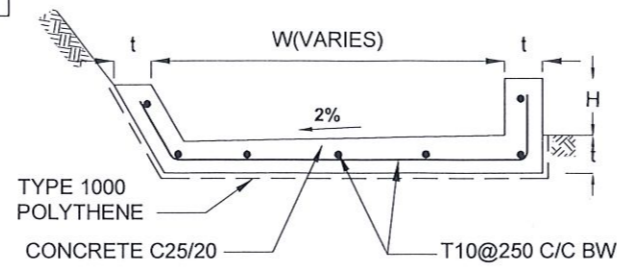
DS (K) - TYPE I



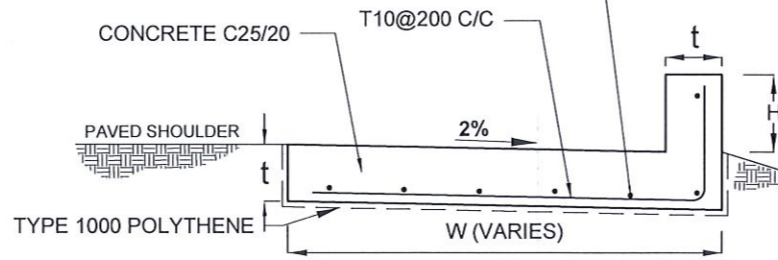
DS (L) - A/B



DS (L) - C/D

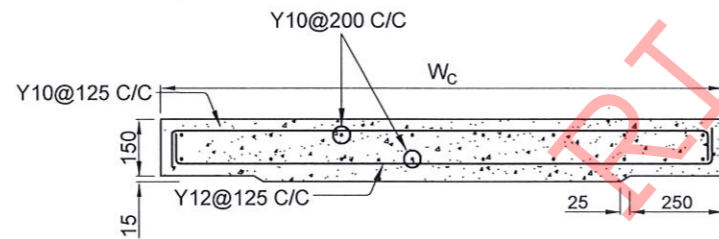


DS (B) - (TYPE II)

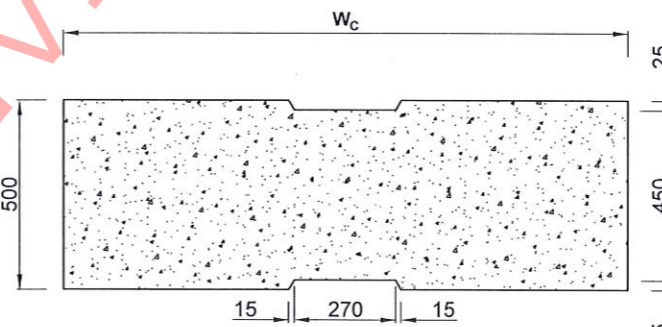


DS (K) - TYPE II

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



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



PLAN VIEW OF COVER SLAB

DRAIN TYPE	W (mm)	H (mm)	t (mm)
DS (L) - A	1000	600	100
DS (L) - B	1000	800	125
DS (L) - C	1000	1000	125
DS (L) - D	2000	2000	150

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	2000	150	100

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  
  
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 MINISTRY OF DEFENCE  
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 COLOMBO - 05




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

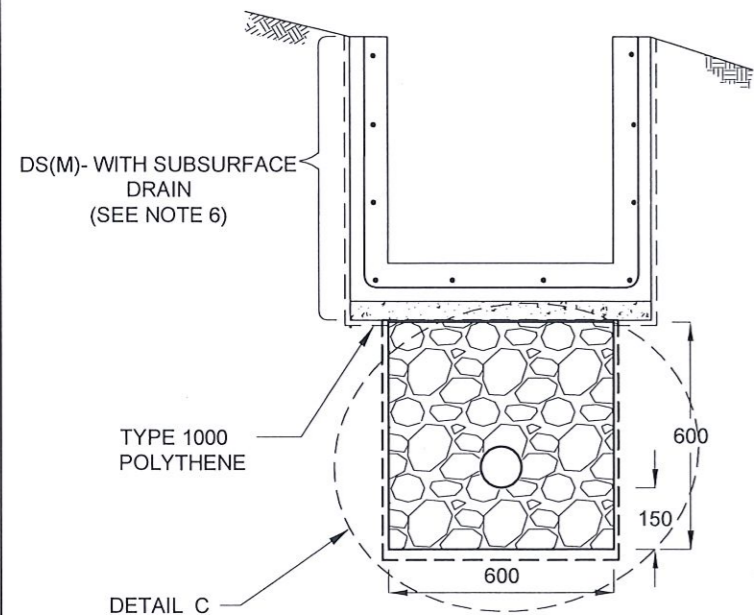
REV	DATE	REVISION DESCRIPTION	APPROVAL

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 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 SEETHA - ELIYA TEMPLE  
 NUWARAEIYA

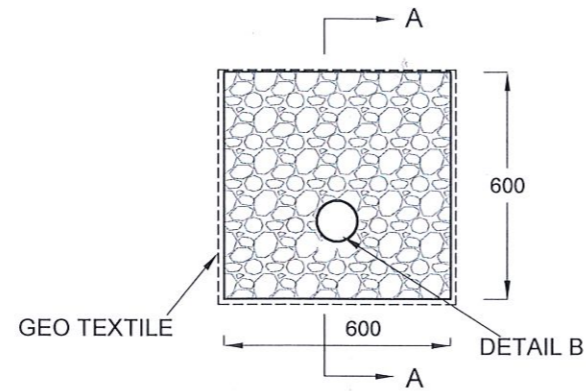
TITLE  
 DETAILS OF DRAINS  
 (SURFACE DRAIN -2 OF 2)

SCALE N.T.S. DATE 01.02.2024  
 PROJECT / DRAWING No. RLVMP/WORKS/NCB/PHII/042-HP/DR-06b REVISION 00

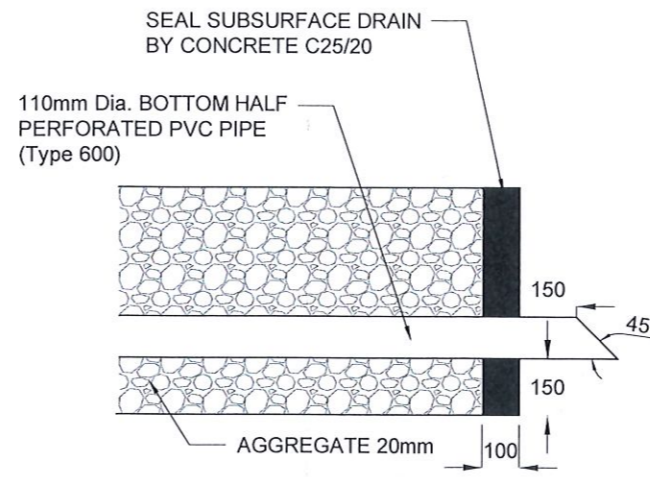
DESCRIPTION	NAME	SIGNATURE
DRAWN	K.M.D. NISHANTHI	
DESIGNED	P.A.D.L.S. CHANDRASIRI	
CHECKED	H. R. MADURANGA	
APPROVED	K.N. BANDARA	



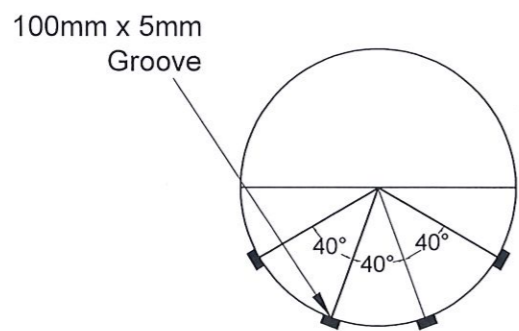
SUBSURFACE DRAIN [DS (S) -A]



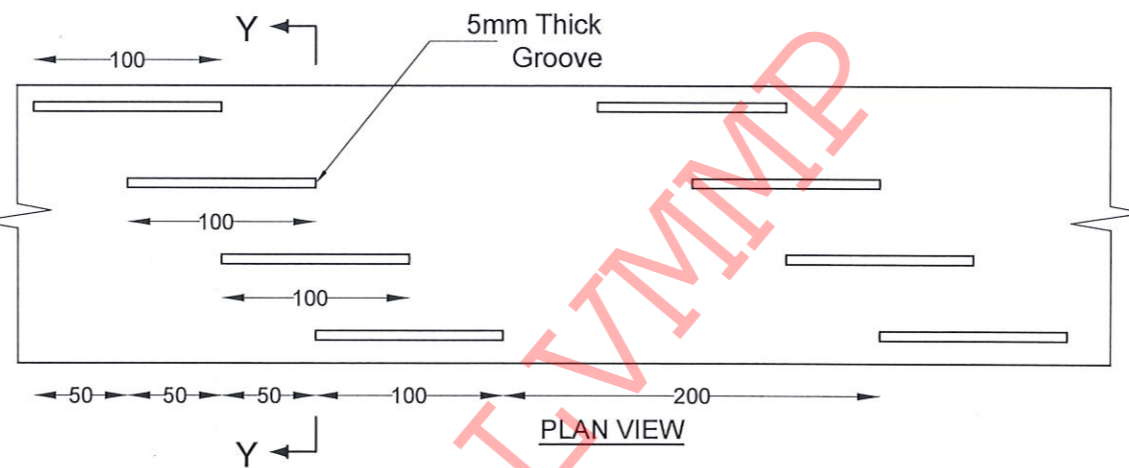
DETAIL C / DS (S) -A



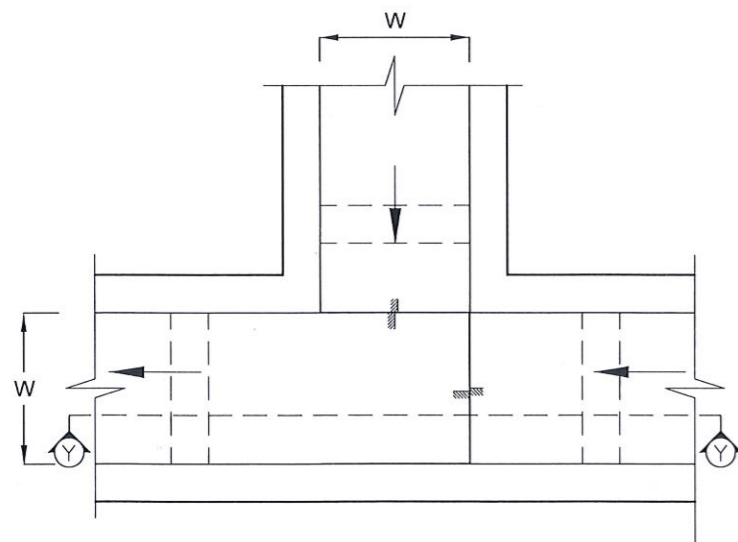
SECTION A-A (OUTLET DETAIL SUBSURFACE DRAIN)



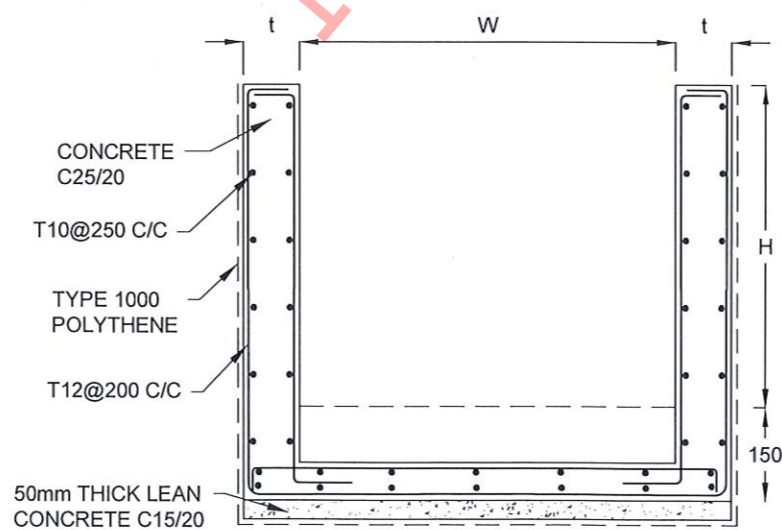
SECTION Y - Y



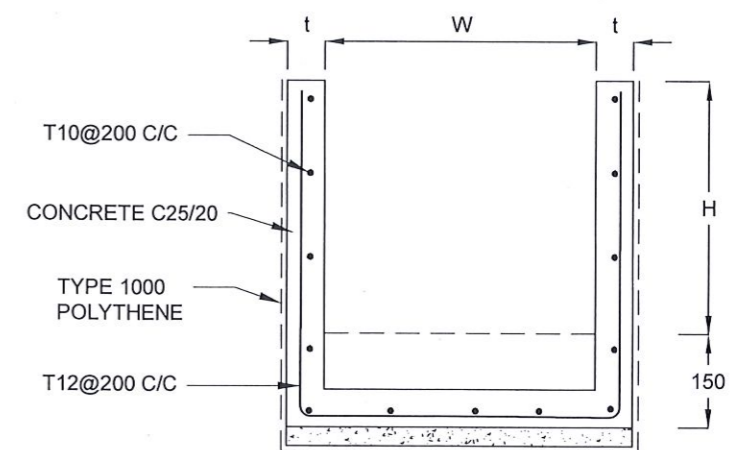
DETAIL - B (PERFORATED PIPE FOR SUB-SURFACE DRAINS)



PLAN VIEW OF CATCH PIT (CP)



SECTION Y-Y (CP-R)



SECTION Y - Y

NOTES

1. W,H,t ; SHALL BE THE SAME AS RESPECTIVE DRAIN SECTION.
2. CP - R SHALL BE USED WHERE  $H \geq 900$ mm
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

EMPLOYER  
 DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
 MINISTRY OF DEFENCE  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

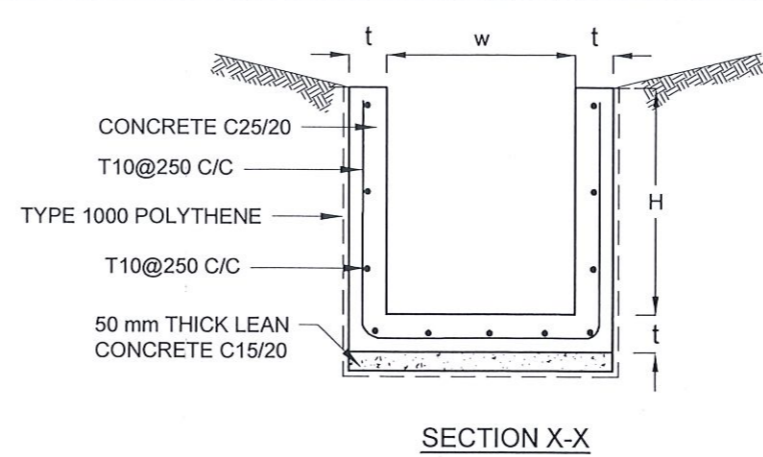
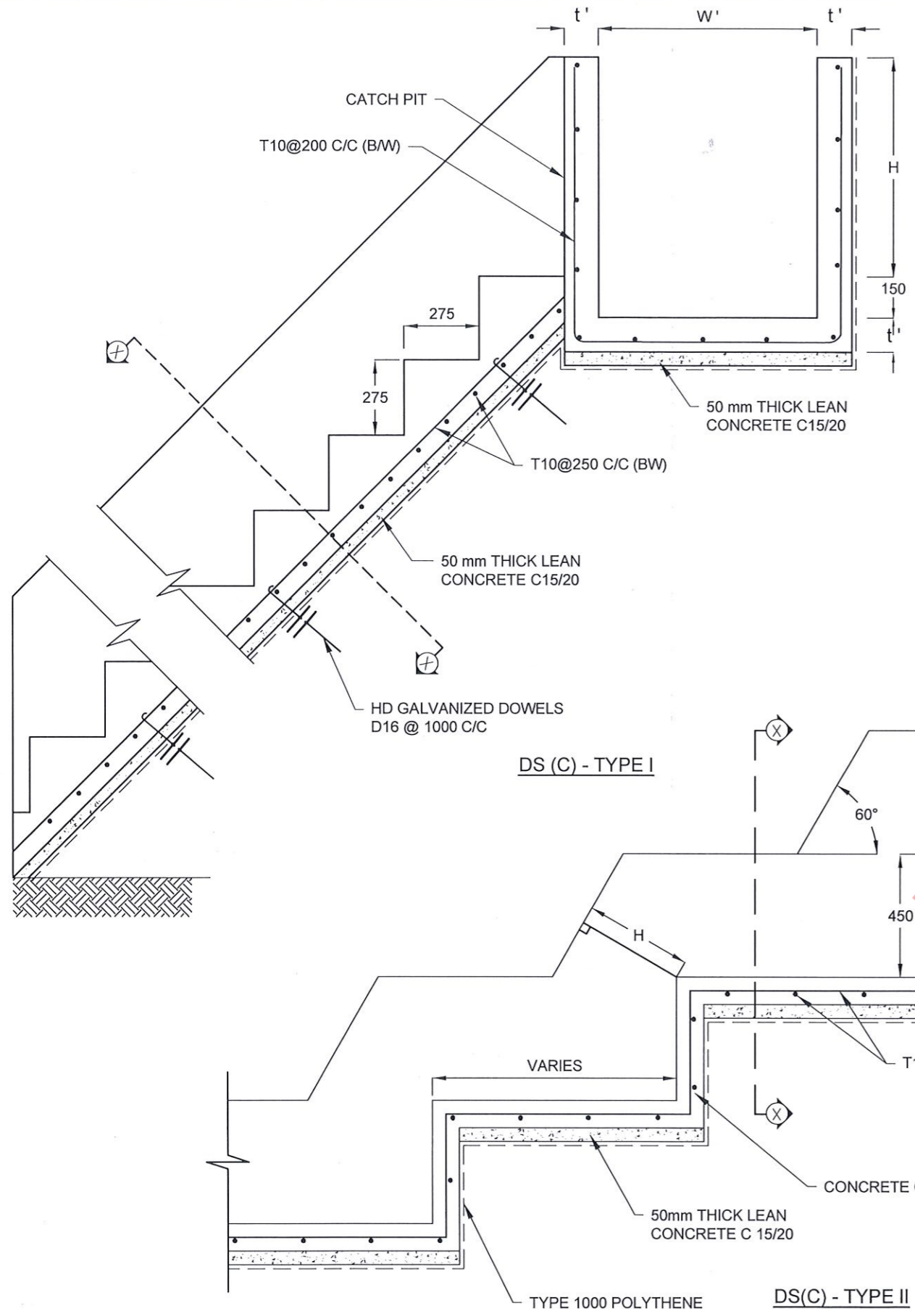
DESIGNER  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 SEETHA - ELIYA TEMPLE  
 NUWARAELIYA

TITLE	DESCRIPTION	NAME	SIGNATURE
DETAILS OF DRAINS (SUBSURFACE DRAIN AND CATCHPIT)	DRAWN	K.M.D. NISHANTHI	
	DESIGNED	P.A.D.L.S. CHANDRASIRI	
	CHECKED	H. R. MADURANGA	
	APPROVED	K.N. BANDARA	

SCALE | N.T.S. | DATE | 01.02.2024  
 PROJECT / DRAWING No. | RLVMMP/WORKS/NCB/PHII/042-HP/DR-06c | REVISION | 00



**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

PRELIMINARY

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

EMPLOYER  

 DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA  
 MINISTRY OF DEFENCE  
 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

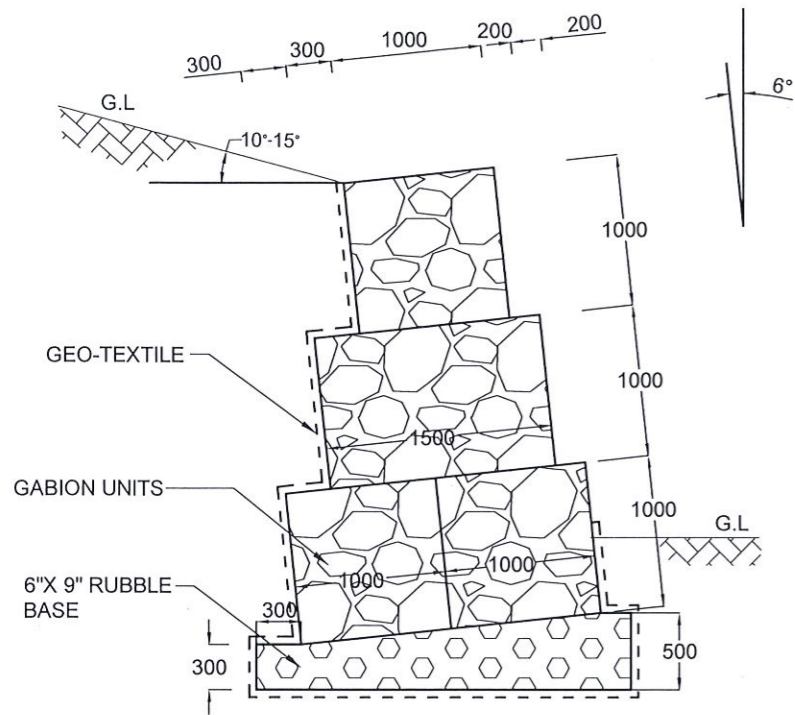
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 SEETHA - ELIYA TEMPLE  
 NUWARAELIYA

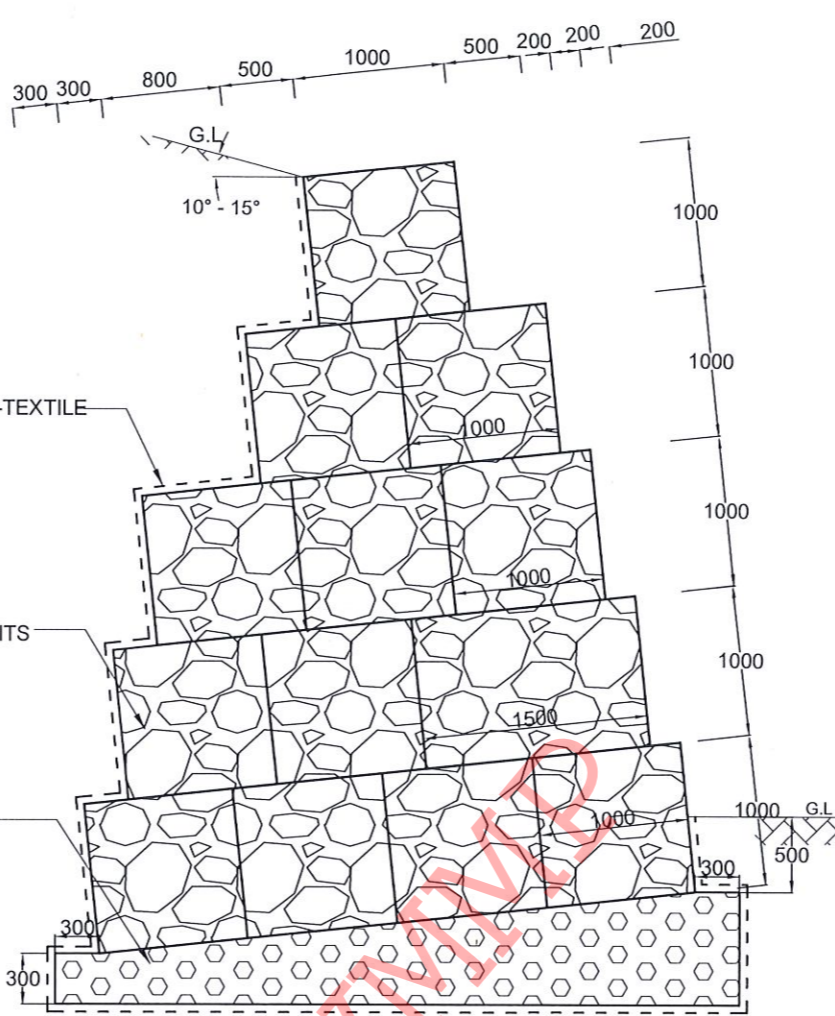
TITLE  
 DETAILS OF DRAINS  
 (CASCADE DRAIN)

SCALE	N.T.S.	DATE	01.02.2024
PROJECT / DRAWING No.	RLVMMMP/WORKS/NCB/PH11/042-HP/DR-06d	REVISION	00

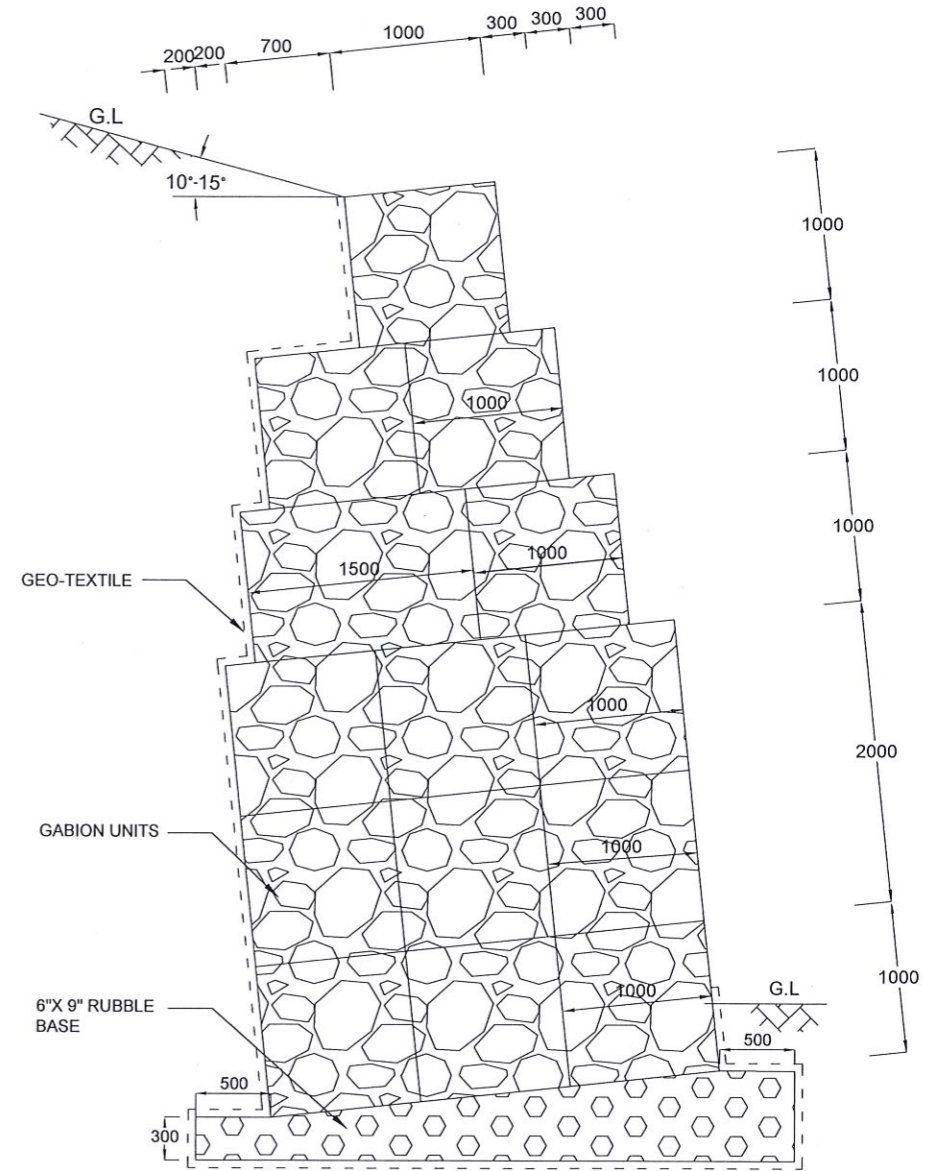
DESCRIPTION	NAME	SIGNATURE
DRAWN	K.M.D. NISHANTHI	
DESIGNED	P.A.D.L.S. CHANDRASIRI	
CHECKED	H. R. MADURANGA	
APPROVED	K.N. BANDARA	



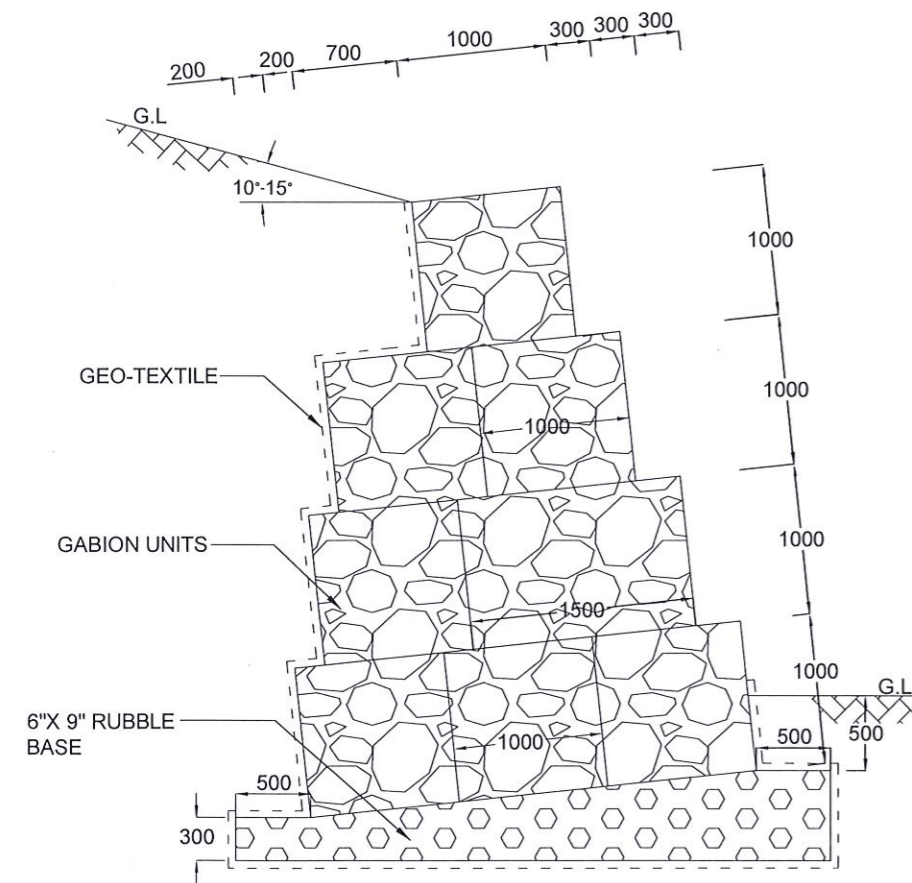
GABION WALL  
TYPE I



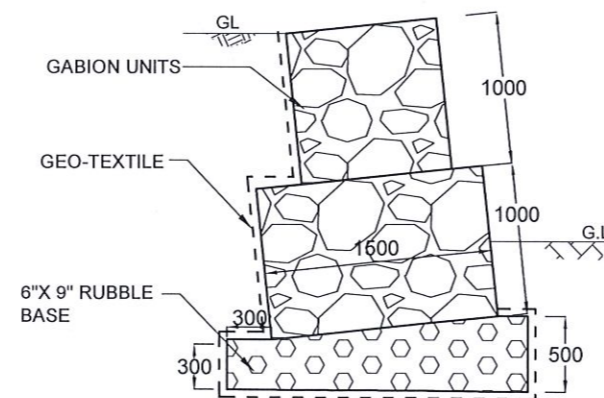
GABION WALL  
TYPE III



GABION WALL  
(TYPE IV)




GABION WALL  
TYPE II



GABION WALL  
TYPE V

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS.




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

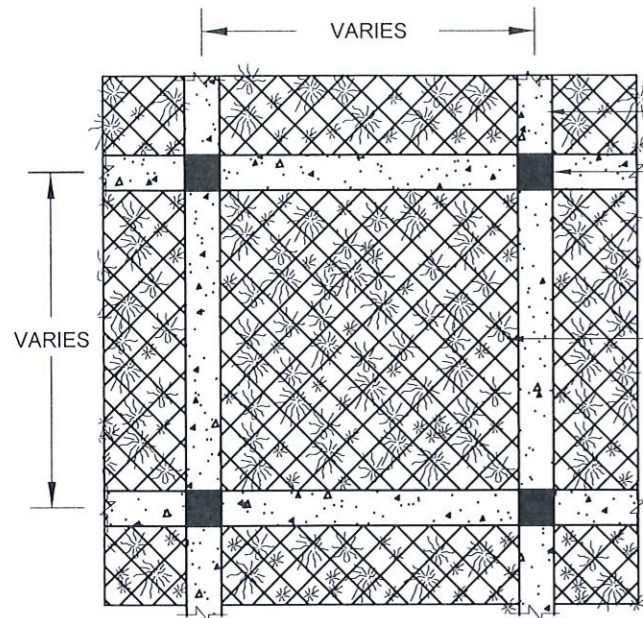
DESIGNER  
  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

REV	DATE	REVISION DESCRIPTION	APPROVAL

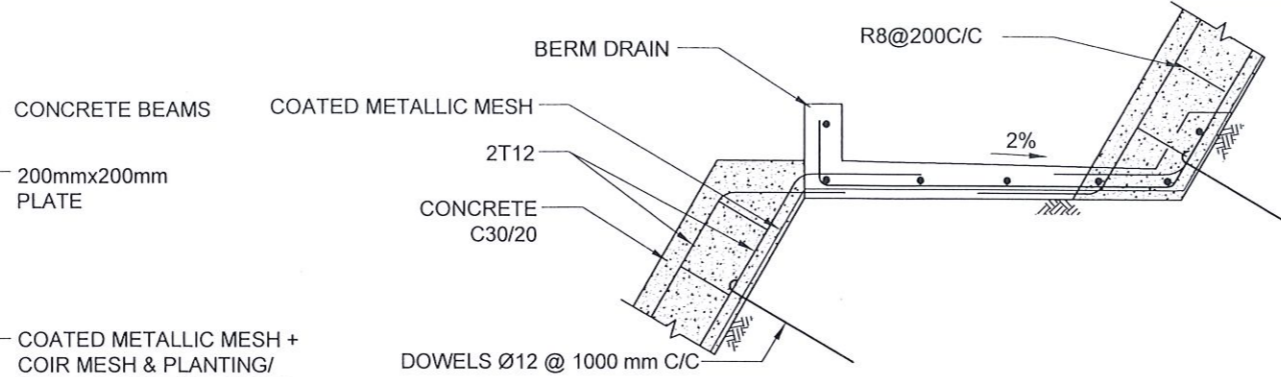
PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 SEETHA - ELIYA TEMPLE  
 NUWARAELIYA

TITLE		DATE	
DETAILS OF GABION WALL		01.02.2024	
SCALE	N.T.S.	REVISION	00
PROJECT / DRAWING No.			
RLVMP/WORKS/NCB/PHII/042-HP/DR-07			

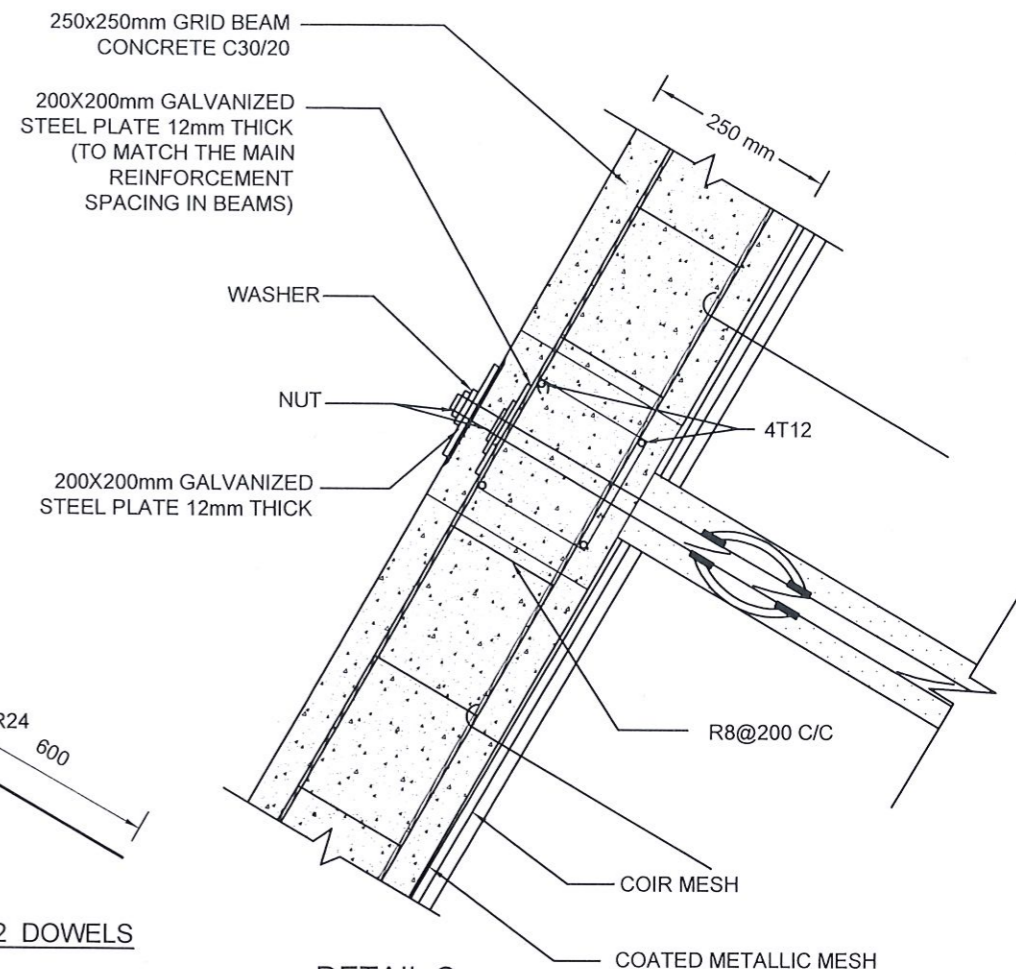
DESCRIPTION	NAME	SIGNATURE
DRAWN	K.M.D. NISHANTHI	
DESIGNED	P.A.D.L.S. CHANDRASIRI	
CHECKED	H. R. MADURANGA	
APPROVED	K.N. BANDARA	



DETAIL - B



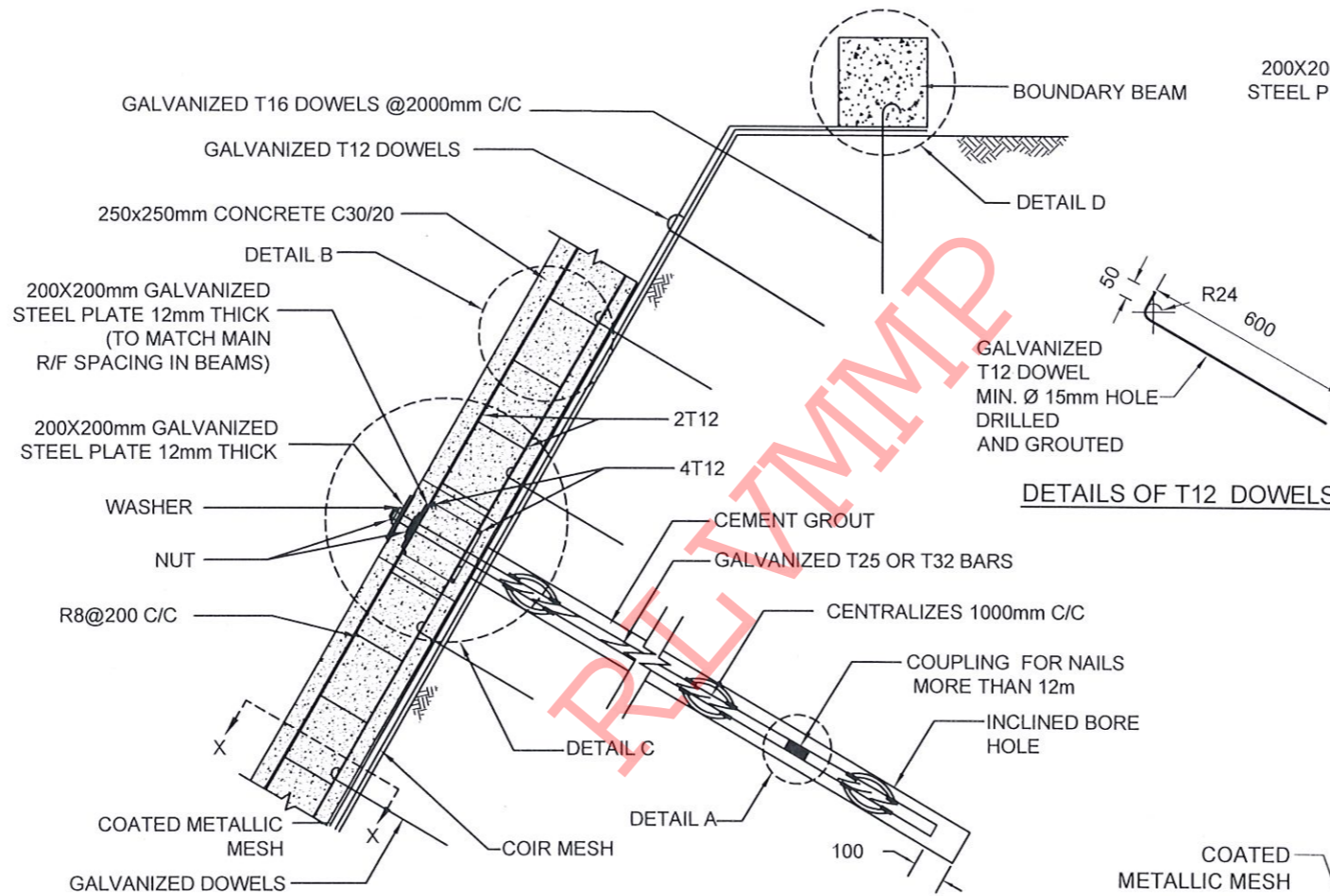
DETAIL OF FACING AT BERM



DETAIL C

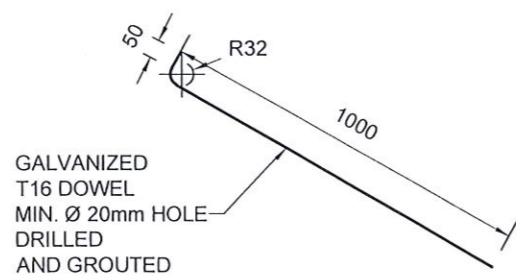
NOTES

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

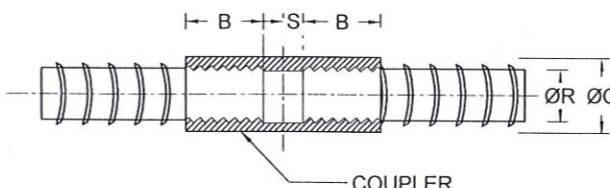


DETAIL OF SOIL NAIL

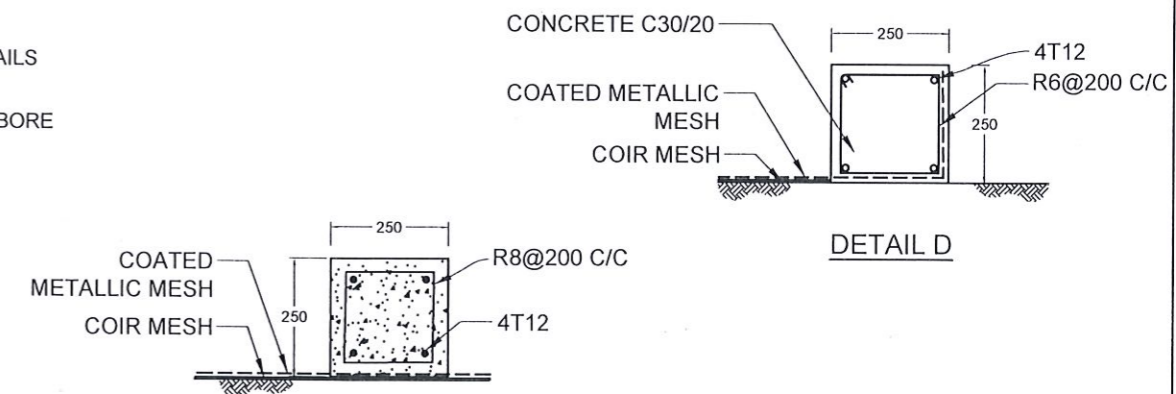
DETAILS OF T12 DOWELS



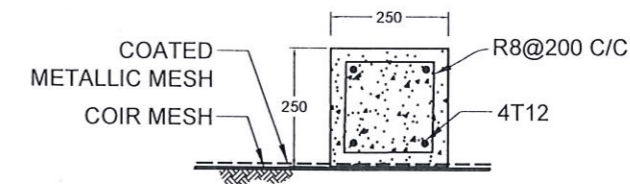
DETAILS OF T16 DOWELS



COUPLER DETAILS - A (NAIL LENGTH > 12m)




DETAIL D



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

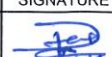



DESIGNER  
  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

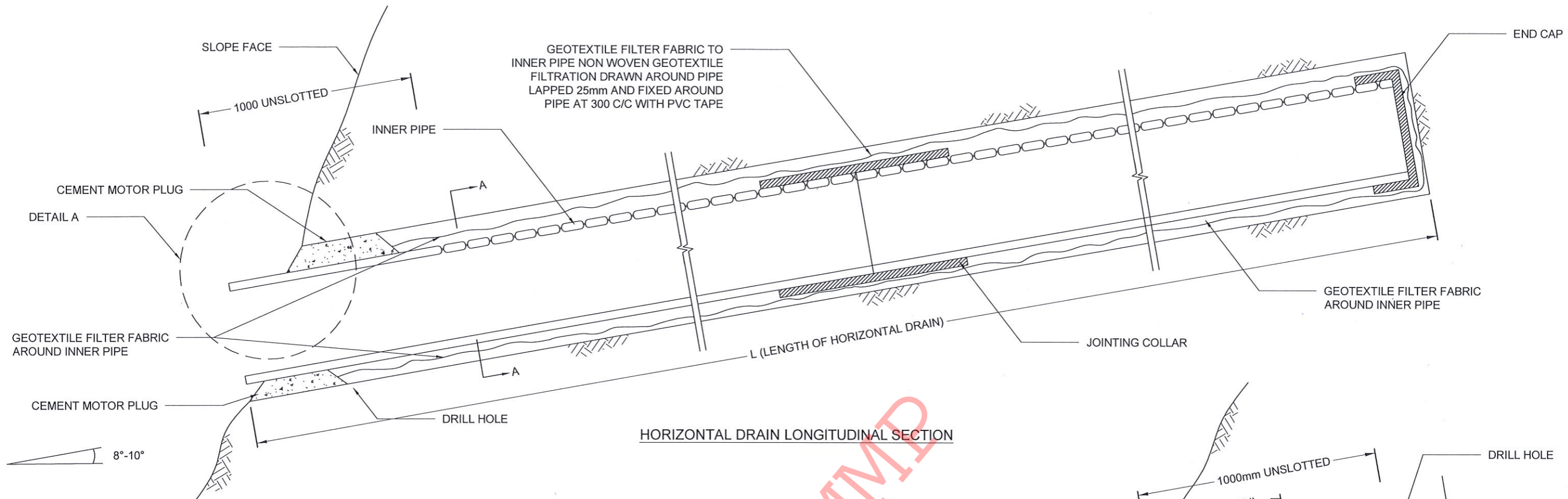
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 SEETHA - ELIYA TEMPLE  
 NUWARAEIYA

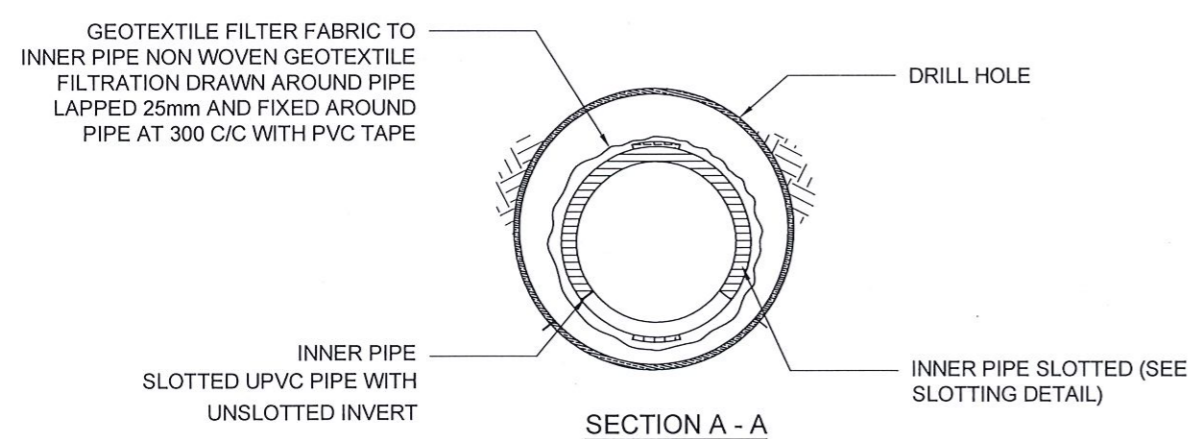
TITLE  
 DETAILS OF SOIL NAILING WITH  
 NON EMBEDDED GRID BEAM

SCALE | N.T.S. | DATE | 01.02.2024  
 PROJECT / DRAWING No. | RLVMMP/WORKS/NCB/PHII/042-HP/DR-08 | REVISION | 00

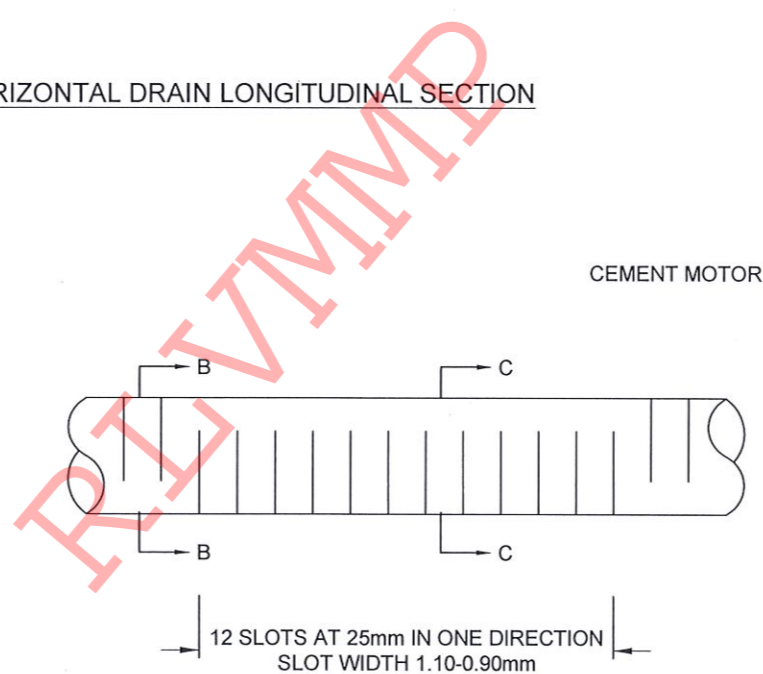
DESCRIPTION	NAME	SIGNATURE
DRAWN	K.M.D. NISHANTHI	
DESIGNED	P.A.D.L.S. CHANDRASIRI	
CHECKED	H. R. MADURANGA	
APPROVED	K.N. BANDARA	



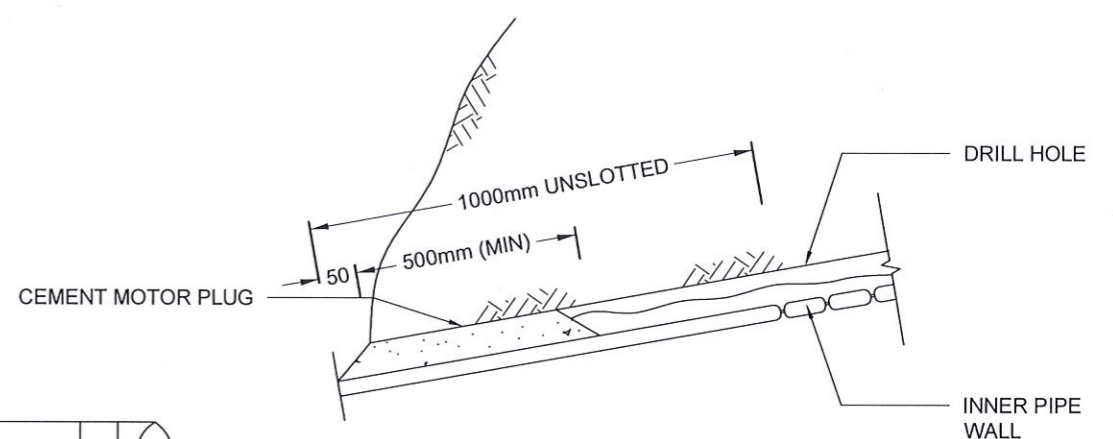
HORIZONTAL DRAIN LONGITUDINAL SECTION



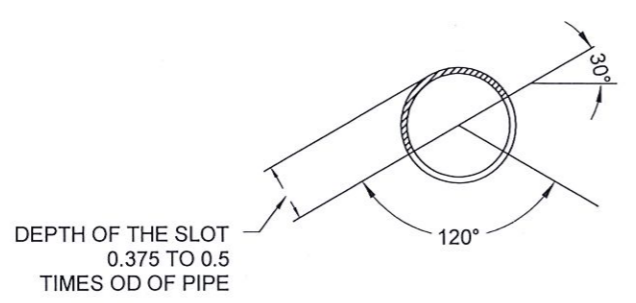
SECTION A - A



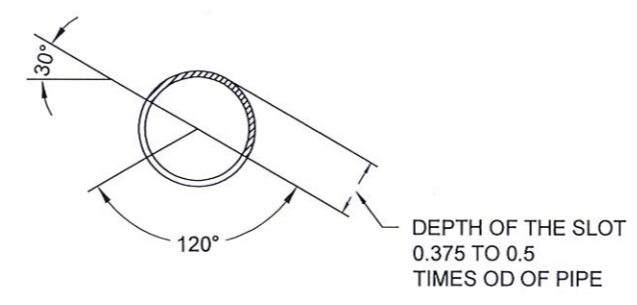
INNER AND OUTER PIPE SLOTTING DETAIL (TOP VIEW)



DETAIL A




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

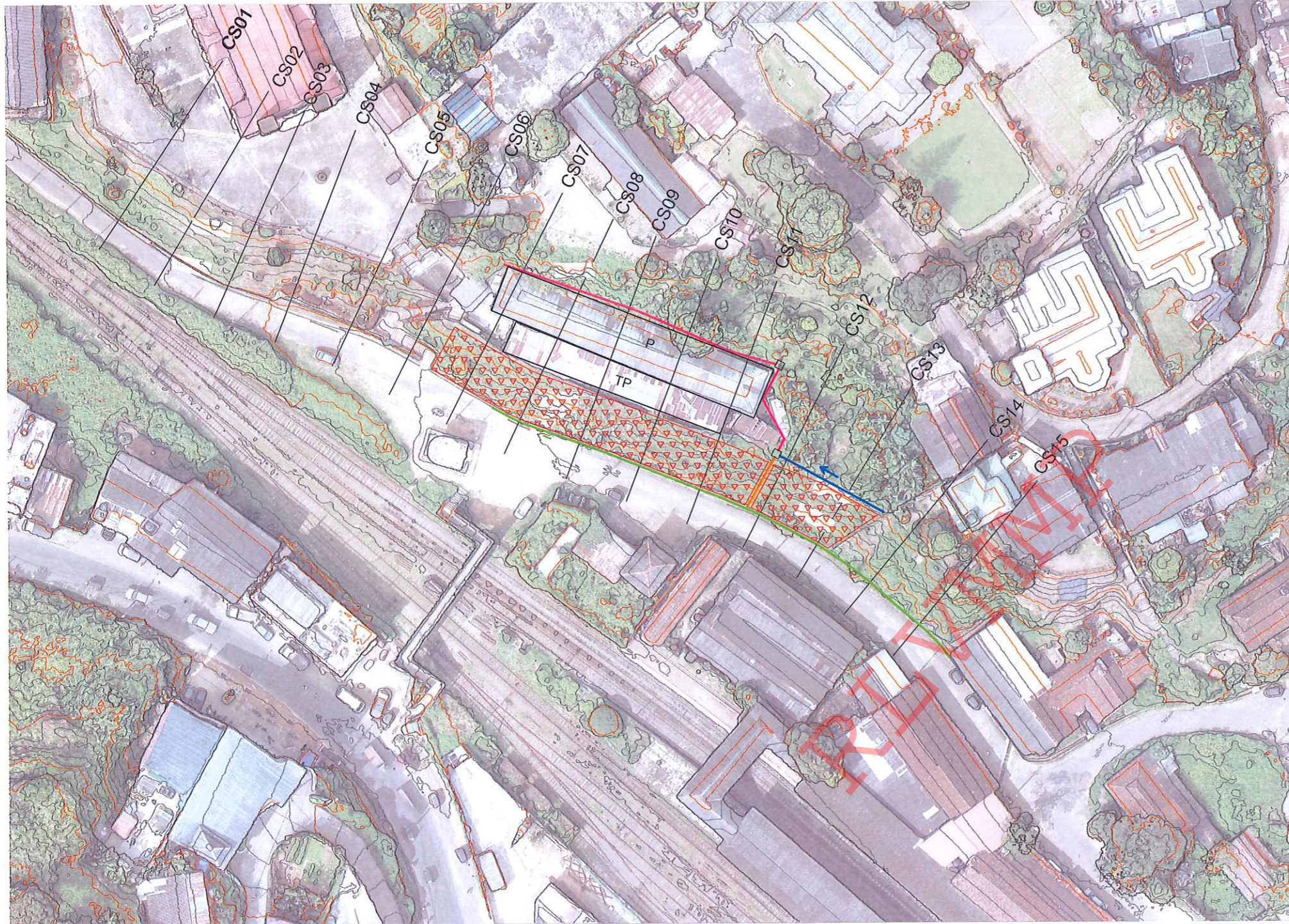
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 SEETHA - ELIYA TEMPLE  
 NUWARAELIYA

TITLE  
 DETAILS OF HORIZONTAL DRAIN

SCALE	N.T.S.	DATE	01.02.2024
PROJECT / DRAWING No.	RLVMMPP/WORKS/NCB/PH11/042-HP/DR-09	REVISION	00

DESCRIPTION	NAME	SIGNATURE
DRAWN	K.M.D. NISHANTHI	
DESIGNED	P.A.D.L.S. CHANDRASIRI	
CHECKED	H. R. MADURANGA	
APPROVED	K.N. BANDARA	



REFERENCE

- P - PERMANENT BUILDING
- TP - TEMPORARY BUILDING

DESIGN NOTATION

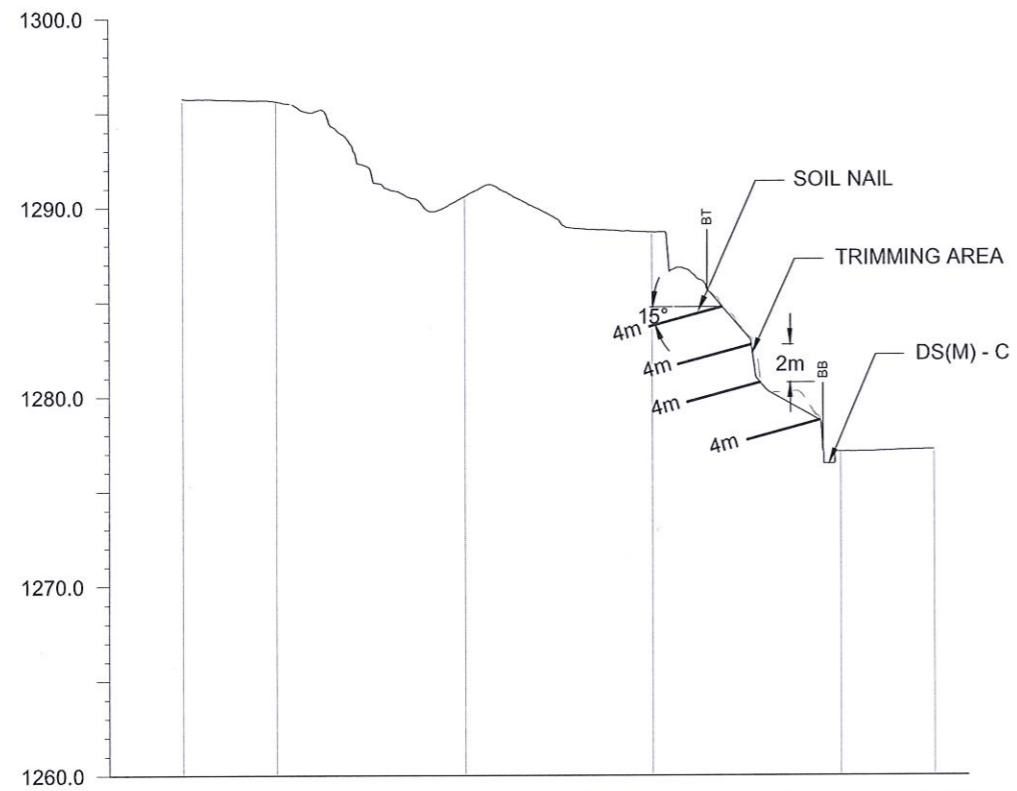
- - DS (M) - A
- - DS (M) - B
- - DS (M) - C (EXISTING)
- - REFURBISH EXISTING RRM DRAIN
- ▽▽▽▽ - SOIL NAIL
- - CATCH PIT

NOTES

1. SURFACE AND CASCADE DRAINS LOCATIONS (PATH OF THE DRAINS) & LENGTH MIGHT BE VARIED ACCORDING TO ACTUAL SITE CONDITION.
2. THE NUMBER OF NAILS, NAILS LENGTH AND NAIL LOCATION MAY BE VARIED ACCORDING TO THE ACTUAL SITE CONDITIONS.
3. THE SIDE DRAIN (DS (M) - B ) SHALL BE DIRECTED TO THE NATURAL VALLEY AND EXISTING CULVERT.
4. THE OVERHANGING / UNSTABLE ROCK EXPOSURES SHALL BE REMOVED BY TRIMMING OR SCALING.

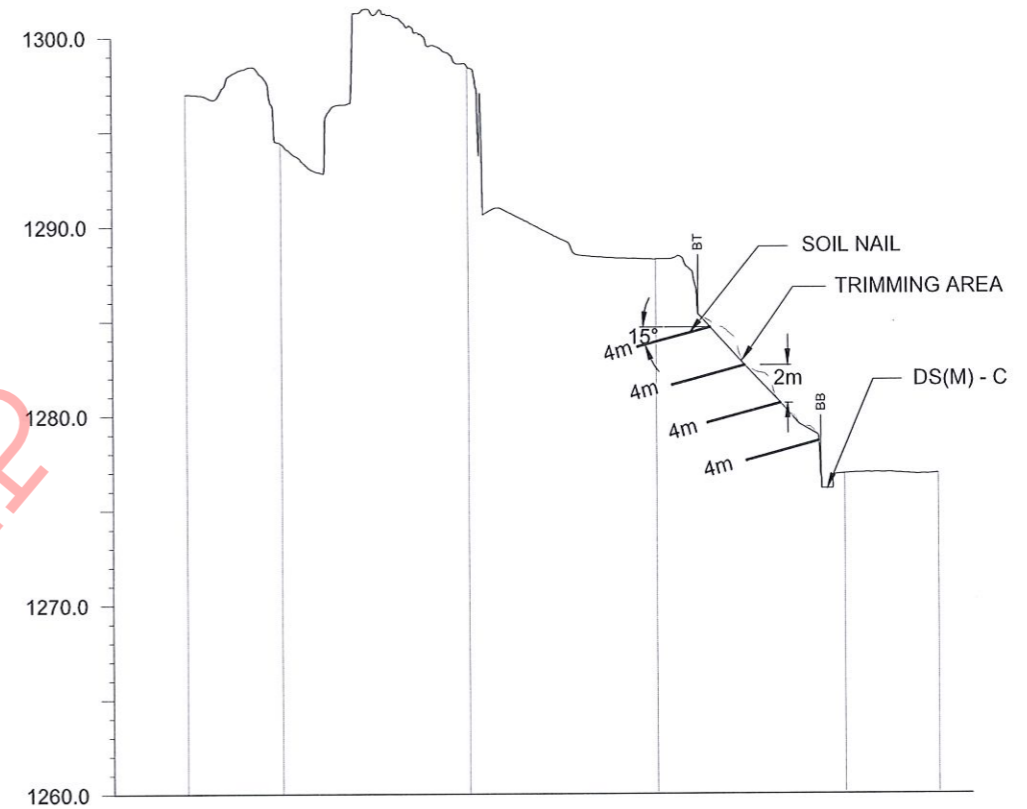
<p>EMPLOYER</p> <p><b>DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA</b>                  STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT                  NATIONAL BUILDING RESEARCH ORGANISATION                  No. 99/1, JAWATTA ROAD,                  COLOMBO - 05</p>	<p>DESIGNER</p> <p><b>DESIGN UNIT</b>                  NATIONAL BUILDING RESEARCH ORGANIZATION                  No. 99/1, JAWATTA ROAD,                  COLOMBO - 05</p>	REV	DATE	REVISION DESCRIPTION	APPROVAL	PROJECT TITLE	TITLE	DESCRIPTION	NAME	SIGNATURE				
REDUCTION OF LANDSLIDE VULNERABILITY BY MITIGATION MEASURES BOSCO COLLEGE - HATTON							DESIGN PLAN VIEW	SCALE	1:750	DATE	11.05.2022	RECOMMENDED	Prof. S.A.S. KULATHILAKA	
							PROJECT / DRAWING No.		REVISION	00	APPROVED	K.N. BANDARA		
							RLVMMP/WORKS/NCB/PHII/043-BO/DR-03							





GROUND LEVEL (m)	1295.630	1295.630	1290.616	1288.710	1277.106	1277.106
DISTANCE (m)	-35.000	-30.000	-20.000	-10.000	0.000	5.000


CS08



GROUND LEVEL (m)	1296.989	1294.413	1298.437	1288.244	1276.914	1276.914
DISTANCE (m)	-35.000	-30.000	-20.000	-10.000	0.000	5.000

CS10

RLVMMP

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

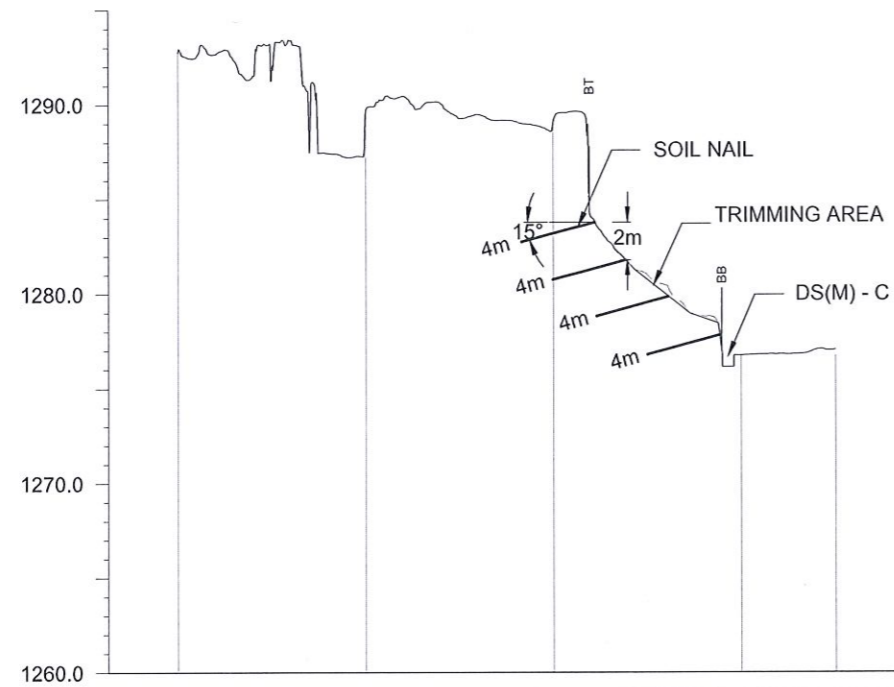
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 BOSCO COLLEGE - HATTON

TITLE  
 DESIGN CROSS SECTION

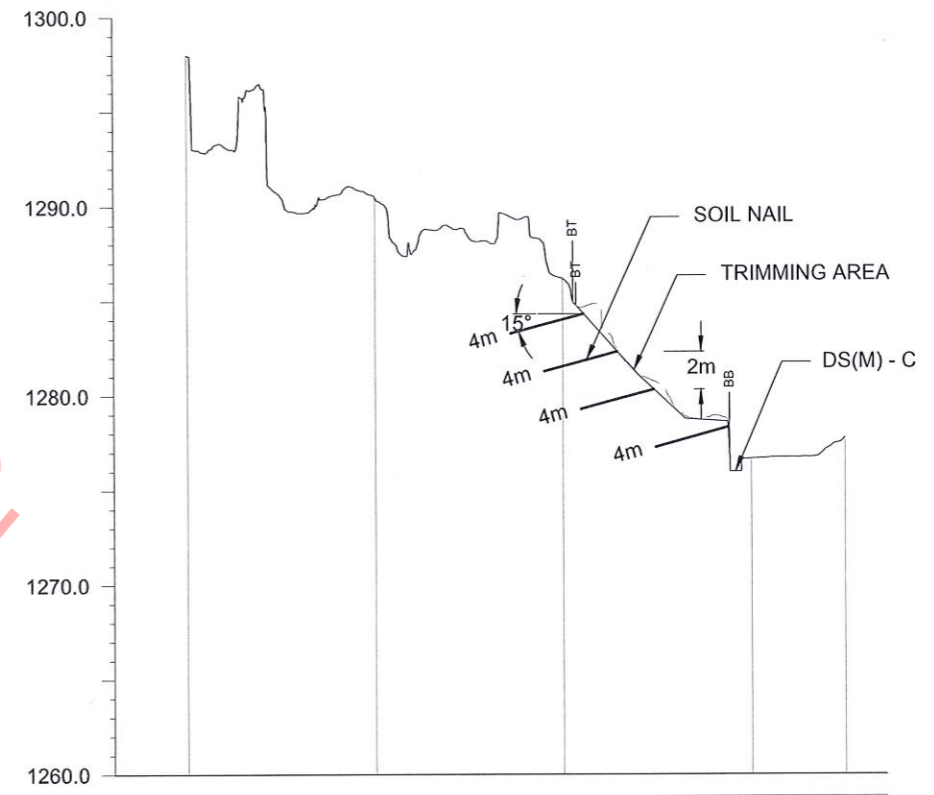
SCALE	1:500	DATE	11.05.2022
PROJECT / DRAWING No.	RLVMMP/WORKS/NCB/PHII/043-BO/DR-04a	REVISION	00

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)	1292.760	1289.744	1289.091	1276.776	1276.776
DISTANCE (m)	-30.000	-20.000	-10.000	0.000	5.000


CS12



GROUND LEVEL (m)	1297.991	1290.461	1286.202	1276.677	1277.813
DISTANCE (m)	-30.000	-20.000	-10.000	0.000	5.000

CS13

RLVMMP



**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

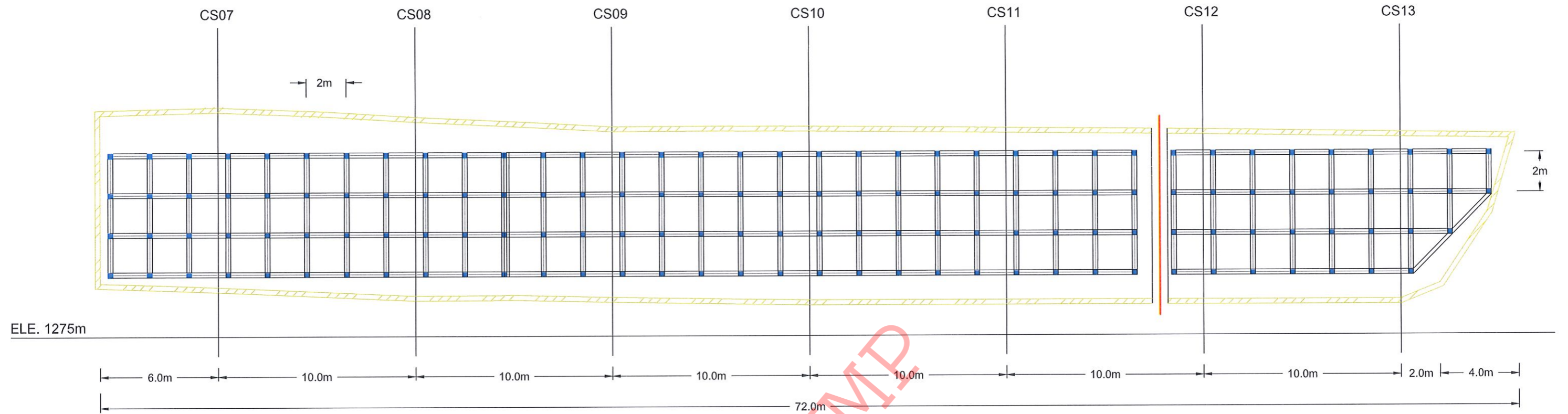
DESIGNER  
  
**DESIGN UNIT**  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 BOSCO COLLEGE - HATTON

TITLE		DESCRIPTION	
DESIGN CROSS SECTION		DRAWN	
SCALE   1:500		DESIGNER	
PROJECT / DRAWING No.		CHECKED	
RLVMMP/WORKS/NCB/PHIJ/043-BO/DR-04b		RECOMMENDED	
DATE   11.05.2022		APPROVED	
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	



FRONT ELEVATION OF AREA

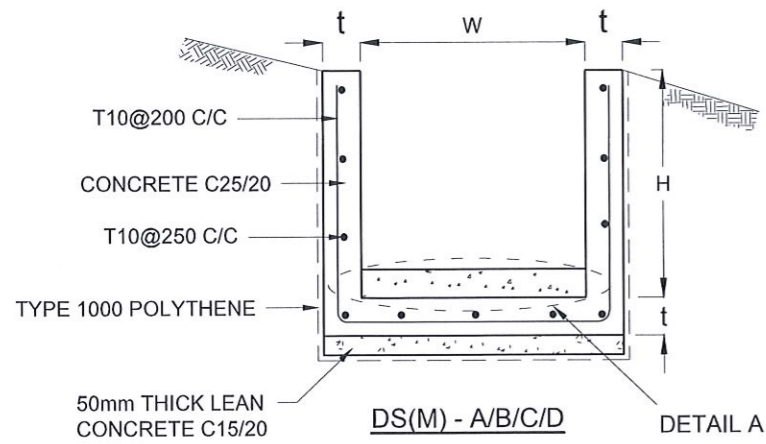
LEGEND

- SOIL NAIL ING - TOTAL NAILING LENGTH = 04 m  
NO'S OF NAILS = 141  
REBAR DIAMETER = 32mm  
DIAMETER OF THE BOREHOLE = 125mm
- ▨ BOUNDARY BEAM
- REFURBISH EXISTING RRM DRAIN

NOTES

1. THE NUMBER OF NAILS, NAILS LENGTH AND NAIL LOCATION MAY BE VARIED ACCORDING TO THE ACTUAL SITE CONDITIONS.

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 BOSCO COLLEGE - HATTON	TITLE FRONT ELEVATION	DESCRIPTION	NAME	SIGNATURE	
									SCALE 1:750	DATE 11.05.2022	RECOMMENDED
							PROJECT / DRAWING No. RLVMMP/WORKS/NCB/PHII/043-BO/DR-05	REVISION 00	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**

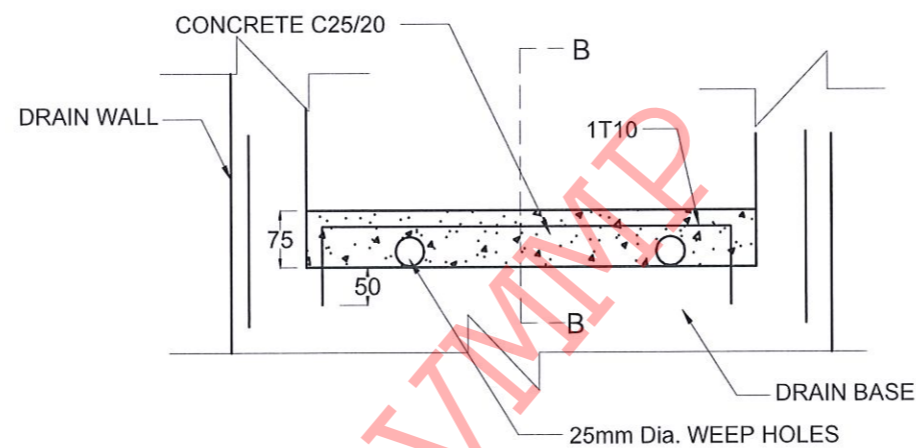
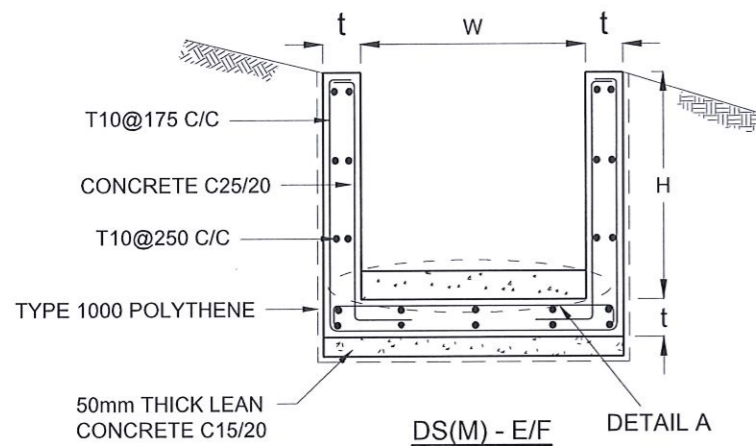
- DEPTH OF EXCAVATION MAY VARY ACCORDING TO SITE CONDITIONS.
- STEPS SHALL BE CONSTRUCTED AT SURFACE DRAIN ON SLOPING GROUND ACCORDING TO THE SITE CONDITIONS AS INSTRUCTED BY THE ENGINEER.
- ENERGY BREAKERS SHALL BE CONSTRUCTED AT THE STEEP DRAIN SEGMENTS AS PER THE INSTRUCTIONS OF THE ENGINEER.
- DOWELS 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**

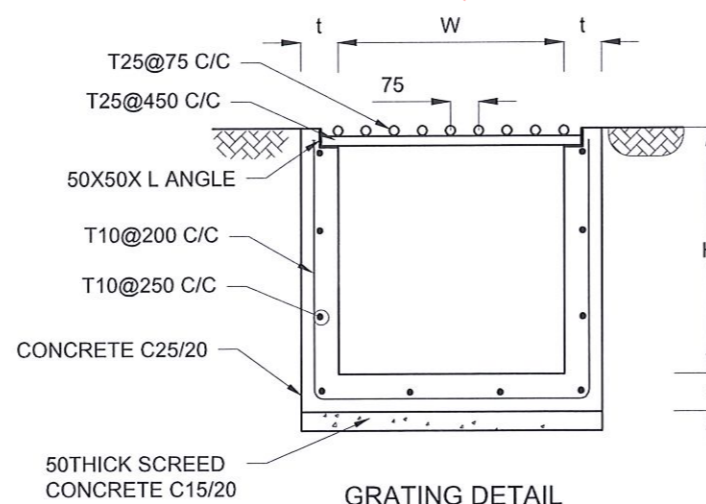
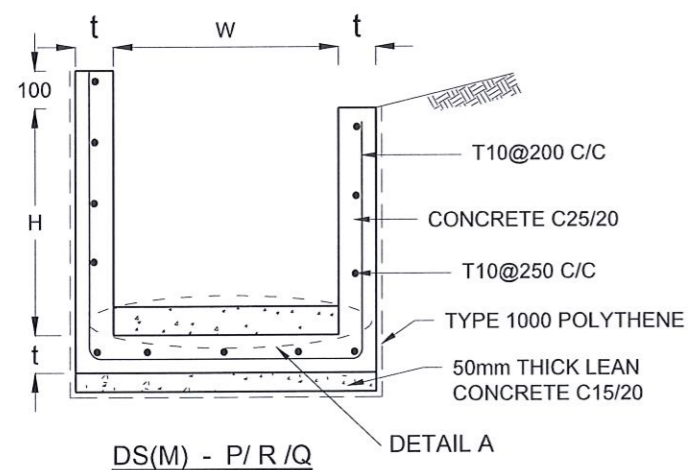
- USE FOLLOWING CONCRETE GRADES FOR STRUCTURE
  - [a] SCREED - C. 15/20
  - [b] WALLS / BASE / ENERGY BREAKERS - C. 25/20

**REINFORCEMENT**

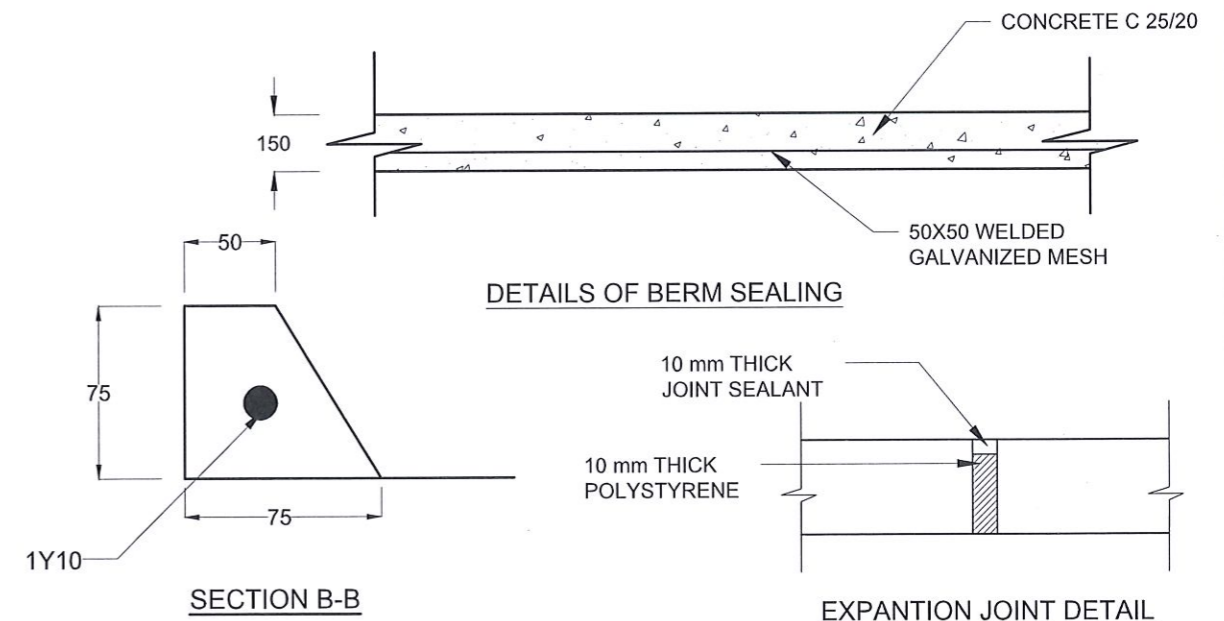
- ALL BARS MARKED "T" SHALL BE HIGH YIELD DEFORMED BARS OF YIELD STRENGTH NOT LESS THAN 460N/mm<sup>2</sup>.
- BARS OF CUT LENGTH LARGER THAN THE SUPPLIED LENGTH TO BE LAPPED FOR A LENGTH OF 50 x BAR DIA. AND LAPPING SHOULD BE STAGGERED.
- ANCHORAGE LENGTH SHOULD BE 40X BAR DIA.
- REINFORCEMENT BARS 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

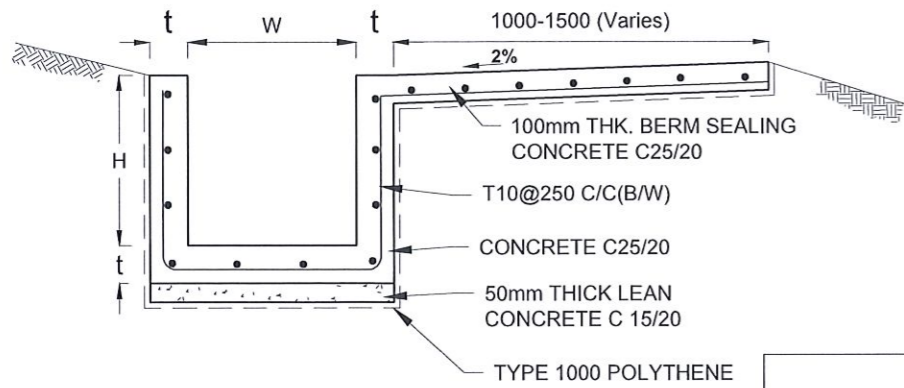
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 BOSCO COLLEGE - HATTON

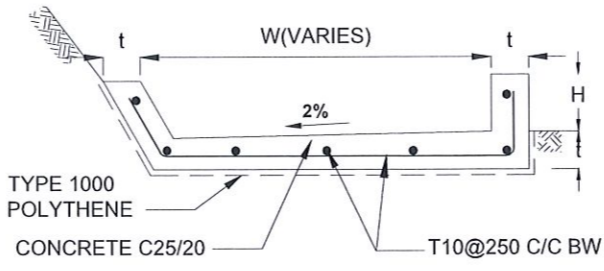
TITLE  
 DETAILS OF DRAINS  
 (SURFACE DRAIN -1 OF 2)

SCALE	N.T.S	DATE	11.05.2022
PROJECT / DRAWING No.	RLVMP/WORKS/NCB/PH11/043-BO/DR-06a	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>



DS (B) - (TYPE I)



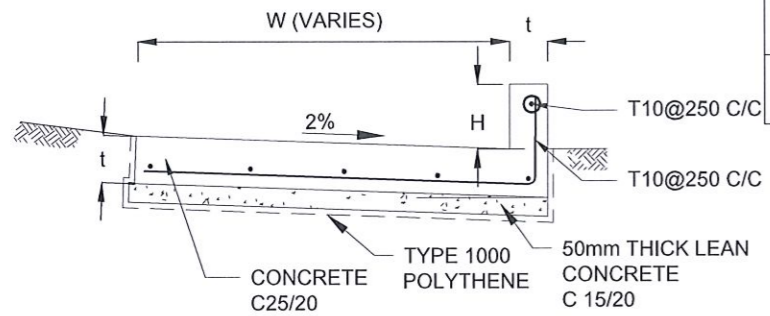
DS (B) - (TYPE II)

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

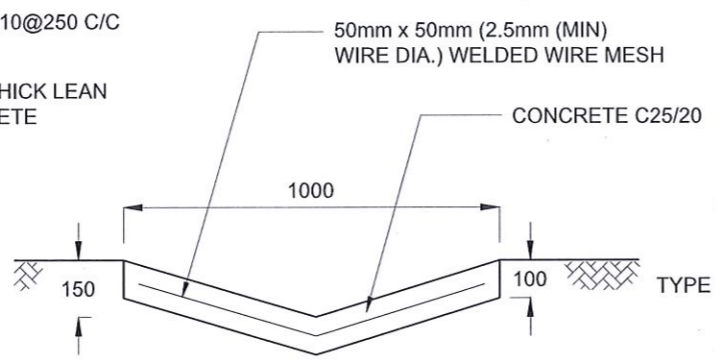
DRAIN TYPE	W (mm)	H (mm)	t (mm)
DS (B) - A	300	300	100
DS (B) - B	450	450	100
DS (B) - C	1000	150	100
DS (B) - D	1500	150	100
DS (B) - E	2000	150	100

NOTES

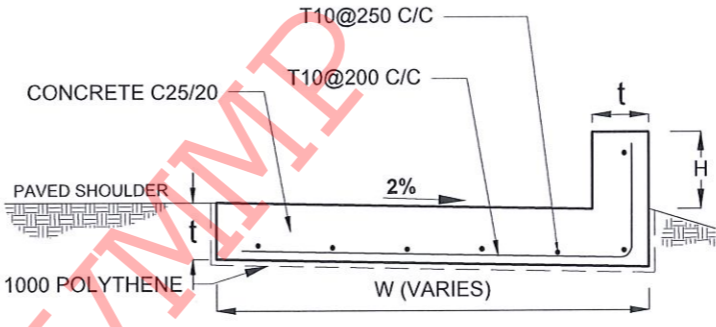
- DEPTH OF EXCAVATION MAY VARY ACCORDING TO SITE CONDITIONS.
- STEPS SHALL BE CONSTRUCTED AT SURFACE DRAIN ON SLOPING GROUND ACCORDING TO THE SITE CONDITIONS AS INSTRUCTED BY THE ENGINEER.
- ENERGY BREAKERS SHALL BE CONSTRUCTED AT THE STEEP DRAIN SEGMENTS AS PER THE INSTRUCTIONS OF THE ENGINEER.
- DOWELS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



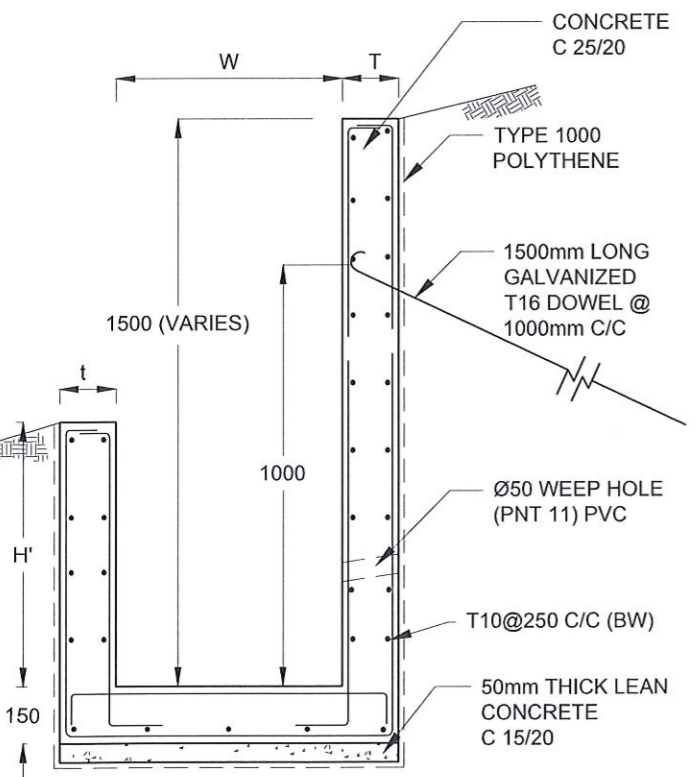
DS (K) - TYPE I



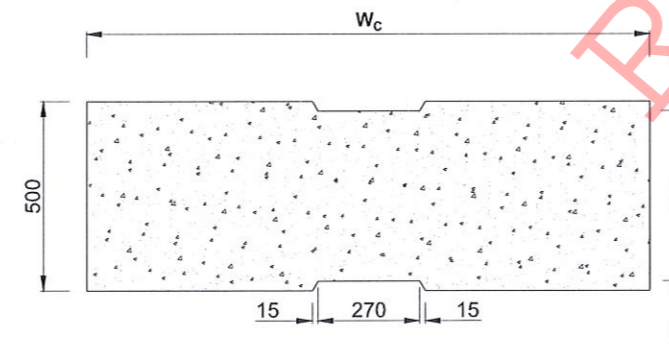
DS (D) - A (DISH DRAIN)



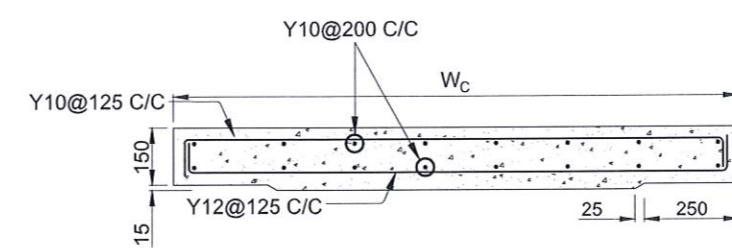
DS (K) - TYPE II



DS (M) - L



PLAN VIEW OF COVER SLAB



ACCESS & HEAVY DUTY COVER SLAB SECTION OF ( $W_c \times 500 \times 150$ mm)

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

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

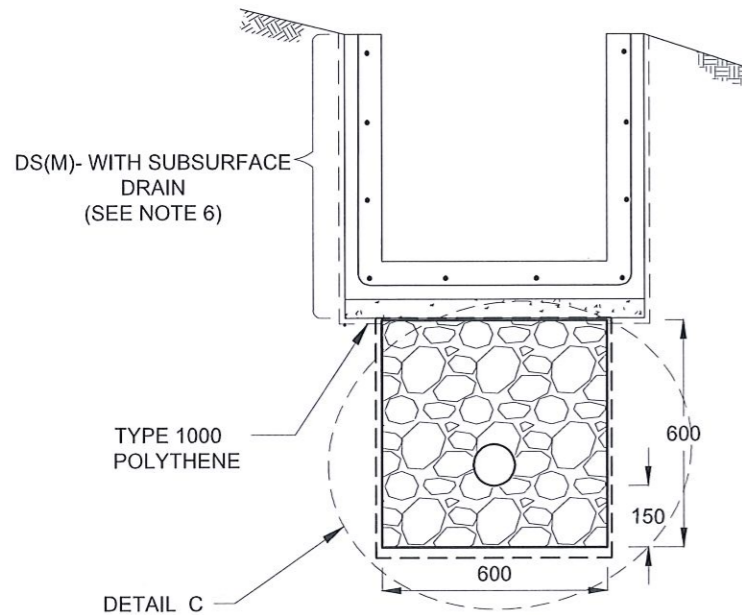
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 BOSCO COLLEGE - HATTON

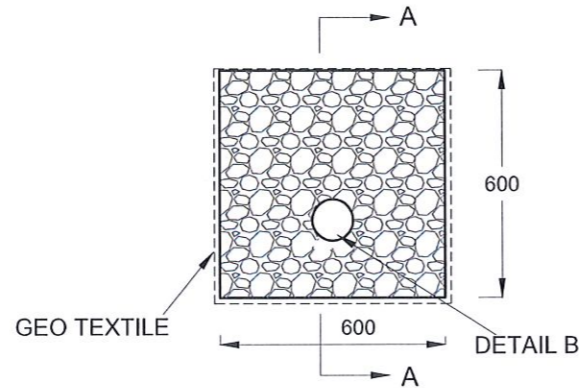
TITLE  
 DETAILS OF DRAINS  
 (SURFACE DRAIN - 2 OF 2)

SCALE | N.T.S | DATE | 11.05.2022  
 PROJECT / DRAWING No. | RLVMP/WORKS/NCB/PHII/043-BO/DR-06b | REVISION | 00

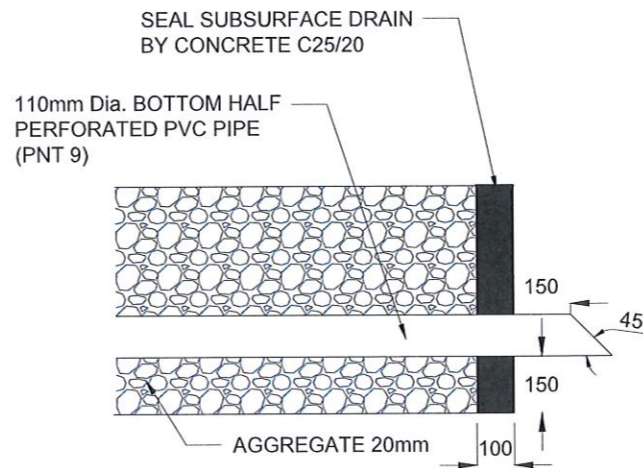
DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	<i>S.A.G.D. Senanayaka</i>
DESIGNER	D.M.D.T. DASANAYAKA	<i>D.M.D.T. Dasanayaka</i>
CHECKED	B.I. KUMARAGE	<i>B.I. Kumarage</i>
RECOMMENDED	Prof. S.A.S. KULATHILAKA	<i>S.A.S. Kulathilaka</i>
APPROVED	K.N. BANDARA	<i>K.N. Bandara</i>



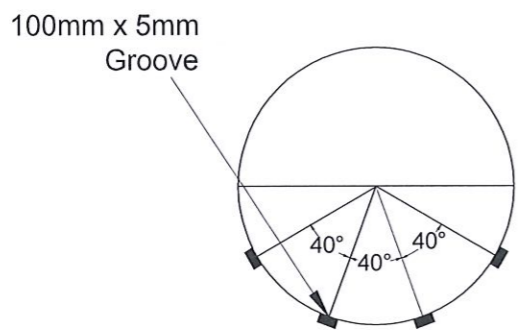
**SUBSURFACE DRAIN [DS (S) -A]**



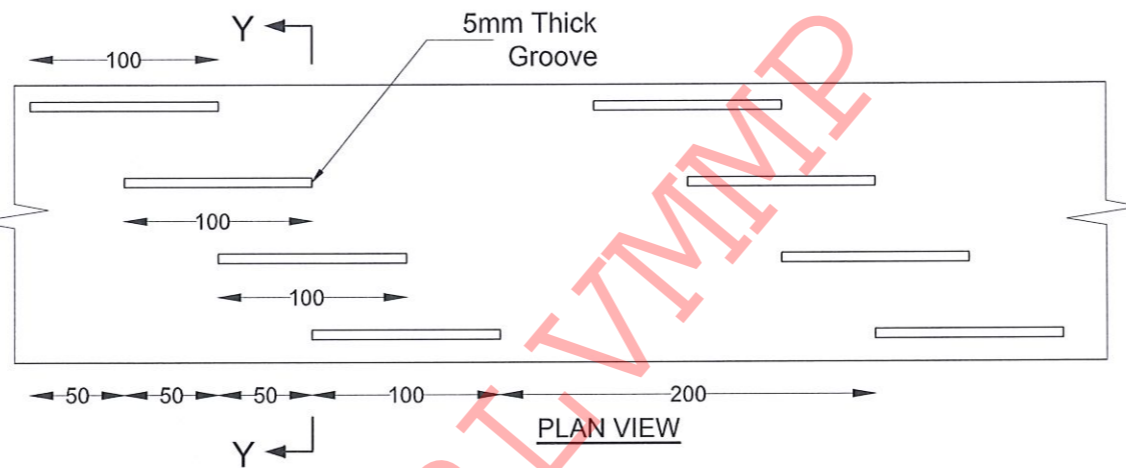
**DETAIL C / DS (S) -A**



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

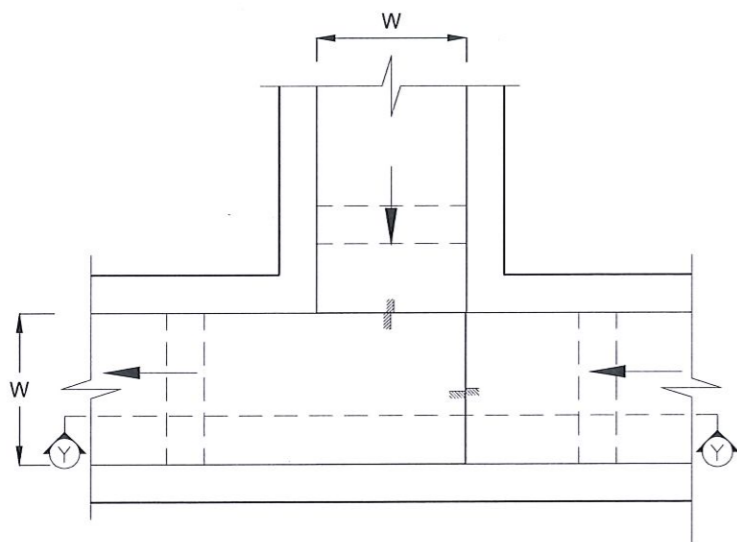


**SECTION Y - Y**

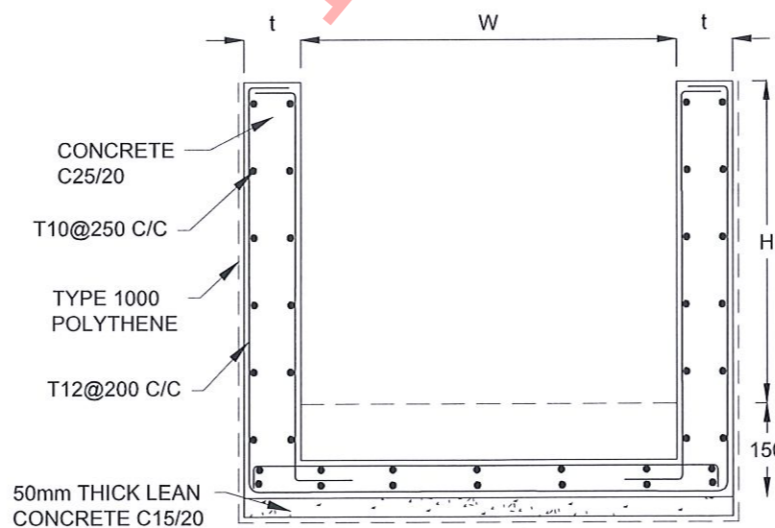


**PLAN VIEW**

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



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



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

**NOTES**

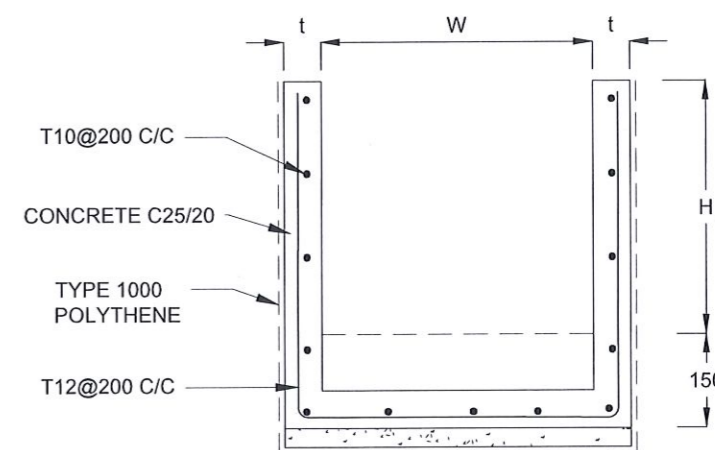
1. W,H,t ; SHALL BE THE SAME AS RESPECTIVE DRAIN SECTION.
2. CP - R SHALL BE USED WHERE H > = 900mm
3. DEPTH OF EXCAVATION MAY VARY ACCORDING TO SITE CONDITIONS.
4. DOWELS SHALL BE INSTALLED ACCORDING TO THE GROUND CONDITIONS AS INSTRUCTED BY THE ENGINEER.
5. 10 mm THICK EXPANSION JOINT SHALL BE INTRODUCED 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

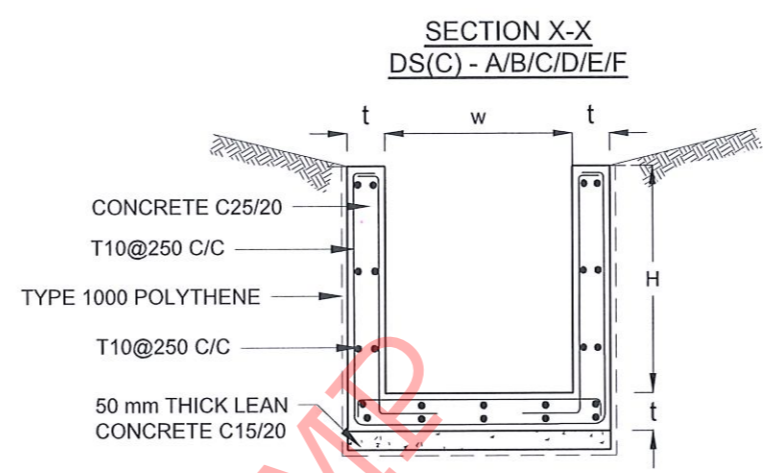
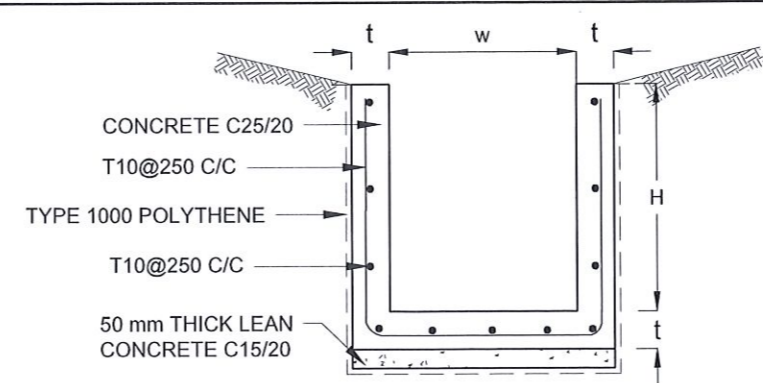
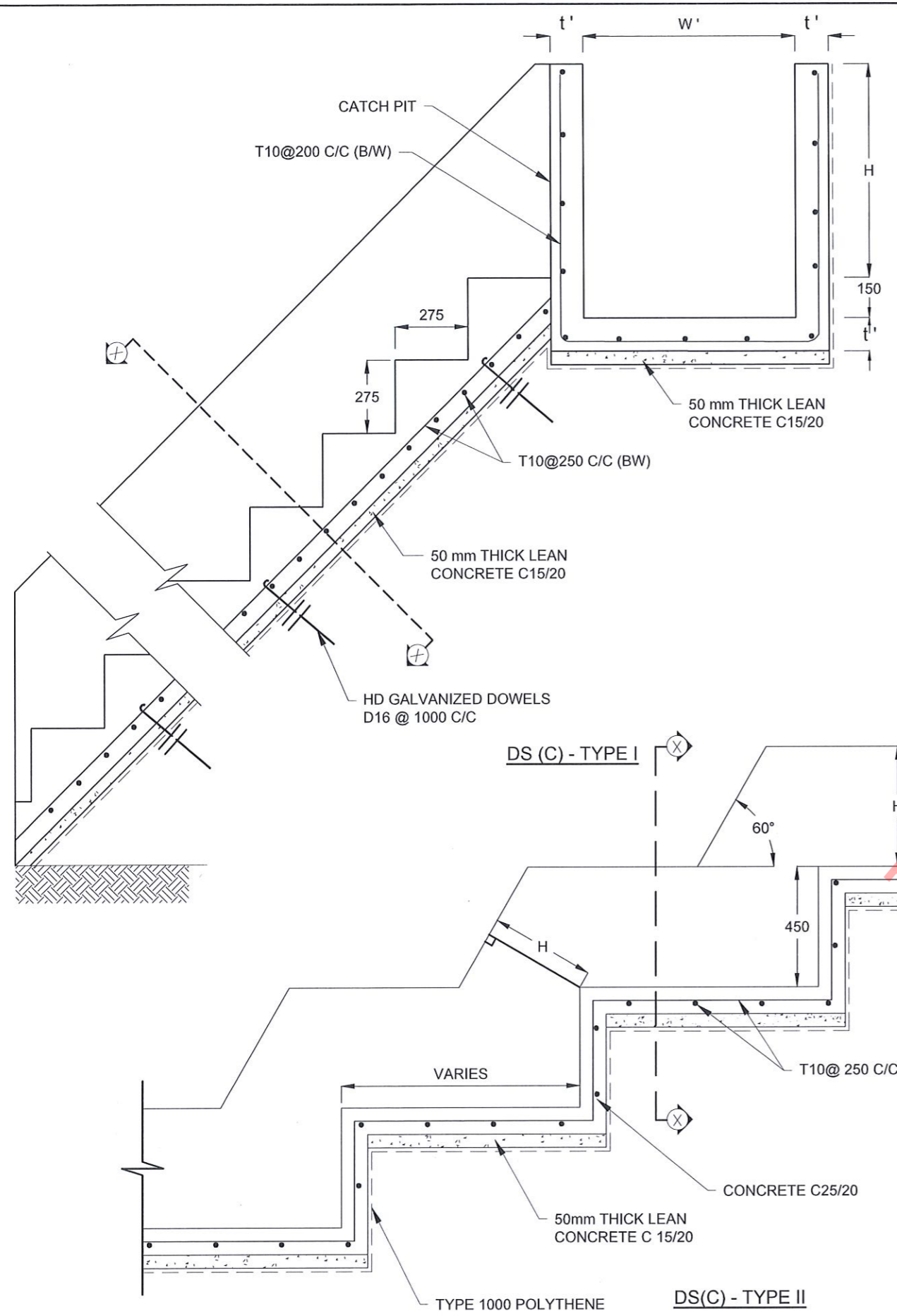
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 BOSCO COLLEGE - HATTON

TITLE  
 DETAILS OF DRAINS  
 (SUBSURFACE DRAIN AND CATCHPIT)

SCALE | N.T.S | DATE | 11.05.2022  
 PROJECT / DRAWING No. | RLVMMMP/WORKS/NCB/PHII/043-BO/DR-06c | 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>



**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  
  
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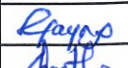




DESIGNER  
  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

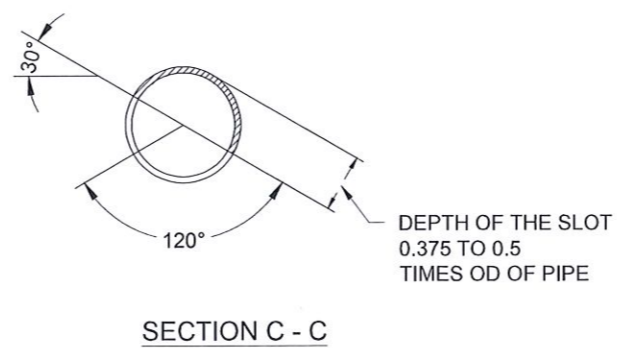
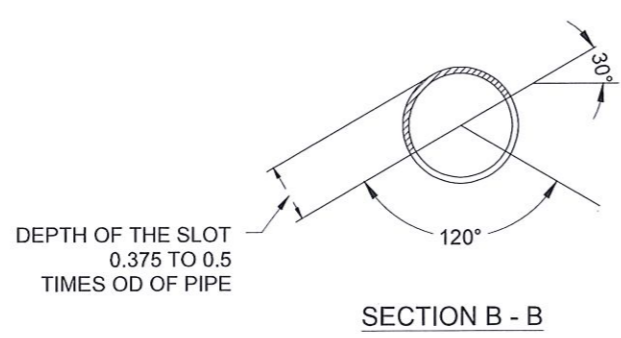
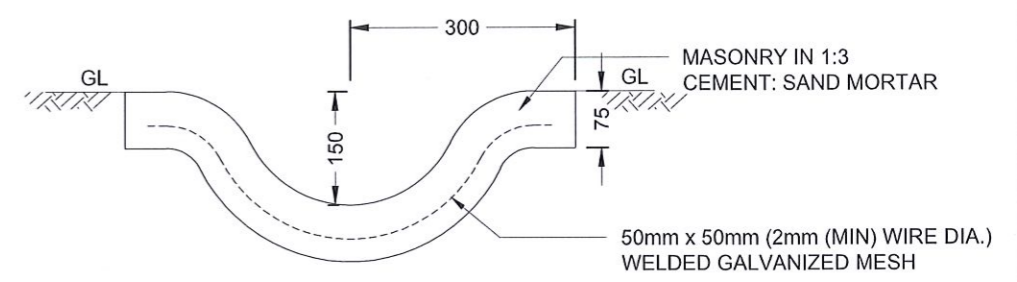
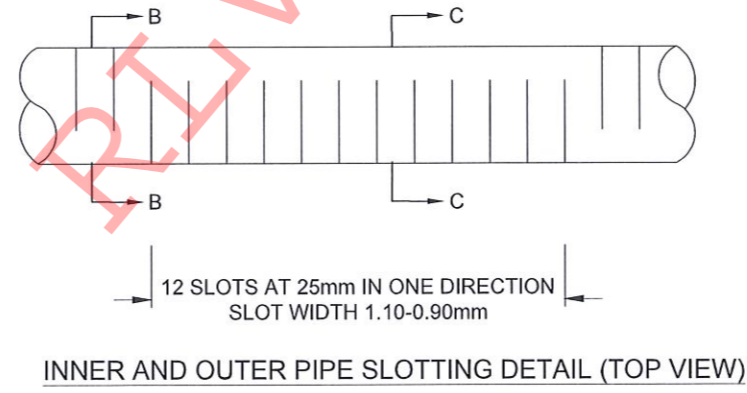
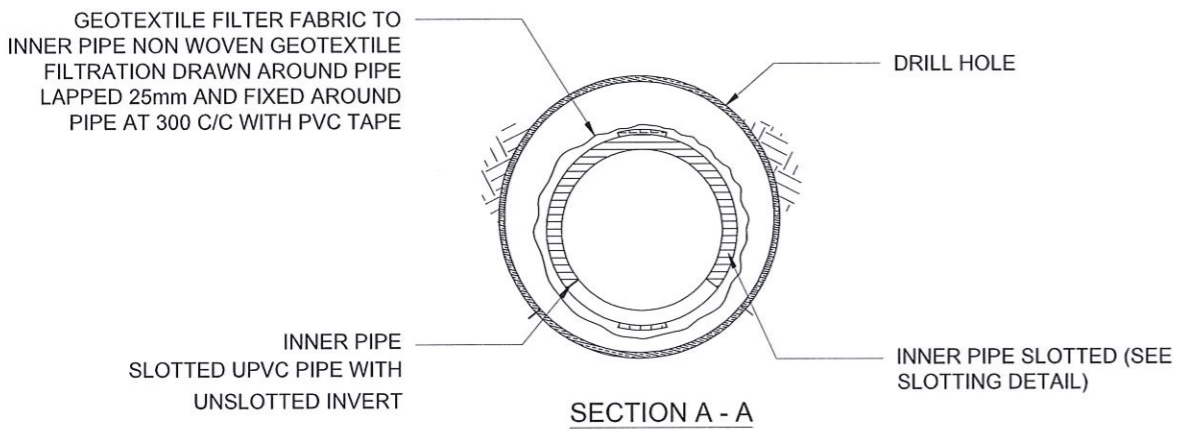
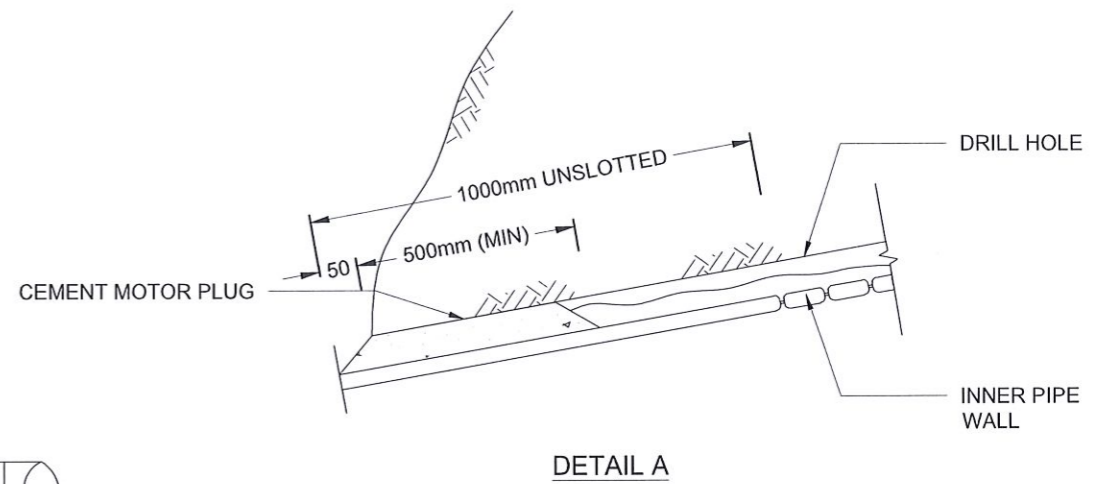
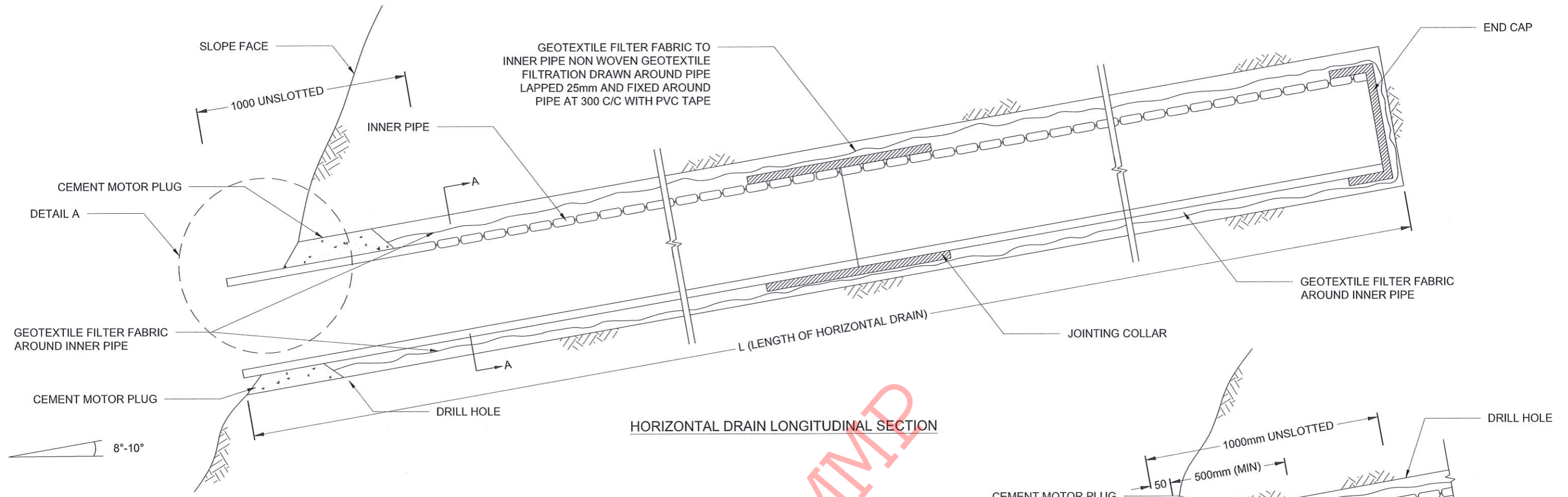
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 BOSCO COLLEGE - HATTON

TITLE  
 DETAILS OF DRAINS  
 (CASCADE DRAIN)

SCALE | N.T.S | DATE | 11.05.2022  
 PROJECT / DRAWING No. | RLVMMP/WORKS/NCB/PHII/043-BO/DR-06d | REVISION | 00

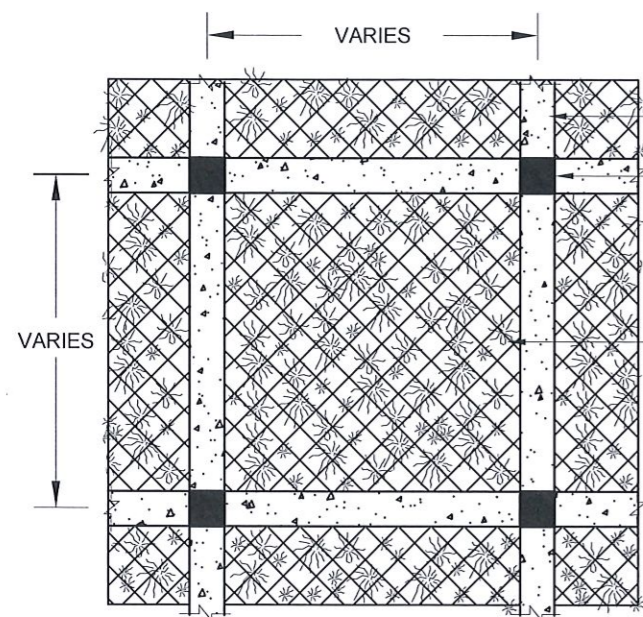
DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	
DESIGNER	D.M.D.T. DASANAYAKA	
CHECKED	B.I. KUMARAGE	
RECOMMENDED	Prof. S.A.S. KULATHILAKA	
APPROVED	K.N. BANDARA	



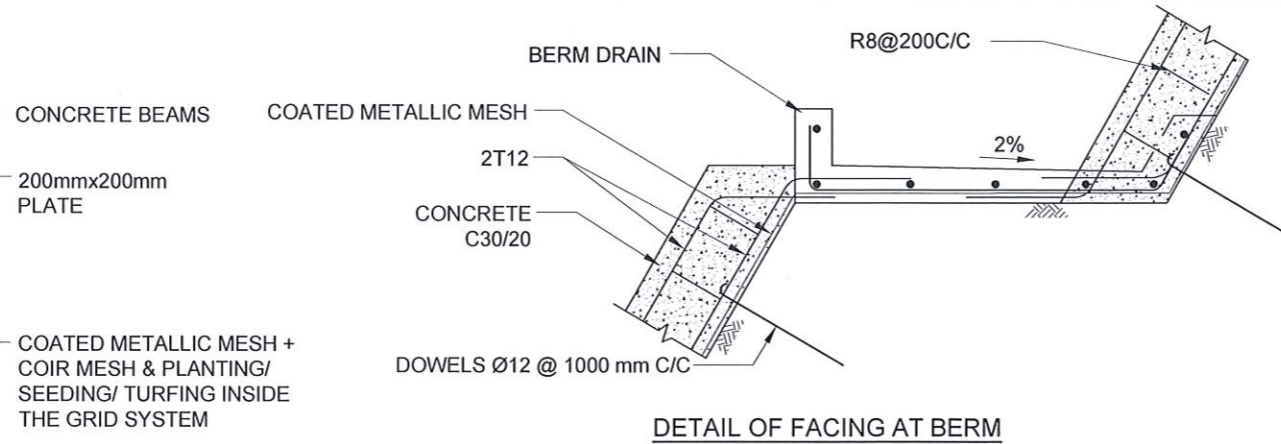
- NOTES**
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
  2. PIPE DIAMETERS, ANGLE & LENGTHS AS SPECIFIED IN DRAWINGS.
  3. ALL MATERIALS SHALL CONFORM TO PROJECT SPECIFICATION

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 BOSCO COLLEGE - HATTON	TITLE DETAILS OF HORIZONTAL DRAIN SECTIONS	DESCRIPTION	NAME	SIGNATURE			
									SCALE	N.T.S	DATE	11.05.2022	RECOMMENDED
							PROJECT / DRAWING No.	RLVMMP/WORKS/NCB/PHII/043-BO/DR-07	REVISION	00	APPROVED	K.N. BANDARA	

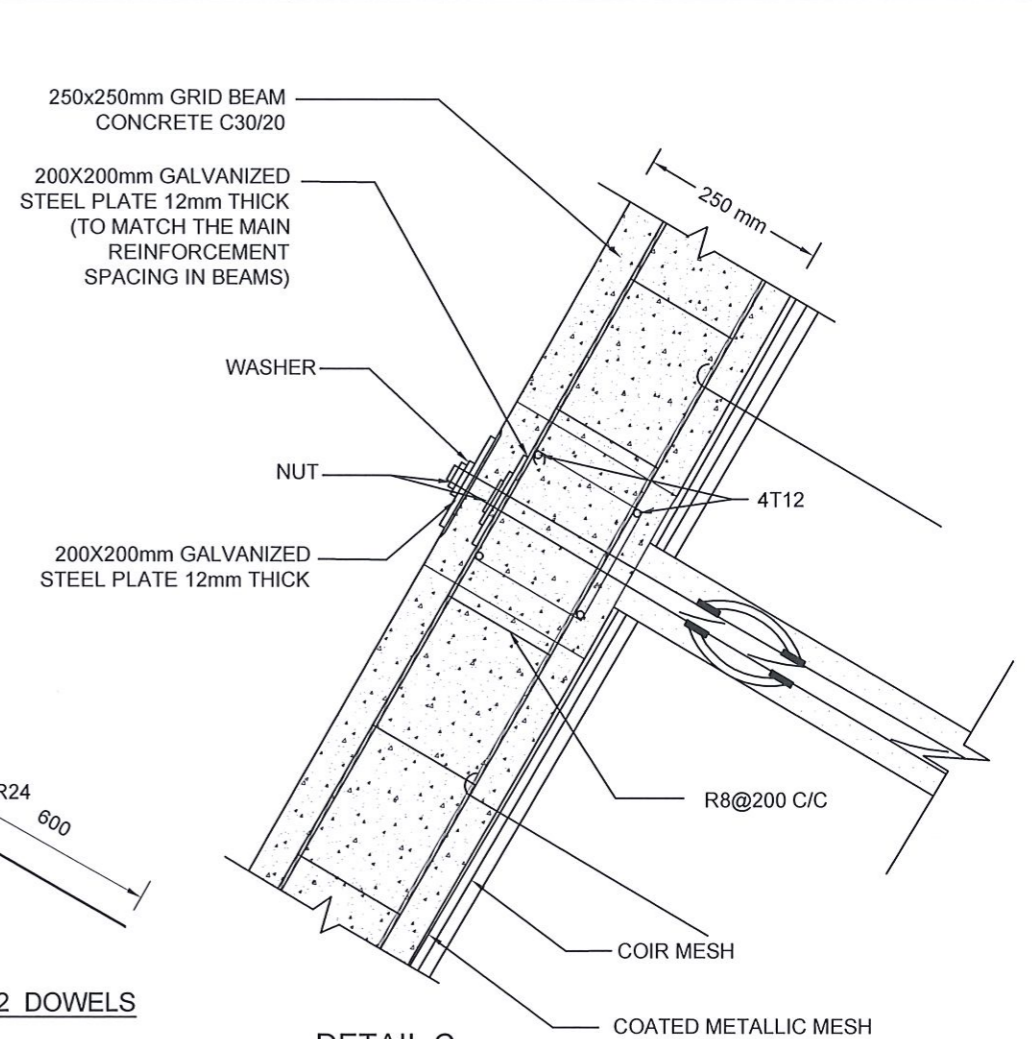




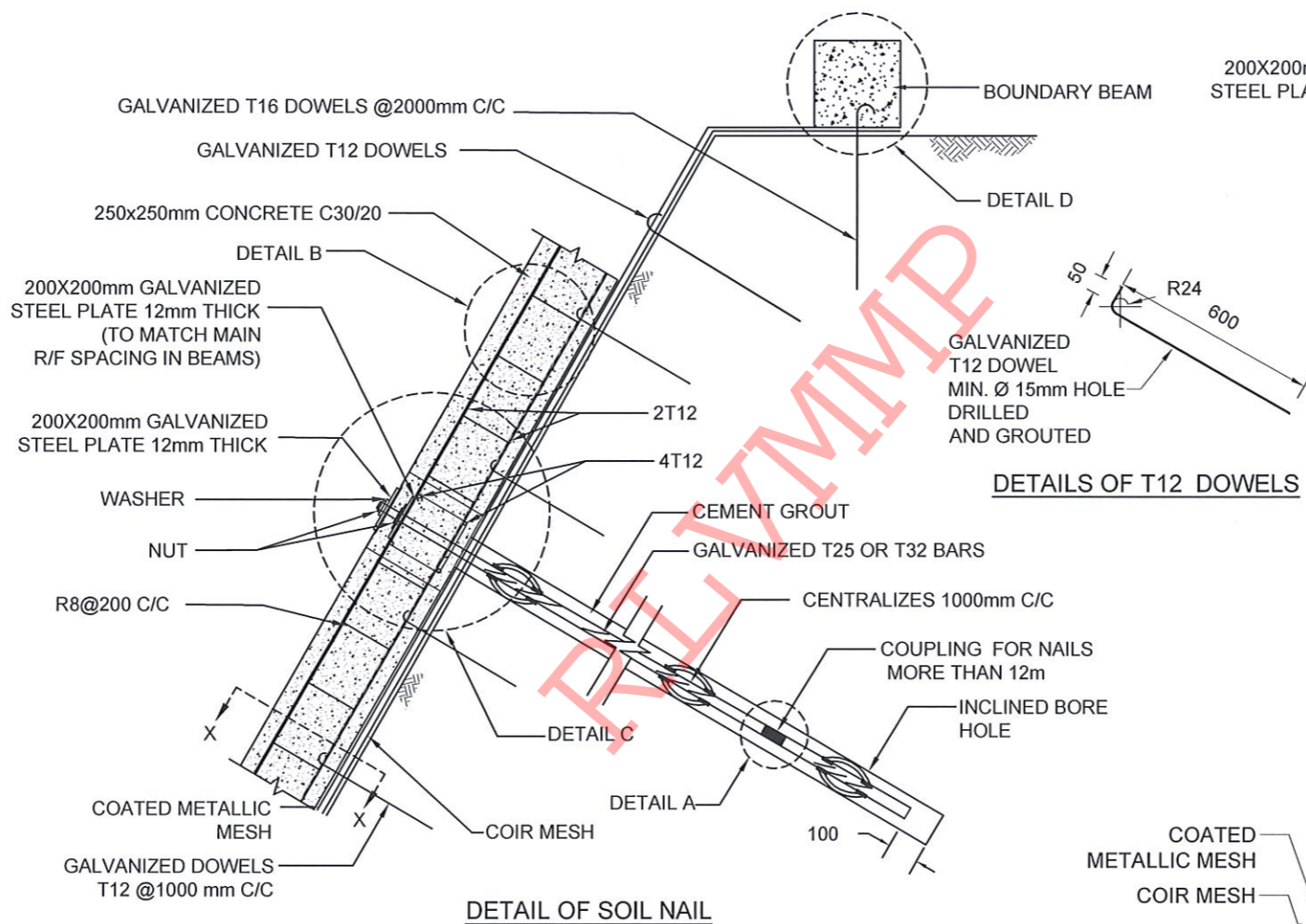
DETAIL - B



DETAIL OF FACING AT BERM

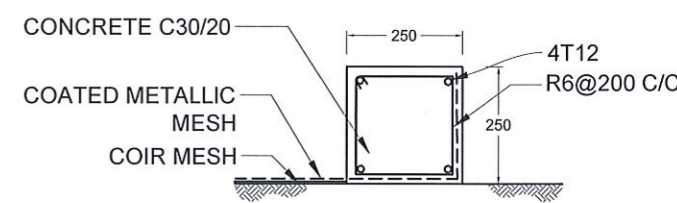


DETAIL C

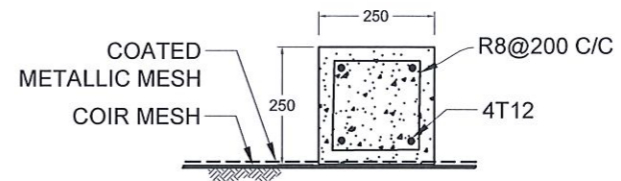


DETAIL OF SOIL NAIL

DETAILS OF T12 DOWELS



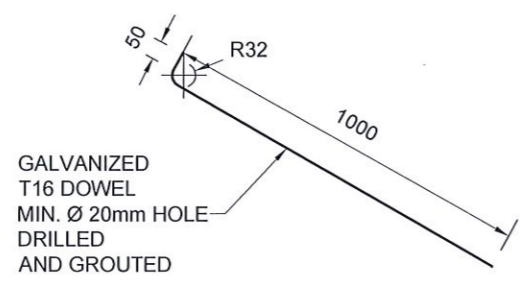
DETAIL D



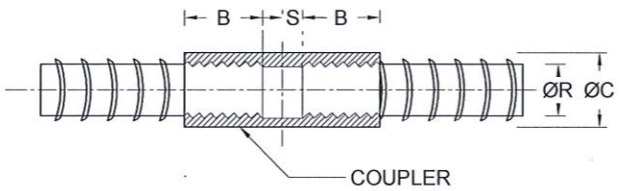
SECTION X-X

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

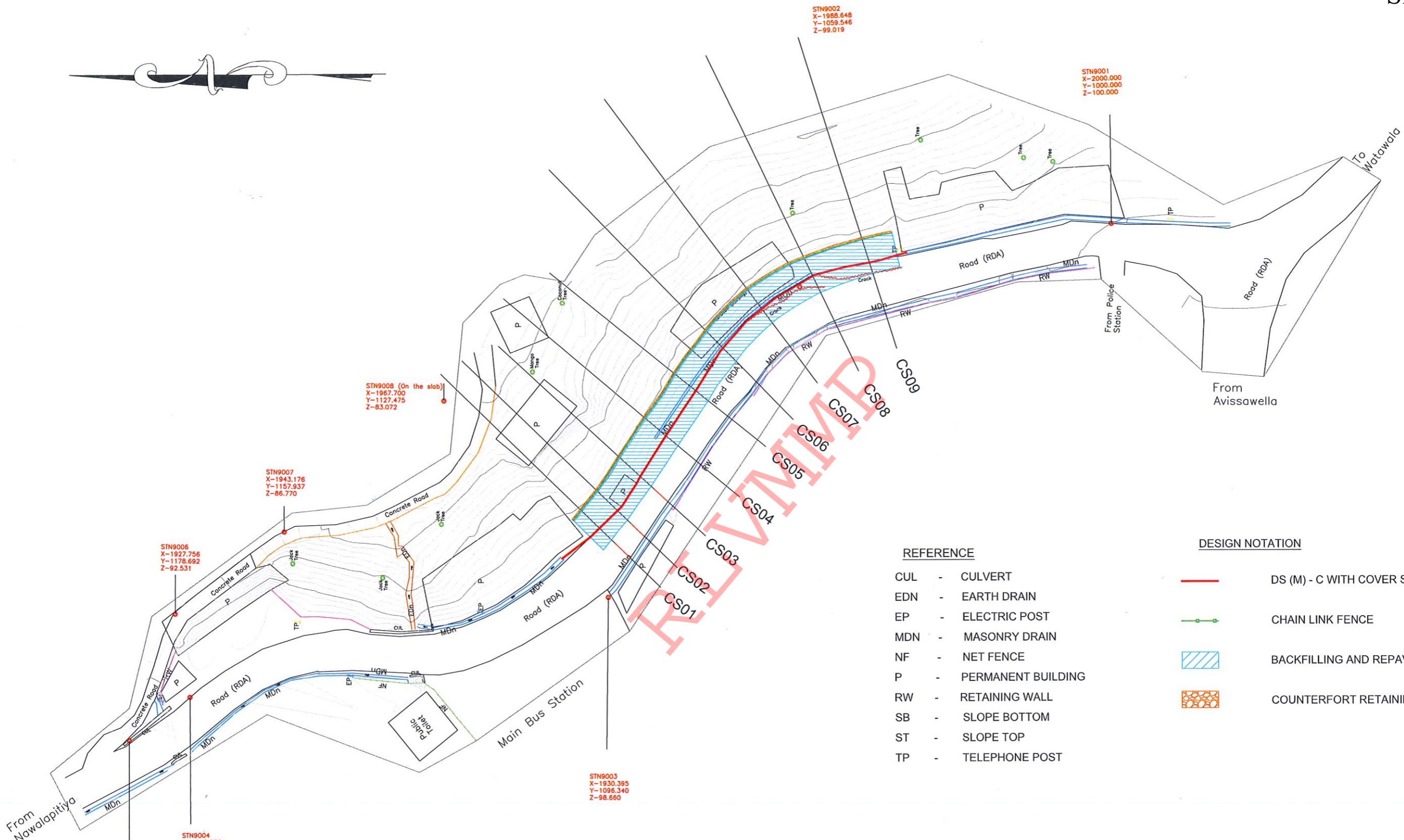
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 BOSCO COLLEGE - HATTON

TITLE  
 DETAILS OF SOIL NAILING WITH  
 NON EMBEDDED GRID BEAM

SCALE | N.T.S. | DATE | 11.05.2022  
 PROJECT / DRAWING No. | RLVMMPP/WORKS/NCB/PHII/043-BO/DR-08 | 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	



REFERENCE

- CUL - CULVERT
- EDN - EARTH DRAIN
- EP - ELECTRIC POST
- MDN - MASONRY DRAIN
- NF - NET FENCE
- P - PERMANENT BUILDING
- RW - RETAINING WALL
- SB - SLOPE BOTTOM
- ST - SLOPE TOP
- TP - TELEPHONE POST

DESIGN NOTATION

- DS (M) - C WITH COVER SLAB
- CHAIN LINK FENCE
- BACKFILLING AND REPAVING
- COUNTERFORT RETAINING WALL (6.0m HIGH)

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  
  
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 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

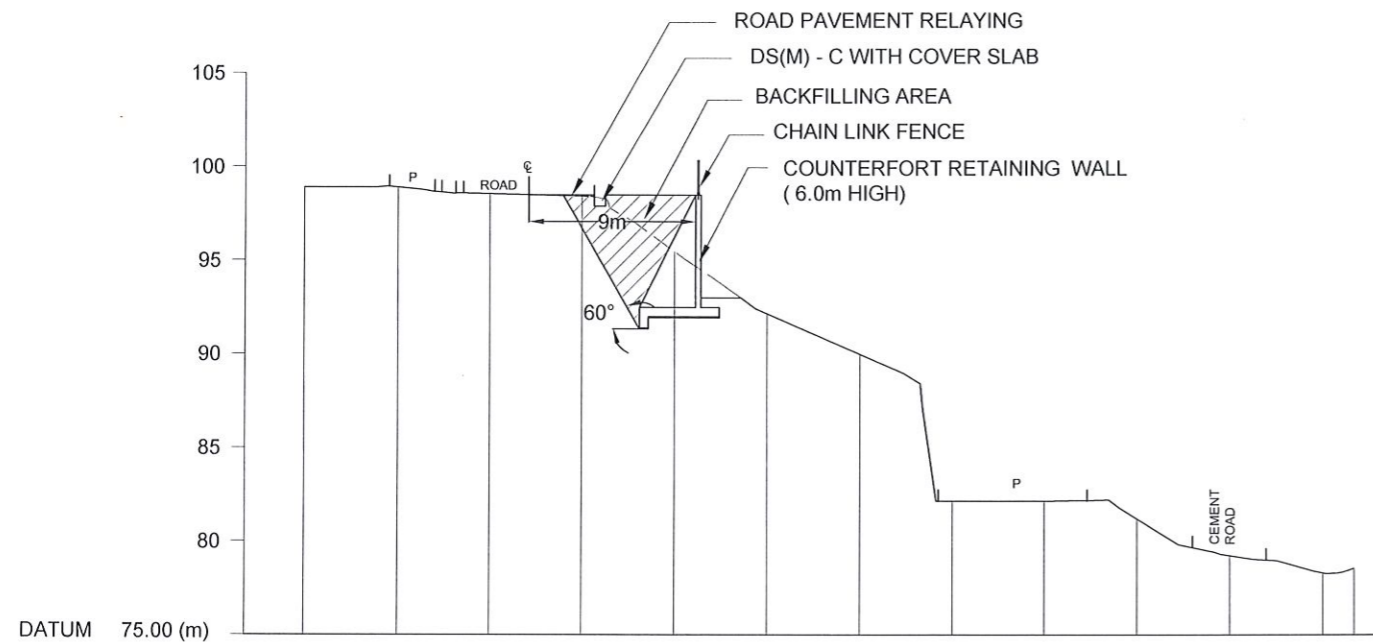
PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 GINIGATHENA TOWN - NUWARAELIYA

TITLE  
 DESIGN CROSS SECTION

SCALE 1:750  
 PROJECT / DRAWING No. RLVMMP/WORKS/NCB/PHII/044-GI/DR-03

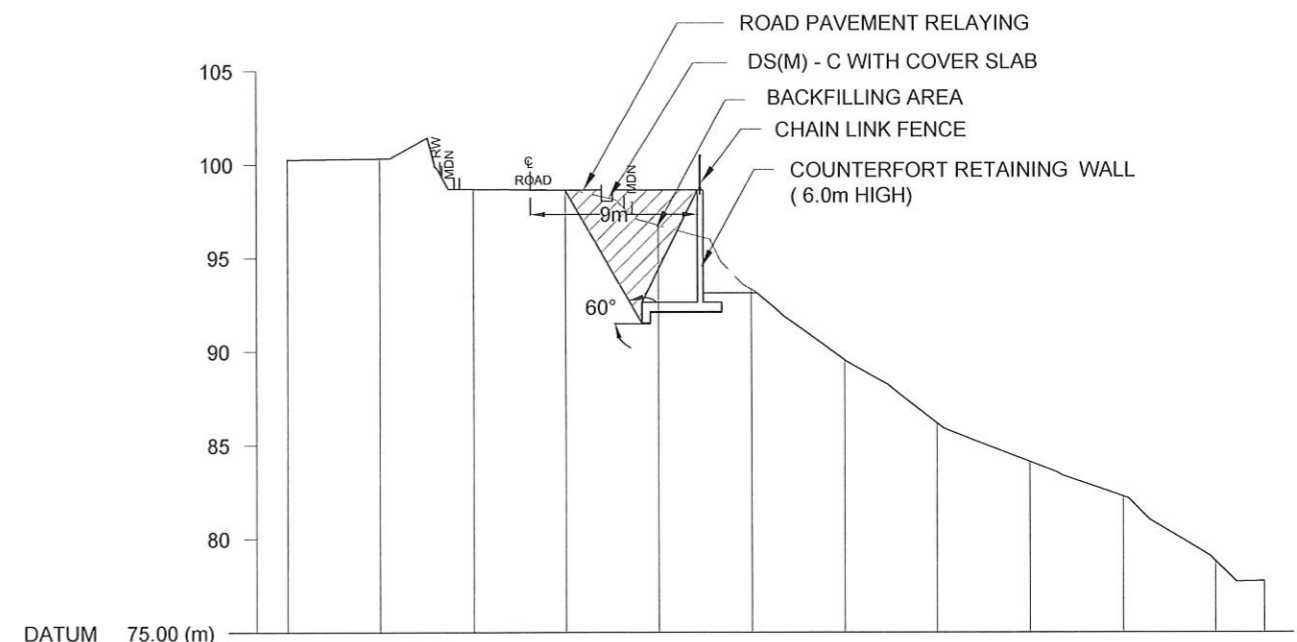
DATE 20.06.2022  
 REVISION 00

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	



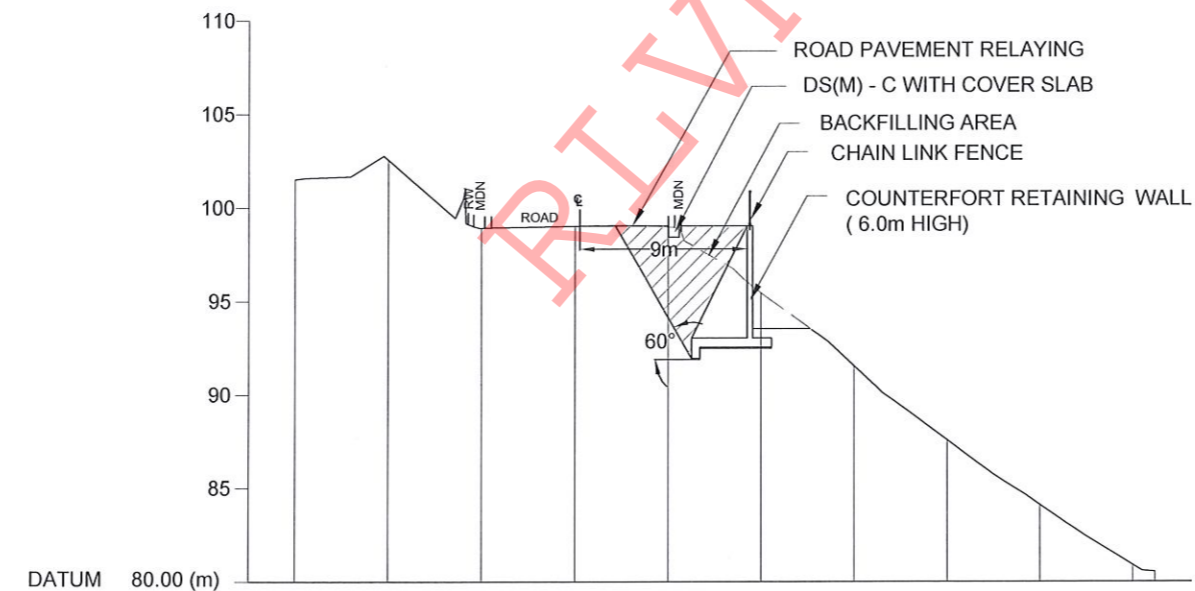
GROUND LEVEL (m)	98.90	98.90	98.55	98.43	95.47	92.15	89.99	82.14	82.14	81.21	79.23	78.30	78.56
ELEVATION (m)	00.00	05.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	56.65

CS02




GROUND LEVEL (m)	100.26	100.32	98.67	98.62	96.74	93.33	89.56	86.19	84.11	82.25	78.79	77.73
ELEVATION (m)	00.00	05.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	52.59

CS05



GROUND LEVEL (m)	101.52	102.58	98.93	90.03	98.97	95.47	91.56	87.59	84.13	80.92	80.53
ELEVATION (m)	00.00	05.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	52.59

CS08

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

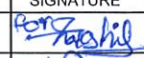


DESIGNER  
  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

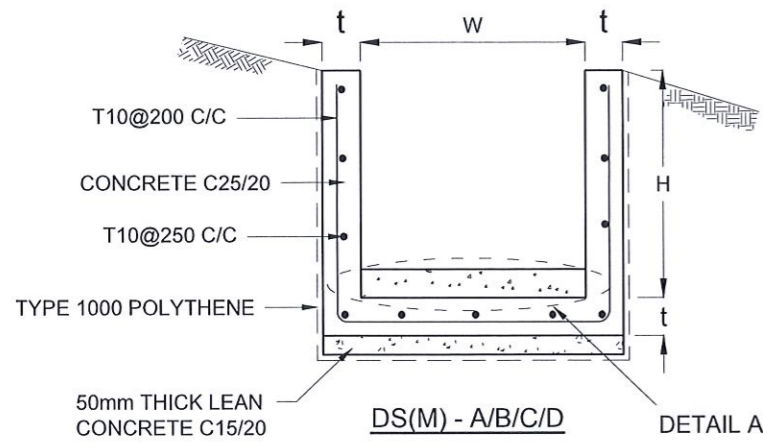
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 GINIGATHENA TOWN - NUWARAELIYA

TITLE  
 DESIGN CROSS SECTION

SCALE 1:500  
 PROJECT / DRAWING No. RLVMP/WORKS/NCB/PHII/044-GI/DR-04a  
 DATE 20.06.2022  
 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	



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**

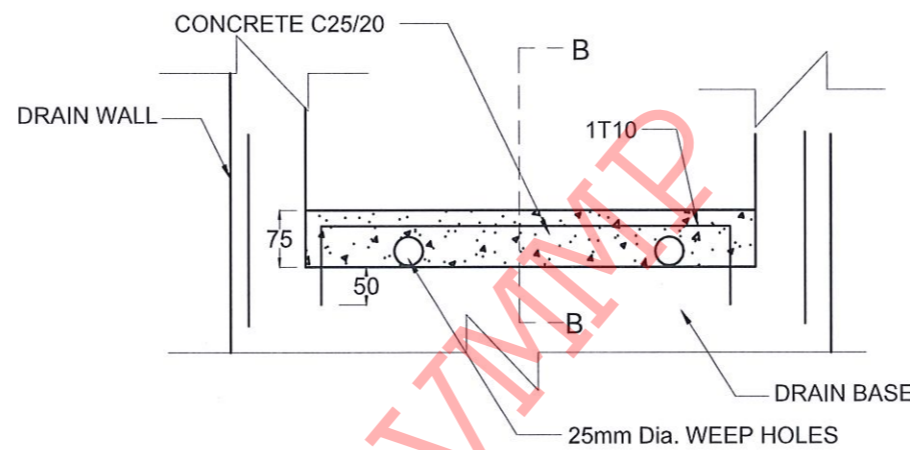
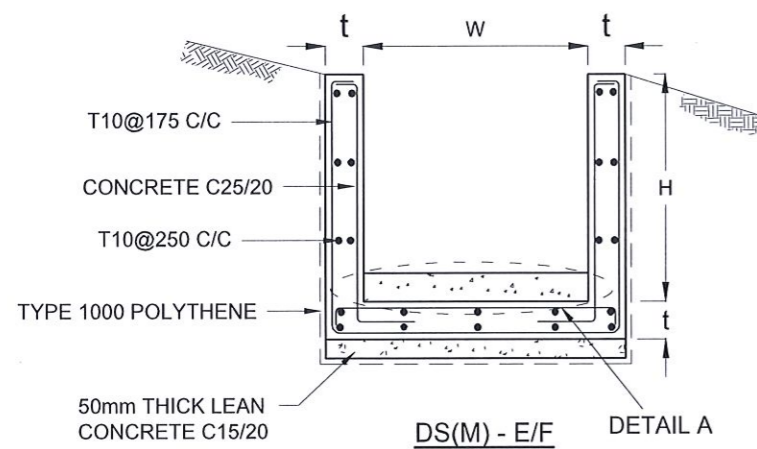
- DEPTH OF EXCAVATION MAY VARY ACCORDING TO SITE CONDITIONS.
- STEPS SHALL BE CONSTRUCTED AT SURFACE DRAIN ON SLOPING GROUND ACCORDING TO THE SITE CONDITIONS AS INSTRUCTED BY THE ENGINEER.
- ENERGY BREAKERS SHALL BE CONSTRUCTED AT THE STEEP DRAIN SEGMENTS AS PER THE INSTRUCTIONS OF THE ENGINEER.
- DOWELS 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**

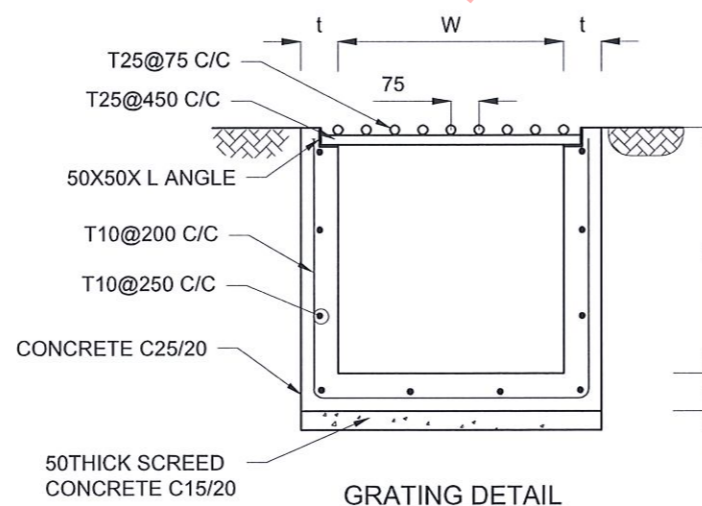
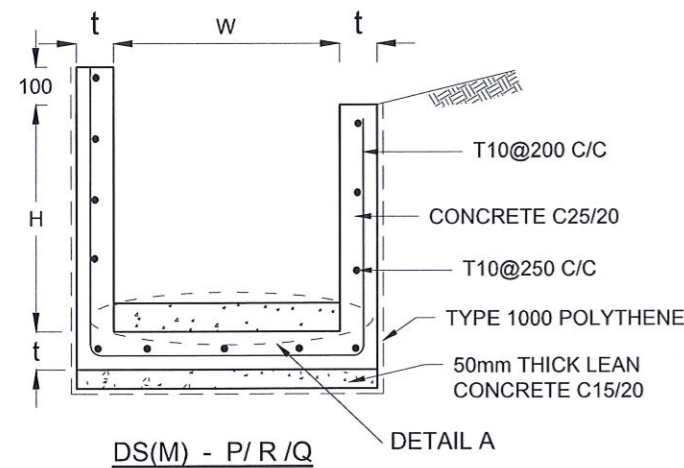
- USE FOLLOWING CONCRETE GRADES FOR STRUCTURE
  - [a] SCREED - C. 15/20
  - [b] WALLS / BASE / ENERGY BREAKERS - C. 25/20

**REINFORCEMENT**

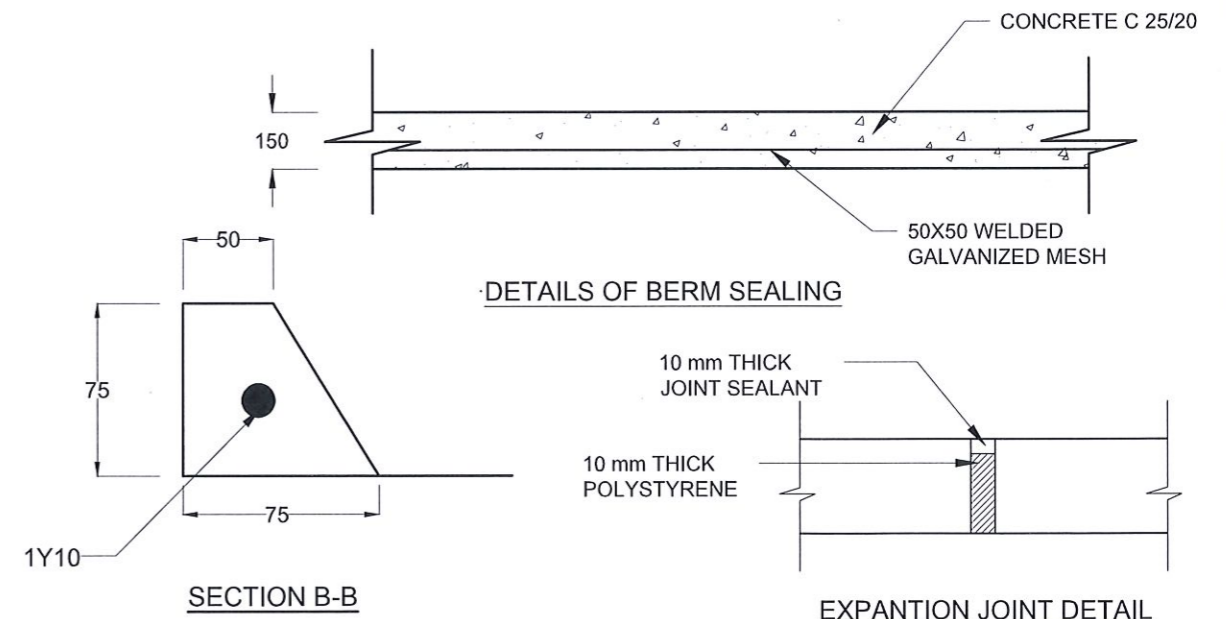
- ALL BARS MARKED "T" SHALL BE HIGH YIELD DEFORMED BARS OF YIELD STRENGTH NOT LESS THAN 460N/mm<sup>2</sup>.
- BARS OF CUT LENGTH LARGER THAN THE SUPPLIED LENGTH TO BE LAPPED FOR A LENGTH OF 50 x BAR DIA. AND LAPPING SHOULD BE STAGGERED.
- ANCHORAGE LENGTH SHOULD BE 40X BAR DIA.
- REINFORCEMENT BARS 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

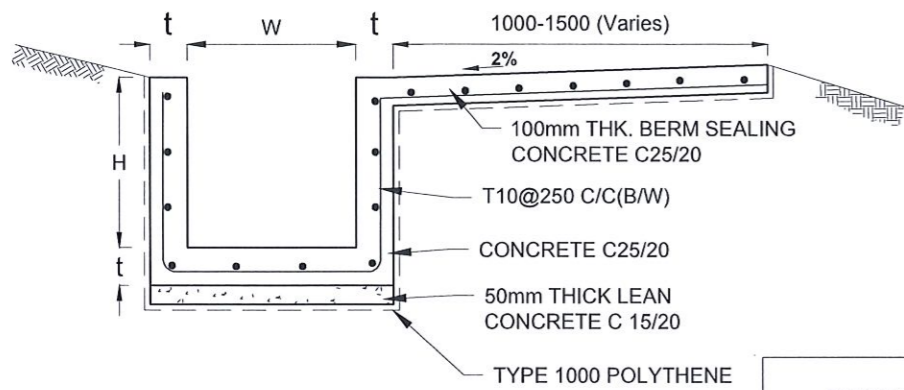
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 GINIGATHENA TOWN - NUWARAELIYA

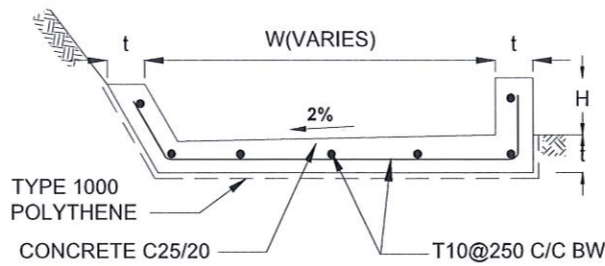
TITLE  
 DETAILS OF DRAINS  
 (SURFACE DRAIN - 1 OF 2)

SCALE | N.T.S | DATE | 20.06.2022  
 PROJECT / DRAWING No. | RLVMP/WORKS/NCB/PH11/044-GI/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>



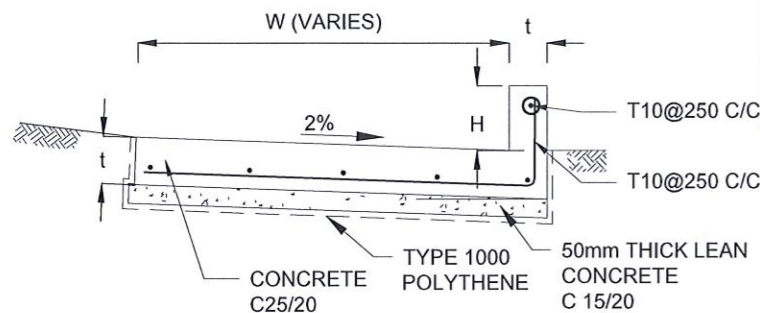
DS (B) - (TYPE I)



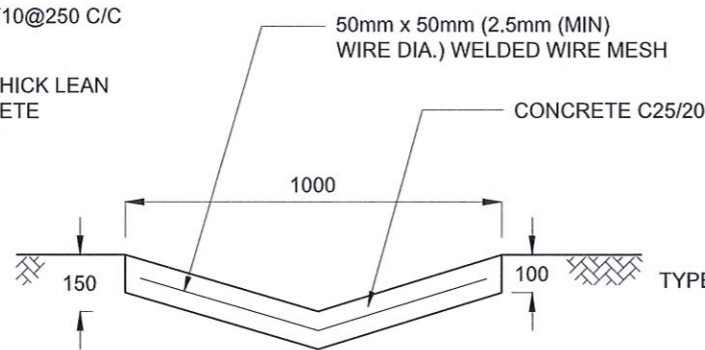
DS (B) - (TYPE II)

DRAIN TYPE	W (mm)	H (mm)	t (mm)
DS (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

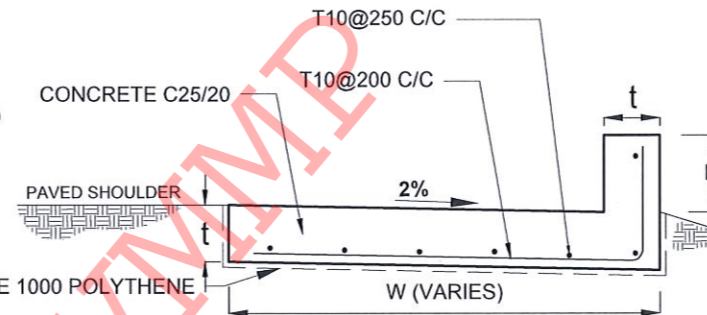
DRAIN TYPE	W (mm)	H (mm)	t (mm)
DS (K) - A	1000	200	100
DS (K) - B	1000	300	100
DS (K) - C	1150	200	200



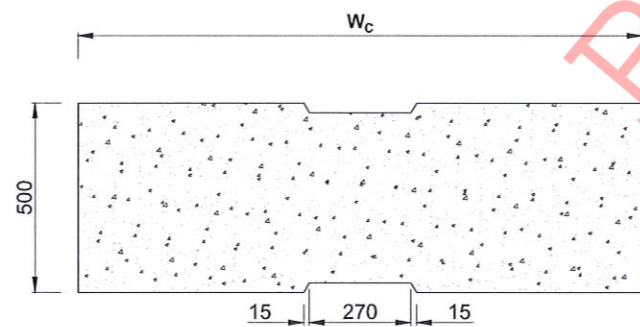
DS (K) - TYPE I



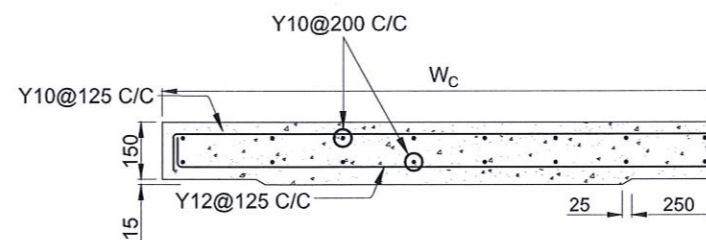
DS (D) - A (DISH DRAIN)



DS (K) - TYPE II

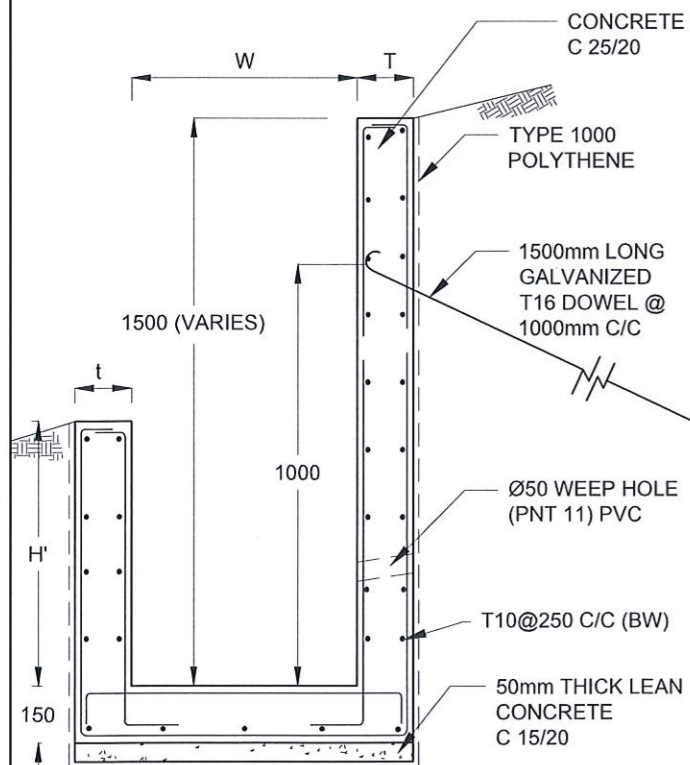


PLAN VIEW OF COVER SLAB



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,  
 COLOMBO - 05

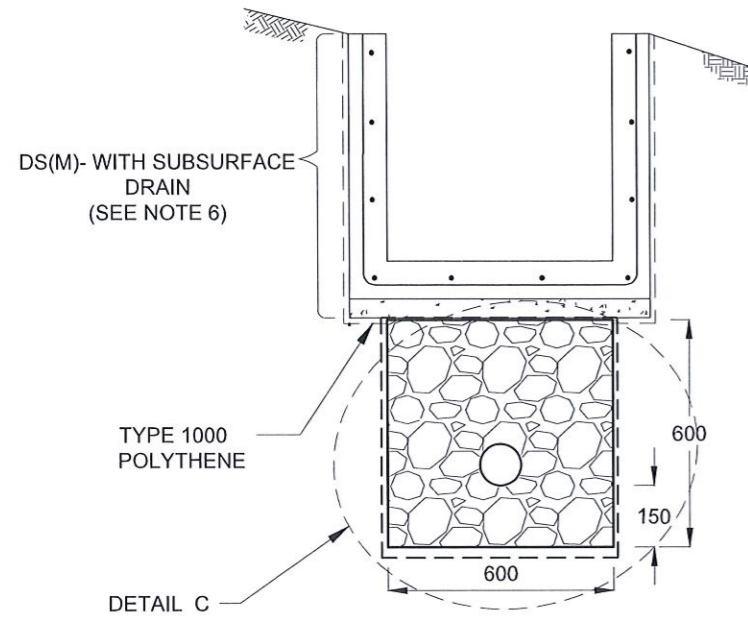
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 GINIGATHENA TOWN - NUWARAELIYA

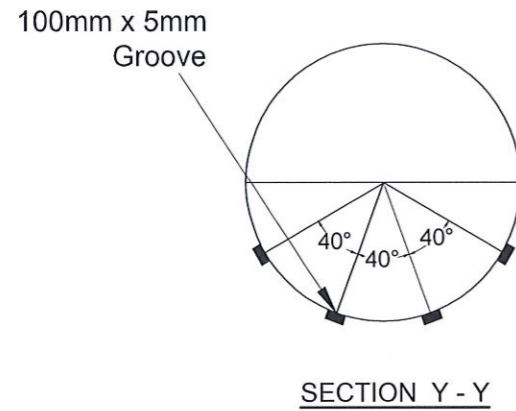
TITLE  
 DETAILS OF DRAINS  
 (SURFACE DRAIN - 2 OF 2)

SCALE | N.T.S | DATE | 20.06.2022  
 PROJECT / DRAWING No. | RLVMP/WORKS/NCB/PHII/044-GI/DR-05b | REVISION | 00

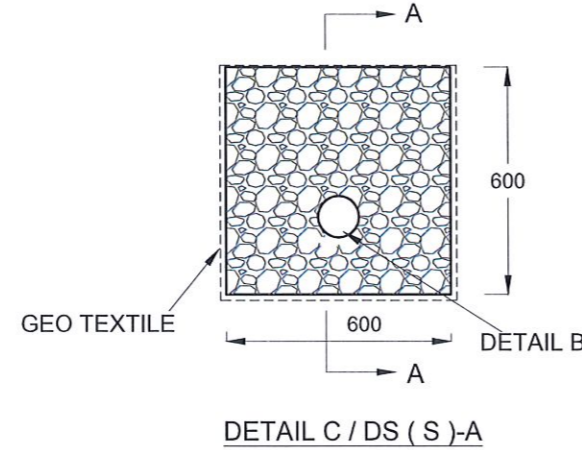
DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	
DESIGNER	M.H.M. HARSHANI	
CHECKED	B.I. KUMARAGE	
RECOMMENDED	Prof. S.A.S. KULATHILAKA	
APPROVED	K.N. BANDARA	



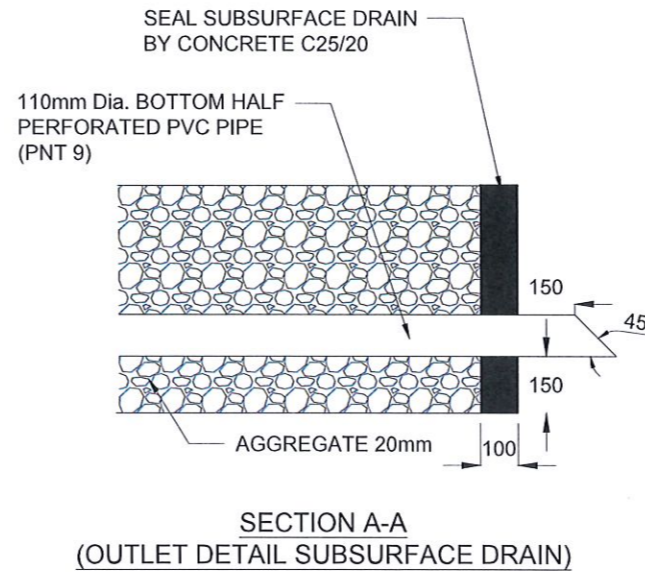
**SUBSURFACE DRAIN  
[DS (S) -A]**



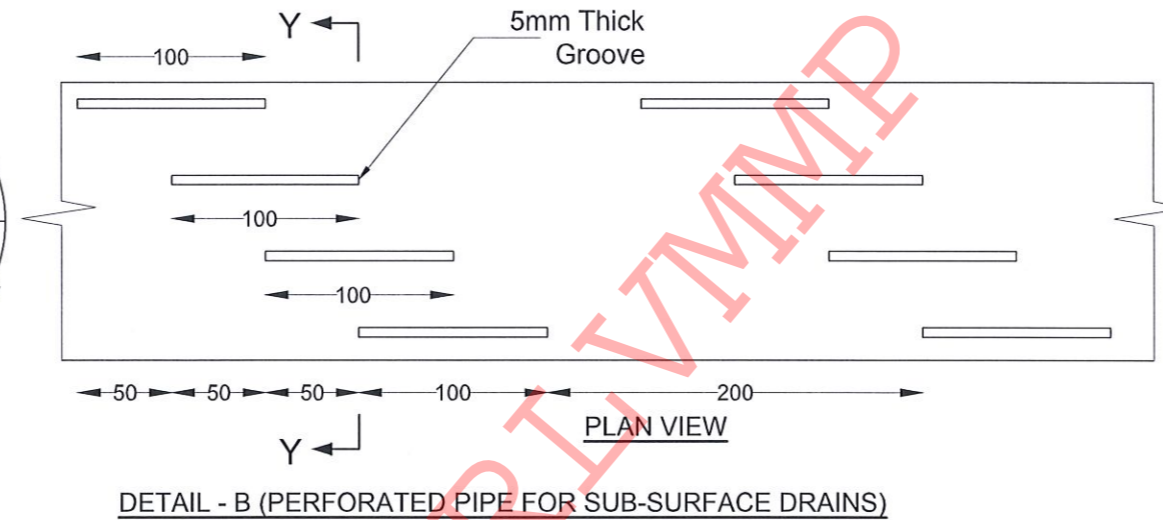
**SECTION Y - Y**



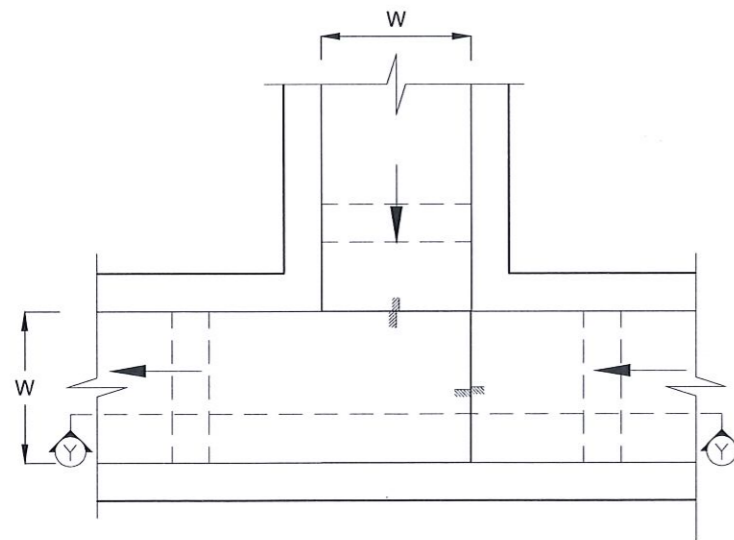
**DETAIL C / DS (S) -A**



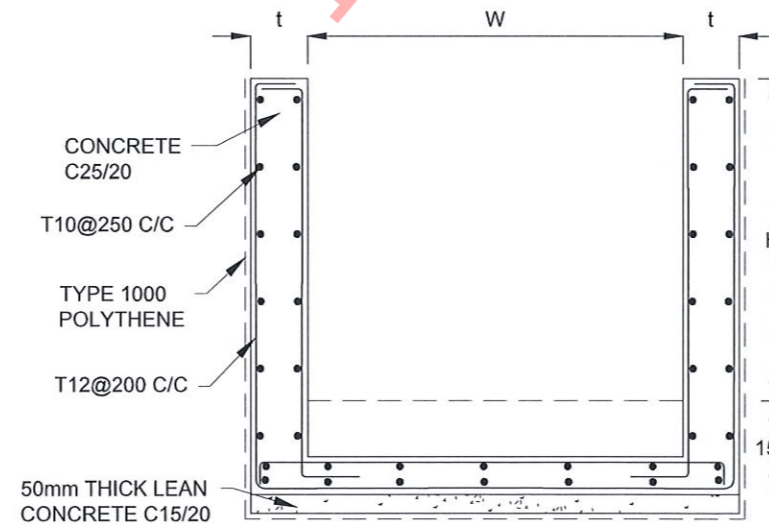
**SECTION A-A  
(OUTLET DETAIL SUBSURFACE DRAIN)**



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



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



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

**NOTES**

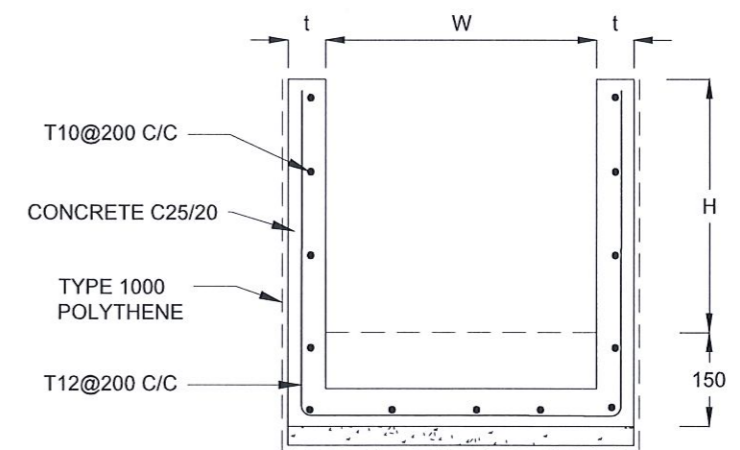
1. W,H,t ; SHALL BE THE SAME AS RESPECTIVE DRAIN SECTION.
2. CP - R SHALL BE USED WHERE H > = 900mm
3. DEPTH OF EXCAVATION MAY VARY ACCORDING TO SITE CONDITIONS.
4. DOWELS SHALL BE INSTALLED ACCORDING TO THE GROUND CONDITIONS AS INSTRUCTED BY THE ENGINEER.
5. 10 mm THICK EXPANSION JOINT SHALL BE INTRODUCED 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

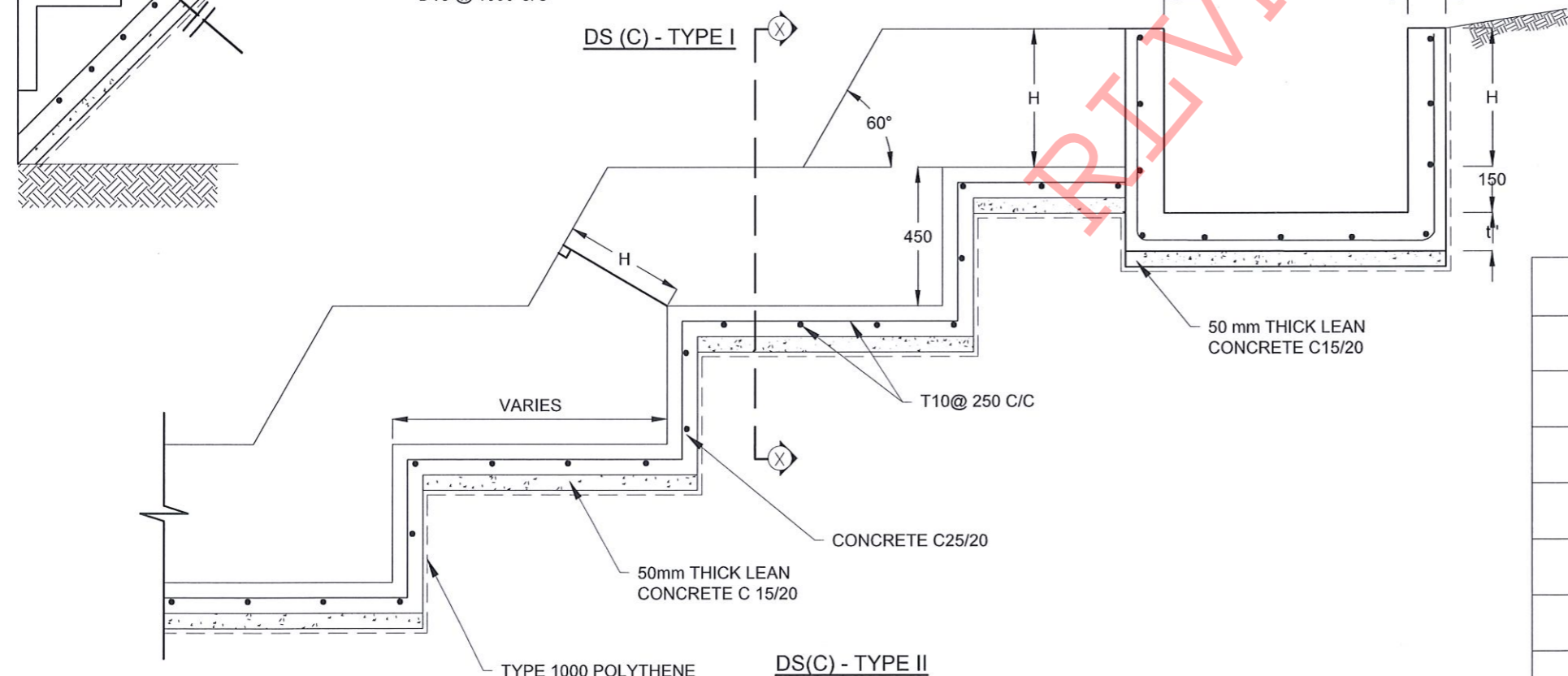
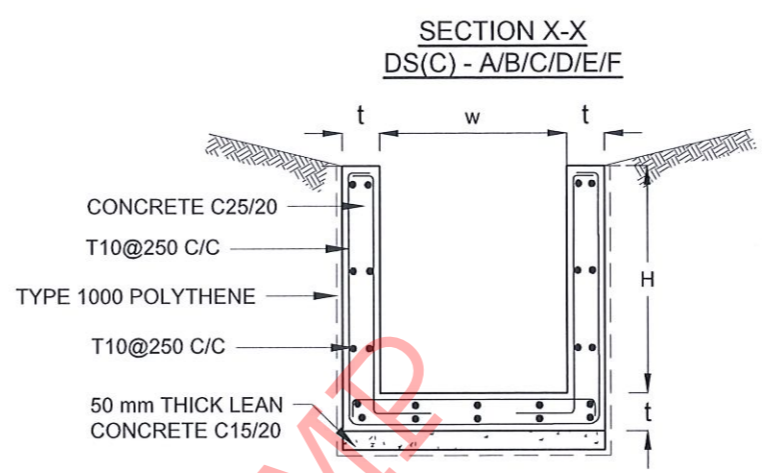
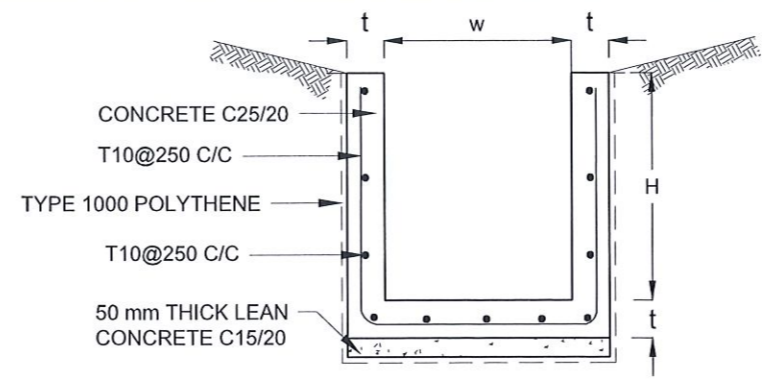
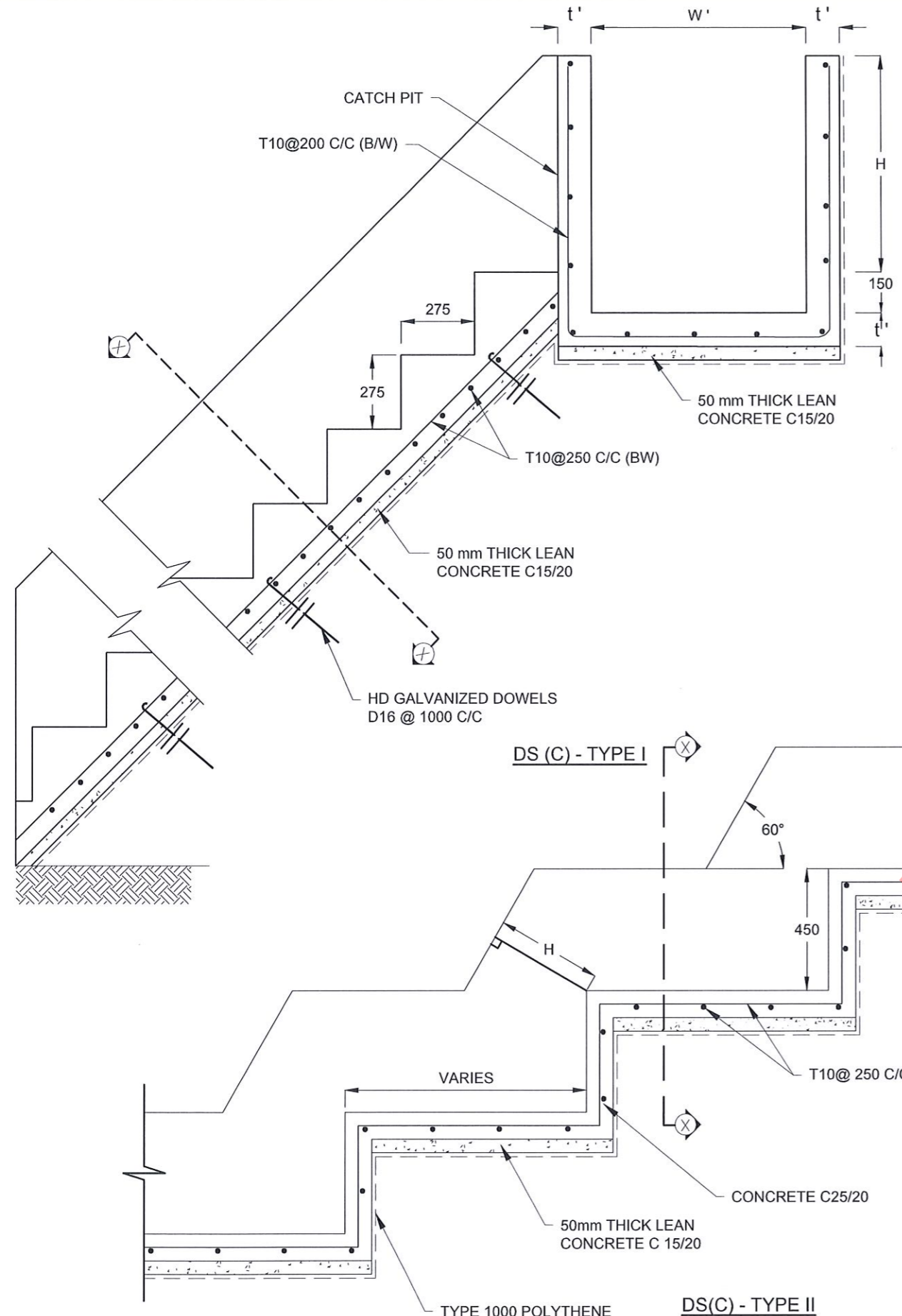
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 GINIGATHENA TOWN - NUWARAELIYA

TITLE  
 DETAILS OF DRAINS  
 (SUBSURFACE DRAIN AND CATCHPIT)

SCALE | N.T.S | DATE | 20.06.2022  
 PROJECT / DRAWING No. | RLVMMP/WORKS/NCB/PHII/044-GII/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**

- 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 ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

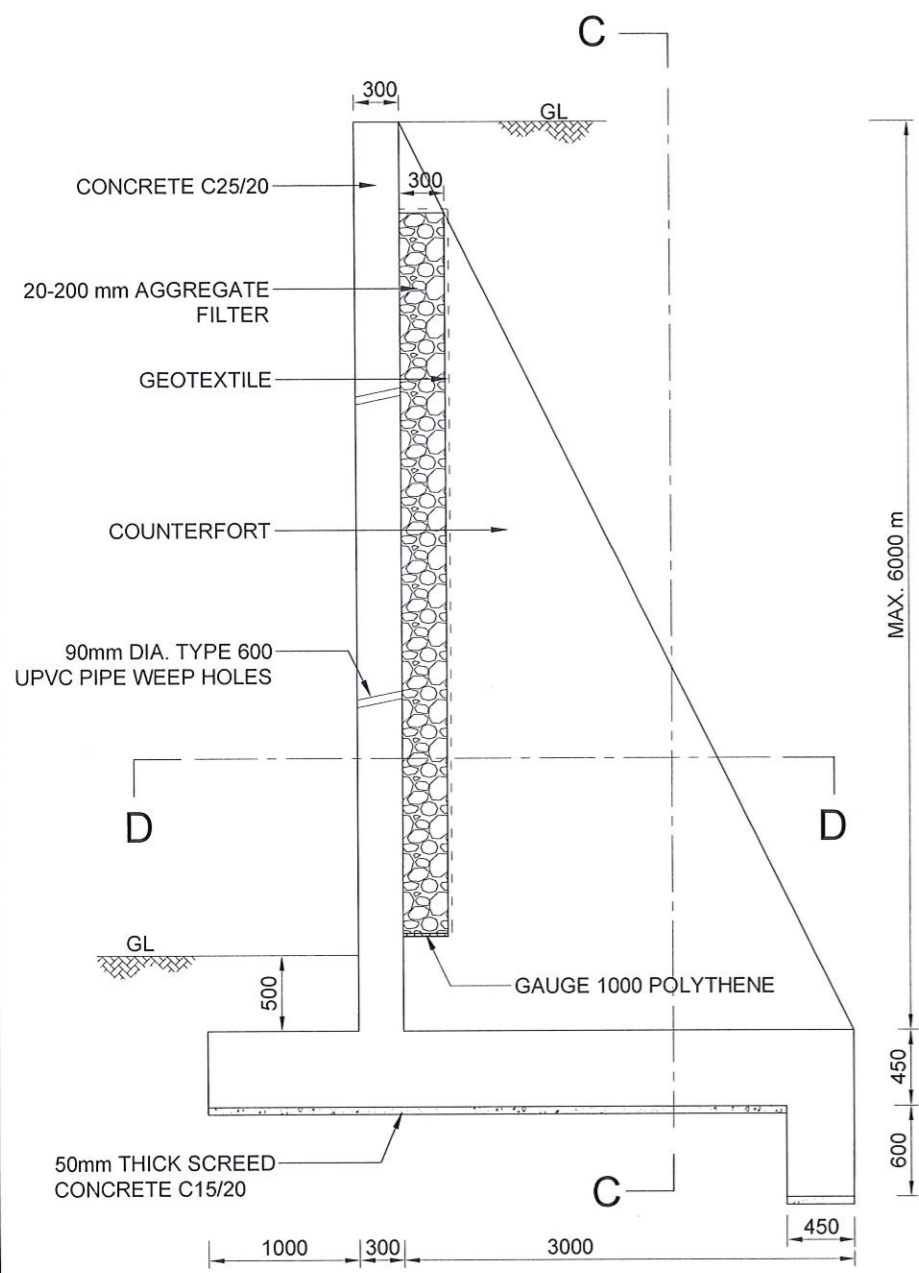
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 GINIGATHENA TOWN - NUWARAELIYA

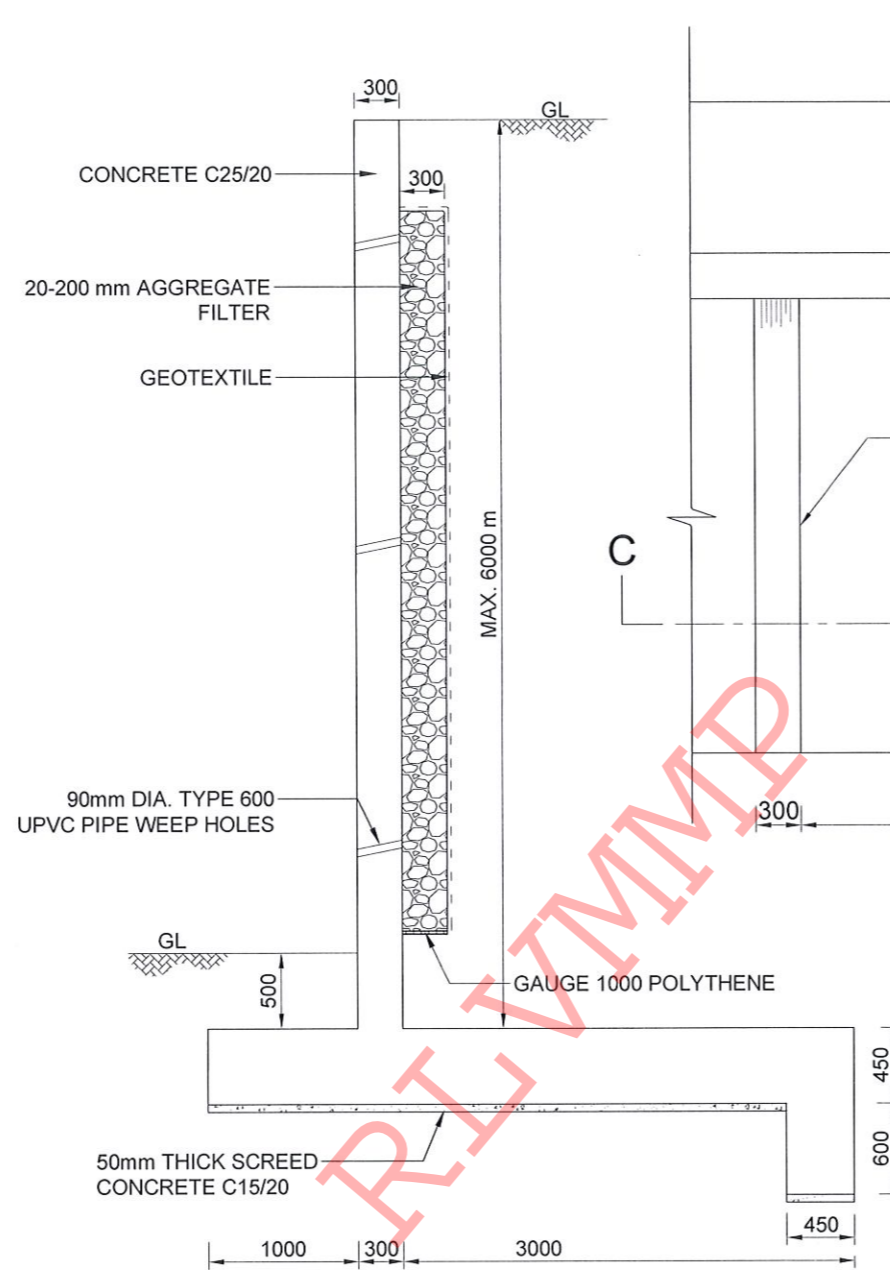
TITLE  
 DETAILS OF DRAINS  
 (CASCADE DRAIN)

SCALE N.T.S DATE 20.06.2022  
 PROJECT / DRAWING No. RLVMMPP/WORKS/NCB/PH11/044-GI/DR-05d REVISION 00

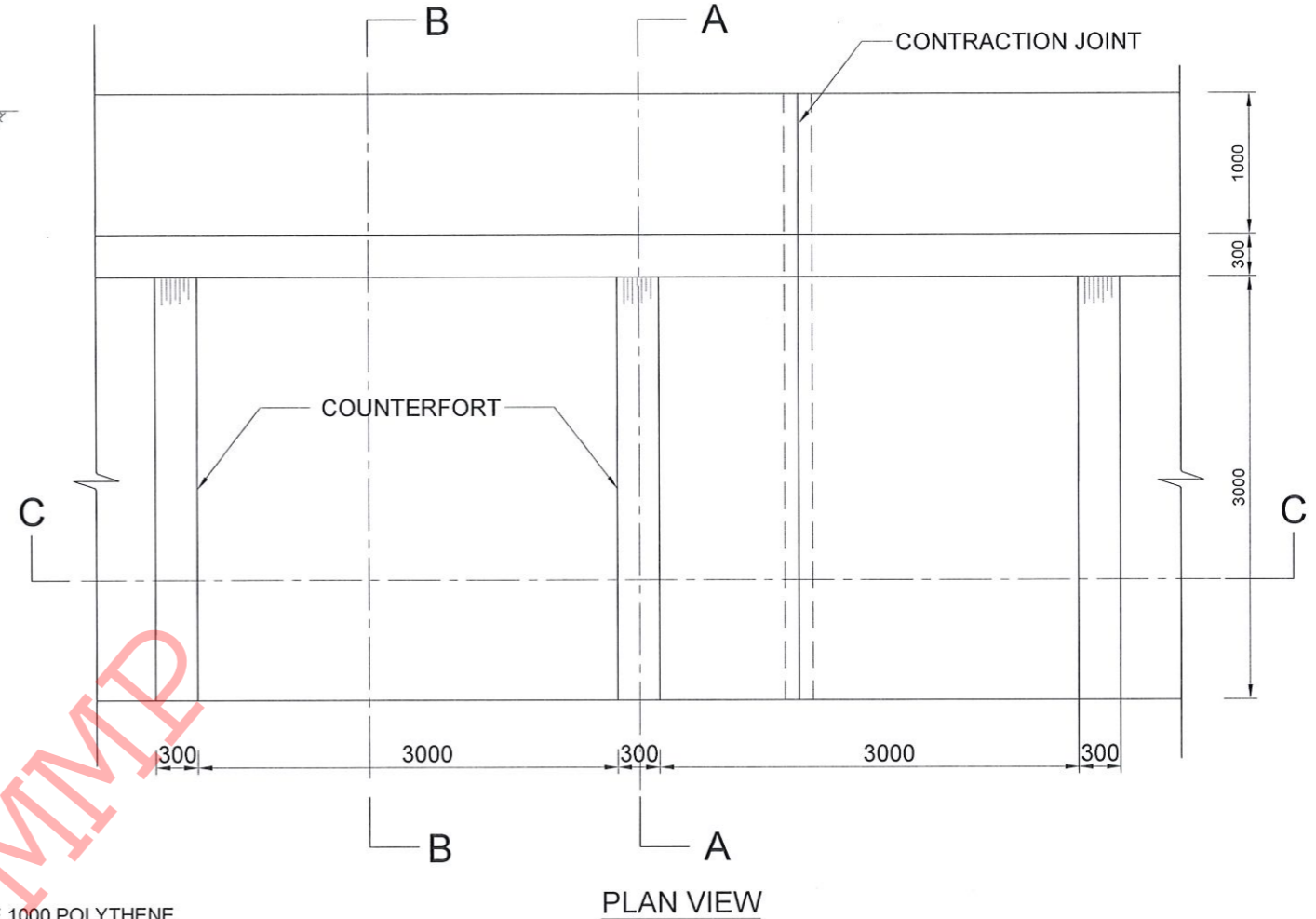
DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	
DESIGNER	M.H.M. HARSHANI	
CHECKED	B.I. KUMARAGE	
RECOMMENDED	Prof. S.A.S. KULATHILAKA	
APPROVED	K.N. BANDARA	



SECTION A - A



SECTION B - B



PLAN VIEW

**NOTES :-**

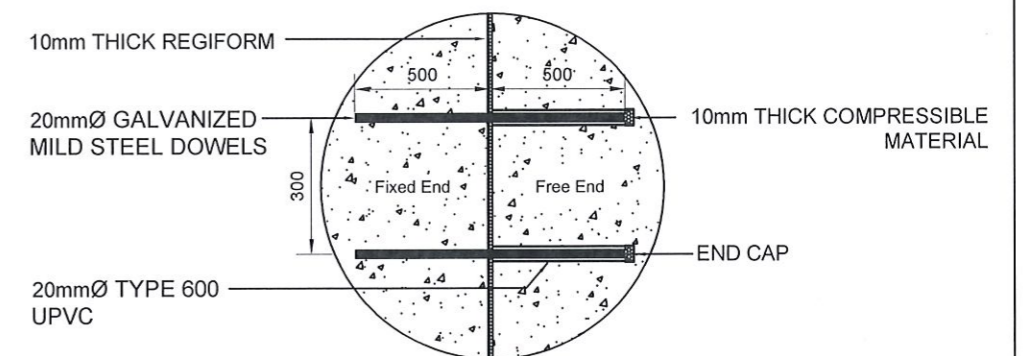
1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. AGGREGATE BACKFILL AND GEO-TEXTILE SHOULD BE CONFORMED TO THE SPECIFICATIONS PROVIDED.
3. 90mm DIAMETER WEEP HOLES SHOULD BE PROVIDED IN 1m VERTICAL AND 1.5m HORIZONTAL SPACING AND SHOULD BE STAGGERED.
4. R16, 1000mm LONG DOWELS SHOULD BE PROVIDED AT 1000mm SPACING IN LONGITUDINAL DIRECTION AND AT 600mm SPACING IN TRANSVERSE DIRECTION IF ROCK SURFACE FOUND.

5. HEAVY COMPACTION MACHINES SHOULD NOT BE USED WITHIN 1m OF RETAINING WALL STEM AND THE ROLLERS USED IN COMPACTION PROCESS SHOULD BE EXERT LOWER PRESSURE THAN 20kN/m<sup>2</sup>.

**CONCRETE**

6. USE FOLLOWING CONCRETE GRADES FOR STRUCTURE

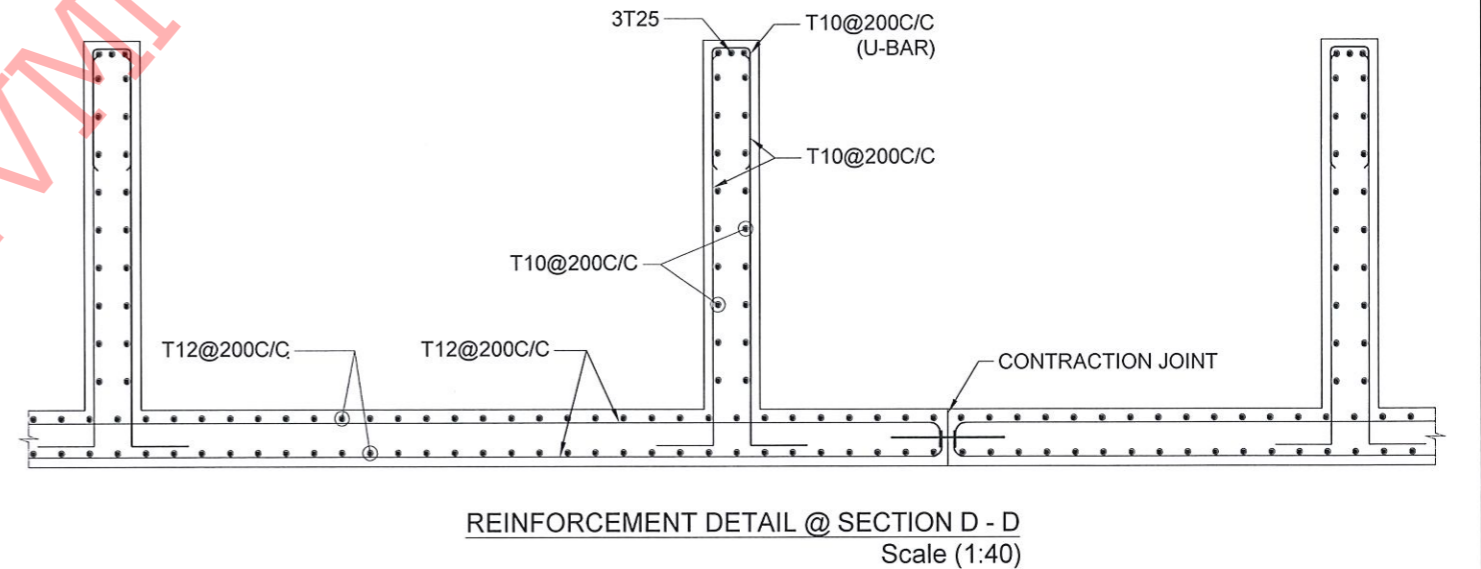
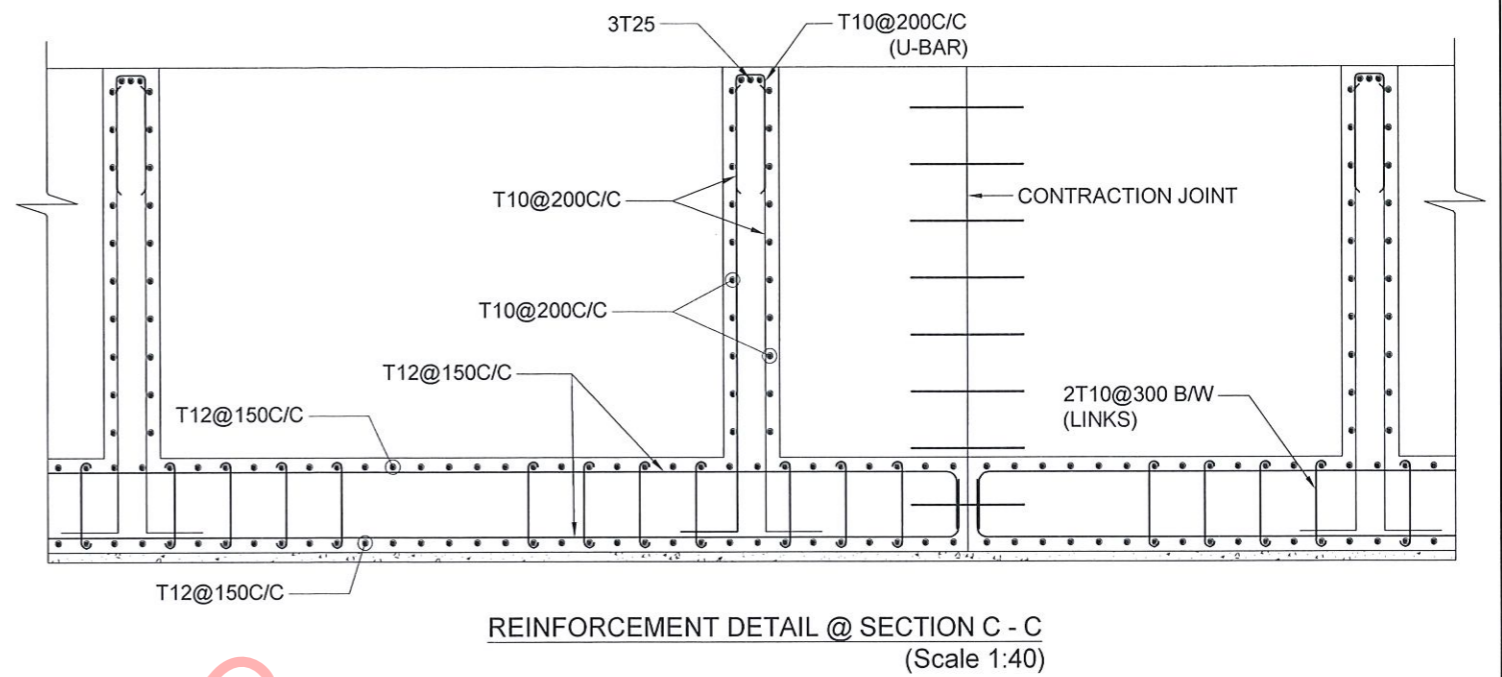
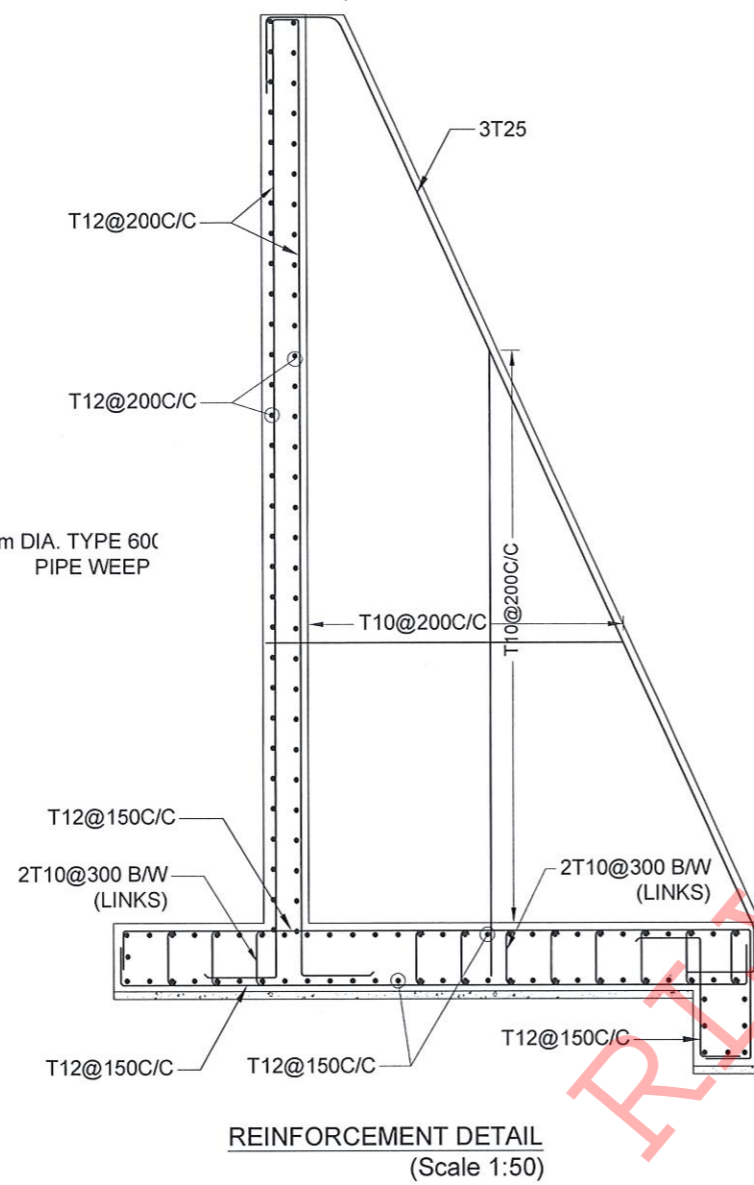
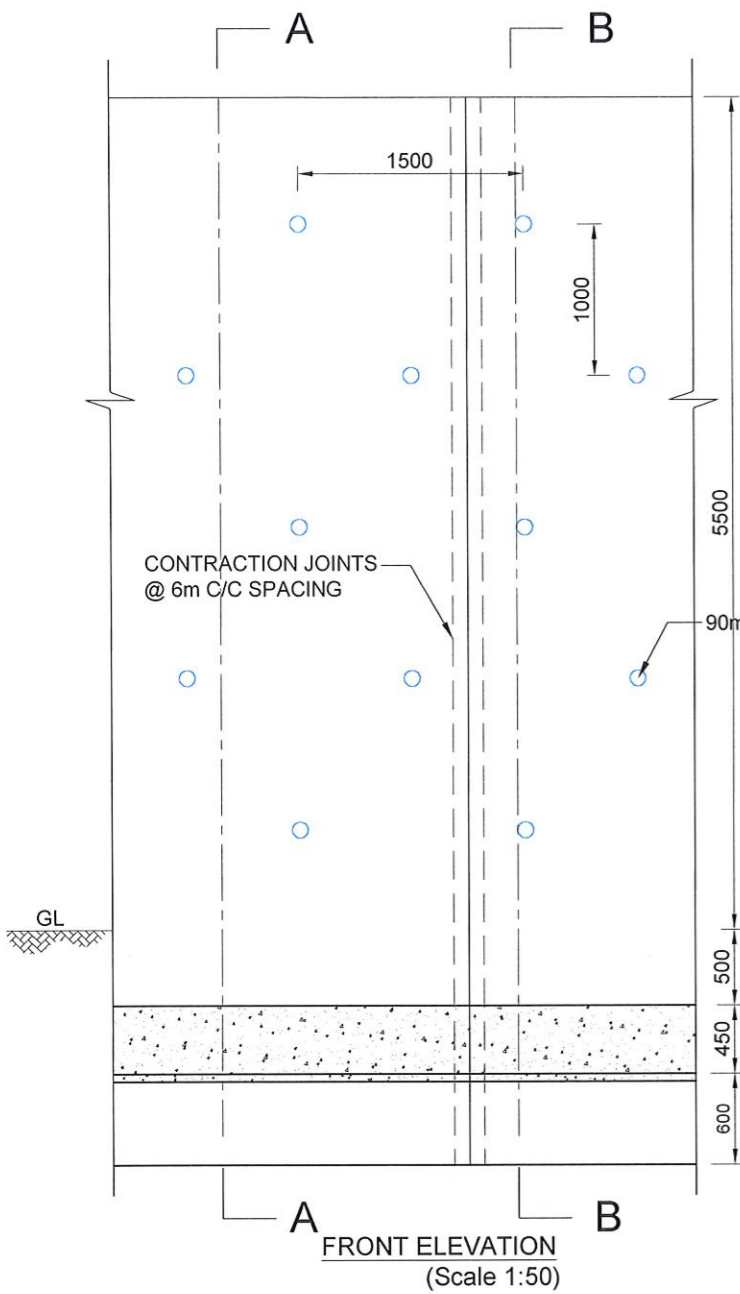
- [a] SCREED - GR. 15/20
- [b] WALLS / BASE - GR. 25/20



DETAILS OF CONTRACTION JOINT  
(Not to Scale)

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 GINIGATHENA TOWN - NUWARAELIYA	TITLE DETAILS OF COUNTERFORT RETAINING WALL		DESCRIPTION	NAME	SIGNATURE
								SCALE	N.T.S	DATE	20.06.2022
							PROJECT / DRAWING No.	RLVMMP/WORKS/NCB/PHII/044-GI/DR-06a	RECOMMENDED	Prof.S.A.S.KULATHILAKA	
								APPROVED	K.N.BANDARA		





**NOTES :-**

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. AGGREGATE BACKFILL AND GEO-TEXTILE SHOULD BE CONFORMED TO THE SPECIFICATIONS PROVIDED.
3. 90mm DIAMETER WEEP HOLES SHOULD BE PROVIDED IN 1m VERTICAL AND 1.5m HORIZONTAL SPACING AND SHOULD BE STAGGERED.
4. R16, 1000mm LONG DOWELS SHOULD BE PROVIDED AT 1000mm SPACING IN LONGITUDINAL DIRECTION AND AT 600mm SPACING IN TRANSVERSE DIRECTION IF ROCK SURFACE FOUND.
5. HEAVY COMPACTION MACHINES SHOULD NOT BE USED WITHIN 1m OF RETAINING WALL STEM AND THE ROLLERS USED IN COMPACTION PROCESS SHOULD BE EXERT LOWER PRESSURE THAN 20kN/m<sup>2</sup>.

**CONCRETE**

6. USE FOLLOWING CONCRETE GRADES FOR STRUCTURE

- [a] SCREED - GR. 15/20
- [b] WALLS / BASE - GR. 25/20

**REINFORCEMENT**


7. ALL BARS MARKED "T" SHALL BE HIGH YIELD DEFORMED BARS OF YIELD STRENGTH NOT LESS THAN 460N/mm<sup>2</sup>.

8. TENSION LAP LENGTH SHOULD BE 52 x BAR DIA. AND COMPRESSION LAP LENGTH SHOULD BE 38 x BAR DIA. LAPPING SHOULD BE STAGGERED. ANCHORAGE LENGTH SHOULD BE 40X BAR DIA.

9. REINFORCEMENT BARS SHALL BE BENT ACCORDANCE WITH STANDARD SPECIFICATIONS.

10. CLEAR CONCRETE COVER FOR THE REINFORCEMENT ABOVE AND BELOW THE GROUND LEVEL SHALL BE 40mm AND 50 mm RESPECTIVELY.

11. 10mm THICK CONTRACTION JOINT SHALL BE INTRODUCED IN EVERY 6m INTERVALS AND SHALL BE PLACED AT ONE THIRD DISTANCE OF SPAN LENGTH BETWEEN TWO COUNTERFORTS.

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

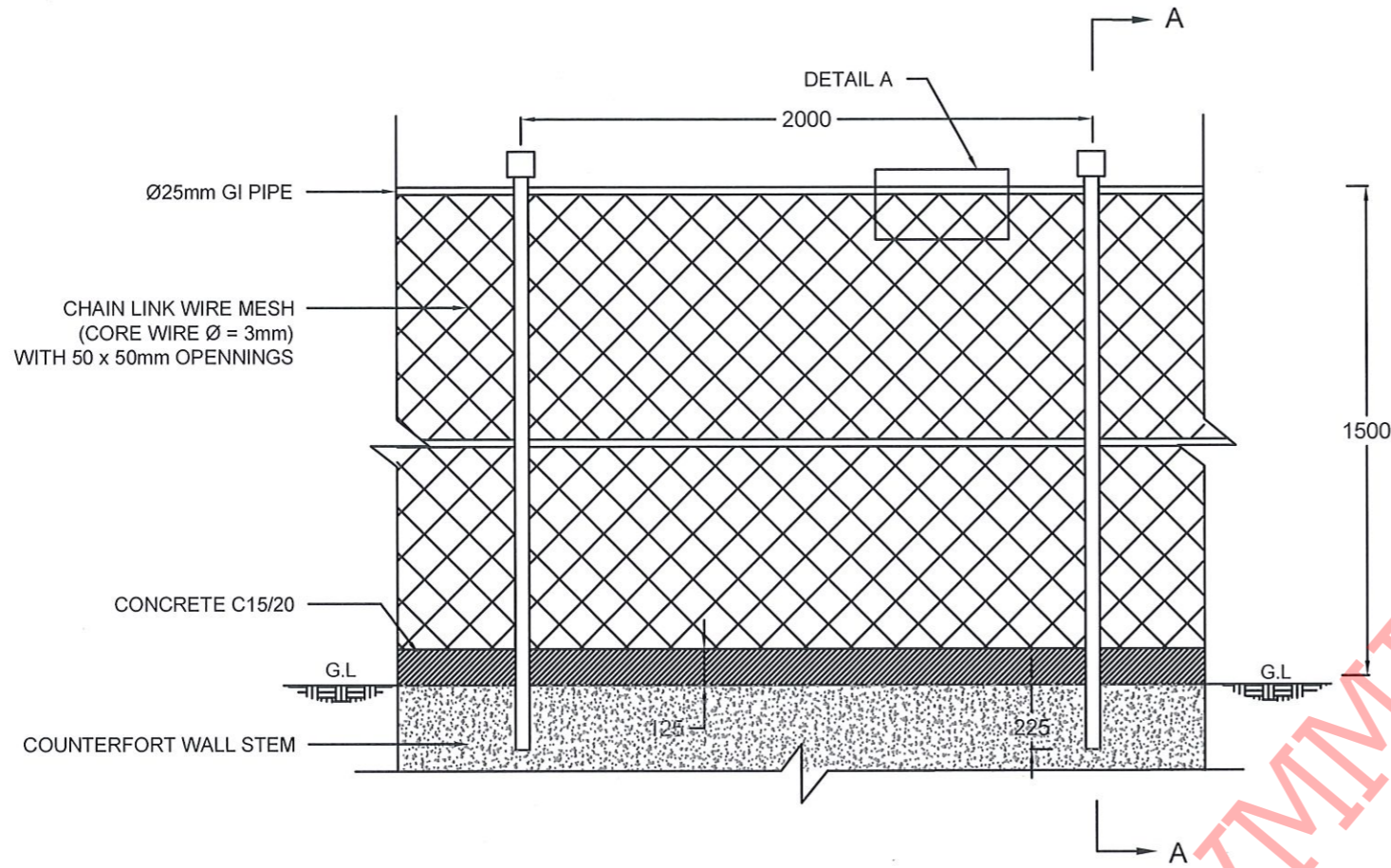
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 GINIGATHENA TOWN - NUWARAELIYA

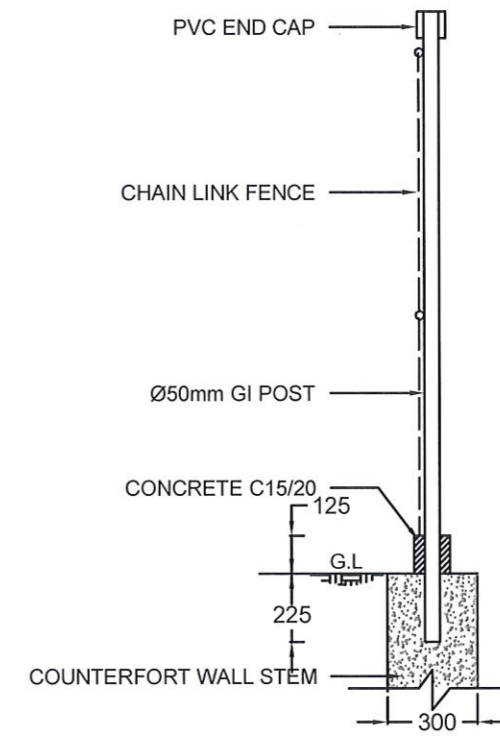
TITLE  
 DETAILS OF COUNTERFORT RETAINING WALL

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

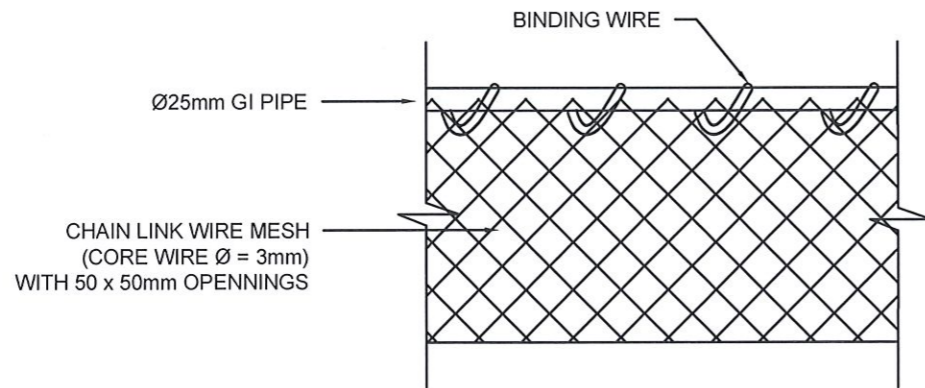
SCALE	N.T.S	DATE	20.06.2022
PROJECT / DRAWING No.	RLVMMP/WORKS/NCB/PH11/044-GI/DR-06b	REVISION	00



FRONT ELEVATION




SECTION A - A



DETAIL A

**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.
4. FENCE FOOTING TO BE CAST TOGETHER WITH COUNTERFORT WALL STEM.

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


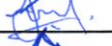


DESIGNER  
  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 GINIGATHENA TOWN - NUWARAELIYA




TITLE  
 DETAILS OF CHAIN LINK FENCE

SCALE	N.T.S.	DATE	20.06.2022
PROJECT / DRAWING No.	RLVMM/WORKS/NCB/PHII/044-GI/DR-07	REVISION	00

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



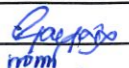
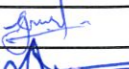





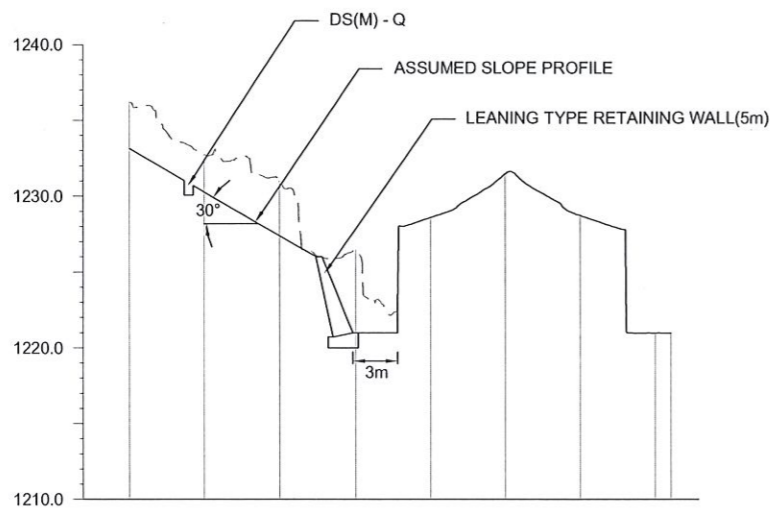
DESIGN NOTATION

-  AMENDED GABION BOX
-  LEANING TYPE RETAINING WALL
-  DS (M) - Q

NOTES

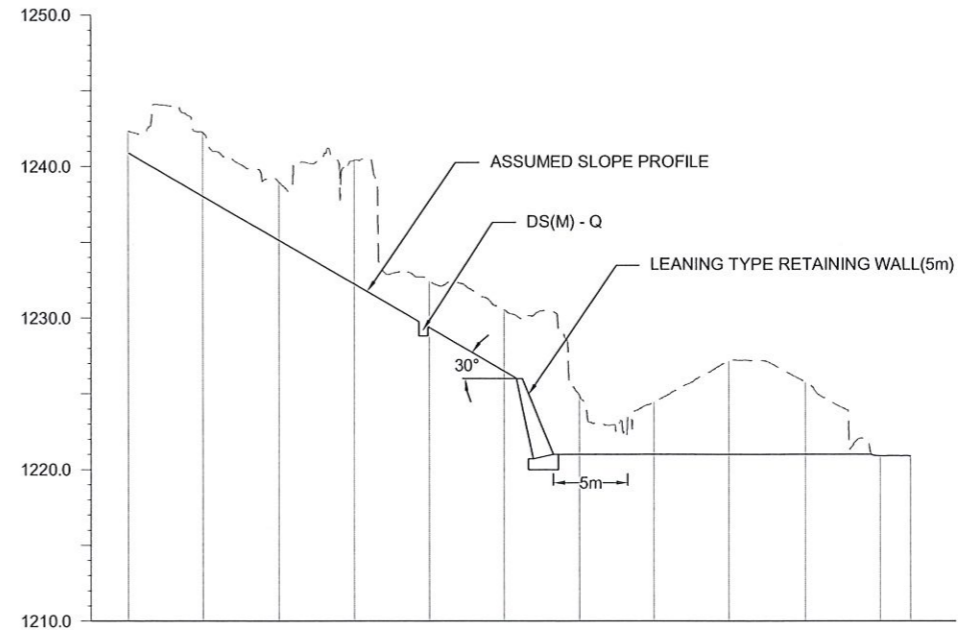
1. SURFACE DRAIN LOCATIONS (PATH OF THE DRAINS) & LENGTH MIGHT BE VARIED ACCORDING TO ACTUAL SITE CONDITION.
2. LEANING TYPE RETAINING WALL HEIGHT SHALL BE VARIED ACCORDING TO THE SITE CONDITION AS INDICATED IN DESIGN CROSS SECTION.

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 SRI SADDHARMARAMAYA TEMPLE THALAWAKELE	TITLE		DESCRIPTION DRAWN DESIGNER CHECKED RECOMMENDED APPROVED	NAME S.A.G.D. SENANAYAKA V. G. D. GANGANI B.I. KUMARAGE Prof. S.A.S. KULATHILAKA K.N. BANDARA	SIGNATURE     
							DESIGN PLAN VIEW				
		SCALE	1:500	DATE	16.06.2022	REVISION	00				
		PROJECT / DRAWING No.		RLVMMP/WORKS/NCB/PHII/101-TK/DR-03							



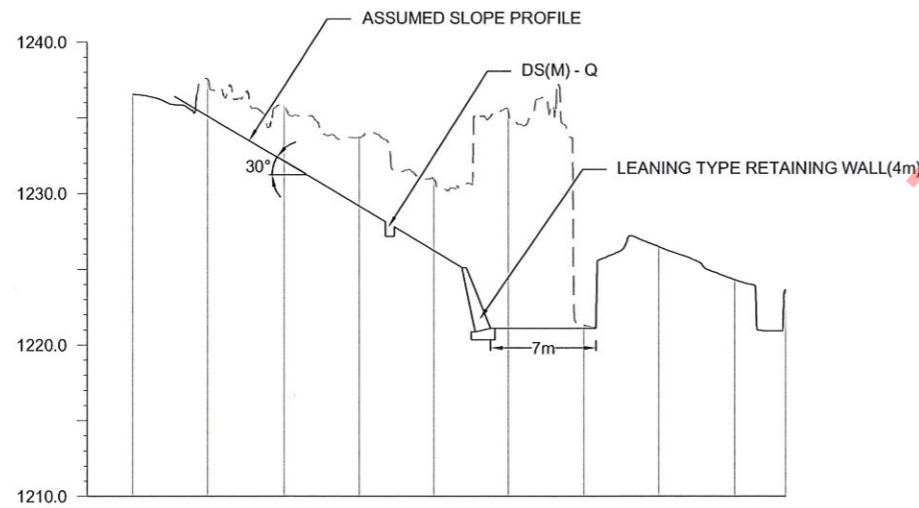
GROUND LEVEL (m)	1236.198	1232.740	1231.006	1226.453	1228.592	1231.476	1228.731	1220.979	1220.971
DISTANCE (m)	0.000	5.000	10.000	15.000	20.000	25.000	30.000	35.000	36.053

CS01



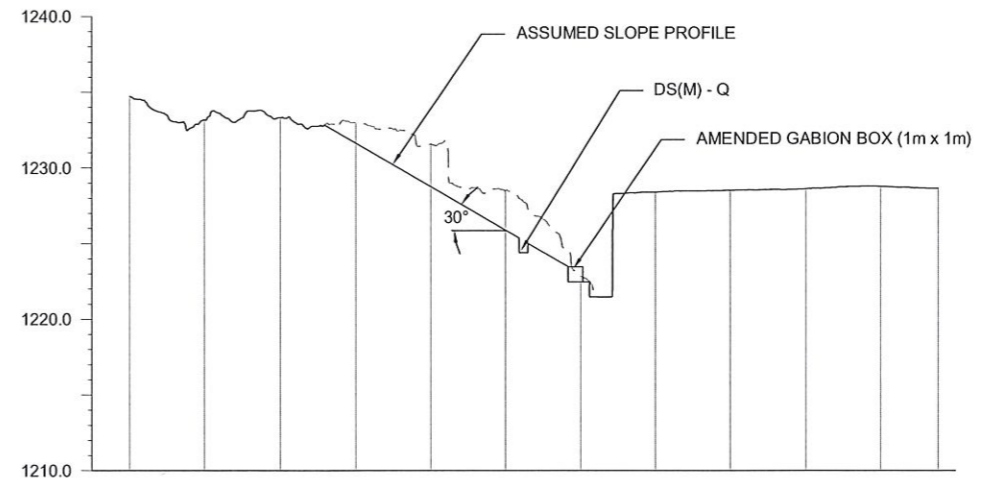
GROUND LEVEL (m)	1242.325	1242.219	1238.954	1240.406	1232.413	1230.546	1224.878	1224.451	1227.162	1225.770	1220.910	1220.911
DISTANCE (m)	0.000	5.000	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000	52.006

CS02




GROUND LEVEL (m)	1236.551	1237.568	1235.760	1233.700	1230.923	1235.396	1221.305	1226.478	1224.293	1223.607
DISTANCE (m)	0.000	5.000	10.000	15.000	20.000	25.000	30.000	35.000	40.000	43.385

CS03



GROUND LEVEL (m)	1234.716	1233.169	1233.315	1232.989	1231.585	1228.491	1222.862	1228.400	1228.531	1228.626	1228.780	1228.645
DISTANCE (m)	0.000	5.000	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000	53.806

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

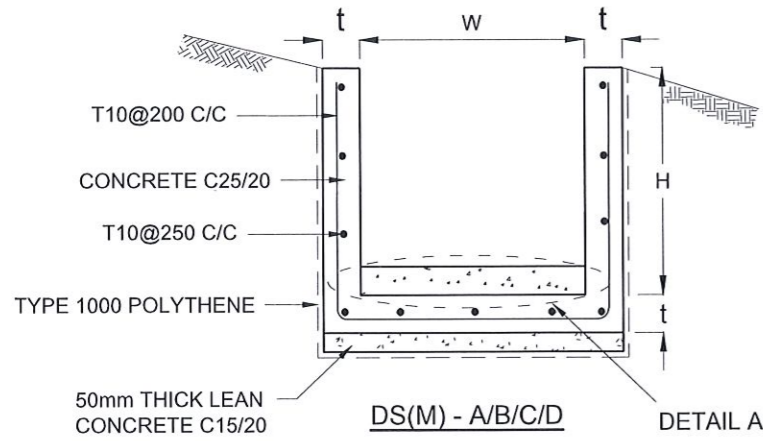
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 SRI SADDHARMARAMAYA TEMPLE  
 THALAWAKELE

TITLE  
 DESIGN CROSS SECTION

SCALE	1:500	DATE	16.06.2022
PROJECT / DRAWING No.	RLVMM/P/WORKS/NCB/PHII/101-TK/DR-04	REVISION	00

DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	
DESIGNER	V. G. D. GANGANI	
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**

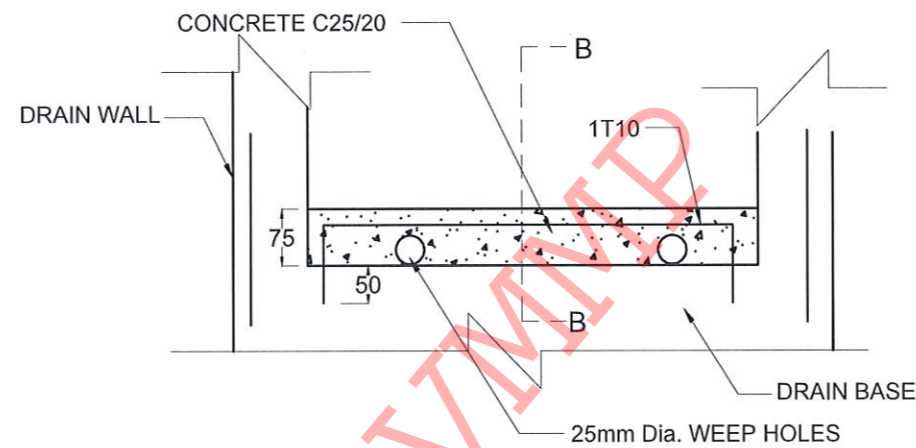
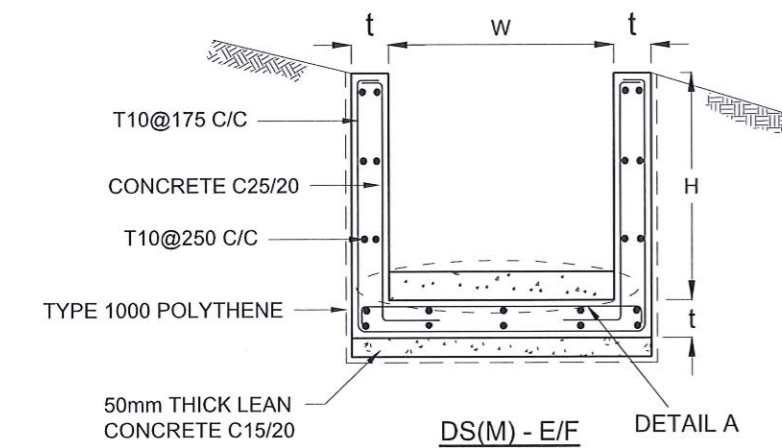
- DEPTH OF EXCAVATION MAY VARY ACCORDING TO SITE CONDITIONS.
- STEPS SHALL BE CONSTRUCTED AT SURFACE DRAIN ON SLOPING GROUND ACCORDING TO THE SITE CONDITIONS AS INSTRUCTED BY THE ENGINEER.
- ENERGY BREAKERS SHALL BE CONSTRUCTED AT THE STEEP DRAIN SEGMENTS AS PER THE INSTRUCTIONS OF THE ENGINEER.
- DOWELS 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**

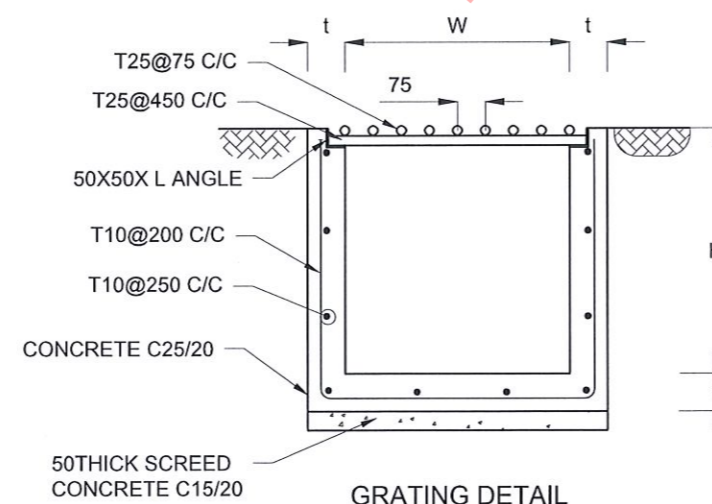
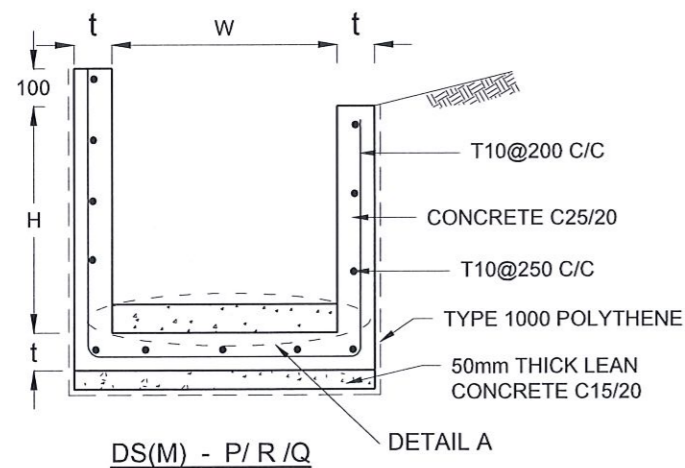
- USE FOLLOWING CONCRETE GRADES FOR STRUCTURE
  - [a] SCREED - C. 15/20
  - [b] WALLS / BASE / ENERGY BREAKERS - C. 25/20

**REINFORCEMENT**

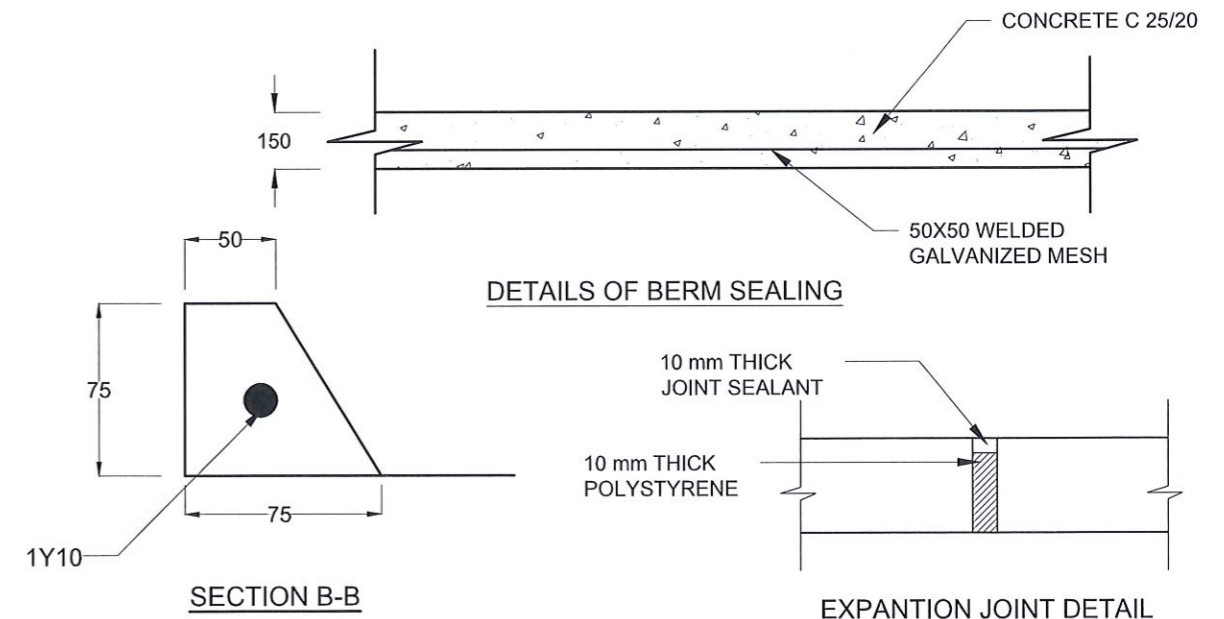
- ALL BARS MARKED "T" SHALL BE HIGH YIELD DEFORMED BARS OF YIELD STRENGTH NOT LESS THAN 460N/mm<sup>2</sup>.
- BARS OF CUT LENGTH LARGER THAN THE SUPPLIED LENGTH TO BE LAPPED FOR A LENGTH OF 50 x BAR DIA. AND LAPPING SHOULD BE STAGGERED.
- ANCHORAGE LENGTH SHOULD BE 40X BAR DIA.
- REINFORCEMENT BARS 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

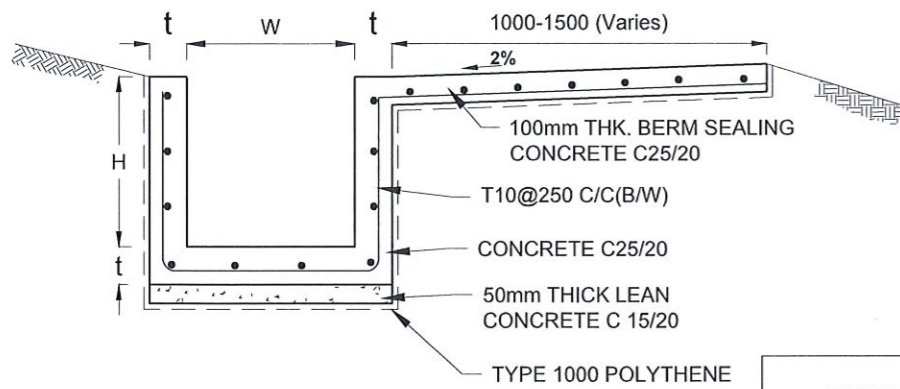
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 SRI SADDHARMARAMAYA TEMPLE  
 THALAWAKELE

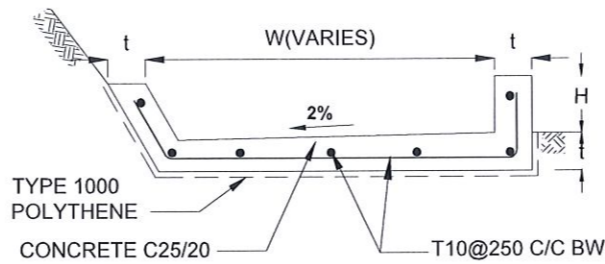
TITLE  
 DETAILS OF DRAINS  
 (SURFACE DRAIN -1 OF 2)

SCALE	N.T.S.	DATE	16.06.2022
PROJECT / DRAWING No.	RLVMMP/WORKS/NCB/PHI/101-TK/DR-05a	REVISION	00

DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	<i>[Signature]</i>
DESIGNER	V. G. D. GANGANI	<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>



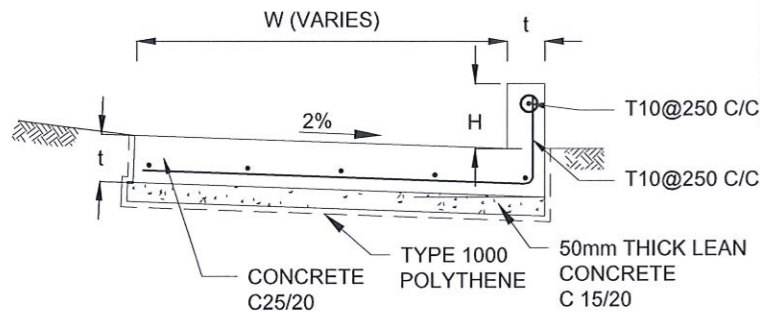
DS (B) - (TYPE I)



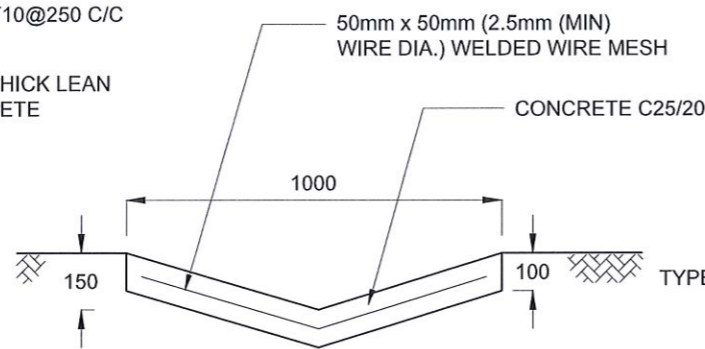
DS (B) - (TYPE II)

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

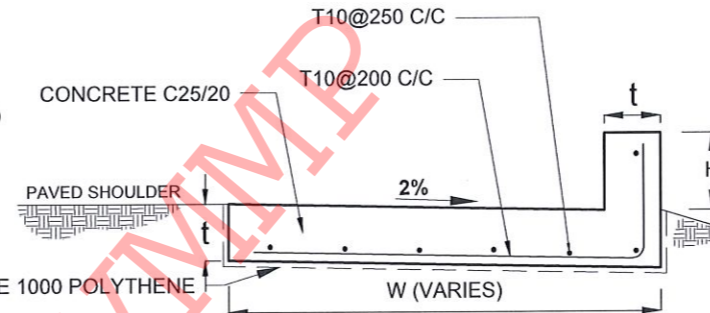
DRAIN TYPE	W (mm)	H (mm)	t (mm)
DS (B) - A	300	300	100
DS (B) - B	450	450	100
DS (B) - C	1000	150	100
DS (B) - D	1500	150	100
DS (B) - E	2000	150	100



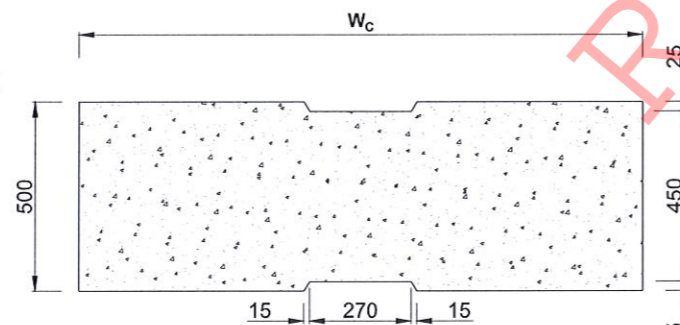
DS (K) - TYPE I



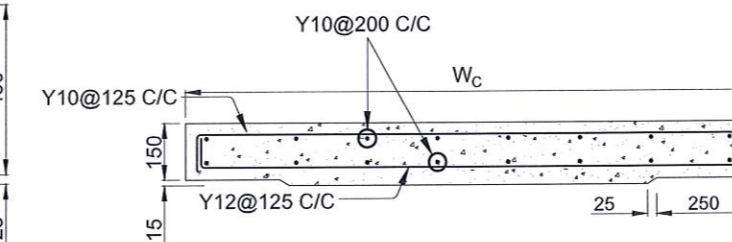
DS (D) - A (DISH DRAIN)



DS (K) - TYPE II



PLAN VIEW OF COVER SLAB



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

DRAIN TYPE	W (mm)	H' (mm)	t (mm)
DS(M) - L	600	600	150
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  
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 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

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

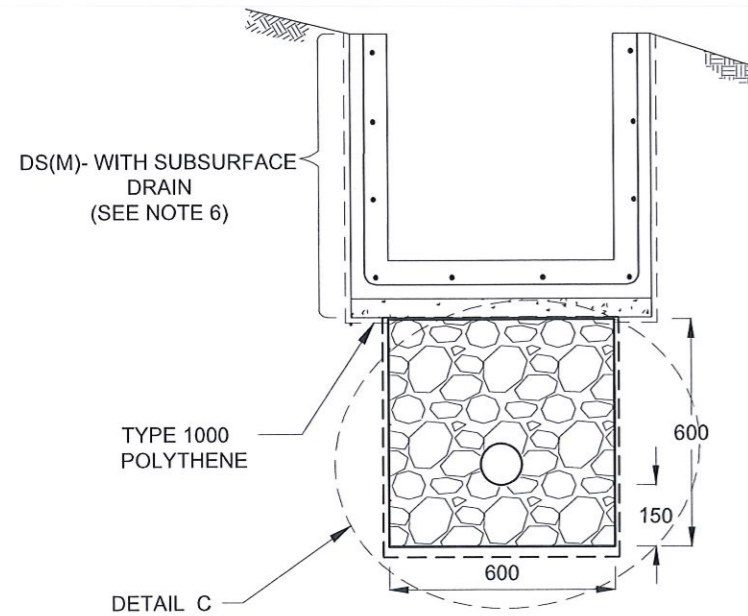
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 SRI SADDHARMARAMAYA TEMPLE  
 THALAWAKELE

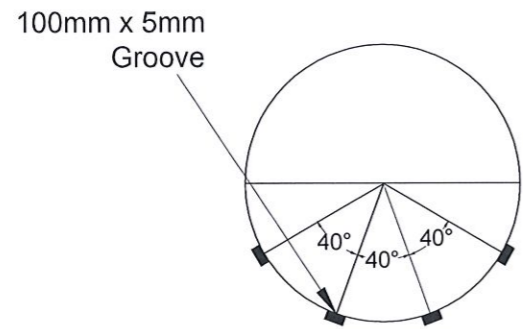
TITLE  
 DETAILS OF DRAINS  
 (SURFACE DRAIN - 2 OF 2)

SCALE | N.T.S. | DATE | 16.06.2022  
 PROJECT / DRAWING No. | RLVMP/WORKS/NCB/PHI/101-TK/DR-05b | REVISION | 00

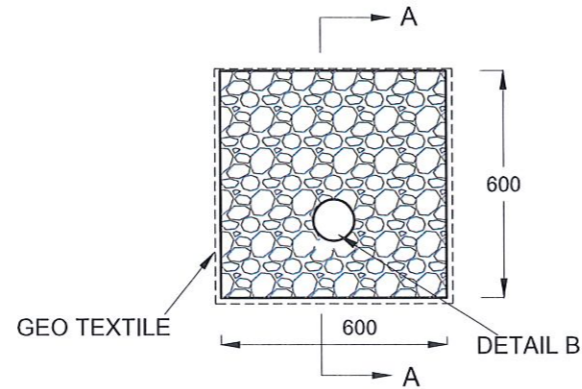
DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	<i>[Signature]</i>
DESIGNER	V. G. D. GANGANI	<i>[Signature]</i>
CHECKED	B.I. KUMARAGE	<i>[Signature]</i>
RECOMMENDED	Prof. S.A.S. KULATHILAKA	<i>[Signature]</i>
APPROVED	K.N. BANDARA	<i>[Signature]</i>



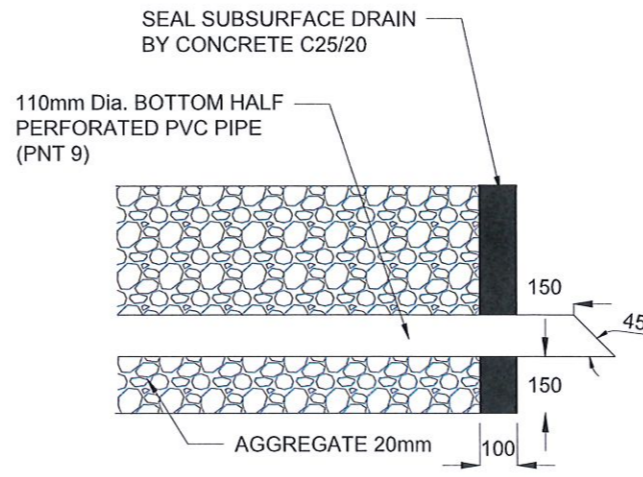
**SUBSURFACE DRAIN  
[DS (S) -A]**



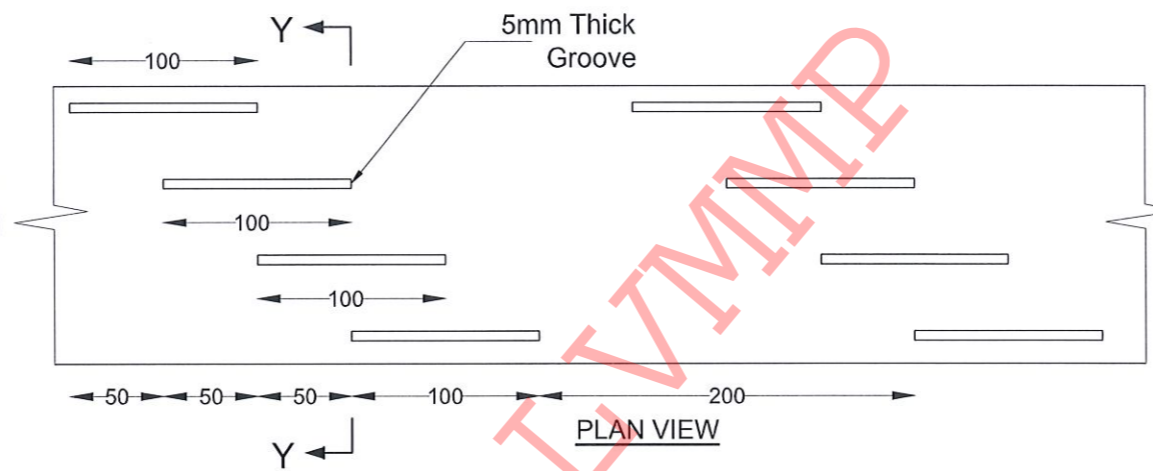
**SECTION Y - Y**



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

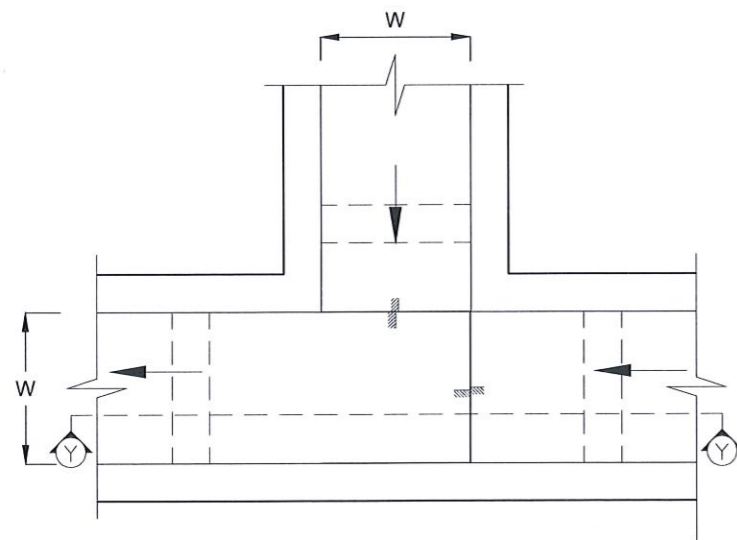


**SECTION A-A  
(OUTLET DETAIL SUBSURFACE DRAIN)**

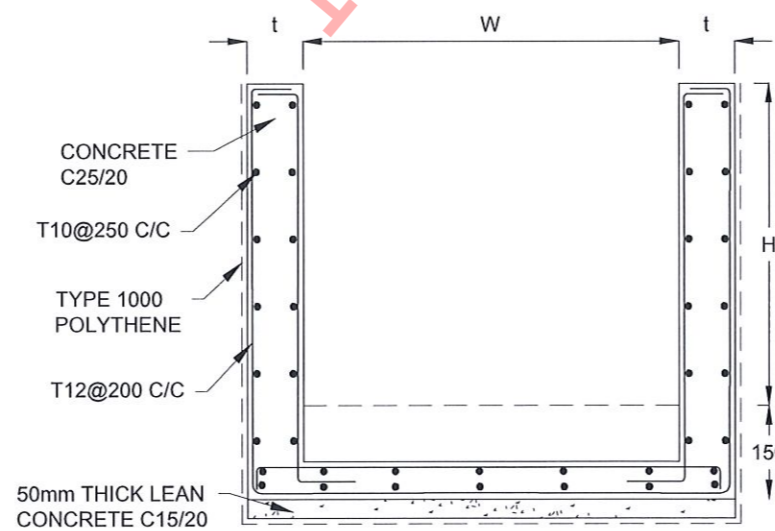


**PLAN VIEW**

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



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



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

**NOTES**

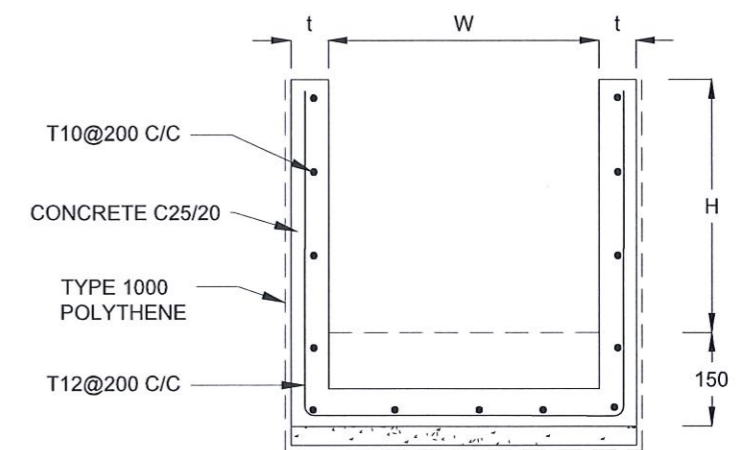
1. W,H,t ; SHALL BE THE SAME AS RESPECTIVE DRAIN SECTION.
2. CP - R SHALL BE USED WHERE H >= 900mm
3. DEPTH OF EXCAVATION MAY VARY ACCORDING TO SITE CONDITIONS.
4. DOWELS SHALL BE INSTALLED ACCORDING TO THE GROUND CONDITIONS AS INSTRUCTED BY THE ENGINEER.
5. 10 mm THICK EXPANSION JOINT SHALL BE INTRODUCED 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

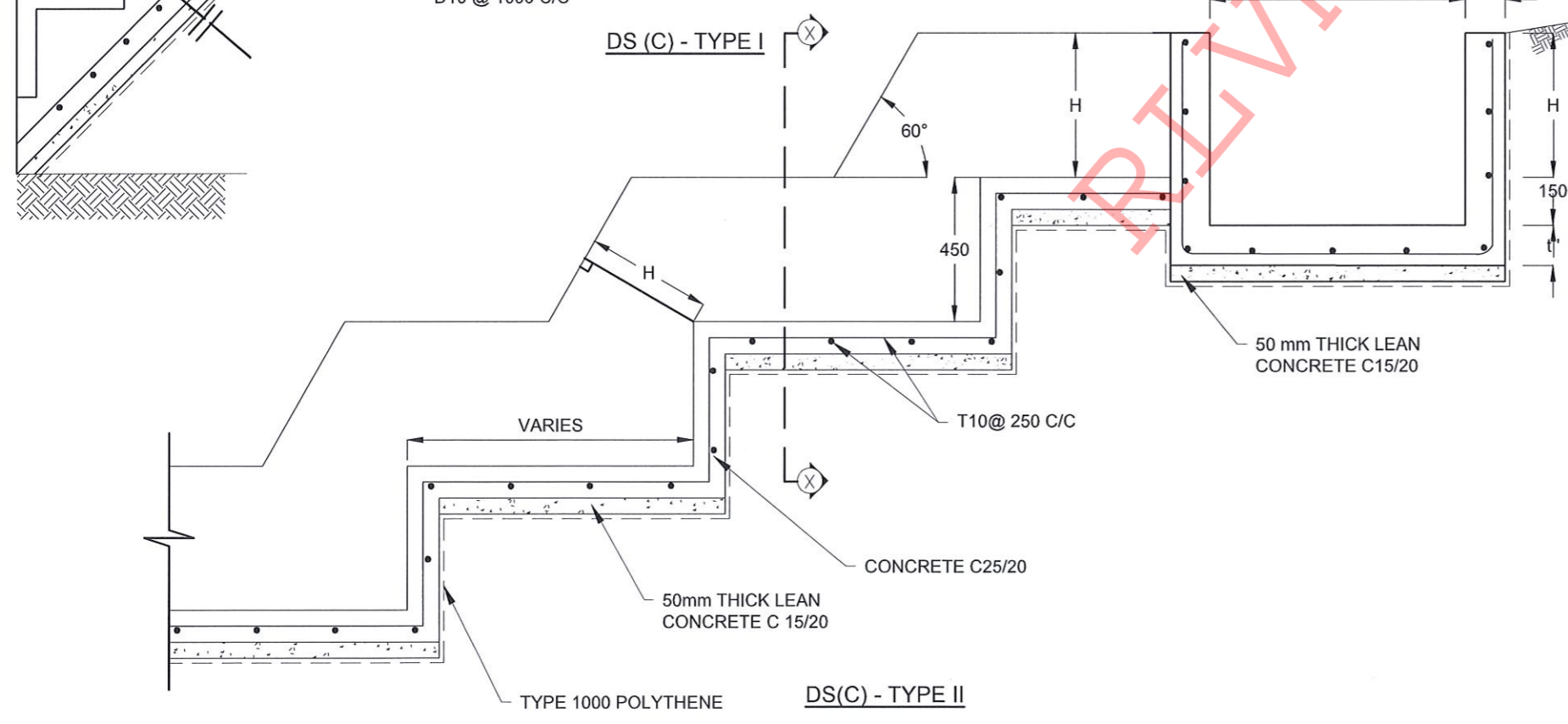
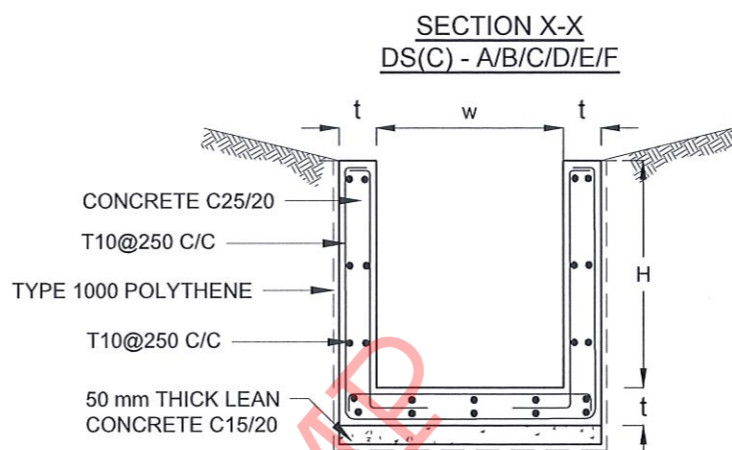
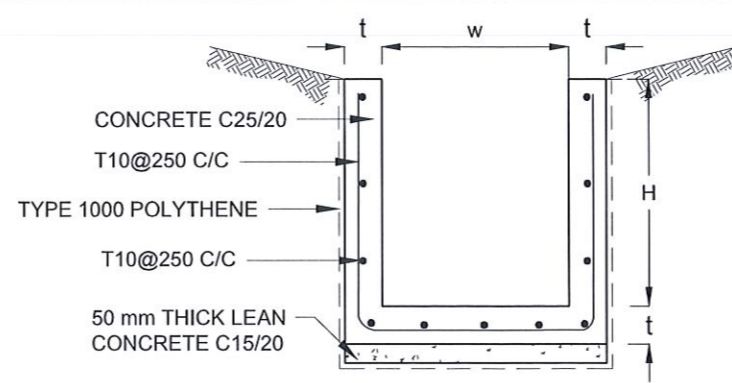
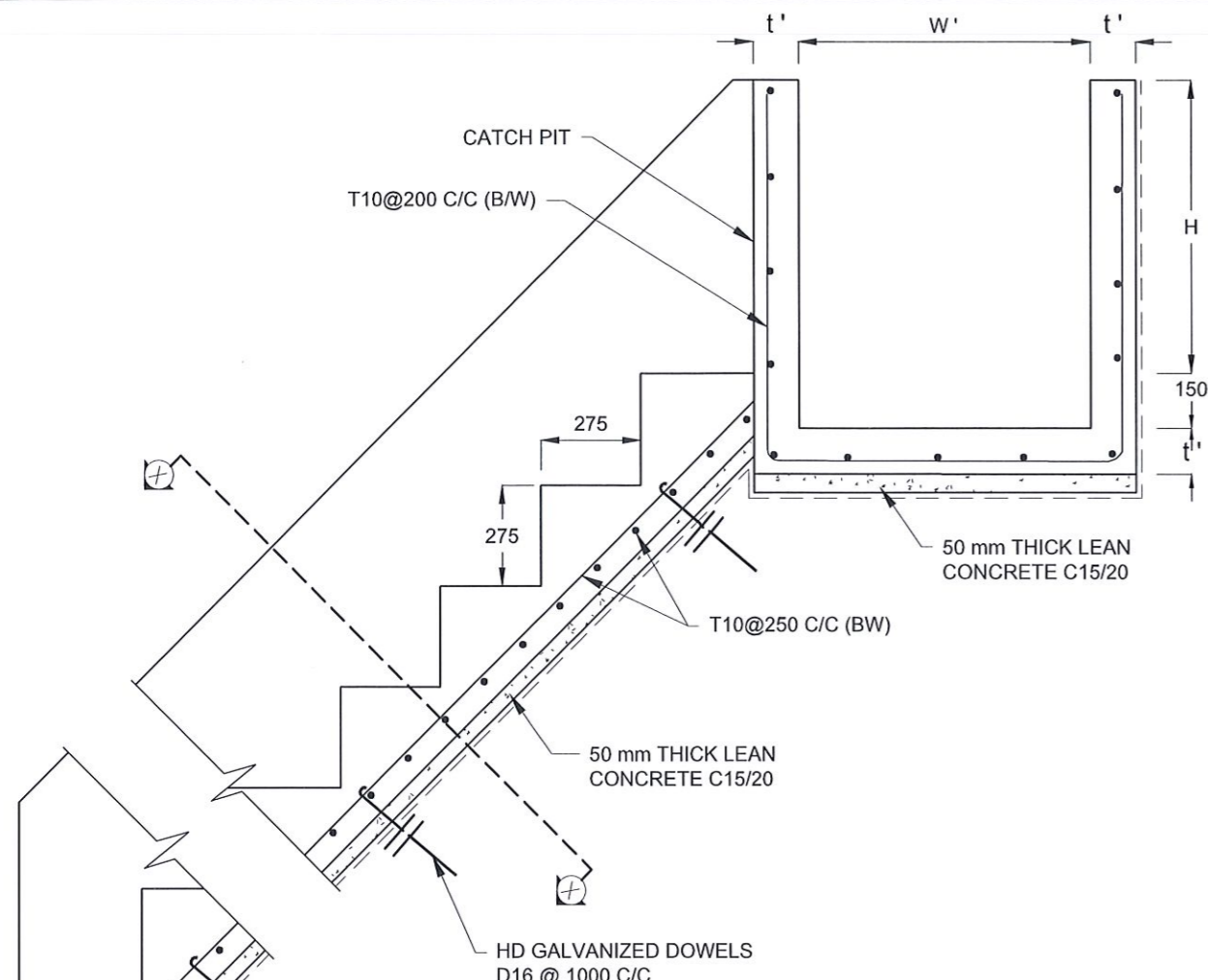
**REINFORCEMENT**

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**

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								DETAILS OF DRAINS (SUBSURFACE DRAIN AND CATCHPIT)	DRAWN DESIGNER CHECKED RECOMMENDED APPROVED	S.A.G.D. SENANAYAKA V. G. D. GANGANI B.I. KUMARAGE Prof. S.A.S. KULATHILAKA K.N. BANDARA	    
		SCALE	N.T.S.	DATE	16.06.2022	PROJECT / DRAWING No.	RLVMMP/WORKS/NCB/PH11/101-TK/DR-05c	REVISION	00		



**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  
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 COLOMBO - 05

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

REV	DATE	REVISION DESCRIPTION	APPROVAL

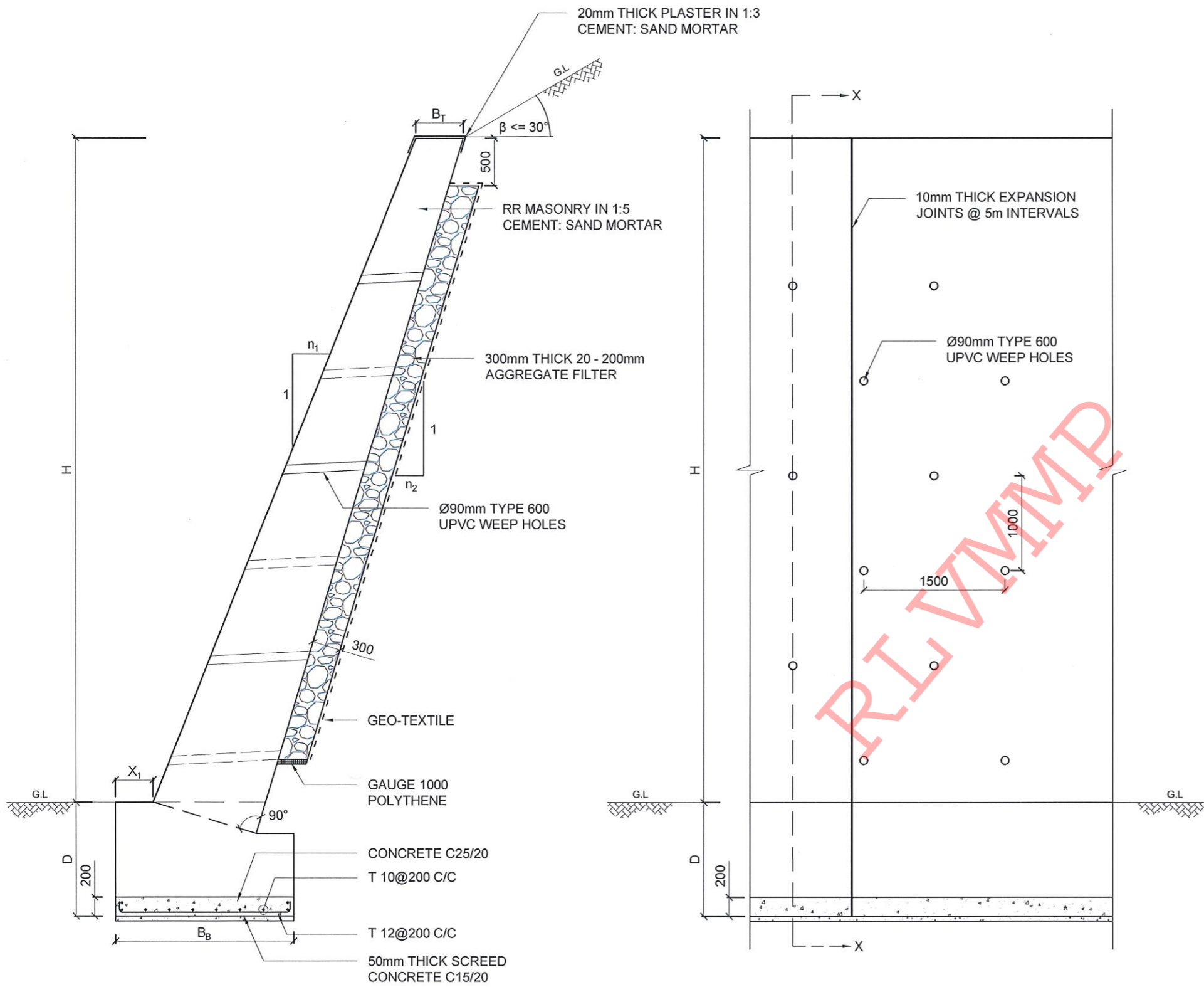
PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 SRI SADDHARMARAMAYA TEMPLE  
 THALAWAKELE

TITLE  
 DETAILS OF DRAINS  
 (CASCADE DRAIN)

SCALE | N.T.S. | DATE | 16.06.2022  
 PROJECT / DRAWING No. | RLVMP/WORKS/NCB/PHII/101-TK/DR-05d | REVISION | 00

DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	<i>[Signature]</i>
DESIGNER	V. G. D. GANGANI	<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>





H / (m)	B <sub>T</sub> / (mm)	B <sub>B</sub> / (mm)	X <sub>1</sub> / (mm)	D / (mm)	n <sub>1</sub>	n <sub>2</sub>
3.0	250	1400	300	600	0.4	0.2
4.0	300	1600	300	800	0.4	0.2
5.0	400	1800	300	1000	0.4	0.2

**NOTES**

- a. WALL HEIGHT AND OTHER DIMENSIONS SHALL BE VARIED ACCORDING TO THE SLOPE CONDITION.
- b. WHERE THE EARTH CUT HEIGHT IS LESS THAN THAT OF THE APPLICABLE TYPICAL WALL HEIGHT, BACKFILLING SHALL BE DONE AS PER THE ENGINEER'S INSTRUCTIONS.
- c. 10mm THICK EXPANSION JOINTS SHOULD BE PROVIDED @ EVERY 5m INTERVALS.
- d. DOWELS SHALL BE INSTALLED IF HARD ROCK IS ENCOUNTERED AS PER THE ENGINEER'S INSTRUCTIONS.
- e. MINIMUM EMBEDMENT DEPTH (D), SHALL NOT BE LESS THAN 0.2 TIMES OF THE WALL HEIGHT (0.2H).

**CONCRETE**

USE FOLLOWING CONCRETE GRADES FOR STRUCTURE

- a. SCREED - GR. 15/20
- b. BASE - GR. 25/20

**REINFORCEMENT**

- a. ALL BARS MARKED "T" SHALL BE HIGH YIELD DEFORMED BARS OF YIELD STRENGTH NOT LESS THAN 460N/mm<sup>2</sup>.
- b. BARS OF CUT LENGTH LARGER THAN THE SUPPLIED LENGTH TO BE LAPPED WITH LENGTH OF 50Ø, WHERE Ø IS THE DIAMETER AND LAPPING SHOULD BE STAGGERED.
- c. ANCHORAGE LENGTH SHOULD BE 40 x BAR DIA.
- d. CLEAR CONCRETE COVER FOR ALL FOUNDATION REINFORCEMENT BELLOW GROUND LEVEL TO BE 50 mm.

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								SCALE	N.T.S	DATE	16.06.2022	RECOMMENDED
						PROJECT / DRAWING No.	RLVMMP/WORKS/NCB/PHII/101-TK/DR-06	REVISION	00	APPROVED	K.N. BANDARA	

REFERENCE

- G GATE
- TF TOILET FIT
- TL TOILET
- LF LIVE FENCE
- B BANK
- B(B) BANK BOTAM
- B(T) BANK TOP
- BW BOUNDARY WALL
- WF WIRE FENCE
- GB GABIAN WALL
- RW RETAINING WALL
- TW TOE WALL
- TBM TEMPORARY BENCH MARK
- SR SRINE ROOM
- MDn MASONRY DRAIN
- ARB ASBESTOS ROOFED BUILDING
- CRB CONCRETE ROOFED BUILDING
- 3SARB THREE STORIED ASBESTOS ROOFED BUILDING


DESIGN NOTATION

-  - SOIL NAILING AREA
-  - CANTILEVER WALL (2m)
-  - BACKFILLING AND ROAD SURFACE REPAVING
-  - TURFING AREA
-  - DS (M) - L
-  - DS (K) - A (TYPE I)

NOTES

1. COVER SLABS SHALL BE INSTALLED TO THE CUTOFF DRAINS AS PER THE INSTRUCTION OF THE ENGINEER IN NECESSARY LOCATIONS ACCORDING TO THE SITE CONDITIONS.



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 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

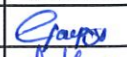




DESIGNER  
  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

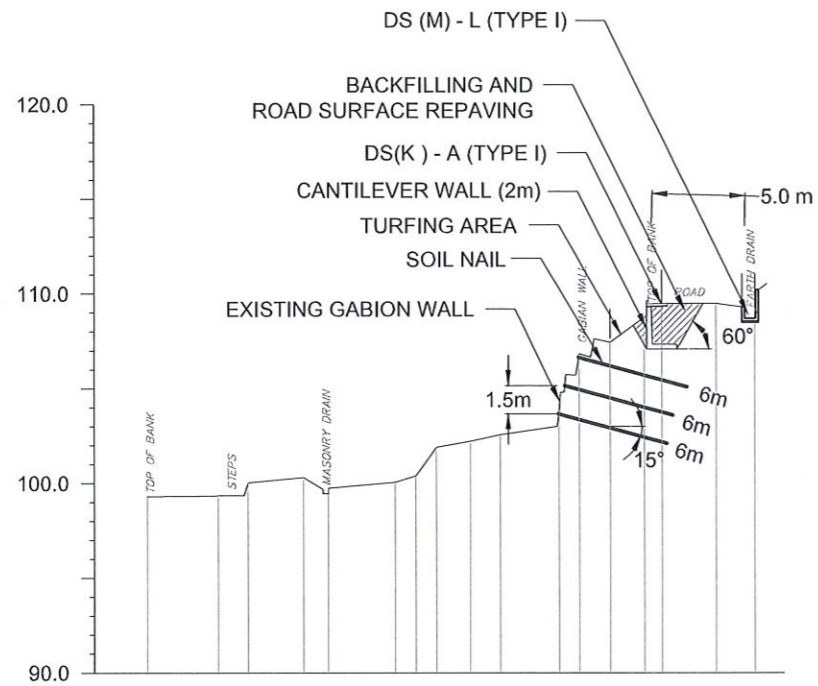
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 LIYANWALA MAHA VIDYALAYA

TITLE  
 DESIGN PLAN VIEW

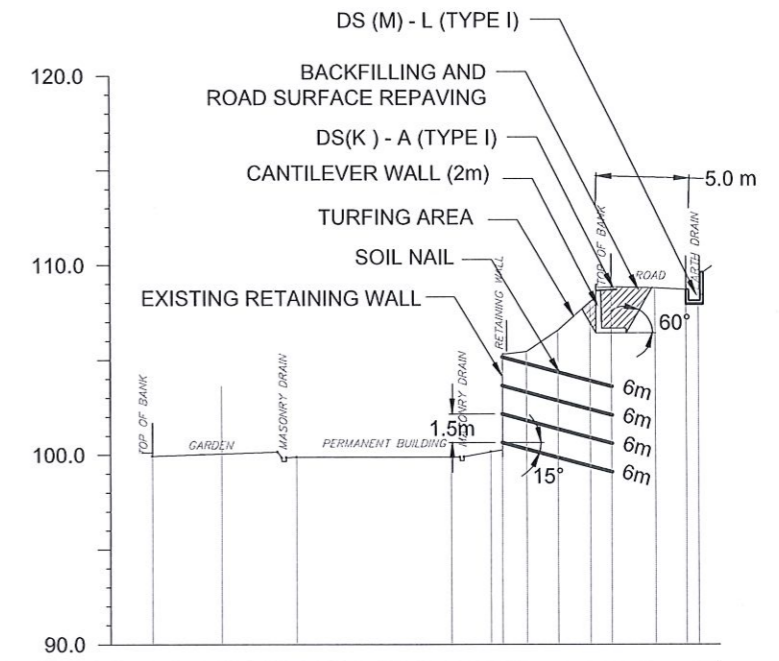
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 PROJECT / DRAWING No. RLVMP/WORKS/NCB/PHI/103-LI/DR-03

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	



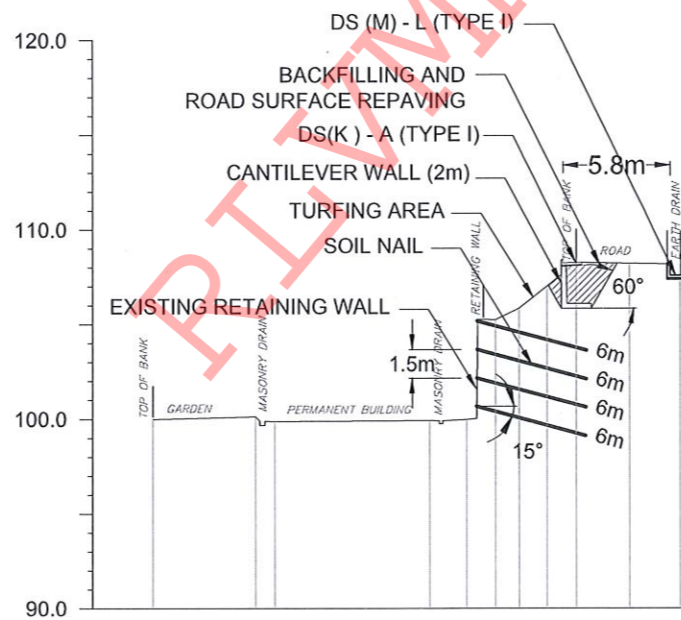
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DISTANCE (m)	32.38	28.59	26.97	24.01	22.69	19.18	18.07	16.99	15.18	13.58	10.46	9.37	7.72	5.90	4.96	2.08	0.00

CS - A01




GROUND LEVEL (m)	99.927	99.881	99.881	109.355	105.439	106.549	108.058	108.839	108.787	108.704
DISTANCE (m)	29.06	21.39	13.13	10.38	9.10	7.43	5.74	4.64	2.30	0.00

CS - A02



GROUND LEVEL (m)	99.992	100.134	99.881	99.881	99.975	105.248	105.846	107.008	108.260	108.198	108.188
DISTANCE (m)	28.06	22.37	21.56	13.31	11.35	9.82	8.57	7.09	5.54	2.70	0.00

CS - A03

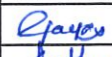
EMPLOYER  
  
**DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA**  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANISATION  
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 COLOMBO - 05

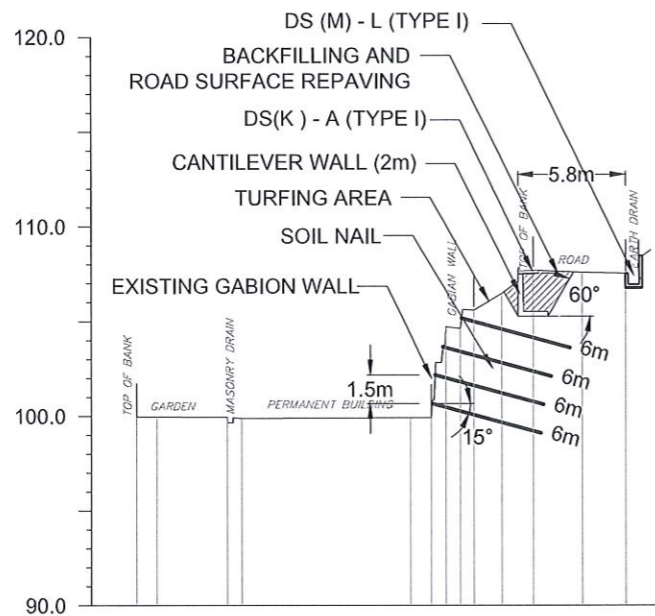
DESIGNER  
  
**DESIGN UNIT**  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 LIYANWALA MAHA VIDYALAYA

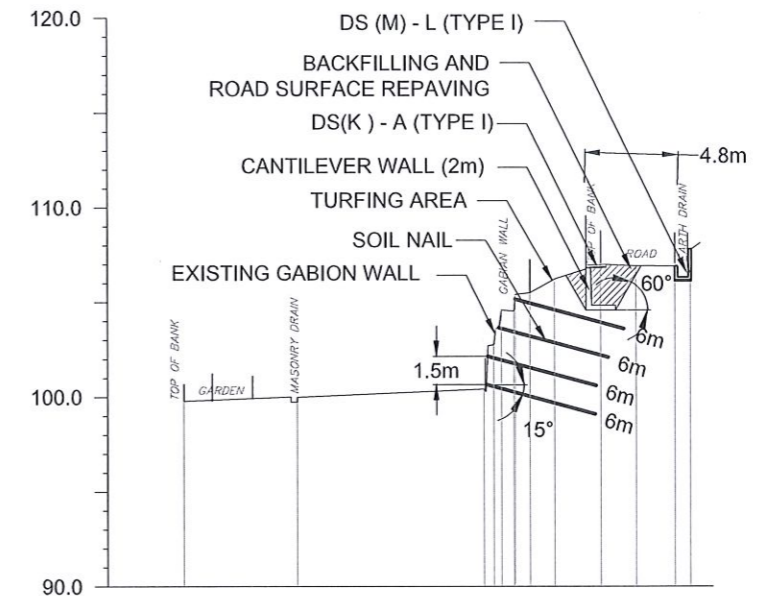
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SCALE	1:500	DATE	25.05.2022
PROJECT / DRAWING No.	RLVMP/WORKS/NCB/PHII/103-LI/DR-04a	REVISION	00

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)	99.958	99.953	99.881	102.824	105.577	106.462	107.692	107.581	107.540
DISTANCE (m)	26.67	21.06	12.13	10.79	8.47	7.28	5.60	2.97	0.66


CS - A04



GROUND LEVEL (m)	99.786	99.986	109.419	105.498	106.223	107.006	106.918	106.802	106.802
DISTANCE (m)	26.93	20.93	11.91	9.32	8.55	7.24	4.77	2.89	0.88

CS - A05

RLVMMP


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 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

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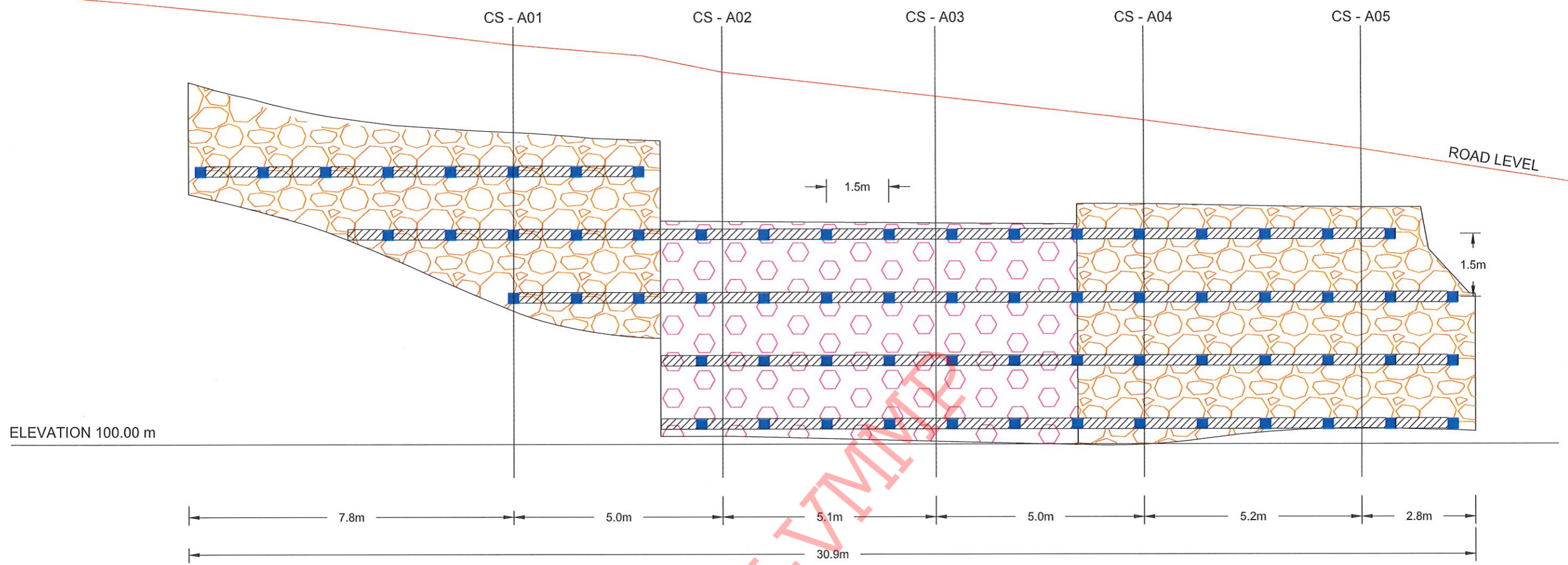
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 LIYANWALA MAHA VIDYALAYA

TITLE		DESCRIPTION	
DESIGN CROSS SECTION		DRAWN	
DESIGNER		DESIGNER	
CHECKED		CHECKED	
RECOMMENDED		RECOMMENDED	
APPROVED		APPROVED	

NAME	SIGNATURE
S.A.G.D. SENANAYAKA	
D.M.D.T. DASANAYAKA	
B.I. KUMARAGE	
Prof. S.A.S. KULATHILAKA	
K.N. BANDARA	

SCALE	1:500	DATE	25.05.2022
PROJECT / DRAWING No.	RLVMMP/WORKS/NCB/PH11/103-LI/DR-04b	REVISION	00



FRONT ELEVATION OF SOIL NAILING AREA

LEGEND

- SOIL NAIL ING - TOTAL NAILING LENGTH = 06 m  
NO'S OF NAILS = 67  
REBAR DIAMETER = 32mm  
DIAMETER OF THE BOREHOLE = 125mm
- GABION WALL FACE
- RETAINING WALL FACE
- GRID BEAMS CONNECTING SOIL NAILS ON THE WALL FACE

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

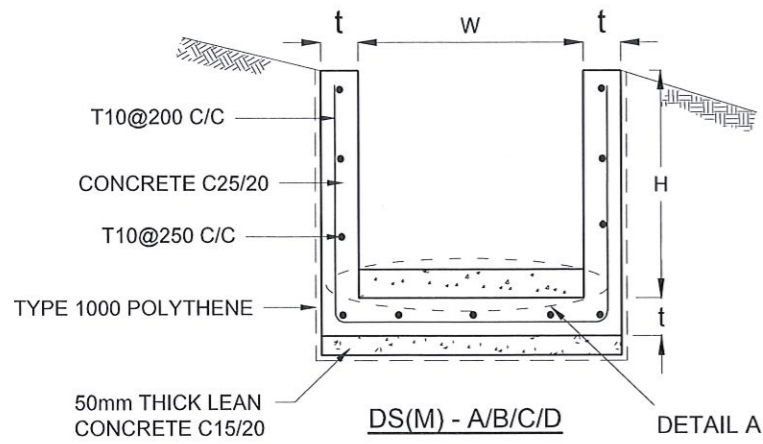
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 LIYANWALA MAHA VIDYALAYA

TITLE  
 FRONT ELEVATION

SCALE 1:100 DATE 25.05.2022  
 PROJECT / DRAWING No. RLVMP/WORKS/NCB/PHII/103-LI/DR-05 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	



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**

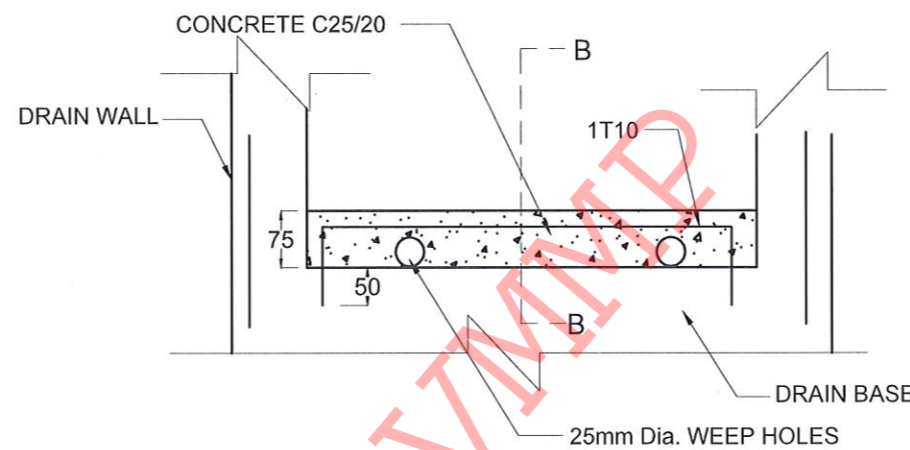
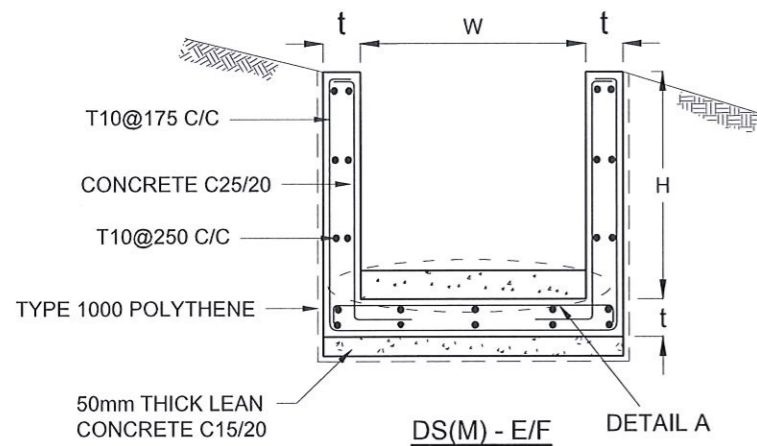
- DEPTH OF EXCAVATION MAY VARY ACCORDING TO SITE CONDITIONS.
- STEPS SHALL BE CONSTRUCTED AT SURFACE DRAIN ON SLOPING GROUND ACCORDING TO THE SITE CONDITIONS AS INSTRUCTED BY THE ENGINEER.
- ENERGY BREAKERS SHALL BE CONSTRUCTED AT THE STEEP DRAIN SEGMENTS AS PER THE INSTRUCTIONS OF THE ENGINEER.
- DOWELS 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**

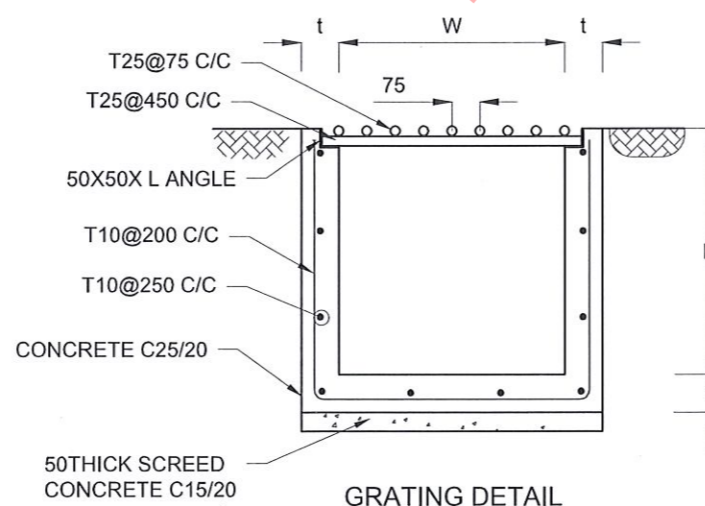
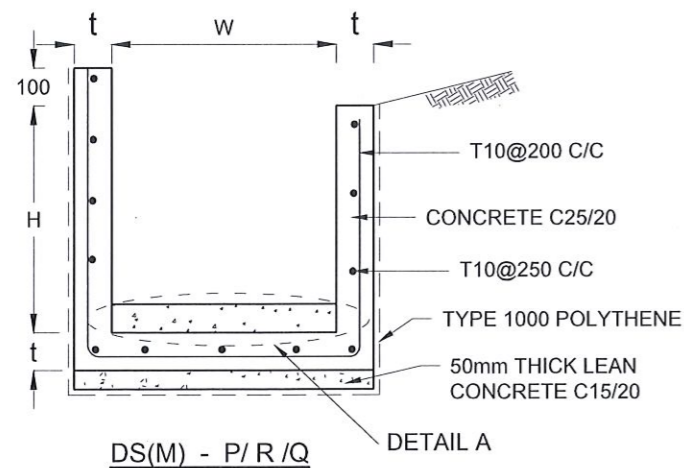
- USE FOLLOWING CONCRETE GRADES FOR STRUCTURE
  - [a] SCREED - C. 15/20
  - [b] WALLS / BASE / ENERGY BREAKERS - C. 25/20

**REINFORCEMENT**

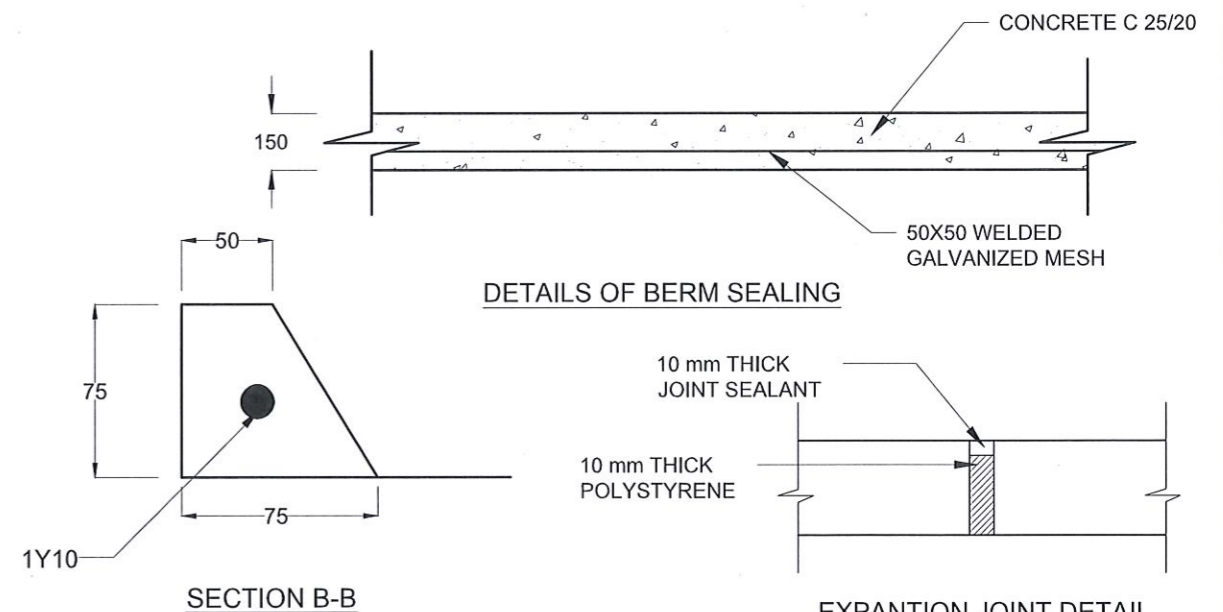
- ALL BARS MARKED "T" SHALL BE HIGH YIELD DEFORMED BARS OF YIELD STRENGTH NOT LESS THAN 460N/mm<sup>2</sup>.
- BARS OF CUT LENGTH LARGER THAN THE SUPPLIED LENGTH TO BE LAPPED FOR A LENGTH OF 50 x BAR DIA. AND LAPPING SHOULD BE STAGGERED.
- ANCHORAGE LENGTH SHOULD BE 40X BAR DIA.
- REINFORCEMENT BARS 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  
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 NATIONAL BUILDING RESEARCH ORGANISATION  
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DESIGNER  
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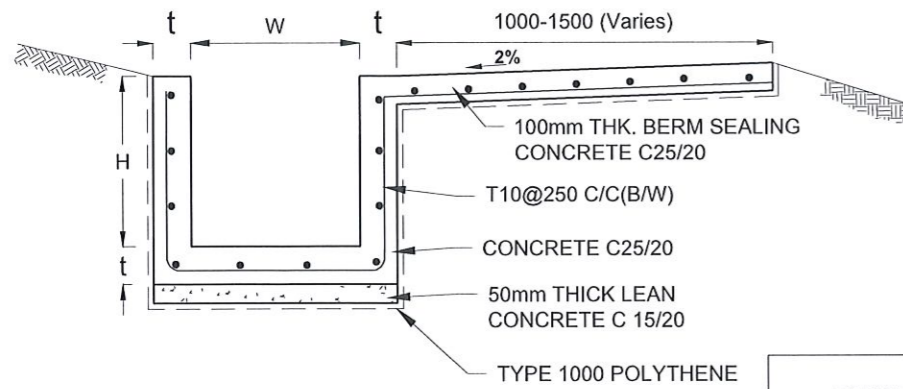
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 LIYANWALA MAHA VIDYALAYA

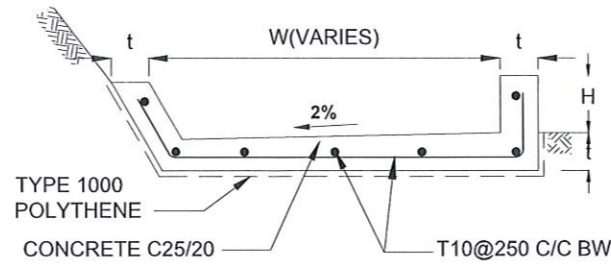
TITLE  
 DETAILS OF DRAINS  
 (SURFACE DRAIN - 1 OF 2)

SCALE	N.T.S	DATE	25.05.2022
PROJECT / DRAWING No.	RLVMP/WORKS/NCB/PHII/103-LI/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.I. KUMARAGE	<i>[Signature]</i>
RECOMMENDED	Prof. S.A.S. KULATHILAKA	<i>[Signature]</i>
APPROVED	K.N. BANDARA	<i>[Signature]</i>



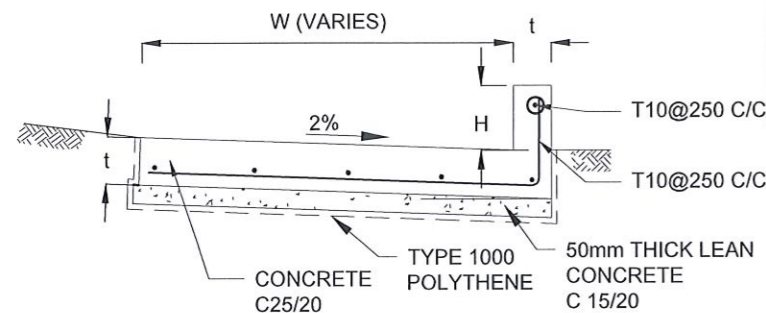
DS (B) - (TYPE I)



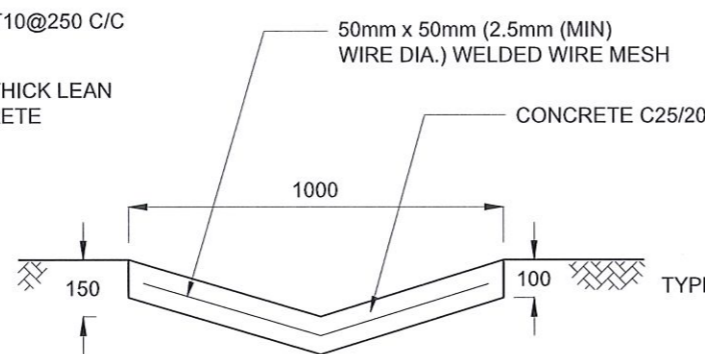
DS (B) - (TYPE II)

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

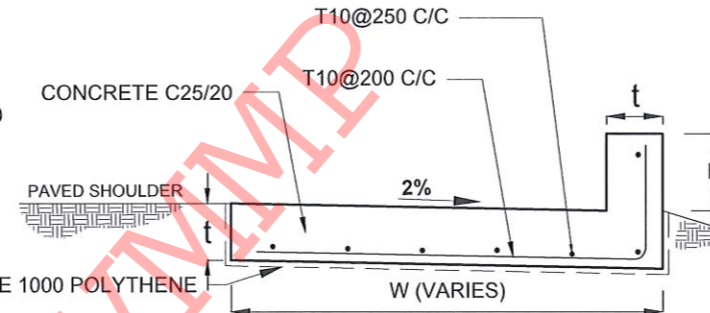
DRAIN TYPE	W (mm)	H (mm)	t (mm)
DS (B) - A	300	300	100
DS (B) - B	450	450	100
DS (B) - C	1000	150	100
DS (B) - D	1500	150	100
DS (B) - E	2000	150	100



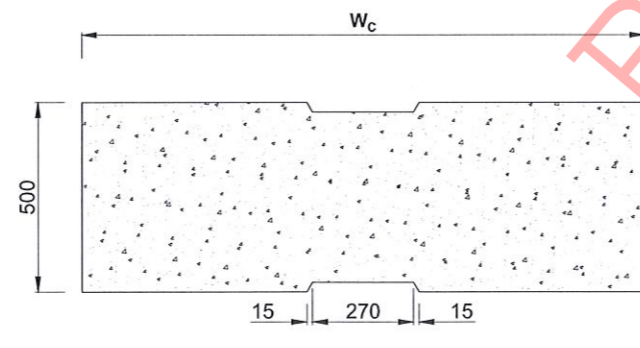
DS (K) - TYPE I



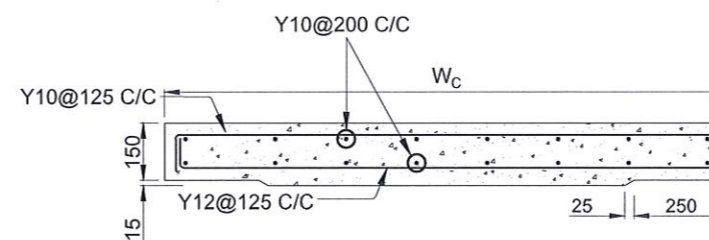
DS (D) - A (DISH DRAIN)



DS (K) - TYPE II



PLAN VIEW OF COVER SLAB



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

DRAIN TYPE	W (mm)	H' (mm)	t (mm)
DS(M) - L	600	600	150
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  
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 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

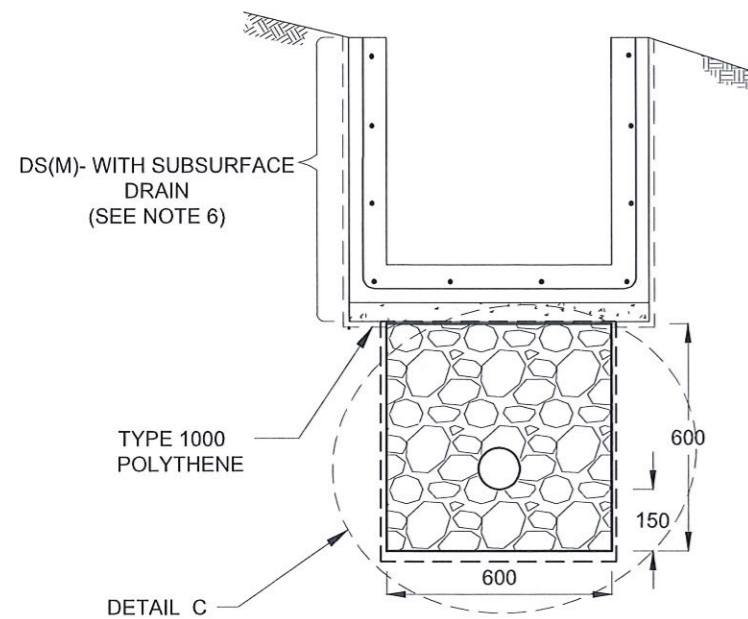
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 LIYANWALA MAHA VIDYALAYA

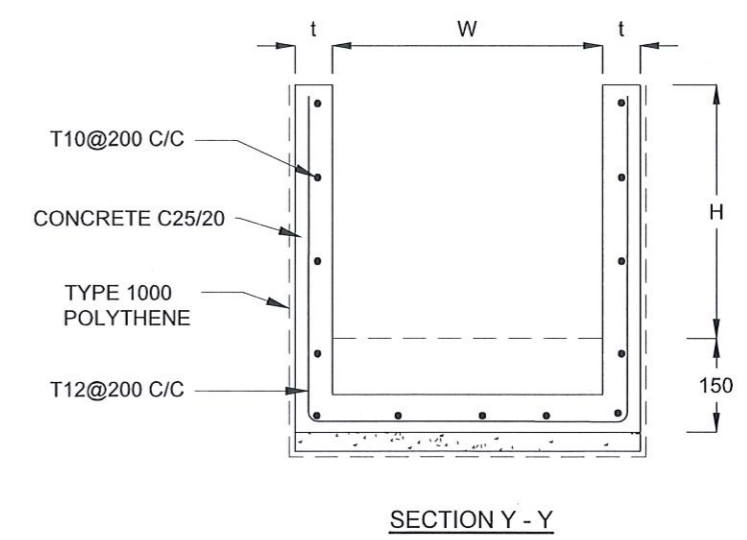
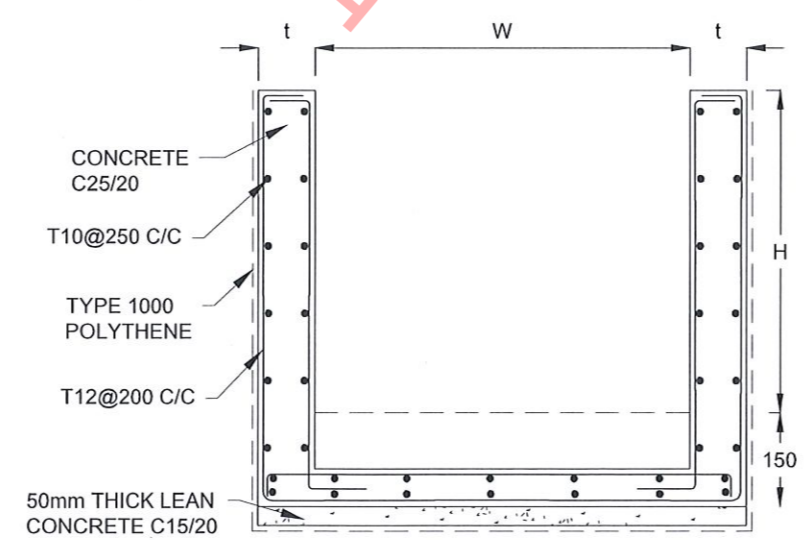
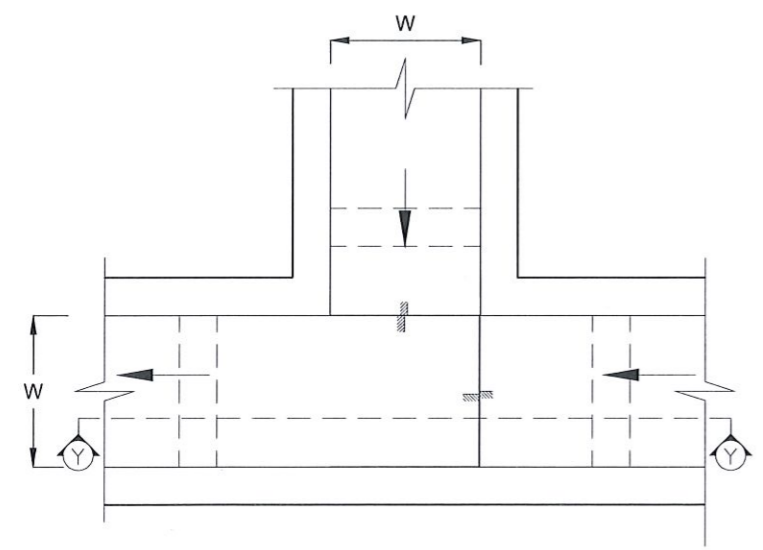
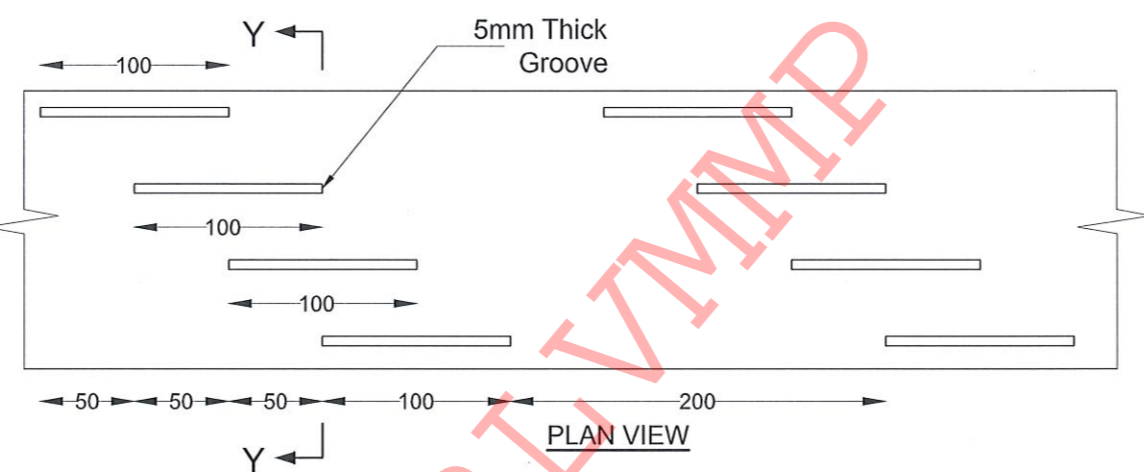
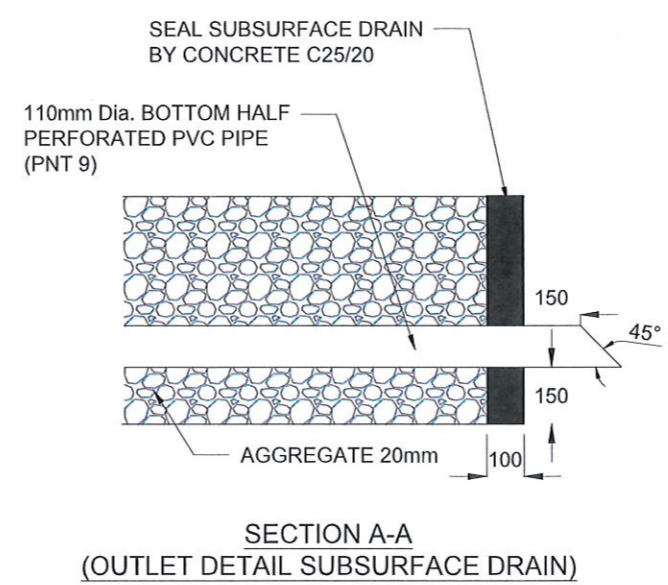
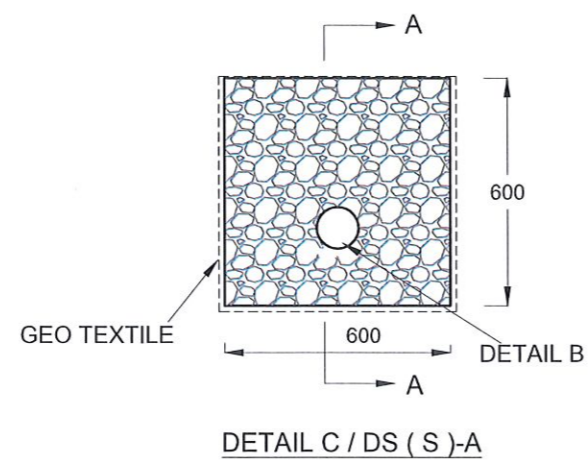
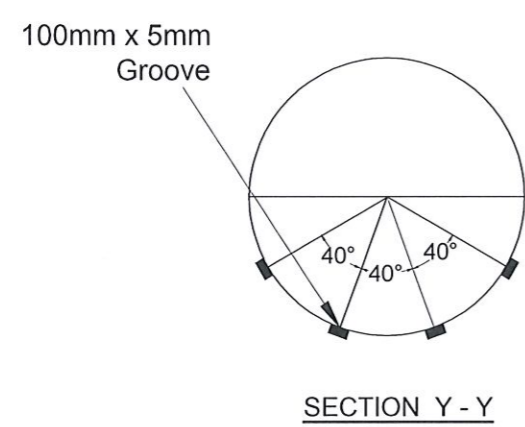
TITLE  
 DETAILS OF DRAINS  
 (SURFACE DRAIN - 2 OF 2)

SCALE | N.T.S | DATE | 25.05.2022  
 PROJECT / DRAWING No. | REVISION | 00  
 RLVMMMP/WORKS/NCB/PHII/103-LI/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]



NOTES

- W,H,t ; SHALL BE THE SAME AS RESPECTIVE DRAIN SECTION.
- CP - R SHALL BE USED WHERE H > = 900mm
- DEPTH OF EXCAVATION MAY VARY 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.
- DETAILS OF SURFACE DRAIN PORTION OF THE SUBSURFACE DRAINS SHALL BE AS PER DS(M), DS(B), DS(K) OR DS(C) SECTIONS ACCORDINGLY.
- 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

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  
 LIYANWALA MAHA VIDYALAYA

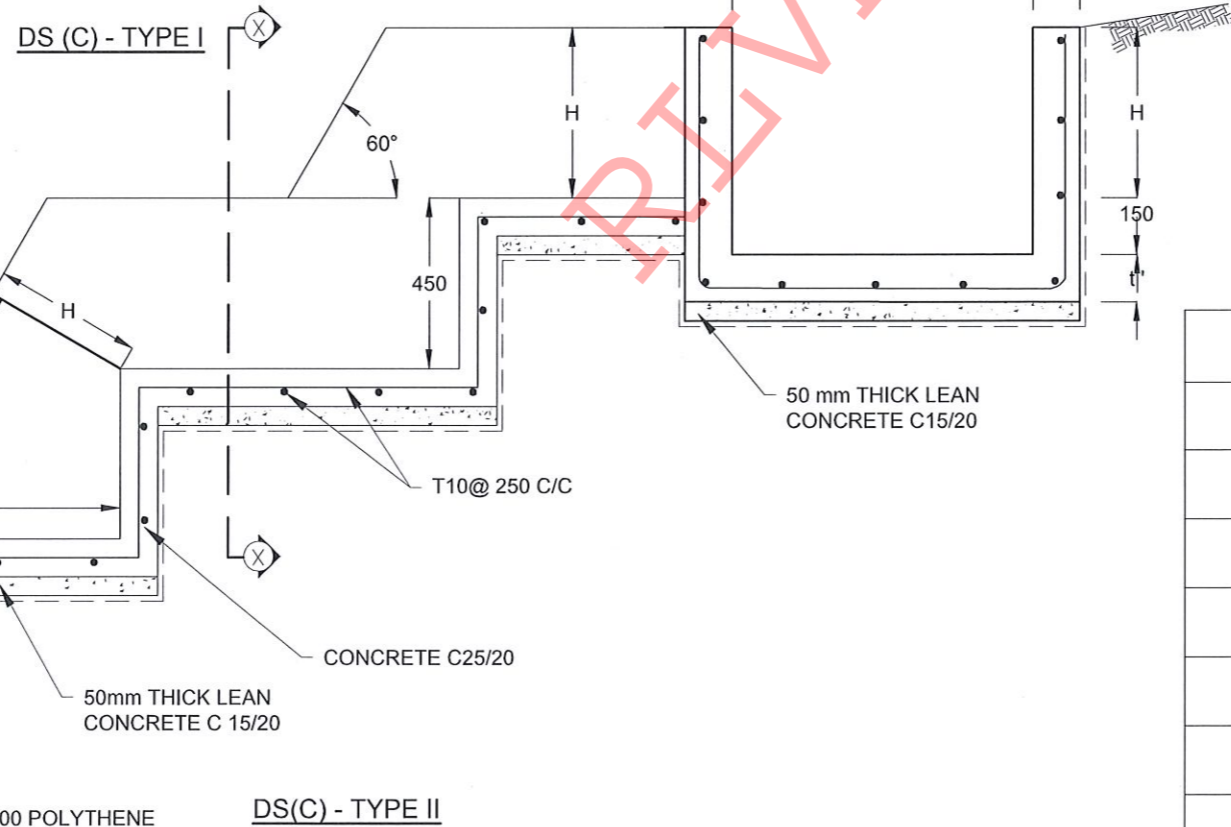
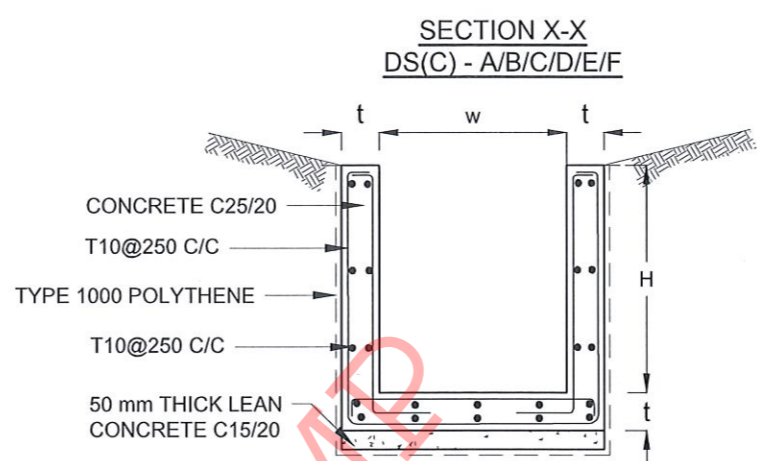
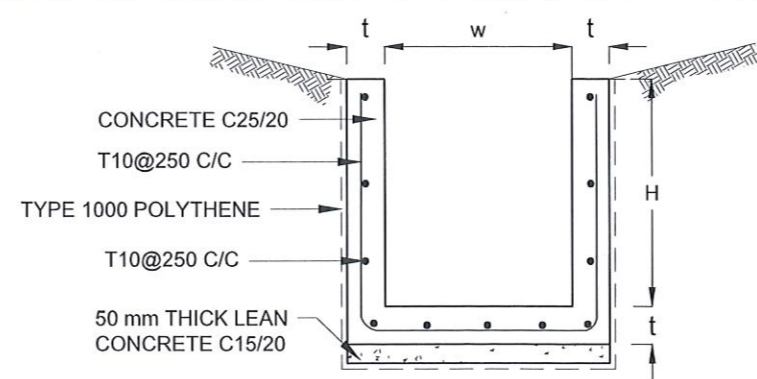
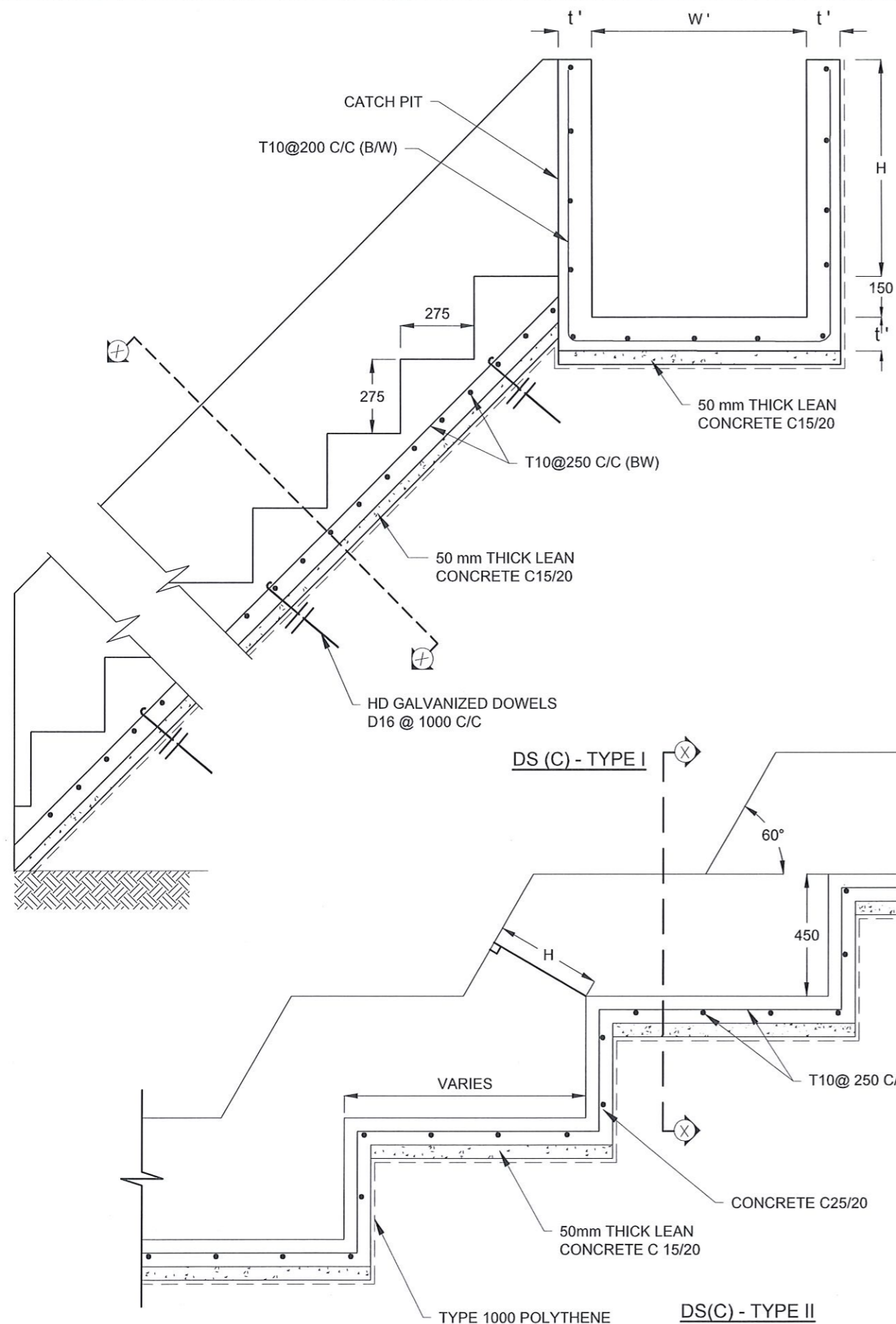
TITLE  
 DETAILS OF DRAINS  
 (SUBSURFACE DRAIN AND CATCHPIT)

SCALE N.T.S  
 PROJECT / DRAWING No. RLVMP/WORKS/NCB/PHII/103-LI/DR-05c

DATE 25.05.2022  
 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>





**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  
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 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
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 No. 99/1, JAWATTA ROAD,  
 COLOMBO - 05

DESIGNER  
 DESIGN UNIT  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
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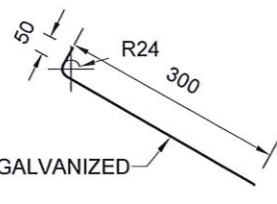
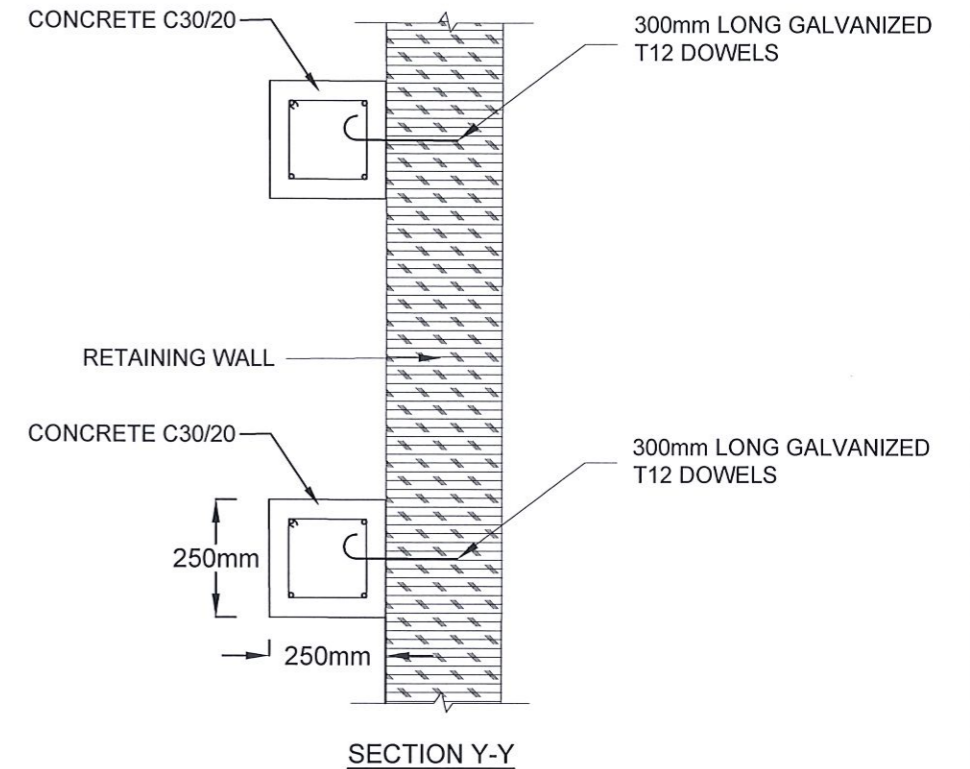
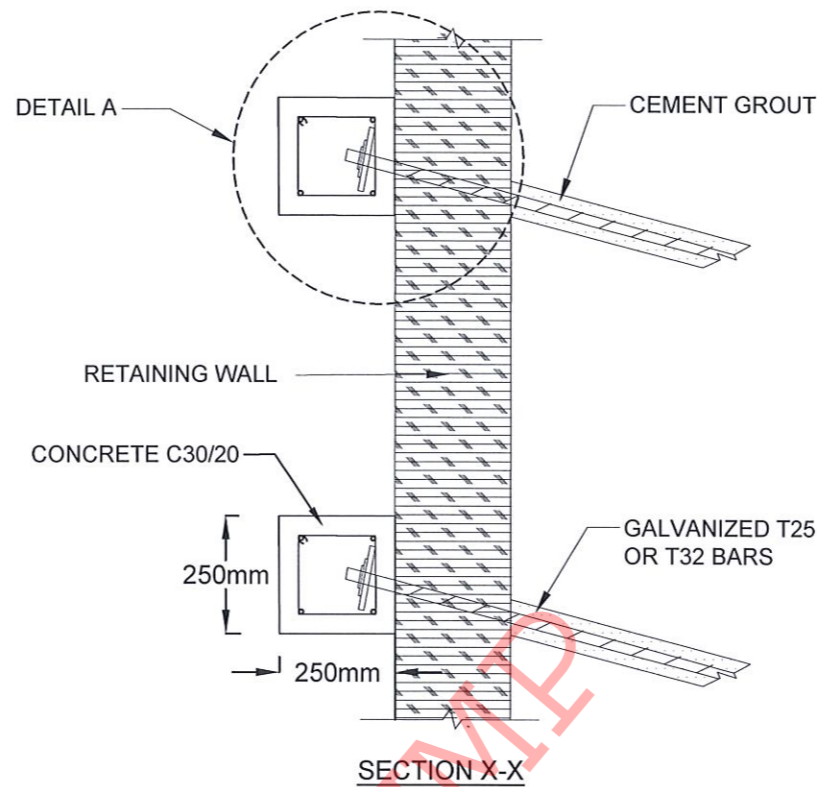
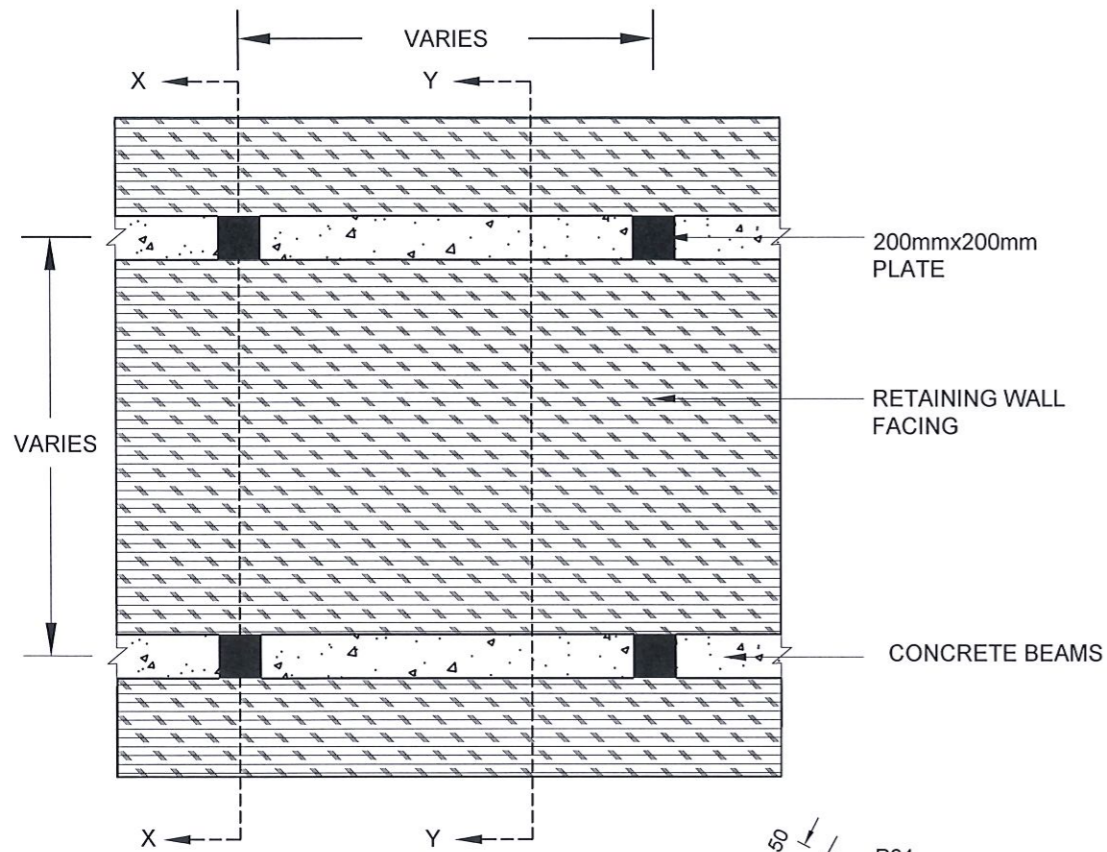
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 LIYANWALA MAHA VIDYALAYA

TITLE  
 DETAILS OF DRAINS  
 (CASCADE DRAIN)

SCALE N.T.S  
 PROJECT / DRAWING No. RLVMMP/WORKS/NCB/PHII/103-LI/DR-05d  
 DATE 25.05.2022  
 REVISION 00

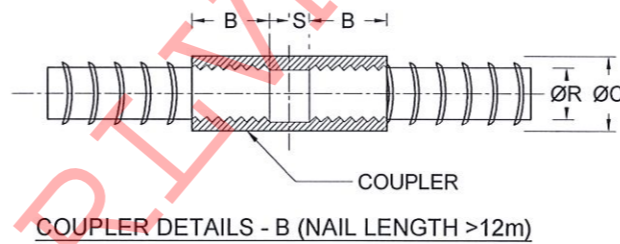
DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	
DESIGNER	D.M.D.T. DASANAYAKA	
CHECKED	B.I. KUMARAGE	
RECOMMENDED	Prof. S.A.S. KULATHILAKA	
APPROVED	K.N. BANDARA	



200X200mm GALVANIZED STEEL PLATE 12mm THICK

WASHER  
NUT  
R8@200 C/C  
4T12

**DETAILS OF T12 DOWELS**

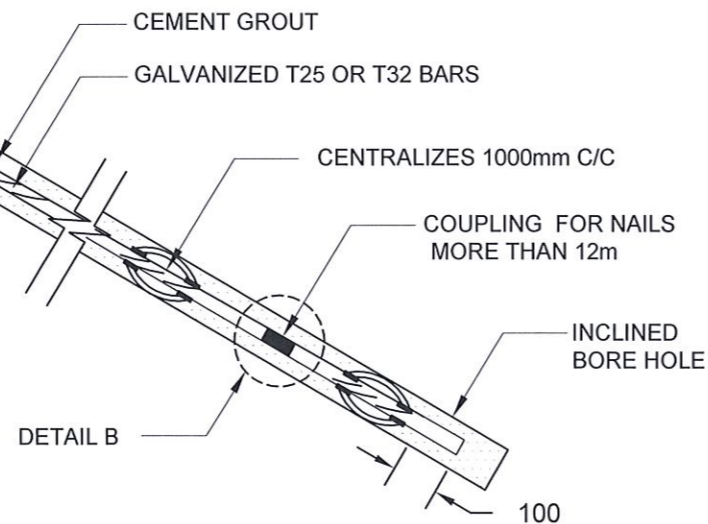


REINFORCEMENT BAR DIAMETER (ØR)	COUPLER OUTER BAR DIAMETER (ØC)	MIN - THREADED LENGTH OF COUPLER (B)	NON - THREADED LENGTH OF COUPLER (S)
25 mm	36 mm	50 mm	2.5 mm
32 mm	46 mm	64 mm	2.5 mm

**NOTES**

- ALL DIMENSIONS ARE IN mm.
- ALL CONSTRUCTIONS SHALL BE AS PER SPECIFICATION
- MINIMUM CLEAR COVER TO R/F - 20mm TO 30mm
- LAP LENGTH FOR R/F BARS 40 x BAR DIA.
- THE BAR COUPLER SHALL ONLY BE USE FOR SOIL NAILING OF MORE THAN 12m LONG UNLESS OTHERWISE SPECIFIED
- 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
- SPACING BETWEEN NAIL HEAD ARE VARIED ACCORDING TO THE GROUND CONDITION
- 300 mm LONG GALVANIZED T12 DOWELS SHALL BE PLACED AT 1m INTERVALS ALONG THE GRID BEAM, IN BETWEEN THE SOIL NAIL LOCATIONS, AS SHOWN IN THE DRAWING
- DRILLING THROUGH EXISTING RETAINING WALL SHALL BE DONE USING CORE CUTTERS UNLESS OTHER METHOD APPROVED BY THE ENGINEER TO AVOID DAMAGES TO THE RETAINING WALL

**DETAIL A**



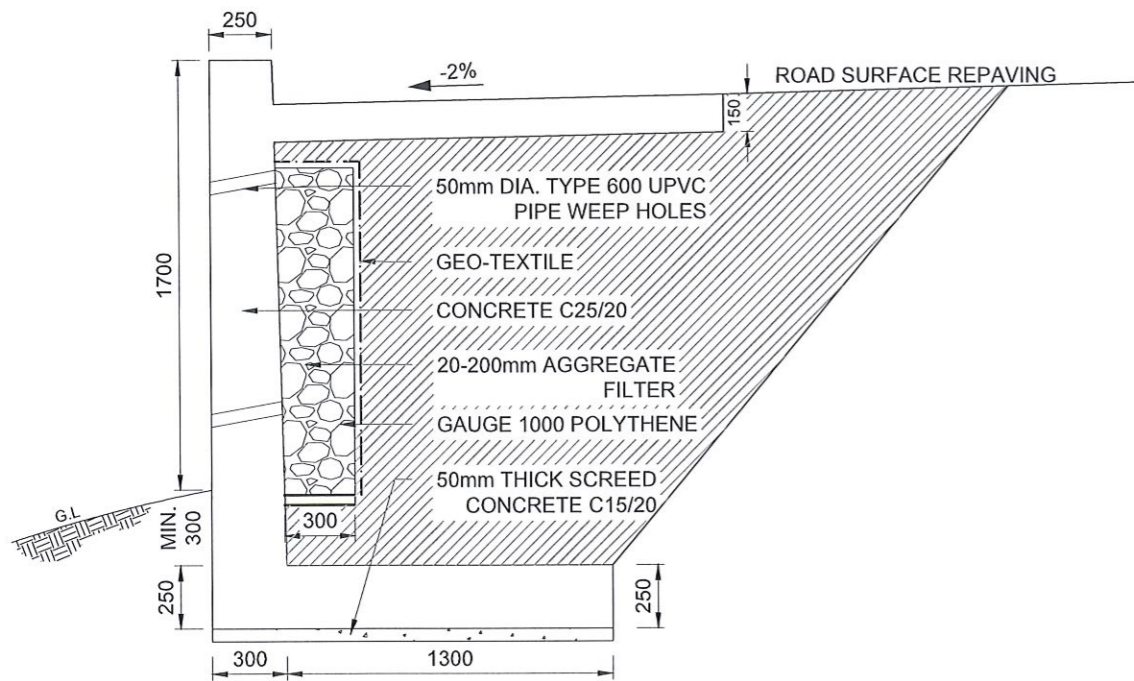
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE
REDUCTION OF LANDSLIDE VULNERABILITY BY MITIGATION MEASURES LIYANWALA MAHA VIDYALAYA

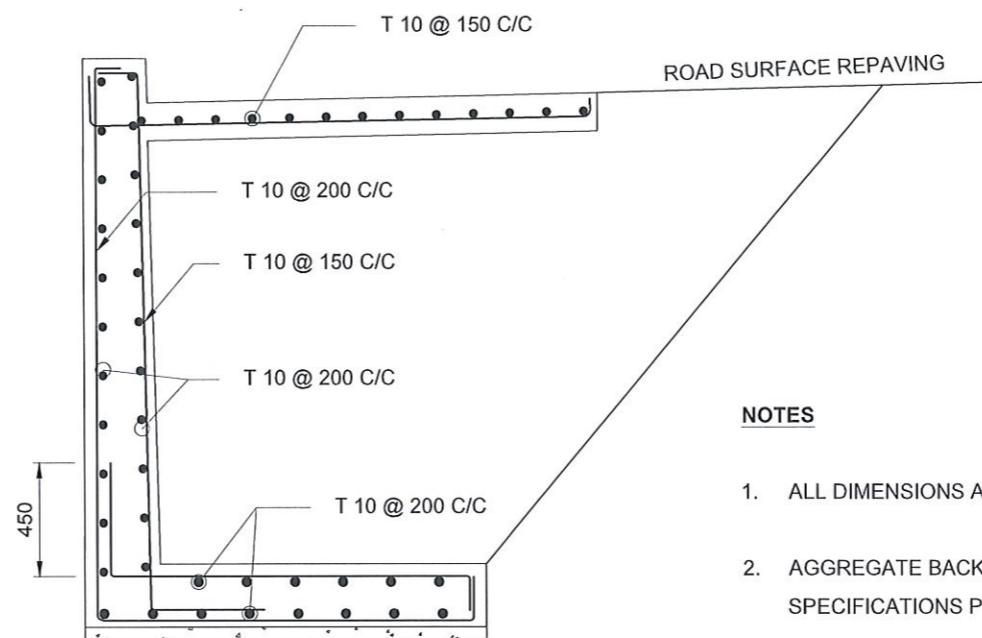
TITLE
DETAILS OF SOIL NAILING THROUGH RETAINING WALL (WITH GRID BEAM)

DESCRIPTION	NAME	SIGNATURE
DRAWN	S.A.G.D. SENANAYAKA	<i>[Signature]</i>
DESIGNED	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>

SCALE	N.T.S.	DATE	25.05.2022
PROJECT / DRAWING No.	RLVMMP/WORKS/NCB/PHII/103-LI/DR-06	REVISION	00



SECTION X - X



REINFORCEMENT DETAIL

**NOTES**

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. AGGREGATE BACKFILL AND GEO-TEXTILE SHOULD BE CONFORMED TO THE SPECIFICATIONS PROVIDED.
3. 50mm DIAMETER WEEP HOLES SHOULD BE PROVIDED IN 1m SPACING BW AND SHOULD BE STAGGERED TO A SLOPE OF 1 : 20.
4. T16, 1000mm LONG DOWELS SHOULD BE PROVIDED AT 1000mm SPACING IN LONGITUDINAL DIRECTION AND AT 600mm SPACING IN TRANSVERSE DIRECTION IF ROCK SURFACE FOUND.

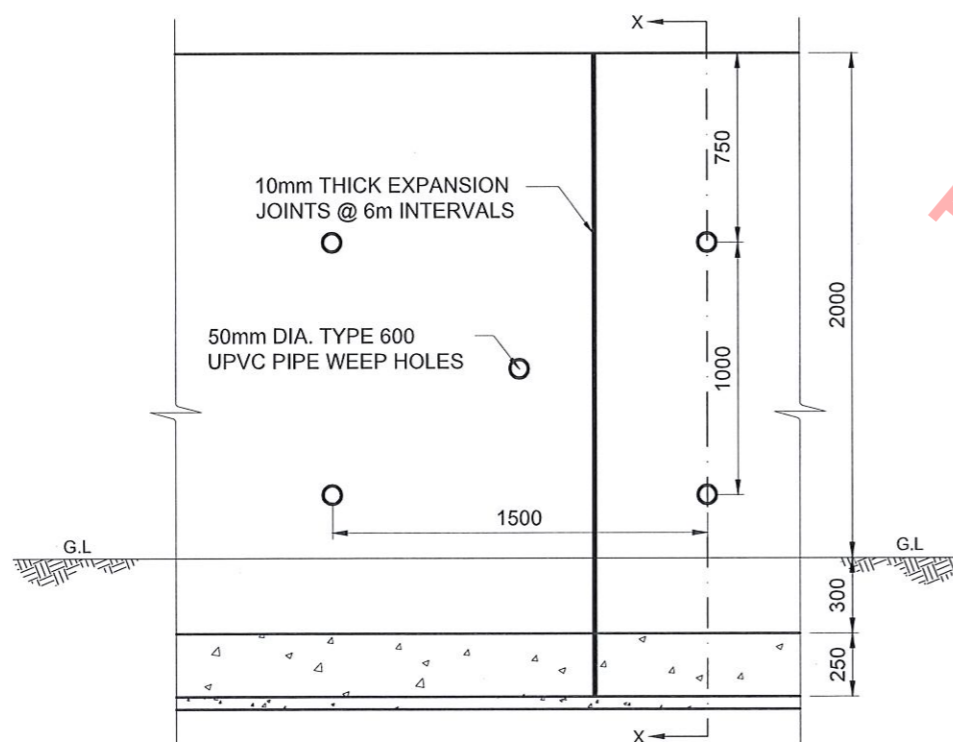
**CONCRETE**

5. USE FOLLOWING CONCRETE GRADES FOR STRUCTURE


- [a] SCREED - C. 15/20
- [b] WALLS / BASE - C. 25/20

**REINFORCEMENT**

6. ALL BARS MARKED "Y" SHALL BE HIGH YIELD DEFORMED BARS OF YIELD STRENGTH NOT LESS THAN 460N/mm<sup>2</sup>.
7. TENSION LAP LENGTH SHOULD BE 52 x BAR DIA. AND COMPRESSION LAP LENGTH SHOULD BE 38 x BAR DIA. LAPPING SHOULD BE STAGGERED.
8. ANCHORAGE LENGTH SHOULD BE 40X BAR DIA.
9. REINFORCEMENT BARS SHALL BE BENT ACCORDANCE WITH STANDARD SPECIFICATIONS.
10. CLEAR CONCRETE COVER FOR THE REINFORCEMENT ABOVE AND BELOW THE GROUND LEVEL SHALL BE 40mm AND 50 mm RESPECTIVELY.
11. 10 mm THICK EXPANSION JOINT SHALL BE INTRODUCE IN EVERY 6m INTERVAL.



FRONT ELEVATION

EMPLOYER  
  
**DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA**  
 MINISTRY OF PUBLIC ADMINISTRATION & DISASTER MANAGEMENT  
 NATIONAL BUILDING RESEARCH ORGANIZATION  
 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  
 LIYANWALA MAHA VIDYALAYA

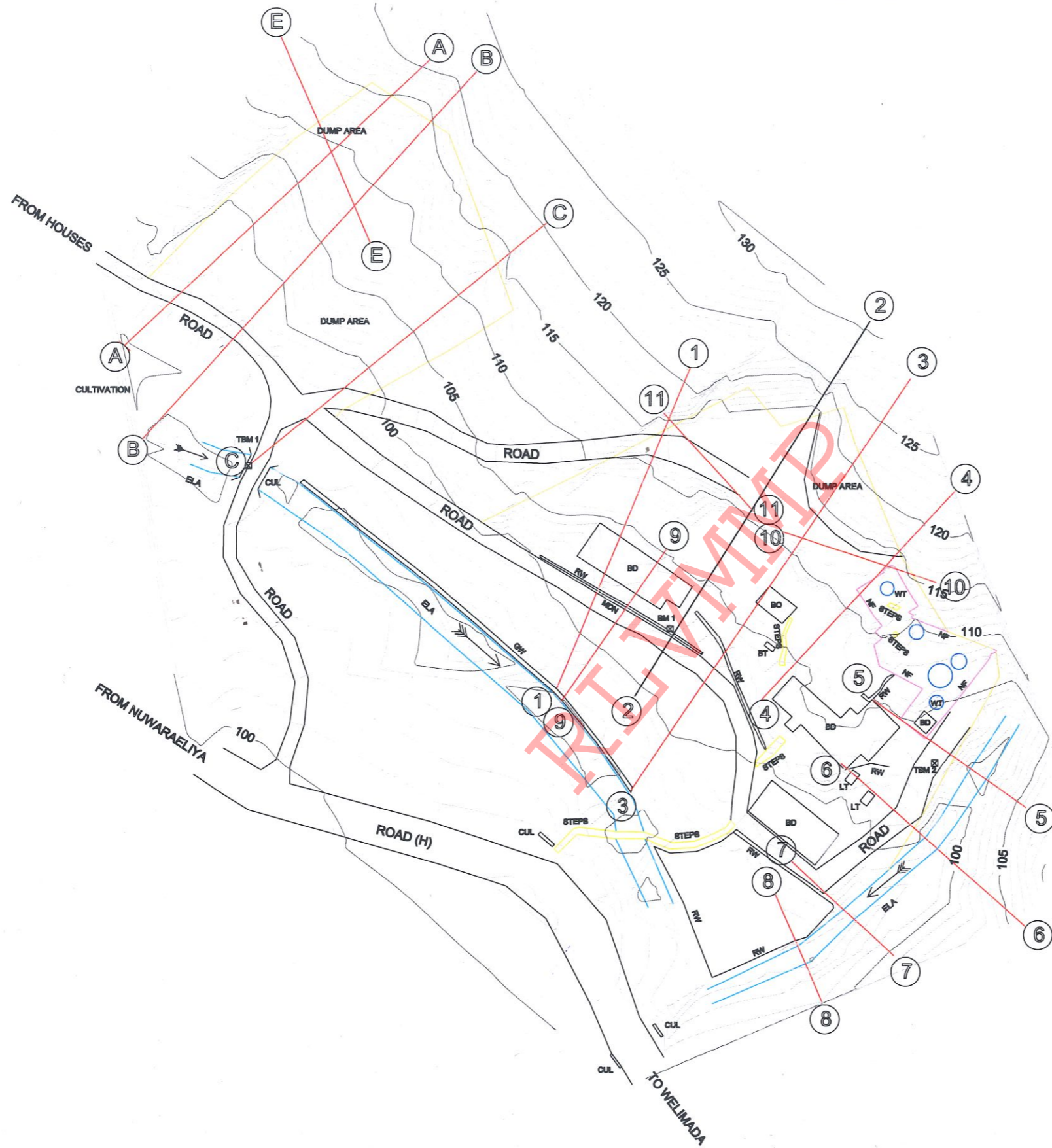
TITLE		DESCRIPTION		NAME		SIGNATURE	
DETAILS OF CANTILEVER WALL		DRAWN	S.A.G.D. SENANAYAKA				
		DESIGNER	D.M.D.T. DASANAYAKA				
		CHECKED	B.I. KUMARAGE				
		RECOMMENDED	Prof. S.A.S. KULATHILAKA				
		APPROVED	K.N. BANDARA				
SCALE	N.T.S.	DATE	25.05.2022	REVISION	00		
PROJECT / DRAWING No.		RLVMP/WORKS/NCB/PHII/103-LI/DR-07					

# SURVEY DRAWINGS

RLVAMP

FLAT PLAN OF SEETHA-ELIYA TEMPLE

Site No.42



REFERENCE

- BD - BUILDING
- BM - BENCH MARK
- BO - BODHIYA
- BT - BELL TOWER
- CUL - CULVERT
- GW - GABION WALL
- LT - LATRINE
- MDN - MASONRY DRAIN
- NF - NET FENCE
- ROAD(H) - ROAD(HIGHWAYS)
- RW - RETAINING WALL
- TBM - TEMPORARY BENCH MARK

NOTE : HEIGHTS ARE BASED ON ARBITRARY DATUM

REFERENCE HEIGHT POINT(TBM) WAS MARKED ON GROUND AND ELEVATION WAS MENTIONED BELOW.

BENCH MARK HEIGHTS

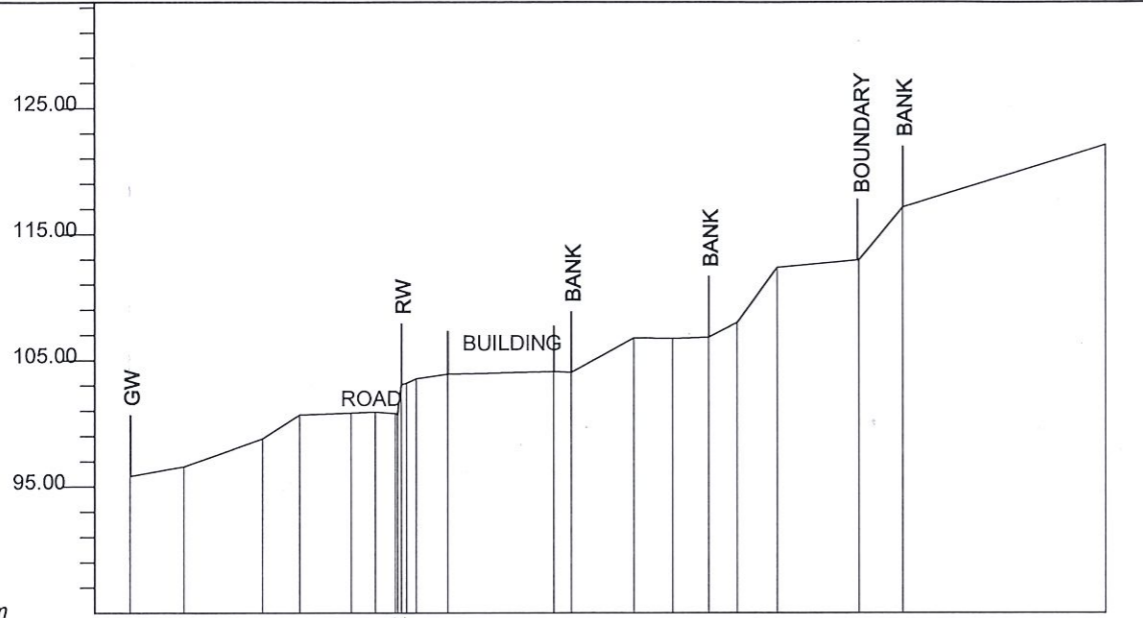
- BM 1 - 103.226
- TBM 1 - 96.225
- TBM 2 - 104.456

REV	DATE	REVISION DESCRIPTION	APPROVAL

TITLE	
CONTOUR SURVEY PLAN	
SCALE	DATE
1:1000	19-04-2022
PROJECT / DRAWING No.	REVISION
RLVMP/WORKS/NCB/06/42/DR - 01	00

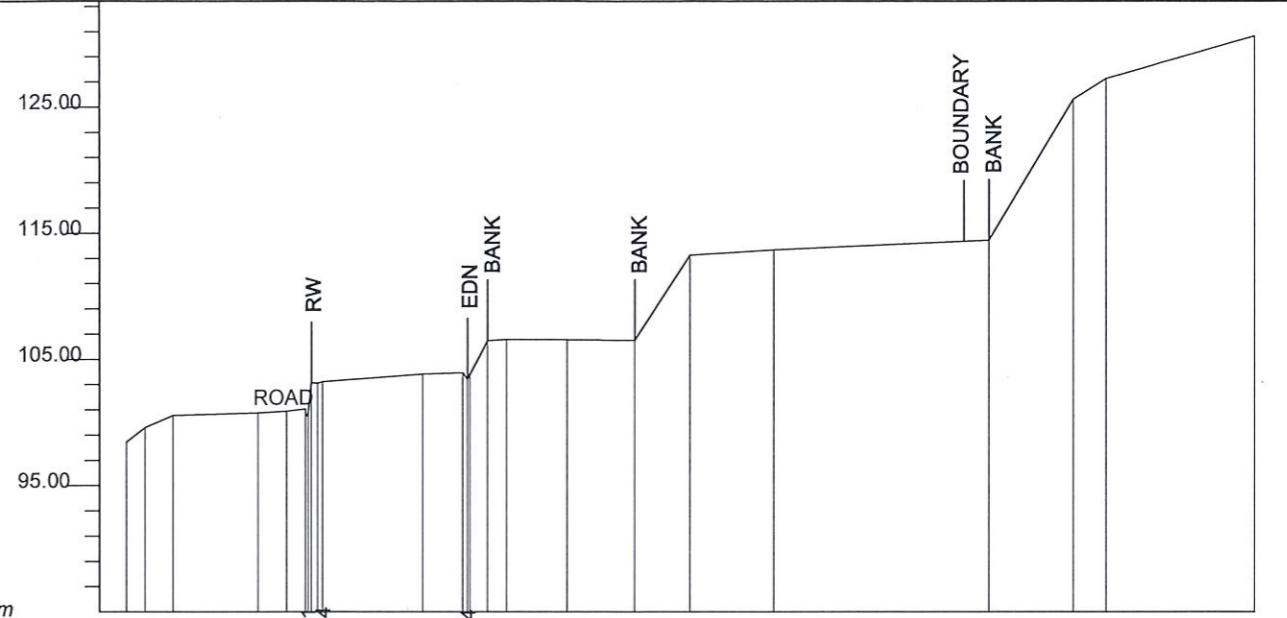
DESCRIPTION	NAME
SURVEYED	
DRAWN	
CHECKED	<i>H.R. Udugama</i>





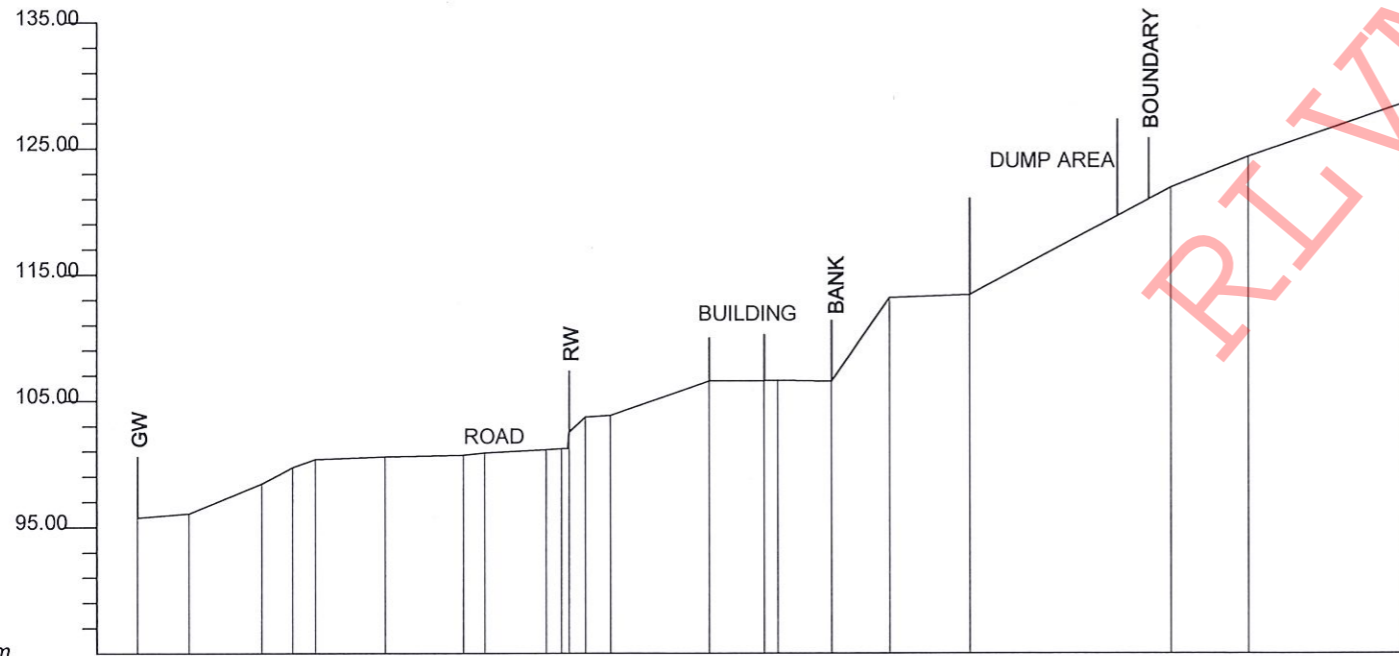
DATUM 85 m	
GROUND LEVEL (m)	95.84 96.60 98.82 100.71 100.86 100.92 103.56 103.92 104.12 104.04 106.80 106.75 106.84 108.01 112.37 112.97 117.16 122.10
DISTANCE (m)	0.0 4.3 10.6 13.6 17.7 19.6 22.9 25.4 33.8 35.2 40.2 43.3 46.2 48.5 51.7 58.2 61.7 77.8

SECTION 1-1



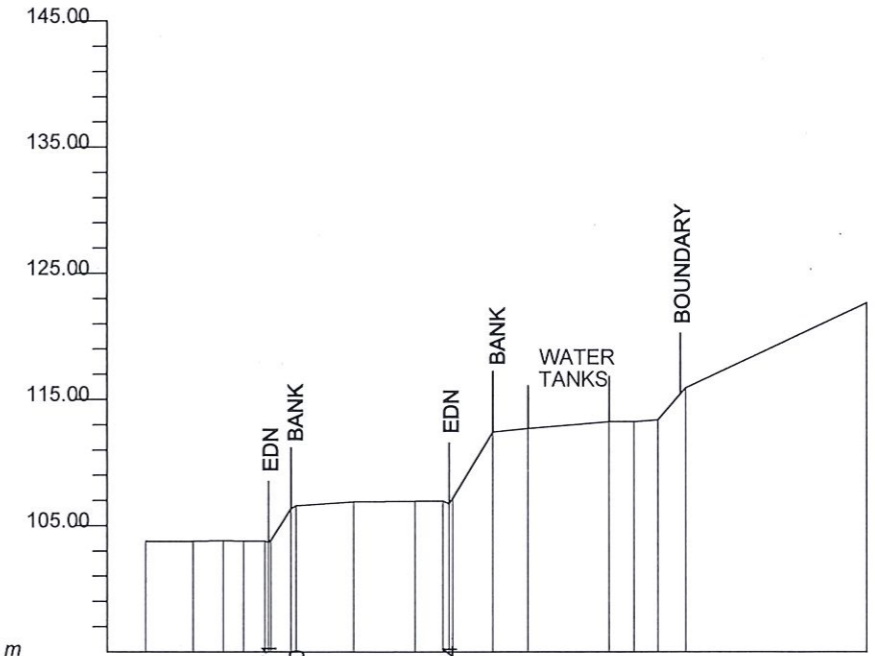
DATUM 85 m	
GROUND LEVEL (m)	98.47 99.61 100.57 100.78 100.91 100.95 103.86 103.84 105.50 106.60 106.57 106.51 113.28 113.70 114.47 125.65 127.28 130.65
DISTANCE (m)	0.0 1.5 3.7 10.4 12.7 14.1 15.7 23.6 26.7 28.8 30.3 35.1 40.5 44.9 51.6 68.8 75.5 78.1 89.9

SECTION 2-2



DATUM 85 m	
GROUND LEVEL (m)	95.75 96.09 98.44 99.75 100.39 100.59 100.72 100.88 101.15 102.54 103.73 103.86 106.58 106.61 106.54 113.17 113.40 121.90 124.34 128.60
DISTANCE (m)	0.0 4.1 9.9 12.4 14.2 19.8 26.0 27.7 32.6 33.4 35.7 37.7 45.6 50.0 51.1 55.4 60.0 66.4 82.4 88.6 101.1

SECTION 3-3



DATUM 95 m	
GROUND LEVEL (m)	103.74 103.79 103.82 103.79 103.76 106.60 106.90 106.95 107.97 112.43 112.71 113.24 113.24 113.39 115.94 122.66
DISTANCE (m)	0.0 3.8 6.2 7.8 9.5 11.2 16.6 21.5 23.2 27.7 30.5 37.0 39.0 40.9 43.1 57.5

SECTION 4-4

REV	DATE	REVISION DESCRIPTION	APPROVAL

TITLE		
EXISTING CROSS SECTIONS		
SCALE	1:600	DATE
PROJECT / DRAWING No.	RLVMMP/WORKS/NCB/06/42/DR - 02b	REVISION
		00

DESCRIPTION	NAME
SURVEYED	
DRAWN	
CHECKED	H. R. Maduranga


RLVMMP







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

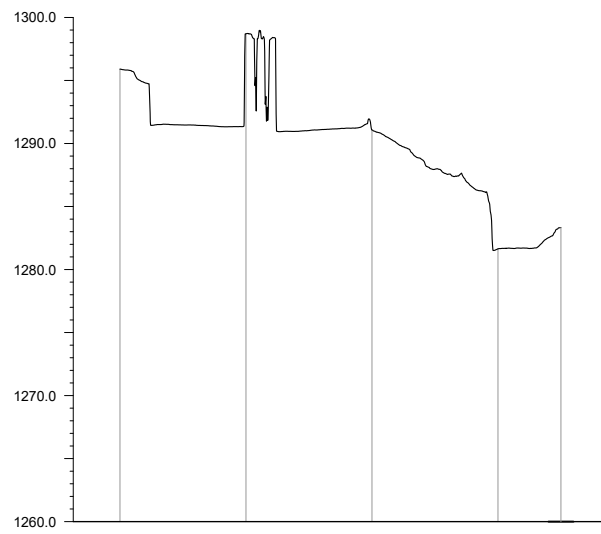
REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 BOSCO COLLEGE - HATTON

TITLE

SURVEY PLAN VIEW

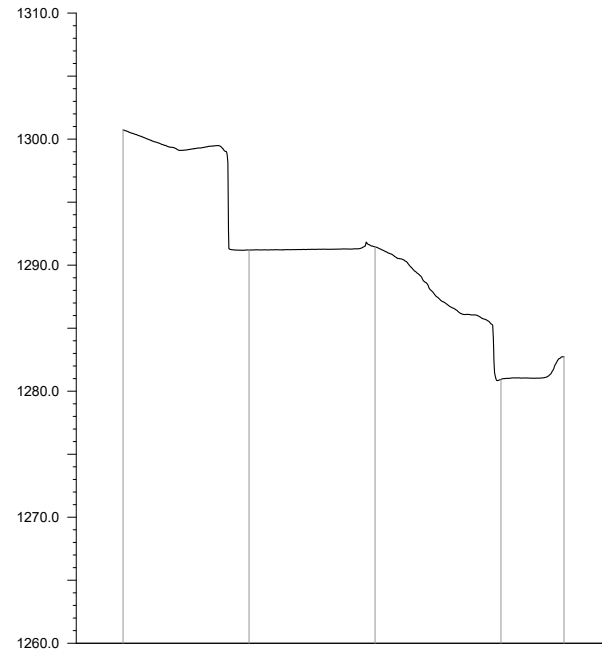
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PROJECT / DRAWING No.	RLVMP/WORKS/NCB/PHII/043-BO/DR-01	REVISION	00

DESCRIPTION	NAME	SIGNATURE
CHECKED	D.M.D.T. DASANAYAKA	



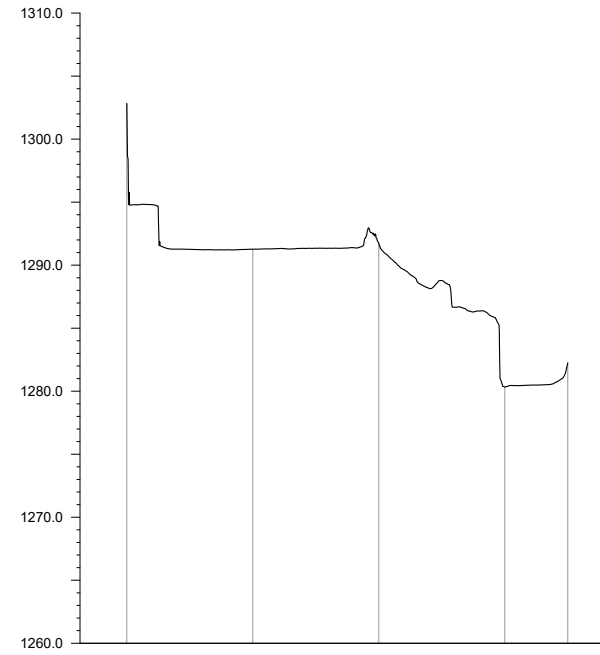
GROUND LEVEL (m)	1295.902	1298.705	1291.076	1281.641	1282.332
DISTANCE (m)	-30.000	-20.000	-10.000	0.000	5.000

CS01



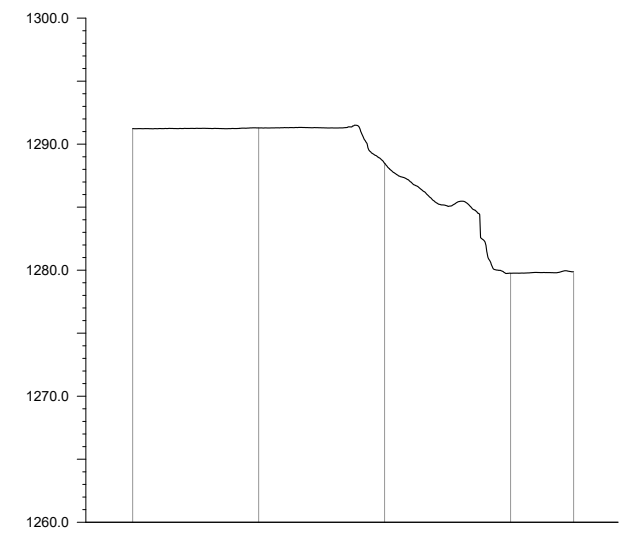
GROUND LEVEL (m)	1300.730	1291.202	1291.454	1280.939	1282.727
DISTANCE (m)	-30.000	-20.000	-10.000	0.000	5.000

CS02



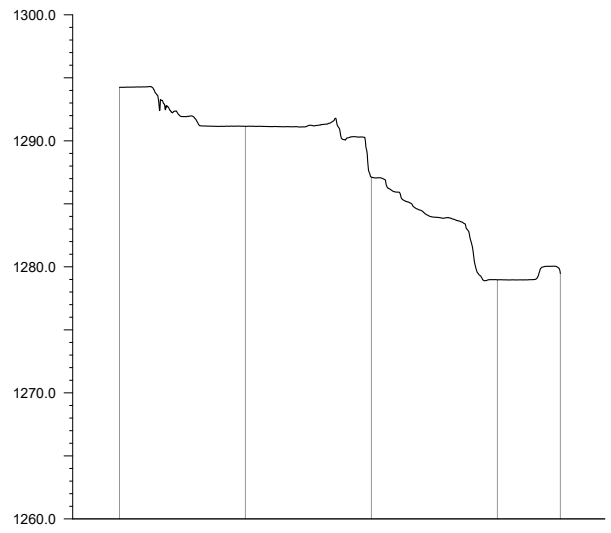
GROUND LEVEL (m)	1302.835	1291.264	1291.713	1280.340	1282.239
DISTANCE (m)	-30.000	-20.000	-10.000	0.000	5.000

CS03



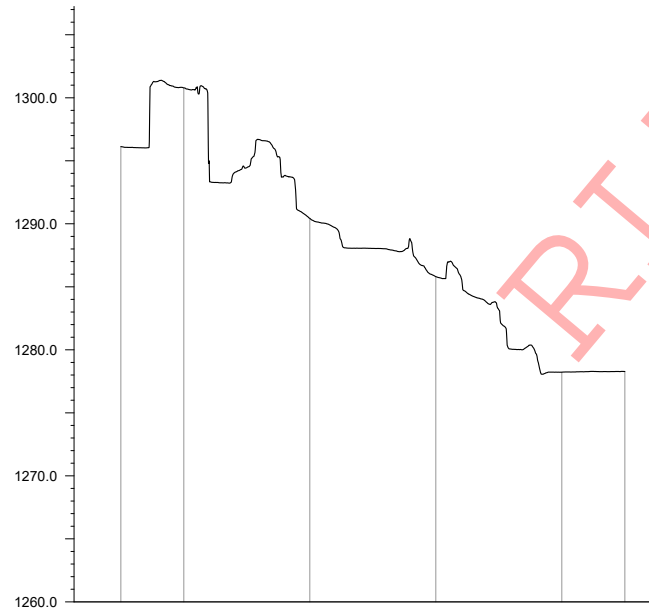
GROUND LEVEL (m)	1291.231	1291.288	1288.435	1279.761	1279.761
DISTANCE (m)	-30.000	-20.000	-10.000	0.000	5.000

CS04



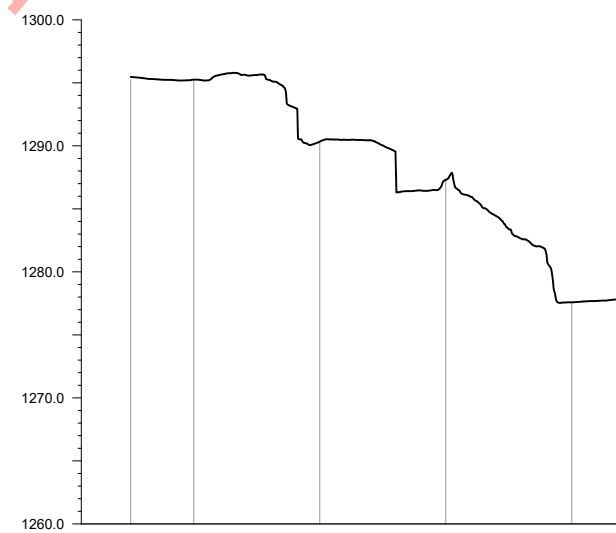
GROUND LEVEL (m)	1294.249	1291.151	1287.110	1278.971	1279.473
DISTANCE (m)	-30.000	-20.000	-10.000	0.000	5.000

CS05



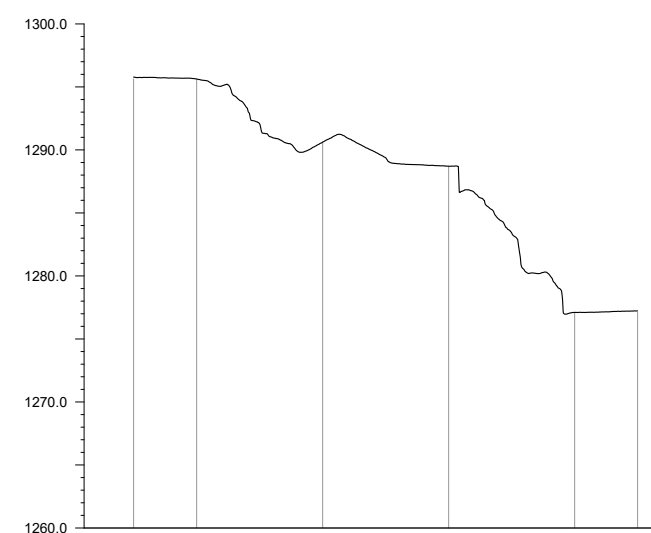
GROUND LEVEL (m)	1286.127	1300.780	1290.431	1285.807	1278.224	1278.281
DISTANCE (m)	-35.000	-30.000	-20.000	-10.000	0.000	5.000

CS06




GROUND LEVEL (m)	1295.255	1295.255	1240.324	1287.305	1277.584	1277.584
DISTANCE (m)	-35.000	-30.000	-20.000	-10.000	0.000	5.000

CS07



GROUND LEVEL (m)	1296.630	1296.630	1290.616	1288.710	1277.106	1277.106
DISTANCE (m)	-35.000	-30.000	-20.000	-10.000	0.000	5.000

CS08

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

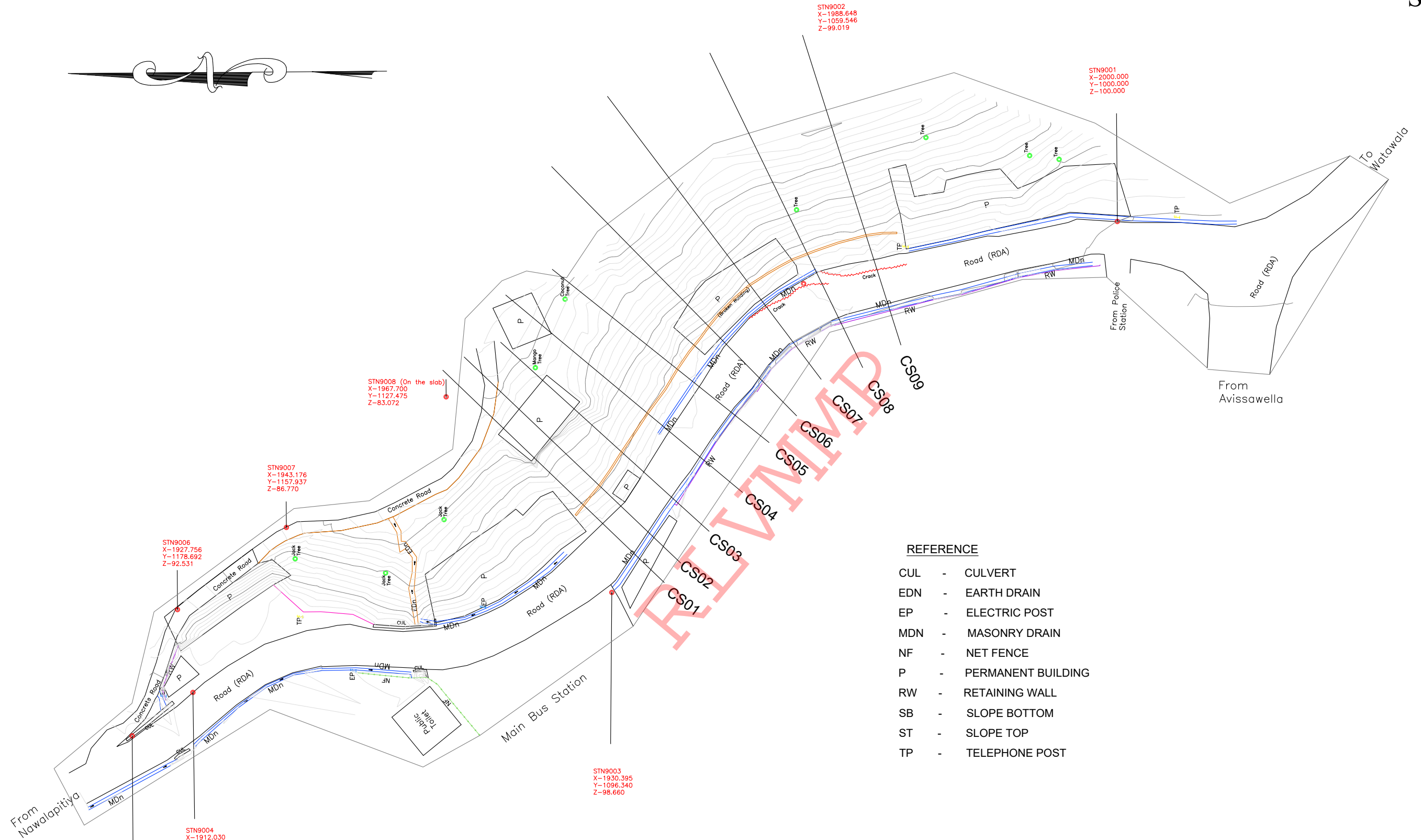
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 BOSCO COLLEGE - HATTON

TITLE  
 SURVEY CROSS SECTION

SCALE	1:750	DATE	11.05.2022
PROJECT / DRAWING No.	RLVMP/WORKS/NCB/PHII/043-BO/DR-02a	REVISION	00

DESCRIPTION	NAME	SIGNATURE
CHECKED	D.M.D.T. DASANAYAKA	




**REFERENCE**

- CUL - CULVERT
- EDN - EARTH DRAIN
- EP - ELECTRIC POST
- MDN - MASONRY DRAIN
- NF - NET FENCE
- P - PERMANENT BUILDING
- RW - RETAINING WALL
- SB - SLOPE BOTTOM
- ST - SLOPE TOP
- TP - TELEPHONE POST

**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

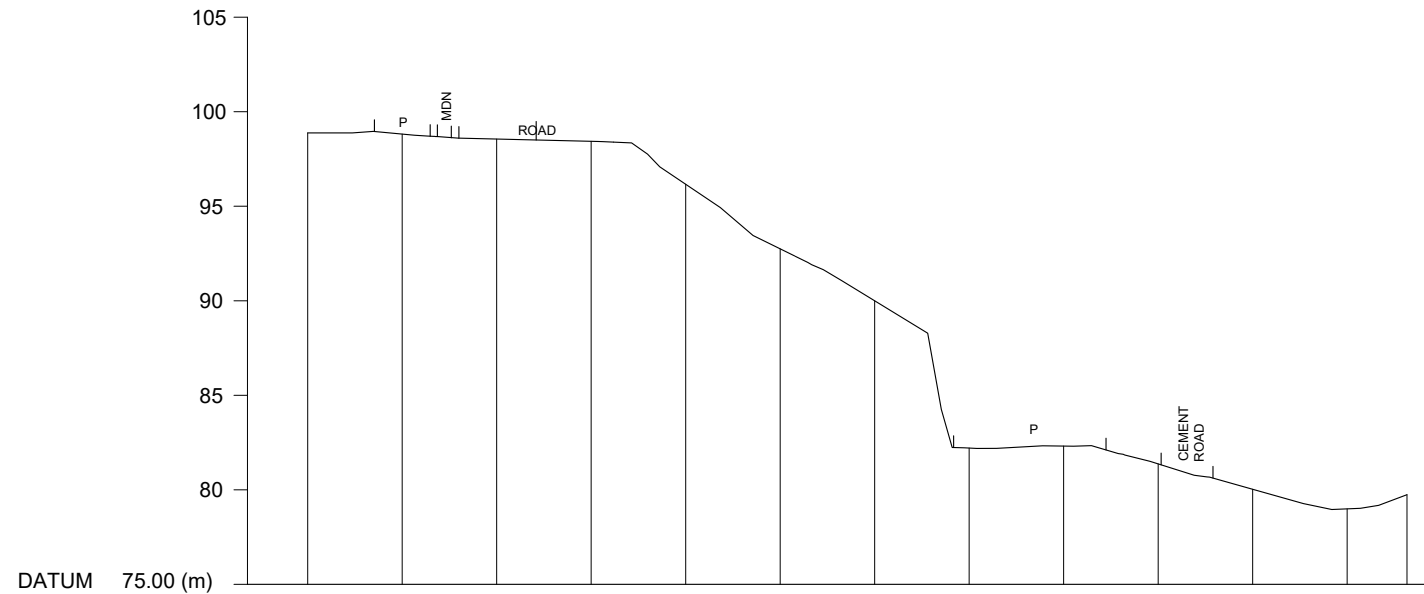
REV	DATE	REVISION DESCRIPTION	APPROVAL

**PROJECT TITLE**

REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 GINIGATHENA TOWN - NUWARAELIYA

TITLE		DATE	
SURVEY PLAN VIEW		20.06.2022	
SCALE	1:750	PROJECT / DRAWING No.	REVISION
		RLVMMP/WORKS/NCB/PHII/044-GI/DR-01	00

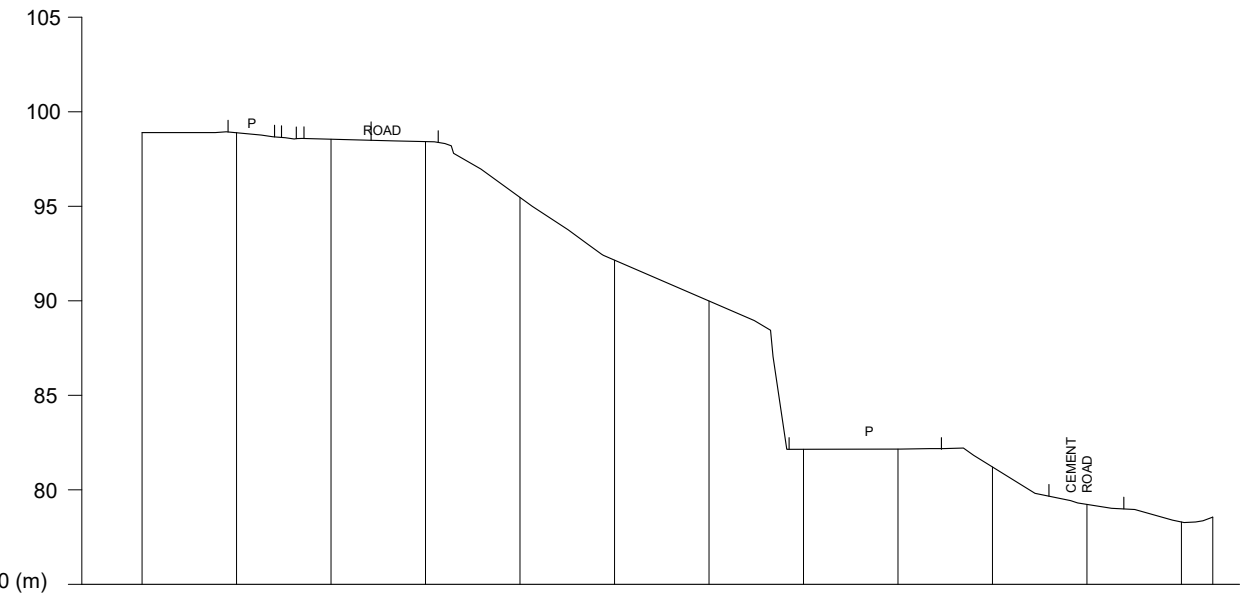
DESCRIPTION	NAME	SIGNATURE
SURVEYED		
CHECKED	M.H.M. HARSHANI	



DATUM 75.00 (m)

GROUND LEVEL (m)	98.88	98.82	98.55	98.43	98.16	92.75	90.00	82.21	82.31	81.37	80.03	78.99	79.74
ELEVATION (m)	00.00	05.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	58.17

CS01

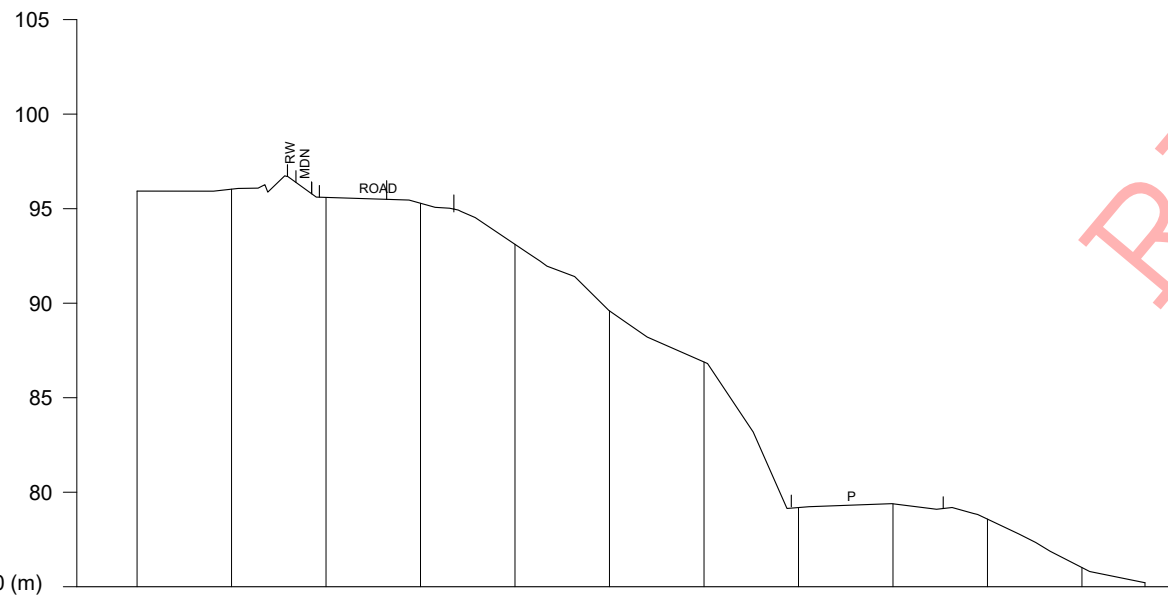


DATUM 75.00 (m)

GROUND LEVEL (m)	98.90	98.90	98.55	98.43	95.47	92.15	89.99	82.14	82.14	81.21	79.23	78.30	78.56
ELEVATION (m)	00.00	05.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	56.65

CS02

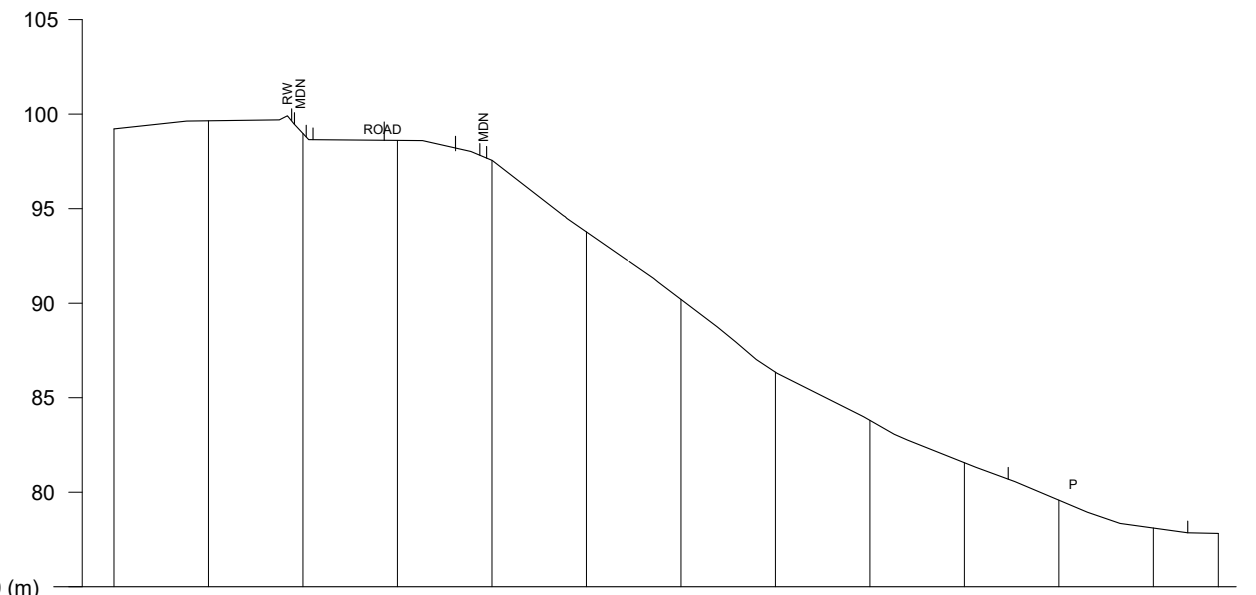
RLVMMP



DATUM 75.00 (m)

GROUND LEVEL (m)	95.93	96.03	95.60	95.29	93.11	89.60	86.89	79.19	79.39	78.58	76.01	75.21
ELEVATION (m)	00.00	05.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	53.33


CS03



DATUM 75.00 (m)

GROUND LEVEL (m)	99.22	99.65	98.98	98.61	97.56	93.77	90.20	86.35	83.80	81.56	79.58	78.10	77.82
ELEVATION (m)	00.00	05.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	58.44

CS04

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

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

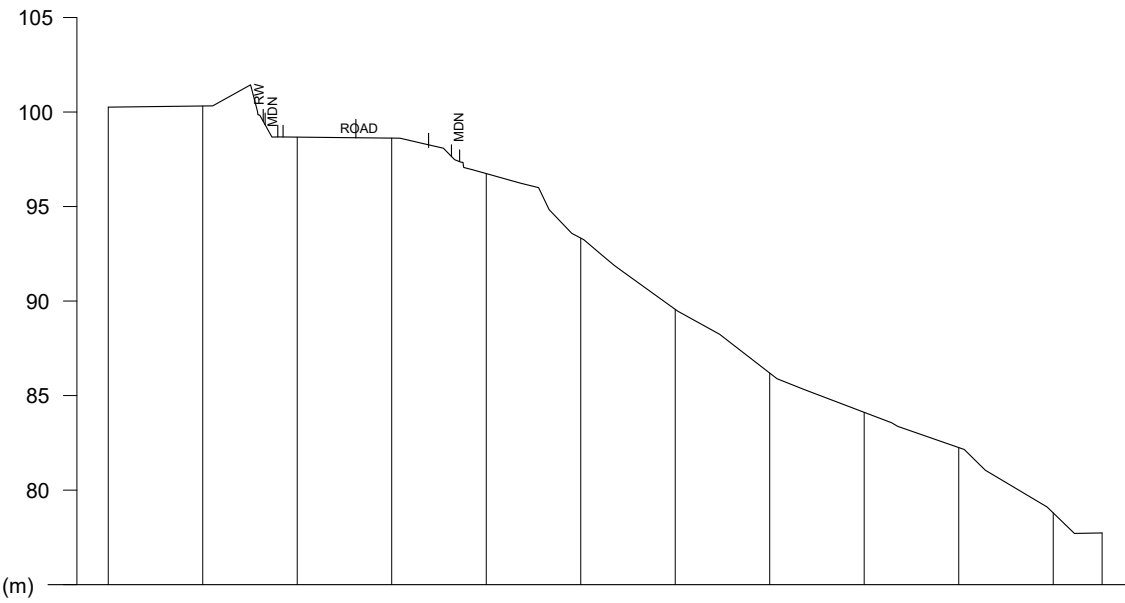
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 GINIGATHENA TOWN - NUWARAELIYA

TITLE  
 SURVEY CROSS SECTION

SCALE 1:500      DATE 20.06.2022  
 PROJECT / DRAWING No.      REVISION  
 RLVMP/WORKS/NCB/PHII/044-GI/DR-02a      00

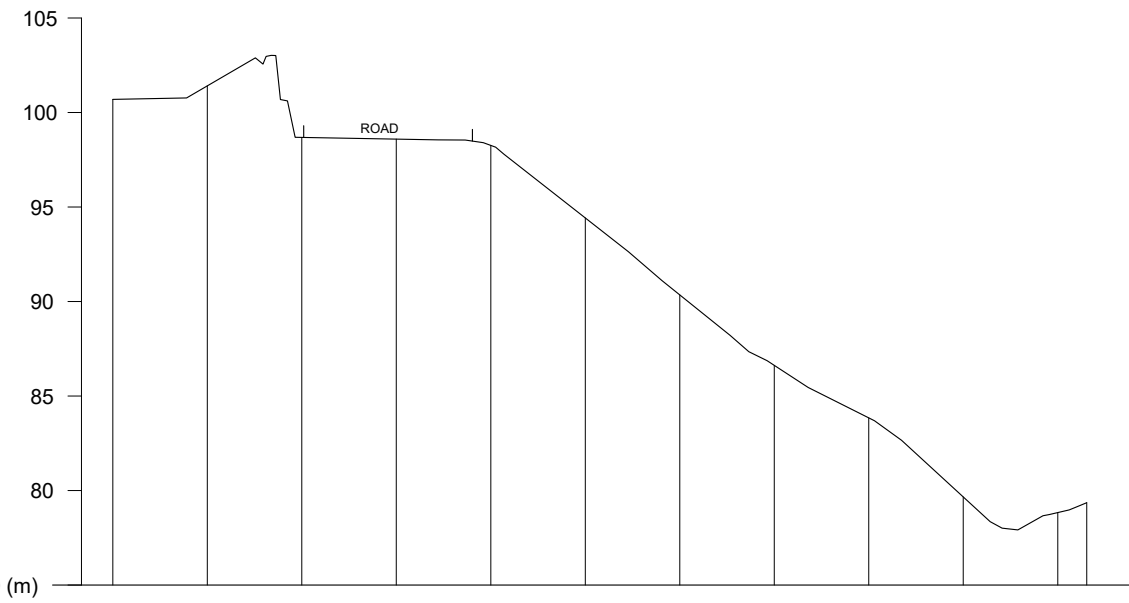
DESCRIPTION	NAME	SIGNATURE
SURVEYED		
CHECKED	M.H.M. HARSHANI	



DATUM 75.00 (m)

GROUND LEVEL (m)	100.26	100.32	98.67	98.62	96.74	93.33	89.56	86.19	84.11	82.25	78.79	77.73
ELEVATION (m)	00.00	05.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	52.59

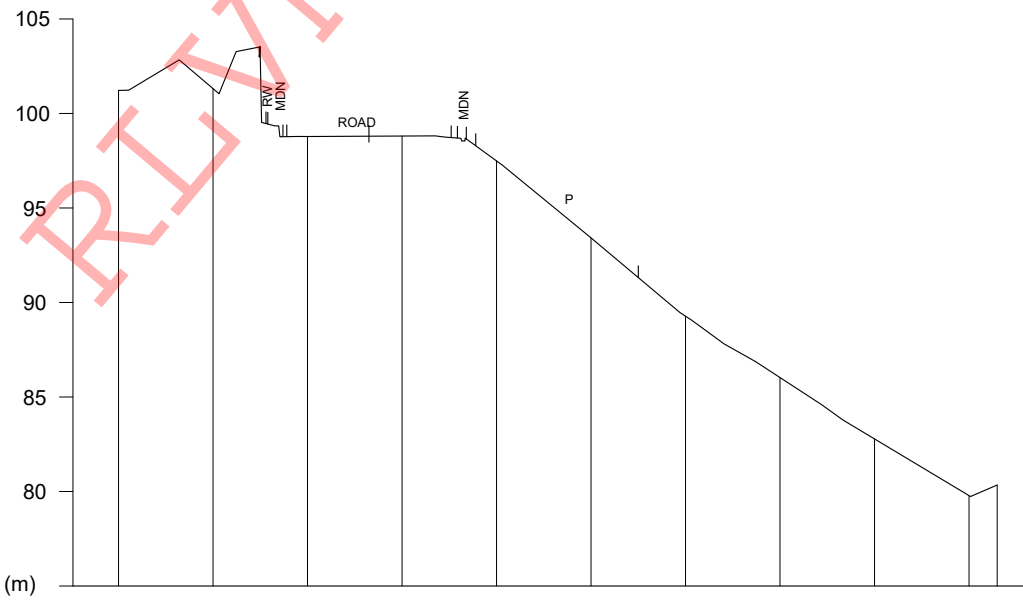
CS05



DATUM 75.00 (m)

GROUND LEVEL (m)	100.70	101.41	98.68	98.62	94.42	93.33	90.35	86.62	83.84	79.66	78.83	79.37
ELEVATION (m)	00.00	05.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	52.59


CS06



DATUM 75.00 (m)

GROUND LEVEL (m)	101.22	101.32	98.78	98.78	93.41	99.22	89.27	86.03	82.78	79.77	80.34
ELEVATION (m)	00.00	05.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	46.49

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

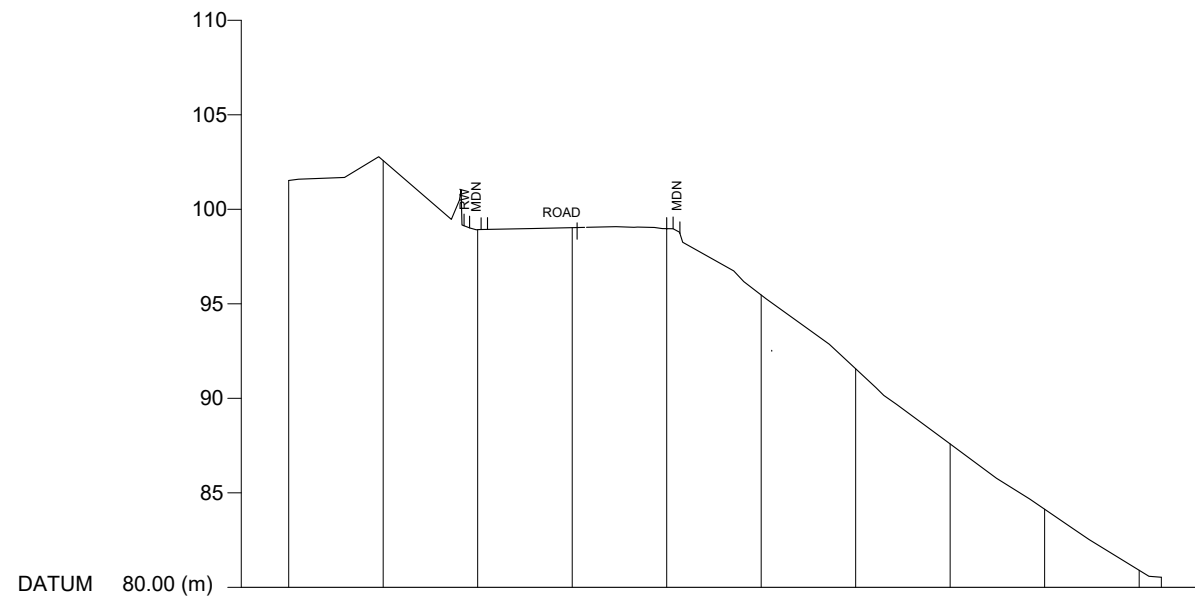
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 GINIGATHENA TOWN - NUWARAELIYA

TITLE  
 SURVEY CROSS SECTION

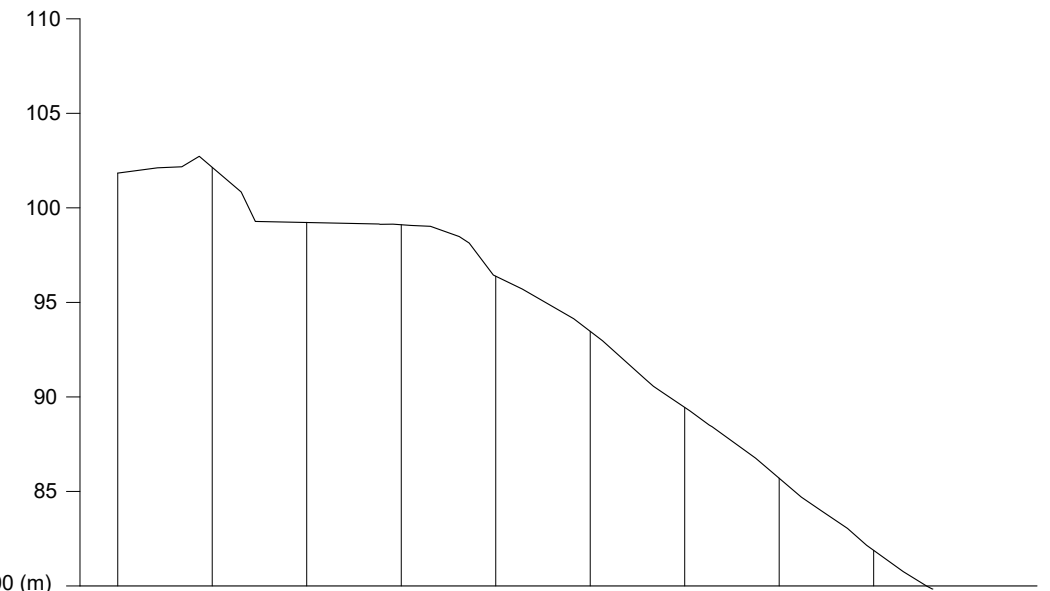
SCALE 1:500 DATE 20.06.2022  
 PROJECT / DRAWING No. REVISION  
 RLVMP/WORKS/NCB/PHII/044-GI/DR-02b 00

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




DATUM	80.00 (m)										
GROUND LEVEL (m)	101.52	102.58	98.93	90.03	98.97	95.47	91.56	87.59	84.13	80.92	80.53
ELEVATION (m)	00.00	05.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	52.59

CS08



DATUM	80.00 (m)									
GROUND LEVEL (m)	101.84	102.14	99.23	99.11	96.38	93.47	89.44	85.70	81.88	80.00
ELEVATION (m)	00.00	05.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	42.80

CS09

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

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

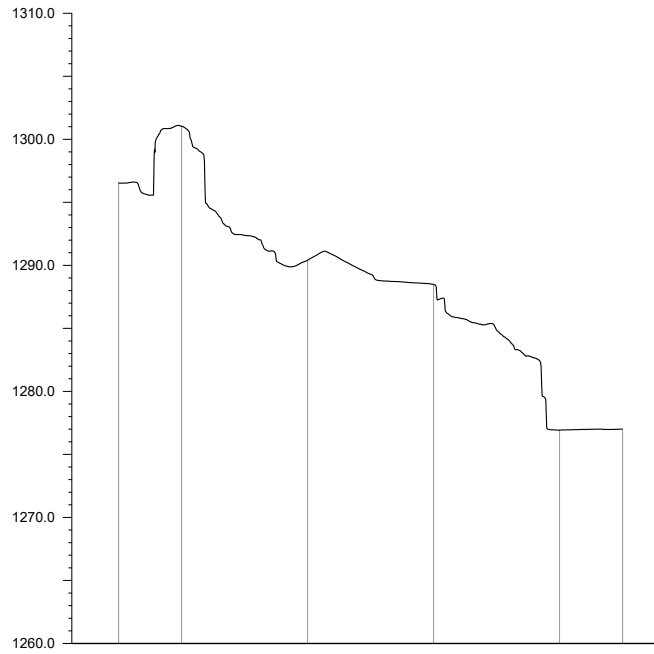
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 GINIGATHENA TOWN - NUWARAELIYA

TITLE  
 SURVEY CROSS SECTION

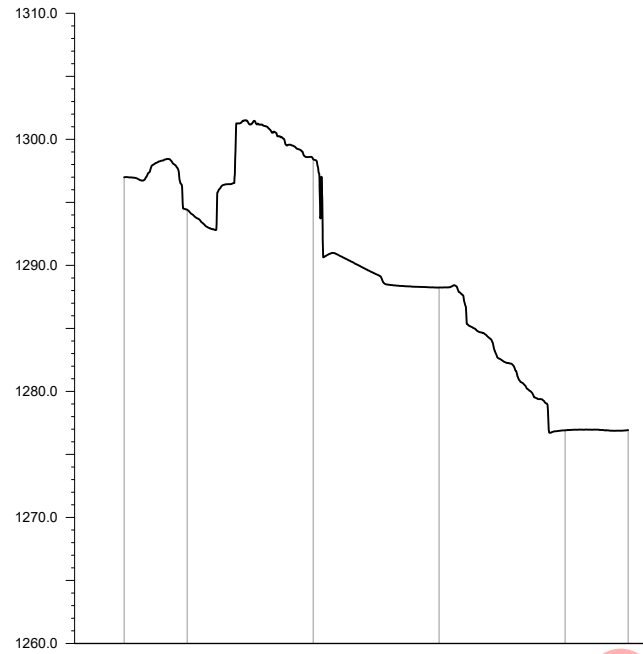
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PROJECT / DRAWING No.	RLVMMP/WORKS/NCB/PHII/044-GI/DR-02c	REVISION	00

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



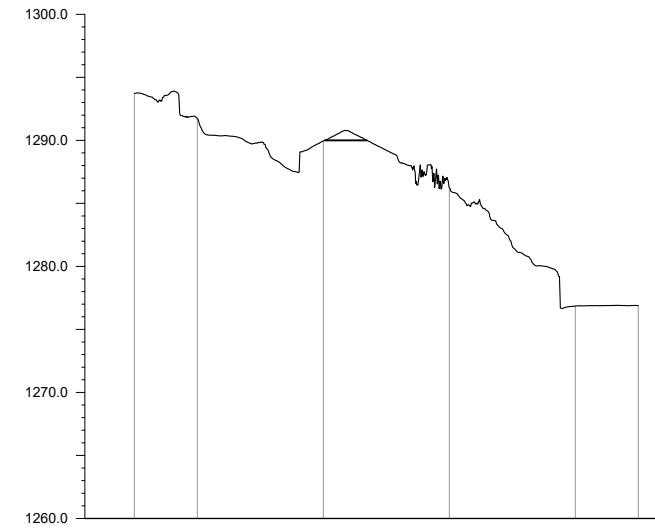
GROUND LEVEL (m)	1296.541	1300.044	1290.405	1288.496	1276.924	1276.924
DISTANCE (m)	-35.000	-30.000	-20.000	-10.000	0.000	5.000

CS09



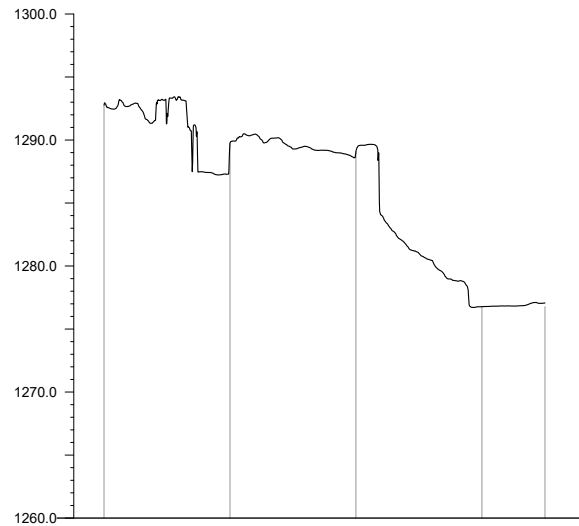
GROUND LEVEL (m)	1296.989	1294.413	1298.437	1288.244	1276.914	1276.914
DISTANCE (m)	-35.000	-30.000	-20.000	-10.000	0.000	5.000

CS10



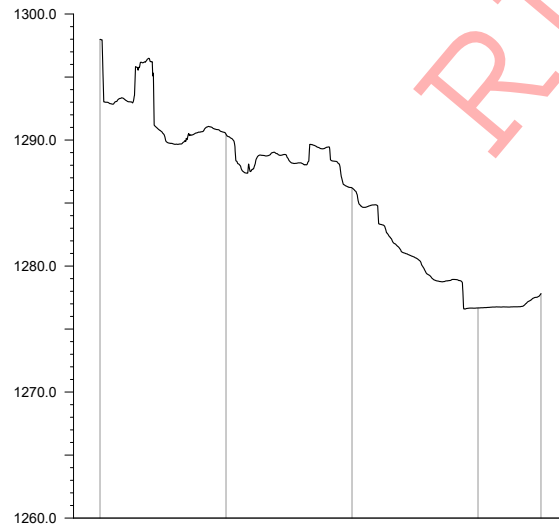
GROUND LEVEL (m)	1293.729	1291.774	1289.959	1286.260	1276.852	1276.852
DISTANCE (m)	-35.000	-30.000	-20.000	-10.000	0.000	5.000

CS11



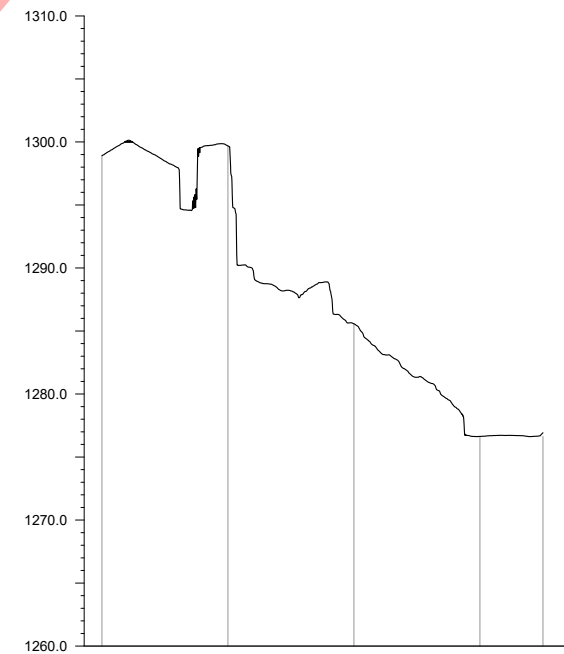
GROUND LEVEL (m)	1292.760	1289.744	1289.091	1276.776	1276.776
DISTANCE (m)	-30.000	-20.000	-10.000	0.000	5.000

CS12



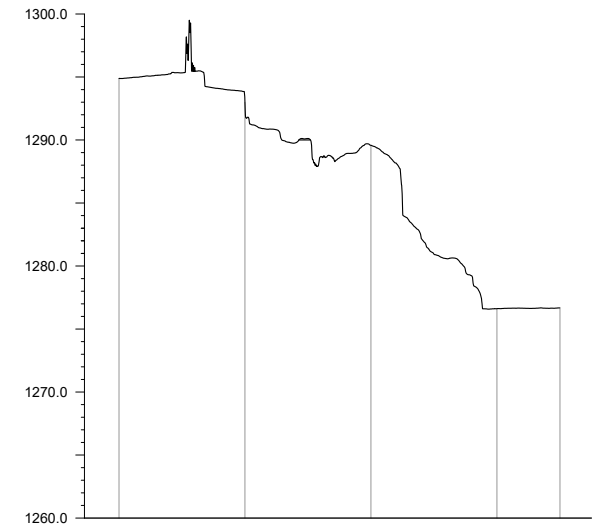
GROUND LEVEL (m)	1297.991	1290.461	1286.202	1276.677	1277.813
DISTANCE (m)	-30.000	-20.000	-10.000	0.000	5.000

CS13




GROUND LEVEL (m)	1299.688	1299.688	1285.569	1276.636	1276.636
DISTANCE (m)	-35.000	-30.000	-20.000	-10.000	0.000

CS14



GROUND LEVEL (m)	1294.885	1292.990	1289.575	1276.613	1276.613
DISTANCE (m)	-30.000	-20.000	-10.000	0.000	5.000

CS15

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  
 BOSCO COLLEGE - HATTON

TITLE		DATE	
SURVEY CROSS SECTION		11.05.2022	
SCALE	1:750	REVISION	00
PROJECT / DRAWING No.		RLVMMP/WORKS/NCB/PHII/043-BO/DR-02b	

DESCRIPTION	NAME	SIGNATURE
CHECKED	D.M.D.T. DASANAYAKA	




**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

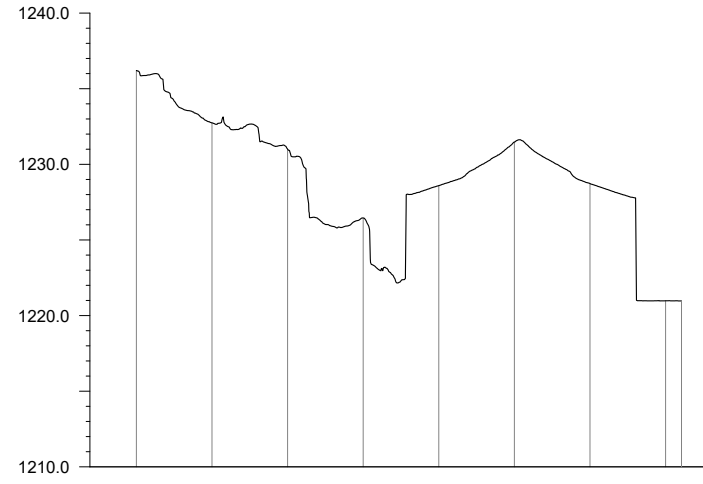
PROJECT TITLE  
**REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 SRI SADDHARMARAMAYA TEMPLE  
 THALAWAKELE**

TITLE  
**SURVEY PLAN VIEW**

SCALE	1:500	DATE	17.05.2022
PROJECT / DRAWING No.	RLVMMP/WORKS/NCB/PHII/101-TK/DR-01	REVISION	00

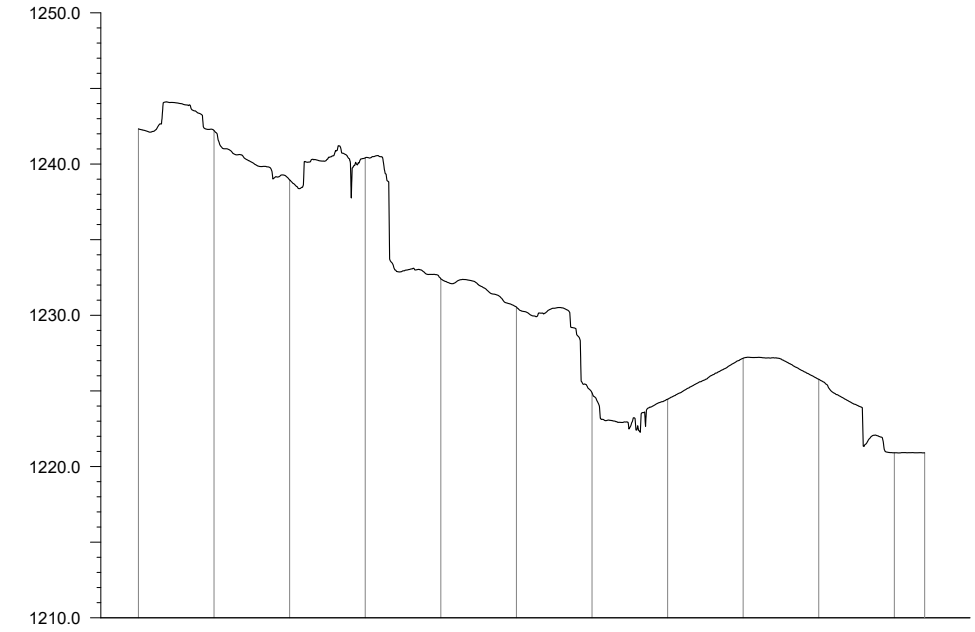
DESCRIPTION	NAME	SIGNATURE
SURVEYED		
CHECKED	V. G. D. GANGANI	





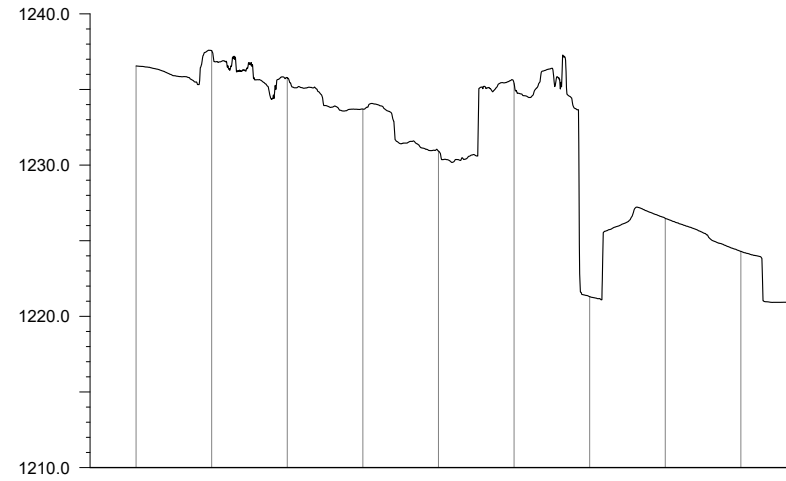
GROUND LEVEL (m)	1236.198	1232.740	1231.006	1226.453	1228.592	1231.476	1228.731	1220.979	1220.971
DISTANCE (m)	0.000	5.000	10.000	15.000	20.000	25.000	30.000	35.000	36.053

CS01



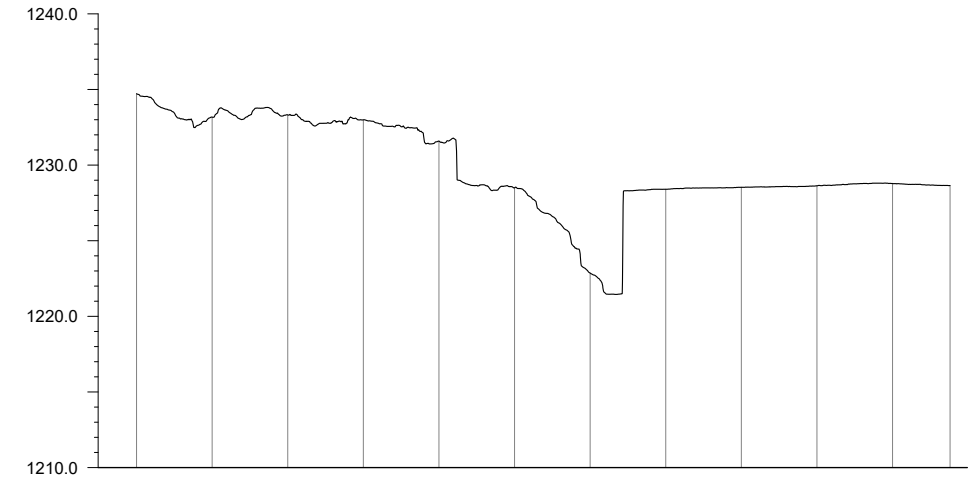
GROUND LEVEL (m)	1242.325	1242.219	1238.954	1240.406	1232.413	1230.546	1224.878	1224.451	1227.162	1225.770	1220.910	1220.911
DISTANCE (m)	0.000	5.000	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000	52.006

CS02



GROUND LEVEL (m)	1236.551	1237.568	1235.760	1233.700	1230.923	1235.396	1221.305	1226.478	1224.293	1223.607
DISTANCE (m)	0.000	5.000	10.000	15.000	20.000	25.000	30.000	35.000	40.000	43.385

CS03




GROUND LEVEL (m)	1234.716	1233.169	1233.315	1232.989	1231.585	1228.491	1222.862	1228.400	1228.531	1228.626	1228.780	1228.645
DISTANCE (m)	0.000	5.000	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000	53.806

CS04

RLVMMP

EMPLOYER



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**STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT**  
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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

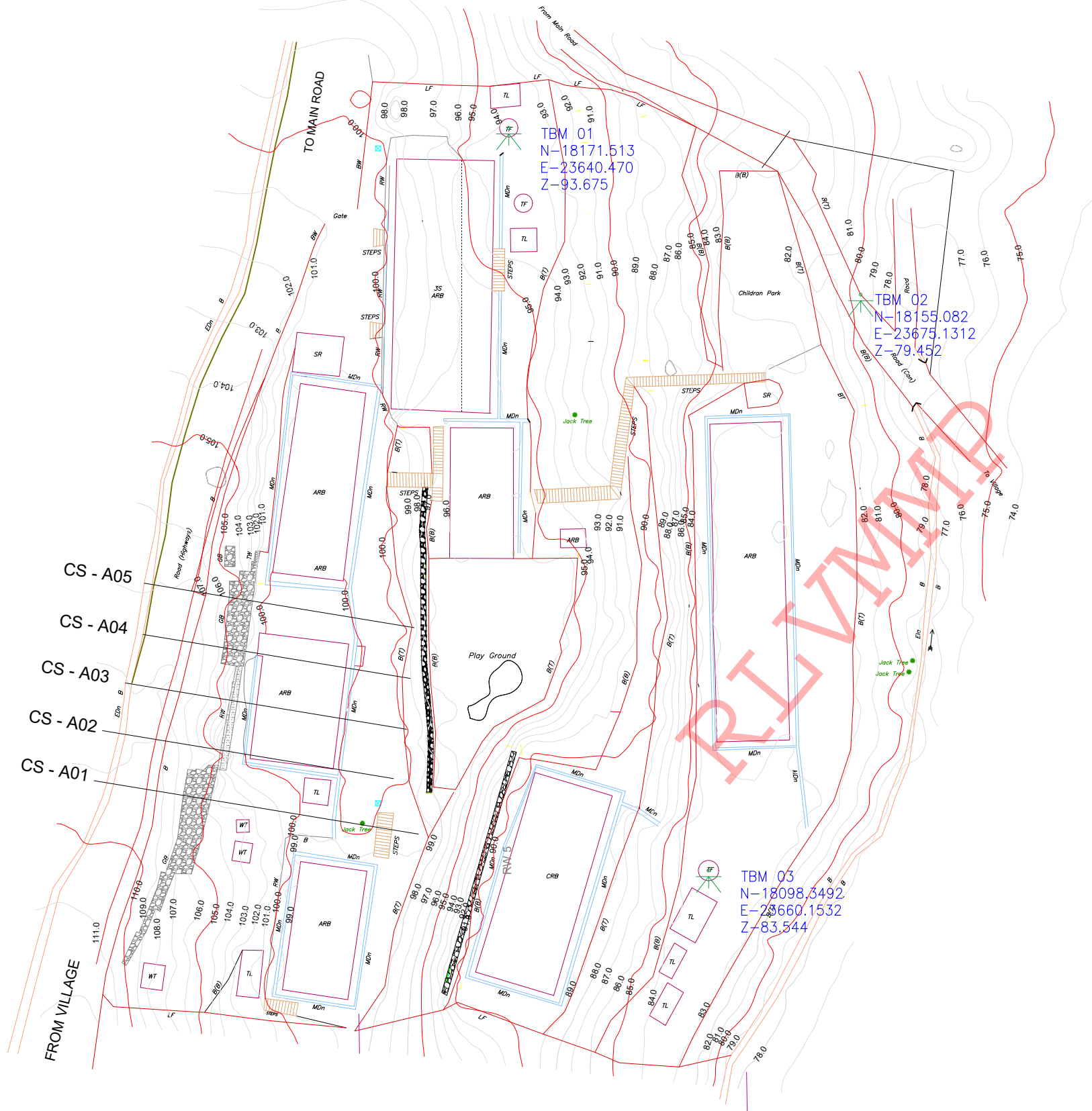
**REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 SRI SADDHARMARAMAYA TEMPLE  
 THALAWAKELE**

TITLE

**SURVEY CROSS SECTION**


SCALE: 1:500      DATE: 17.05.2022  
 PROJECT / DRAWING No.      REVISION  
 RLVMMP/WORKS/NCB/PHII/101-TK/DR-02      00

DESCRIPTION	NAME	SIGNATURE
SURVEYED		
CHECKED	V. G. D. GANGANI	



**REFERENCE**

- G GATE
- TF TOILET FIT
- TL TOILET
- LF LIVE FENCE
- B BANK
- B(B) BANK BOTAM
- B(T) BANK TOP
- BW BOUNDARY WALL
- WF WIRE FENCE
- GB GABIAN WALL
- RW RETAINING WALL
- TW TOE WALL
- TBM TEMPORARY BENCH MARK
- SR SRINE ROOM
- MDN MASONRY DRAIN
- ARB ASBESTOS ROOFED BUILDING
- CRB CONCRETE ROOFED BUILDING
- 3SARB THREE STORIED ASBESTOS ROOFED BUILDING

EMPLOYER  
  
**DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA**  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
 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

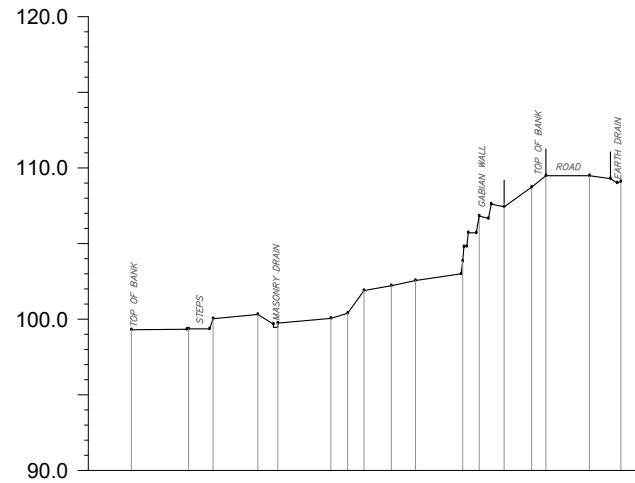
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 LIYANWALA - MUNWATTA

TITLE  
 SURVEY PLAN VIEW

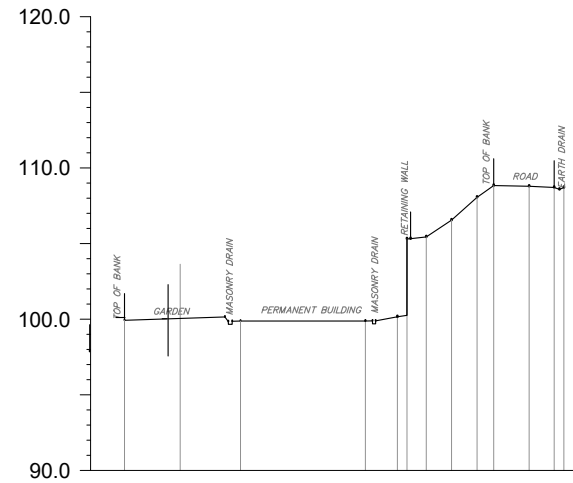
SCALE	1:500	DATE	15.05.2015
PROJECT / DRAWING No.	RLVMM/WORKS/NCB/PHI/103-LI/DR-01	REVISION	00

DESCRIPTION	NAME	SIGNATURE
SURVEYED	K.G.C.KULAWANSA	
CHECKED	D.M.D.T. DASANAYAKA	



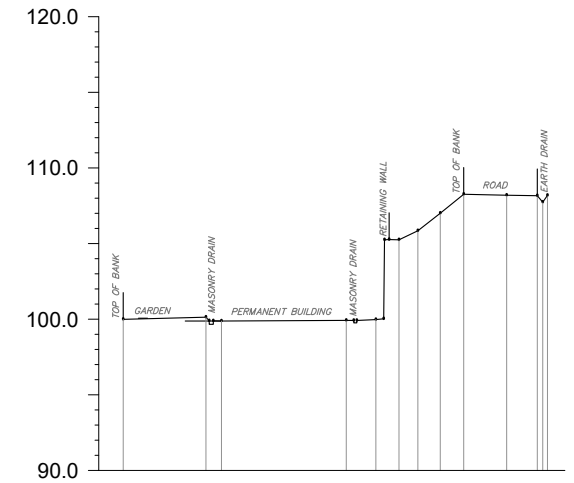
GROUND LEVEL (m)	99.300	99.361	100.032	100.310	100.051	100.384	101.894	102.212	102.558	103.833	106.826	107.431	108.739	109.485	109.094
DISTANCE (m)	32.38	28.59	26.97	24.01	22.69	19.18	18.07	16.99	15.18	13.58	10.46	9.37	7.72	5.96	2.08

CS - A01



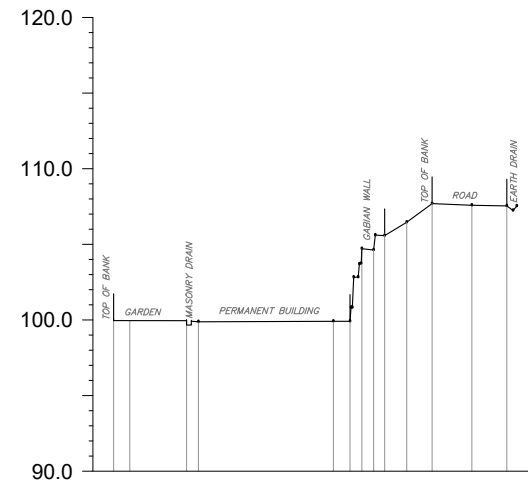
GROUND LEVEL (m)	99.927	99.881	99.881	100.366	105.439	106.549	108.058	108.839	108.787	108.709
DISTANCE (m)	29.06	21.39	13.13	10.98	9.10	7.43	5.74	4.64	2.30	0.66

CS - A02



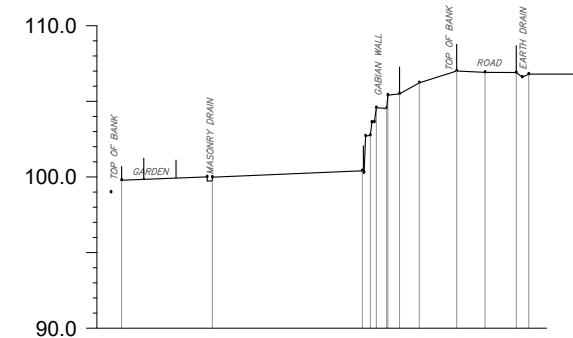
GROUND LEVEL (m)	99.992	100.134	99.881	99.881	99.975	105.248	105.846	107.008	108.260	108.198	108.188
DISTANCE (m)	28.06	21.36	13.31	11.35	9.82	8.57	7.09	5.54	2.70	0.00	

CS - A03



GROUND LEVEL (m)	99.958	99.953	99.881	102.824	105.677	106.462	107.692	107.581	107.540
DISTANCE (m)	26.67	21.86	12.13	10.79	8.74	7.28	5.60	2.97	0.66


CS - A04



GROUND LEVEL (m)	99.786	99.986	100.419	105.408	106.223	107.006	106.918	106.803
DISTANCE (m)	26.93	20.93	11.91	9.52	8.56	7.24	4.77	2.89

CS - A05

REVIEWED

EMPLOYER  
  
**DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA**  
 STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT  
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 COLOMBO - 05

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 COLOMBO - 05

REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE  
 REDUCTION OF LANDSLIDE  
 VULNERABILITY BY MITIGATION MEASURES  
 LIYANWALA - MUNWATTA

TITLE		DESCRIPTION	NAME	SIGNATURE
SURVEY CROSS SECTION		SURVEYED	K.G.C.KULAWANSA	
		CHECKED	D.M.D.T. DASANAYAKA	
SCALE	1:750	DATE	15.05.2015	
PROJECT / DRAWING No.		REVISION	00	
RLVMM/WORKS/NCB/PHII/103-LI/DR-02a				