

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

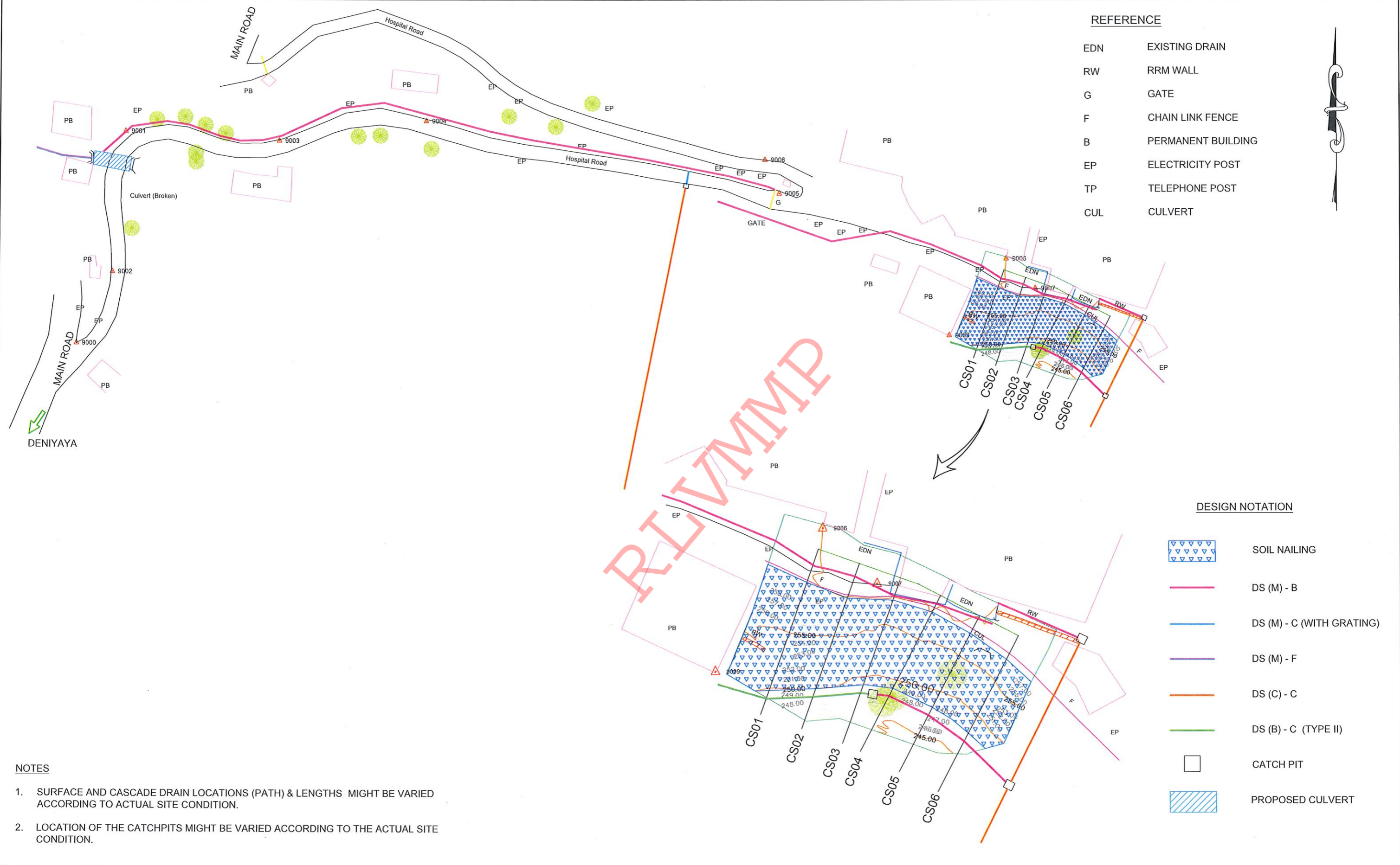
Landslide Mitigation Measures at 02 Locations in Matara & Hambantota Districts (Site No. 104,151)
Under Package – 06F of Reduction of Landslide Vulnerability by Mitigation Measures Project (RLVMMP)

RFT No: RLVMMP/WORKS/06F

March 2024

DESIGN DRAWINGS

REVAMP



REFERENCE

- EDN EXISTING DRAIN
- RW RRM WALL
- G GATE
- F CHAIN LINK FENCE
- B PERMANENT BUILDING
- EP ELECTRICITY POST
- TP TELEPHONE POST
- CUL CULVERT

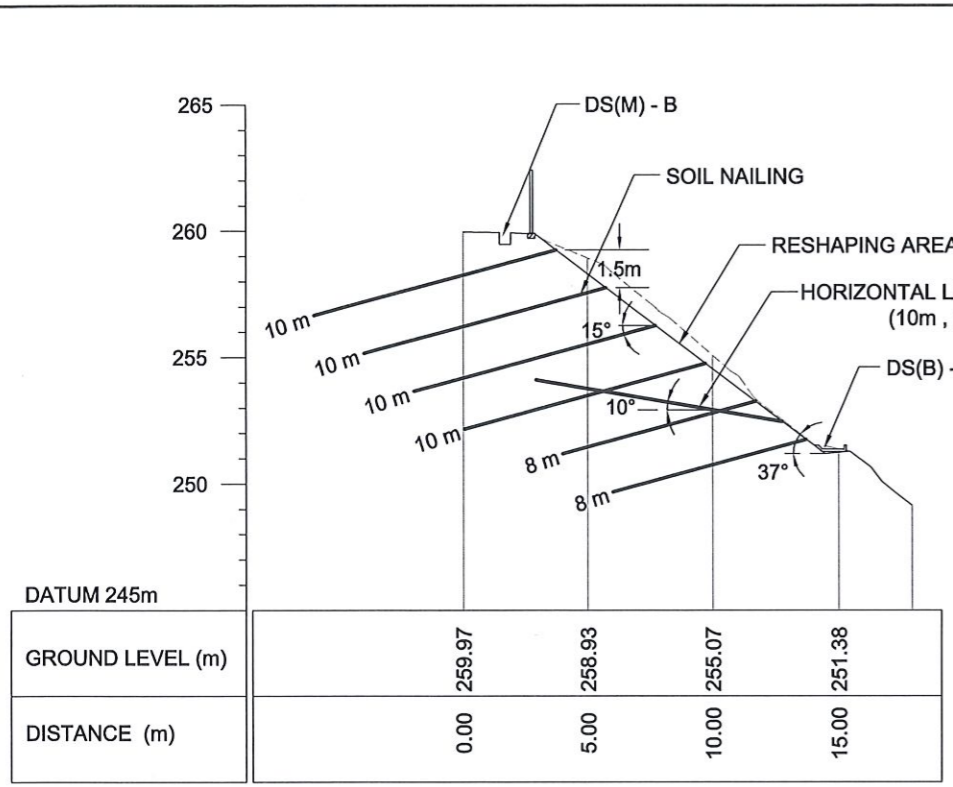
DESIGN NOTATION

- SOIL NAILING
- DS (M) - B
- DS (M) - C (WITH GRATING)
- DS (M) - F
- DS (C) - C
- DS (B) - C (TYPE II)
- CATCH PIT
- PROPOSED CULVERT

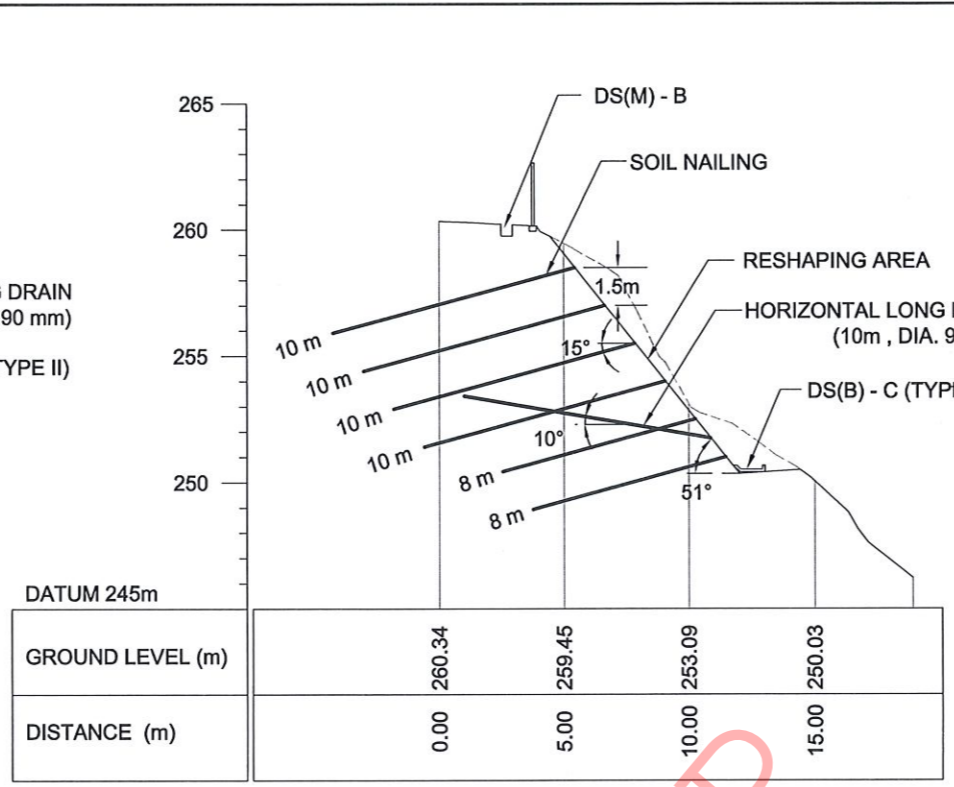
NOTES

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.

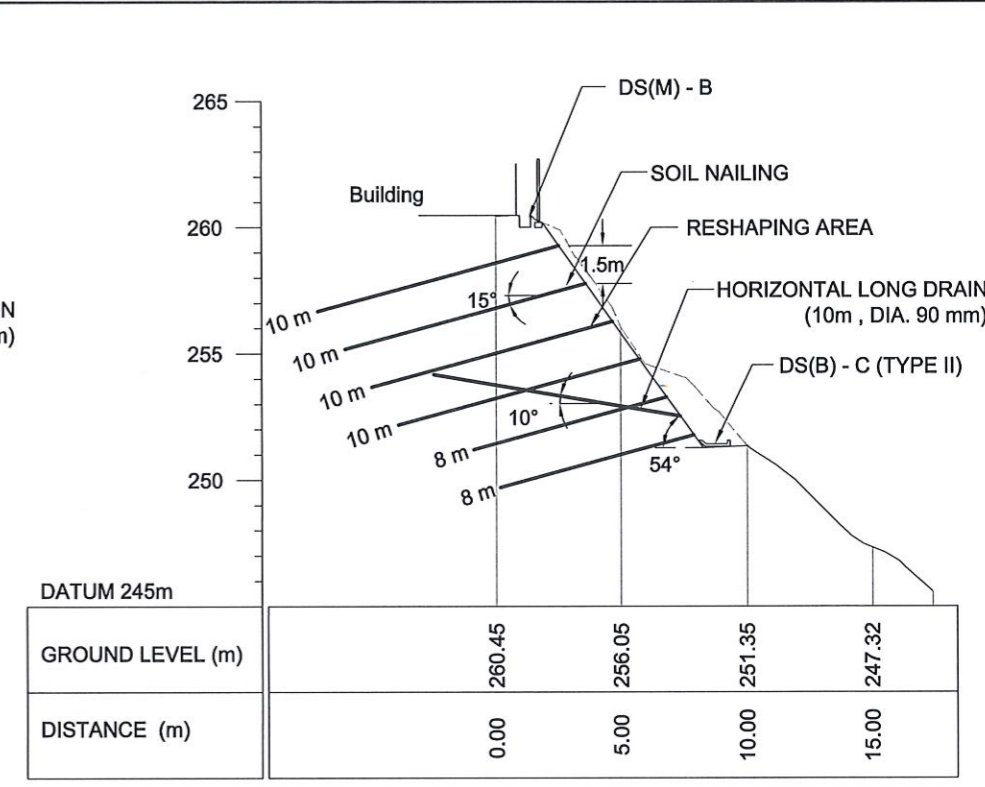
EMPLOYER DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT NATIONAL BUILDING RESEARCH ORGANISATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	DESIGNER DESIGN UNIT NATIONAL BUILDING RESEARCH ORGANIZATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	REV	DATE	REVISION DESCRIPTION	APPROVAL	PROJECT TITLE REDUCTION OF LANDSLIDE VULNERABILITY BY MITIGATION MEASURES DENIYAYA HOSPITAL	TITLE DESIGN PLAN VIEW	DESCRIPTION	NAME	SIGNATURE
									SCALE 1:400, 1:750 PROJECT / DRAWING No. RLVMMMP/WORKS/NCB/PHII/104-DH/DR-03	DATE 19.04.2022 REVISION 00



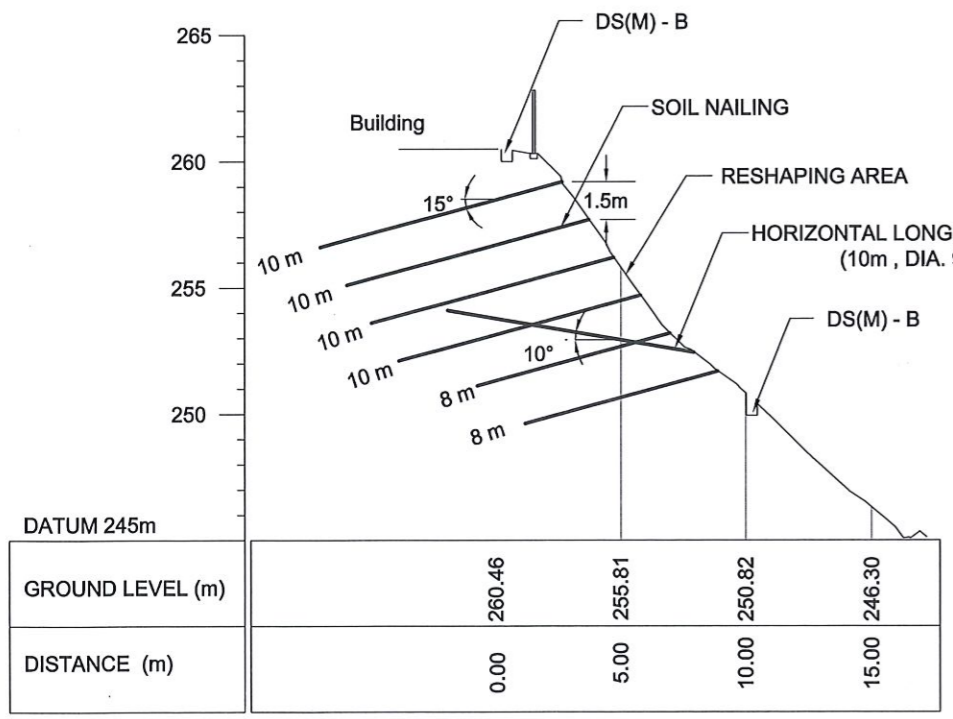
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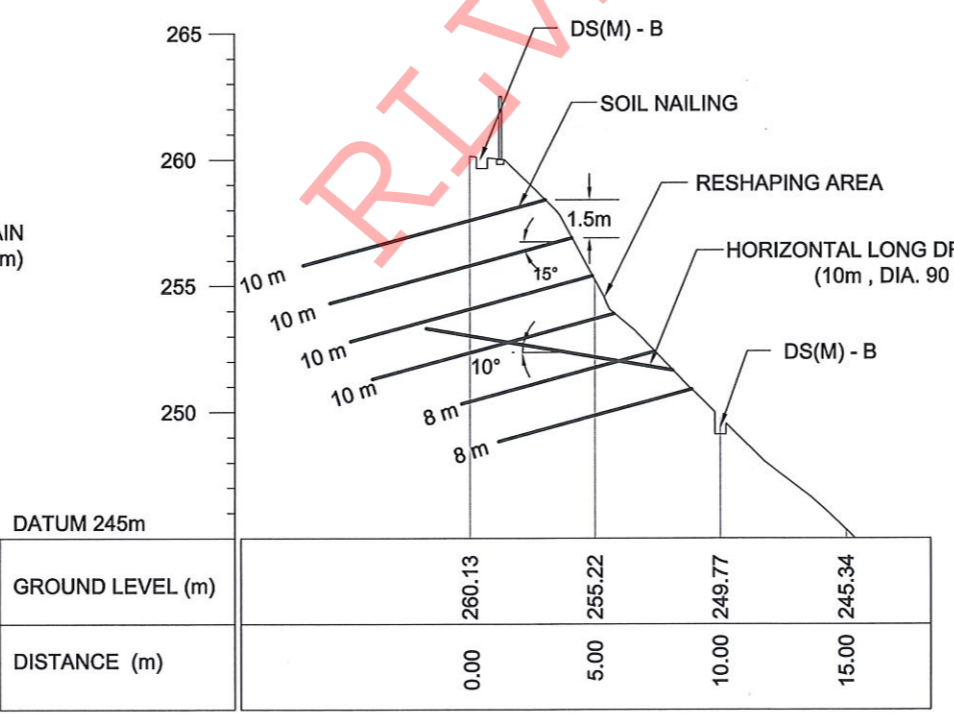
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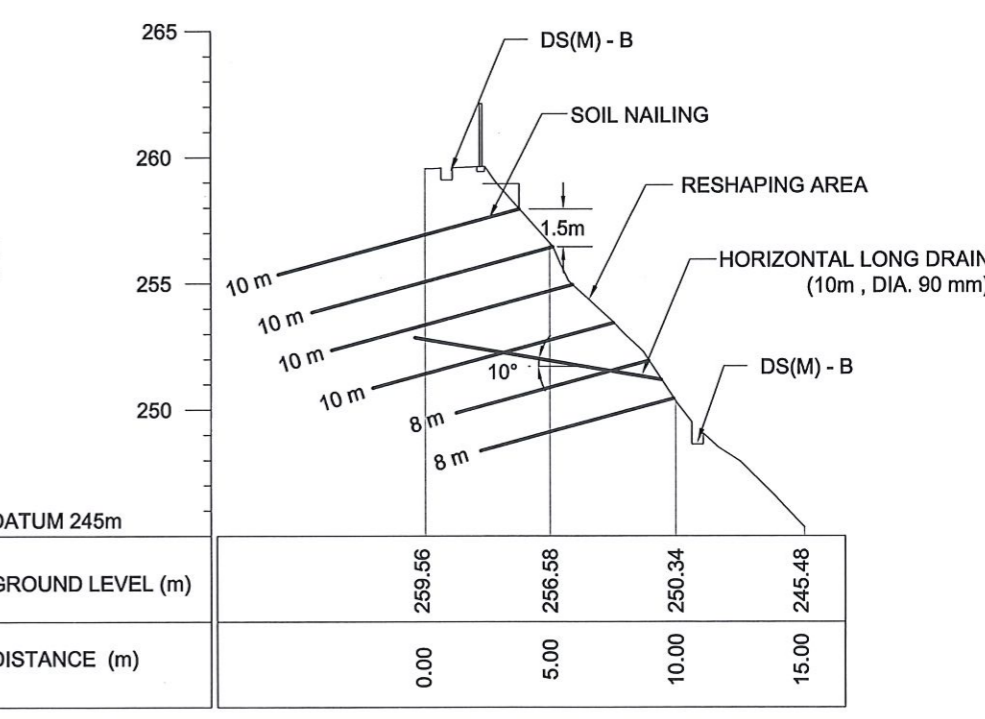
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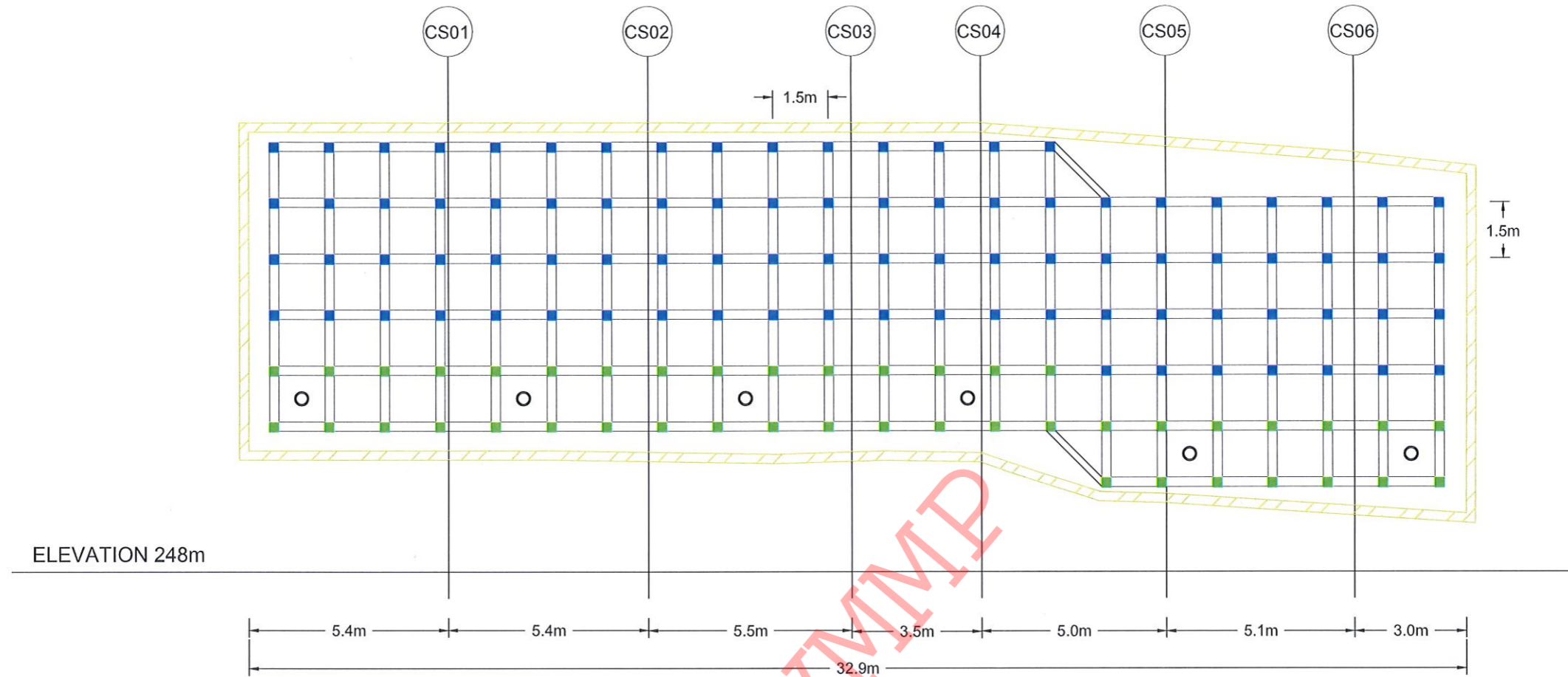


CS05



CS06

<p>DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT NATIONAL BUILDING RESEARCH ORGANISATION No. 99/1, JAWATTA ROAD, COLOMBO - 05</p>	<p>DESIGN UNIT NATIONAL BUILDING RESEARCH ORGANIZATION No. 99/1, JAWATTA ROAD, COLOMBO - 05</p>	REV	DATE	REVISION DESCRIPTION	APPROVAL	<p>PROJECT TITLE</p> <p>REDUCTION OF LANDSLIDE VULNERABILITY BY MITIGATION MEASURES DENIYAYA HOSPITAL</p>	<p>TITLE</p> <p>DESIGN CROSS SECTION</p>	DESCRIPTION	NAME	SIGNATURE
									SCALE 1:300	DATE 19.04.2022
						PROJECT / DRAWING No. RLVMP/WORKS/NCB/PHI/104-DH/DR-04	REVISION 00	DESIGNER	D.M.D.T. DASANAYAKA	
								CHECKED	B.I. KUMARAGE	
								RECOMMENDED	Prof. S.A.S. KULATHILAKA	
								APPROVED	K.N. BANDARA	



FRONT ELEVATION OF SOIL NAILING AREA

LEGEND

- SOIL NAILING - TOTAL SOIL NAIL LENGTH = 08m
 NO OF SOIL NAIL = 44
 REINFORCEMENT DIAMETER = 32 mm
 DIAMETER OF DRILLED HOLE = 125mm
 NAIL SPACING = 2m (BW)
- SOIL NAILING - TOTAL SOIL NAIL LENGTH = 10m
 NO OF SOIL NAIL = 88
 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 = 06
 DIAMETER = 90 mm
 SPACING = 06 m
- BOUNDARY BEAM

NOTES

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

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

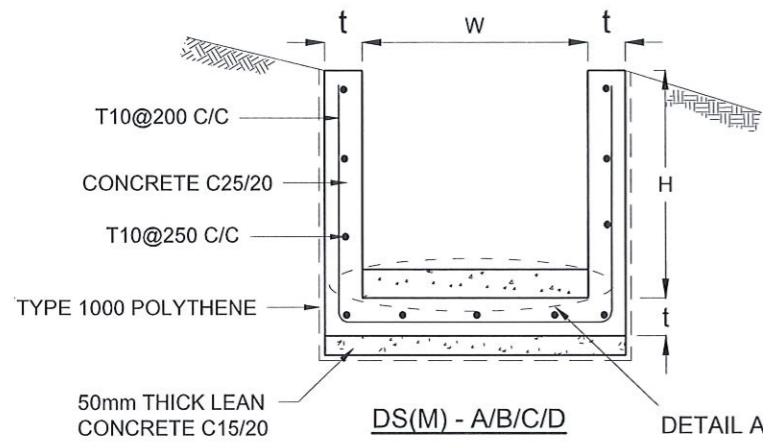
DESIGNER
 DESIGN UNIT
 NATIONAL BUILDING RESEARCH ORGANIZATION
 No. 99/1, JAWATTA ROAD,
 COLOMBO - 05

REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE
 REDUCTION OF LANDSLIDE
 VULNERABILITY BY MITIGATION MEASURES
 DENIYAYA HOSPITAL

TITLE		DATE	
FRONT ELEVATION		19.04.2022	
SCALE	1:150	PROJECT / DRAWING No.	RLVMMP/WORKS/NCB/PHII/104-DH/DR-05
REVISION	00	APPROVED	K.N. BANDARA

DESCRIPTION	NAME	SIGNATURE
DRAWN	K.M.D. NISHANTHI	
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

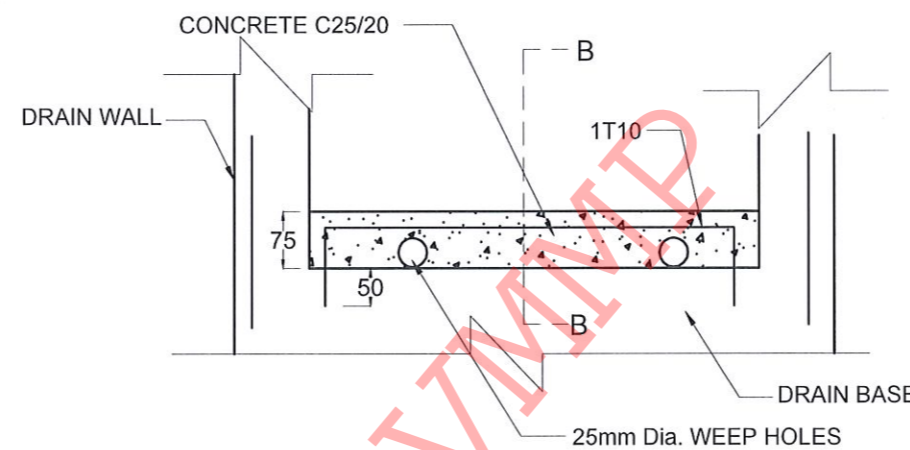
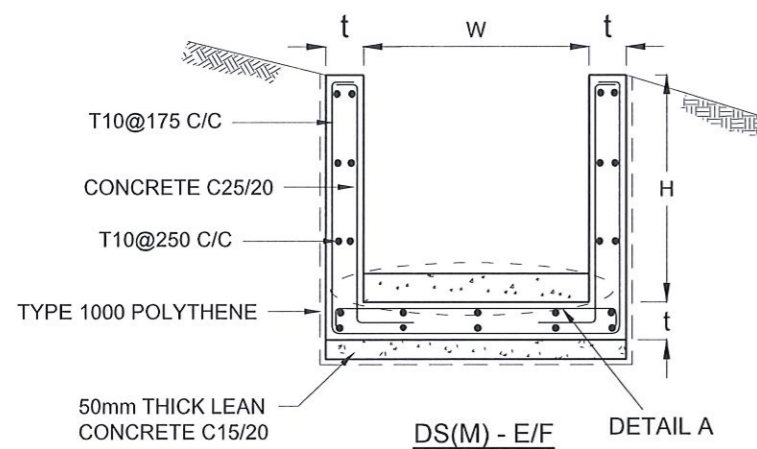
- DEPTH OF EXCAVATION MAY VARY ACCORDING TO SITE CONDITIONS.
- STEPS SHALL BE CONSTRUCTED AT SURFACE DRAIN ON SLOPING GROUND ACCORDING TO THE SITE CONDITIONS AS INSTRUCTED BY THE ENGINEER.
- ENERGY BREAKERS SHALL BE CONSTRUCTED AT THE STEEP DRAIN SEGMENTS AS PER THE INSTRUCTIONS OF THE ENGINEER.
- DOWELS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

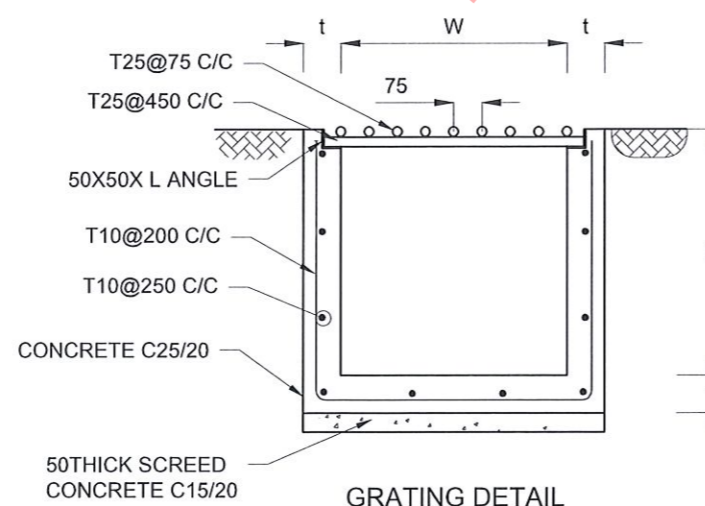
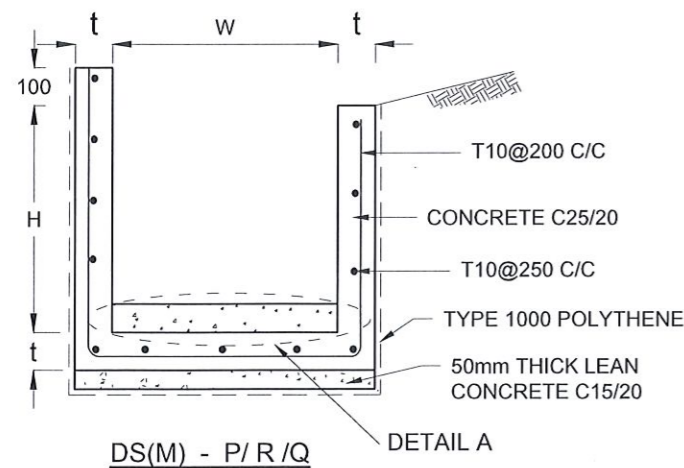
- USE FOLLOWING CONCRETE GRADES FOR STRUCTURE
 - [a] SCREED - C. 15/20
 - [b] WALLS / BASE / ENERGY BREAKERS - C. 25/20

REINFORCEMENT

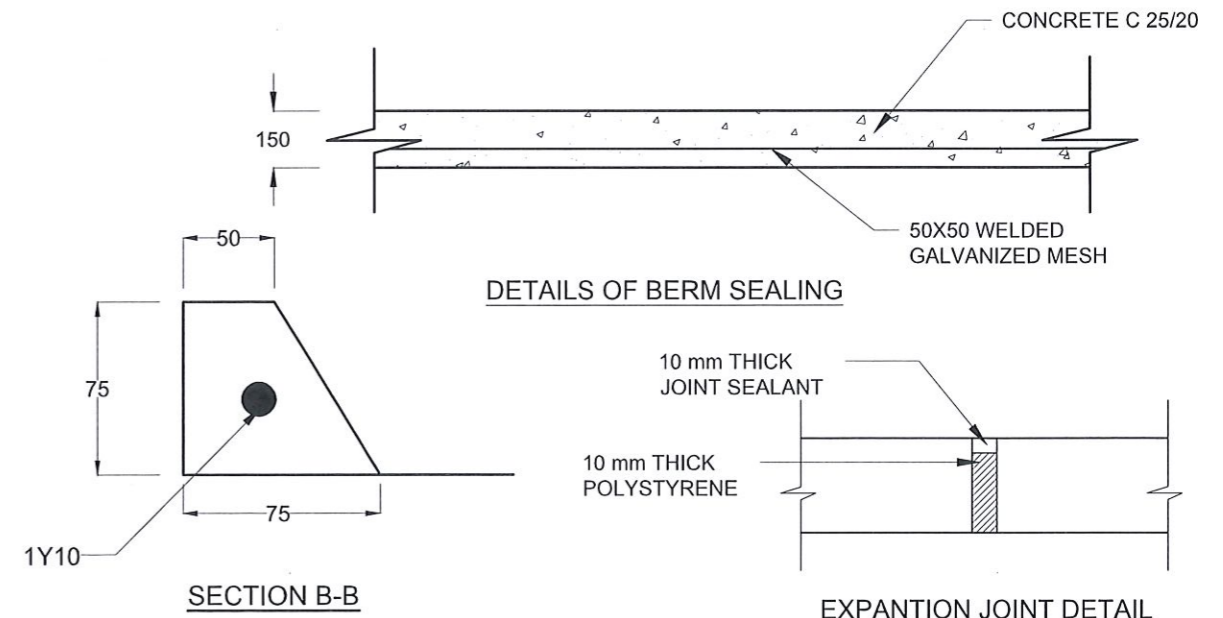
- ALL BARS MARKED "T" SHALL BE HIGH YIELD DEFORMED BARS OF YIELD STRENGTH NOT LESS THAN 460N/mm².
- BARS OF CUT LENGTH LARGER THAN THE SUPPLIED LENGTH TO BE LAPPED FOR A LENGTH OF 50 x BAR DIA. AND LAPPING SHOULD BE STAGGERED.
- ANCHORAGE LENGTH SHOULD BE 40X BAR DIA.
- REINFORCEMENT BARS SHALL BE BENT 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

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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

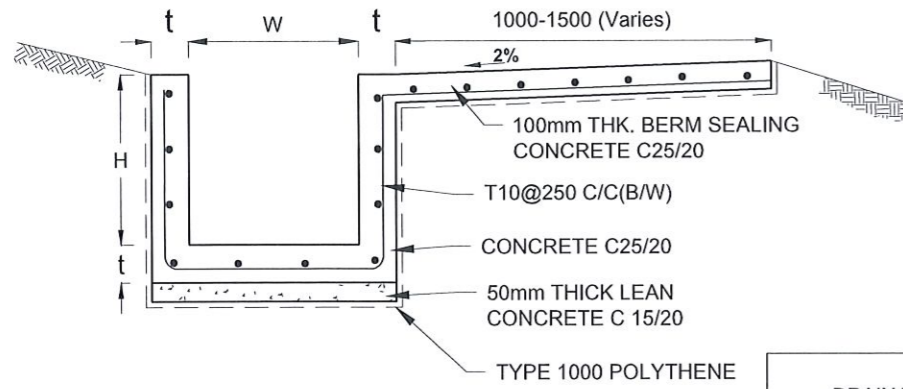
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE
 REDUCTION OF LANDSLIDE
 VULNERABILITY BY MITIGATION MEASURES
 DENIYAYA HOSPITAL

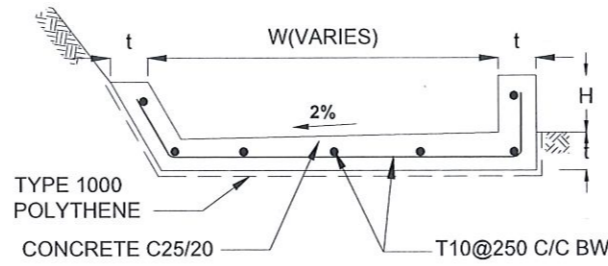
TITLE
 DETAILS OF DRAINS
 (SURFACE DRAIN -1 OF 2)

SCALE	N.T.S	DATE	11.05.2022
PROJECT / DRAWING No.	RLVMMP/WORKS/NCB/PH11/104-DH/DR-06a	REVISION	00

DESCRIPTION	NAME	SIGNATURE
DRAWN	K.M.D.NISHANTHI	<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>



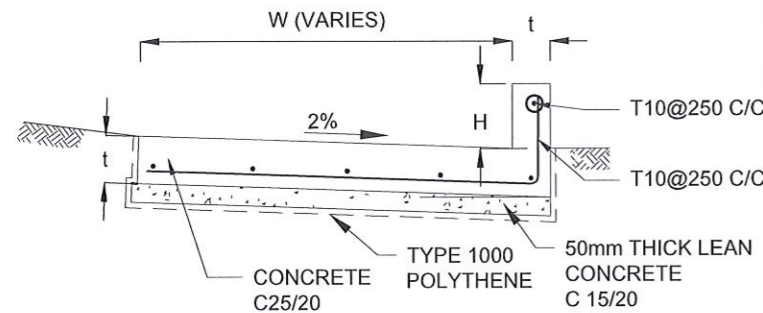
DS (B) - (TYPE I)



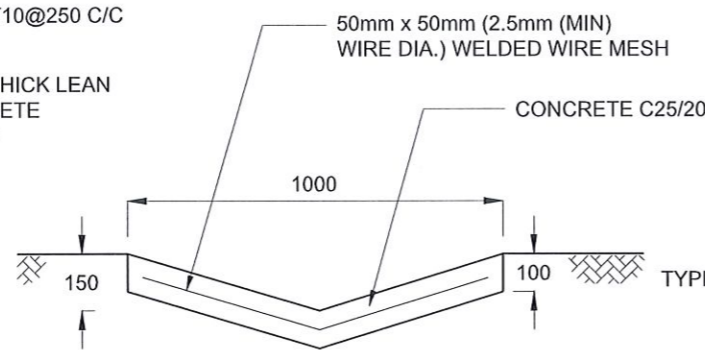
DS (B) - (TYPE II)

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

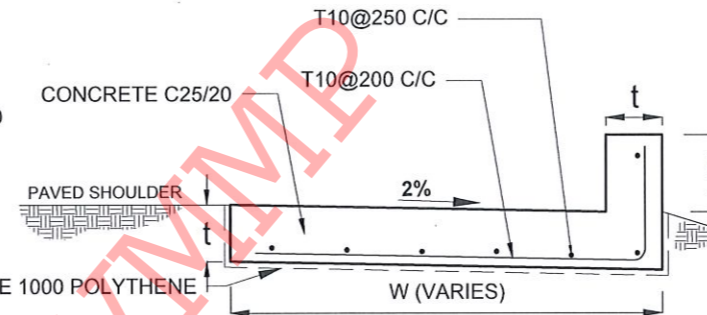
DRAIN TYPE	W (mm)	H (mm)	t (mm)
DS (B) - A	300	300	100
DS (B) - B	450	450	100
DS (B) - C	1000	150	100
DS (B) - D	1500	150	100
DS (B) - E	2000	150	100



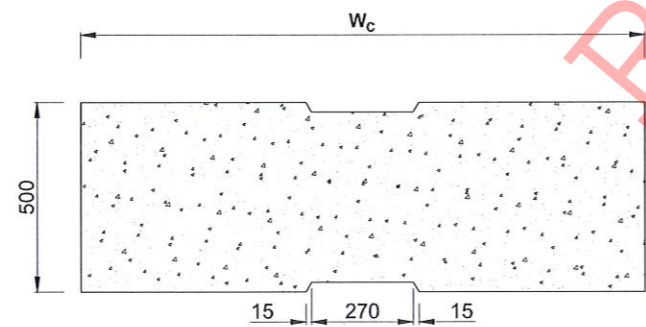
DS (K) - TYPE I



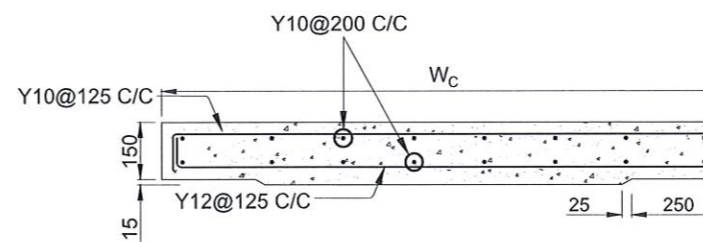
DS (D) - A (DISH DRAIN)



DS (K) - TYPE II



PLAN VIEW OF COVER SLAB



ACCESS & HEAVY DUTY COVER SLAB
SECTION OF (W_c x 500 x 150mm)

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

NOTES

- DEPTH OF EXCAVATION MAY VARY ACCORDING TO SITE CONDITIONS.
- STEPS SHALL BE CONSTRUCTED AT SURFACE DRAIN ON SLOPING GROUND ACCORDING TO THE SITE CONDITIONS AS INSTRUCTED BY THE ENGINEER.
- ENERGY BREAKERS SHALL BE CONSTRUCTED AT THE STEEP DRAIN SEGMENTS AS PER THE INSTRUCTIONS OF THE ENGINEER.
- DOWELS SHALL BE INSTALLED ACCORDING TO THE GROUND CONDITIONS AS INSTRUCTED BY THE ENGINEER.
- COVER SLABS NEED TO BE PROVIDED ONLY FOR THE REGIONS AS INSTRUCTED BY THE ENGINEER.
- COVER SLAB WIDTH (W_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.

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/mm².
- 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

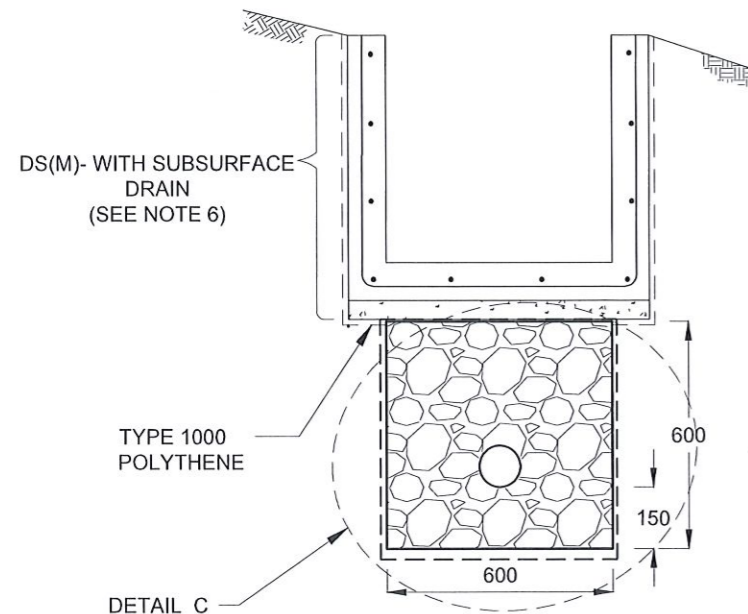
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE
 REDUCTION OF LANDSLIDE
 VULNERABILITY BY MITIGATION MEASURES
 DENIYAYA HOSPITAL

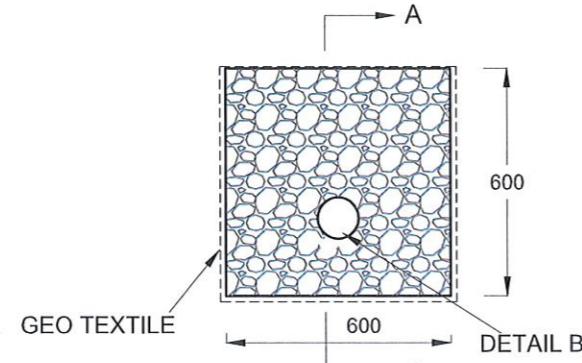
TITLE
 DETAILS OF DRAINS
 (SURFACE DRAIN - 2 OF 2)

SCALE N.T.S. DATE 11.05.2022
 PROJECT / DRAWING No. RLVMP/WORKS/NCB/PHII/104-DH/DR-06b REVISION 00

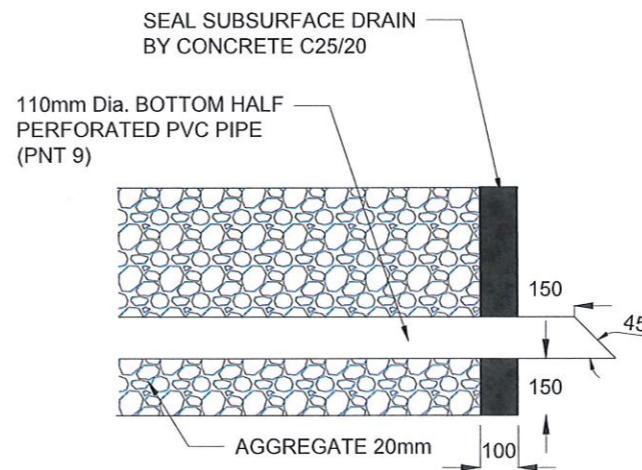
DESCRIPTION	NAME	SIGNATURE
DRAWN	K.M.D.NISHANTHI	<i>[Signature]</i>
DESIGNER	D.M.D.T. DASANAYAKA	<i>[Signature]</i>
CHECKED	B.I. KUMARAGE	<i>[Signature]</i>
RECOMMENDED	Prof. S.A.S. KULATHILAKA	<i>[Signature]</i>
APPROVED	K.N. BANDARA	<i>[Signature]</i>



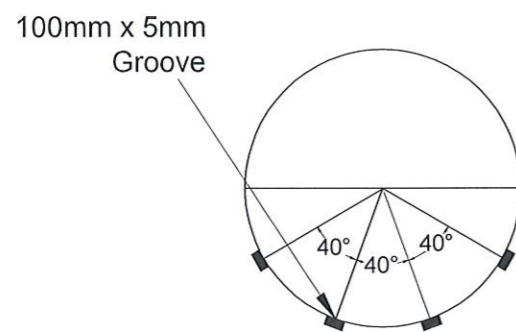
SUBSURFACE DRAIN [DS (S) -A]



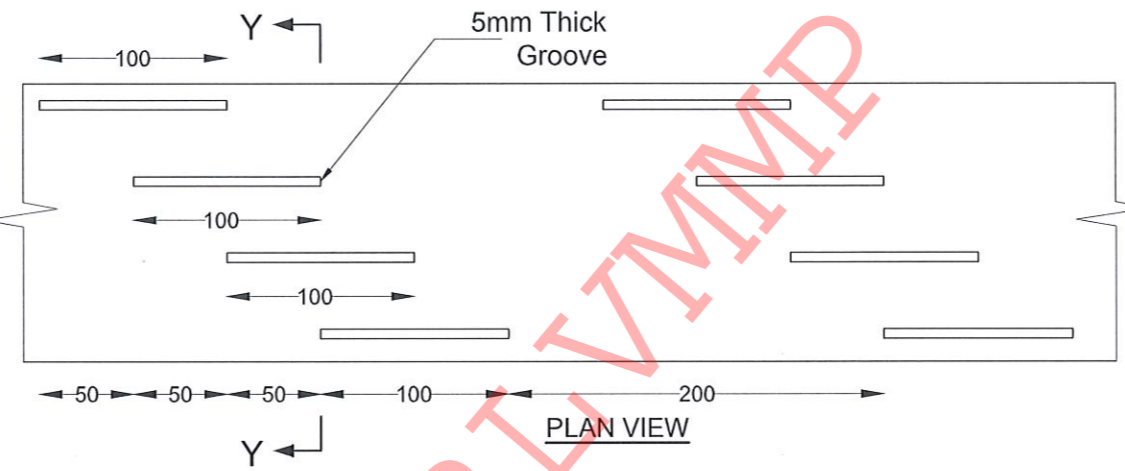
DETAIL C / DS (S) -A



SECTION A-A (OUTLET DETAIL SUBSURFACE DRAIN)

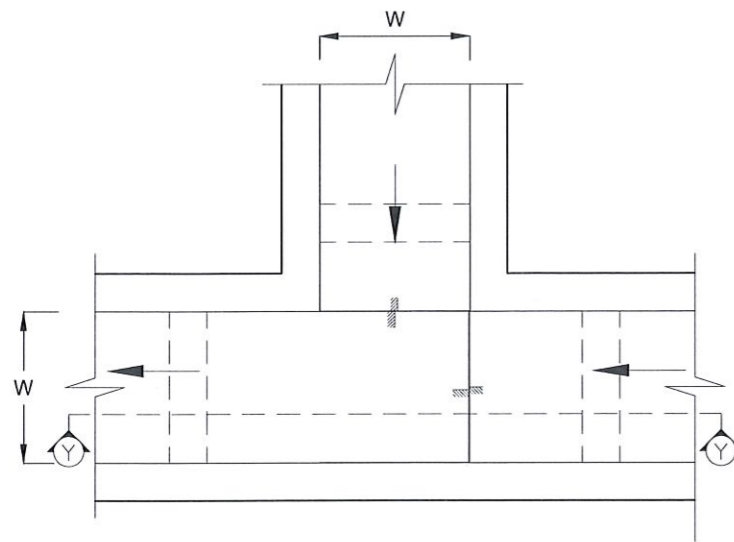


SECTION Y - Y

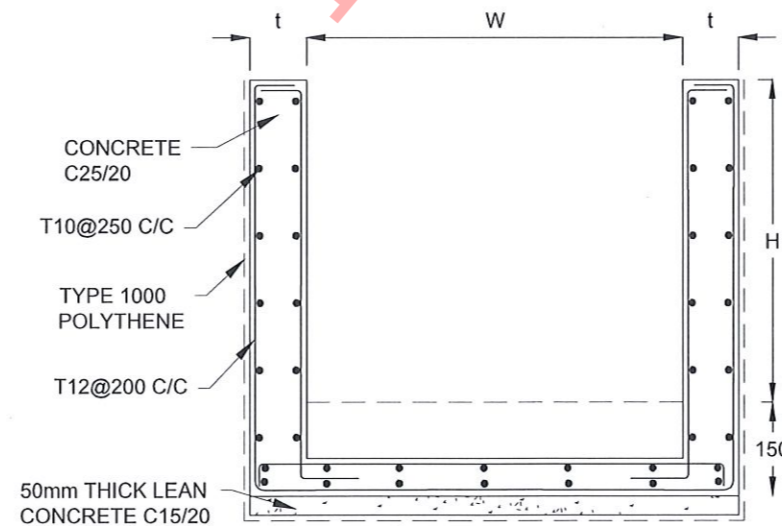


PLAN VIEW

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



PLAN VIEW OF CATCH PIT (CP)



SECTION Y - Y (CP - R)

NOTES

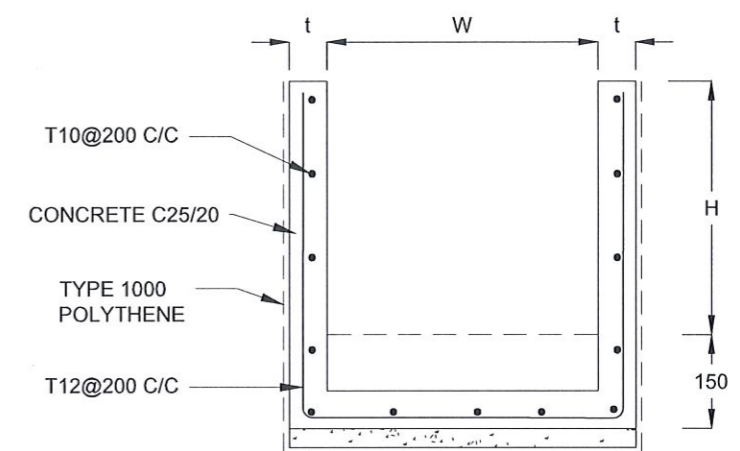
1. W,H,t ; SHALL BE THE SAME AS RESPECTIVE DRAIN SECTION.
2. CP - R SHALL BE USED WHERE H > = 900mm
3. DEPTH OF EXCAVATION MAY VARY ACCORDING TO SITE CONDITIONS.
4. DOWELS SHALL BE INSTALLED ACCORDING TO THE GROUND CONDITIONS AS INSTRUCTED BY THE ENGINEER.
5. 10 mm THICK EXPANSION JOINT SHALL BE INTRODUCED 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/mm².
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
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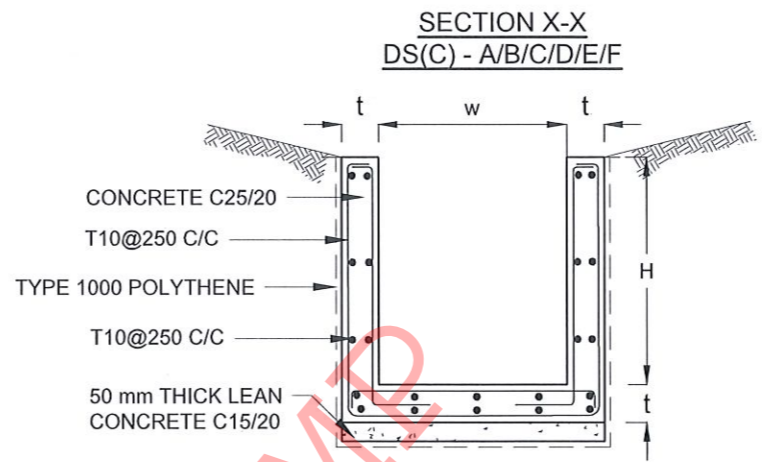
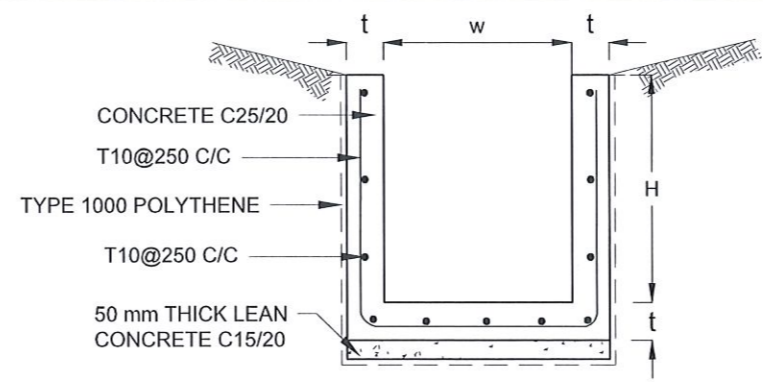
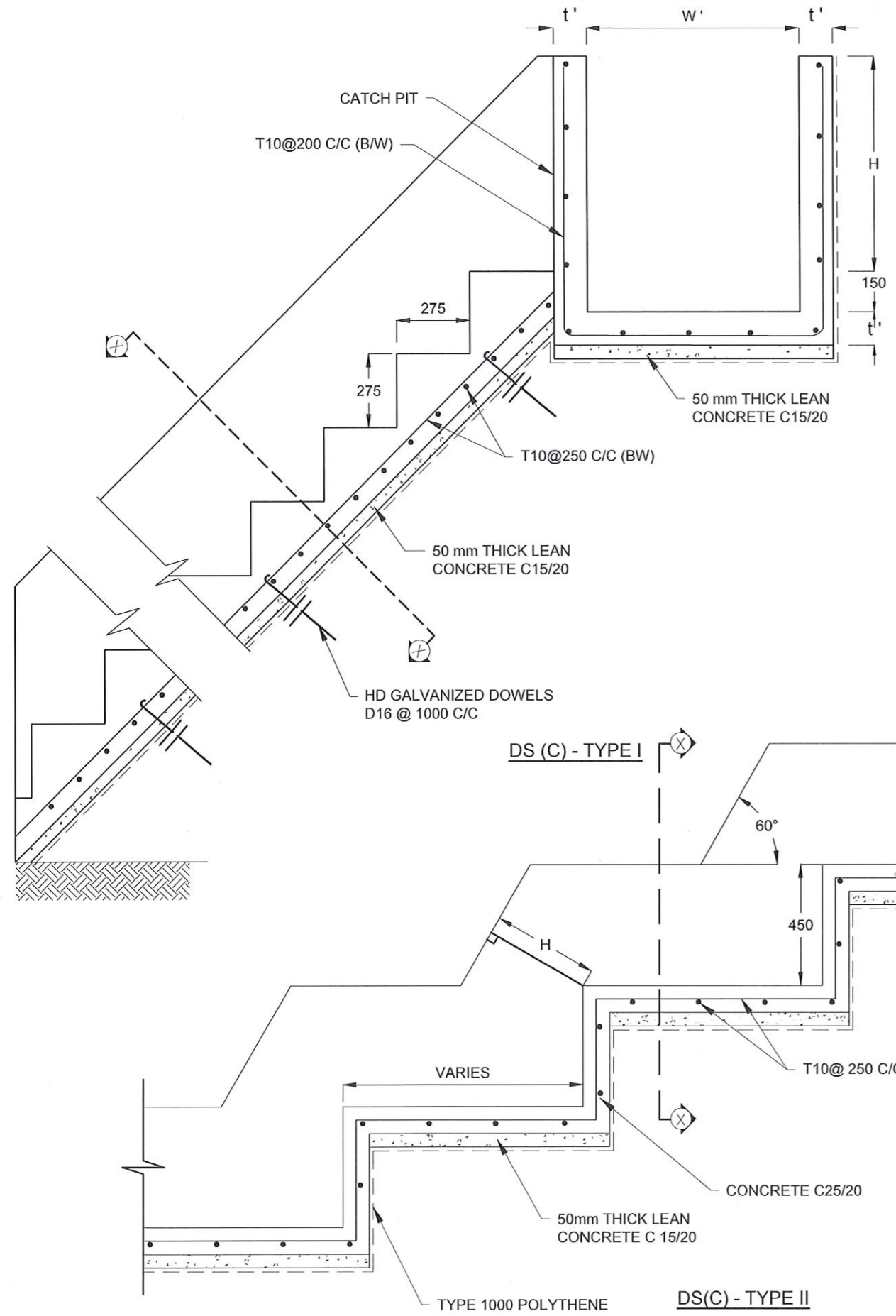
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE
 REDUCTION OF LANDSLIDE
 VULNERABILITY BY MITIGATION MEASURES
 DENIYAYA HOSPITAL

TITLE
 DETAILS OF DRAINS
 (SUBSURFACE DRAIN AND CATCHPIT)

SCALE | N.T.S | DATE | 11.05.2022
 PROJECT / DRAWING No. | REVISION |
 RLVMMP/WORKS/NCB/PHII/104-DH/DR-06c | 00

DESCRIPTION	NAME	SIGNATURE
DRAWN	K.M.D.NISHANTHI	<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/mm².
- 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

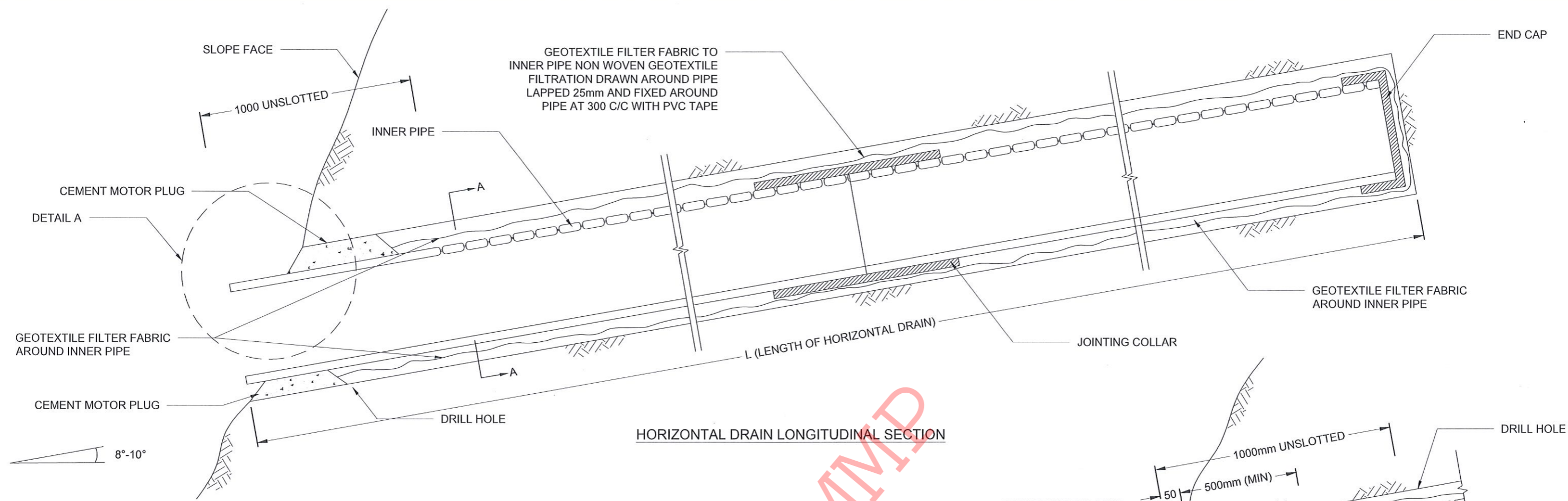
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE
 REDUCTION OF LANDSLIDE
 VULNERABILITY BY MITIGATION MEASURES
 DENIYAYA HOSPITAL

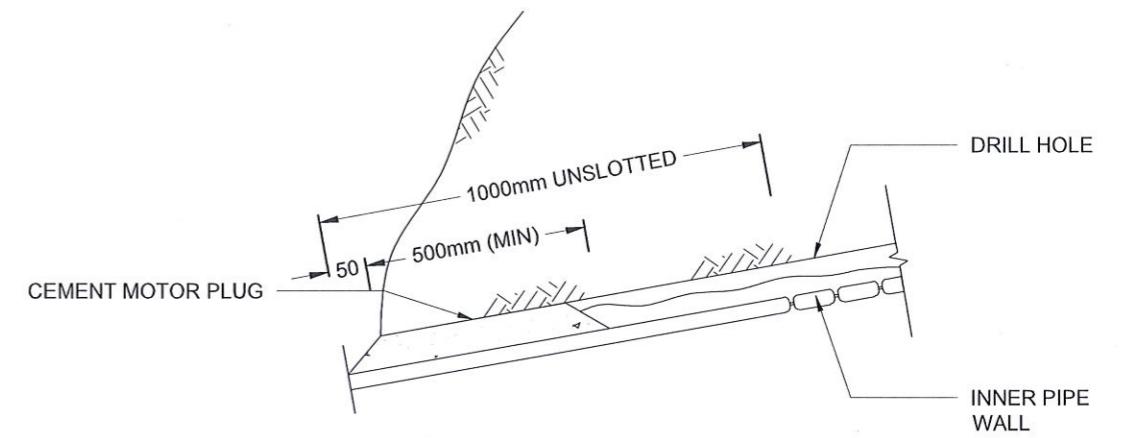
TITLE
 DETAILS OF DRAINS
 (CASCADE DRAIN)

SCALE: N.T.S. DATE: 11.05.2022
 PROJECT / DRAWING No. RLVMMP/WORKS/NCB/PH11/104-DH/DR-06d REVISION: 00

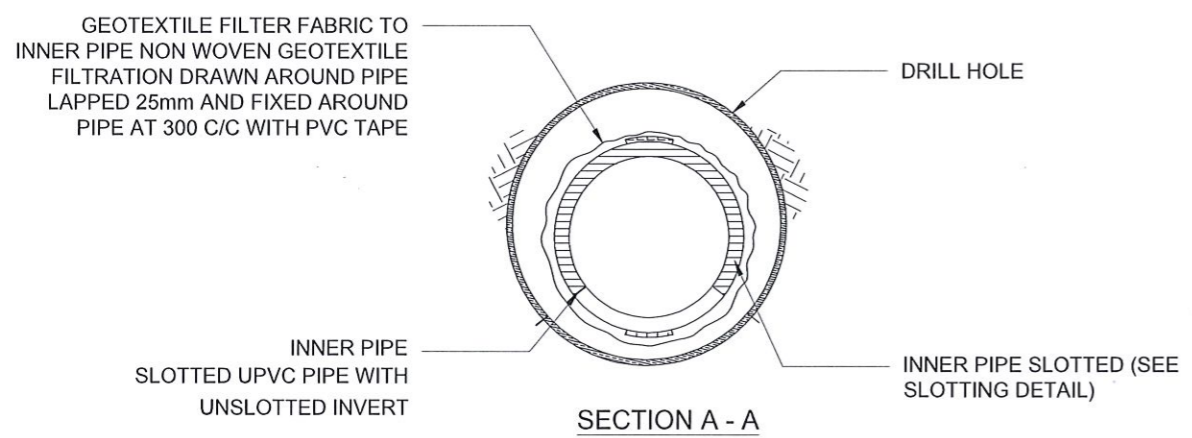
DESCRIPTION	NAME	SIGNATURE
DRAWN	K.M.D.NISHANTHI	<i>[Signature]</i>
DESIGNER	D.M.D.T. DASANAYAKA	<i>[Signature]</i>
CHECKED	B.I. KUMARAGE	<i>[Signature]</i>
RECOMMENDED	Prof. S.A.S. KULATHILAKA	<i>[Signature]</i>
APPROVED	K.N. BANDARA	<i>[Signature]</i>



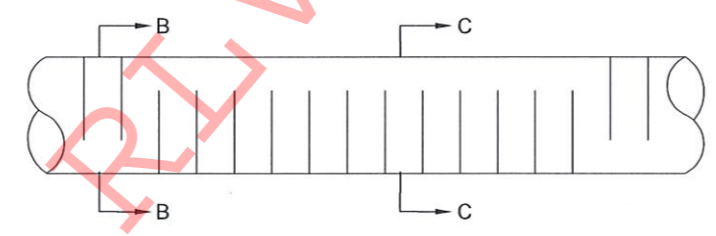
HORIZONTAL DRAIN LONGITUDINAL SECTION



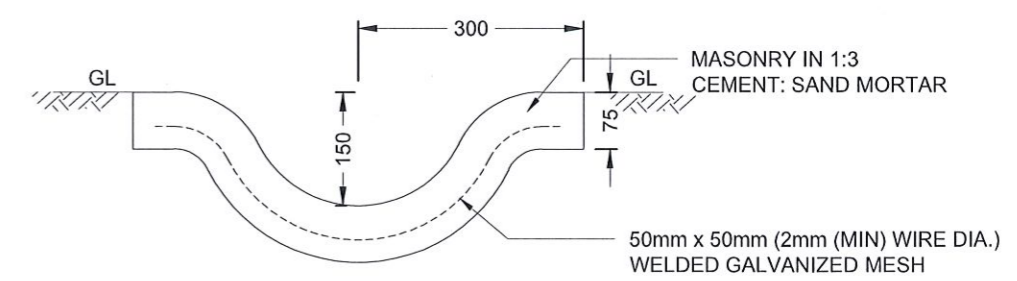
DETAIL A



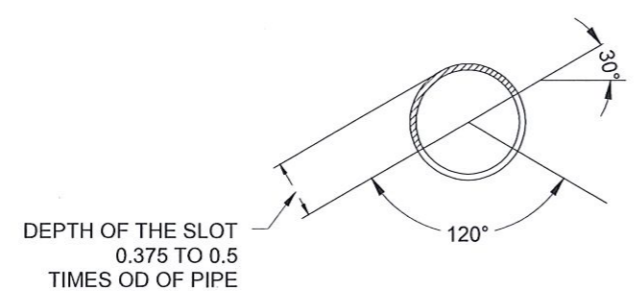
SECTION A - A



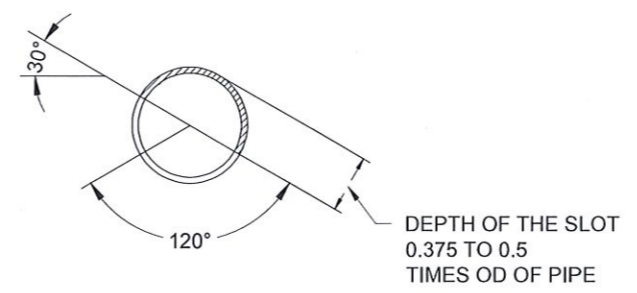
INNER AND OUTER PIPE SLOTTING DETAIL (TOP VIEW)



DETAIL OF GUIDE DRAIN



SECTION B - B

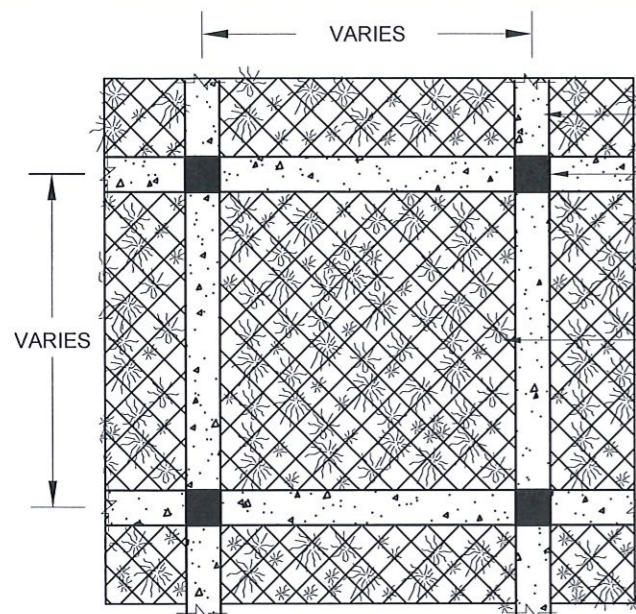


SECTION C - C

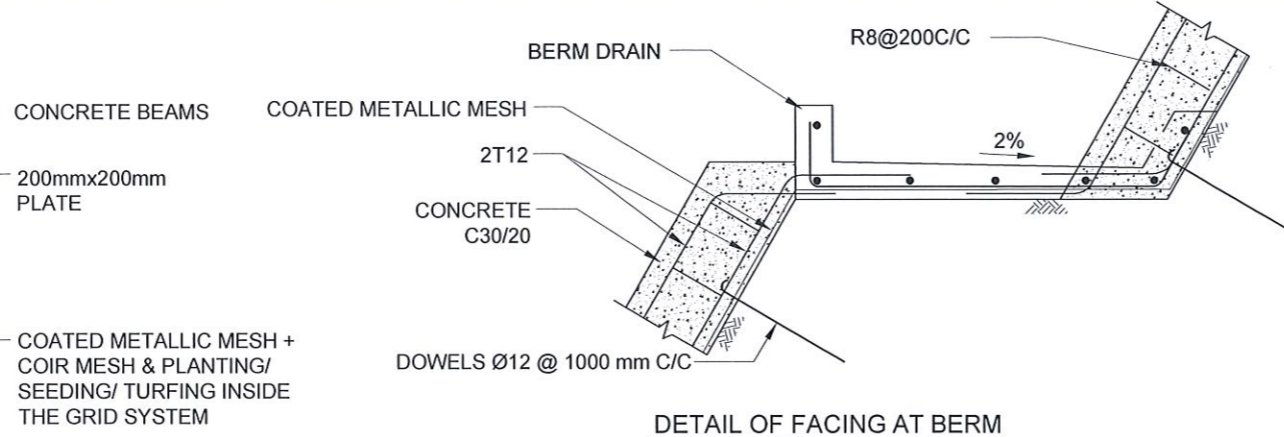
NOTES

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

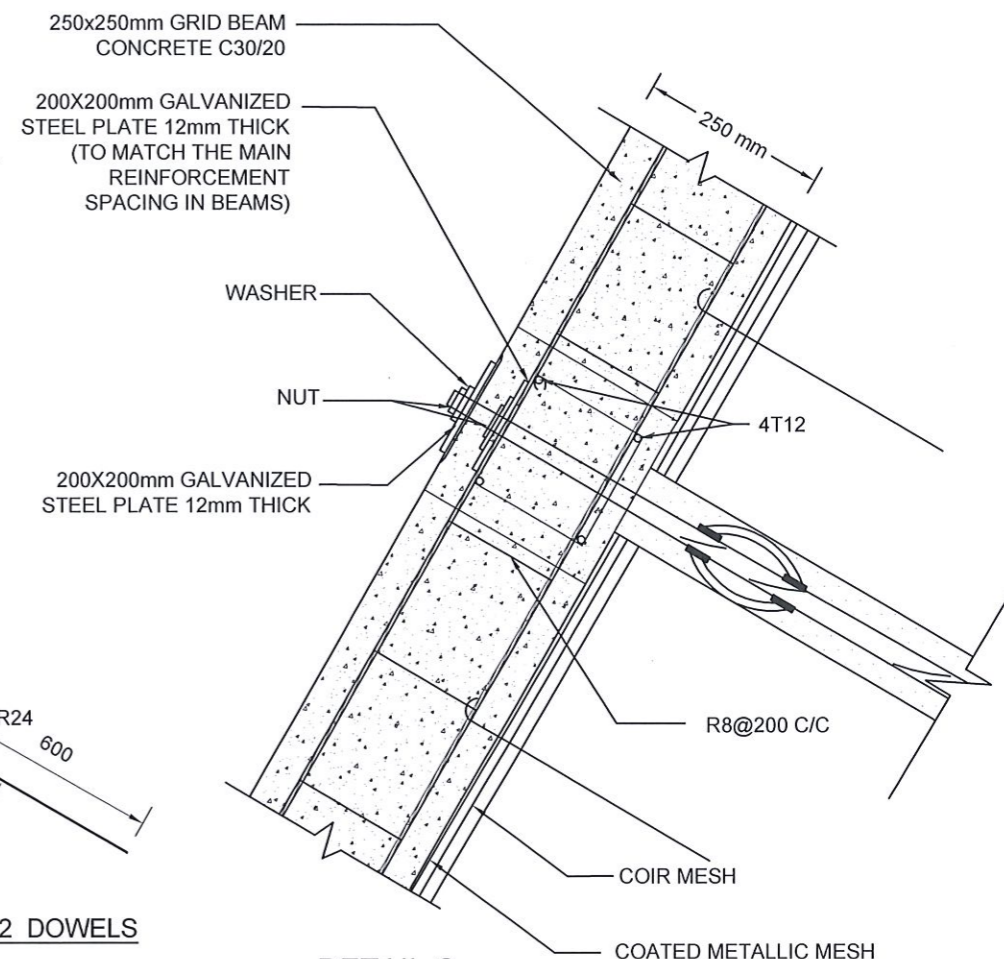
EMPLOYER DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT NATIONAL BUILDING RESEARCH ORGANISATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	DESIGNER DESIGN UNIT NATIONAL BUILDING RESEARCH ORGANIZATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	REV	DATE	REVISION DESCRIPTION	APPROVAL	PROJECT TITLE REDUCTION OF LANDSLIDE VULNERABILITY BY MITIGATION MEASURES DENIYAYA HOSPITAL	TITLE DETAILS OF HORIZONTAL DRAIN SECTIONS	DESCRIPTION	NAME	SIGNATURE
									SCALE	N.T.S
							PROJECT / DRAWING No.	REVISION	00	
							RLVMMP/WORKS/NCB/PH11/104-DH/DR-07			
								RECOMMENDED	Prof. S.A.S. KULATHILAKA	
								APPROVED	K.N. BANDARA	



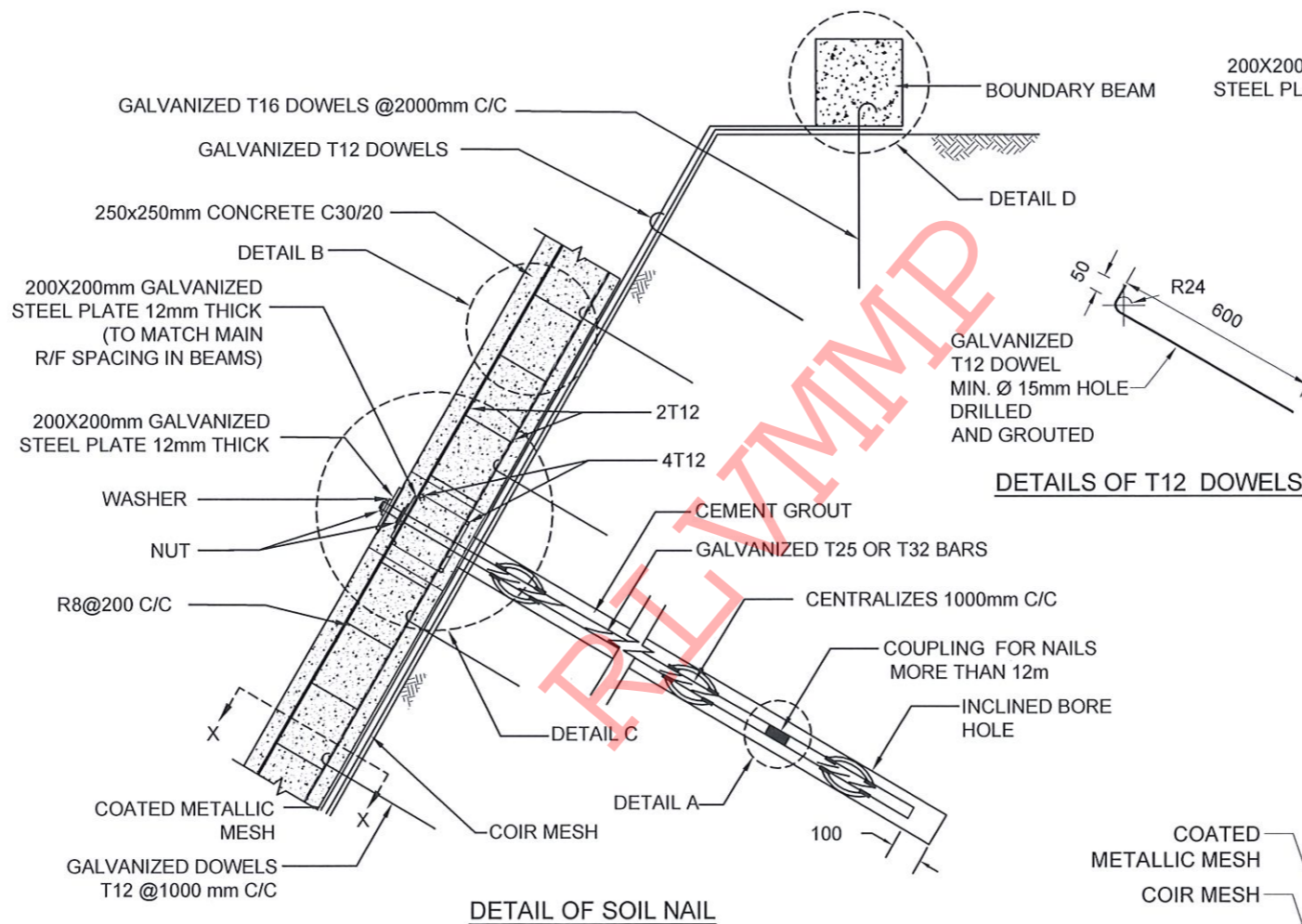
DETAIL - B



DETAIL OF FACING AT BERM

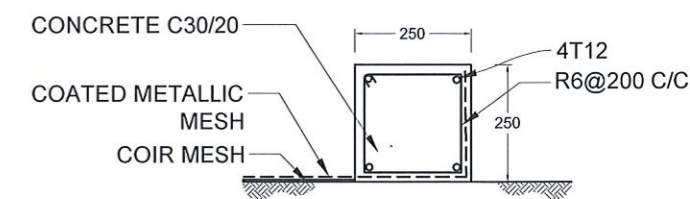


DETAIL C

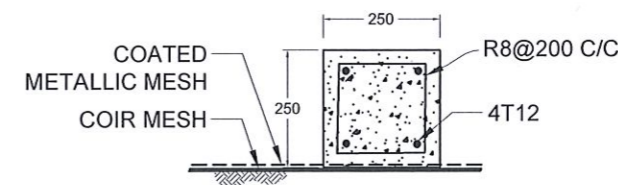


DETAIL OF SOIL NAIL

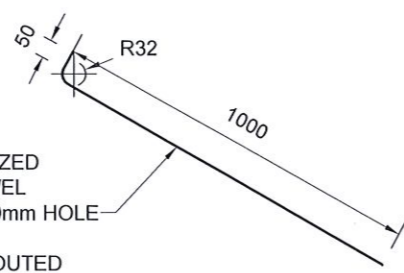
DETAILS OF T12 DOWELS



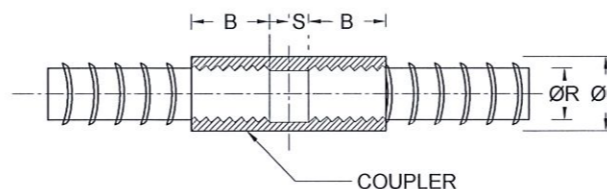
DETAIL D



SECTION X-X



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

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.
- TURFING / SODDING / SEEDING / PLANTING USED FOR VEGETATION COVER
- 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
- BOUNDARY BEAM SHALL BE STRUCTURALLY CONNECTED TO ALREADY CONSTRUCTED GRID BEAMS AT EACH JUNCTION
- BOUNDARY BEAM SHALL BE FOUNDED ON SLOPES $\leq 30^\circ$ AT CROWN AREAS.
- 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
- SPACING AND LOCATIONS OF DOWELS INSTALLED TO FIX THE COATED METALLIC MESH AGAINST THE SLOPE SHALL BE VARIED ACCORDING TO THE SITE CONDITION

EMPLOYER

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

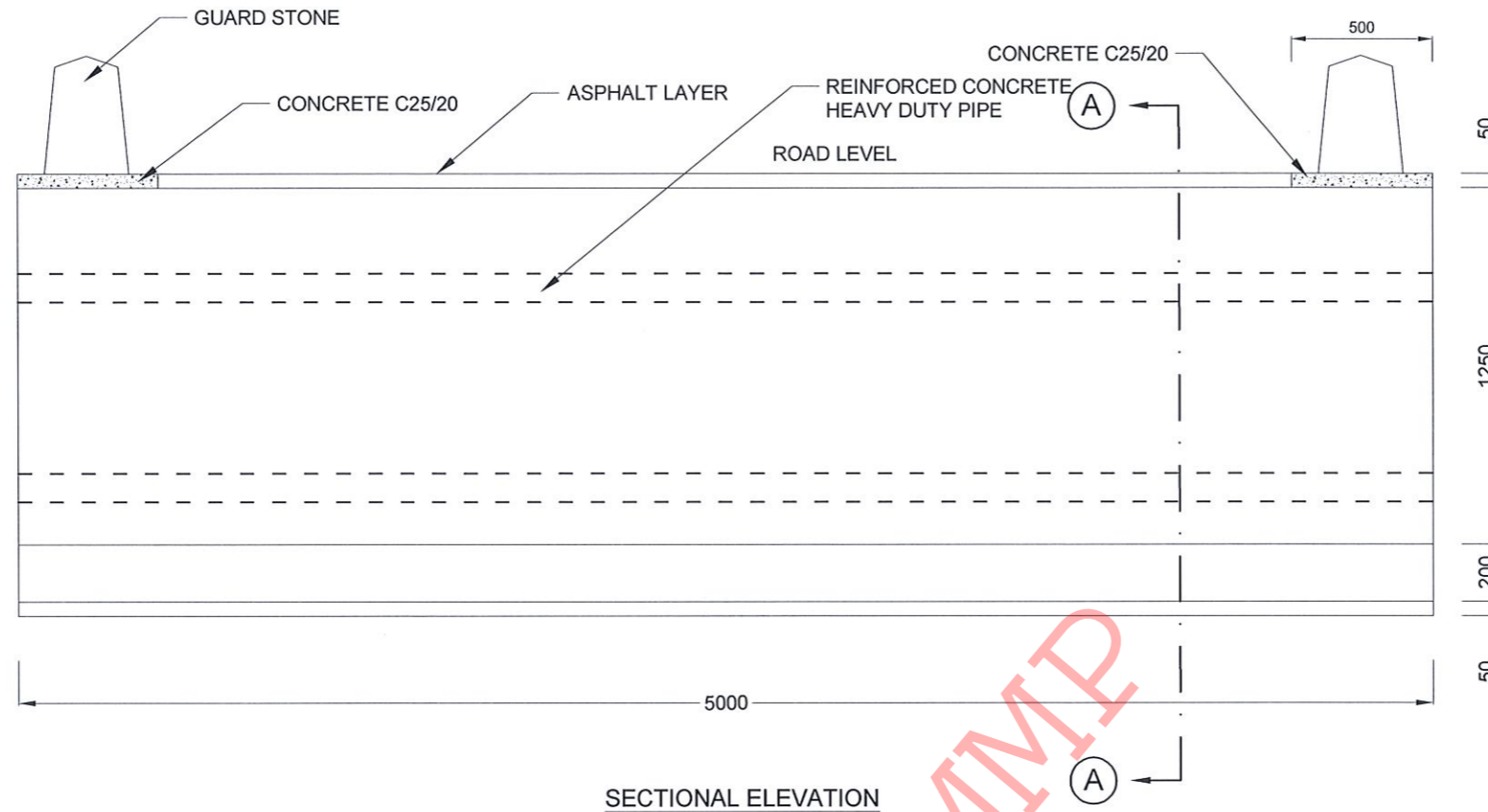
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE
 REDUCTION OF LANDSLIDE
 VULNERABILITY BY MITIGATION MEASURES
 DENIYAYA HOSPITAL

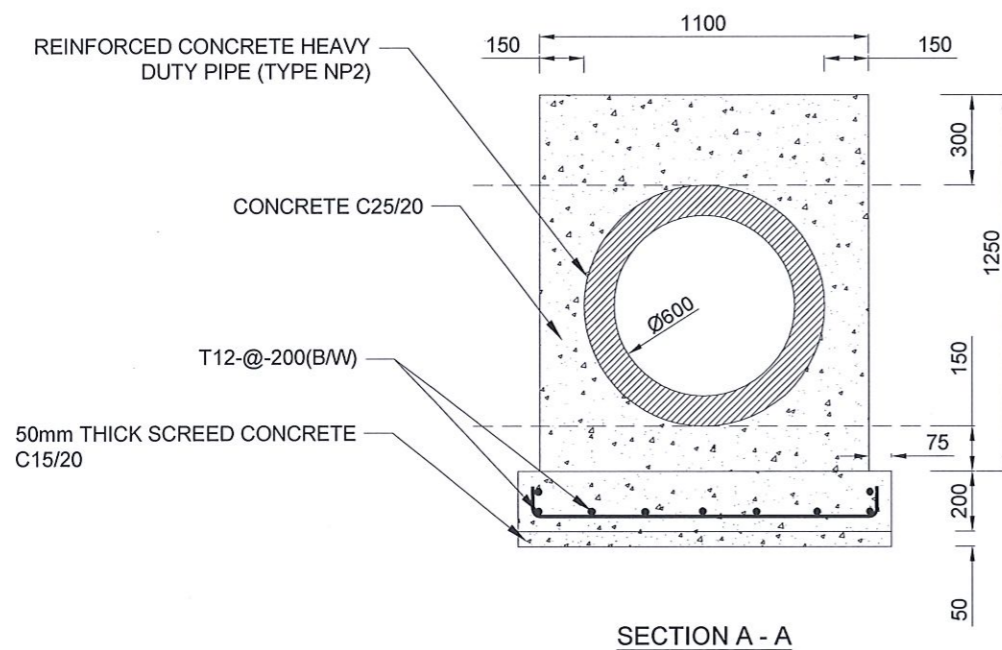
DETAILS OF SOIL NAILING WITH
 NON EMBEDDED GRID BEAM

SCALE N.T.S. DATE 11.05.2022
 PROJECT / DRAWING No. RLVMM/WORKS/NCB/PHII/104-DH/DR-08 REVISION 00

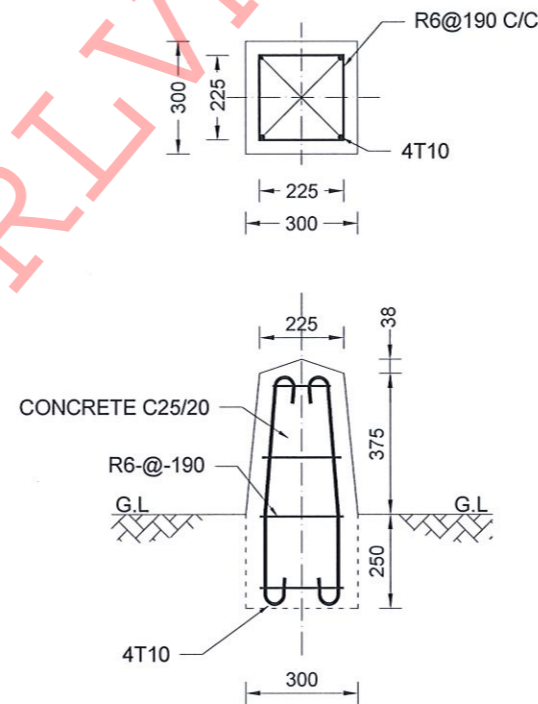
DESCRIPTION	NAME	SIGNATURE
DRAWN	K.M.D.NISHANTHI	
DESIGNER	D.M.D.T. DASANAYAKA	
CHECKED	B.I. KUMARAGE	
RECOMMENDED	Prof. S.A.S. KULATHILAKA	
APPROVED	K.N. BANDARA	



SECTIONAL ELEVATION




SECTION A - A



DETAILS OF GUARD STONE

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS.
 2. REINFORCED CONCRETE HEAVY DUTY PIPE SHALL BE IN ACCORDANCE WITH REQUIREMENTS GIVEN IN SLS 452; "SRI LANKA STANDARD SPECIFICATION FOR CONCRETE NON REINFORCEMENT PRESSURE PIPE" CONDITIONS.
 3. DEPTH OF EXCAVATION SHALL BE VARIED ACCORDING TO SITE CONDITIONS.
- REINFORCEMENT
4. ALL BARS MARKED "T" SHALL BE HIGH YIELD DEFORMED BARS OF YIELD STRENGTH NOT LESS THAN 460N/mm².
 5. 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.
 6. ANCHORAGE LENGTH SHOULD BE 40X BAR DIA.
 7. REINFORCEMENT BARS SHALL BE BENT ACCORDANCE WITH STANDARD SPECIFICATIONS.
 8. CLEAR CONCRETE COVER FOR ALL FOUNDATION REINFORCEMENT BELLOW GROUND LEVEL TO BE 40 mm.
 9. 10 mm THICK EXPANSION JOINT SHALL BE INTRODUCE IN EVERY 5m INTERVAL.

EMPLOYER

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 MINISTRY OF PUBLIC ADMINISTRATION & DISASTER MANAGEMENT
 NATIONAL BUILDING RESEARCH ORGANIZATION
 No. 99/1, JAWATTA ROAD,
 COLOMBO - 05

DESIGNER

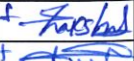




 DESIGN UNIT
 NATIONAL BUILDING RESEARCH ORGANIZATION
 No. 99/1, JAWATTA ROAD,
 COLOMBO - 05

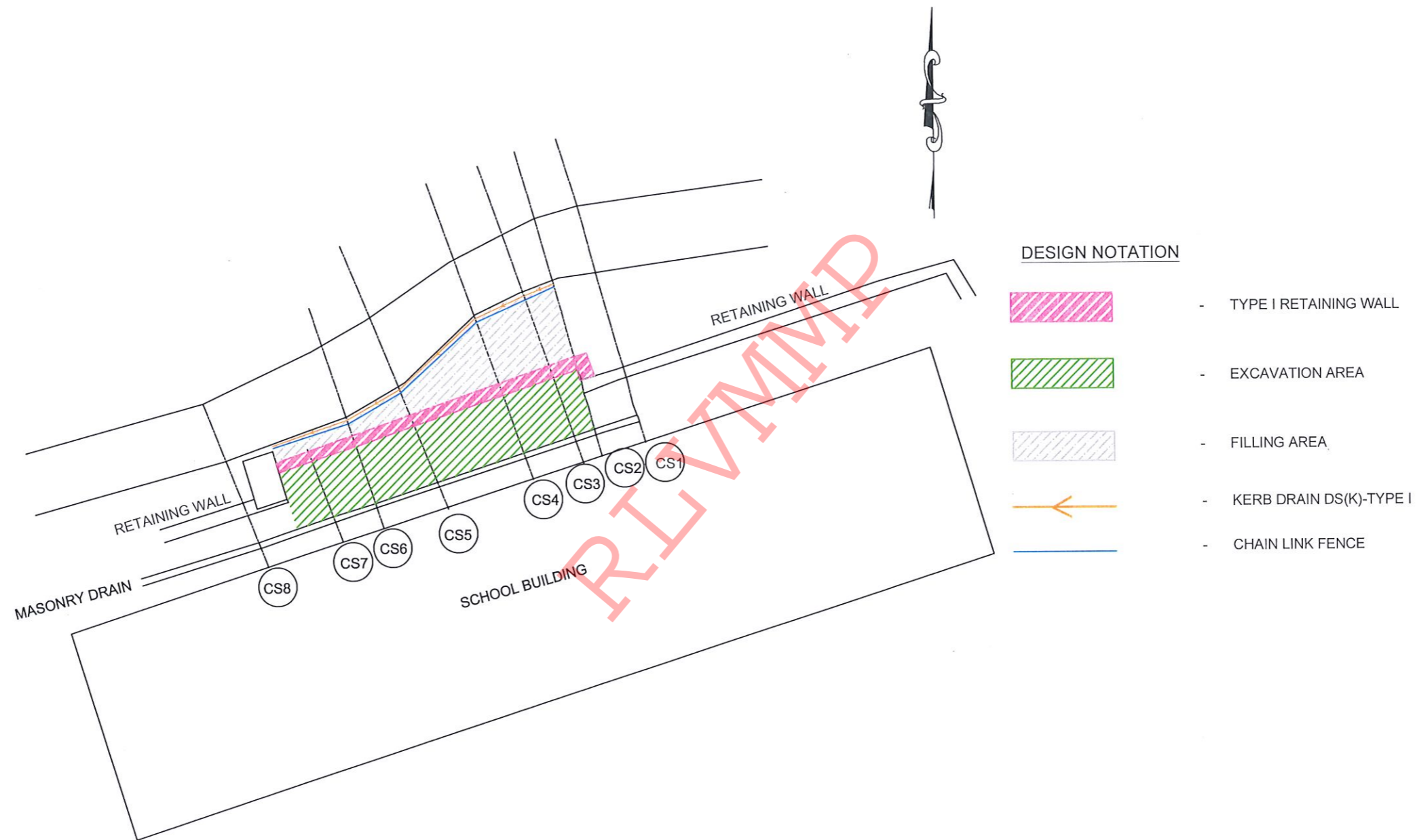
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE
 REDUCTION OF LANDSLIDE
 VULNERABILITY BY MITIGATION MEASURES
 DENIYAYA HOSPITAL

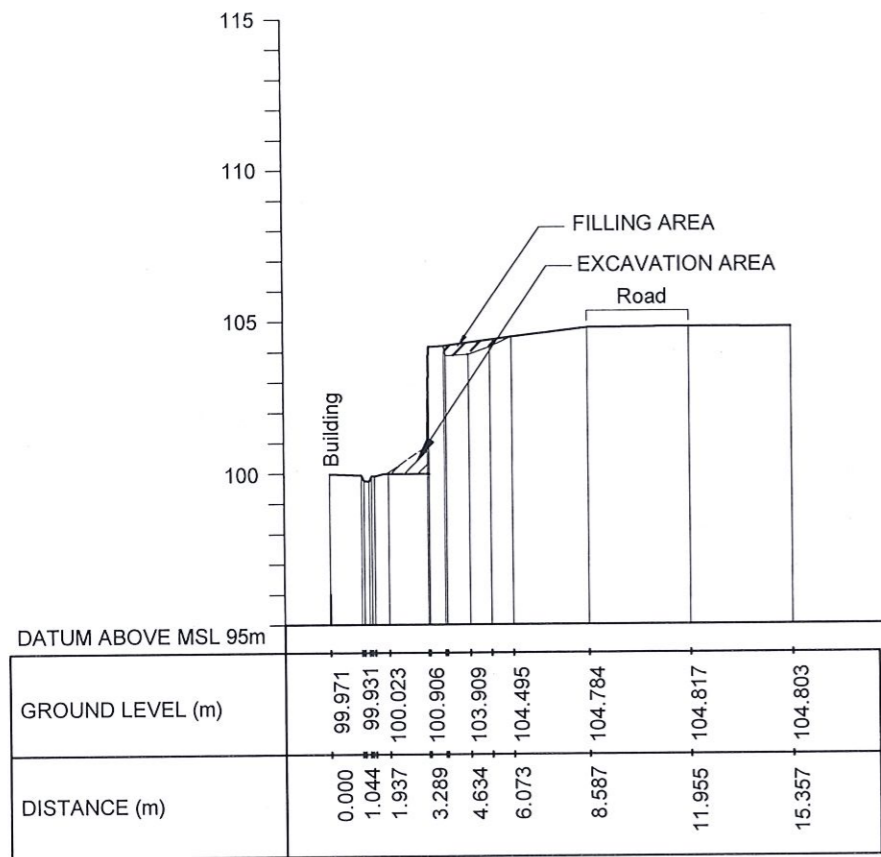
TITLE
 SECTIONAL DETAILS OF PIPE CULVERT

SCALE | N.T.S. | DATE | 11.05.2022
 PROJECT / DRAWING No. | RLVMP/WORKS/NCB/PH11/104-DH/DR-09 | REVISION | 00

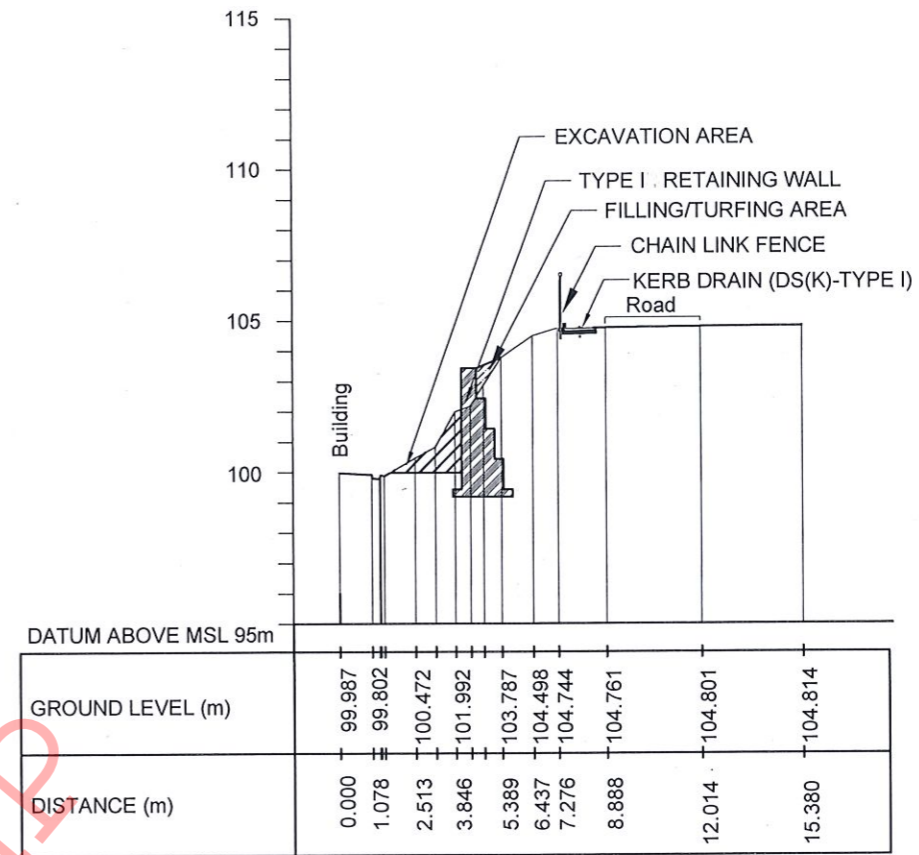
DESCRIPTION	NAME	SIGNATURE
DRAWN	K.M.D.NISHANTHI	
DESIGNED	D.M.D.T. DASANAYAKA	
CHECKED	B.I. KUMARAGE	
RECOMMENDED	PROF. S.A.S. KULATHILAKE	
APPROVED	K.N. BANDARA	



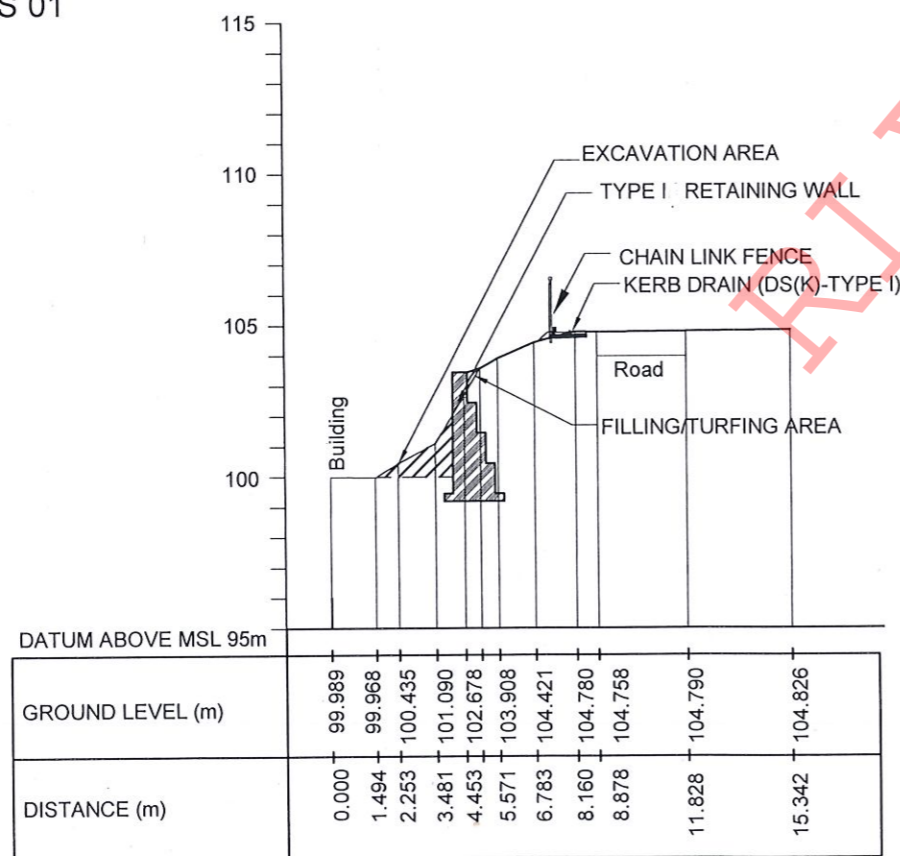
EMPLOYER DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA MINISTRY OF DEFENCE NATIONAL BUILDING RESEARCH ORGANISATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	DESIGNER GEOTECHNICAL ENGINEERING DIVISION NATIONAL BUILDING RESEARCH ORGANISATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	REV	DATE	REVISION DESCRIPTION	APPROVAL	PROJECT TITLE REDUCTION OF LANDSLIDE VULNERABILITY BY MITIGATION MEASURES H/ WALASMULLA NATIONAL SCHOOL LOCATION 1	TITLE PLAN VIEW OF THE PROPOSED MITIGATION MEASURES		DESCRIPTION	NAME	SIGNATURE	
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						PROJECT / DRAWING No.	RLVMMP/WORKS/NCB/PHII/150/L1/ DR-03	REVISION	00	DESIGNED	W.A.V. ANJALEE	
										RECOMMENDED	U.K.N.P. DHARMASENA	
										APPROVED	K.N. BANDARA	



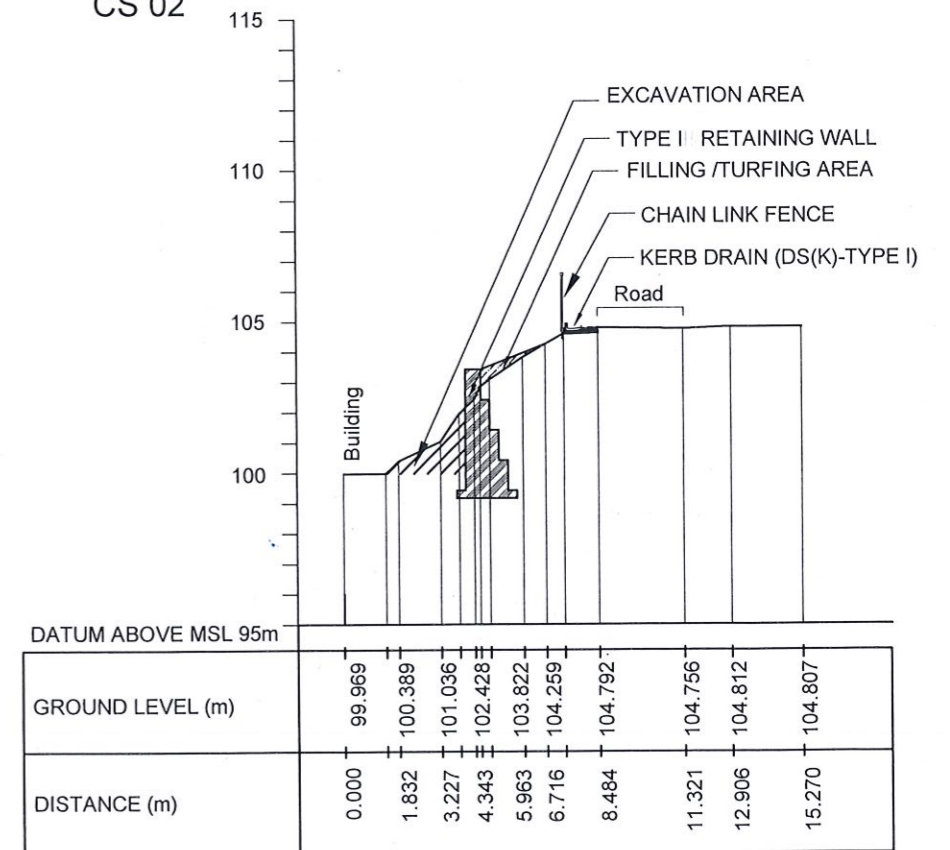
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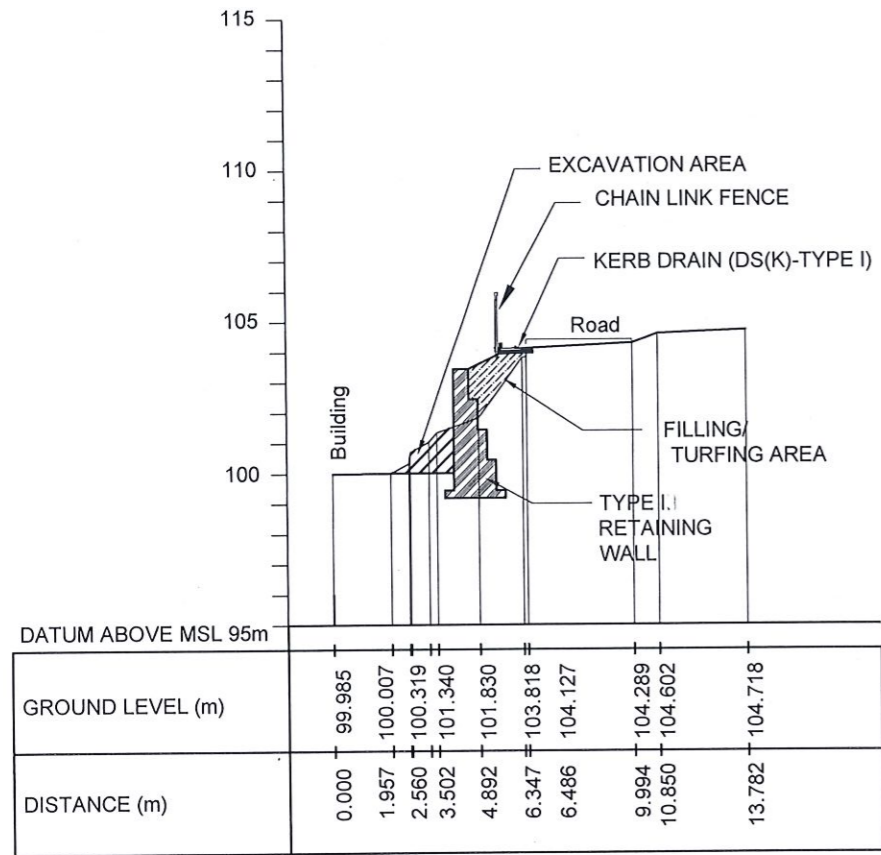


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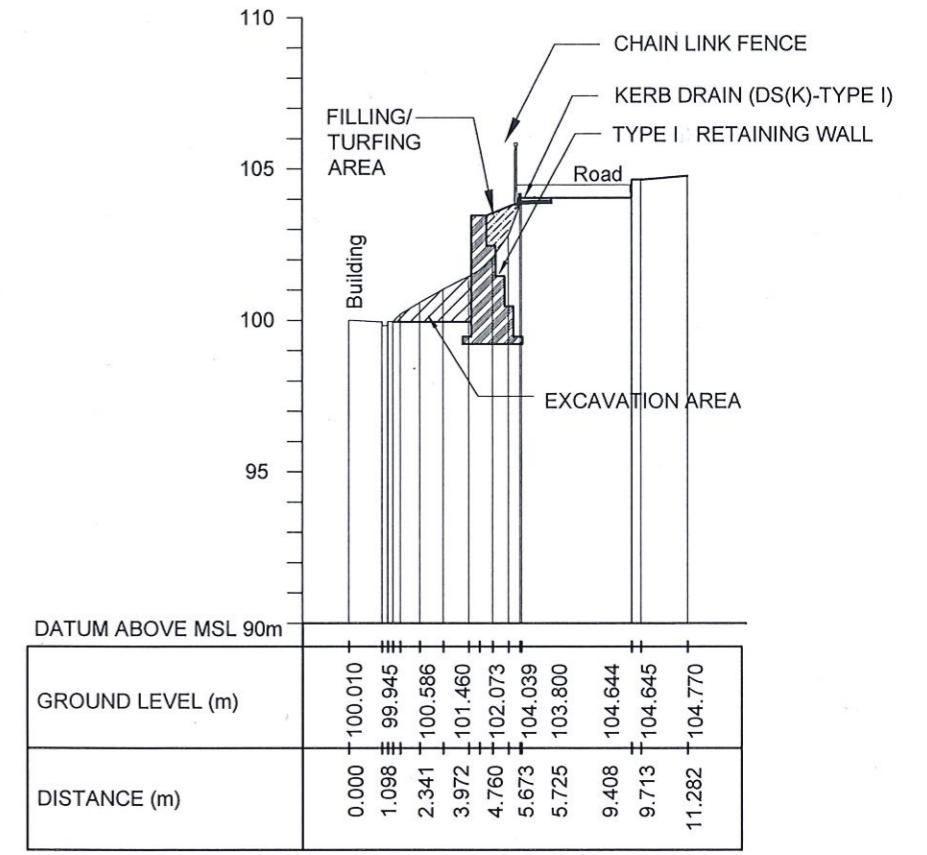


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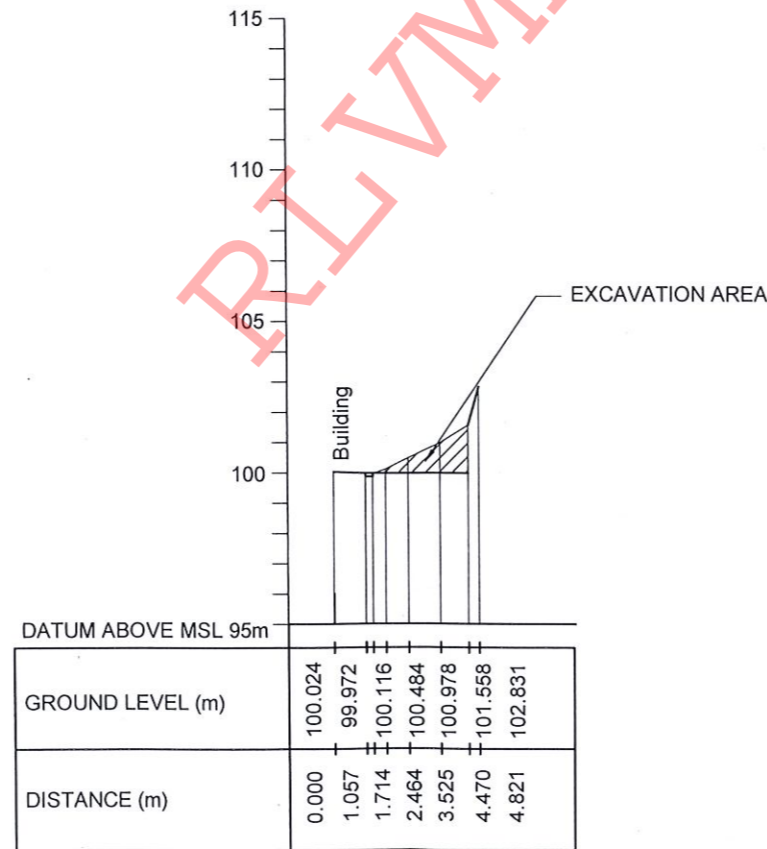
EMPLOYER DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA MINISTRY OF DEFENCE NATIONAL BUILDING RESEARCH ORGANISATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	DESIGNER GEOTECHNICAL ENGINEERING DIVISION NATIONAL BUILDING RESEARCH ORGANISATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	REV	DATE	REVISION DESCRIPTION	APPROVAL	PROJECT TITLE REDUCTION OF LANDSLIDE VULNERABILITY BY MITIGATION MEASURES H/ WALASMULLA NATIONAL SCHOOL LOCATION 1	TITLE		DESCRIPTION DRAWN DESIGNED RECOMMENDED APPROVED	NAME K. M. D. NISHANTHI W.A.V. ANJALEE U.K.N.P. DHARMASENA K.N. BANDARA	SIGNATURE
		SCALE	1:250	DATE	04.10.2023		REVISION	00			



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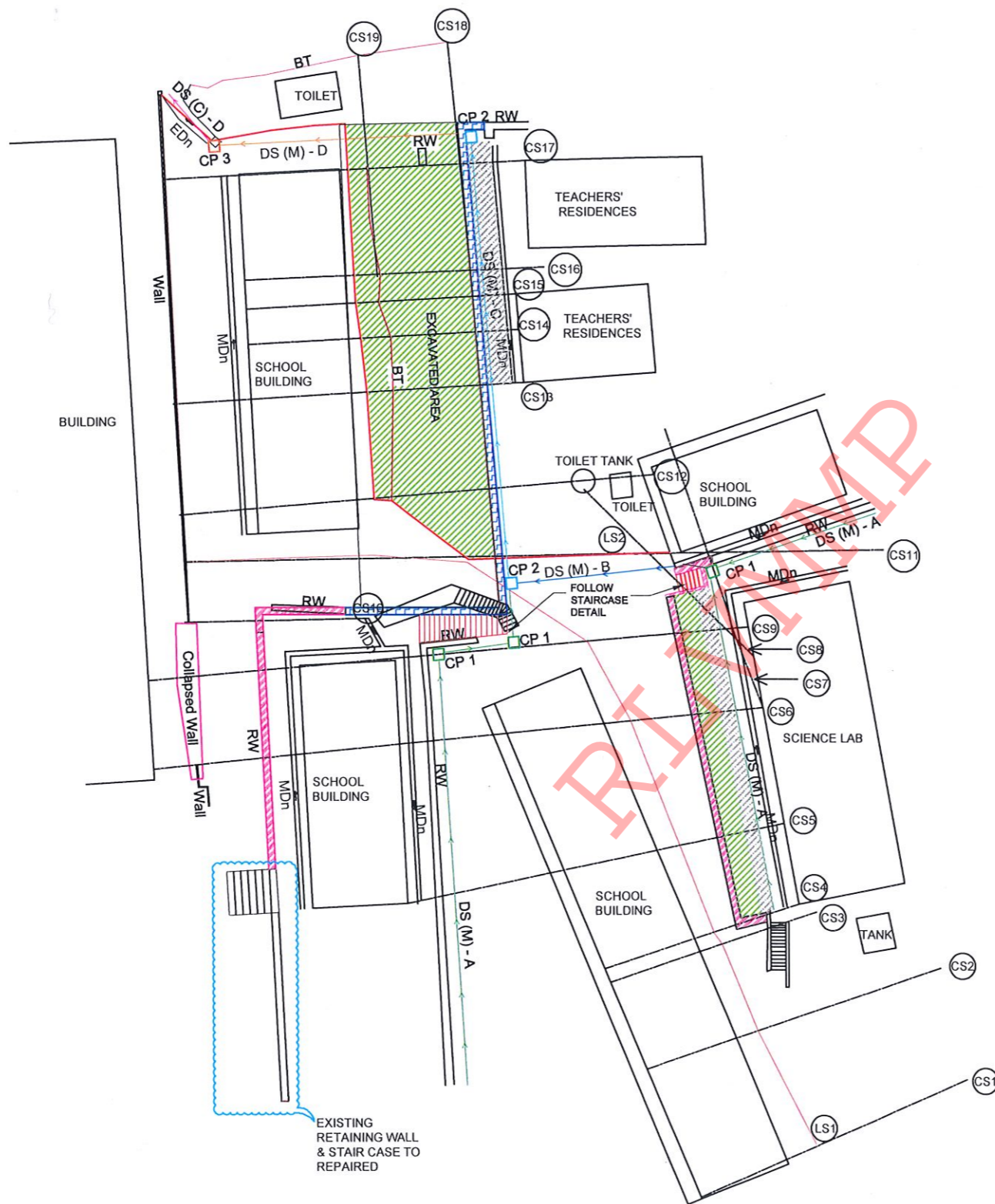


CS 06









CS 07

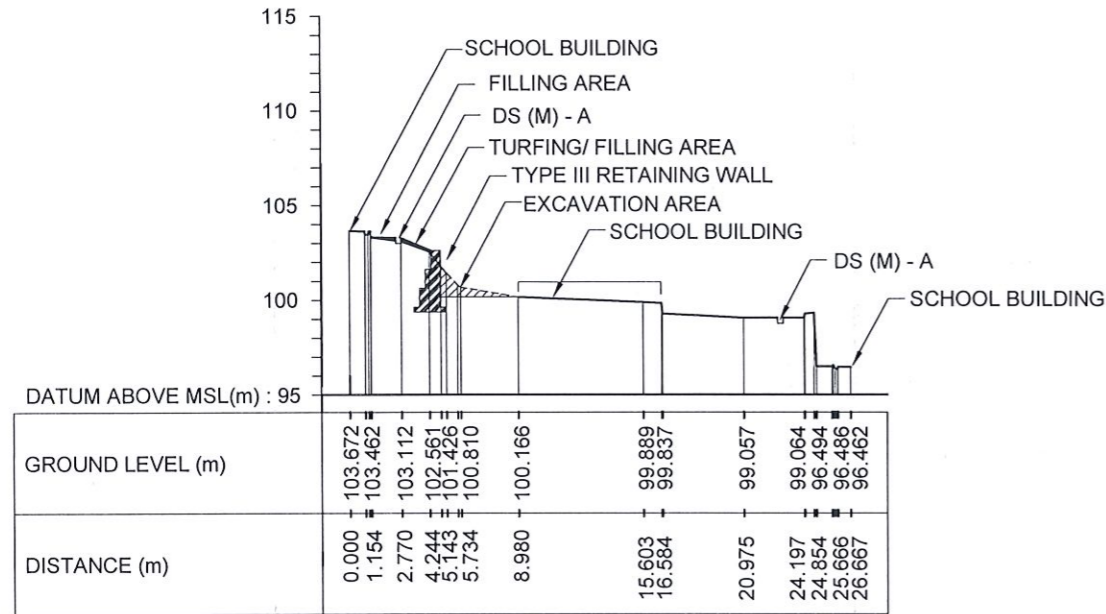
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		CROSS SECTIONS OF PROPOSED MITIGATION MEASURES		SCALE	1:250		DATE	04.10.2023			
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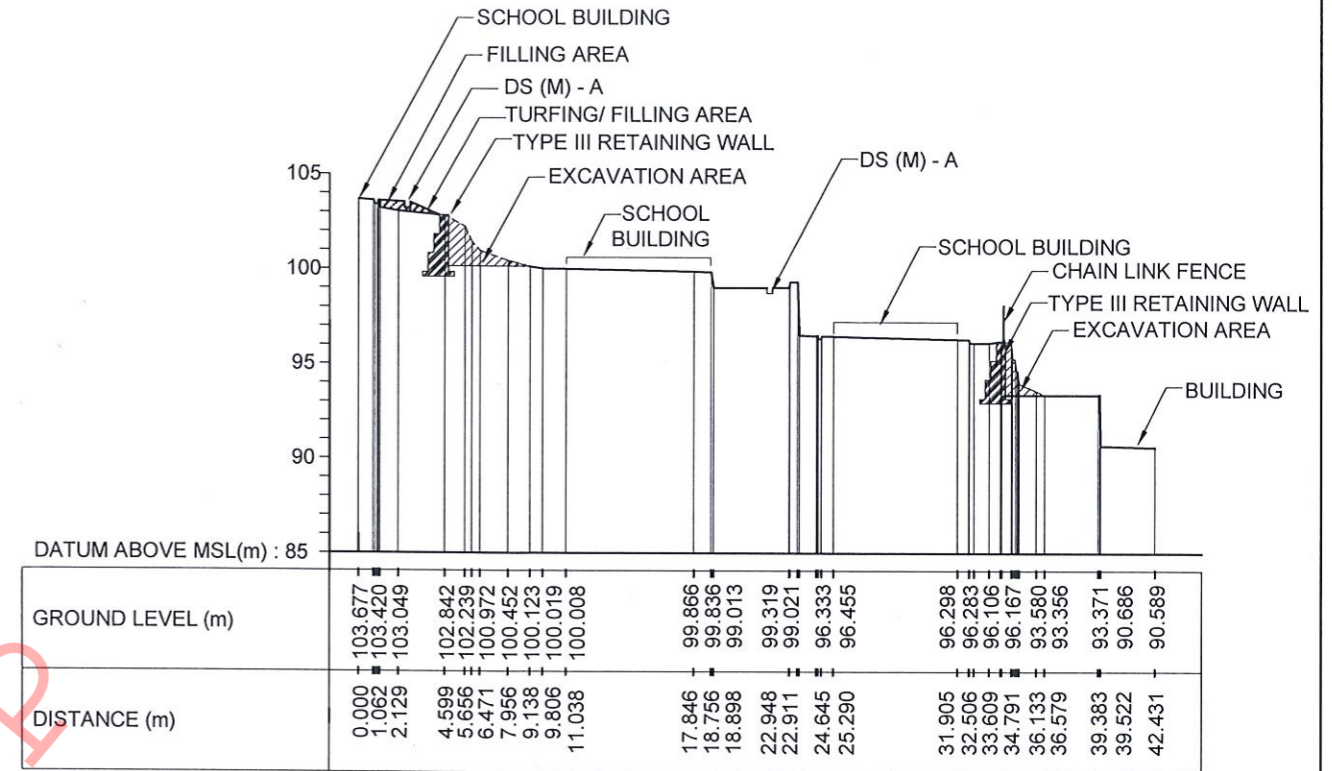
DESIGN NOTATION

- - DS(M) - A
- - DS(M) - B
- - DS(M) - C
- - DS (M) - D
- TYPE I RETAINING WALL
- TYPE II RETAINING WALL
- TYPE III RETAINING WALL
- EXCAVATION AREA
- FILLING AREA
- TURFING/FILLING AREA
- CATCH PIT
- PROPOSED STAIR CASE

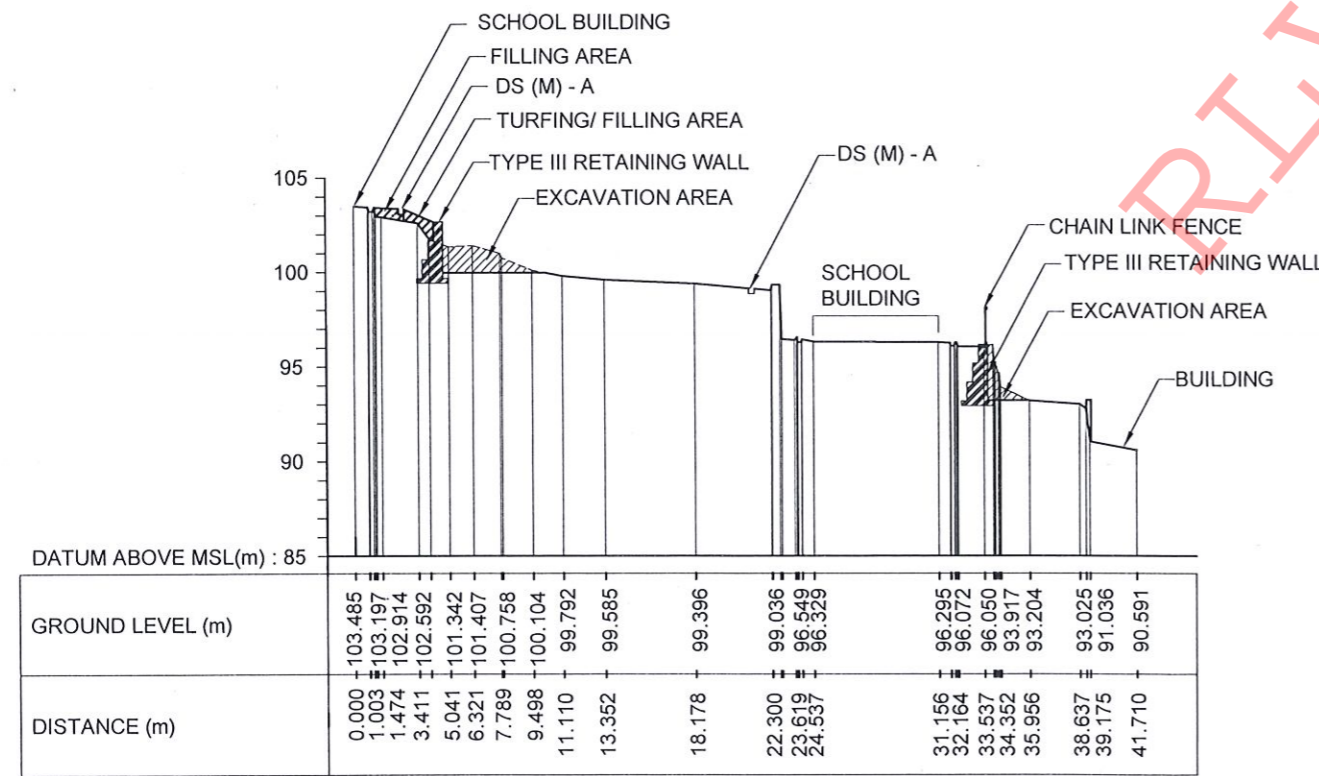
 DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA MINISTRY OF DEFENCE NATIONAL BUILDING RESEARCH ORGANISATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	 GEOTECHNICAL ENGINEERING DIVISION NATIONAL BUILDING RESEARCH ORGANISATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	REV	DATE	REVISION DESCRIPTION	APPROVAL	PROJECT TITLE REDUCTION OF LANDSLIDE VULNERABILITY BY MITIGATION MEASURES H/ WALASMULLA NATIONAL SCHOOL LOCATION 2	TITLE PLAN VIEW OF THE PROPOSED MITIGATION MEASURES			DESCRIPTION	NAME	SIGNATURE
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								PROJECT / DRAWING No. RLVMM/WORKS/NCB/PHI/150/L2/DR-03	REVISION 00	DESIGNED	W.A.V. ANJALEE	
										RECOMMENDED	U.K.N.P. DHARMASENA	
							APPROVED	K.N. BANDARA				



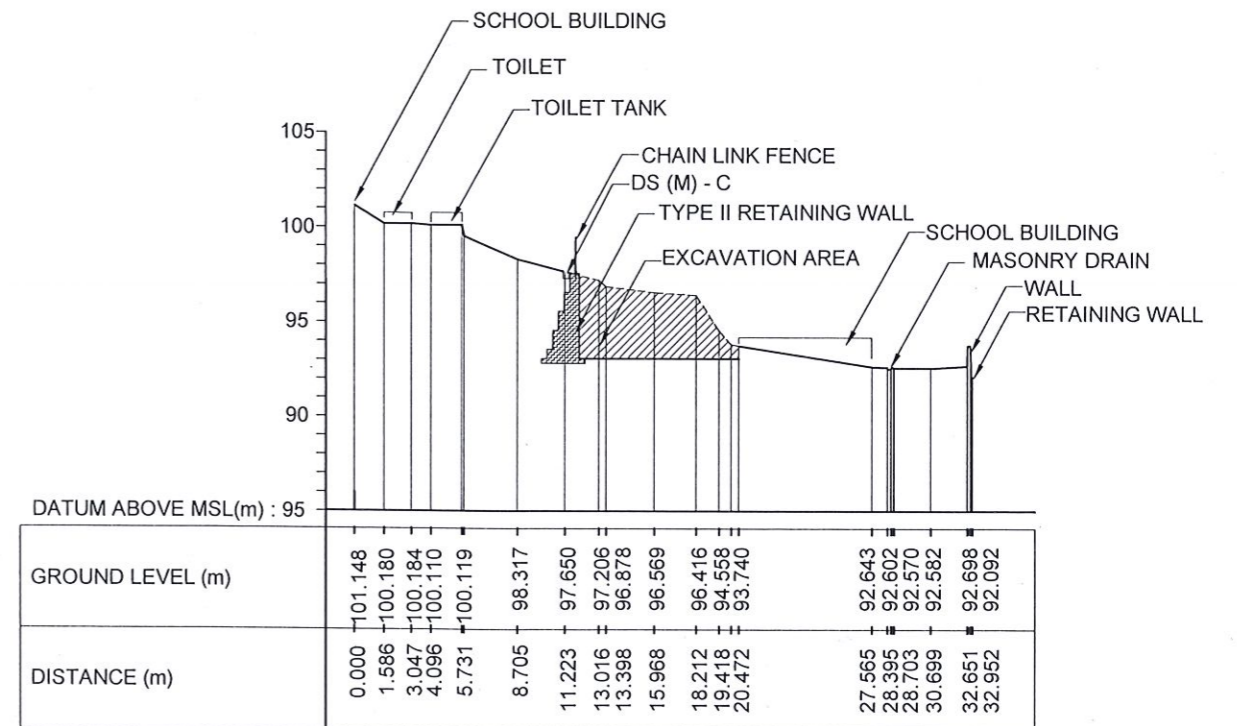
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CS 06

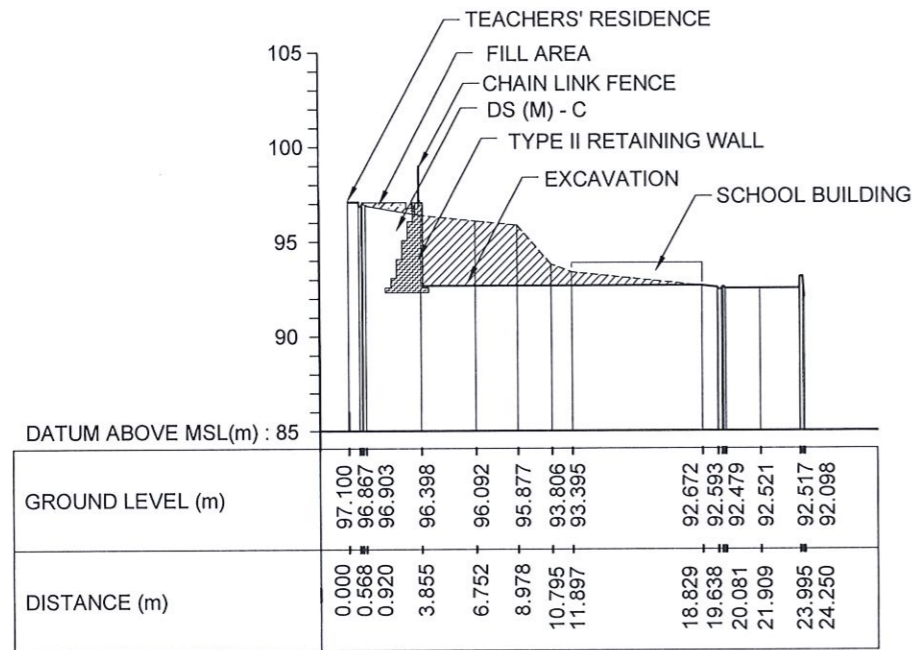


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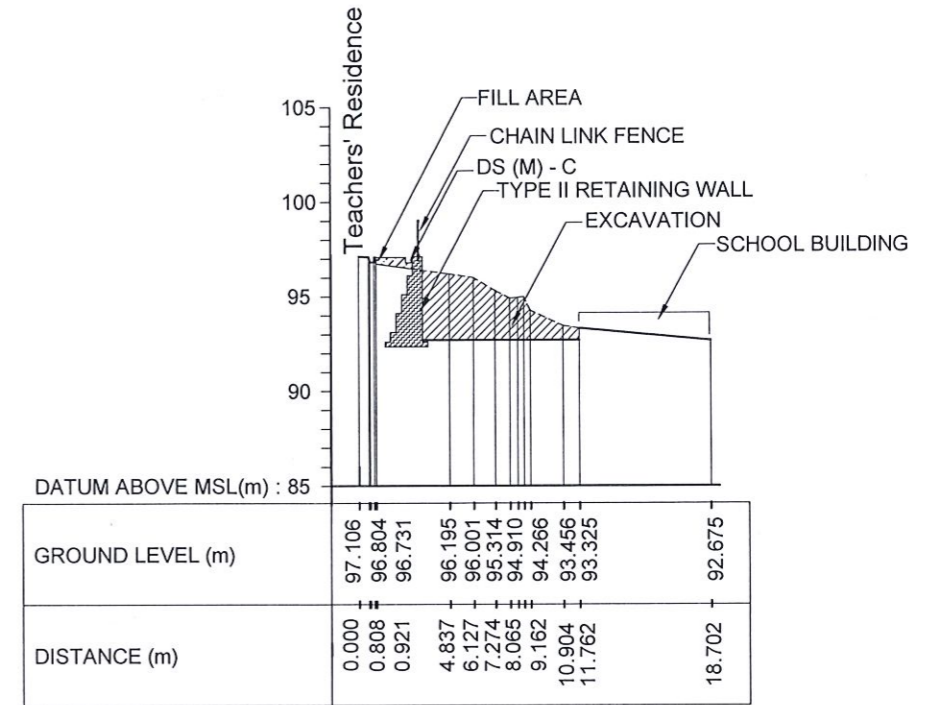


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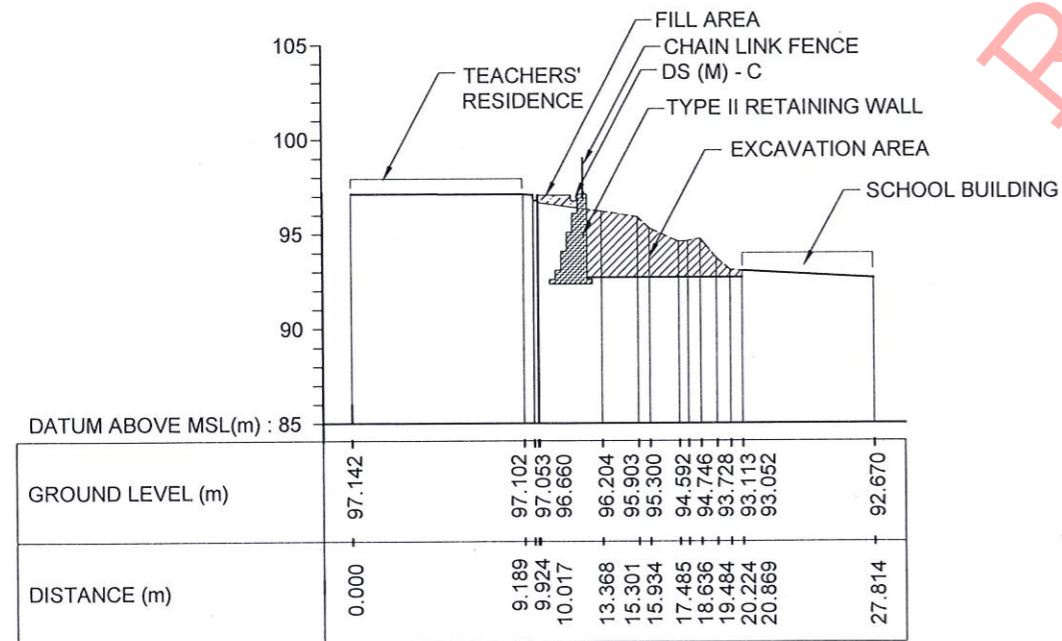
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								RECOMMENDED	U.K.N.P. DHARMASENA	
								APPROVED	K.N. BANDARA	



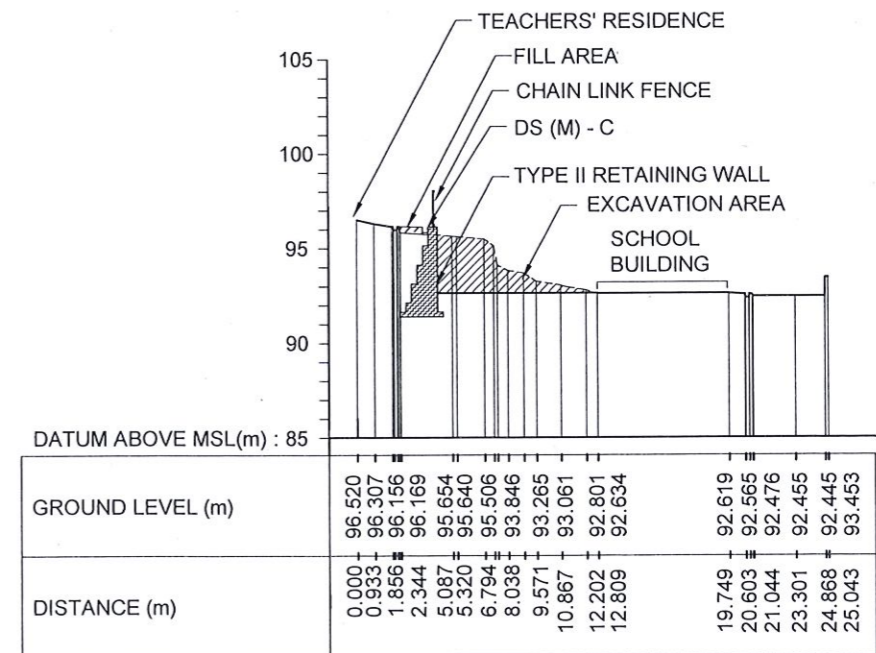
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CS 14








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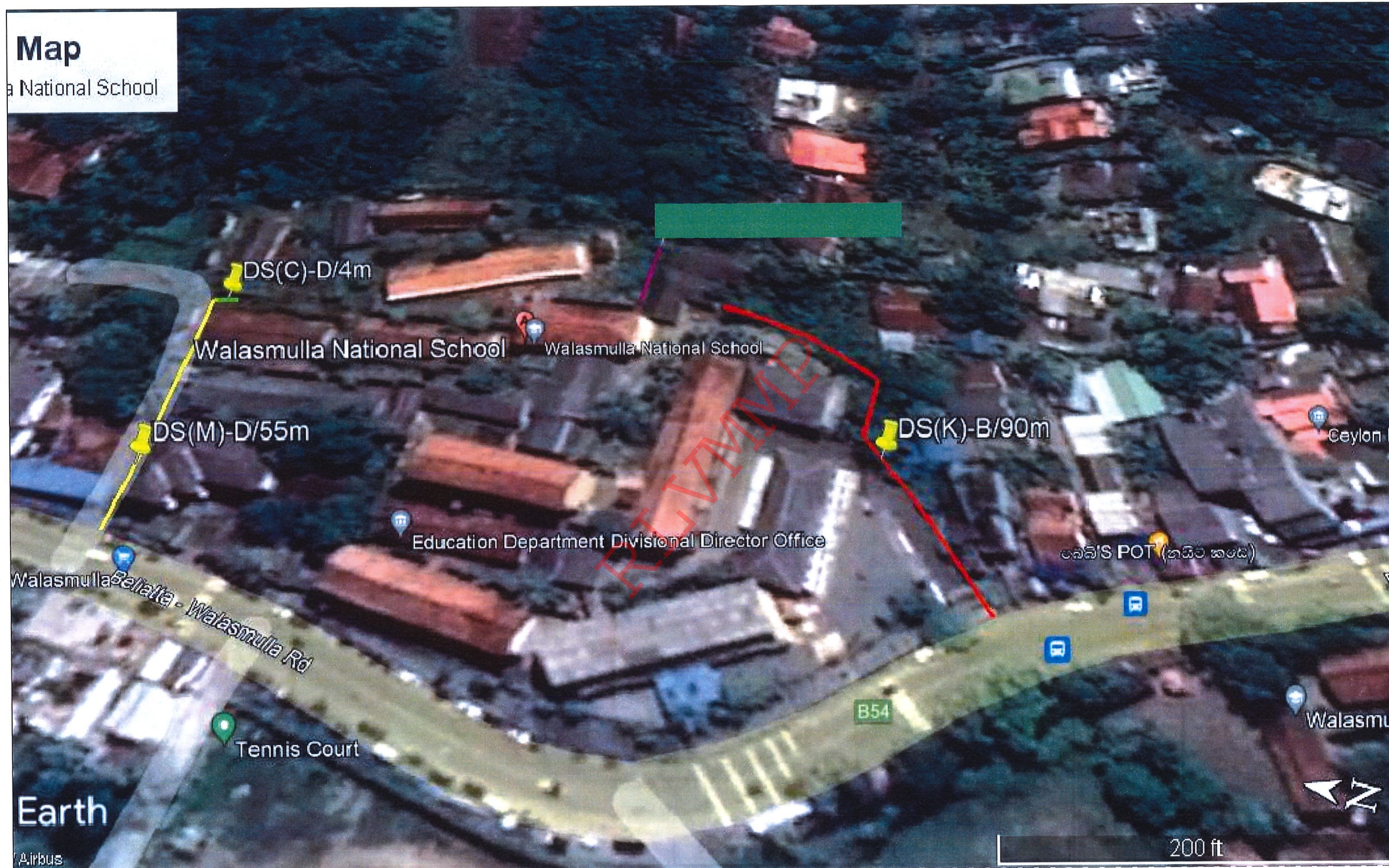
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RLVMMP

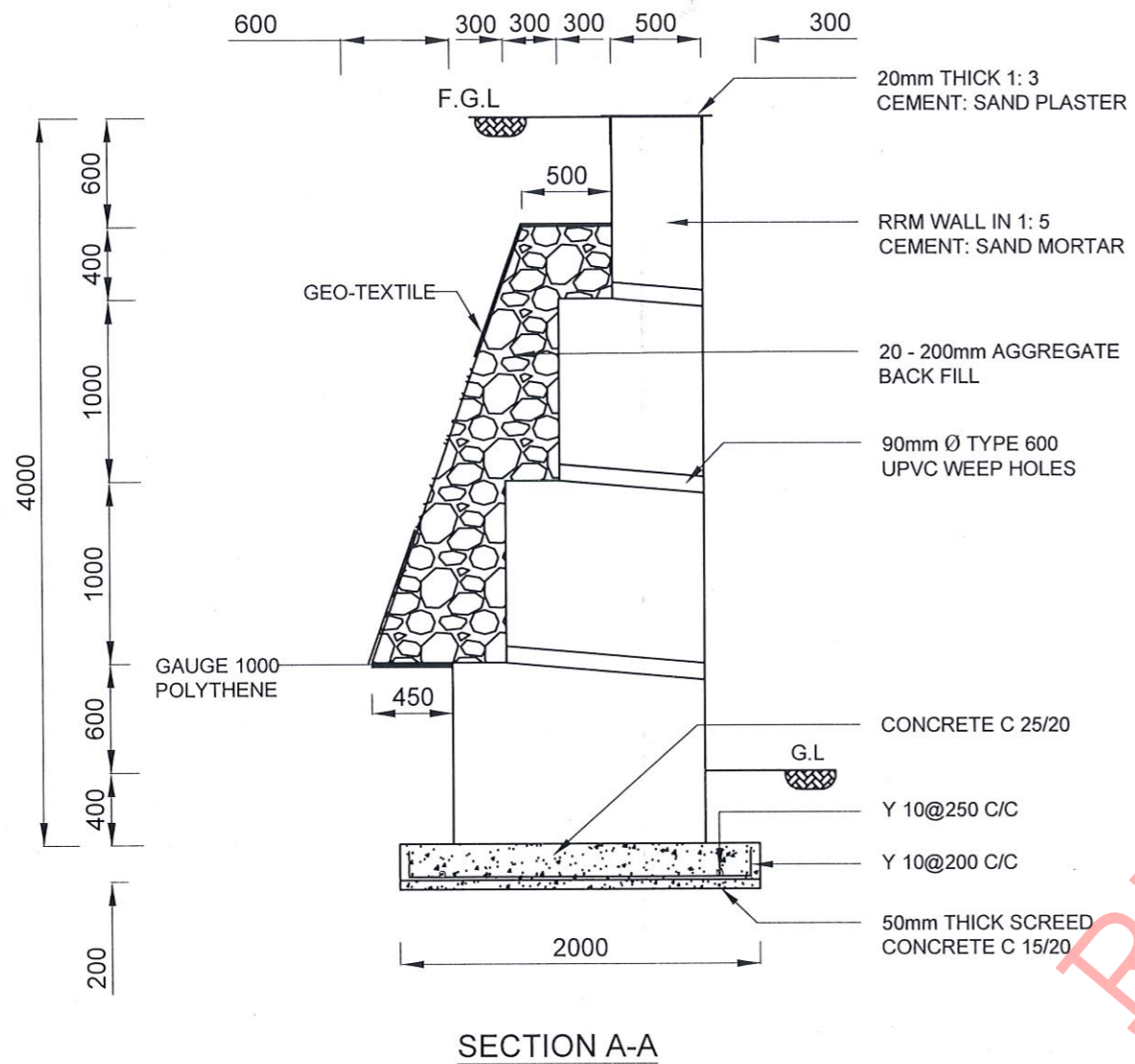
EMPLOYER  DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA MINISTRY OF DEFENCE NATIONAL BUILDING RESEARCH ORGANISATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	DESIGNER  GEOTECHNICAL ENGINEERING DIVISION NATIONAL BUILDING RESEARCH ORGANISATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	REV	DATE	REVISION DESCRIPTION	APPROVAL	PROJECT TITLE REDUCTION OF LANDSLIDE VULNERABILITY BY MITIGATION MEASURES H/ WALASMULLA NATIONAL SCHOOL LOCATION 2	TITLE CROSS SECTIONS OF PROPOSED MITIGATION MEASURES	DESCRIPTION	NAME	SIGNATURE
									SCALE 1:400	DATE 12.09.2023
						PROJECT / DRAWING No. RLVMP/WORKS/NCB/PHII/150/L2/DR-04b	REVISION 00	DESIGNED	W.A.V. ANJALEE	
								RECOMMENDED	U.K.N.P. DHARMASENA	
								APPROVED	K.N. BANDARA	

Map

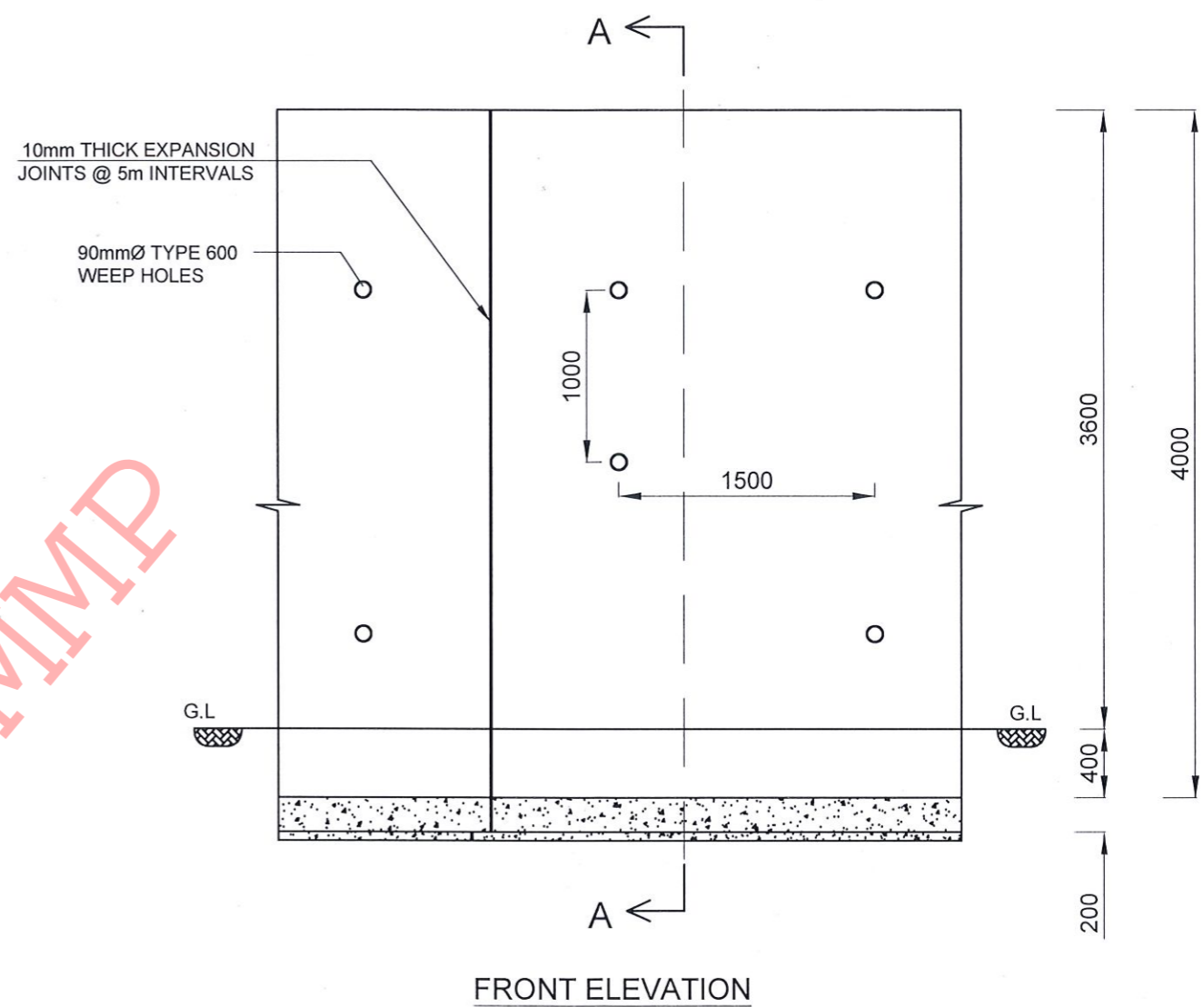
Walasmulla National School



EMPLOYER DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA MINISTRY OF DEFENCE NATIONAL BUILDING RESEARCH ORGANISATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	DESIGNER GEOTECHNICAL ENGINEERING DIVISION 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 H/ WALASMULLA NATIONAL SCHOOL	TITLE GOGGLE VIEW OF THE PROPOSED LEADER WAY DRAINS	DESCRIPTION DRAWN DESIGNED RECOMMENDED APPROVED	NAME K. M. D. NISHANTHI W.A.V. ANJALEE U.K.N.P. DHARMASENA K.N. BANDARA	SIGNATURE
		SCALE 1:250 PROJECT / DRAWING No. RLVMP/WORKS/NCB/PHII/150/L3/ DR-01	DATE 04.10.2023 REVISION 00				



SECTION A-A



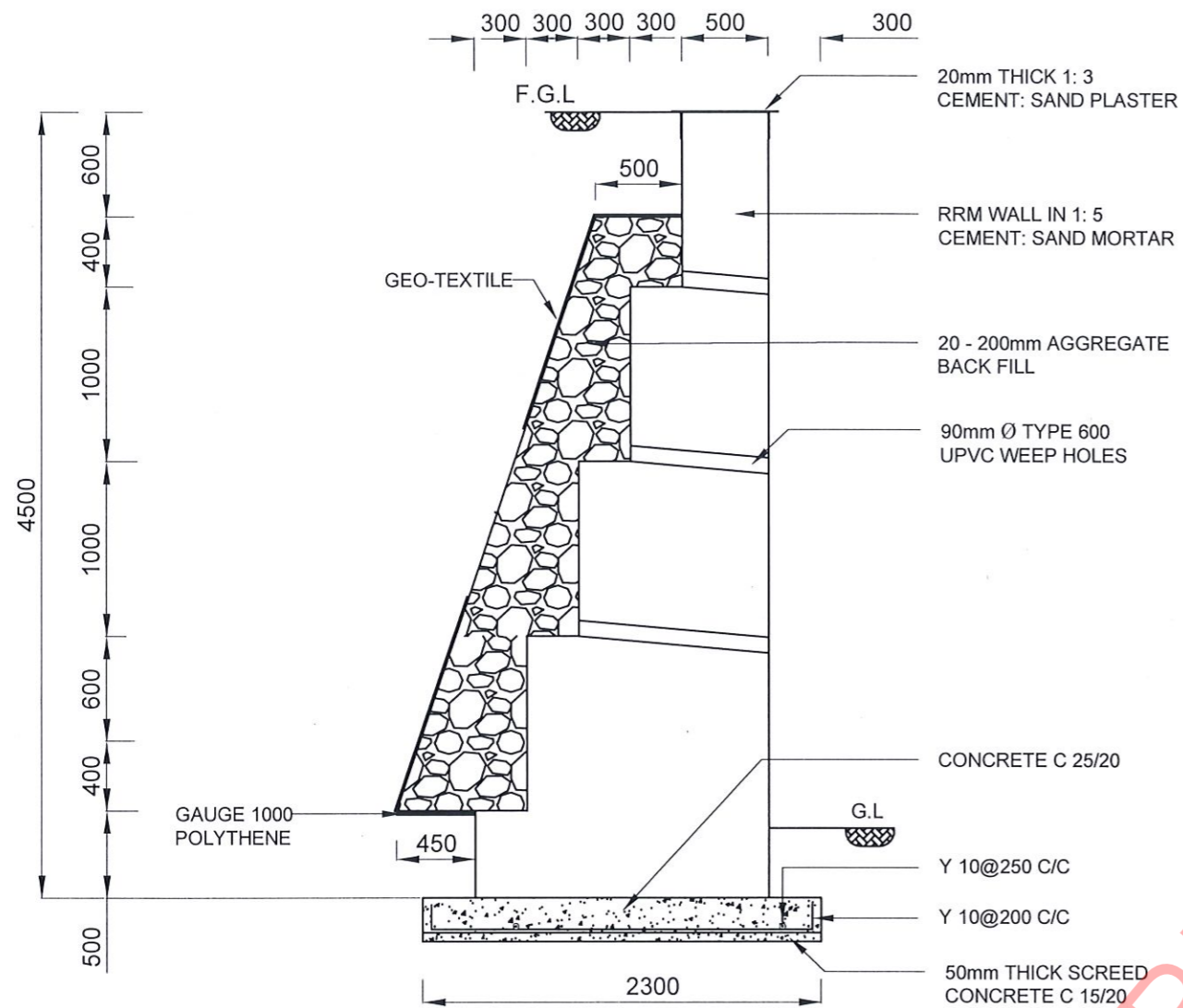
FRONT ELEVATION

RW TYPE - I

NOTES

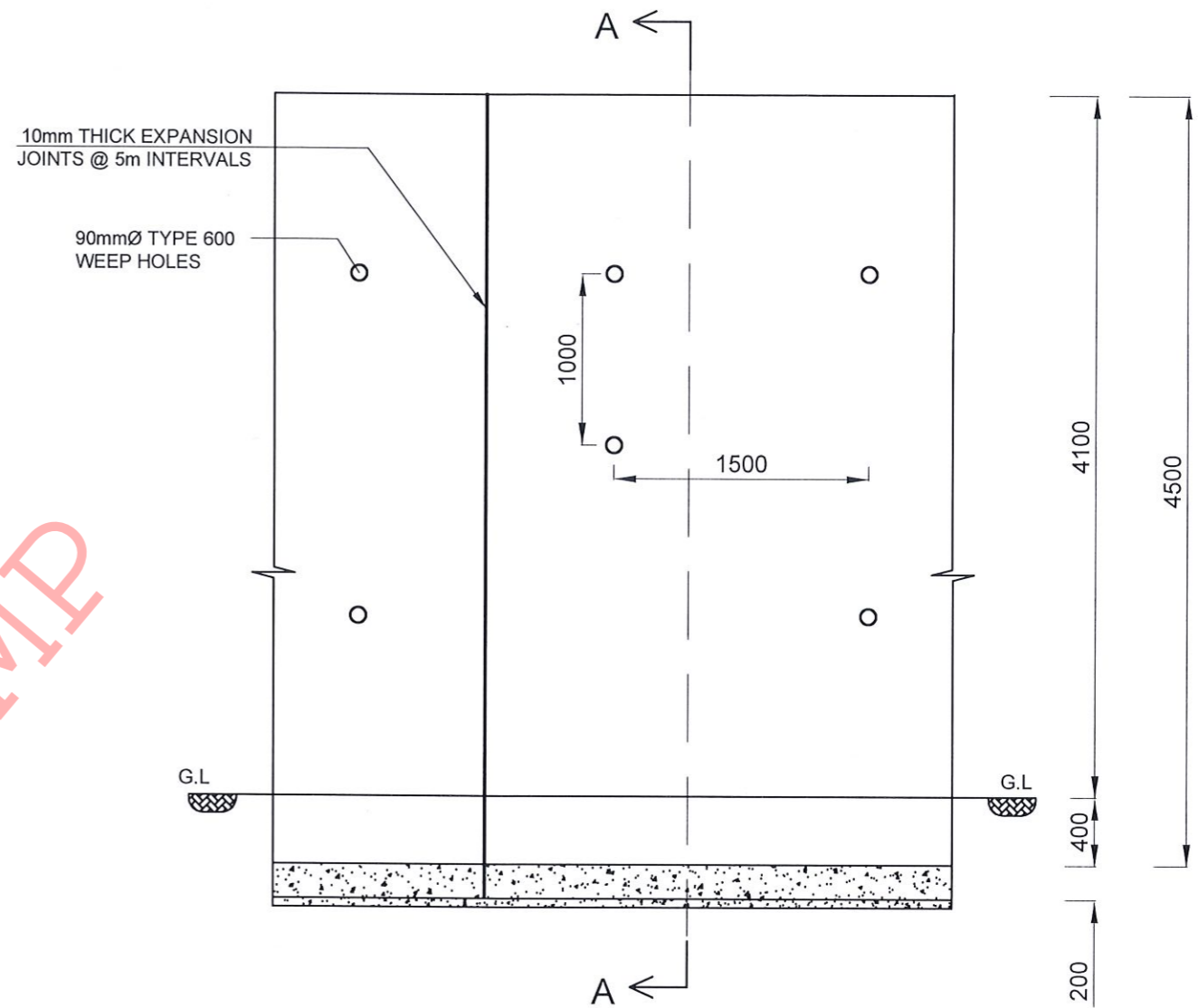
- MORTAR MIX FOR RANDOM RUBBLE MASONRY WALLS SHOULD BE 1: 5 CEMENT: SAND RATIO.
- 10mm THICK EXPANSION JOINTS SHOULD BE PROVIDED @ EVERY 5m INTERVALS.
- MINIMUM CLEAR COVER FOR THE REINFORCEMENTS SHOULD NOT BE LESS THAN 50mm.
- RETAINING WALL TYPE SHALL BE DECIDED ACCORDING TO THE ACTUAL SITE CONDITION.

EMPLOYER DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA MINISTRY OF DEFENCE NATIONAL BUILDING RESEARCH ORGANISATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	DESIGNER GEOTECHNICAL ENGINEERING DIVISION 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 H/ WALASMULLA NATIONAL SCHOOL LOCATION 1 & 2	TITLE DETAILS OF RETAINING WALLS TYPE I	DESCRIPTION	NAME	SIGNATURE			
									SCALE	N.T.S.	DATE	12.09.2023	REVISION
								PROJECT / DRAWING No.	RLVMMP/WORKS/NCB/PHII/150/L1&L2/DR-05a	APPROVED	K.N. BANDARA		



SECTION A-A



RW TYPE - II

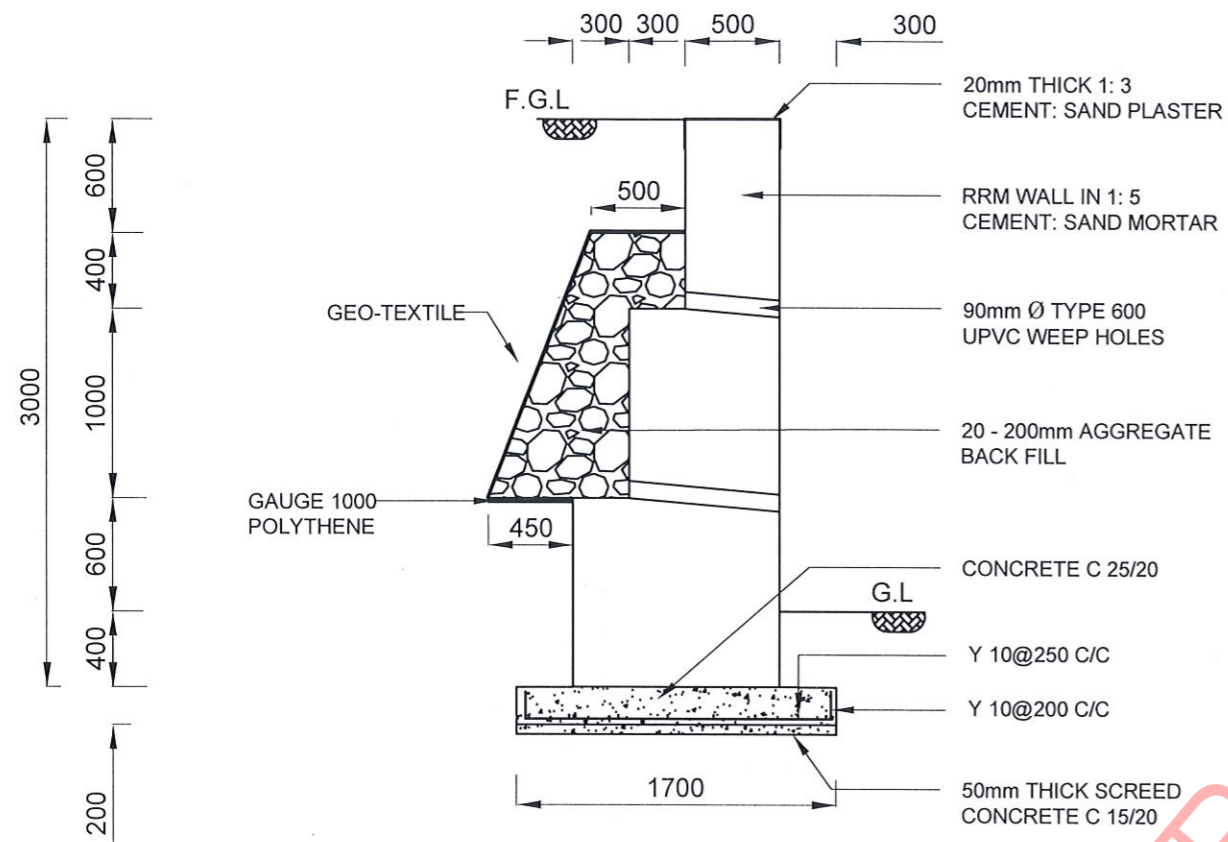


FRONT ELEVATION

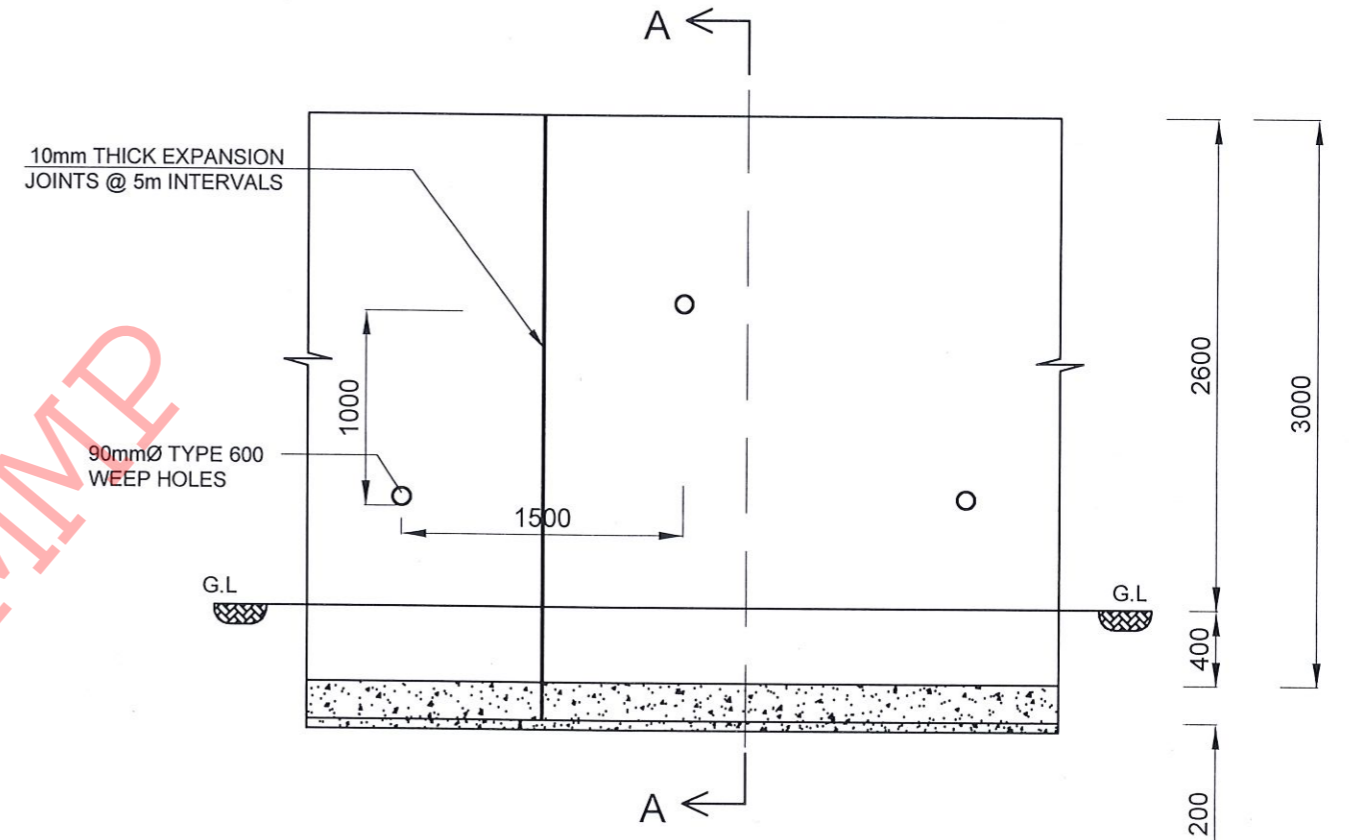
NOTES

1. MORTAR MIX FOR RANDOM RUBBLE MASONRY WALLS SHOULD BE 1: 5 CEMENT: SAND RATIO.
2. 10mm THICK EXPANSION JOINTS SHOULD BE PROVIDED @ EVERY 5m INTERVALS.
3. MINIMUM CLEAR COVER FOR THE REINFORCEMENTS SHOULD NOT BE LESS THAN 50mm.
4. RETAINING WALL TYPE SHALL BE DECIDED ACCORDING TO THE ACTUAL SITE CONDITION.

EMPLOYER  DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA MINISTRY OF DEFENCE NATIONAL BUILDING RESEARCH ORGANISATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	DESIGNER  GEOTECHNICAL ENGINEERING DIVISION 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 H/ WALASMULLA NATIONAL SCHOOL LOCATION 2	TITLE DETAILS OF RETAINING WALLS TYPE II	DESCRIPTION	NAME	SIGNATURE
								SCALE N.T.S.	DATE 12.09.2023	
								PROJECT / DRAWING No. RLVMMP/WORKS/NCB/PH11/150/L2/DR-05b	REVISION 00	APPROVED K.N. BANDARA



SECTION A-A







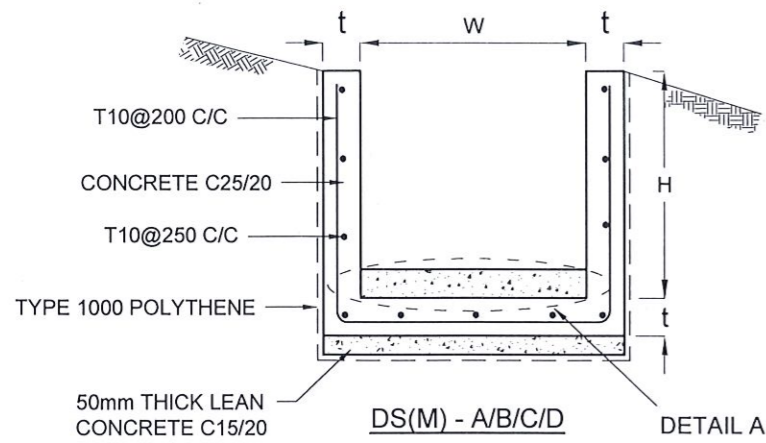
FRONT ELEVATION

RW TYPE - III

NOTES

1. MORTAR MIX FOR RANDOM RUBBLE MASONRY WALLS SHOULD BE 1:5 CEMENT: SAND RATIO.
2. 10mm THICK EXPANSION JOINTS SHOULD BE PROVIDED @ EVERY 5m INTERVALS.
3. MINIMUM CLEAR COVER FOR THE REINFORCEMENTS SHOULD NOT BE LESS THAN 50mm.
4. RETAINING WALL TYPE SHALL BE DECIDED ACCORDING TO THE ACTUAL SITE CONDITION.

EMPLOYER  DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA MINISTRY OF DEFENCE NATIONAL BUILDING RESEARCH ORGANISATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	DESIGNER  GEOTECHNICAL ENGINEERING DIVISION 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 H/ WALASMULLA NATIONAL SCHOOL LOCATION 2	TITLE DETAILS OF RETAINING WALLS TYPE III	DESCRIPTION	NAME	SIGNATURE	
							SCALE N.T.S.	DATE 12.09.2023	RECOMMENDED	U.K.N.P. DHARMASENA	
							PROJECT / DRAWING No. RLVMMP/WORKS/NCB/PHII/150/L1&L2//DR-05c	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

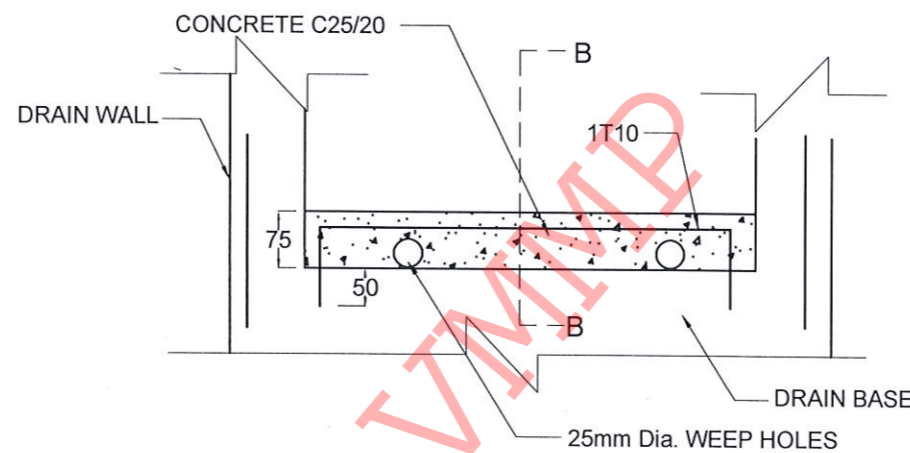
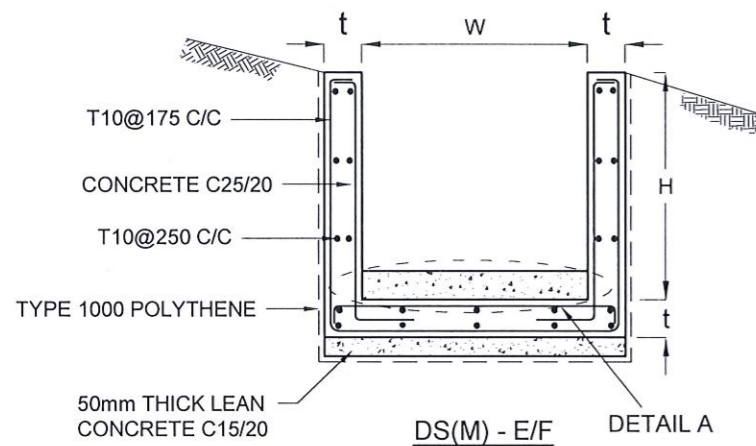
1. DEPTH OF EXCAVATION MAY VARY ACCORDING TO SITE CONDITIONS.
2. STEPS SHALL BE CONSTRUCTED AT SURFACE DRAIN ON SLOPING GROUND ACCORDING TO THE SITE CONDITIONS AS INSTRUCTED BY THE ENGINEER.
3. ENERGY BREAKERS SHALL BE CONSTRUCTED AT THE STEEP DRAIN SEGMENTS AS PER THE INSTRUCTIONS OF THE ENGINEER.
4. DOWELS SHALL BE INSTALLED ACCORDING TO THE GROUND CONDITIONS AS INSTRUCTED BY THE ENGINEER.
5. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED.
6. 10 mm THICK EXPANSION JOINT SHALL BE INTRODUCED IN EVERY 5m INTERVAL.

CONCRETE

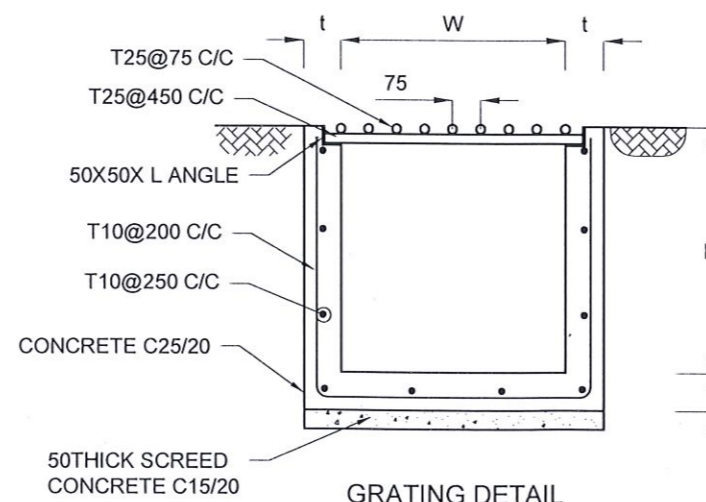
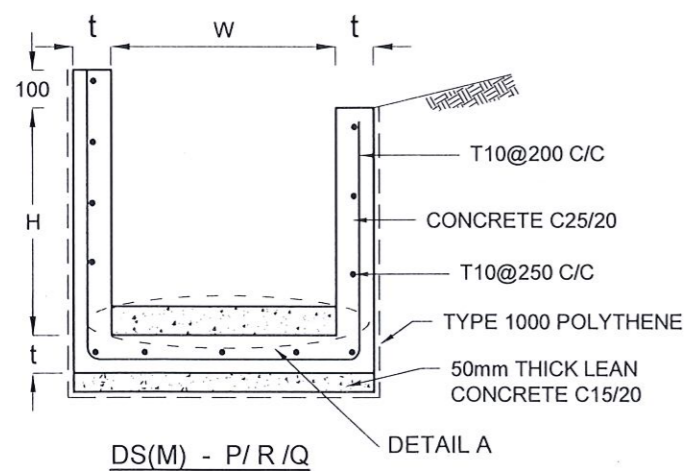
7. USE FOLLOWING CONCRETE GRADES FOR STRUCTURE
 - [a] SCREED - C. 15/20
 - [b] WALLS / BASE / ENERGY BREAKERS - C. 25/20

REINFORCEMENT

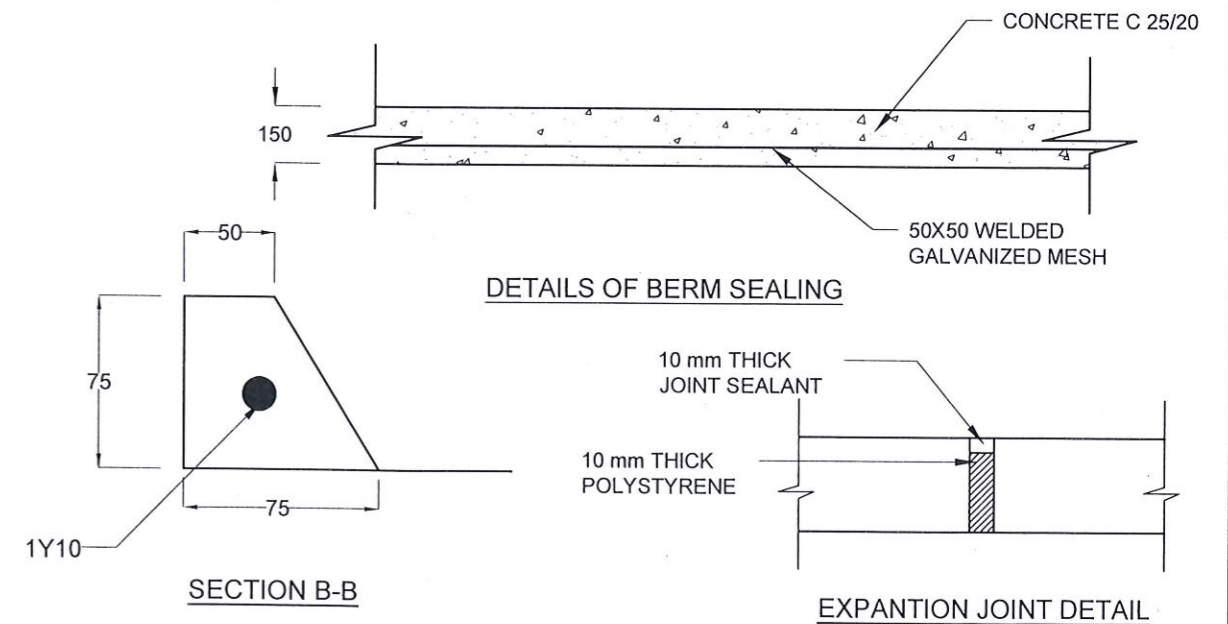
8. ALL BARS MARKED "T" SHALL BE HIGH YIELD DEFORMED BARS OF YIELD STRENGTH NOT LESS THAN 460N/mm².
9. BARS OF CUT LENGTH LARGER THAN THE SUPPLIED LENGTH TO BE LAPPED FOR A LENGTH OF 50 x BAR DIA. AND LAPPING SHOULD BE STAGGERED.
10. ANCHORAGE LENGTH SHOULD BE 40X BAR DIA.
11. REINFORCEMENT BARS SHALL 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



DETAIL A - (ENERGY BREAKER AT 3M)



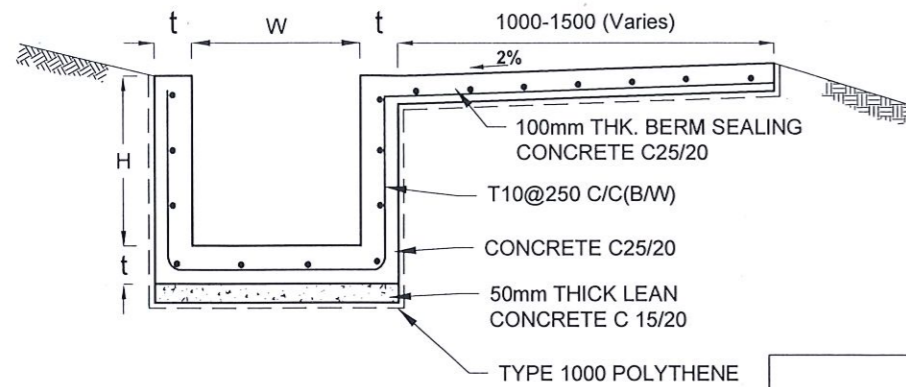
GRATING DETAIL



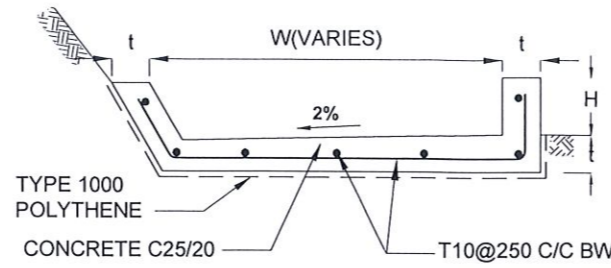
SECTION B-B

EXPANSION JOINT DETAIL

EMPLOYER DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA MINISTRY OF DEFENCE NATIONAL BUILDING RESEARCH ORGANISATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	DESIGNER GEOTECHNICAL ENGINEERING DIVISION 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 H/ WALASMULLA NATIONAL SCHOOL LOCATION 2	TITLE		DESCRIPTION DRAWN DESIGNED RECOMMENDED APPROVED	NAME K. M. D. NISHANTHI W.A.V. ANJALEE U.K.N.P. DHARMASENA K.N. BANDARA	SIGNATURE
		DETAILS OF DRAINS (SURFACE DRAIN -1 OF 2)		SCALE	1:400		DATE	12.09.2023			

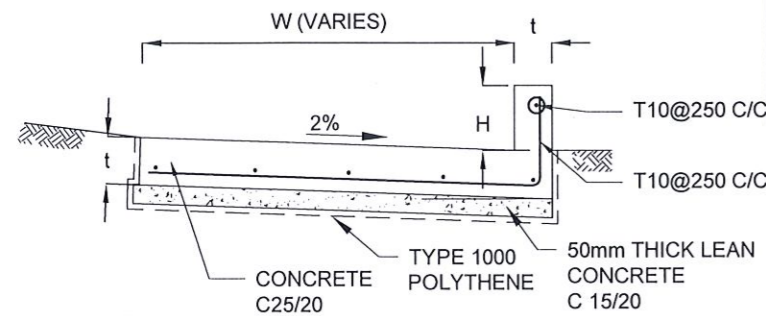


DS (B) - (TYPE I)

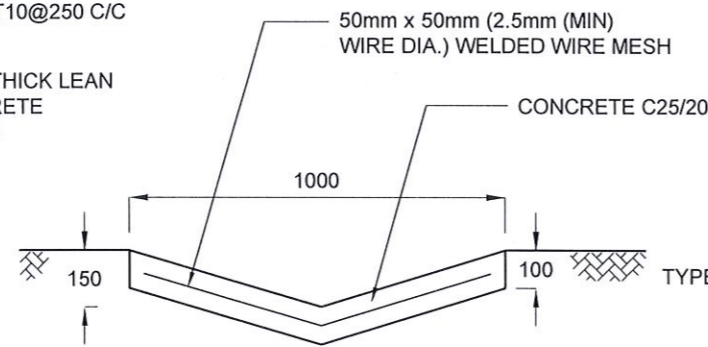


DS (B) - (TYPE II)

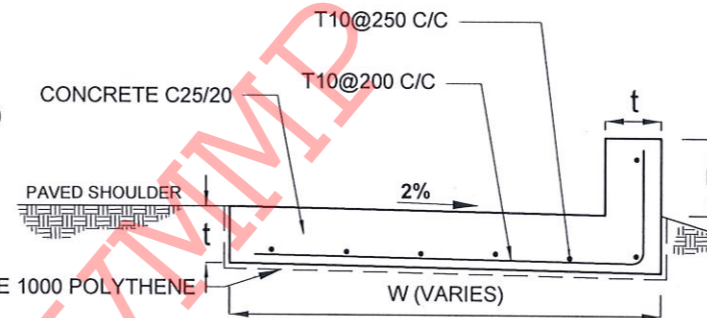
DRAIN TYPE	W (mm)	H (mm)	t (mm)
DS (K) - A	1000	200	100
DS (K) - B	1000	300	100
DS (K) - C	1150	200	200



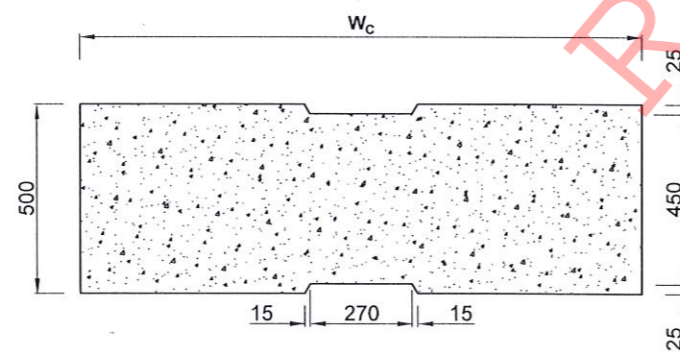
DS (K) - TYPE I



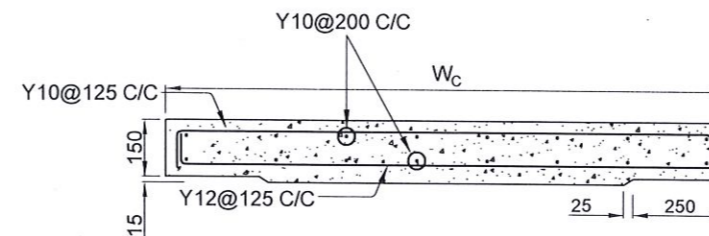
DS (D) - A (DISH DRAIN)



DS (K) - TYPE II

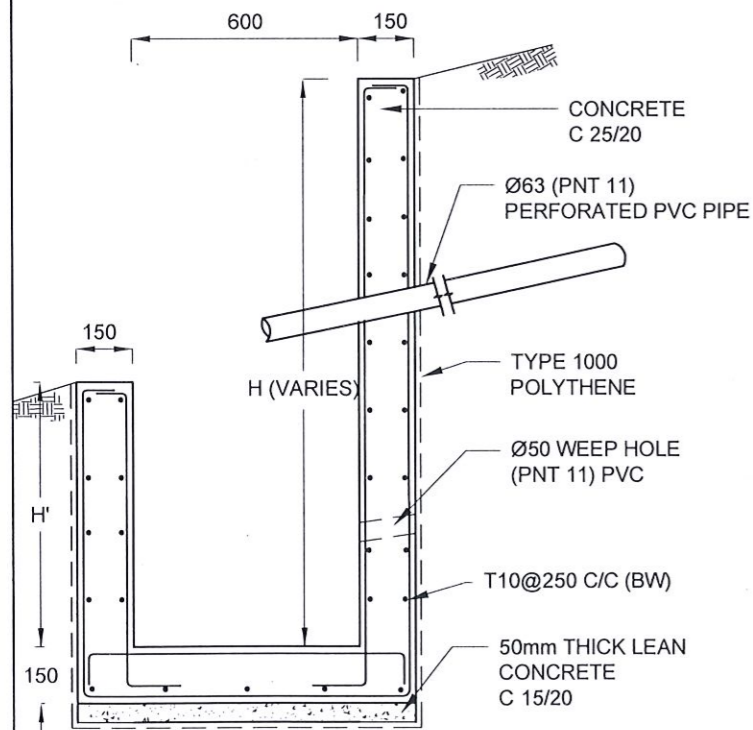


PLAN VIEW OF COVER SLAB



ACCESS & HEAVY DUTY COVER SLAB
SECTION OF (W_c 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

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.


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/mm².
- 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
 NATIONAL BUILDING RESEARCH ORGANISATION
 No. 99/1, JAWATTA ROAD,
 COLOMBO - 05

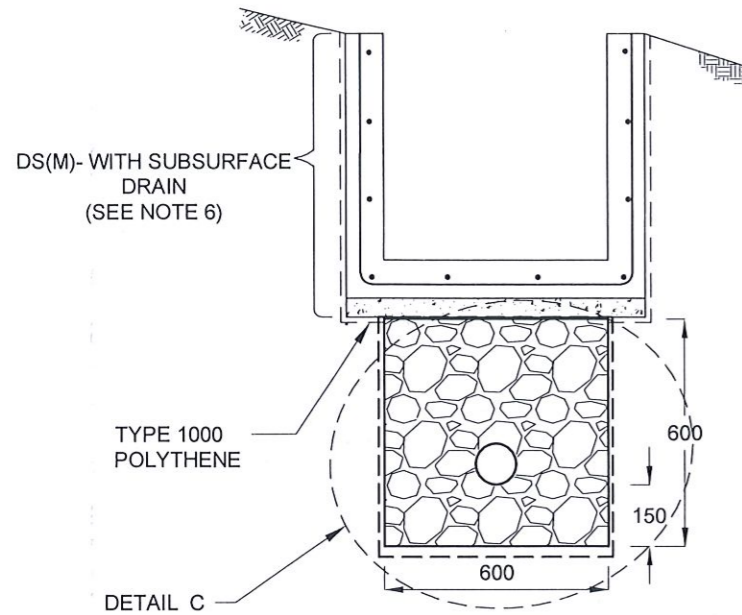
DESIGNER

 GEOTECHNICAL ENGINEERING DIVISION
 NATIONAL BUILDING RESEARCH ORGANISATION
 No. 99/1, JAWATTA ROAD,
 COLOMBO - 05

REV	DATE	REVISION DESCRIPTION	APPROVAL

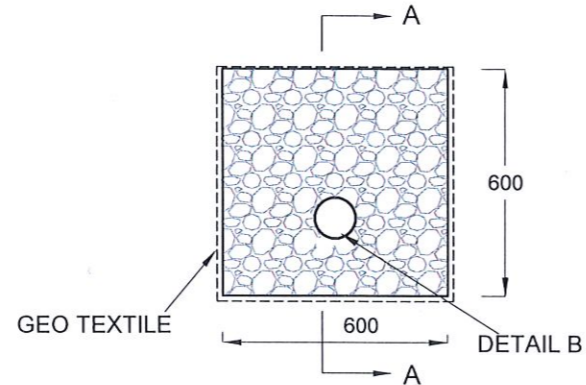
PROJECT TITLE
 REDUCTION OF LANDSLIDE
 VULNERABILITY BY MITIGATION MEASURES
 H/ WALASMULLA NATIONAL SCHOOL
 LOCATION 2

TITLE	DESCRIPTION	NAME	SIGNATURE
DETAILS OF DRAINS (SURFACE DRAIN -2 OF 2)	DRAWN	K. M. D. NISHANTHI	
	DESIGNED	W.A.V. ANJALEE	
	RECOMMENDED	U.K.N.P. DHARMASENA	
	APPROVED	K.N. BANDARA	

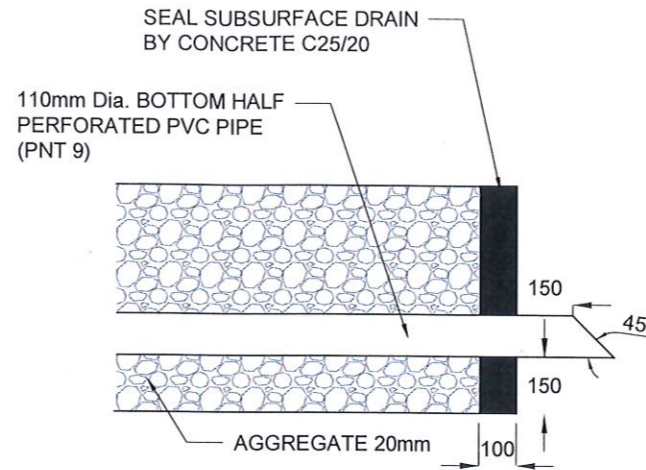
SCALE: 1:400 DATE: 12.09.2023
 PROJECT / DRAWING No. RLVMMPP/WORKS/NCB/PHII/150/L2/DR-06b REVISION: 00



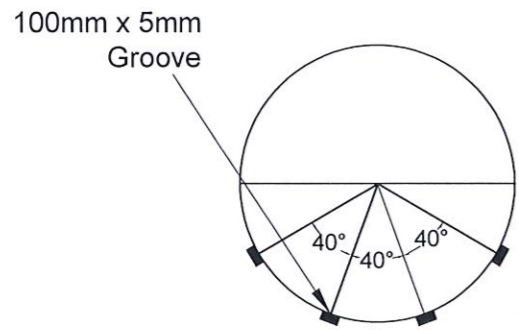
**SUBSURFACE DRAIN
[DS (S) -A]**



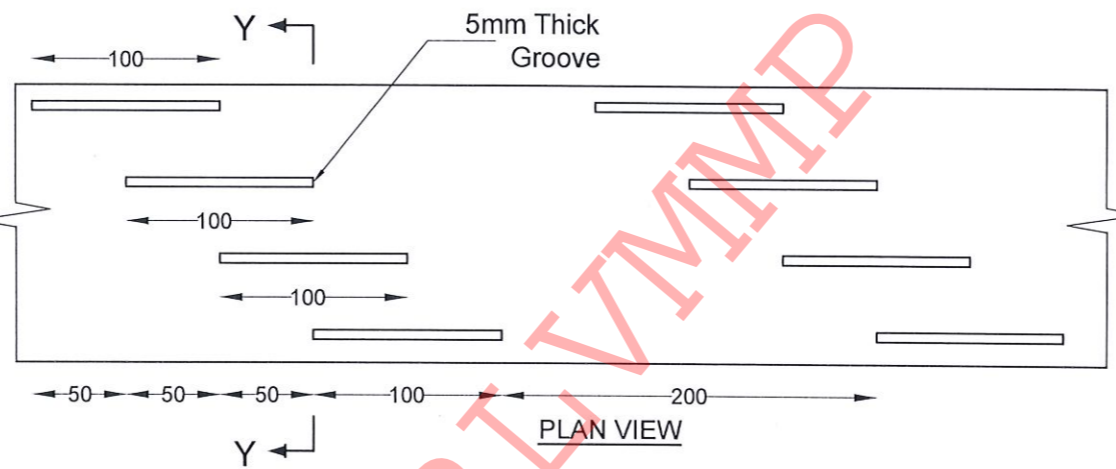
DETAIL C / DS (S) -A



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

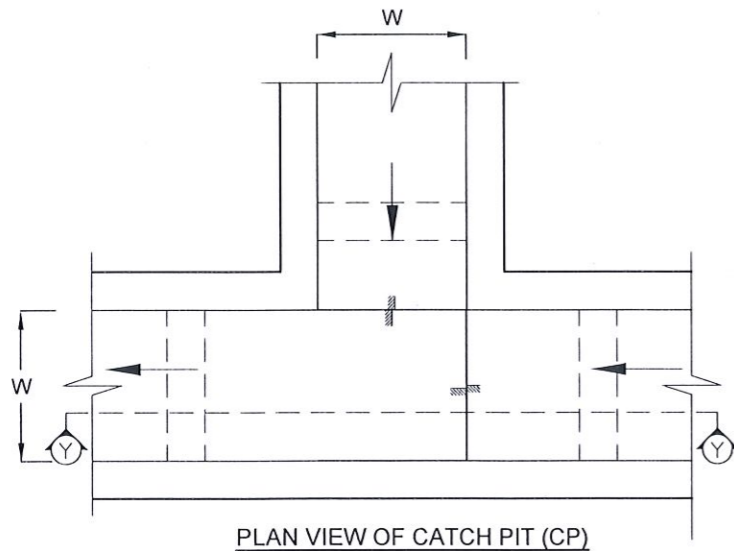


SECTION Y - Y

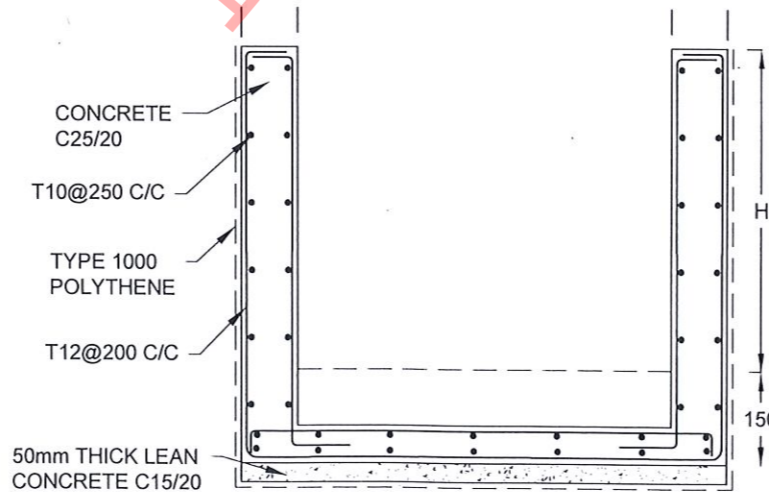


PLAN VIEW

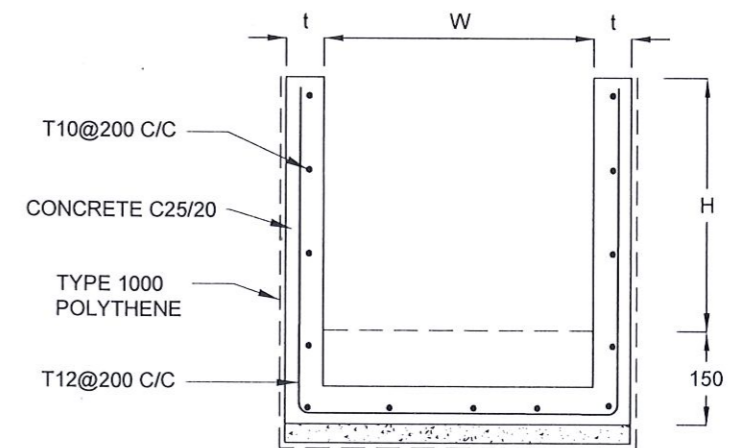
DETAIL - B (PERFORATED PIPE FOR SUB-SURFACE DRAINS)



PLAN VIEW OF CATCH PIT (CP)



SECTION Y-Y (CP- R)



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/mm².
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

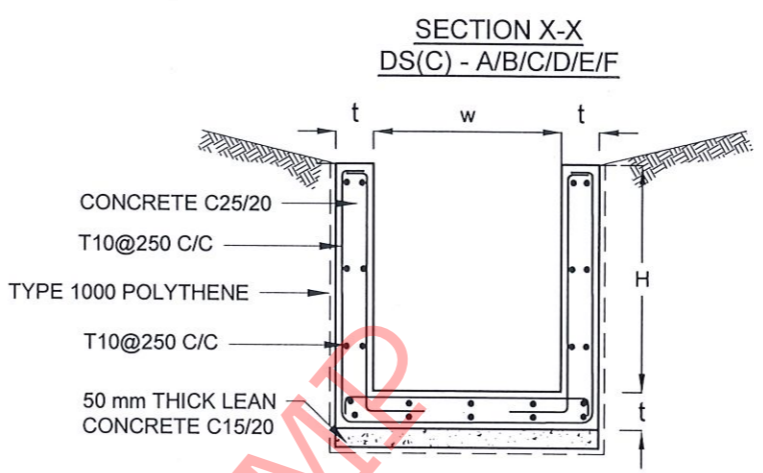
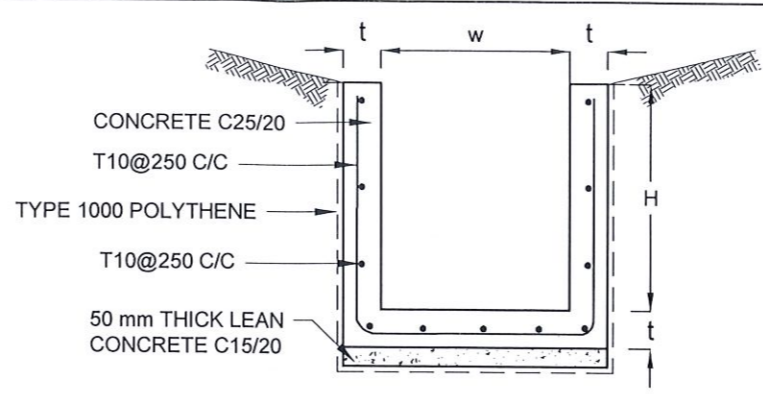
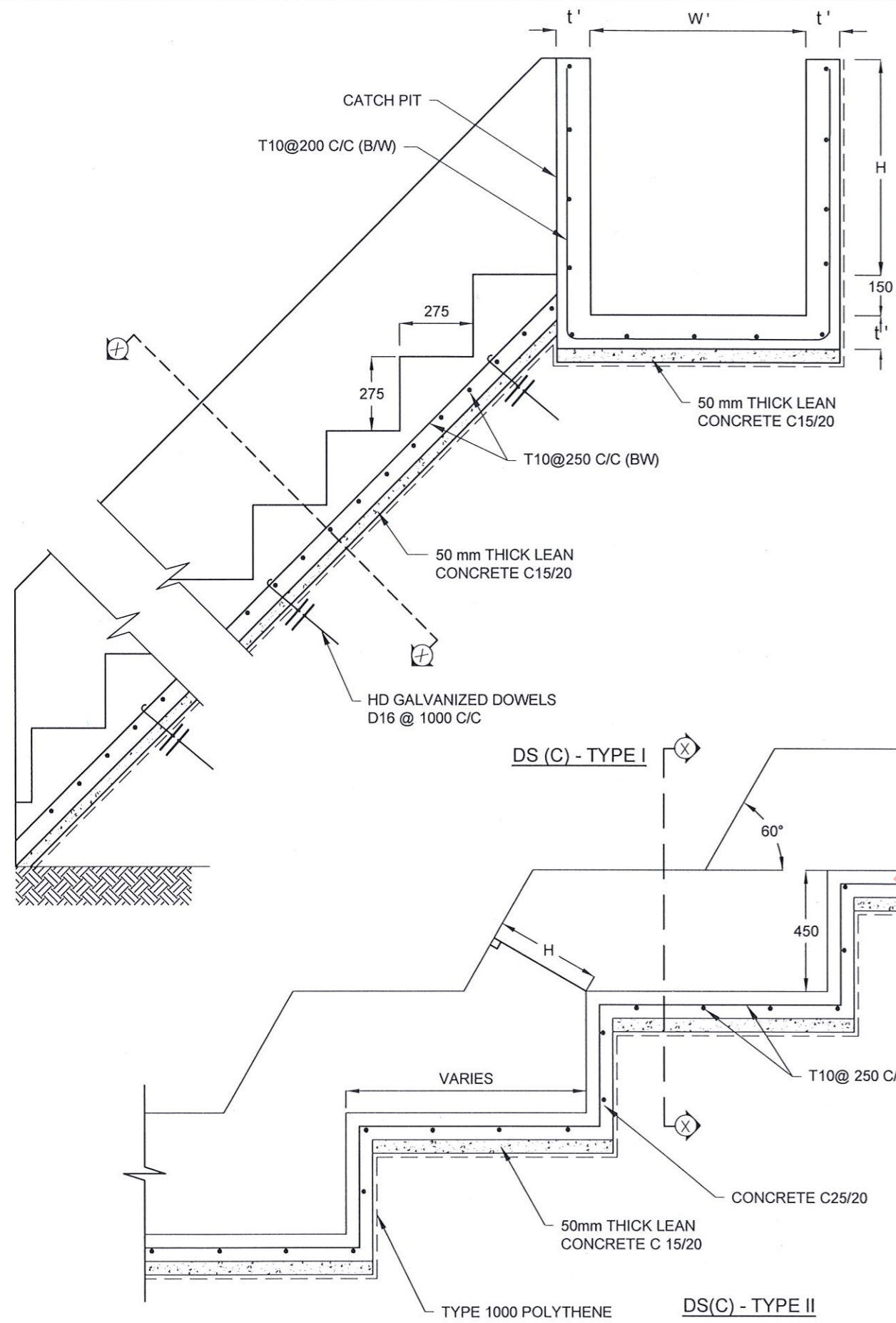
GEOTECHNICAL ENGINEERING DIVISION
NATIONAL BUILDING RESEARCH ORGANISATION
No. 99/1, JAWATTA ROAD,
COLOMBO - 05

REV	DATE	REVISION DESCRIPTION	APPROVAL	PROJECT TITLE

REDUCTION OF LANDSLIDE
VULNERABILITY BY MITIGATION MEASURES
H/ WALASMULLA NATIONAL SCHOOL
LOCATION 2

TITLE	DESCRIPTION	NAME	SIGNATURE
DETAILS OF DRAINS (SUBSURFACE DRAIN AND CATCHPIT)	DRAWN	K. M. D. NISHANTHI	
	DESIGNED	W.A.V. ANJALEE	
	RECOMMENDED	U.K.N.P. DHARMASENA	
	APPROVED	K.N. BANDARA	

SCALE | 1:400 | DATE | 12.09.2023
PROJECT / DRAWING No. | RLVMMP/WORKS/NCB/PHI/150/L2/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.




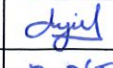
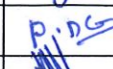

CONCRETE

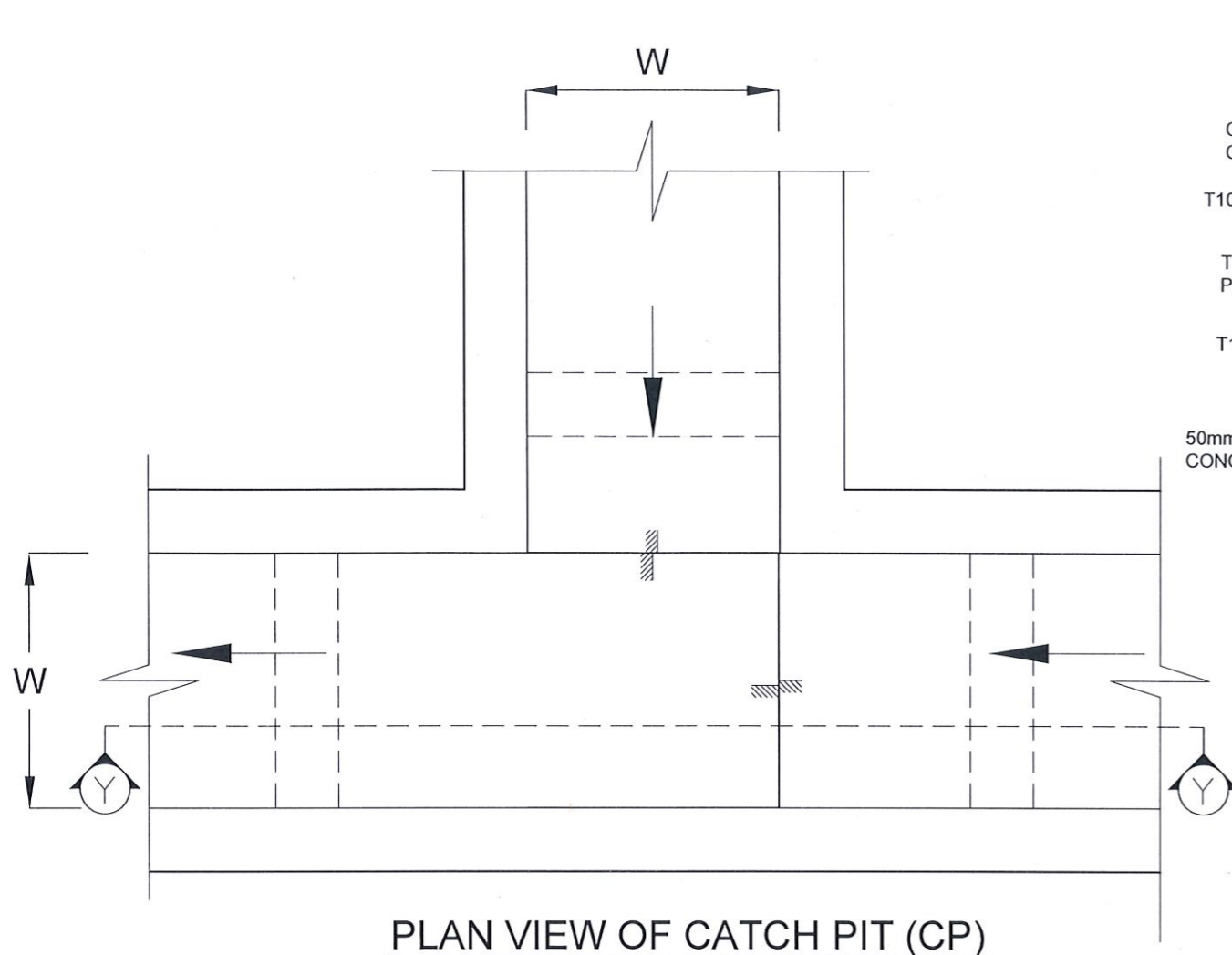
- USE FOLLOWING CONCRETE GRADES FOR STRUCTURE
 - [a] SCREED - C. 15/20
 - [b] WALLS / BASE / ENERGY BREAKERS - C. 25/20

REINFORCEMENT

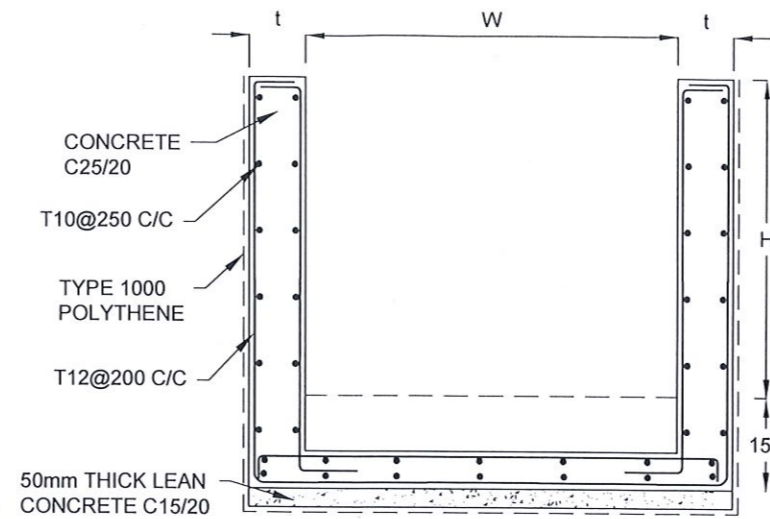
- ALL BARS MARKED "T" SHALL BE HIGH YIELD DEFORMED BARS OF YIELD STRENGTH NOT LESS THAN 460N/mm².
- BARS OF CUT LENGTH LARGER THAN THE SUPPLIED LENGTH TO BE LAPPED FOR A LENGTH OF 50 x BAR DIA. AND LAPPING SHOULD BE STAGGERED.
- ANCHORAGE LENGTH SHOULD BE 40X BAR DIA.
- REINFORCEMENT BARS SHALL BE BENT 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

 DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA MINISTRY OF DEFENCE NATIONAL BUILDING RESEARCH ORGANISATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	 DESIGNER GEOTECHNICAL ENGINEERING DIVISION NATIONAL BUILDING RESEARCH ORGANISATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	REV	DATE	REVISION DESCRIPTION	APPROVAL	PROJECT TITLE	TITLE	DESCRIPTION	NAME	SIGNATURE
		REDUCTION OF LANDSLIDE VULNERABILITY BY MITIGATION MEASURES H/ WALASMULLA NATIONAL SCHOOL LOCATION 2	DETAILS OF DRAINS (CASCADE DRAIN)	DRAWN DESIGNED RECOMMENDED APPROVED	K. M. D. NISHANTHI W.A.V. ANJALEE U.K.N.P. DHARMASENA K.N. BANDARA	   				



PLAN VIEW OF CATCH PIT (CP)



SECTION Y-Y (CP-R)

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/mm².
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

CATCH PIT TYPE	W (mm)	H (mm)	t (mm)
CP 1	600	450	100
CP 2	750	600	100
CP 3	900	750	125
CP 4	1050	900	150
CP 5	1200	1050	150
CP 6	1350	1200	150
CP 7	1600	1400	150

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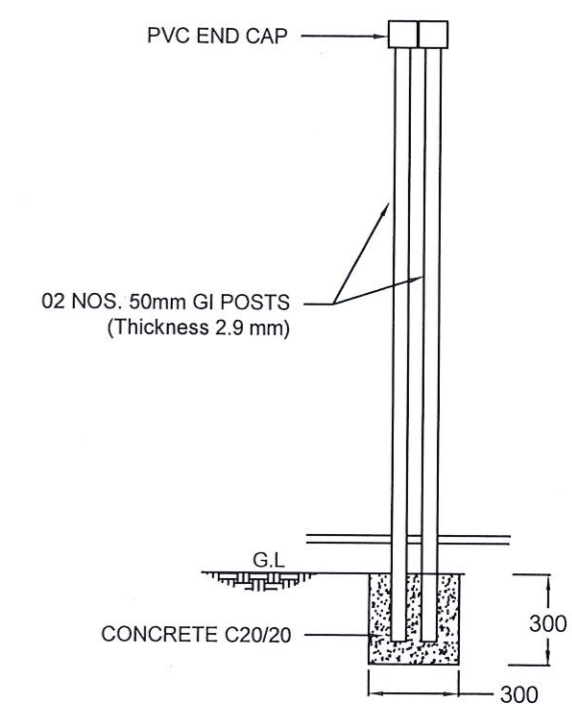
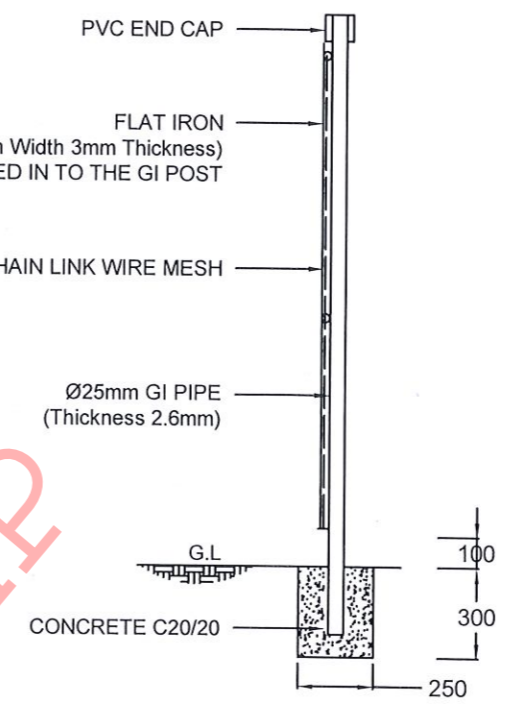
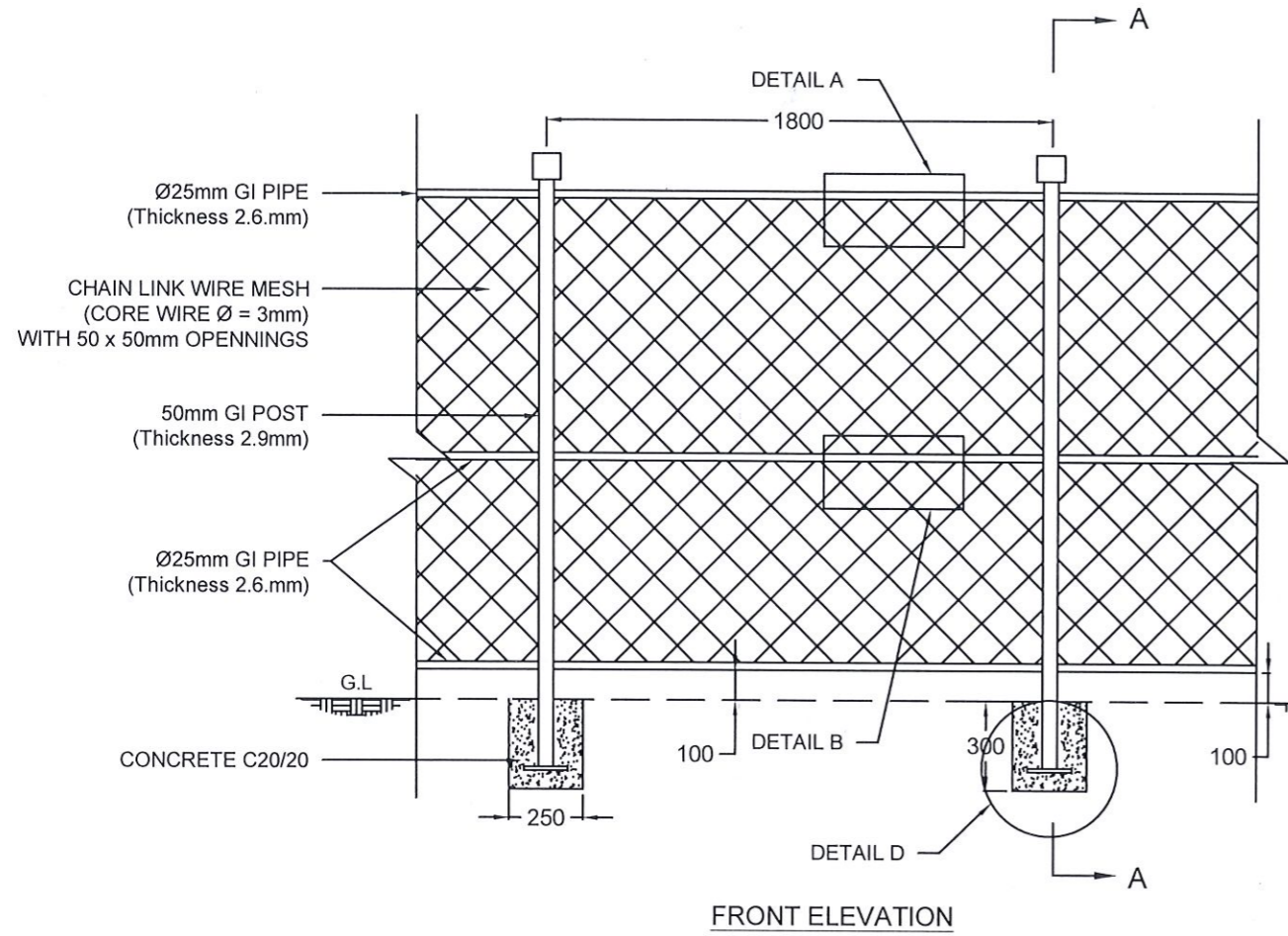
DESIGNER
 GEOTECHNICAL ENGINEERING DIVISION
 NATIONAL BUILDING RESEARCH ORGANISATION
 No. 99/1, JAWATTA ROAD,
 COLOMBO - 05

REV	DATE	REVISION DESCRIPTION	APPROVAL

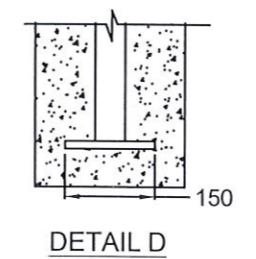
PROJECT TITLE
 REDUCTION OF LANDSLIDE
 VULNERABILITY BY MITIGATION MEASURES
 H/ WALASMULLA NATIONAL SCHOOL
 LOCATION 2

TITLE		DETAILS OF DRAINS (CATCH PIT)	
SCALE	1:400	DATE	12.09.2023
PROJECT / DRAWING No.	RLVMMP/WORKS/NCB/PHIII/150/L2/DR-06e	REVISION	00

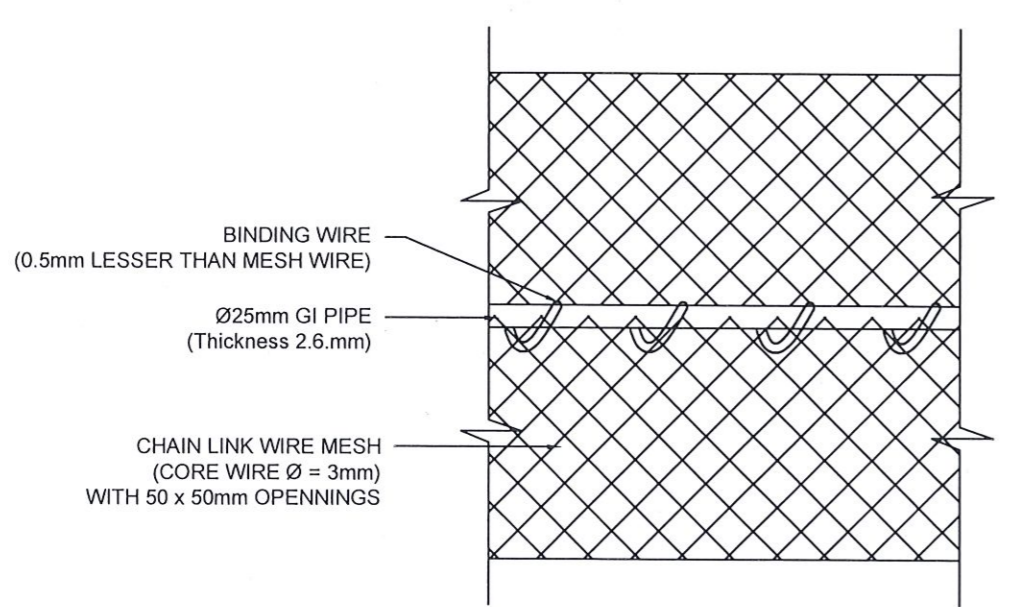
DESCRIPTION	NAME	SIGNATURE
DRAWN	K. M. D. NISHANTHI	
DESIGNED	W.A.V. ANJALEE	
RECOMMENDED	U.K.N.P. DHARMASENA	
APPROVED	K.N. BANDARA	



RLVMMP



DETAIL D
FLAT IRON 12.5mm X 30mm WELDED TO THE INTO THE BASE OF THE 50mm Ø GI POST

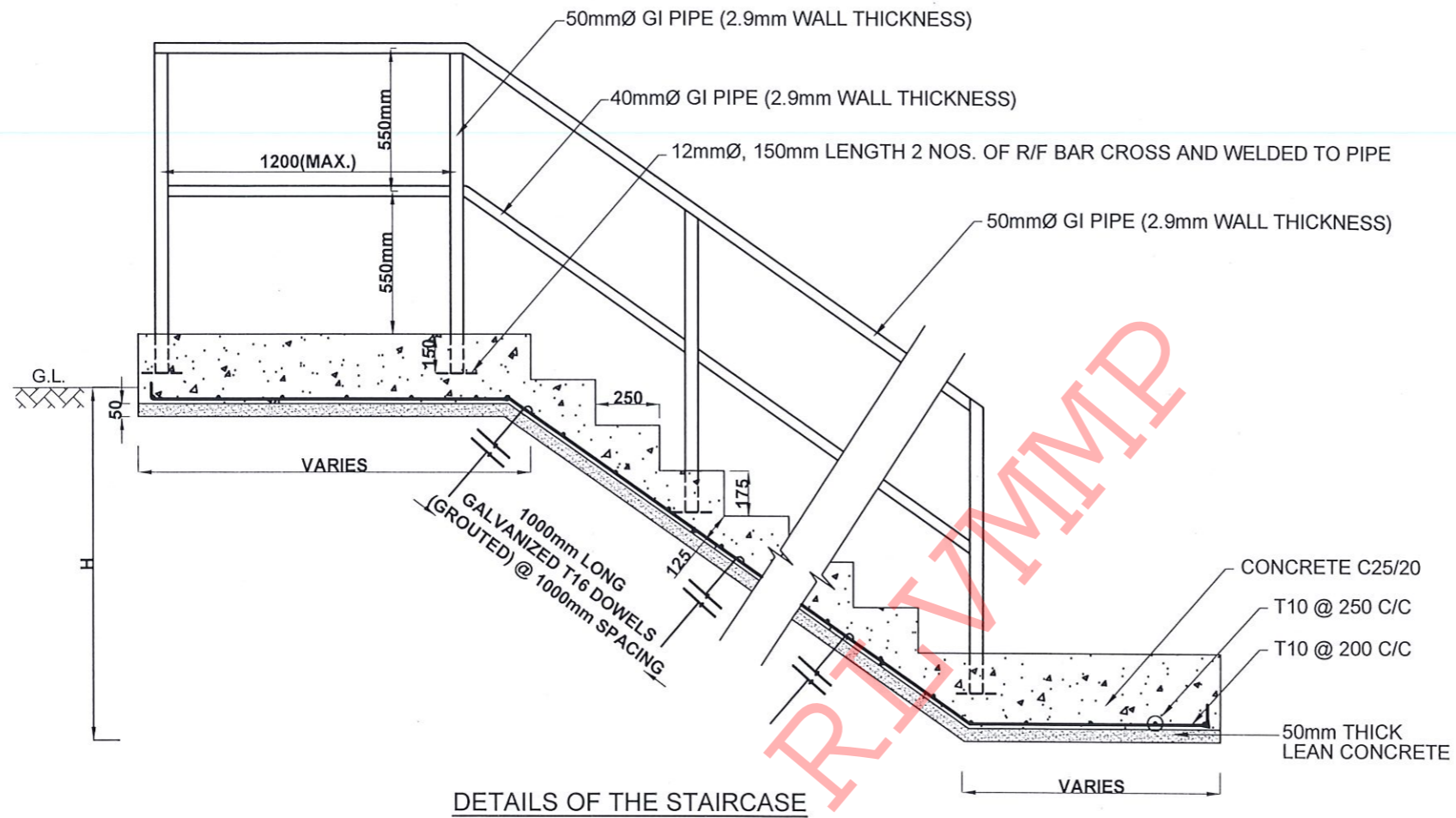


DETAIL A & B

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. GI POST SHALL BE PAINTED IN GREEN COLOUR ANTI-CORROSIVE PAINT.
3. PRIOR APPROVAL IS REQUIRED FOR CHAIN LINK WIRE MESH, GI POST AND PVC CAP.
4. PROVIDE ADDITIONAL 50mm Ø GI EXPANSION POST IN EVERY 30m INTERVALS AS PER THE DETAIL C.

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									DESIGNED	W.A.V. ANJALEE	
									RECOMMENDED	U.K.N.P. DHARMASENA	
									APPROVED	K.N. BANDARA	



DETAILS OF THE STAIRCASE

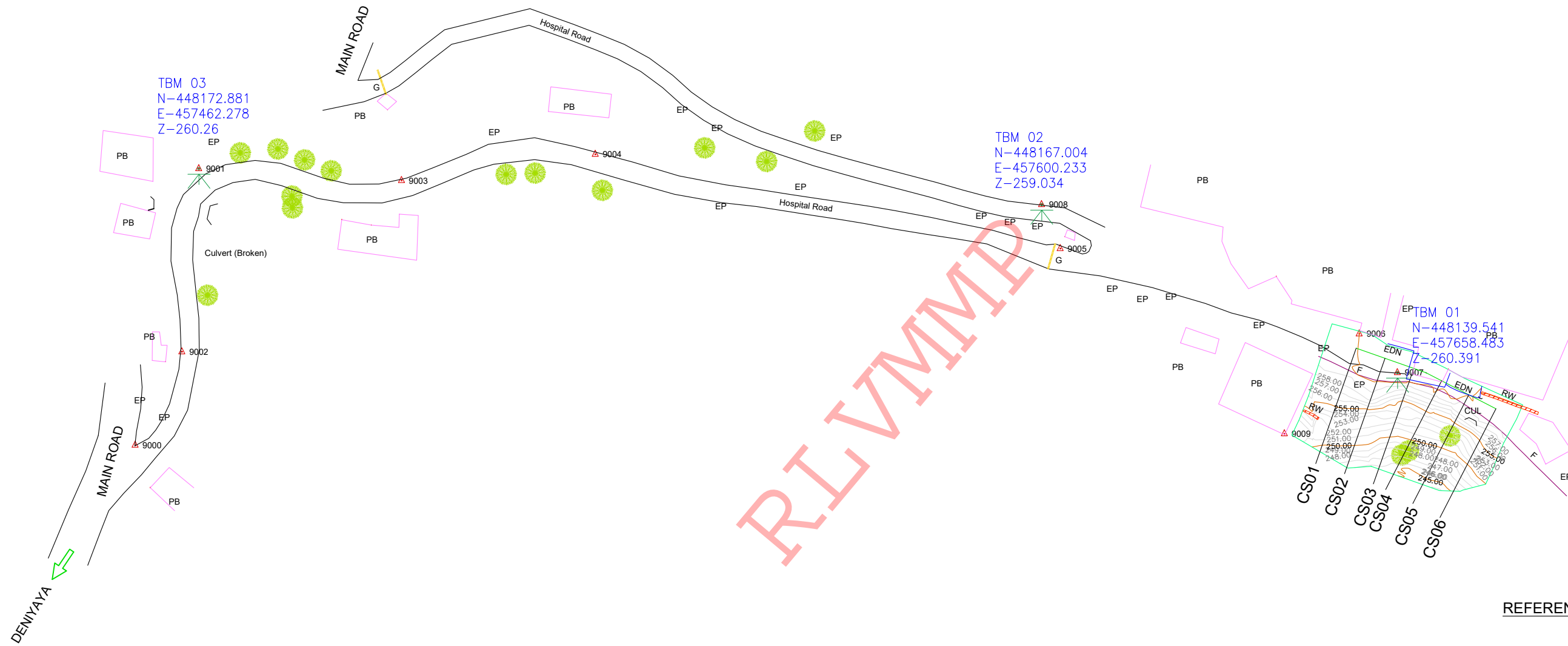
NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. MINIMUM CLEAR COVER TO R/F TO BE NOT LESS THAN 25 mm.
3. COMPRESSION LAP LENGTH TO BE 40XBAR DIAMETER.
4. TENSION LAP LENGTH TO BE 56XBAR DIAMETER.
5. ANCHORAGE LENGTH SHOULD BE 40X BAR DIAMETER.
6. TREAD AND RISER OF THE STEPS WILL BE VARIED ACCORDING TO THE ACTUAL SITE CONDITIONS.
7. DEPTH OF EXCAVATION SHALL BE VARIED ACCORDING TO THE SITE CONDITIONS.
8. DOWELS SHALL BE INSTALLED AS PER THE INSTRUCTION OF THE ENGINEER.
9. MINIMUM STAIR CASE WIDTH 1.0m
10. CLEAR HEIGHT (H) OF GROUND SHALL BE DETERMINE IN BASED ON ACTUAL SITE CONDITIONS.

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		SCALE	1:250	DATE	12.09.2023		REVISION	00			

SURVEY DRAWINGS


RLVAMP



REFERENCE

EDN	EXISTING DRAIN
RW	RRM WALL
G	GATE
F	CHAIN LINK FENCE
PB	PERMANENT BUILDING
EP	ELECTRICITY POST
TP	TELEPHONE POST
CUL	CULVERT

EMPLOYER



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 COLOMBO - 05

DESIGNER



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

REV	DATE	REVISION DESCRIPTION	APPROVAL

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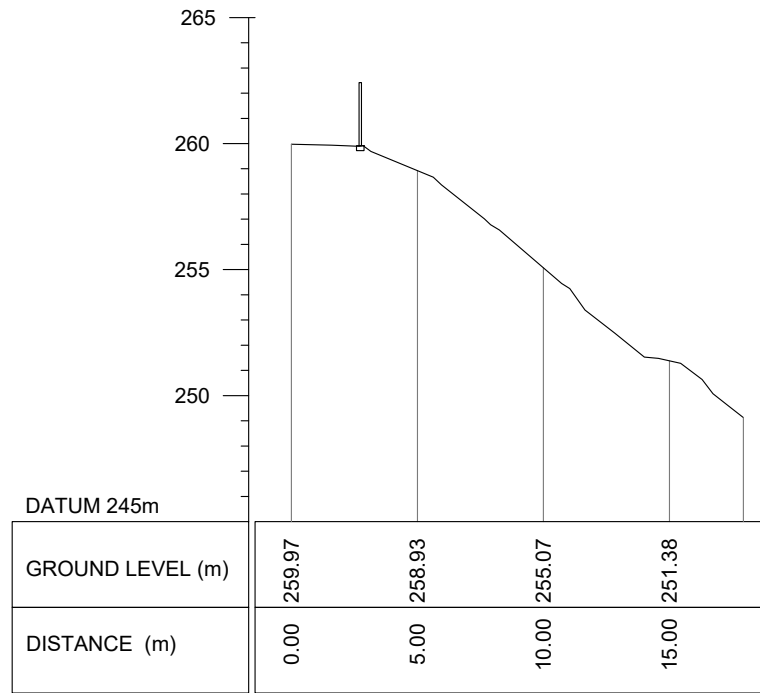
REDUCTION OF LANDSLIDE
 VULNERABILITY BY MITIGATION MEASURES
 DENIYAYA HOSPITAL

TITLE

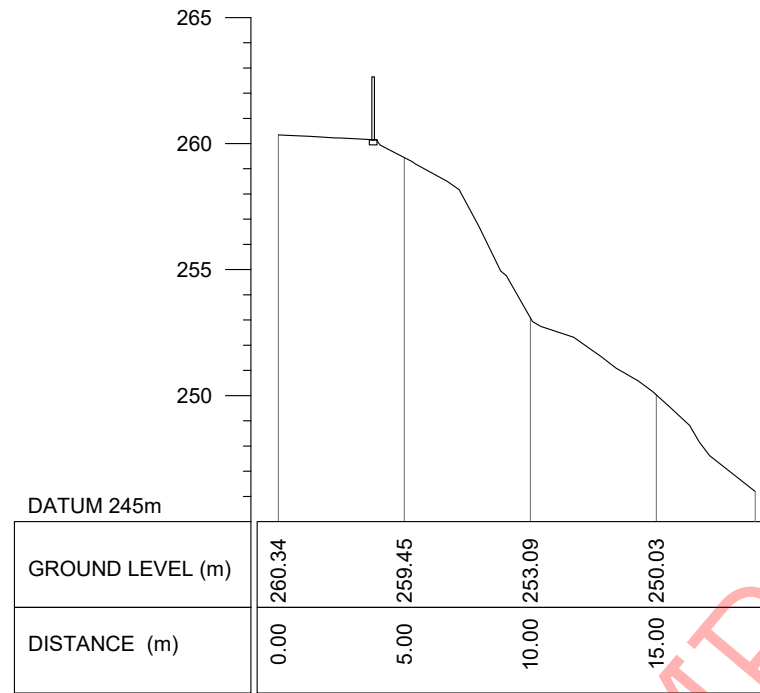
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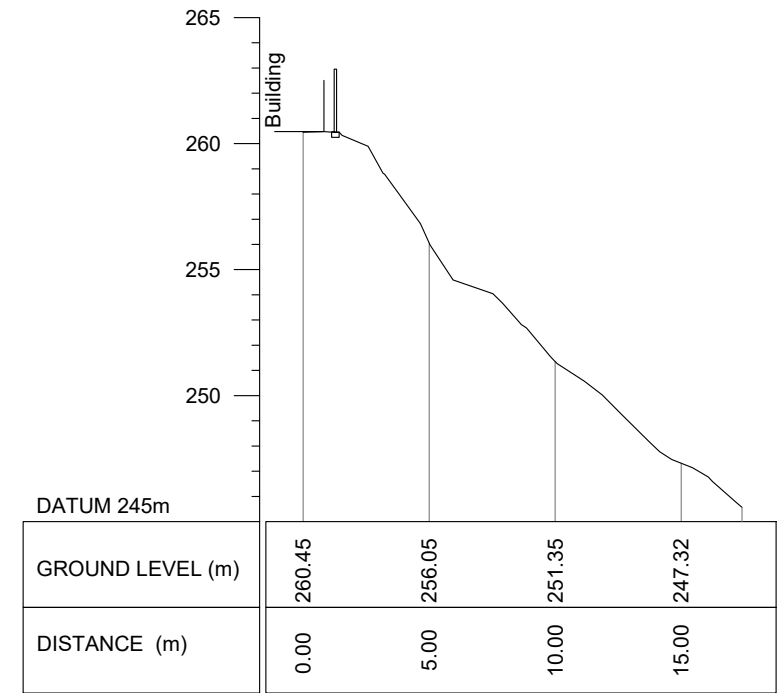
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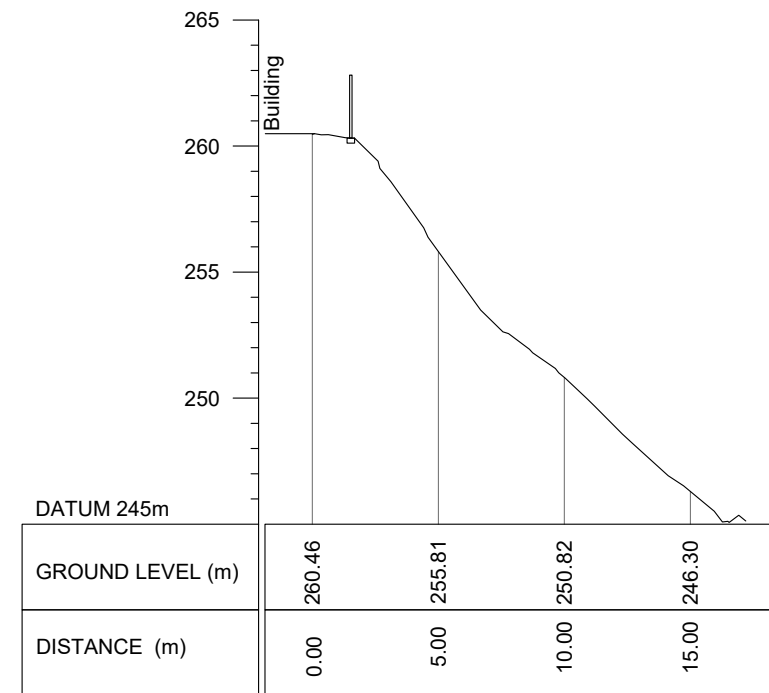
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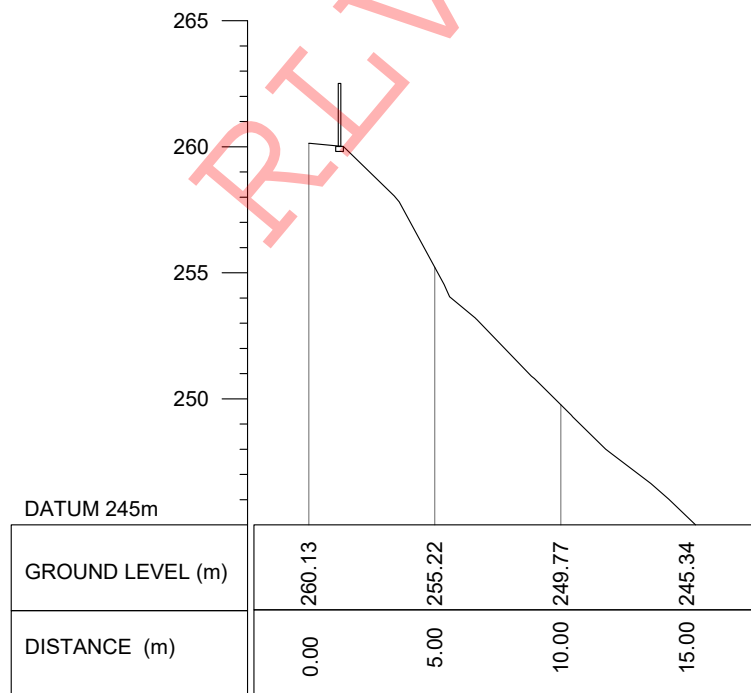
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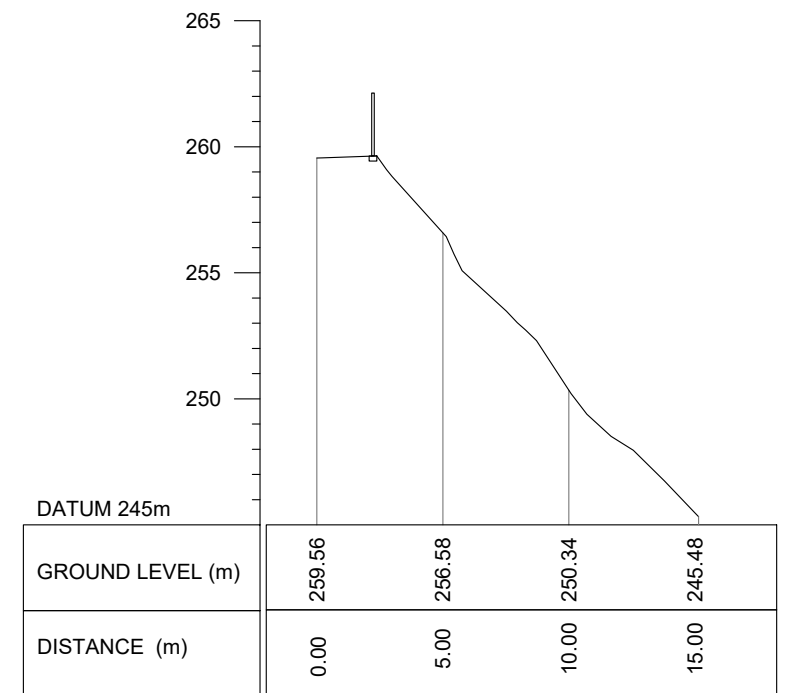
CS03




CS04



CS05



CS06

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STATE MINISTRY OF NATIONAL SECURITY AND DISASTER MANAGEMENT
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 COLOMBO - 05

DESIGNER

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NATIONAL BUILDING RESEARCH ORGANIZATION
 No. 99/1, JAWATTA ROAD,
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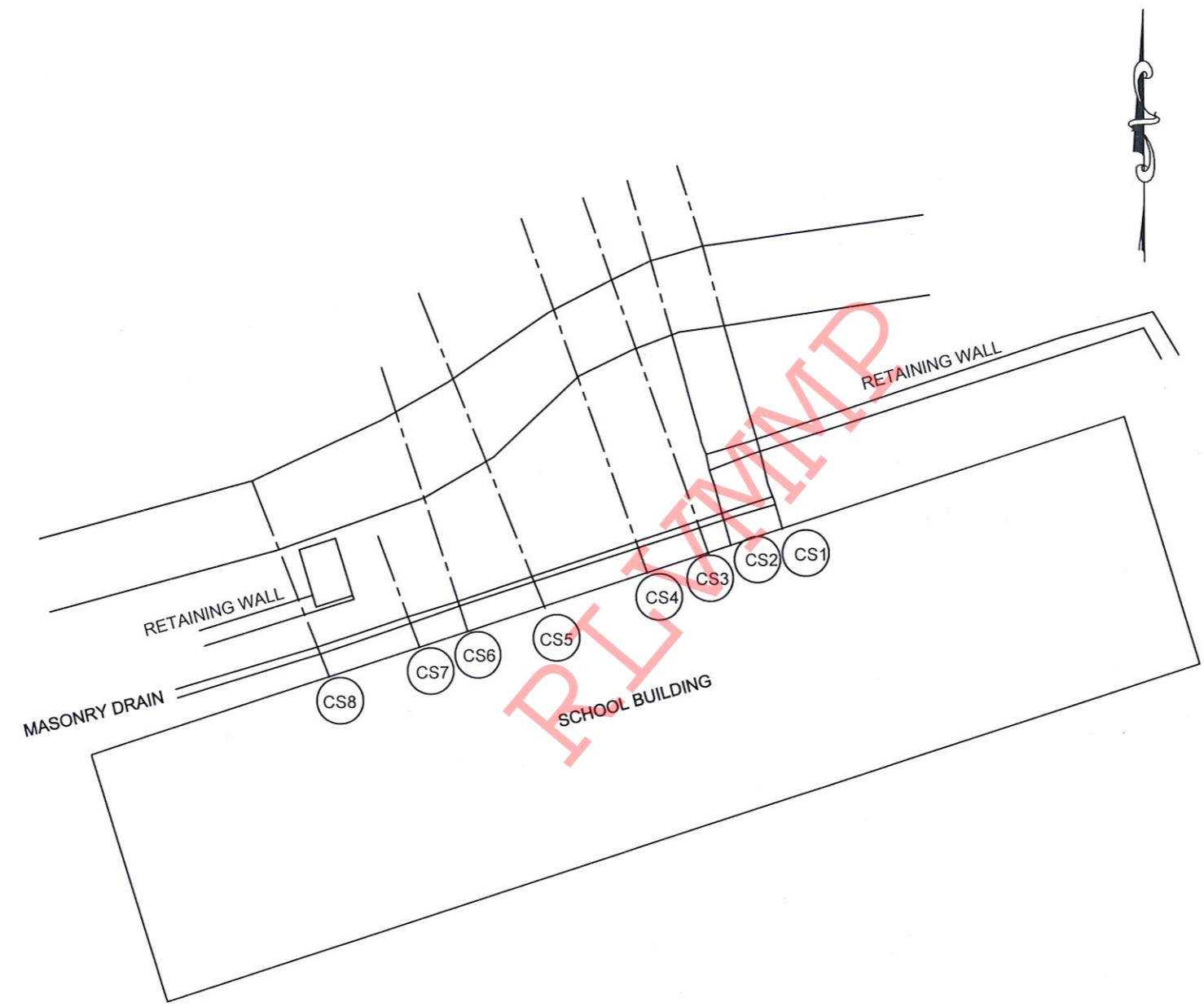
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PROJECT TITLE
 REDUCTION OF LANDSLIDE
 VULNERABILITY BY MITIGATION MEASURES
 DENIYAYA HOSPITAL

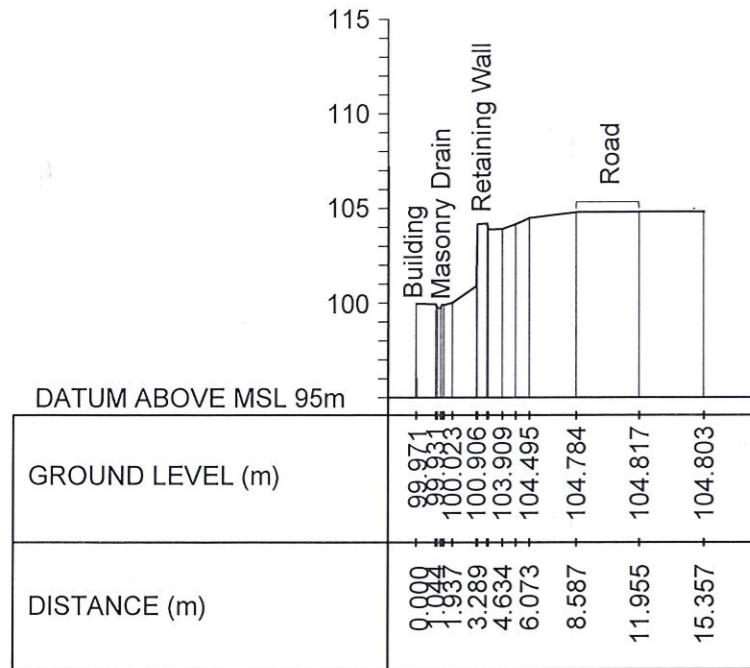
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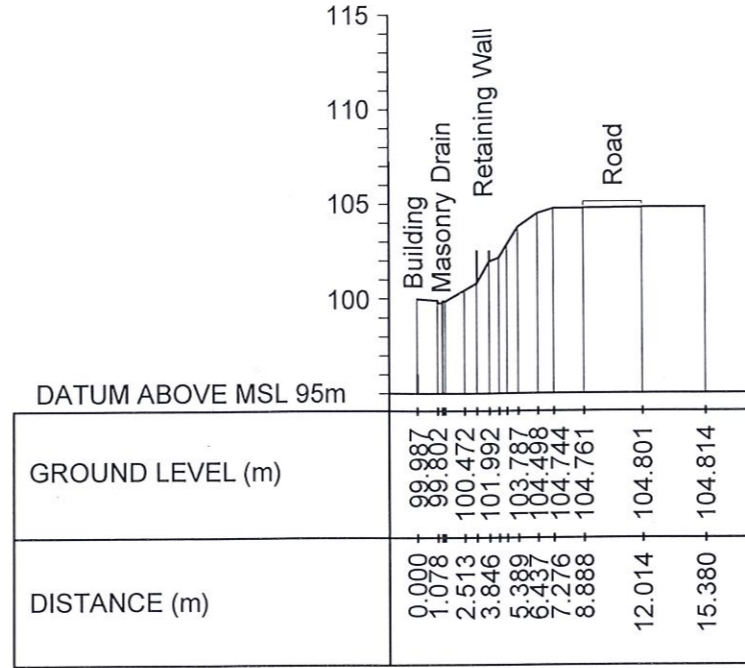
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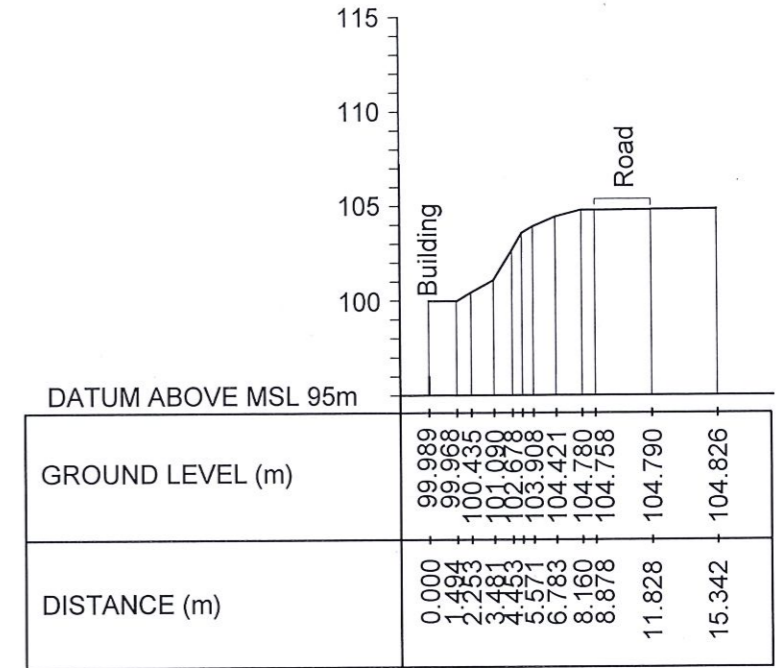
EMPLOYER  DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA MINISTRY OF DEFENCE NATIONAL BUILDING RESEARCH ORGANISATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	DESIGNER  GEOTECHNICAL ENGINEERING DIVISION NATIONAL BUILDING RESEARCH ORGANISATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	REV	DATE	REVISION DESCRIPTION	APPROVAL	PROJECT TITLE REDUCTION OF LANDSLIDE VULNERABILITY BY MITIGATION MEASURES H/ WALASMULLA NATIONAL SCHOOL LOCATION 1	TITLE SURVEY PLAN	DESCRIPTION	NAME	SIGNATURE
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								CHECKED W.A.V. ANJALEE		<i>[Signature]</i>
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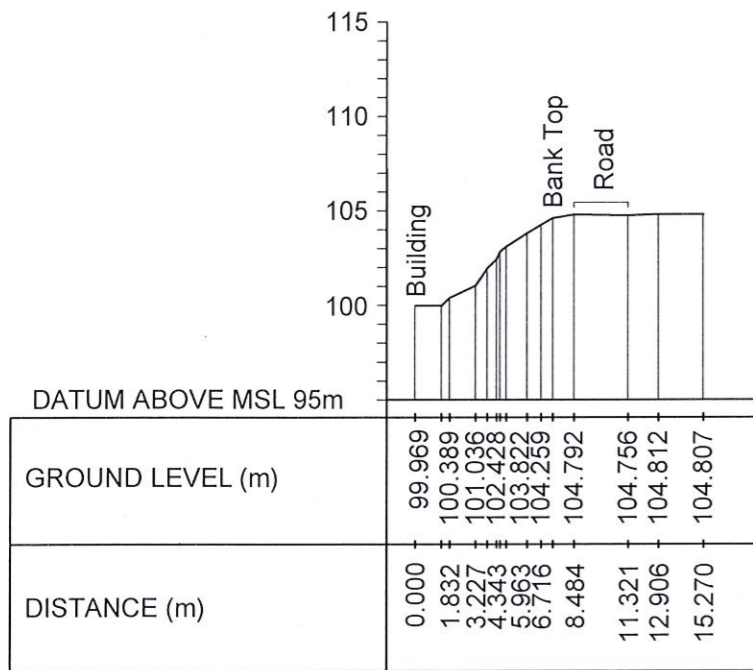
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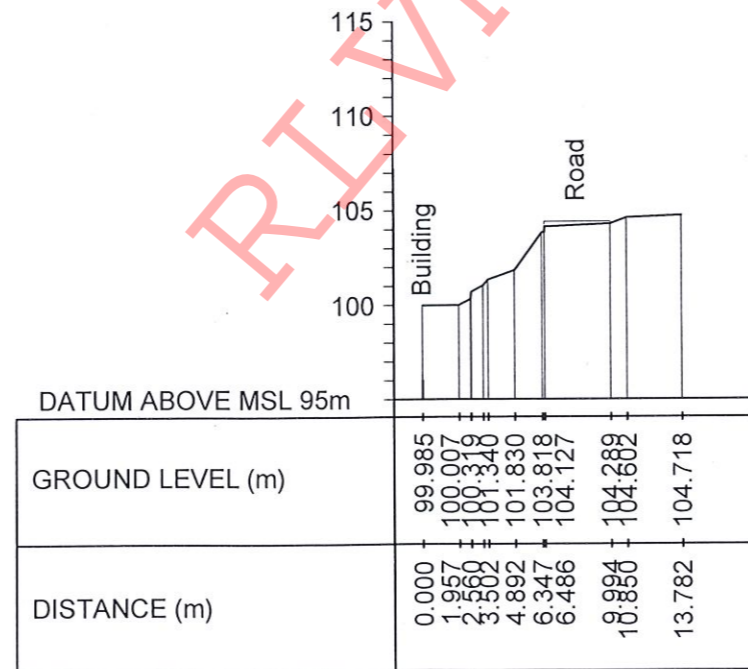
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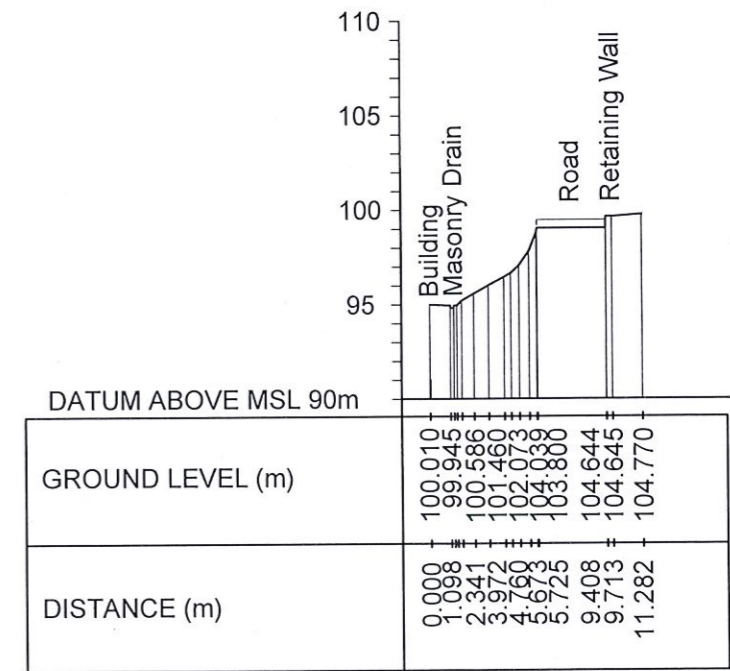
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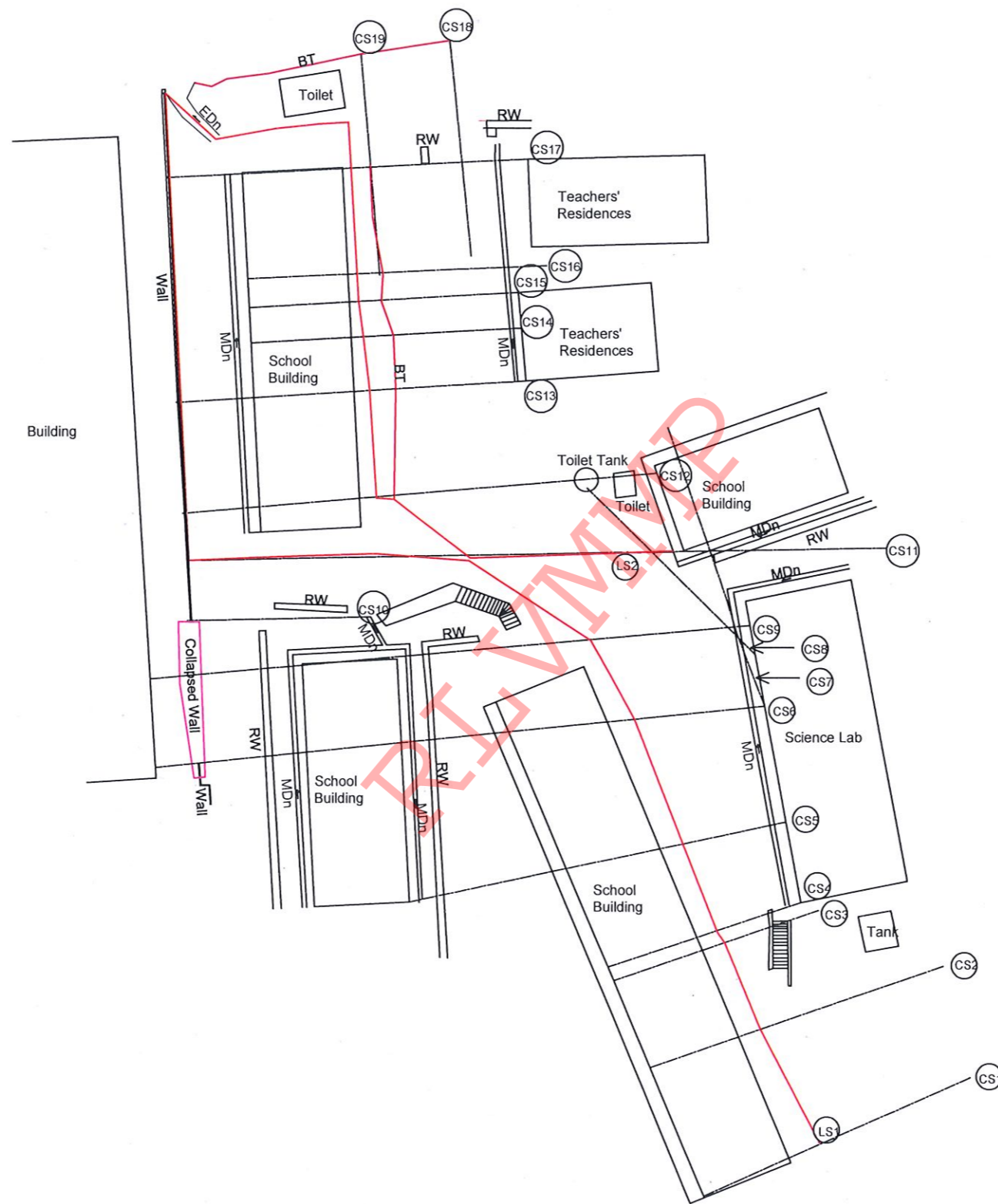



CS 05




CS 06

<p>EMPLOYER</p> <p>DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA MINISTRY OF DEFENCE NATIONAL BUILDING RESEARCH ORGANISATION No. 99/1, JAWATTA ROAD, COLOMBO - 05</p>	<p>DESIGNER</p> <p>GEOTECHNICAL ENGINEERING DIVISION NATIONAL BUILDING RESEARCH ORGANISATION No. 99/1, JAWATTA ROAD, COLOMBO - 05</p>	REV	DATE	REVISION DESCRIPTION	APPROVAL	PROJECT TITLE	TITLE	DESCRIPTION	NAME	SIGNATURE
									EXISTING CROSS SECTIONS	SURVEYED
						REDUCTION OF LANDSLIDE VULNERABILITY BY MITIGATION MEASURES H/ WALASMULLA NATIONAL SCHOOL LOCATION 1	SCALE 1:400	CHECKED	W.A.V. ANJALEE	<i>Signature</i>
							DATE 04.10.2023			
							PROJECT / DRAWING No. RLVMP/WORKS/NCB/PHII/150/L/1/ DR-02a	REVISION 00		




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



DESIGNER
 GEOTECHNICAL ENGINEERING DIVISION
 NATIONAL BUILDING RESEARCH ORGANISATION
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 COLOMBO - 05

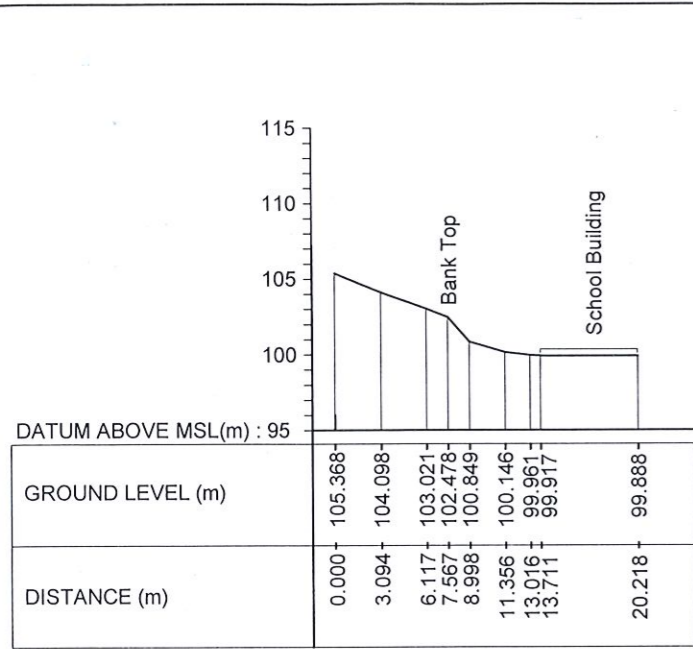
REV	DATE	REVISION DESCRIPTION	APPROVAL

PROJECT TITLE
 REDUCTION OF LANDSLIDE
 VULNERABILITY BY MITIGATION MEASURES
 H/ WALASMULLA NATIONAL SCHOOL
 LOCATION 2

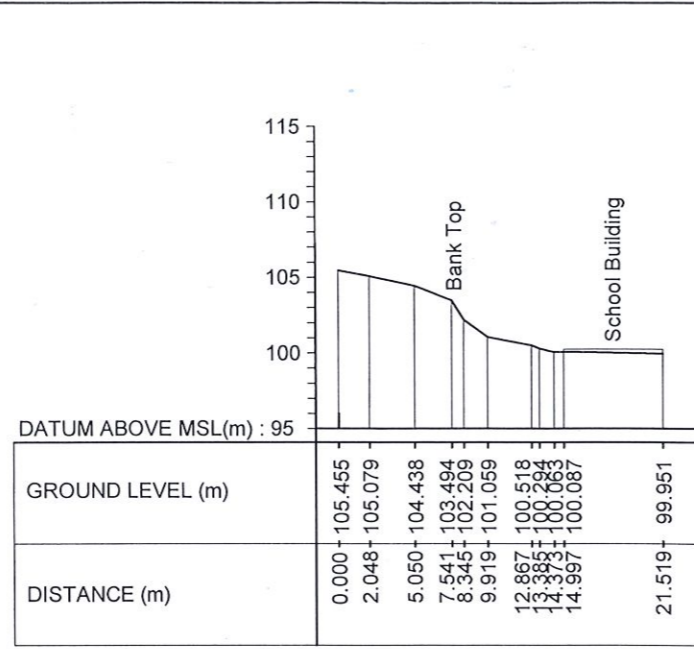
TITLE
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SCALE	1:400	DATE	12.09.2023
PROJECT / DRAWING No.	RLVMMP/WORKS/NCB/PHII/150/L2/DR-01		REVISION
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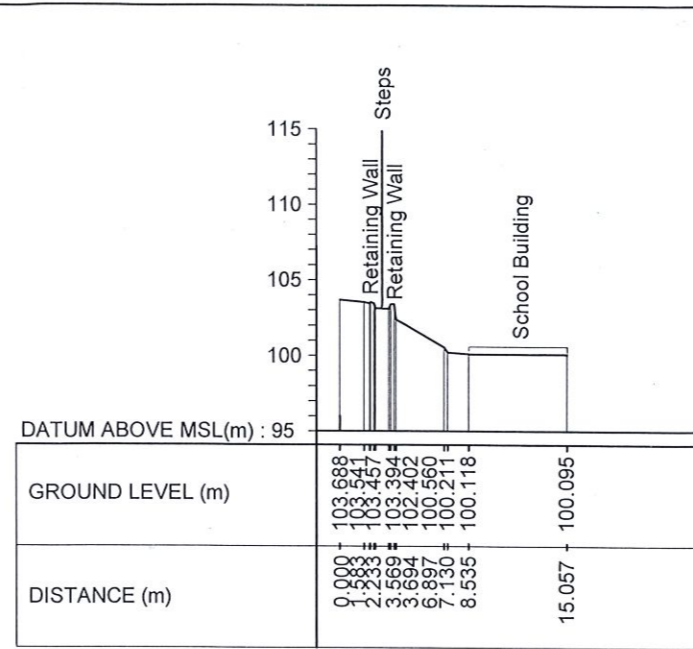
DESCRIPTION	NAME	SIGNATURE
SURVEYED	H. ASHAN LAKSHITHA	
CHECKED	W.A.V. ANJALEE	



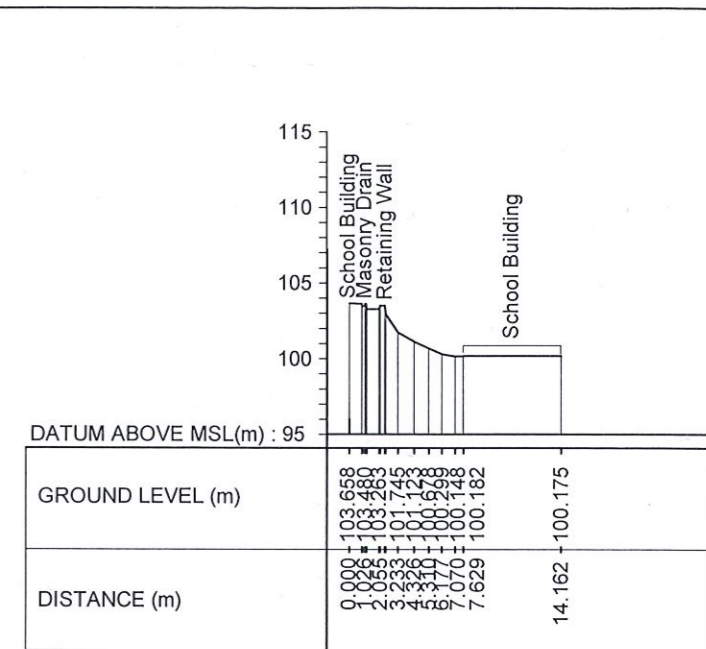
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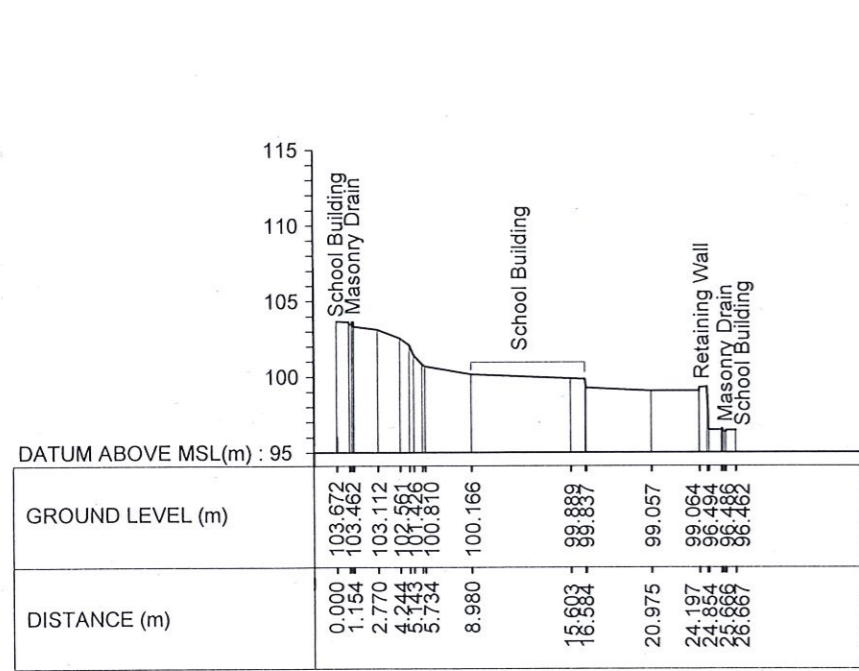
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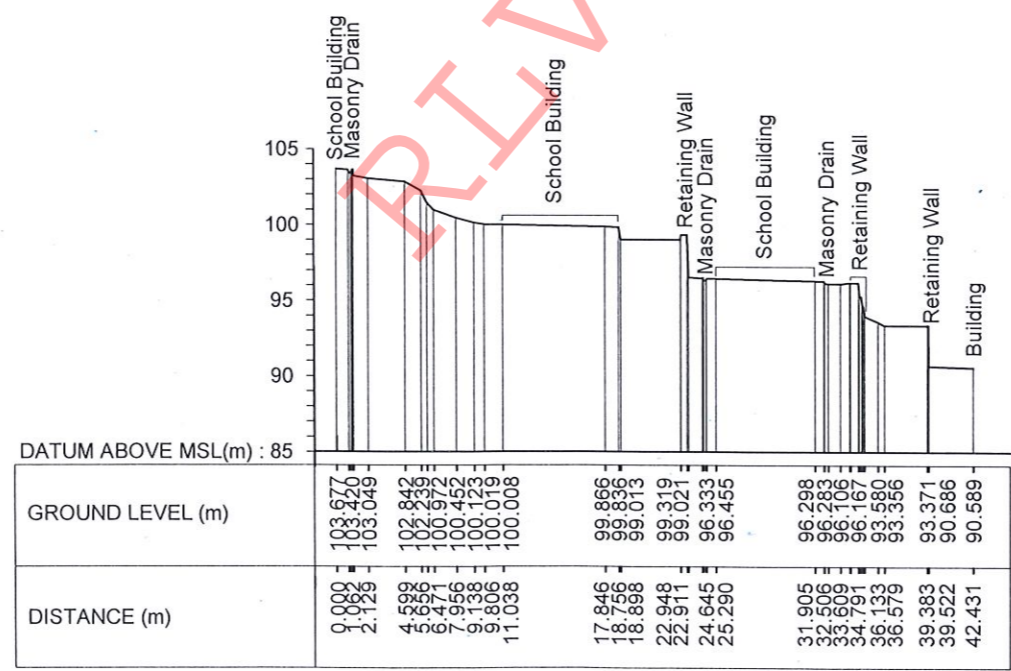
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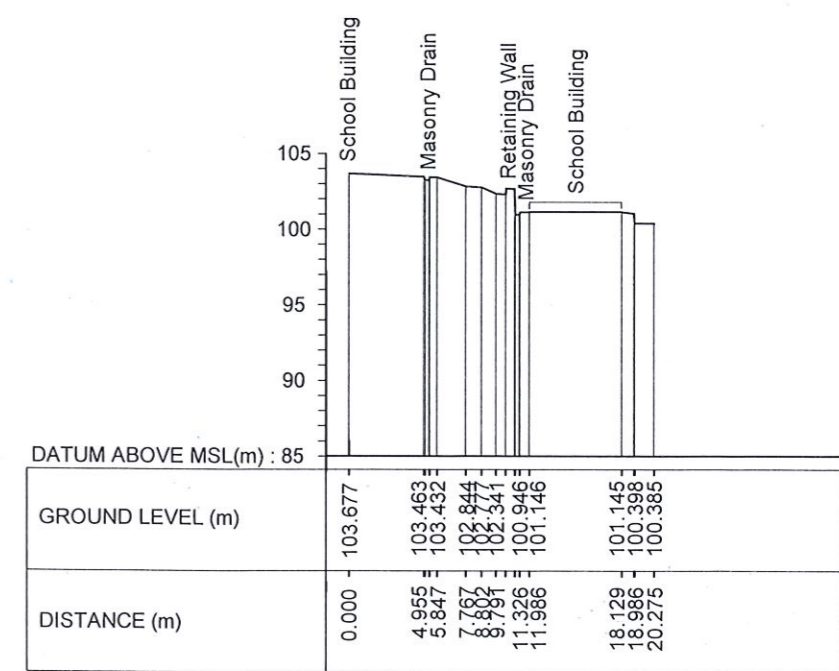
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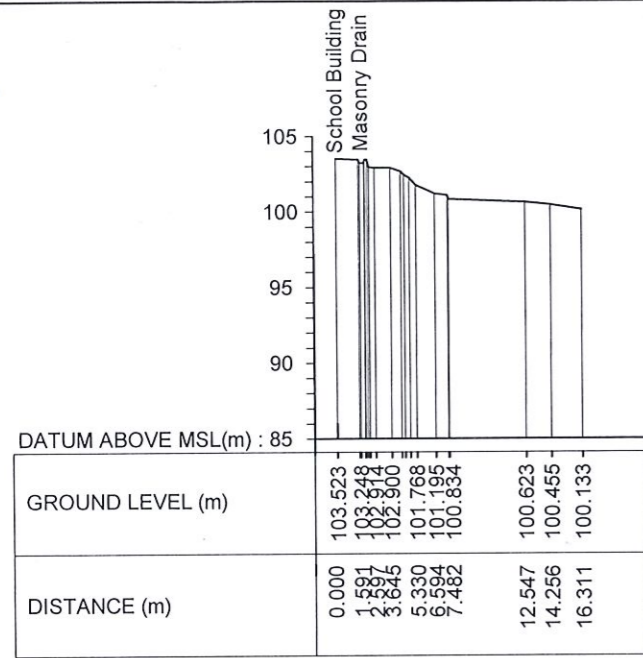


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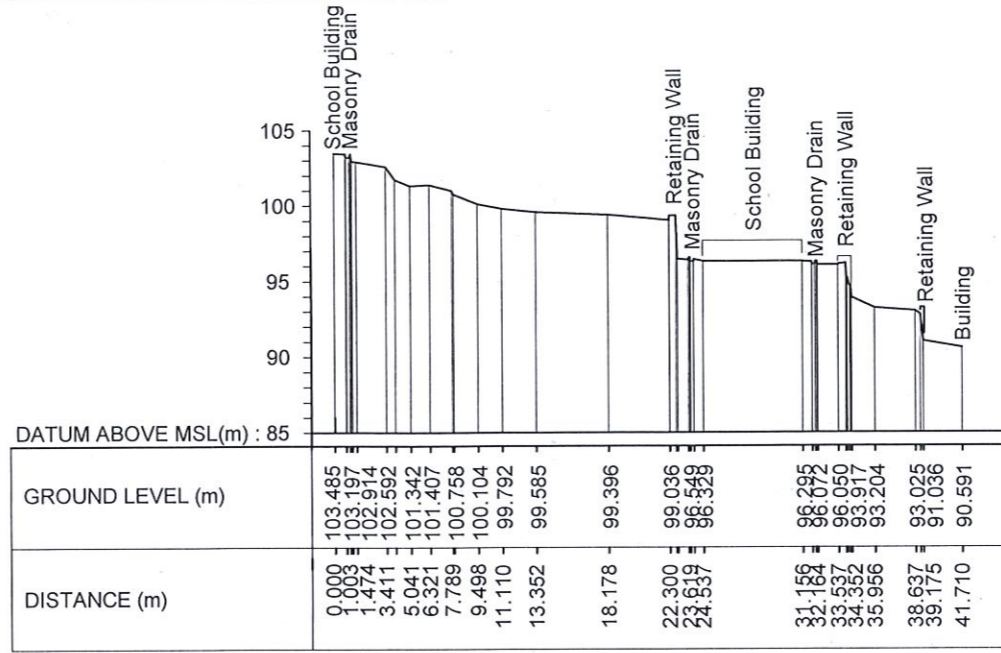


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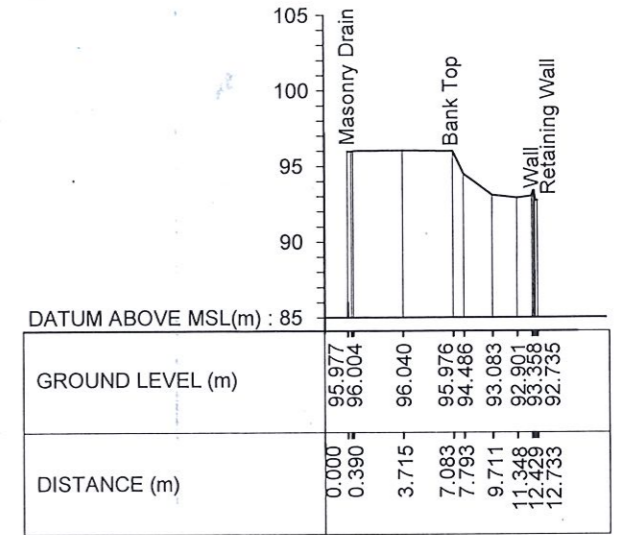
EMPLOYER DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA MINISTRY OF DEFENCE NATIONAL BUILDING RESEARCH ORGANISATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	DESIGNER GEOTECHNICAL ENGINEERING DIVISION NATIONAL BUILDING RESEARCH ORGANISATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	REV	DATE	REVISION DESCRIPTION	APPROVAL	PROJECT TITLE REDUCTION OF LANDSLIDE VULNERABILITY BY MITIGATION MEASURES H/ WALASMULLA NATIONAL SCHOOL LOCATION 2	TITLE EXISTING CROSS SECTIONS		DESCRIPTION	NAME	SIGNATURE
								SCALE 1:500	DATE 12.09.2023	SURVEYED	H. ASHAN LAKSHITHA
							PROJECT / DRAWING No. RLVMMMP/WORKS/NCB/PHIU/150/L2/DR-02a	REVISION 00	CHECKED	W.A.V. ANJALEE	



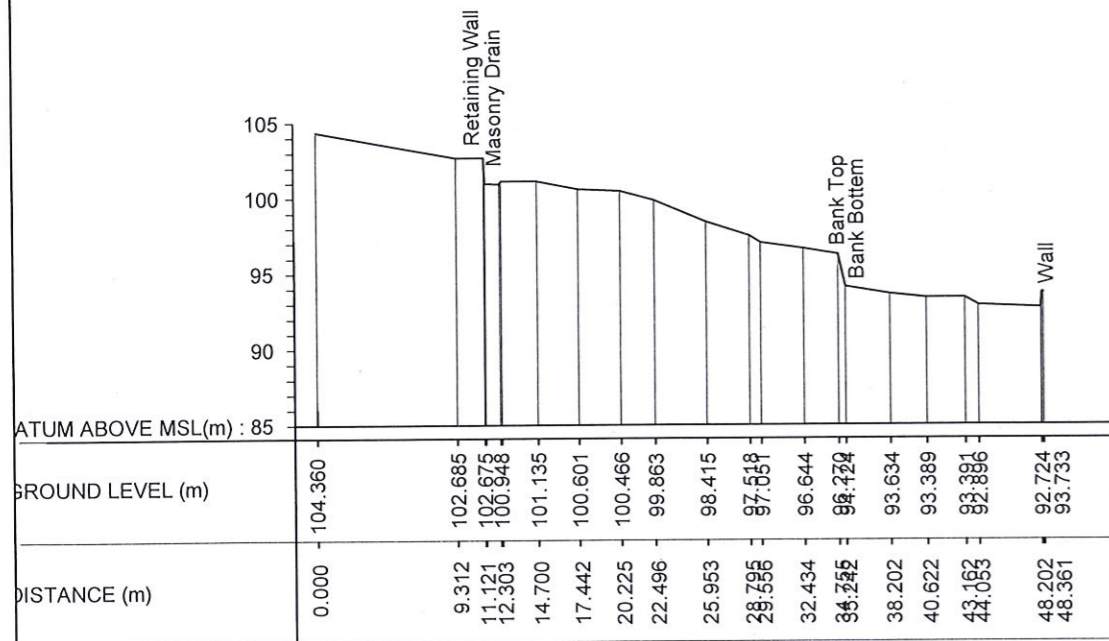
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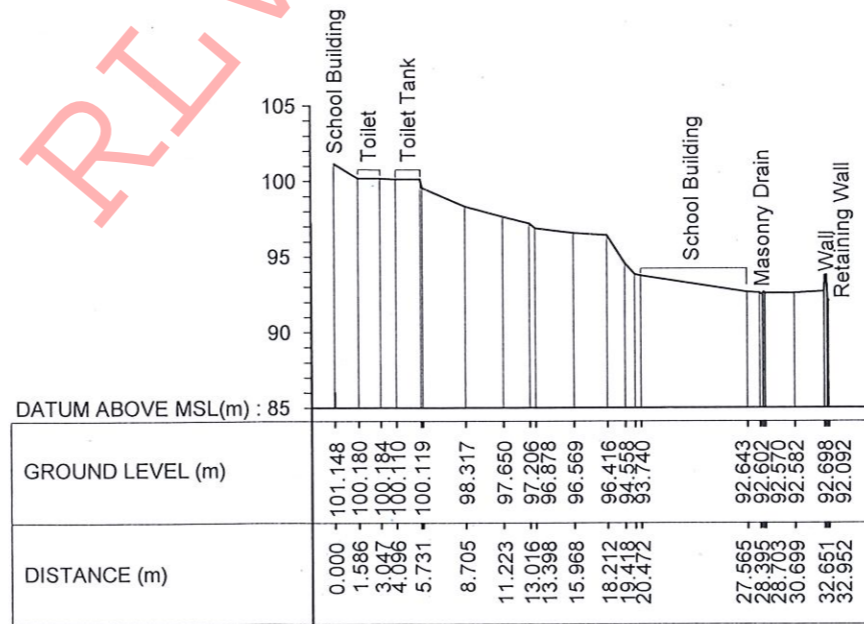
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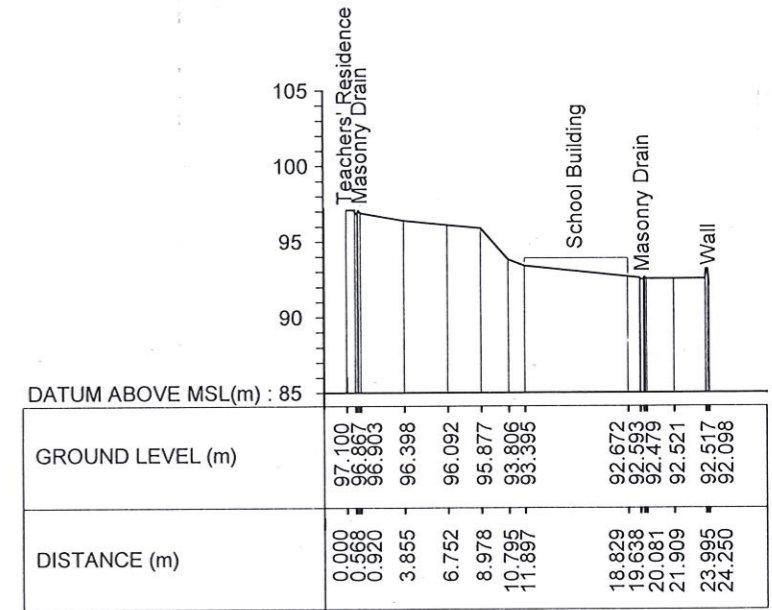
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CS 11






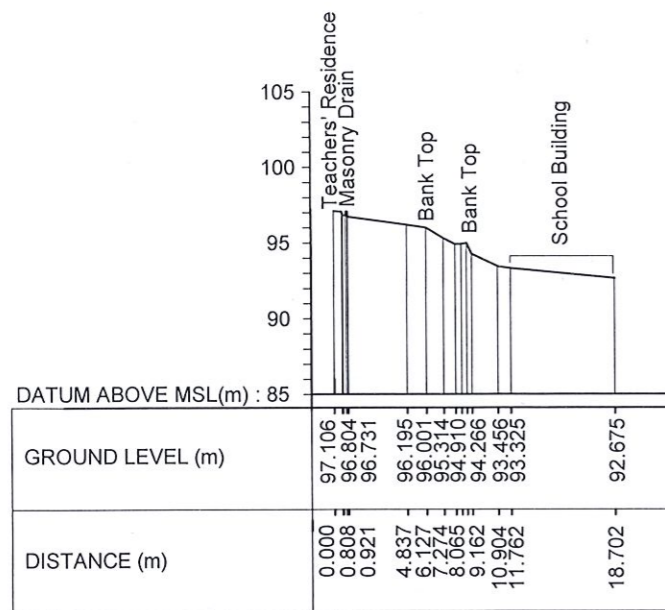
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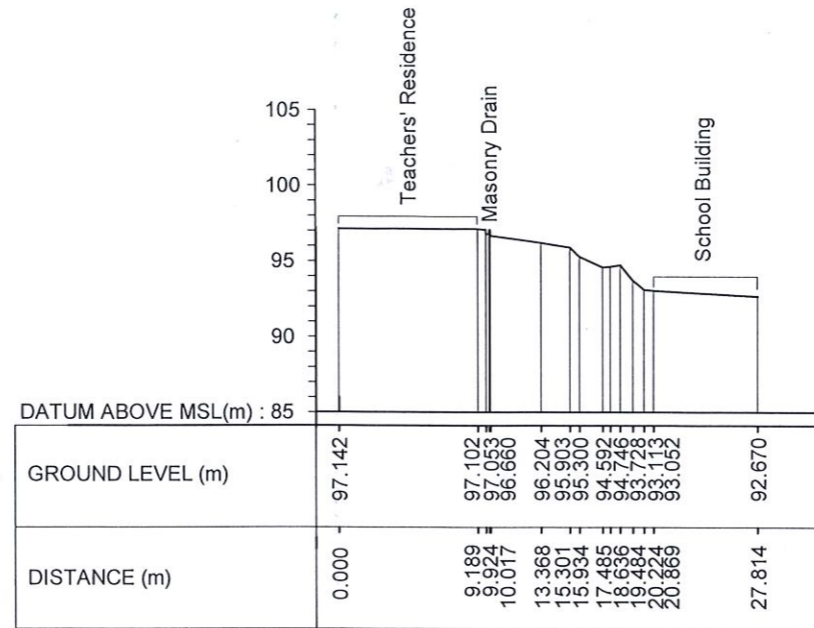
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RLVMMP

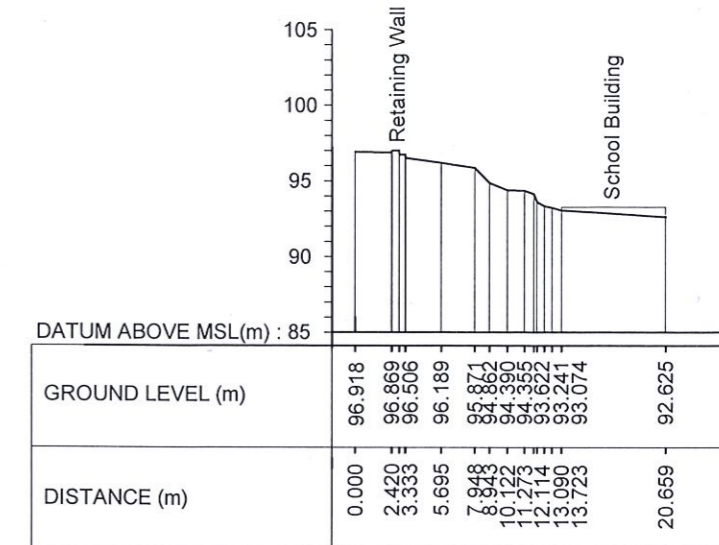
EMPLOYER  DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA MINISTRY OF DEFENCE NATIONAL BUILDING RESEARCH ORGANISATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	DESIGNER  GEOTECHNICAL ENGINEERING DIVISION NATIONAL BUILDING RESEARCH ORGANISATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	REV DATE REVISION DESCRIPTION APPROVAL	PROJECT TITLE REDUCTION OF LANDSLIDE VULNERABILITY BY MITIGATION MEASURES H/ WALASMULLA NATIONAL SCHOOL LOCATION 2	TITLE EXISTING CROSS SECTIONS	DESCRIPTION SURVEYED H. ASHAN LAKSHITHA CHECKED W.A.V. ANJALEE 
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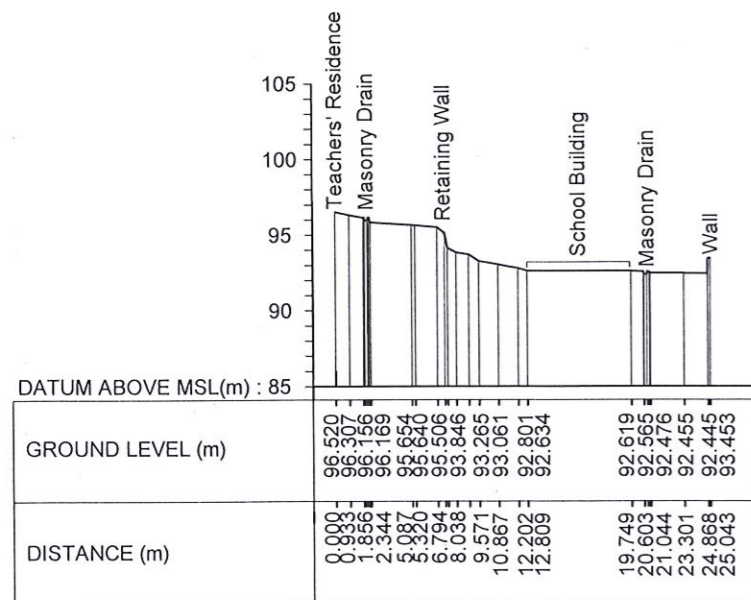
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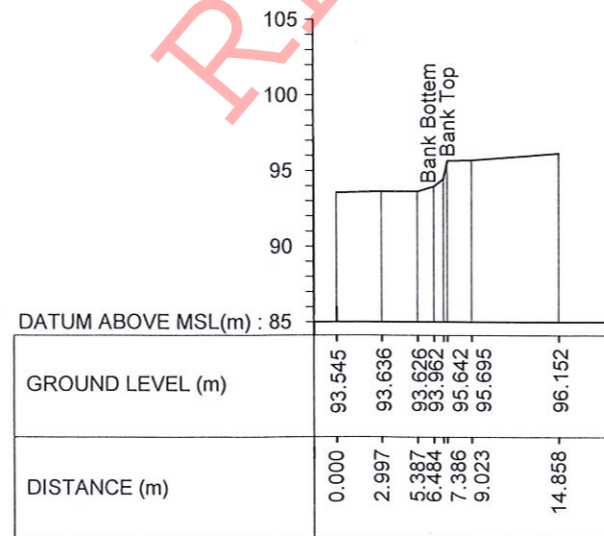
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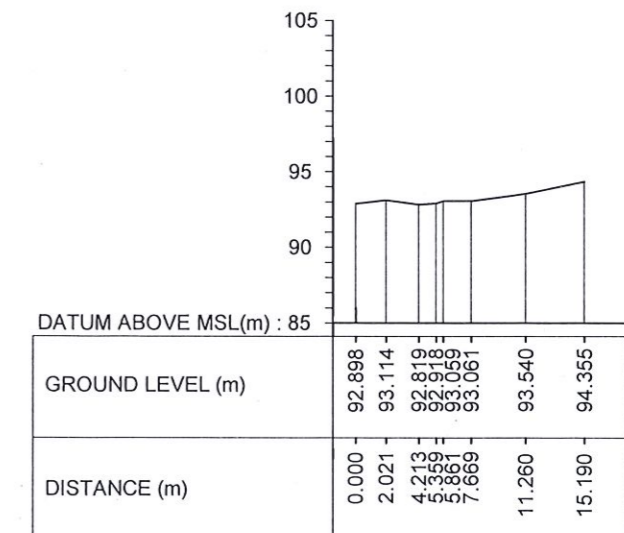
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CS 17



CS 18



CS 19

EMPLOYER



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



DESIGNER

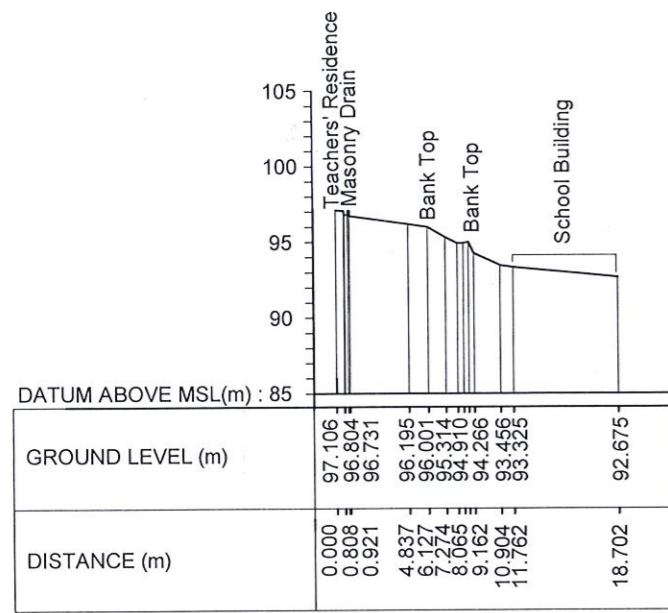
GEOTECHNICAL ENGINEERING DIVISION
NATIONAL BUILDING RESEARCH ORGANISATION
No. 99/1, JAWATTA ROAD,
COLOMBO - 05

REV	DATE	REVISION DESCRIPTION	APPROVAL

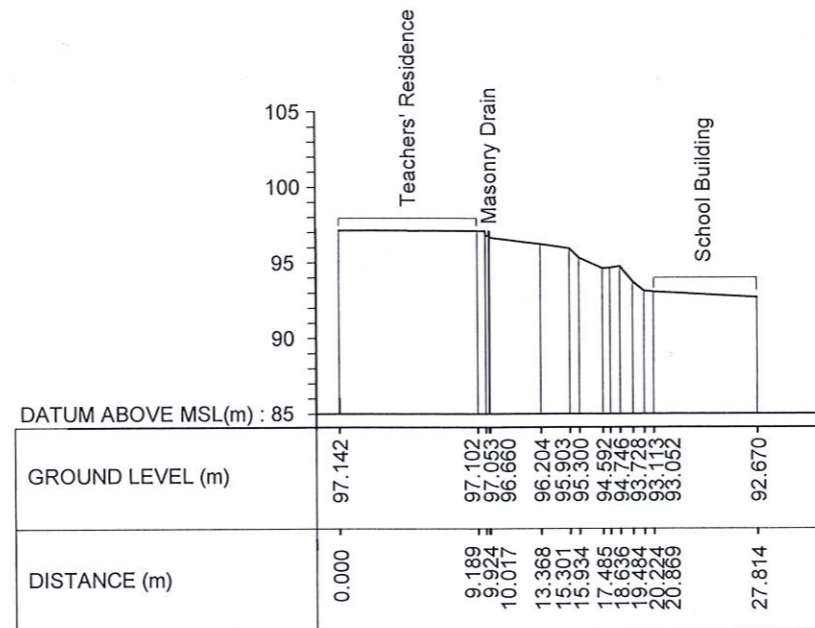
PROJECT TITLE
REDUCTION OF LANDSLIDE
VULNERABILITY BY MITIGATION MEASURES
H/ WALASMULLA NATIONAL SCHOOL
LOCATION 2

TITLE		DATE	
EXISTING CROSS SECTIONS		12.09.2023	
SCALE	1:500	PROJECT / DRAWING No.	REVISION
RLVMMP/WORKS/NCB/PH11/150/L2/DR-02c		00	

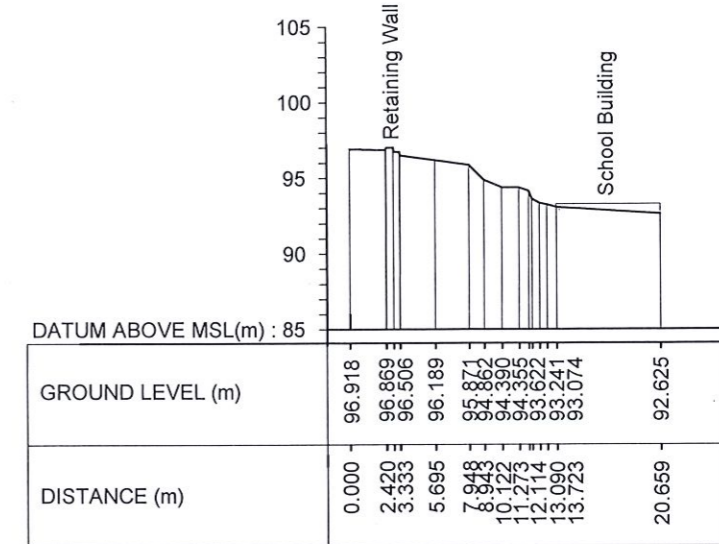
DESCRIPTION	NAME	SIGNATURE
SURVEYED	H. ASHAN LAKSHITHA	
CHECKED	W.A.V. ANJALEE	<i>Anjalee</i>



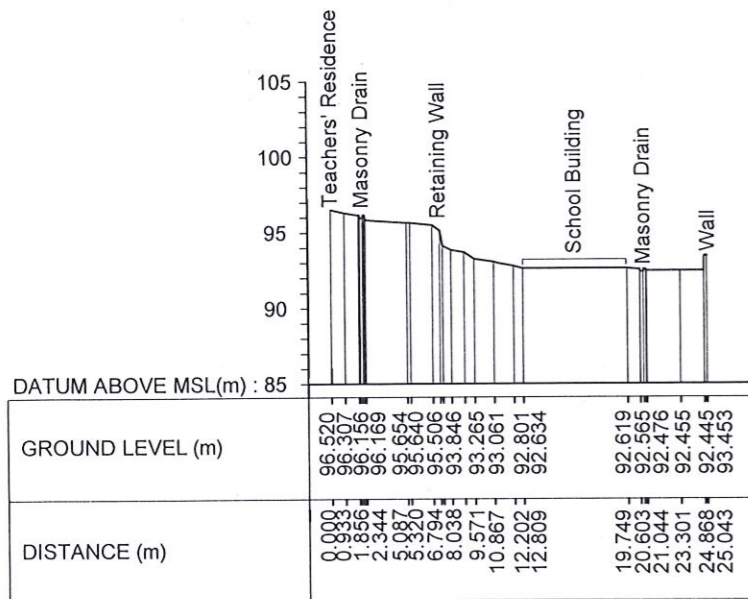
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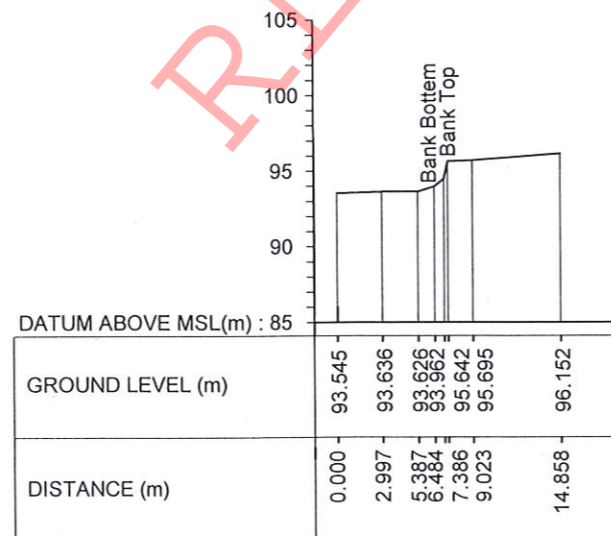
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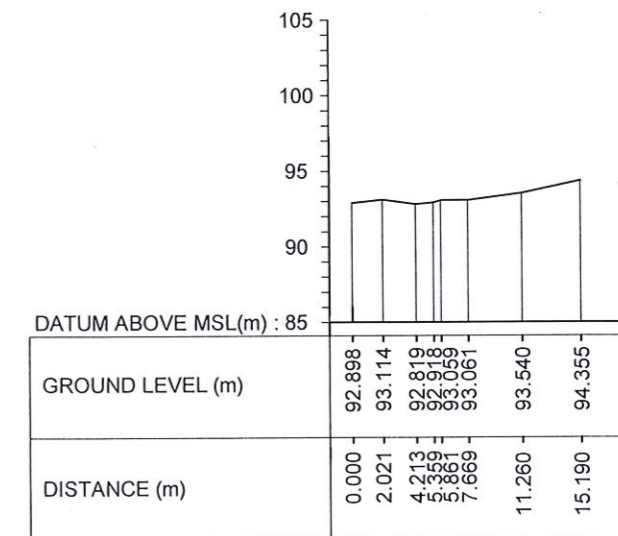
CS 16



CS 17



CS 18



CS 19

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EMPLOYER DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA MINISTRY OF DEFENCE NATIONAL BUILDING RESEARCH ORGANISATION No. 99/1, JAWATTA ROAD, COLOMBO - 05	DESIGNER GEOTECHNICAL ENGINEERING DIVISION 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 H/ WALASMULLA NATIONAL SCHOOL LOCATION 2	TITLE EXISTING CROSS SECTIONS	DESCRIPTION SURVEYED H. ASHAN LAKSHITHA CHECKED W.A.V. ANJALEE	NAME H. ASHAN LAKSHITHA W.A.V. ANJALEE	SIGNATURE
		SCALE 1:500 PROJECT / DRAWING No. RLVMMP/WORKS/NCB/PH11/150/L2/DR-02d	DATE 12.09.2023 REVISION 00				