



LEGEND		
1.	CONTOUR	830
2.	ROAD	
3.	ROAD CENTER LINE	
4.	SLIDED MASS	
5.	OVERBURDEN	
6.	RR WALL	
7.	PARAPET	
8.	SLIDE LINE	
9.	DRAIN/NALA	
10.	E.P	
11.	AREA LINE	
12.	JIO POLE	
13.	OFFLOADING/REMOVAL	
14.	HT ROLLED CABLE NET WITH SDRA	
15.	ANCHORED CC GRAVITY WALL OVER 4M WIDE BERM	

SCALE : 0 10 20 30 40 50M

FOR TENDER PURPOSE ONLY SHEET 1 OF 6



सड़क परिवहन और राजमार्ग मंत्रालय
Ministry of Road Transport and Highways

PROTECTION / TREATMENT WORKS OF LANDSLIDE ZONE JAULJIBI-DHARCHULA (NH-09) STRETCH.

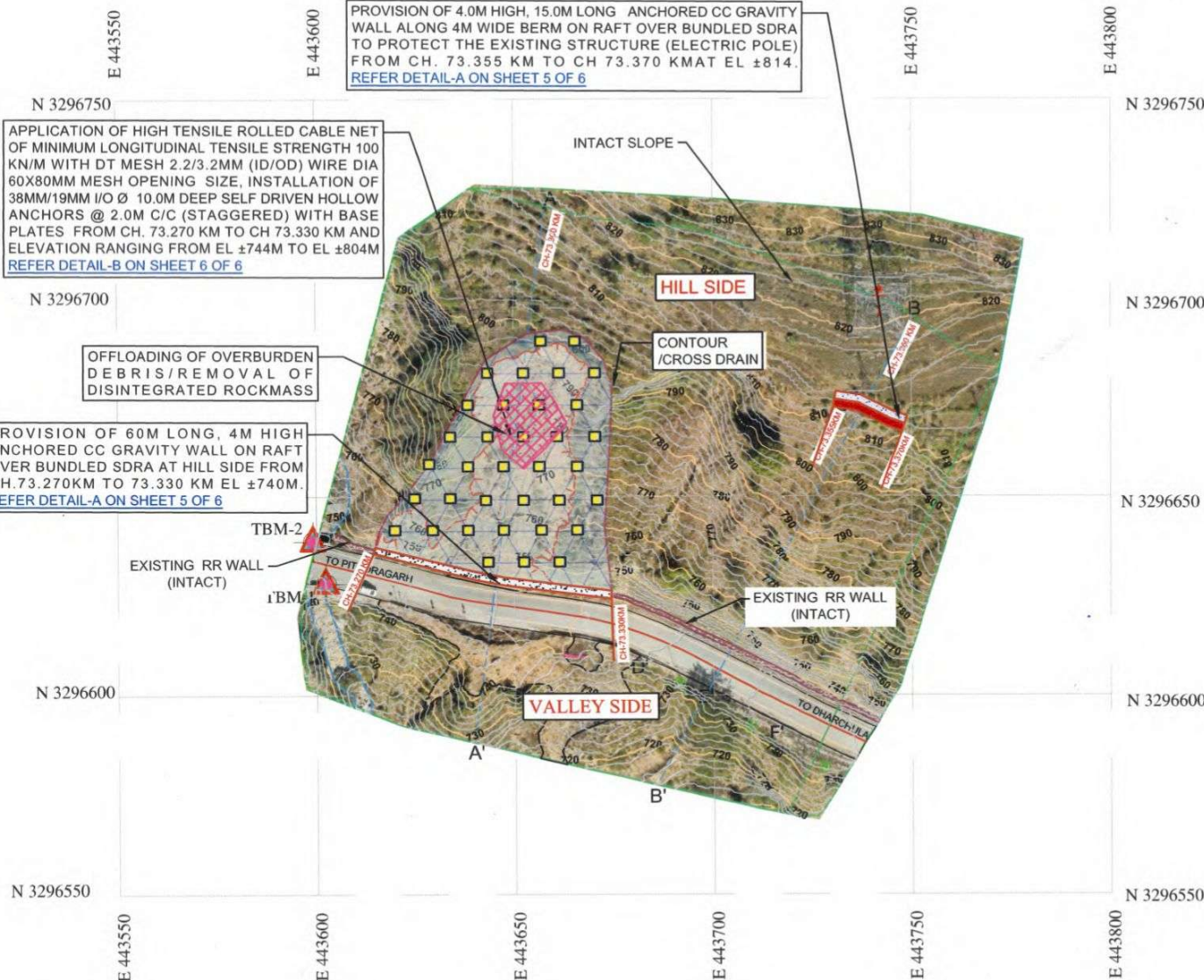
CONSULTANT: टीएचडीसी इंडिया लिमिटेड
THDC INDIA LIMITED

(KEY PLAN)

STABILITY MEASURES
BETWEEN CH-73.270 TO 73.370 KM,
JAULJIBI-DHARCHULA (NH-09) UTTARAKHAND

DRAWN BY	DESIGNED BY	CHECKED BY	SUBMITTED BY	APPROVED BY
AMIT KUMAR (D.MAN)	HMANOJ KUMAR (STR.ER.)	ANIL KUMAR (STR.ER.)	J.R. KOTHARI (DGM)	NIRAJ AGARWAL (DGM)

DRG. NO. THDC/RKSHD&E/MORTH/L-CH-73.270 TO 73.370 KM/ TD-01 DATE: MAR - 2020 D&E CIVIL RISHKESH



PROVISION OF 4.0M HIGH, 15.0M LONG ANCHORED CC GRAVITY WALL ALONG 4M WIDE BERM ON RAFT OVER BUNDLED SDRA TO PROTECT THE EXISTING STRUCTURE (ELECTRIC POLE) FROM CH. 73.355 KM TO CH 73.370 KMAT EL ±814. REFER DETAIL-A ON SHEET 5 OF 6

APPLICATION OF HIGH TENSILE ROLLED CABLE NET OF MINIMUM LONGITUDINAL TENSILE STRENGTH 100 KN/M WITH DT MESH 2.2/3.2MM (ID/OD) WIRE DIA 60X80MM MESH OPENING SIZE, INSTALLATION OF 38MM/19MM I/O Ø 10.0M DEEP SELF DRIVEN HOLLOW ANCHORS @ 2.0M C/C (STAGGERED) WITH BASE PLATES FROM CH. 73.270 KM TO CH 73.330 KM AND ELEVATION RANGING FROM EL ±744M TO EL ±804M REFER DETAIL-B ON SHEET 6 OF 6

OFFLOADING OF OVERBURDEN DEBRIS/REMOVAL OF DISINTEGRATED ROCKMASS

PROVISION OF 60M LONG, 4M HIGH ANCHORED CC GRAVITY WALL ON RAFT OVER BUNDLED SDRA AT HILL SIDE FROM CH.73.270KM TO 73.330 KM EL ±740M. REFER DETAIL-A ON SHEET 5 OF 6

NOTE:

- ALL DIMENSIONS & ELEVATIONS ARE IN METRES UNLESS OTHERWISE SPECIFIED.
- THE REFERENCE OF MEASURES SHALL BE APPLIED IN ACCORDANCE WITH THE GEOGRAPHIC CO-ORDINATES.
- THE PROPOSED LONGITUDINAL DRAIN SHALL BE CONNECTED TO THE NEARBY CROSS DRAINAGE WORKS FOR PROPER DISPOSAL OF SURFACE RUNOFF.
- ANGLE OF SDRA SHOULD BE PERPENDICULAR TO THE FRACTURE JOINT.

N 3296750

E 443550

E 443600

PROVISION OF 4.0M HIGH, 15.0M LONG ANCHORED CC GRAVITY WALL ALONG 4M WIDE BERM ON RAFT OVER BUNDLED SDRA TO PROTECT THE EXISTING STRUCTURE (ELECTRIC POLE) FROM CH. 73.355 KM TO CH 73.370 KMAT EL ±814. REFER DETAIL-A ON SHEET 5 OF 6

E 443750

E 443800

N 3296750

N 3296700

N 3296650

N 3296600

N 3296550

E 443550

E 443600

E 443650

E 443700

E 443750

E 443800

N 3296600

N 3296550

APPLICATION OF HIGH TENSILE ROLLED CABLE NET OF MINIMUM LONGITUDINAL TENSILE STRENGTH 100 KN/M WITH DT MESH 2.2/3.2MM (ID/OD) WIRE DIA 60X80MM MESH OPENING SIZE, INSTALLATION OF 38MM/19MM I/O Ø 10.0M DEEP SELF DRIVEN HOLLOW ANCHORS @ 2.0M C/C (STAGGERED) WITH BASE PLATES FROM CH. 73.270 KM TO CH 73.330 KM AND ELEVATION RANGING FROM EL ±744M TO EL ±804M REFER DETAIL-B ON SHEET 6 OF 6

OFFLOADING OF OVERBURDEN DEBRIS/REMOVAL OF DISINTEGRATED ROCKMASS

PROVISION OF 60M LONG, 4M HIGH ANCHORED CC GRAVITY WALL ON RAFT OVER BUNDLED SDRA AT HILL SIDE FROM CH.73.270KM TO 73.330 KM EL ±740M. REFER DETAIL-A ON SHEET 5 OF 6

TBM-2

TBM-1

INTACT SLOPE

HILL SIDE

CONTOUR /CROSS DRAIN

EXISTING RR WALL (INTACT)

VALLEY SIDE

A

B

TO DHARCHULA

TO PITHORAGARH



LEGEND

1.	CONTOUR	830
2.	ROAD	
3.	ROAD CENTER LINE	
4.	SLIDED MASS	
5.	OVERBURDEN	
6.	RR WALL	
7.	PARAPET	
8.	SLIDE LINE	
9.	DRAIN/NALA	
10.	E.P	
11.	AREA LINE	
12.	JIO POLE	
13.	OFFLOADING/REMOVAL	
14.	HT ROLLED CABLE NET WITH SDRA	
15.	ANCHORED CC GRAVITY WALL OVER 4M WIDE BERM	

SCALE : 0 10 20 30 40 50M

NOTE:

1. ALL DIMENSIONS & ELEVATIONS ARE IN METRES UNLESS OTHERWISE SPECIFIED.
2. THE REFERENCE OF MEASURES SHALL BE APPLIED IN ACCORDANCE WITH THE GEOGRAPHIC CO-ORDINATES.
3. THE PROPOSED LONGITUDINAL DRAIN SHALL BE CONNECTED TO THE NEARBY CROSS DRAINAGE WORKS FOR PROPER DISPOSAL OF SURFACE RUNOFF.
4. ANGLE OF SDRA SHOULD BE PERPENDICULAR TO THE FRACTURE JOINT.

FOR TENDER PURPOSE ONLY SHEET 2 OF 6



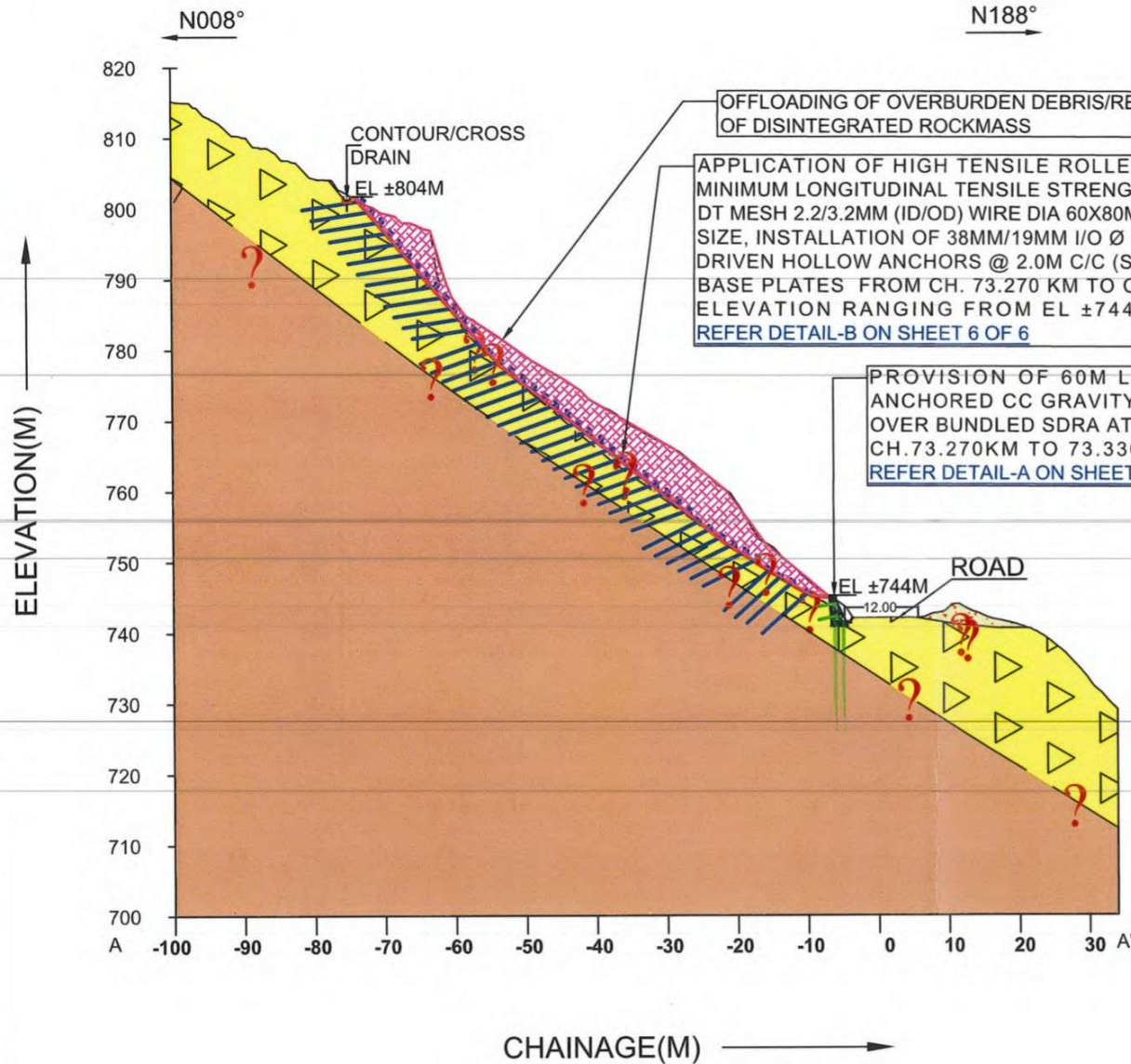
सड़क परिवहन और राजमार्ग मंत्रालय
Ministry of Road Transport and Highways

PROTECTION / TREATMENT WORKS OF LANDSLIDE ZONE JAULIBI-DHARCHULA (NH-09) STRETCH.

CONSULTANT: टीएचडीसी इंडिया लिमिटेड
THDC INDIA LIMITED

(KEY PLAN)
STABILITY MEASURES
BETWEEN CH-73.270 TO 73.370 KM.
JAULIBI-DHARCHULA (NH-09) UTTARAKHAND

DRAWN BY ANIL KUMAR (J.MAN)	DESIGNED BY HIMANSHU MEHRA (STR. ENR.)	CHECKED BY RAJ Purohit (STR. ENR.)	SUBMITTED BY J.R. KOTHARI (DOO)	APPROVED BY NRAJ AGARWAL (DOO)
DRG. NO. THDC/RSKSHD&E/MORTH/L-CH-73.270 TO 73.370 KM/TD-02	DATE: MAR - 2026			D&E CIVIL, RISHIKESH



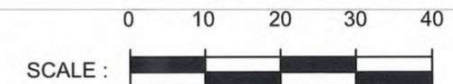
SECTION A-A' (CH. 73.300 KM)

NOTE

1. ALL DIMENSIONS & ELEVATIONS ARE IN METRES UNLESS OTHERWISE SPECIFIED.

LEGEND

1.	OVERBURDEN	
2.	SLIDE MATERIAL	
3.	ROCK MASS	
4.	HT ROLLED CABLE NET WITH SDRA	
5.	ANCHORED CC GRAVITY WALL	
6.	OFFLOADING/REMOVAL	



FOR TENDER PURPOSE ONLY SHEET 3 OF 6



सड़क परिवहन और राजमार्ग मंत्रालय
Ministry of Road Transport and Highways

PROTECTION / TREATMENT WORKS OF LANDSLIDE ZONE JAULJIBI-DHARCHULA (NH-09) STRETCH.

CONSULTANT: टीएचडीसी इंडिया लिमिटेड
THDC INDIA LIMITED

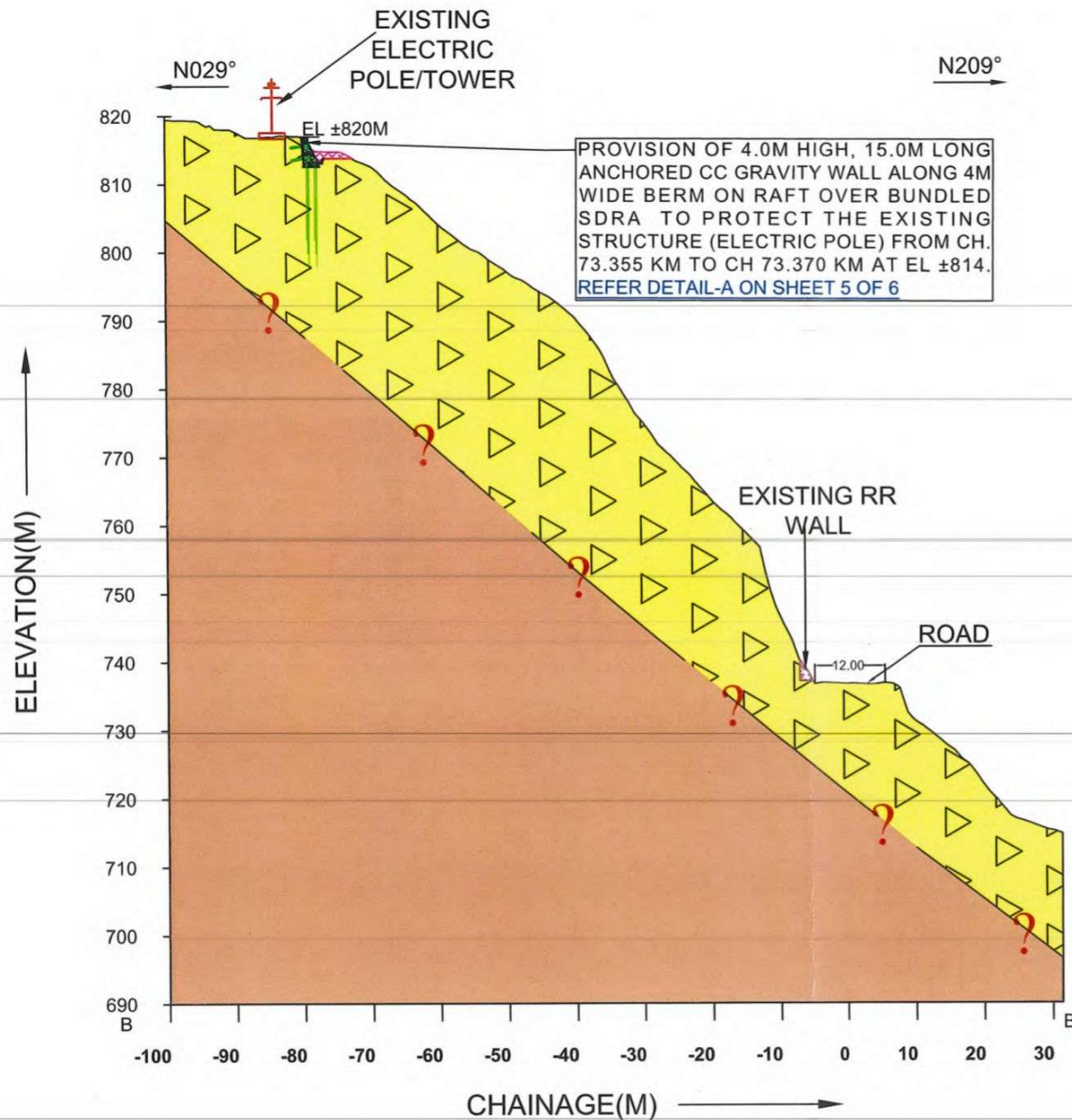
SECTION A-A'
STABILITY MEASURES
BETWEEN CH-73.270 TO 73.370 KM,
JAULJIBI-DHARCHULA (NH-09) UTTARAKHAND

DRAWN BY HIMANSHU KUMAR (D.M.S.)	DESIGNED BY HIMANSHU MEHRA (S.T.R. EN.)	CHECKED BY JAY PURCHIT (S.T.R. EN.)	SUBMITTED BY J.K. KOTHARI (S.D.O.)	APPROVED BY NIRAJ AGARWAL (D.A.)
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DRG. NO. THDC/RKSHD&M/RTTH/CH-73.270 TO 73.370 KM/ TD-03

DATE: MAR - 2026

D&E CIVIL, RISHIKESH

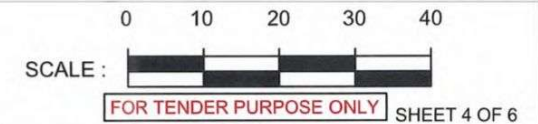


NOTE

1. ALL DIMENSIONS & ELEVATIONS ARE IN METRES UNLESS OTHERWISE SPECIFIED.

LEGEND

1.	OVERBURDEN	
2.	SLIDE MATERIAL	
3.	ELECTRIC POLE /TOWER	
4.	ROCKMASS	
5.	ANCHORED CC GRAVITY WALL	
6.	OFFLOADING/ REMOVAL	



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Ministry of Road Transport and Highways

PROTECTION / TREATMENT WORKS OF LANDSLIDE ZONE JAULJIBI-DHARCHULA (NH-09) STRETCH.

CONSULTANT:



THDC INDIA LIMITED

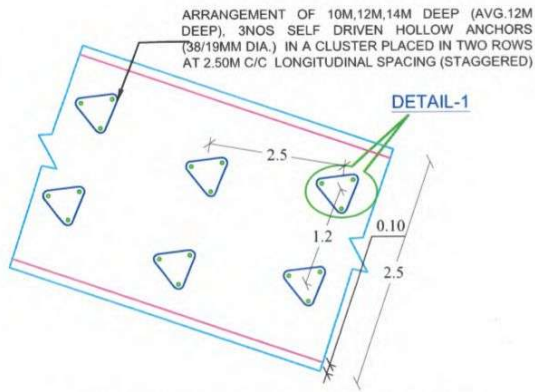
SECTION B-B'

STABILITY MEASURES

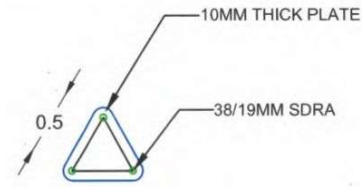
BETWEEN CH-73.270 TO 73.370 KM,
JAULJIBI-DHARCHULA (NH-09) UTTARAKHAND

DRAWN BY ANIL KUMAR (D.MAN)	DESIGNED BY HIMANSHU MEHRA (DTR. ENR.)	CHECKED BY JYOTI PURI (DTR. ENR.)	SUBMITTED BY J.R. KOTHARI (DGM)	APPROVED BY NIRAJ ADWANI (GM)
DRG. NO. THDC/RKSHD&EM/THIL-CH-73.270 TO 73.370 KM/ TD-04			DATE: MAR - 2026	

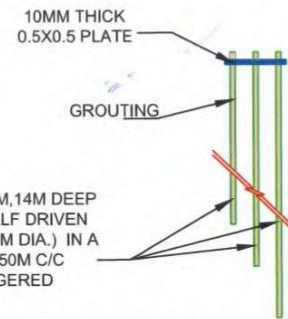
D&E CIVIL, RISHKESH



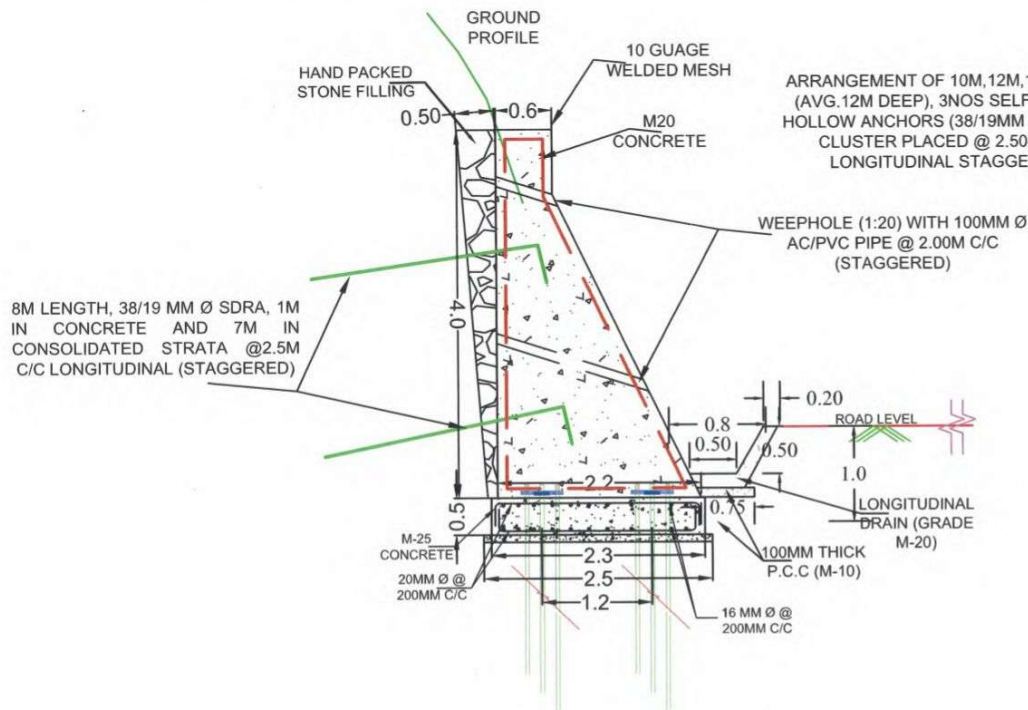
TYPICAL ARRANGEMENT OF CLUSTER OF SELF DRIVEN HOLLOW ROCK ANCHORS



DETAIL-1
TYPICAL ARRANGEMENT OF SDRA CLUSTER



SECTIONAL ELEVATION OF SDRA CLUSTER WITH 500X500X10 PLATE



DETAIL-A
TYPICAL DETAILS OF 4.0M HIGH CEMENT CONCRETE GRAVITY WALL

NOTES:

1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.
2. NO DIMENSION SHALL BE SCALED FROM THE DRAWING.
3. HIGH STRENGTH ORDINARY PORTLAND CEMENT CONFORMING TO IS : 8112 CAPABLE OF ACHIEVING THE REQUIRED DESIGN CONCRETE STRENGTH SHALL ONLY BE USED.
4. THE MINIMUM CEMENT CONTENT AND WATER CEMENT RATIO IN THE CONCRETE DESIGN MIX SHALL BE 310 KG/CUM AND 0.45 RESPECTIVELY.
5. CONCRETE USED SHALL BE OF GRADES AS SPECIFIED BELOW CONFORMING TO IS 456 (LATEST):
CC GRAVITY WALL - M20.
RCC RAFT - M25.
CC DRAIN - M20.
LEVELING COURSE - M10.
6. PROPERLY BRACED STEEL PLATES SHALL BE USED AS SHUTTERING.
7. ANY DEVIATION SHALL BE CHECKED AND ADEQUATE MEASURES MUST BE TAKEN BY ENGINEER-IN-CHARGE.

FOR TENDER PURPOSE ONLY SHEET 5 OF 6



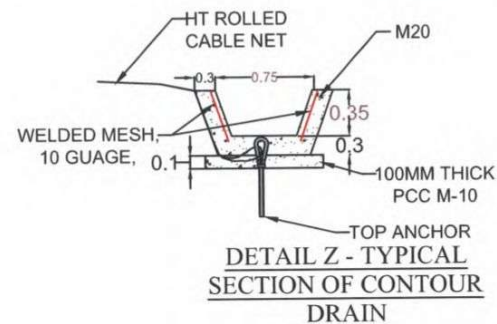
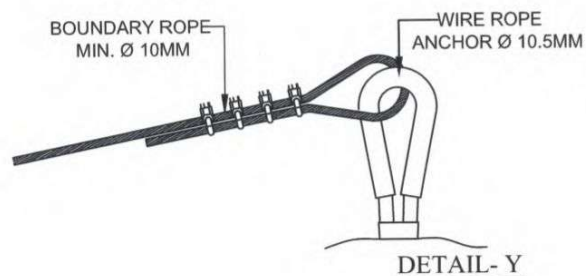
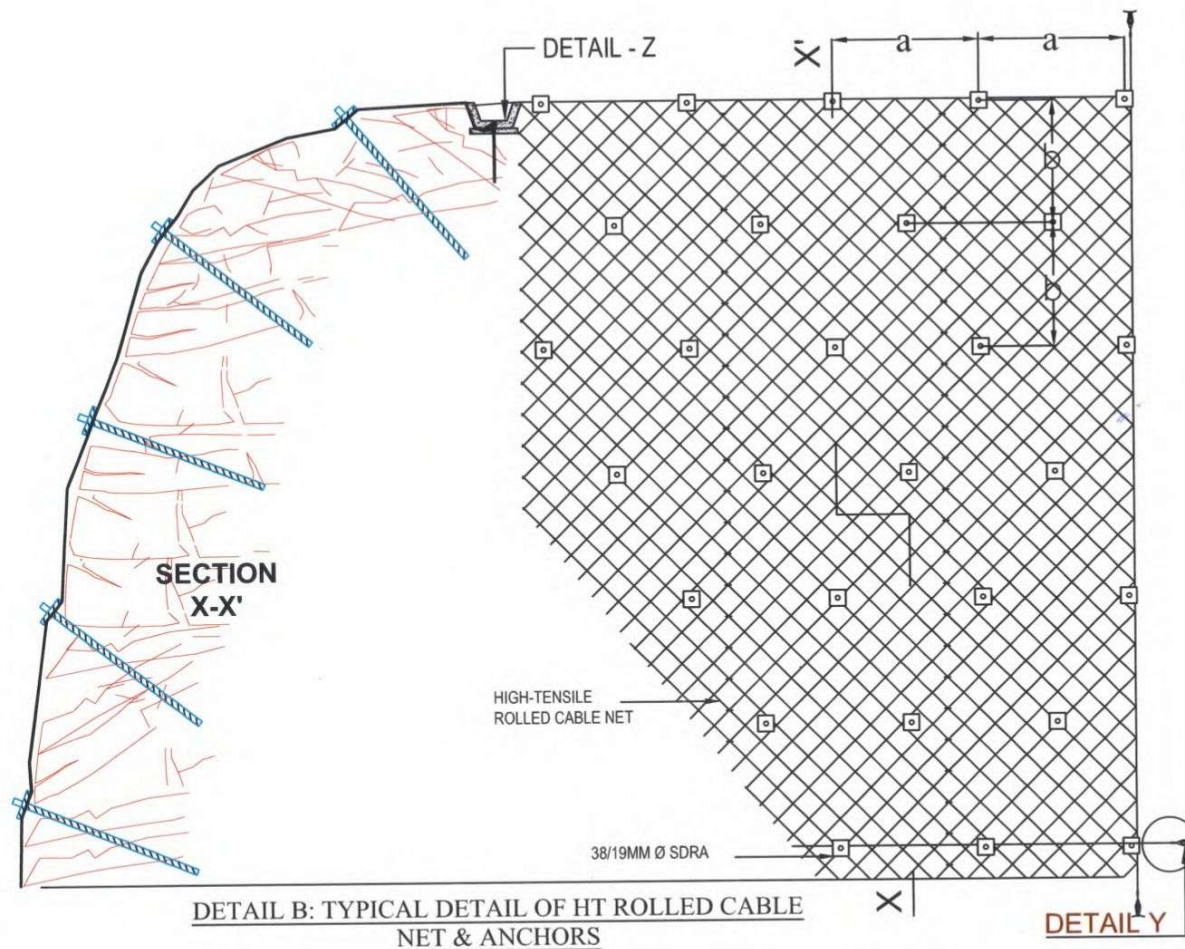
सड़क परिवहन और राजमार्ग मंत्रालय
Ministry of Road Transport and Highways

PROTECTION / TREATMENT WORKS OF LANDSLIDE ZONE JAULJIBI-DHARCHULA (NH-09) STRETCH.

CONSULTANT: टीएचडीसी इंडिया लिमिटेड
THDC INDIA LIMITED

DETAIL A
STABILITY MEASURES
BETWEEN CH-73.270 TO 73.370 KM.
JAULJIBI-DHARCHULA (NH-09) UTTARAKHAND

DRAWN BY	DESIGNED BY	CHECKED BY	SUBMITTED BY	APPROVED BY
ANIL KUMAR (D.MAN)	HIMANSHU MEHRA (STR. ENR.)	PRATYUSHA (STR. ENR.)	J.P. KOTHARI (DGM)	NRAJ KANWAR (GM)
ORG. NO. THDC/RKSHD&E/MORTHIL-CH-73.270 TO 73.370 KM/TD-05			DATE: MAR - 2026	D&E CIVIL, RISHIKESH



NOTES:-

1. THE GENERAL SPECIFICATIONS OF THE SYSTEM SHALL BE AS BELOW. HOWEVER, MENTIONED BELOW ARE THE MINIMUM VALUES.
2. THE HIGH-TENSILE ROLLED CABLE NETS SHOULD INCLUDE THE SECONDARY MESH.
3. FOR THE INSTALLATION OF HIGH-TENSILE ROLLED CABLE NETS STANDARD SUPPORT ROPES, SEAMING ROPES AND SHACKLES SHOULD BE USED. FOR THE HORIZONTAL CONNECTION STANDARD SHACKLES OR LACES SHALL BE USED.
4. DESIGN SPECIFICATION OF SYSTEM
 - a. TENSILE STRENGTH OF HT ROLLED CABLE NET - 100 KN /M
 - b. PUNCTURING RESISTANCE OF HT ROLLED CABLE NET - 200 KN
 - c. APERTURE NOT MORE THAN 300MM IN ONE DIRECTION
 - d. DIA OF CABLE OF HT ROLLED CABLE NET - 8MM
 - e. BREAKING LOAD OF CABLE OF HT ROLLED CABLE NET - 40.70 KN
 - f. TENSILE STRENGTH OF WIRE OF THE CABLE - 1770 N/SQMM
 - g. COMPOUND FOR CORROSION PROTECTION - 95% ZN AND 5% AL CLASS B OR ZINC COATING CLASS A AS PER IS/ISO-17746-2016.
 - h. AVERAGE LENGTH OF THE 38/19MM DIA. 40 CR SDRA - 10.0 M (9.7M GROUTED+0.3M ABOVE SLOPE SURFACE)
 - i. DRILL BIT SIZE - 76MM
 - j. GRID PATTERN - STAGGERED
 - k. SPACING OF ANCHORS, i.e. (a=b) - 2.0M (AVG.) (DEPENDING ON THE SLOPE ANGLE/ PROFILE, STRATA AT SITE)
 - l. SIZE OF BASE PLATE - 200MM X 200MM X 10MM (MINIMUM)
 - m. GROUTING MATERIAL - CEMENT GROUT
 - n. SIZE OF DOUBLE TWISTED MESH - 60MMX80MM, COMPRISING OF MESH WIRE DIA. 2.2/3.2MM DIA GI WIRE AND CORROSION PROTECTION Zn COATING+PVC

FOR TENDER PURPOSE ONLY

SHEET 6 OF 6



सड़क परिवहन और राजमार्ग मंत्रालय
Ministry of Road Transport and Highways

PROTECTION / TREATMENT WORKS OF LANDSLIDE ZONE JAULIBI-DHARCHULA (NH-09) STRETCH.

CONSULTANT:

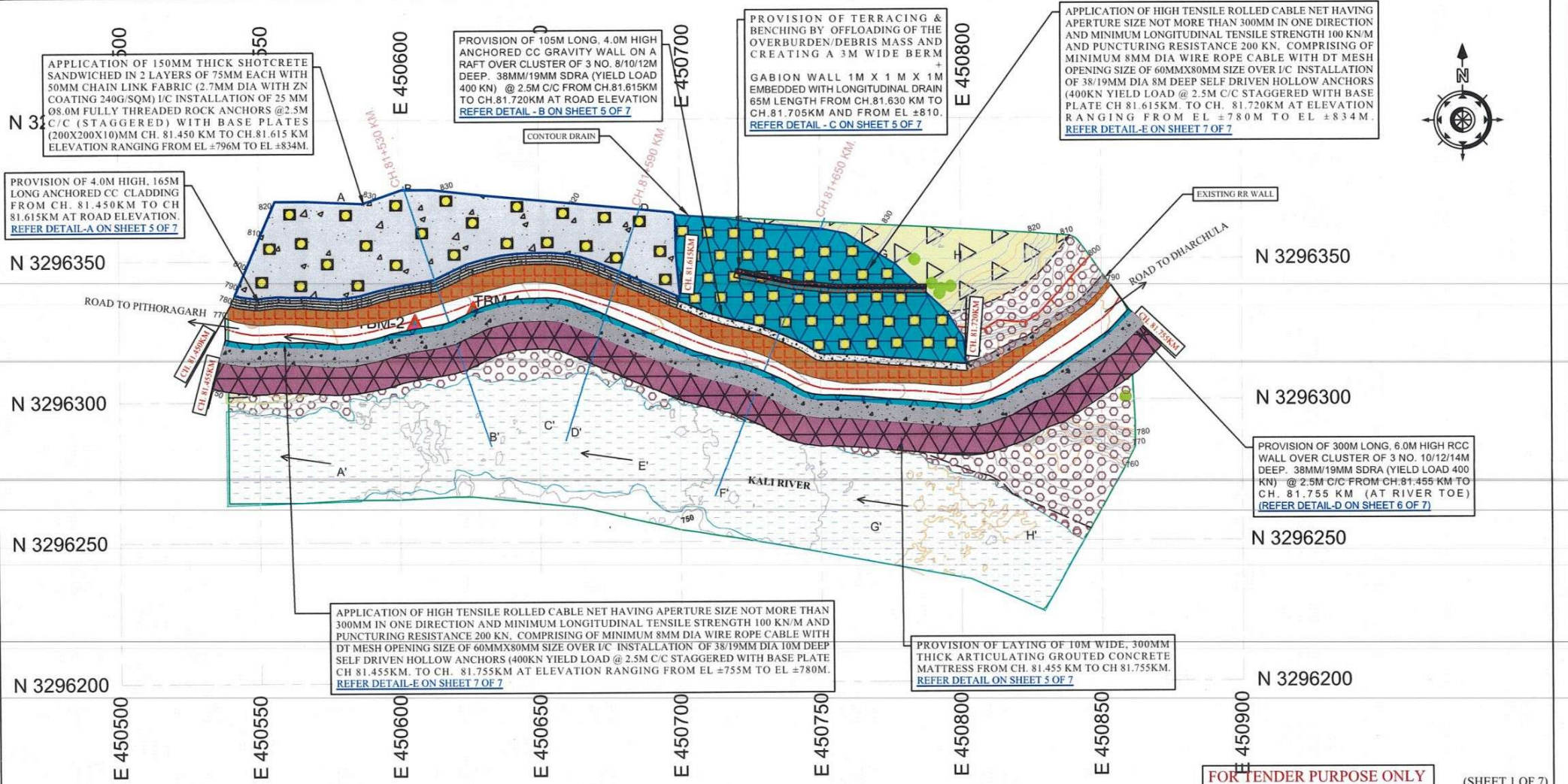


टीएचडीसी इंडिया लिमिटेड
THDC INDIA LIMITED

DETAIL B
STABILITY MEASURES
BETWEEN CH-73.270 TO 73.370 KM.
JAULIBI-DHARCHULA (NH-09) UTTARAKHAND

DRAWN BY	DESIGNED BY	CHECKED BY	SUBMITTED BY	APPROVED BY
AMTK	HMANSHU MEHRA (STR. ENR.)	DR. K. K. KOTHARI (STR. ENR.)	J.P. KOTHARI (DGM)	NIRAJ AGARWAL (GM)
DRG. NO. THDC/RRKSHD&MORTH/LCH-73.270 TO 73.370 KM/TD-06			DATE: MAR - 2026	DAE CIVIL, RISHIKESH

TCS -2



LEGEND	
1. CONTOUR	
2. ROAD	
3. OVERBURDEN	
4. SLIDEMATERIAL	
5. TREE	
6. E.P	
7. R.B.M	
8. DOLOMITE	
9. JO-POLE	
10. SLIDE LINE	

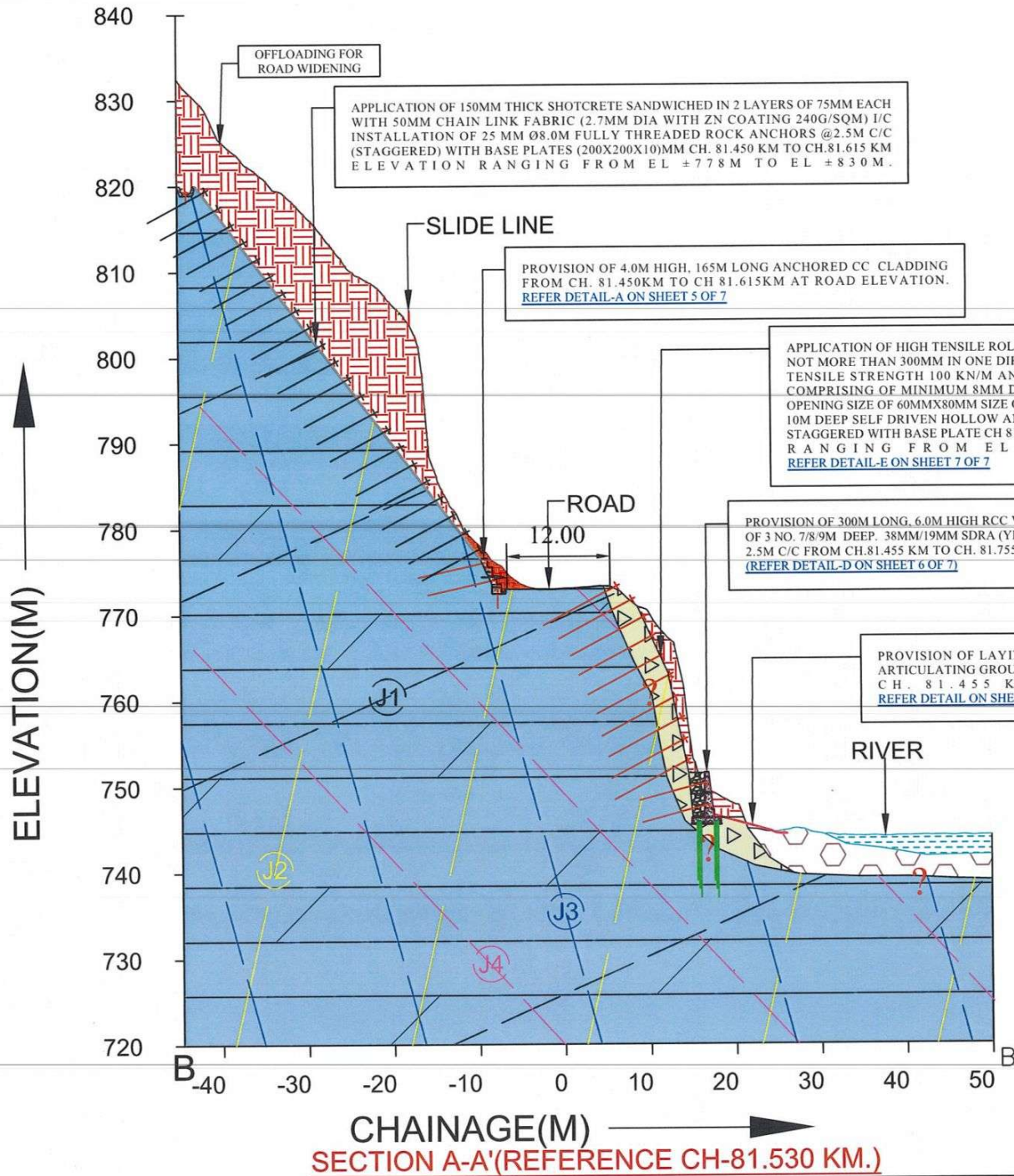
11. RIVER	
12. DIP OF FOLIATION / JOINTS	
13. EXISTING RR WALL	
14. HT ROLLED CABLE NET WITH SDRA	
15. CC CLADDING	
16. ARTICULATING MATTRESS	
17. GABION BENCH	
18. CC GRAVITY WALL	
19. RCC CANTILEVER WALL	

NOTE:
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FOR TENDER PURPOSE ONLY

(SHEET 1 OF 7)

 सड़क परिवहन और राजमार्ग मंत्रालय Ministry of Road Transport and Highways				
PROTECTION / TREATMENT WORKS OF LANDSLIDE ZONE DHARCHULA-GUNJ,UK (NH 09), KUMAON REGION (UTTARAKHAND).				
CONSULTANT:		 टीएचडीसी इंडिया लिमिटेड THDC INDIA LIMITED		
(KEY PLAN) (PROPOSED TREATMENT MEASURES) CH-81.450 TO CH-81.755 KM, DHARCHULA-GUNJ, UK (NH 09)				
DRAWN BY	DESIGNED BY	CHECKED BY	SUBMITTED BY	APPROVED BY
 AMIT KUMAR (D. MAN)	 DINESH KUMAR (HYD. ENGINEER)	 VINAY PUROHIT (STR. EN.)	 J.R. KOTHARI (IGM)	 NIRAJ AGARWAL (GM)
DRG. NO. TIDC_RKSH D&E-MORTH-NH09-CH-81.450-81.755 KM-TD-01			DATE: MAR - 2026 D&E CIVIL, RISHIKESH	



NOTE:

1. ALL DIMENSIONS & ELEVATIONS ARE IN METRES UNLESS OTHERWISE SPECIFIED.
2. ANCHORS SHALL BE INSTALLED PERPENDICULAR TO FAILURE PLANE IN SUCH A MANNER THAT THEY SHOULD ALSO SEAL THE JOINT AS PER THE SITE CONDITION IN ROCK SLOPE.
3. THE GROUTING IN SDRA SHALL BE PERFORMED AFTER PULLING THE INSTALLED ANCHORS IN 0.5M FOR CREATING GROUT SPACE.

LEGEND	
1. OVERBURDEN	
2. DOLOMITE	
3. SLIDE MATERIAL	
4. R.B.M	
5. TRACES OF JOINTS	
6. REMOVAL OF LOOSE MASS	
7. SHOTCRETE	
8. CC CLADDING	
9. RCC CANTILEVER WALL	
10. ARTICULATING MATTRESS	
11. HT ROLLED CABLE NET WITH SDRA	

FOR TENDER PURPOSE ONLY (SHEET 2 OF 7)

सड़क परिवहन और राजमार्ग मंत्रालय Ministry of Road Transport and Highways				
PROTECTION / TREATMENT WORKS OF LANDSLIDE ZONE DHARCHULA-GUNJLUK (NH 09), KUMAON REGION (UTTARAKHAND).				
CONSULTANT: टीएचडीसी इंडिया लिमिटेड THDC INDIA LIMITED				
(SECTION A-A') (PROPOSED TREATMENT MEASURES) CH-81.450 TO CH-81.755 KM, DHARCHULA-GUNJLUK (NH 09)				
DRAWN BY	DESIGNED BY	CHECKED BY	SUBMITTED BY	APPROVED BY
AMIT KUMAR (D. MAN.)	DINESH KUMAR (HYD. ENGINEER)	VINAY PUROHIT (STR. ENR.)	J.R. KOTHARI (DGM.)	NIRAJ AGARWAL (GM.)
DRG. NO. THDC_RKSHI DAE MORTH NH09/CH-81.450-81.755 KM TD-02			DATE: MAR - 2026	
			DSE CIVIL, RISHIKESH	

NOTE:

1. ALL DIMENSIONS & ELEVATIONS ARE IN METRES UNLESS OTHERWISE SPECIFIED.
2. ANCHORS SHALL BE INSTALLED PERPENDICULAR TO FAILURE PLANE IN SUCH A MANNER THAT THEY SHOULD ALSO SEAL THE JOINT AS PER THE SITE CONDITION IN ROCK SLOPE.
3. THE GROUTING IN SDRA SHALL BE PERFORMED AFTER PULLING THE INSTALLED ANCHORS IN 0.5M FOR CREATING GROUT SPACE.

LEGEND	
1. OVERBURDEN	
2. DOLOMITE	
3. SLIDE MATERIAL	
4. R.B.M	
5. TRACES OF JOINTS	
6. REMOVAL OF LOOSE MASS	
7. SHOTCRETE	
8. CC CLADDING	
9. RCC CANTILEVER WALL	
10. ARTICULATING MATTRESS	
11. HT ROLLED CABLE NET WITH SDRA	

FOR TENDER PURPOSE ONLY

(SHEET 3 OF 7)



सड़क परिवहन और राजमार्ग मंत्रालय
Ministry of Road Transport and Highways

PROTECTION / TREATMENT WORKS OF LANDSLIDE ZONE
DHARCHULA-GUNJI, UK (NH 09), KUMAON REGION (UTTARAKHAND).

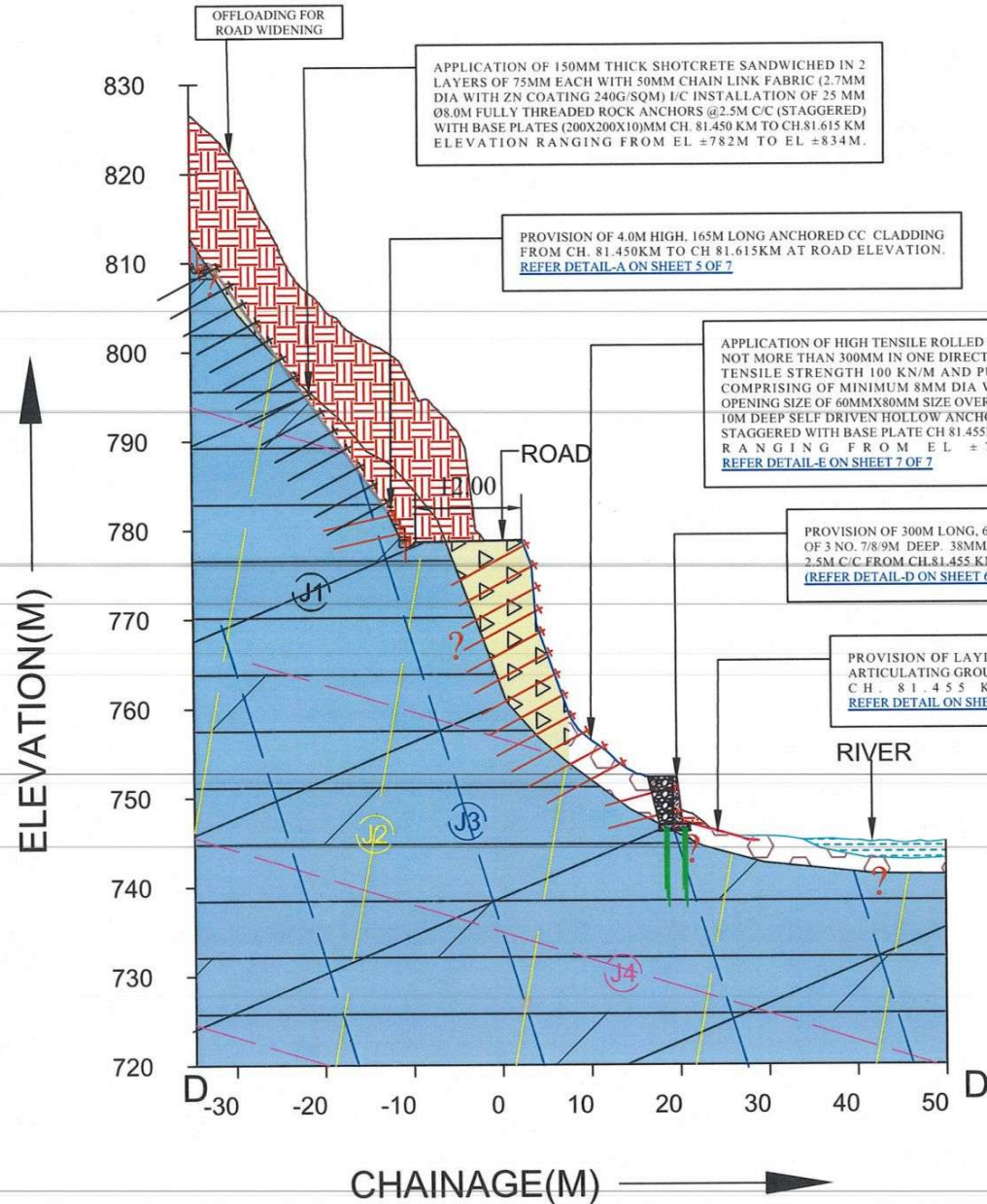
CONSULTANT: टीएचडीसी इंडिया लिमिटेड
THDC INDIA LIMITED

(SECTION B-B')
(PROPOSED TREATMENT MEASURES)
CH-81.450 TO CH-81.755 KM, DHARCHULA-GUNJI, UK (NH 09)

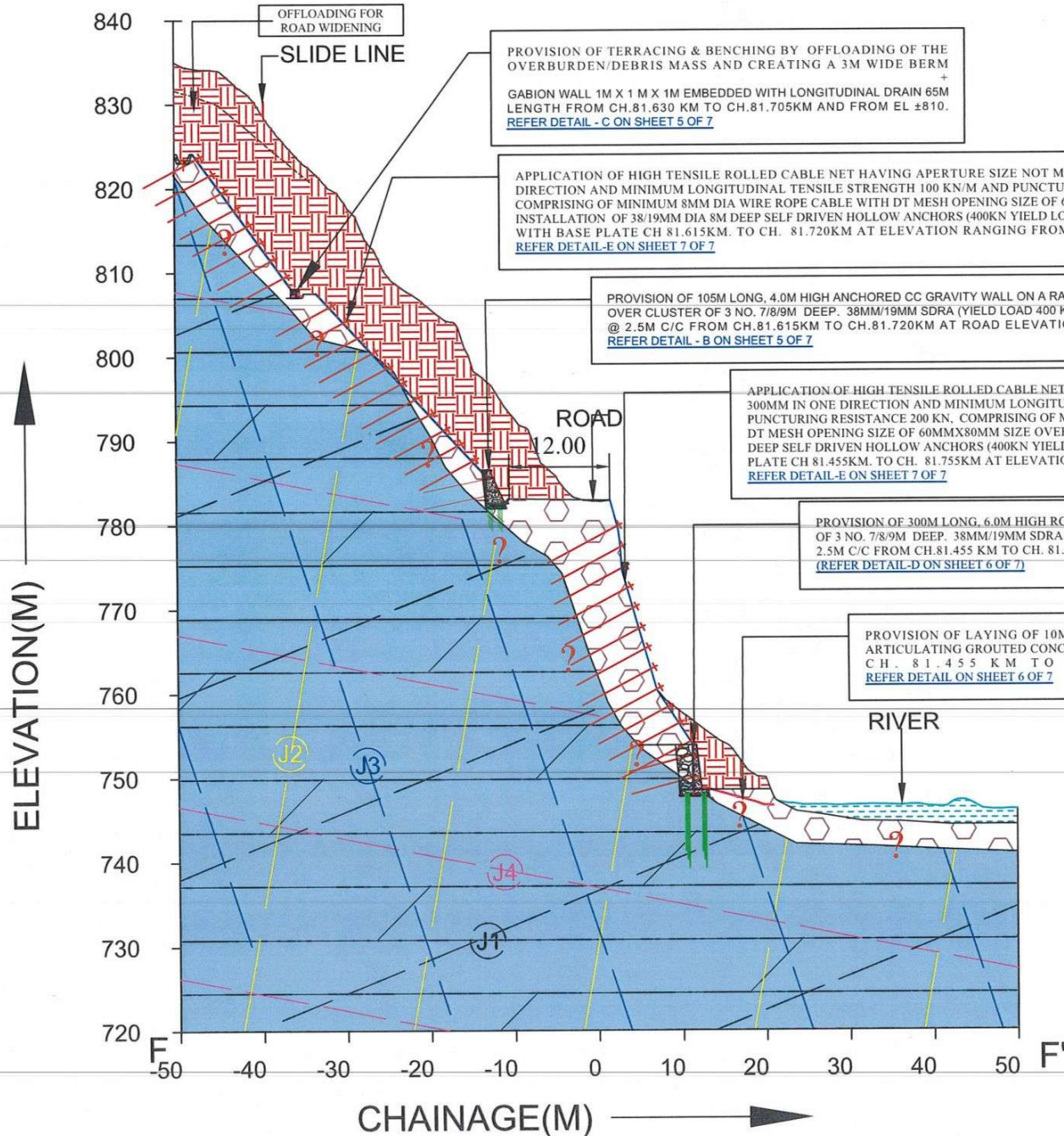
DRAWN BY	DESIGNED BY	CHECKED BY	SUBMITTED BY	APPROVED BY
AMIT KUMAR (D.MAN)	DINESH KUMAR (HYD. ENGINEER)	VINAY PUROHIT (SR. E.R.)	J.R. KOTHARI (DGM)	NIRAJ AGARWAL (DGM)

DRG. NO. THDC/ RKS/D&E/MORTH/NB/CH-81.450-81.755 KM TD-03

DATE: MAR - 2026 D&E CIVIL, RISHIKESH



SECTION B-B'(REFERENCE CH-81.590 KM.)



SECTION C-C'(REFERENCE CH-81.650 KM.)

- NOTE:
1. ALL DIMENSIONS & ELEVATIONS ARE IN METRES UNLESS OTHERWISE SPECIFIED.
 2. ANCHORS SHALL BE INSTALLED PERPENDICULAR TO FAILURE PLANE IN SUCH A MANNER THAT THEY SHOULD ALSO SEAL THE JOINT AS PER THE SITE CONDITION IN ROCK SLOPE.
 3. THE GROUTING IN SDRA SHALL BE PERFORMED AFTER PULLING THE INSTALLED ANCHORS IN 0.5M FOR CREATING GROUT SPACE.

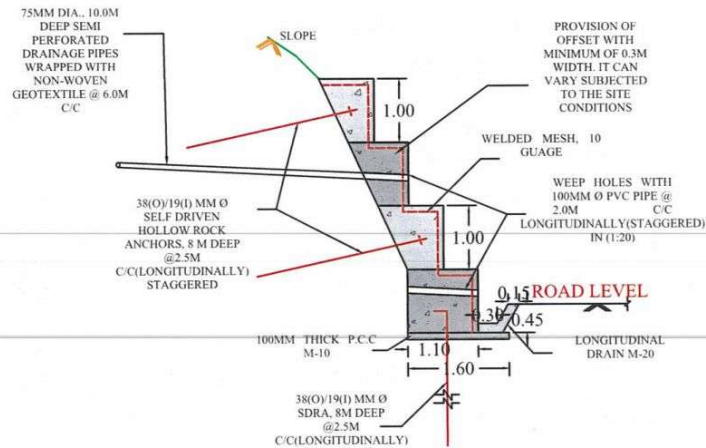
LEGEND	
1. OVERBURDEN	
2. DOLOMITE	
3. SLIDE MATERIAL	
4. R.B.M	
5. TRACES OF JOINTS	
6. REMOVAL OF LOOSE MASS	
7. HT ROLLED CABLE NET WITH SDRA	
8. CC GRAVITY WALL	
9. GABION BENCH	
10. RCC CANTILEVER WALL	
11. ARTICULATING MATTRESS	

FOR TENDER PURPOSE ONLY (SHEET 4 OF 7)

सड़क परिवहन और राजमार्ग मंत्रालय Ministry of Road Transport and Highways	
PROTECTION / TREATMENT WORKS OF LANDSLIDE ZONE DHARCHULA-GUNJ, UK (NH 09), KUMAON REGION (UTTARAKHAND).	
CONSULTANT:	
टीएचडीसी इंडिया लिमिटेड THDC INDIA LIMITED	
(SECTION C-C') (PROPOSED TREATMENT MEASURES) CH-81.450 TO CH-81.755 KM, DHARCHULA-GUNJ, UK (NH 09)	
DRAWN BY	DESIGNED BY
ASMIT KUMAR (D. MAN)	DINESH KUMAR (HYD. ENGINEER)
CHECKED BY	SUBMITTED BY
VINAY PUROHIT (SR. EN.)	J.R. KOTHARI (DM)
APPROVED BY	
NIRAJ AGARWAL (GM)	
DRG. NO. THDC/RKSH/D&E/MORTH/NH09/CH/81.450-81.755 KM TD-04	DATE: MAR - 2026
	D&E CIVIL, RISHIKESH

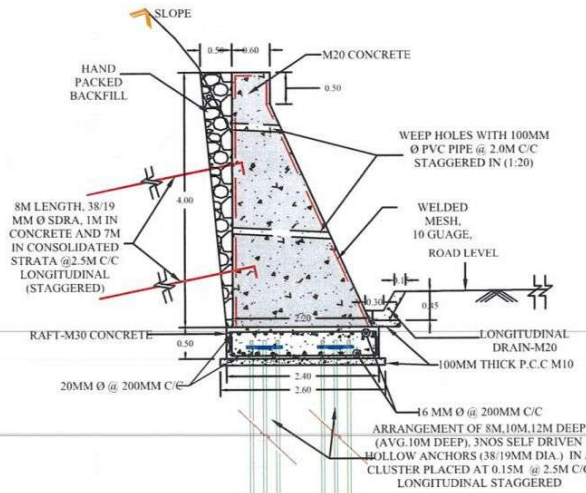
NOTES:

1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.
2. EXCAVATION FOR FOUNDATION SHALL BE DONE IN 8-10M LONG STRETCHES ONLY & TREATMENT SHALL BE COMPLETED BEFORE START OF NEW PATCH.
3. ORDINARY PORTLAND CEMENT CONFORMING TO IS : 8112 CAPABLE OF ACHIEVING THE REQUIRED DESIGN CONCRETE STRENGTH SHALL ONLY BE USED.
4. CONCRETE USED SHALL BE OF GRADES AS SPECIFIED BELOW CONFORMING TO IS 456 (LATEST):
CC CLADDING WALL -M25
RCC RAFT - M30
LEVELLING COURSE - M10
5. REINFORCEMENT SHALL COMPRISE OF FE 500D GRADE DEFORMED BARS, CONFORMING TO IS:1786.
6. PROPERLY BRACED STEEL PLATES SHALL BE USED AS SHUTTERING.
7. LAPS AND ANCHORAGE LENGTH SHALL BE AS PER IS 456(LATEST).
8. LAPS SHALL BE STAGGERED.
9. FOUNDATION SURFACE UPON WHICH RCC RAFT IS TO BE PLACED SHALL BE APPROVED BY GEOLOGIST/ENGINEER-IN - CHARGE PRIOR TO START OF WORK
10. LAYING OF GABION SHALL BE DONE AS PER IS CODE 16014 AND IRC-SP-116



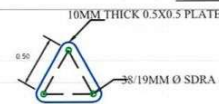
DETAIL-A

TYPICAL DETAILS OF ANCHORED CC CLADDING ON HILL SIDE

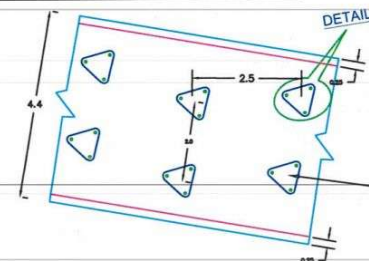


DETAIL-B

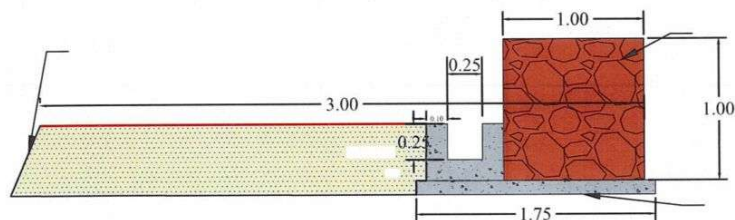
TYPICAL DETAILS OF 4.0M HIGH ANCHORED CC GRAVITY WALL



TYPICAL ARRANGEMENT OF SDR CLUSTER DETAIL-1

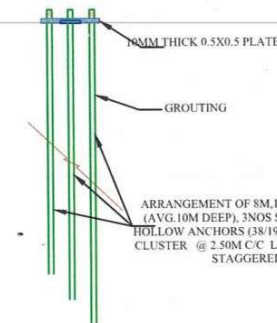


TYPICAL ARRANGEMENT OF CLUSTER OF SELF DRIVEN HOLLOW ROCK ANCHORS PLACED @ 2.50M C/C (STAGGERED) IN TWO ROWS



DETAIL-C

TYPICAL DETAILS OF 1.0M X 1.0M X 1.0M GABION WALL WITH 0.25M WIDE DRAIN ON 3M WIDE BERM



SECTIONAL ELEVATION OF SDR CLUSTER WITH 500X500X10MM PLATE

FOR TENDER PURPOSE ONLY

(SHEET 5 OF 7)



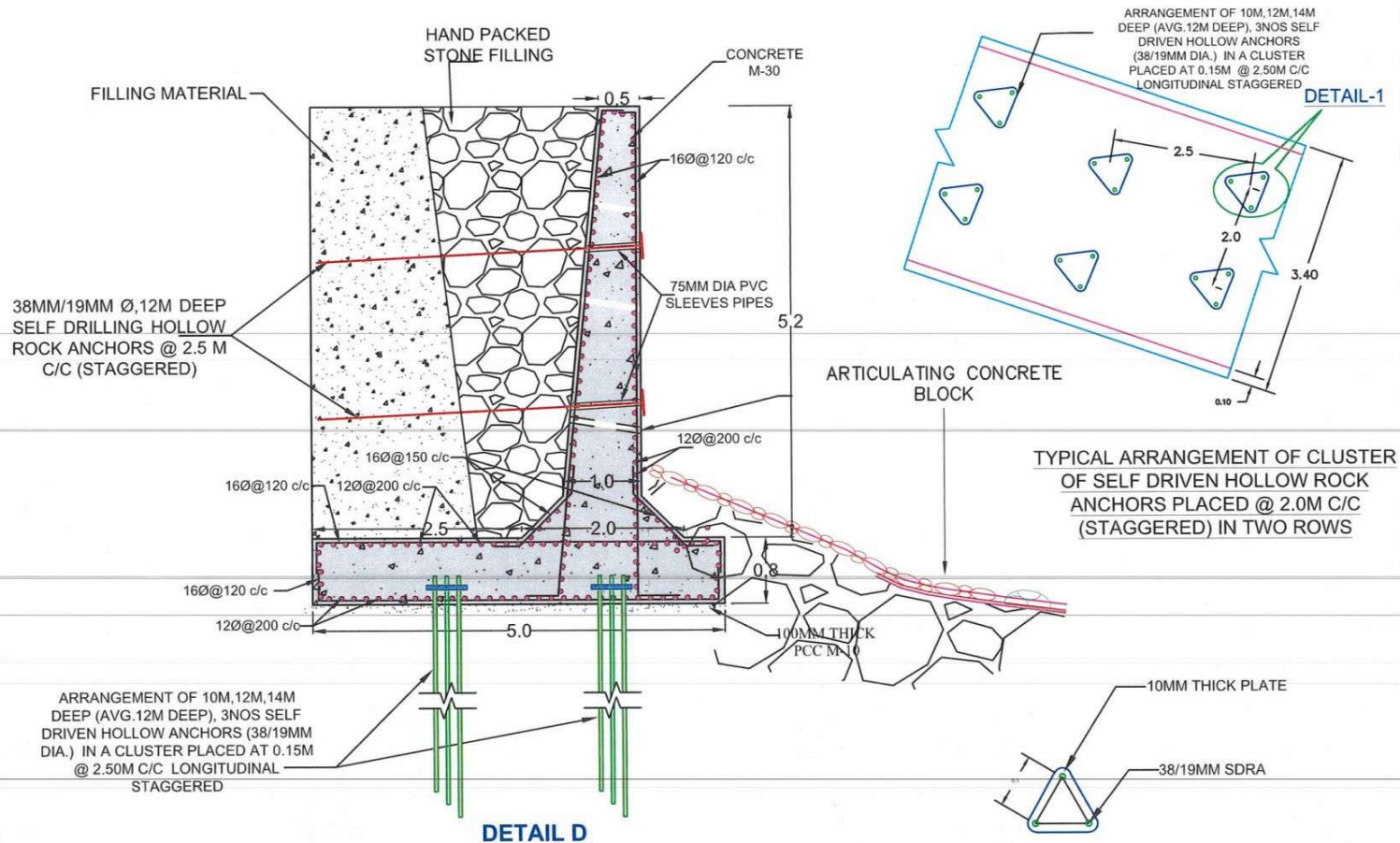
सड़क परिवहन और राजमार्ग मंत्रालय
Ministry of Road Transport and Highways

PROTECTION / TREATMENT WORKS OF LANDSLIDE ZONE
DHARCHULA-GUNJ, UK (NH 09), KUMAON REGION (UTTARAKHAND).

CONSULTANT: टीएचडीसी इंडिया लिमिटेड
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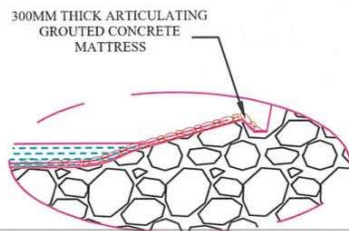
(DETAIL - A, B & C)
(PROPOSED TREATMENT MEASURES)
CH-S1.450 TO CH-S1.755 KM, DHARCHULA-GUNJ, UK (NH.09)

DRAWN BY	DESIGNED BY	CHECKED BY	SUBMITTED BY	APPROVED BY
AMIT KUMAR (D. MAN)	DINESH KUMAR (HYD. ENGINEER)	VINAY PUROHIT (STR. ENR.)	J.R. KOTHARI (DSM)	NIRAJ AGARWAL (DSM)
DRG. NO. THDC RKSH DAE-MORTH N109/CH-S1.450-S1.755 KM TD-05			DATE: MAR - 2026	D&E CIVIL, RISHIKESH



TYPICAL DETAILS OF 6.0M HIGH ANCHORED RCC WALL

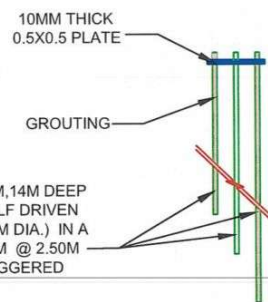
DETAIL-1
TYPICAL ARRANGEMENT OF SDR A CLUSTER



ARTICULATING BLOCK
MATTRESS

ARRANGEMENT OF 10M, 12M, 14M DEEP (AVG. 12M DEEP), 3NOS SELF DRIVEN HOLLOW ANCHORS (38/19MM DIA.) IN A CLUSTER PLACED AT 0.15M @ 2.50M C/C LONGITUDINAL STAGGERED

SECTIONAL ELEVATION OF SDR A CLUSTER
WITH 500X500X10 PLATE



NOTES:

- ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.
- EXCAVATION FOR FOUNDATION SHALL BE DONE IN 6-8M LONG STRETCHES ONLY & TREATMENT SHALL BE COMPLETED BEFORE START OF NEW PATCH.
- HIGH STRENGTH ORDINARY PORTLAND CEMENT CONFORMING TO IS : 8112 CAPABLE OF ACHIEVING THE REQUIRED DESIGN CONCRETE STRENGTH SHALL ONLY BE USED.
- THE MINIMUM CEMENT CONCRETE AND WATER CEMENT RATIO IN THE CONCRETE DESIGN MIX SHALL BE 310 KG PR CUM AND 0.45 RESPECTIVELY.
- CONCRETE USED SHALL BE OF GRADES AS SPECIFIED BELOW CONFORMING TO IS 456 (LATEST):
CANTILEVER WALL - M30.
LEVELLING COURSE - M10.
- REINFORCEMENT SHALL COMPRISE OF FE 500D GRADE DEFORMED BARS, CONFORMING TO IS:1786.
- PROPERLY BRACED STEEL PLATES SHALL BE USED AS SHUTTERING.
- SELF DRIVEN HOLLOW SOIL/ ROCK ANCHORS 38MM (Ø)/19MM(I) Ø HAVING YIELD LOAD OF 400KN SHALL BE INSERTED TO MAX. 12M DEEP IN INTO COMPATIBLE SLOPE MASS
- LAPS AND ANCHORAGE LENGTH SHALL BE AS PER IS 456(LATEST).
- LAPS SHALL BE STAGGERED.
- EXCAVATION SHALL BE DONE IN 3-5M STRETCHES ONLY & TREATMENT SHALL BE COMPLETED BEFORE START OF NEW PATCH.
- CONCRETE SURFACE SHOULD BE ROUGHED AND CLEAN BEFORE POURING THE CONCRETE/FRESH CONCRETE.
- FOUNDATION SURFACE UPON WHICH CC WALL IS TO BE PLACED SHALL BE APPROVED BY GEOLOGIST/ ENGINEER-IN -CHARGE PRIOR TO START OF WORK.

FOR TENDER PURPOSE ONLY

(SHEET 6 OF 7)



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Ministry of Road Transport and Highways

PROTECTION / TREATMENT WORKS OF LANDSLIDE ZONE
DHARCHULA-GUNJ, UK (NH 09), KUMAON REGION (UTTARAKHAND).

CONSULTANT:

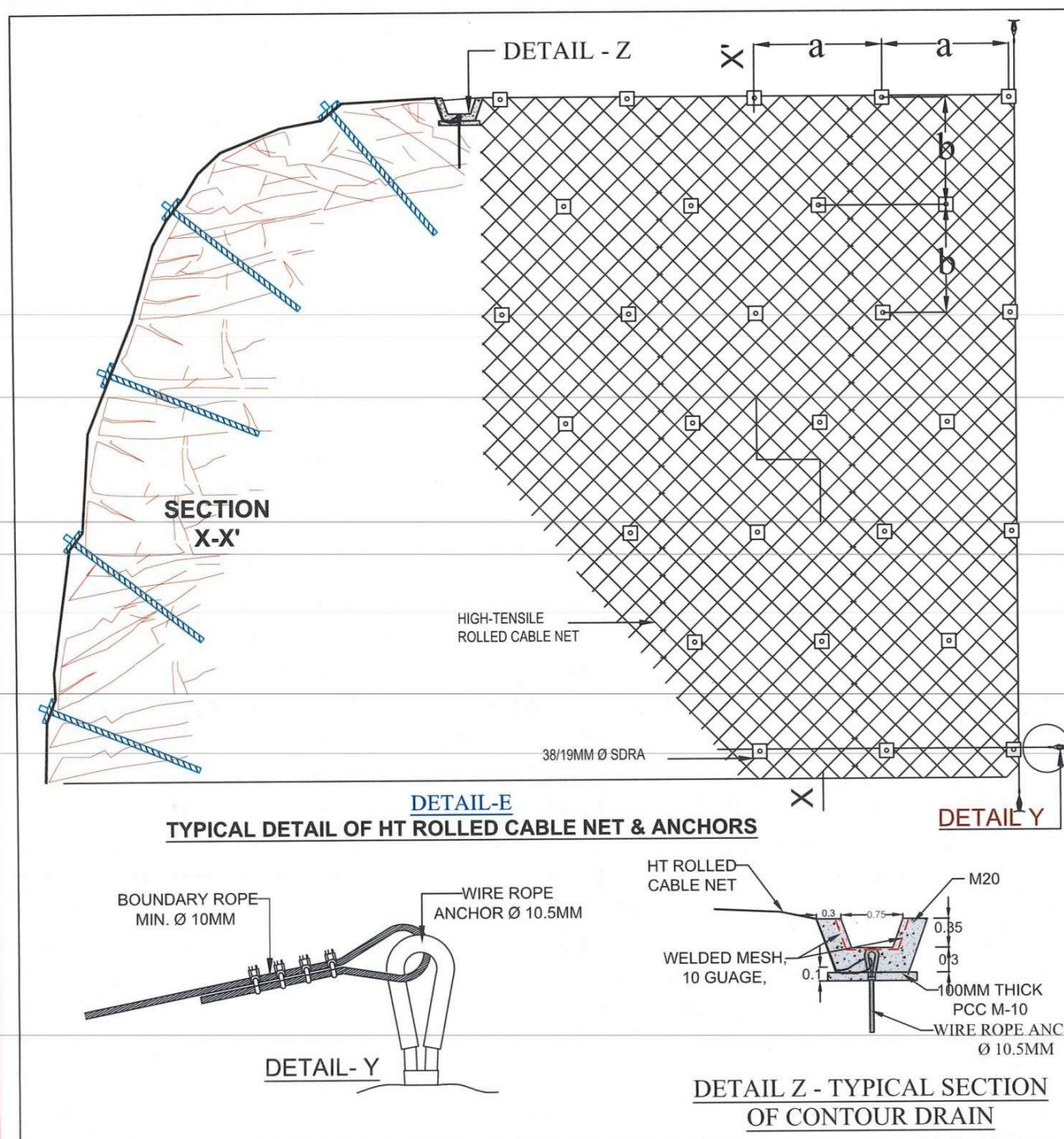


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THDC INDIA LIMITED

(DETAIL-D)
(PROPOSED TREATMENT MEASURES)

CH-81-450 TO CH-81-755 KM, DHARCHULA-GUNJ, UK (NH.09)

DRAWN BY	DESIGNED BY	CHECKED BY	SUBMITTED BY	APPROVED BY
AMTK	DESHI KUMAR (D. MAN)	DESHI KUMAR (HYD. ENGINEER)	IR. KOTHARI (ISM)	NIRAJ AGARWAL (GM)
DRG. NO. THDC/ RKS/ D&E/ MORTH/ NH09/ CH-81-450 -81-755 KM TD-04			DATE: MAR - 2026	D&E CIVIL, RISHKESH



NOTES:-

1. THE GENERAL SPECIFICATIONS OF THE SYSTEM SHALL BE AS BELOW. HOWEVER, MENTIONED BELOW ARE THE MINIMUM VALUES.
2. THE HIGH-TENSILE ROLLED CABLE NETS SHOULD INCLUDE THE SECONDARY MESH.
3. FOR THE INSTALLATION OF HIGH-TENSILE ROLLED CABLE NETS STANDARD SUPPORT ROPES, SEAMING ROPES AND SHACKLES SHOULD BE USED. FOR THE HORIZONTAL CONNECTION STANDARD SHACKLES OR LACES SHALL BE USED.
4. DESIGN SPECIFICATION OF SYSTEM
 - a. TENSILE STRENGTH OF HT ROLLED CABLE NET - 100 KN /M
 - b. PUNCTURING RESISTANCE OF HT ROLLED CABLE NET - 200 KN
 - c. APERTURE NOT MORE THAN 300MM IN ONE DIRECTION
 - d. DIA OF CABLE OF HT ROLLED CABLE NET - 8MM
 - e. BREAKING LOAD OF CABLE OF HT ROLLED CABLE NET - 40.7 KN
 - f. TENSILE STRENGTH OF WIRE OF THE CABLE - 1770 N/SQMM
 - g. COMPOUND FOR CORROSION PROTECTION - 95% ZN AND 5% AL CLASS B OR ZINC COATING CLASS A AS PER IS/ISO-17746-2016.
 - h. (ZONE-I)- AVERAGE LENGTH OF THE 38/19MM DIA. 40 CR SDRA - 8.0 M (7.7M GROUTED+0.3M ABOVE SLOPE SURFACE), SPACING OF ANCHORS, i.e. (a=b) - 2.5M (AVG.) (DEPENDING ON THE SLOPE ANGLE/ PROFILE, STRATA AT SITE)
 - i. DRILL BIT SIZE - 76MM
 - j. GRID PATTERN - STAGGERED
 - k. SIZE OF BASE PLATE - 200MM X 200MM X 10MM (MINIMUM)
 - l. GROUTING MATERIAL - CEMENT GROUT
 - m. SIZE OF DOUBLE TWISTED MESH - 60MMX80MM, COMPRISING OF MESH WIRE DIA. 2.2/3.2MM DIA GI WIRE AND CORROSION PROTECTION Zn COATING+PVC

FOR TENDER PURPOSE ONLY

(SHEET 7 OF 7)



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Ministry of Road Transport and Highways

PROTECTION / TREATMENT WORKS OF LANDSLIDE ZONE
DHARCHULA-GUNJLUK (NH 09), KUMAON REGION (UTTARAKHAND).

CONSULTANT:



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THDC INDIA LIMITED

(DETAIL - E)

(PROPOSED TREATMENT MEASURES)

CH-81.450 TO CH-81.755 KM, DHARCHULA-GUNJLUK (NH.09)

DRAWN BY	DESIGNED BY	CHECKED BY	SUBMITTED BY	APPROVED BY
AMIT KUMAR (D. MAN)	DINESH KUMAR (HYD. ENGINEER)	VINAY PUROHIT (STR. ENR.)	J.R. KOTHARI (DSM)	NIRAJ AGARWAL (DSM)
DRG. NO. THDC/ RKSII DAE-MORTH NH09/CH.81.450-81.755 KM TD-07			DATE: MAR - 2026	DSE CIVIL, RISHIKESH

TCS - 3

NOTES:-

1. ALL DIMENSIONS & ELEVATIONS ARE IN METRES UNLESS OTHERWISE SPECIFIED.
2. THE REFERENCE OF MEASURES SHALL BE APPLIED IN ACCORDANCE WITH THE GEOGRAPHIC CO-ORDINATES.
3. THE PROPOSED LONGITUDINAL DRAIN SHALL BE CONNECTED TO THE NEARBY CROSS DRAINAGE WORKS FOR PROPER DISPOSAL OF SURFACE RUNOFF.



LEGEND

1.	CONTOUR	
2.	ROAD	
3.	ROAD CENTER LINE	
4.	TREE	
5.	FOOTPATH	
6.	GABION WALL	
7.	CRASH BARRIER	
8.	DRAIN/NALI	
9.	CANAL	
10.	JO-POLE	
11.	ROCK	
12.	OVERBURDEN	
13.	WALL	
14.	PARAPET WALL	
15.	TBM	
16.	E.P	
17.	BRIDGE	
18.	BUILT UP	
19.	AREA LINE	
20.	SLIDE AREA	
21.	RIVER	
22.	WATER BODY	
23.	HT ROLLED CABLE NET OVER DT MESH	
24.	38/19 MM SDRA	
25.	5M HIGH CC GRAVITY WALL OVER MICROPILE	
26.	5M HIGH CC GRAVITY WALL OVER BUNDLED SDRA	
27.	3M HIGH CC GRAVITY WALL	
28.	OFFLOADING	

SCALE :

FOR TENDER PURPOSE ONLY



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Ministry of Road Transport and Highways

PROTECTION / TREATMENT WORKS OF LANDSLIDE ZONE
ALONG DHARCHULA - GUNJI ROAD ON NH - 09

CONSULTANT:



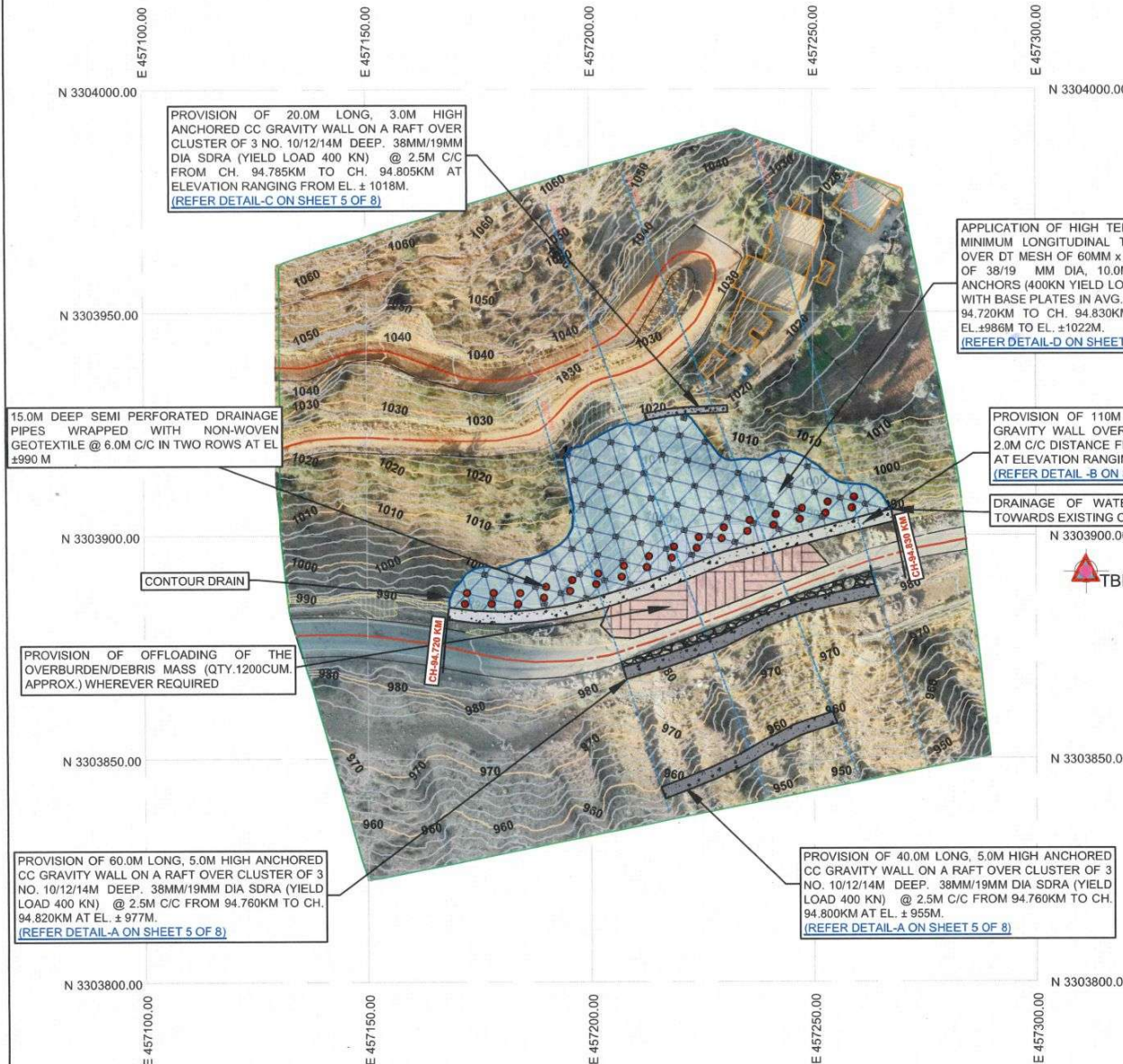
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THDC INDIA LIMITED

(KEY PLAN DRONE)
STABILITY MEASURES

FOR LOCATION BETWEEN CH-94.720 TO CH. 94.830 KM,
ALONG DHARCHULA - GUNJI, NH09 UTTARAKHAND.

SHEET 1 OF 8

DRAWN BY ABHISHEK GUSAIN (D.MAN)	DESIGNED BY ADITI YADAV (STR. ER.)	CHECKED BY J.R. PUROHIT (STR. ER.)	SUBMITTED BY J.R. KOTHARI (DGM)	APPROVED BY NIRAJ AGRAWAL (GM)
DRG.NO.: THDC/RKSH/D&E/MORTH/(L-CH 94.720-94.830KM)/TD-01	MARCH- 2026	D&E RISHIKESH		





NOTES:-

1. ALL DIMENSIONS & ELEVATIONS ARE IN METRES UNLESS OTHERWISE SPECIFIED.
2. THE REFERENCE OF MEASURES SHALL BE APPLIED IN ACCORDANCE WITH THE GEOGRAPHIC CO-ORDINATES.
3. THE PROPOSED LONGITUDINAL DRAIN SHALL BE CONNECTED TO THE NEARBY CROSS DRAINAGE WORKS FOR PROPER DISPOSAL OF SURFACE RUNOFF.

LEGEND

1.	CONTOUR	
2.	ROAD	
3.	OVERBURDEN	
4.	SLIDE MATERIAL	
5.	TBM	
6.	SLIDE LINE	
7.	GABION WALL	
8.	BUILTUP	
9.	RR WALL	
10.	HT ROLLED CABLE NET OVER DT MESH	
11.	38/19 MM SDRA	
12.	5M HIGH CC GRAVITY WALL WITH MICROPILE	
13.	5M HIGH CC GRAVITY WALL WITH BUNDLED SDRA	
14.	3M HIGH CC GRAVITY WALL	
15.	OFFLOADING	

SCALE :

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Ministry of Road Transport and Highways

PROTECTION / TREATMENT WORKS OF LANDSLIDE ZONE
ALONG DHARCHULA - GUNJI ROAD ON NH - 09

CONSULTANT:



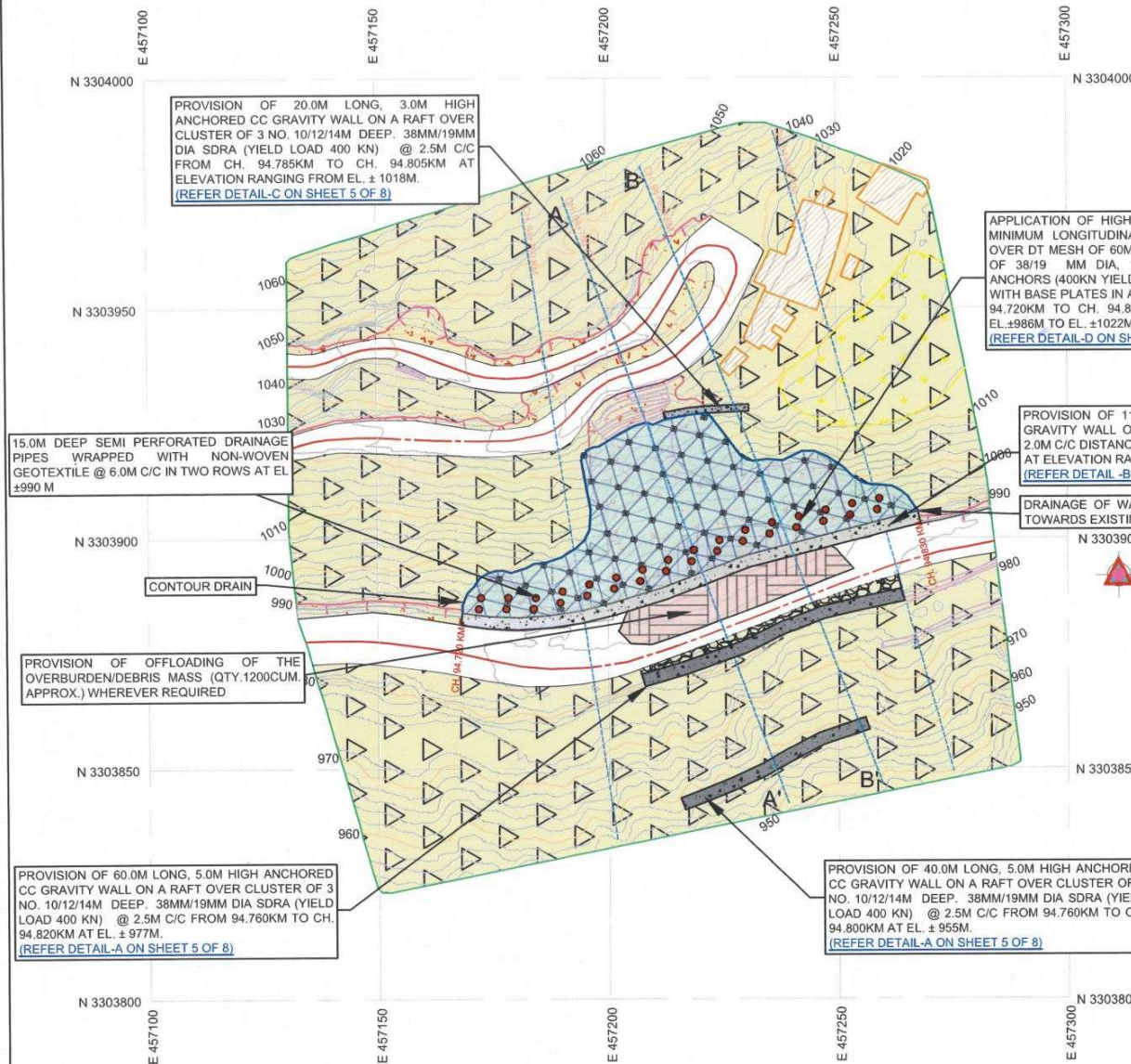
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THDC INDIA LIMITED

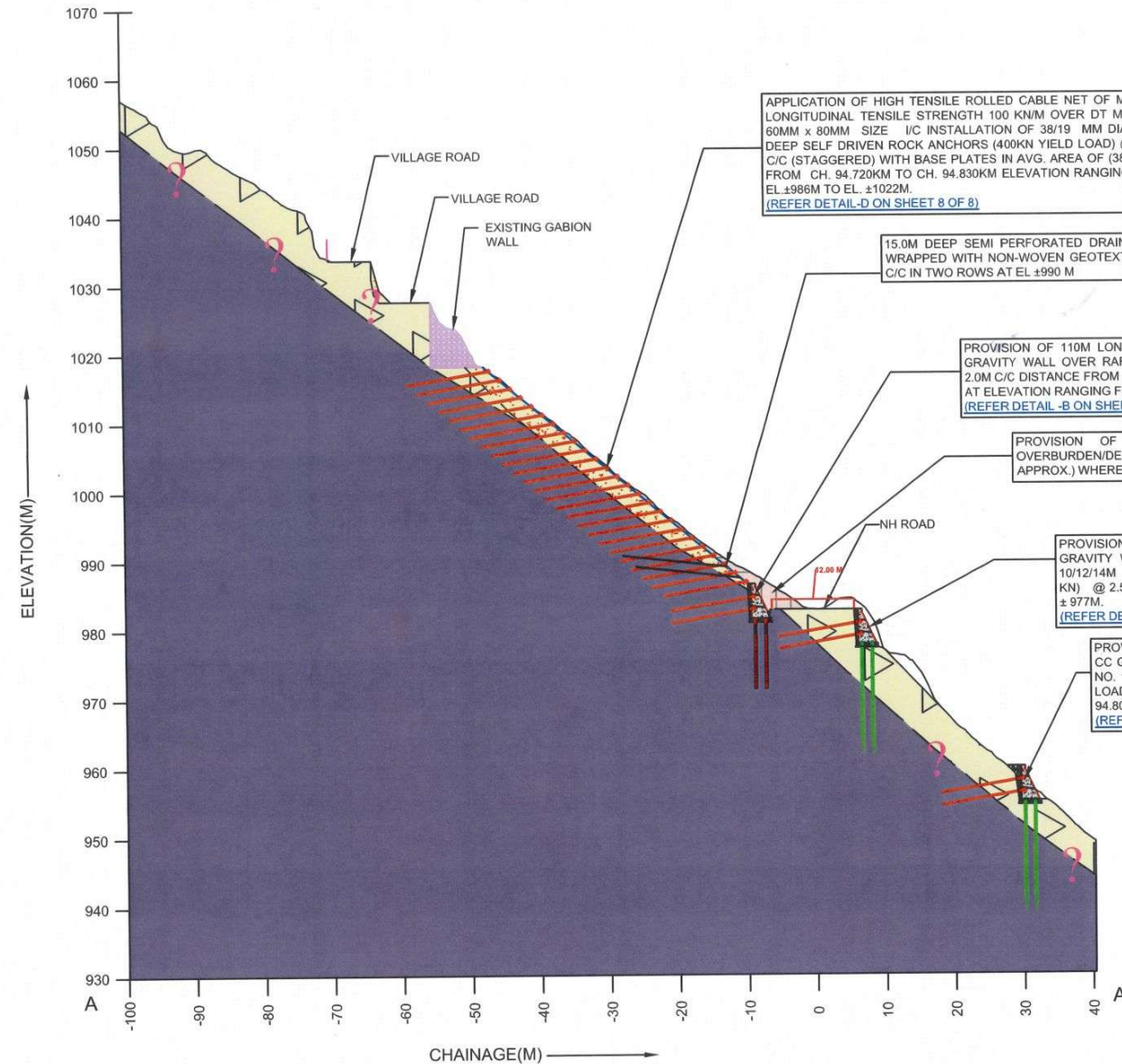
(KEY PLAN GEOLOGY)
STABILITY MEASURES

FOR LOCATION BETWEEN CH-94.720 TO CH. 94.830 KM,
ALONG DHARCHULA - GUNJI, NH09 UTTARAKHAND.

SHEET 2 OF 8

DRAWN BY ABHISHEK GUSAIN (D.MAN)	DESIGNED BY KIRTI YADAV (STR. ENR.)	CHECKED BY PRAY PUROHIT (STR. ENR.)	SUBMITTED BY J.R. KOTHARI (DGM)	APPROVED BY NIRAJ AGRAWAL (GM)
DRG.NO.: THDC /RKSH/D&E/MoRTH/(L-CH 94.720-94.830KM)/TD-02			MARCH- 2026	
			D&E RISHIKESH	





SECTION A-A' (CH. 94.780 KM)

- NOTES:-**
1. ALL DIMENSIONS & ELEVATIONS ARE IN METRES UNLESS OTHERWISE SPECIFIED.
 2. INSTALLATION OF SDRA SHOULD BE 10"-25" FROM HORIZONTAL IN DEBRIS SLOPE.
 3. THE GROUTING IN SDRA SHALL BE PERFORMED AFTER PULLING THE INSTALLED ANCHORS IN 0.5M FOR CREATING GROUT SPACE.

LEGEND	
1. OVERBURDEN	
2. ROCKMASS	
3. SLIDE MATERIAL	
4. HT ROLLED CABLE NET OVER DT MESH	
5. 38/19 MM SDRA	
6. 5M HIGH CC GRAVITY WALL WITH BUNDLED SDRA	
7. 5M HIGH CC GRAVITY WALL WITH MICROPILE	
8. OFFLOADING	

APPLICATION OF HIGH TENSILE ROLLED CABLE NET OF MINIMUM LONGITUDINAL TENSILE STRENGTH 100 KN/M OVER DT MESH OF 60MM x 80MM SIZE I/C INSTALLATION OF 38/19 MM DIA, 10.0M DEEP SELF DRIVEN ROCK ANCHORS (400KN YIELD LOAD) @ 2.00M C/C (STAGGERED) WITH BASE PLATES IN AVG. AREA OF (3870SQM) FROM CH. 94.720KM TO CH. 94.830KM ELEVATION RANGING FROM EL. ±986M TO EL. ±1022M.
(REFER DETAIL-D ON SHEET 8 OF 8)

15.0M DEEP SEMI PERFORATED DRAINAGE PIPES WRAPPED WITH NON-WOVEN GEOTEXTILE @ 6.0M C/C IN TWO ROWS AT EL. ±990 M

PROVISION OF 110M LONG, 5.0M HIGH ANCHORED CC GRAVITY WALL OVER RAFT WITH MICROPILE 300MM Ø 2.0M C/C DISTANCE FROM CH. 94.720KM TO CH. 94.830KM AT ELEVATION RANGING FROM EL. ± 981M TO EL. ± 986M.
(REFER DETAIL -B ON SHEET 6 OF 8)

PROVISION OF OFFLOADING OF THE OVERBURDEN/DEBRIS MASS (QTY.1200CUM. APPROX.) WHEREVER REQUIRED

PROVISION OF 60.0M LONG, 5.0M HIGH ANCHORED CC GRAVITY WALL ON A RAFT OVER CLUSTER OF 3 NO. 10/12/14M DEEP. 38MM/19MM DIA SDRA (YIELD LOAD 400 KN) @ 2.5M C/C FROM 94.760KM TO CH. 94.820KM AT EL. ± 977M.
(REFER DETAIL-A ON SHEET 5 OF 8)

PROVISION OF 40.0M LONG, 5.0M HIGH ANCHORED CC GRAVITY WALL ON A RAFT OVER CLUSTER OF 3 NO. 10/12/14M DEEP. 38MM/19MM DIA SDRA (YIELD LOAD 400 KN) @ 2.5M C/C FROM 94.760KM TO CH. 94.800KM AT EL. ± 955M.
(REFER DETAIL-A ON SHEET 5 OF 8)

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Ministry of Road Transport and Highways

PROTECTION / TREATMENT WORKS OF LANDSLIDE ZONE
ALONG DHARCHULA - GUNJI ROAD ON NH - 09

CONSULTANT:



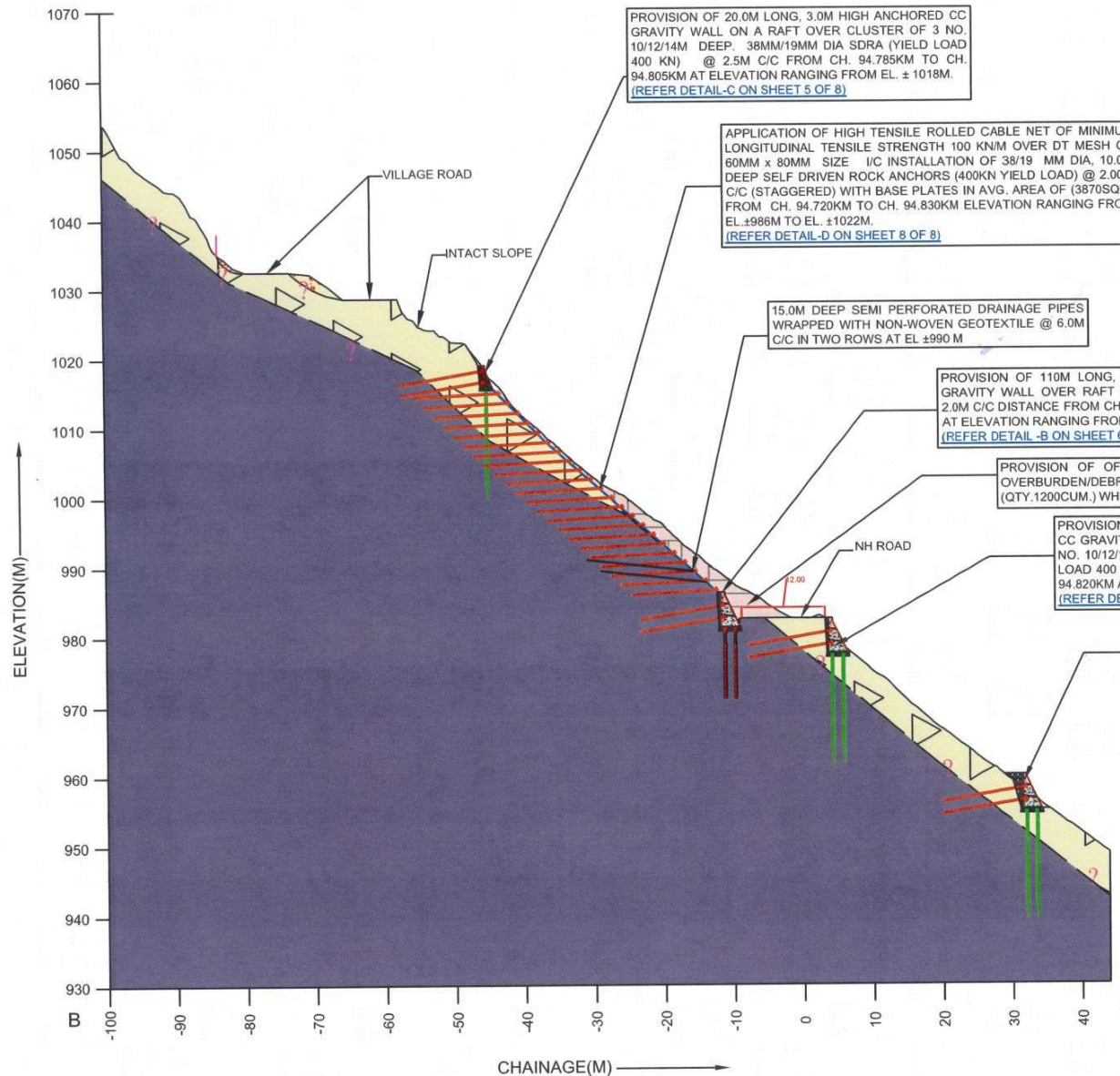
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THDC INDIA LIMITED

(SECTION-A-A')
STABILITY MEASURES

FOR LOCATION BETWEEN CH-94.720 TO CH. 94.830 KM,
ALONG DHARCHULA - GUNJI, NH09 UTTARAKHAND.

SHEET 3 OF 8

DRAWN BY	DESIGNED BY	CHECKED BY	SUBMITTED BY	APPROVED BY
ABHISHEK GUSAIN (D.MAN)	ADITI YADAV (STR. ER.)	DR. P. PURHIT (STR. ER.)	J.R. KOTHARI (DGM)	NIRAJ AGRAWAL (GM)
DRG. NO.: THDC /RKSH/D&E/MoRTH/(L-CH 94.720-94.830KM)/TD-03	MARCH- 2026	D&E RISHIKESH		



SECTION B-B' (CH. 94.800 KM)

- NOTES:-**
1. ALL DIMENSIONS & ELEVATIONS ARE IN METRES UNLESS OTHERWISE SPECIFIED.
 2. INSTALLATION OF SDRA SHOULD BE 10'- 25" FROM HORIZONTAL IN DEBRIS SLOPE.
 3. THE GROUTING IN SDRA SHALL BE PERFORMED AFTER PULLING THE INSTALLED ANCHORS IN 0.5M FOR CREATING GROUT SPACE.

LEGEND		
1.	OVERBURDEN	
2.	ROCKMASS	
3.	SLIDE MATERIAL	
4.	HT ROLLED CABLE NET OVER DT MESH	
5.	38/19 MM SDRA	
6.	5M HIGH CC GRAVITY WALL WITH BUNDLED SDRA	
7.	5M HIGH CC GRAVITY WALL WITH MICROPILE	
8.	OFFLOADING	
9.	3M HIGH CC GRAVITY WALL WITH BUNDLED SDRA	

FOR TENDER PURPOSE ONLY



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Ministry of Road Transport and Highways

PROTECTION / TREATMENT WORKS OF LANDSLIDE ZONE
ALONG DHARCHULA - GUNJI ROAD ON NH - 09

CONSULTANT:



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THDC INDIA LIMITED

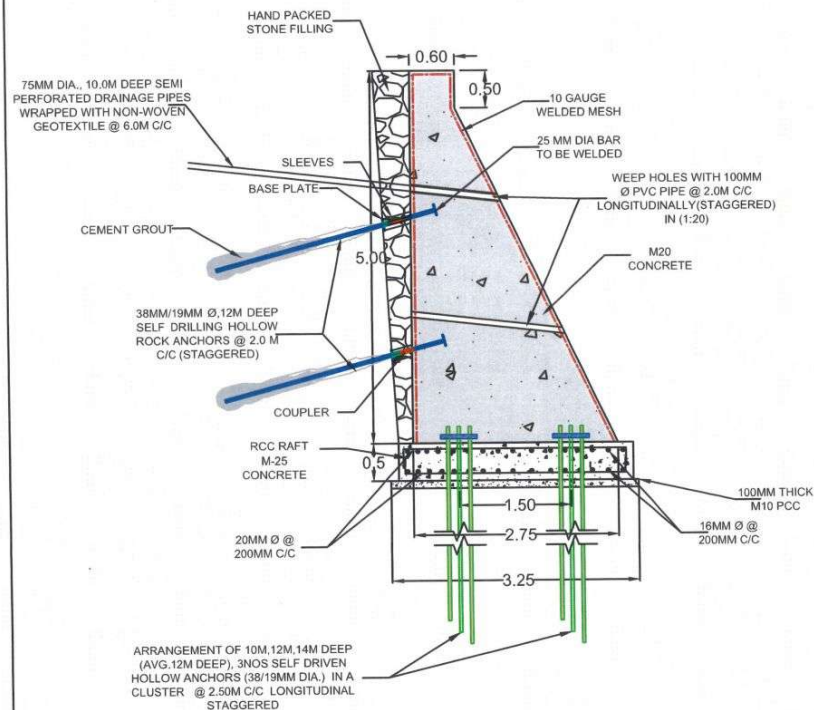
(SECTION-B-B')

STABILITY MEASURES

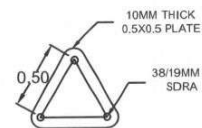
FOR LOCATION BETWEEN CH-94.720 TO CH. 94.830 KM,
ALONG DHARCHULA - GUNJI, NH09 UTTARAKHAND.

SHEET 4 OF 8

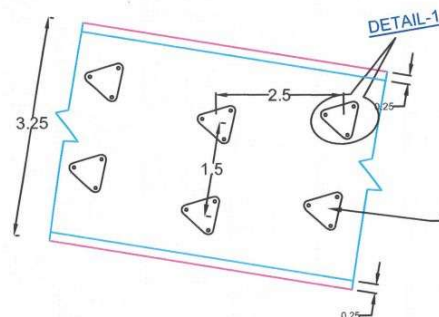
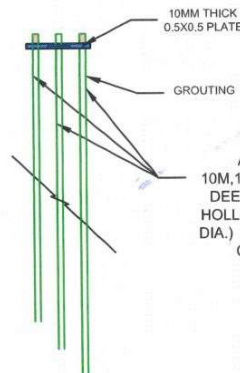
DRAWN BY	DESIGNED BY	CHECKED BY	SUBMITTED BY	APPROVED BY
ABHISHEK GUSAIN (D.MAN)	ADITI YADAV (STR. ENR.)	ADITI YADAV (STR. ENR.)	J.R. KOTHARI (DGM)	NIRAJ AGRAWAL (GM)
DRG. NO.: THDC /RKSH/D&E/MoRTH/(L-CH 94.720-94.830KM)/TD-04			MARCH- 2026	
			D&E RISHIKESH	



TYPICAL ARRANGEMENT OF SDRA CLUSTER
DETAIL-1



SECTIONAL ELEVATION OF SDRA CLUSTER WITH
500X500X10MM PLATE



TYPICAL ARRANGEMENT OF CLUSTER OF SELF DRIVEN
HOLLOW ROCK ANCHORS PLACED @ 2.50M C/C
(STAGGERED) IN TWO ROWS

DETAIL-A

TYPICAL DETAILS OF 5.0M HIGH CC GRAVITY WALL OVER A RAFT WITH BUNDLED ANCHORS FROM CH. 94.740KM TO CH. 94.820KM AT EL. $\pm$ 977M AND CH. 94.760KM TO CH. 94.800KM AT EL. $\pm$ 955M

NOTES:

- ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.
- EXCAVATION FOR FOUNDATION SHALL BE DONE IN 6-8M LONG STRECHES ONLY & TREATMENT SHALL BE COMPLETED BEFORE START OF NEW PATCH.
- HIGH STRENGTH ORDINARY PORTLAND CEMENT CONFORMING TO IS : 8112 CAPABLE OF ACHIEVING THE REQUIRED DESIGN CONCRETE STRENGTH SHALL ONLY BE USED.
- THE MINIMUM CEMENT CONTENT AND WATER CEMENT RATIO IN THE CONCRETE DESIGN MIX SHALL BE 310 KG PER CUM AND 0.45 RESPECTIVELY.
- CONCRETE USED SHALL BE OF GRADES AS SPECIFIED BELOW CONFORMING TO IS 456 (LATEST):
CC WALL - M20.
RCC RAFT - M25.
LEVELLING COURSE - M10.
- REINFORCEMENT SHALL COMPRISE OF FE 500D GRADE DEFORMED BARS, CONFORMING TO IS:1786.
- PROPERLY BRACED STEEL PLATES SHALL BE USED AS SHUTTERING.
- LAPS AND ANCHORAGE LENGTH SHALL BE AS PER IS 456(LATEST).
- LAPS SHALL BE STAGGERED.
- CONCRETE SURFACE SHOULD BE ROUGHED AND CLEAN BEFORE POURING THE CONCRETE/FRESH CONCRETE.
- FOUNDATION SURFACE UPON WHICH CC WALL IS TO BE PLACED SHALL BE APPROVED BY GEOLOGIST/ ENGINEER-IN - CHARGE PRIOR TO START OF WORK.

FOR TENDER PURPOSE ONLY



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Ministry of Road Transport and Highways

PROTECTION / TREATMENT WORKS OF LANDSLIDE ZONE
ALONG DHARCHULA - GUNJI ROAD ON NH - 09

CONSULTANT:

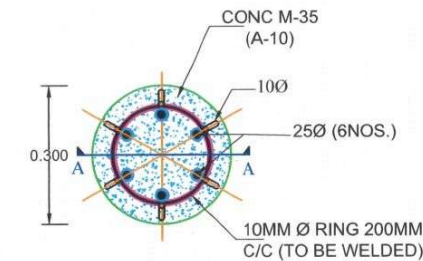
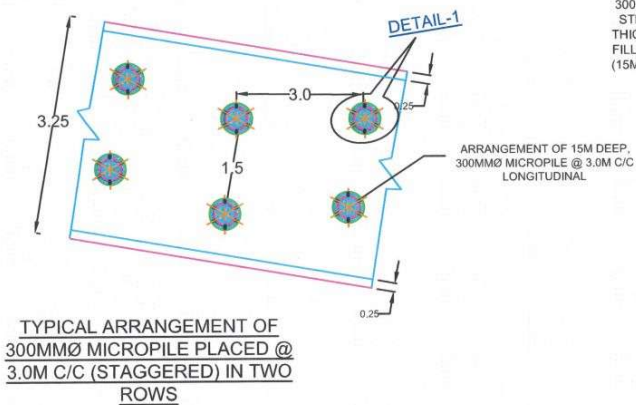
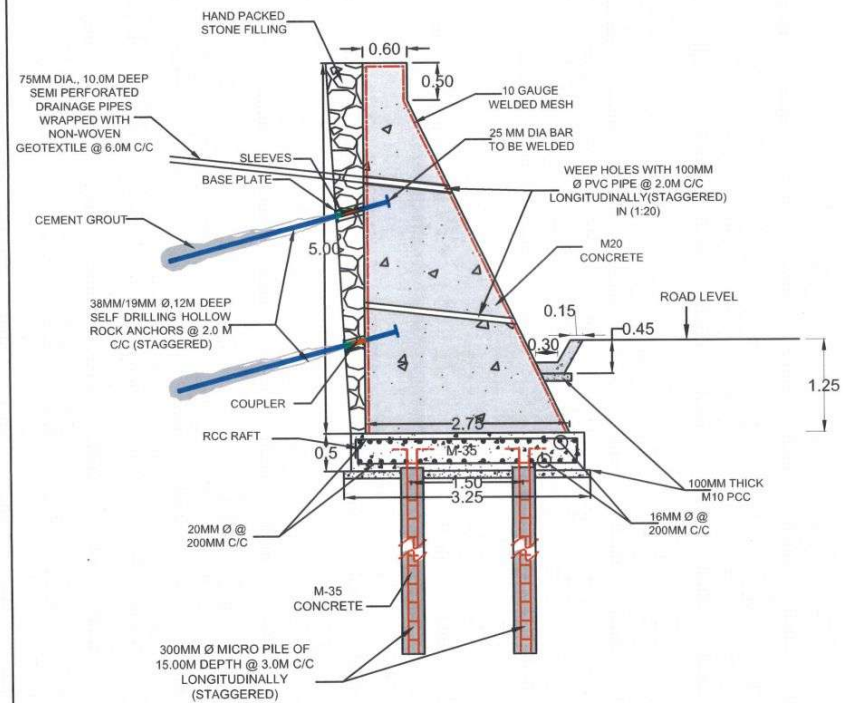


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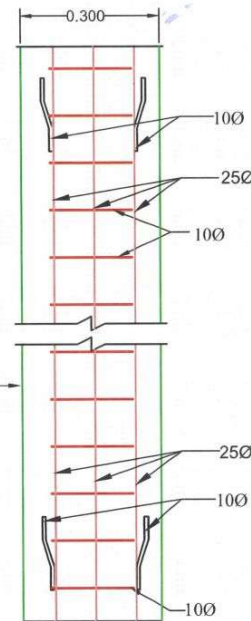
(DETAIL-A)
STABILITY MEASURES
FOR LOCATION BETWEEN CH-94.720 TO CH. 94.830 KM,
ALONG DHARCHULA - GUNJI, NH09 UTTARAKHAND.

SHEET 5 OF 8

DRAWN BY	DESIGNED BY	CHECKED BY	SUBMITTED BY	APPROVED BY
ABHISHEK GUSAN (D.MAN)	ADITI YADAV (STR. ER.)	VINAY PURCHIT (STR. ER.)	J.R. KOTHARI (DGM)	NIRAJ AGRAWAL (GM)
DRG.NO.: THDC /RKSH/D&E/MORTH/(L-CH 94.720-94.830KM)/TD-05			MARCH- 2026	D&E RISHIKESH



SECTIONAL VIEW OF 300MM Ø MICRO-PILE



TYPICAL DETAILS OF 300MM Ø MICRO-PILE

SECTION A-A

DETAIL-B
TYPICAL DETAILS OF 5.0M HIGH ANCHORED CC GRAVITY WALL OVER MICROPILE

NOTES:-

1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.
2. EXCAVATION FOR FOUNDATION SHALL BE DONE IN 3-5M LONG STRETCHES ONLY & TREATMENT SHALL BE COMPLETED BEFORE START OF NEW PATCH.
3. HIGH STRENGTH ORDINARY PORTLAND CEMENT CONFORMING TO IS : 8112 CAPABLE OF ACHIEVING THE REQUIRED DESIGN CONCRETE STRENGTH SHALL ONLY BE USED.
4. THE MINIMUM CEMENT CONTENT AND WATER CEMENT RATIO IN THE CONCRETE DESIGN MIX SHALL BE 310 KG PER CUM AND 0.45 RESPECTIVELY.
5. CONCRETE USED SHALL BE OF GRADES AS SPECIFIED BELOW CONFORMING TO IS 456 (LATEST):
FOUNDATION/RAFT - M35
CC GRAVITY WALL - M20
LEVELING COURSE - M10
MICROPILE - M35
6. REINFORCEMENT SHALL COMPRISE OF FE 500D GRADE DEFORMED BARS, CONFORMING TO IS:1786.
7. PROPERLY BRACED STEEL PLATES SHALL BE USED AS SHUTTERING.
8. LAPS AND ANCHORAGE LENGTH SHALL BE AS PER IS 456(LATEST).
9. LAPS SHALL BE STAGGERED.
10. CONCRETE SURFACE SHOULD BE ROUGHED AND CLEAN BEFORE POURING THE CONCRETE/FRESH CONCRETE.
11. THE THICKNESS OF 300MM Ø PERFORATED STEEL CASING PIPE SHALL BE 6.35 MM AND WEIGHT 49.71KG/RM.
12. THE DRILLING FOR MICROPILE SHALL BE DONE WITH CRAWLER MOUNTED ODEX MACHINE
13. THE DEPTH OF PERFORATED CASING SHALL BE DRIVEN UPTO THE ENTIRE DEPTH OF PILE.

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Ministry of Road Transport and Highways

PROTECTION / TREATMENT WORKS OF LANDSLIDE ZONE
ALONG DHARCHULA - GUNJI ROAD ON NH - 09

CONSULTANT:

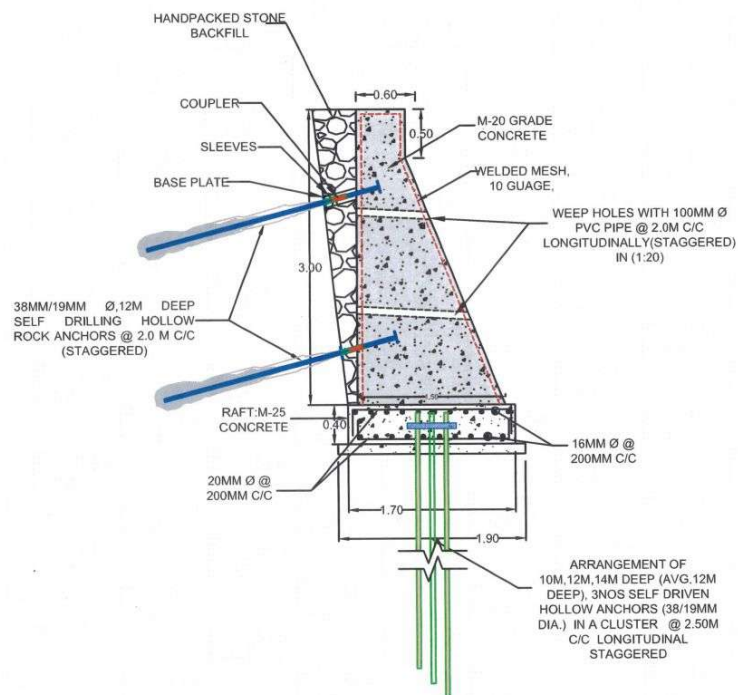


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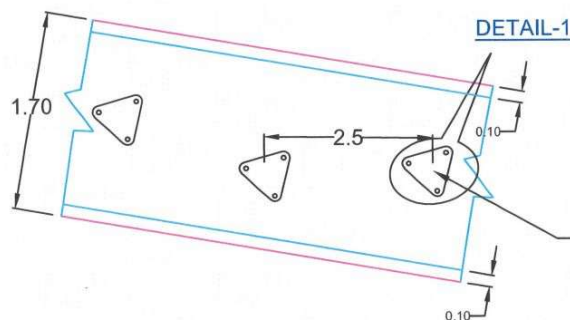
(DETAIL-B)
STABILITY MEASURES
FOR LOCATION BETWEEN CH-94.720 TO CH. 94.830 KM,
ALONG DHARCHULA - GUNJI, NH09 UTTARAKHAND.

SHEET 6 OF 8

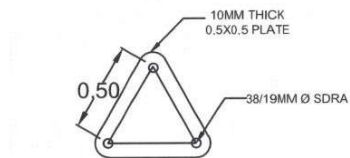
DRAWN BY	DESIGNED BY	CHECKED BY	SUBMITTED BY	APPROVED BY
ABHISHEK GUSAIN (D.MAN)	ANITI YADAV (STR. ER.)	VIKRAM PUROHIT (STR. ER.)	J.R. KOTHARI (DGM)	NIRAJ AGRAWAL (GM)
DRG.NO.: THDC/RKSH/D&E/MoRTH/(L-CH 94.720-94.830KM)/TD-06			MARCH- 2026	D&E RISHIKESH



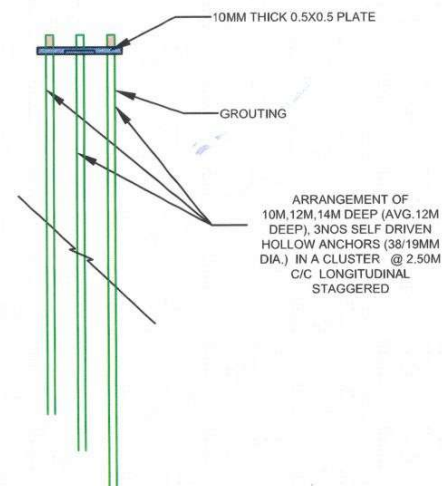
DETAIL-C
TYPICAL DETAILS OF 3.00M HIGH ANCHORED CC GRAVITY WALL



TYPICAL ARRANGEMENT OF CLUSTER OF SELF DRIVEN
HOLLOW ROCK ANCHORS PLACED @ 2.50M C/C (STAGGERED)
IN TWO ROWS



TYPICAL ARRANGEMENT OF SDRA CLUSTER
DETAIL-1



SECTIONAL ELEVATION OF SDRA CLUSTER WITH
500X500X10MM PLATE

DETAIL-C
TYPICAL DETAILS OF 3.0M HIGH CC GRAVITY WALL OVER A RAFT WITH
BUNDLED ANCHORS

NOTES:

1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.
2. EXCAVATION FOR FOUNDATION SHALL BE DONE IN 6-8M LONG STRECHES ONLY & TREATMENT SHALL BE COMPLETED BEFORE START OF NEW PATCH.
3. HIGH STRENGTH ORDINARY PORTLAND CEMENT CONFORMING TO IS : 8112 CAPABLE OF ACHIEVING THE REQUIRED DESIGN CONCRETE STRENGTH SHALL ONLY BE USED.
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11. CONCRETE SURFACE SHOULD BE ROUGHED AND CLEAN BEFORE POURING THE CONCRETE/FRESH CONCRETE.
12. FOUNDATION SURFACE UPON WHICH CC WALL IS TO BE PLACED SHALL BE APPROVED BY GEOLOGIST/ ENGINEER-IN - CHARGE PRIOR TO START OF WORK.

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Ministry of Road Transport and Highways

PROTECTION / TREATMENT WORKS OF LANDSLIDE ZONE
ALONG DHARCHULA - GUNJI ROAD ON NH - 09

CONSULTANT:



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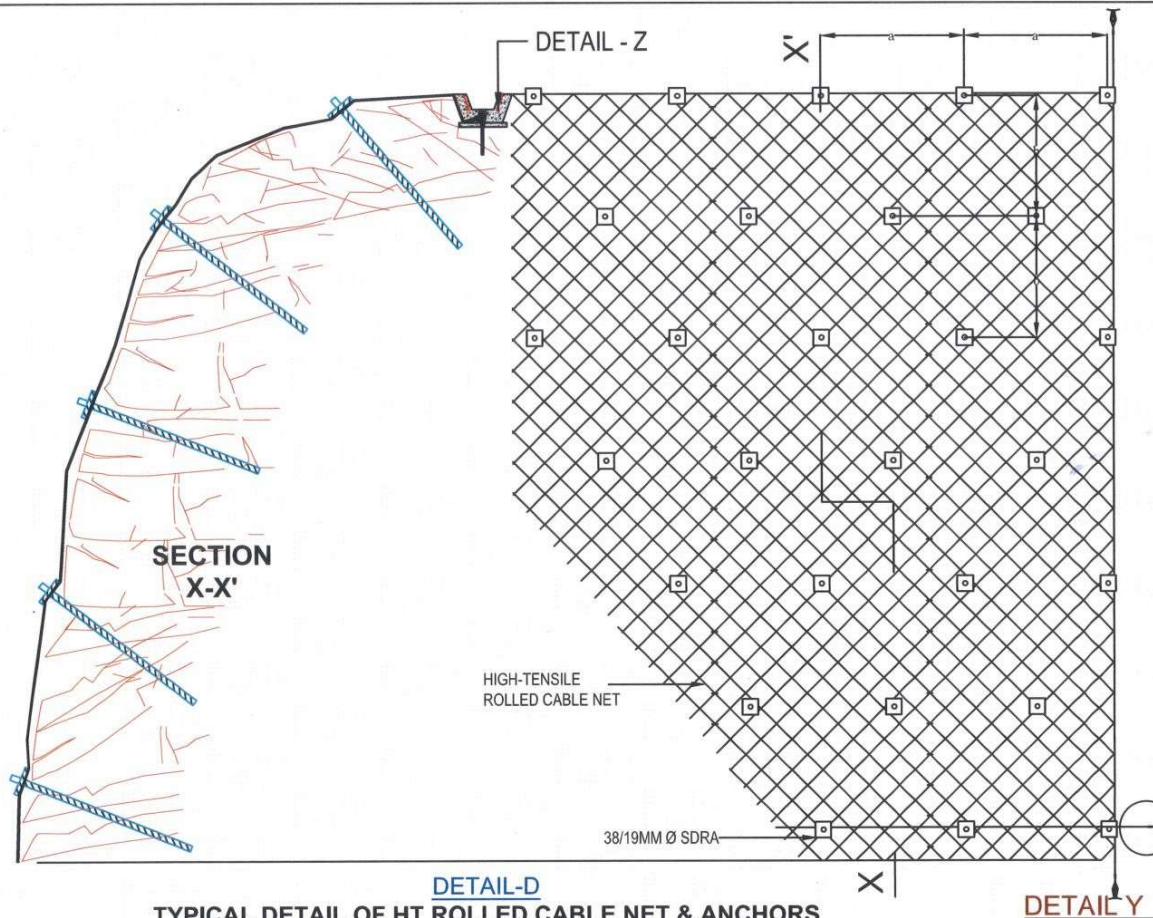
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STABILITY MEASURES

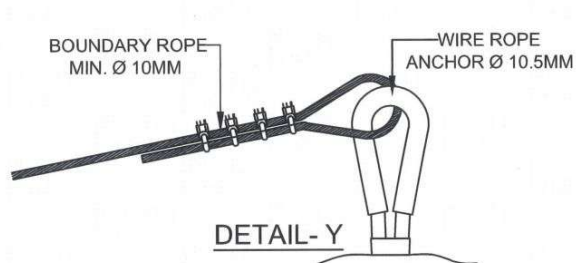
FOR LOCATION BETWEEN CH-94.720 TO CH. 94.830 KM,
ALONG DHARCHULA - GUNJI, NH09 UTTARAKHAND.

SHEET 7 OF 8

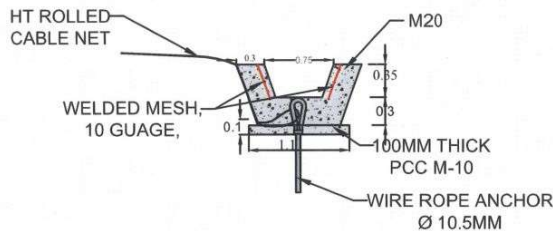
DRAWN BY	DESIGNED BY	CHECKED BY	SUBMITTED BY	APPROVED BY
ABHISHEK GUSAIN (D.MAN)	ADITI YADAV (STR. ER.)	ANIL K. PUROHIT (STR. ER.)	J.R. KOTHARI (DGM)	NIRAJ AGRAWAL (GM)
DRG.NO.: THDC/RKSH/D&E/MoRTH/(L-CH 94.720-94.830KM)/TD-07			MARCH-2026	D&E RISHIKESH



DETAIL-D
TYPICAL DETAIL OF HT ROLLED CABLE NET & ANCHORS



DETAIL-Y



**DETAIL Z - TYPICAL SECTION OF
CONTOUR/CROSS DRAIN**

NOTES:-

1. THE GENERAL SPECIFICATIONS OF THE SYSTEM SHALL BE AS BELOW. HOWEVER, MENTIONED BELOW ARE THE MINIMUM VALUES.
2. THE HIGH-TENSILE ROLLED CABLE NETS SHOULD INCLUDE THE SECONDARY MESH.
3. FOR THE INSTALLATION OF HIGH-TENSILE ROLLED CABLE NETS STANDARD SUPPORT ROPES, SEAMING ROPES AND SHACKLES SHOULD BE USED. FOR THE HORIZONTAL CONNECTION STANDARD SHACKLES OR LACES SHALL BE USED.
4. DESIGN SPECIFICATION OF SYSTEM
 - a. TENSILE STRENGTH OF HT ROLLED CABLE NET - 100 KN / M
 - b. PUNCTURING RESISTANCE OF HT ROLLED CABLE NET - 200 KN
 - c. APERTURE NOT MORE THAN 300MM IN ONE DIRECTION
 - d. DIA OF CABLE OF HT ROLLED CABLE NET - 8MM
 - e. BREAKING LOAD OF CABLE OF HT ROLLED CABLE NET - 40.70 KN
 - f. TENSILE STRENGTH OF WIRE OF THE CABLE - 1770 N/SQMM
 - g. COMPOUND FOR CORROSION PROTECTION - 95% ZN AND 5% AL CLASS B OR ZINC COATING CLASS A AS PER IS/ISO-17746-2016.
 - h. AVERAGE LENGTH OF THE 38/19MM DIA. 40 CR SDRA - 10.0 M (9.7M GROUTED+0.3M ABOVE SLOPE SURFACE)
 - i. DRILL BIT SIZE - 76MM
 - j. GRID PATTERN - STAGGERED
 - k. SPACING OF ANCHORS, i.e. (a=b) - 2.0M (AVG.) (DEPENDING ON THE SLOPE ANGLE/ PROFILE, STRATA AT SITE)
 - l. SIZE OF BASE PLATE - 200MM X 200MM X 10MM (MINIMUM)
 - m. GROUTING MATERIAL - CEMENT GROUT
 - n. SIZE OF DOUBLE TWISTED MESH - 60MMX80MM, COMPRISING OF MESH WIRE DIA. 2.2/3.2MM DIA GI WIRE AND CORROSION PROTECTION Zn COATING+PVC
5. INSTALLATION OF SDRA SHOULD BE 10°- 25° FROM HORIZONTAL IN DEBRIS SLOPE
6. ANCHORS SHALL BE INSTALLED PERPENDICULAR TO FAILURE PLANE IN SUCH A MANNER THAT THEY SHOULD ALSO SEAL THE JOINT AS PER THE SITE CONDITION IN ROCK SLOPE.

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Ministry of Road Transport and Highways

PROTECTION / TREATMENT WORKS OF LANDSLIDE ZONE
ALONG DHARCHULA - GUNJI ROAD ON NH - 09

CONSULTANT:

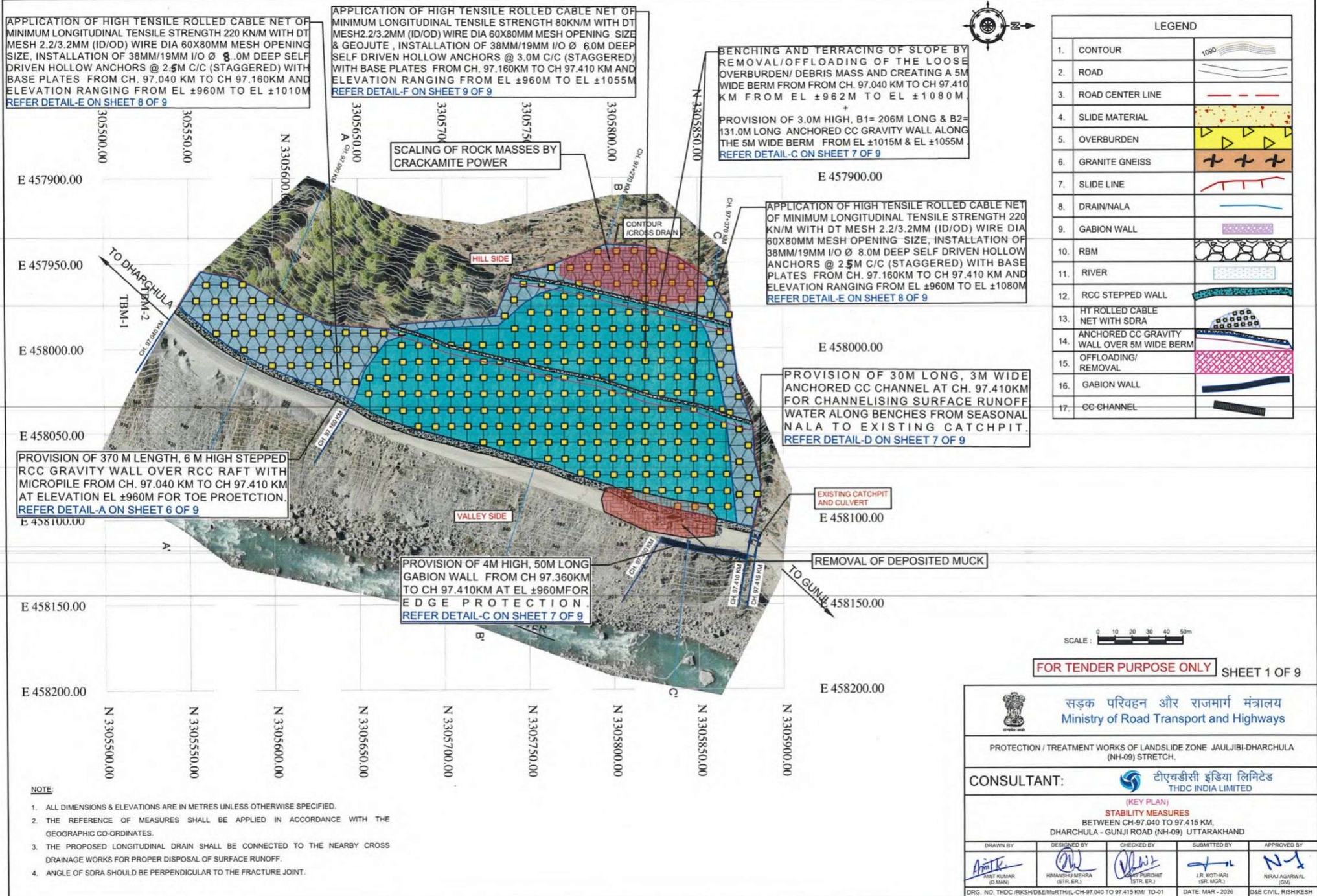


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(DETAIL-D)
STABILITY MEASURES
FOR LOCATION BETWEEN CH-94.720 TO CH. 94.830 KM,
ALONG DHARCHULA - GUNJI, NH09 UTTARAKHAND.

SHEET 8 OF 8

DRAWN BY	DESIGNED BY	CHECKED BY	SUBMITTED BY	APPROVED BY
ABHISHEK GUSAIN (D.MAN)	ADITI YADAV (STR. ER.)	RAJ PUROHIT (STR. ER.)	J.R. KOTHARI (DGM)	NIRAJ AGRAWAL (GM)
DRG.NO.: THDC /RKSH/D&E/MORTH/(L-CH 94.720-94.830KM)/TD-08	MARCH- 2026		D&E RISHIKESH	



APPLICATION OF HIGH TENSILE ROLLED CABLE NET OF MINIMUM LONGITUDINAL TENSILE STRENGTH 220 KN/M WITH DT MESH 2.2/3.2MM (ID/OD) WIRE DIA 60X80MM MESH OPENING SIZE, INSTALLATION OF 38MM/19MM I/O Ø 6.0M DEEP SELF DRIVEN HOLLOW ANCHORS @ 2.5M C/C (STAGGERED) WITH BASE PLATES FROM CH. 97.040 KM TO CH 97.160KM AND ELEVATION RANGING FROM EL ±960M TO EL ±1010M
REFER DETAIL-E ON SHEET 8 OF 9

APPLICATION OF HIGH TENSILE ROLLED CABLE NET OF MINIMUM LONGITUDINAL TENSILE STRENGTH 80KN/M WITH DT MESH 2.2/3.2MM (ID/OD) WIRE DIA 60X80MM MESH OPENING SIZE & GEOJUTE, INSTALLATION OF 38MM/19MM I/O Ø 6.0M DEEP SELF DRIVEN HOLLOW ANCHORS @ 3.0M C/C (STAGGERED) WITH BASE PLATES FROM CH. 97.160KM TO CH 97.410 KM AND ELEVATION RANGING FROM EL ±960M TO EL ±1055M
REFER DETAIL-F ON SHEET 9 OF 9

SCALING OF ROCK MASSES BY CRACKMITE POWER

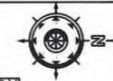
BENCHING AND TERRACING OF SLOPE BY REMOVAL/OFFLOADING OF THE LOOSE OVERBURDEN/ DEBRIS MASS AND CREATING A 5M WIDE BERM FROM CH. 97.040 KM TO CH 97.410 KM FROM EL ±962M TO EL ±1080M
PROVISION OF 3.0M HIGH, B1= 206M LONG & B2= 131.0M LONG ANCHORED CC GRAVITY WALL ALONG THE 5M WIDE BERM FROM EL ±1015M & EL ±1055M
REFER DETAIL-C ON SHEET 7 OF 9

APPLICATION OF HIGH TENSILE ROLLED CABLE NET OF MINIMUM LONGITUDINAL TENSILE STRENGTH 220 KN/M WITH DT MESH 2.2/3.2MM (ID/OD) WIRE DIA 60X80MM MESH OPENING SIZE, INSTALLATION OF 38MM/19MM I/O Ø 8.0M DEEP SELF DRIVEN HOLLOW ANCHORS @ 2.5M C/C (STAGGERED) WITH BASE PLATES FROM CH. 97.160 KM TO CH 97.410 KM AND ELEVATION RANGING FROM EL ±960M TO EL ±1080M
REFER DETAIL-E ON SHEET 8 OF 9

PROVISION OF 30M LONG, 3M WIDE ANCHORED CC CHANNEL AT CH. 97.410KM FOR CHANNELISING SURFACE RUNOFF WATER ALONG BENCHES FROM SEASONAL NALA TO EXISTING CATCHPIT.
REFER DETAIL-D ON SHEET 7 OF 9

PROVISION OF 370 M LENGTH, 6 M HIGH STEPPED RCC GRAVITY WALL OVER RCC RAFT WITH MICROPILE FROM CH. 97.040 KM TO CH 97.410 KM AT ELEVATION EL ±960M FOR TOE PROTECTION.
REFER DETAIL-A ON SHEET 6 OF 9

PROVISION OF 4M HIGH, 50M LONG GABION WALL FROM CH 97.360KM TO CH 97.410KM AT EL ±960M FOR EDGE PROTECTION.
REFER DETAIL-C ON SHEET 7 OF 9



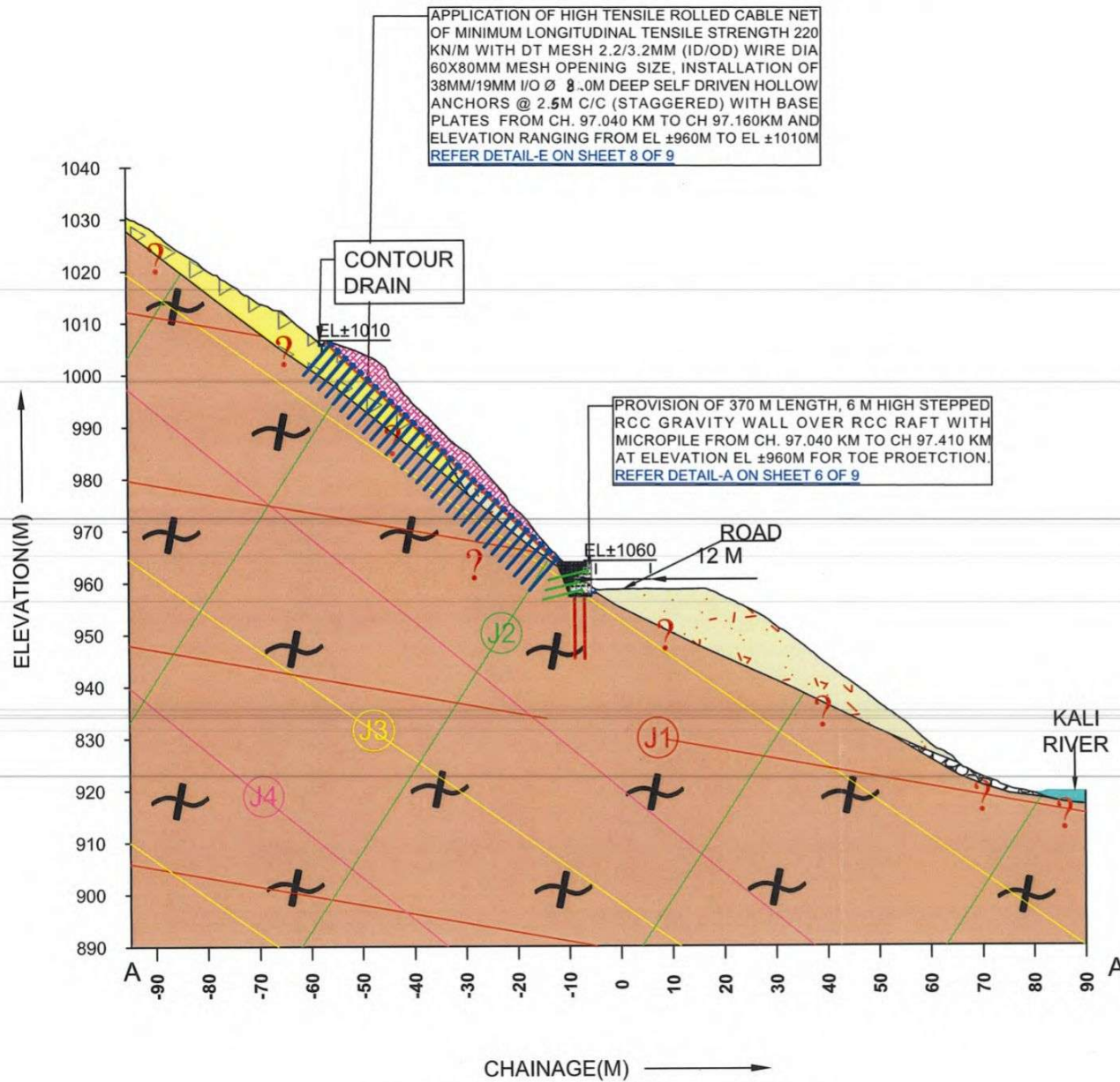
LEGEND	
1. CONTOUR	1000
2. ROAD	
3. ROAD CENTER LINE	
4. SLIDE MATERIAL	
5. OVERBURDEN	
6. GRANITE GNEISS	
7. SLIDE LINE	
8. DRAIN/NALA	
9. GABION WALL	
10. RBM	
11. RIVER	
12. RCC STEPPED WALL	
13. HT ROLLED CABLE NET WITH SDRA	
14. ANCHORED CC GRAVITY WALL OVER 5M WIDE BERM	
15. OFFLOADING/ REMOVAL	
16. GABION WALL	
17. CC CHANNEL	



FOR TENDER PURPOSE ONLY SHEET 2 OF 9

- NOTE:**
- ALL DIMENSIONS & ELEVATIONS ARE IN METRES UNLESS OTHERWISE SPECIFIED.
 - THE REFERENCE OF MEASURES SHALL BE APPLIED IN ACCORDANCE WITH THE GEOGRAPHIC CO-ORDINATES.
 - THE PROPOSED LONGITUDINAL DRAIN SHALL BE CONNECTED TO THE NEARBY CROSS DRAINAGE WORKS FOR PROPER DISPOSAL OF SURFACE RUNOFF.
 - ANGLE OF SDRA SHOULD BE PERPENDICULAR TO THE FRACTURE JOINT.

 सड़क परिवहन और राजमार्ग मंत्रालय Ministry of Road Transport and Highways				
PROTECTION / TREATMENT WORKS OF LANDSLIDE ZONE JAULJIBI-DHARCHULA (NH-09) STRETCH.				
CONSULTANT:		 टीएचडीसी इंडिया लिमिटेड THDC INDIA LIMITED		
(KEY PLAN-2) STABILITY MEASURES BETWEEN CH-97.040 TO 97.415 KM DHARCHULA - GUNJI ROAD (NH-09) UTTARAKHAND				
DRAWN BY  ANIL KUMAR (SR. ENR)	DESIGNED BY  HIMANSHU MEHRA (SR. ENR)	CHECKED BY  JAY PURSHOT (SR. ENR)	SUBMITTED BY  J.R. KOTHARI (SR. ENR)	APPROVED BY  N.RAJ AGARWAL (GM)
DRG. NO. THDC/RSKSHD&M&RTH/L-CH-97.040 TO 97.415 KM/ TD-02			DATE: MAR - 2026	



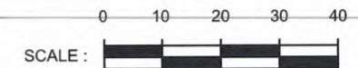
SECTION A-A' (CH. 97.090 KM)

NOTE

1. ALL DIMENSIONS & ELEVATIONS ARE IN METRES UNLESS OTHERWISE SPECIFIED.
2. THE ANGLE OF THE SDRA SHOULD BE PERPENDICULAR TO THE FRACTURE JOINT.

LEGEND

1.	OVERBURDEN	
2.	GRANITE GNEISS	
3.	SLIDE MATERIAL	
4.	RBM	
5.	TRACES OF JOINTS	
6.	HT ROLLED CABLE NET WITH SDRA	
7.	OFFLOADING/REMOVAL	
8.	ANCHORED CC GRAVITY WALL	
9.	RCC STEPPED WALL	



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Ministry of Road Transport and Highways

PROTECTION / TREATMENT WORKS OF LANDSLIDE ZONE JAULJIBI-DHARCHULA (NH-09) STRETCH.

CONSULTANT:



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THDC INDIA LIMITED

SECTION A-A'

STABILITY MEASURES

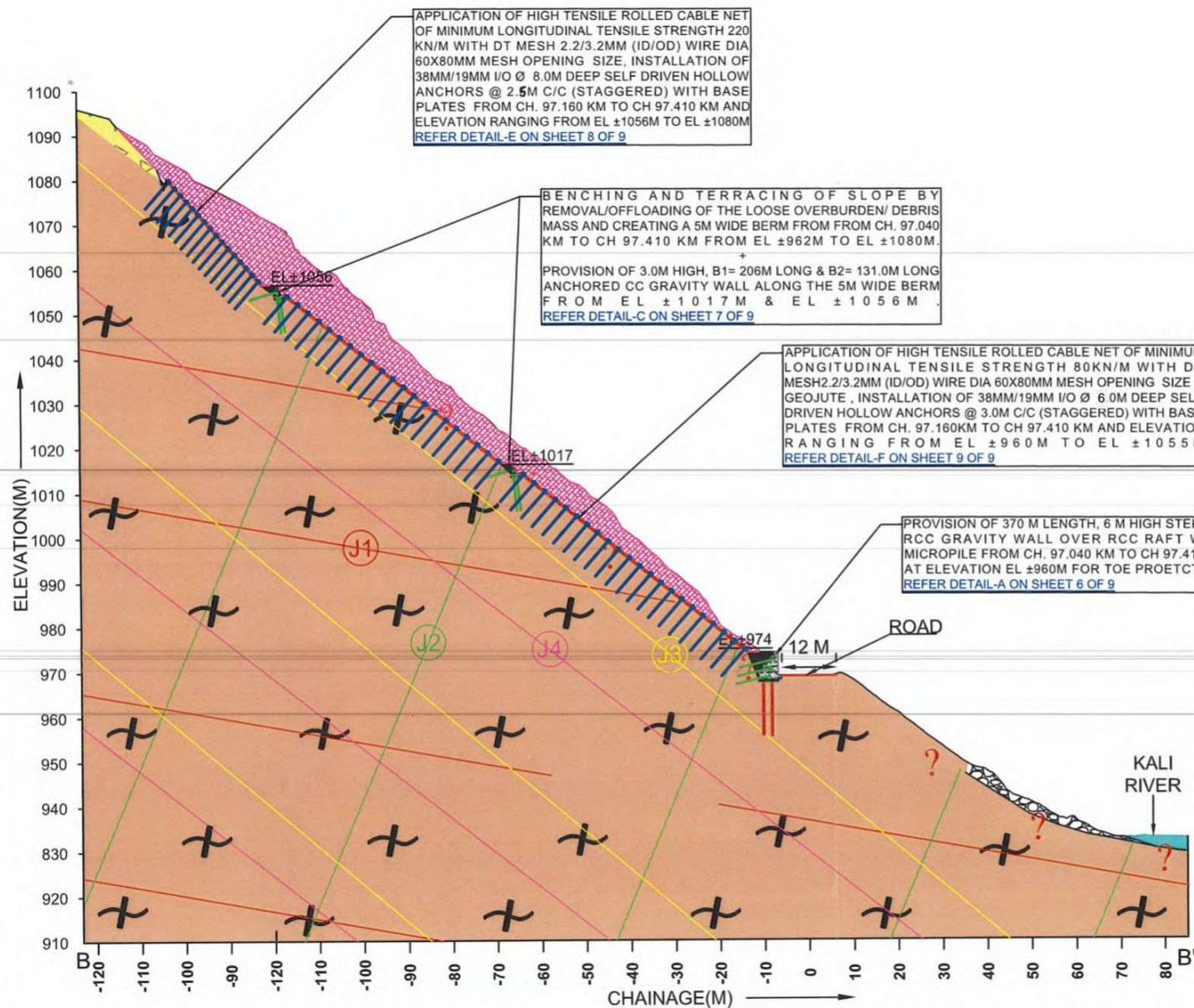
BETWEEN CH-97.040 TO 97.415 KM,
DHARCHULA - GUNJI ROAD (NH-09) UTTARAKHAND

DRAWN BY ANIL KUMAR (D.M.A.)	DESIGNED BY HIMANSHU MEHRA (STR. ENR.)	CHECKED BY PARAG PUROHIT (STR. ENR.)	SUBMITTED BY J.R. KOTHARI (SR. MGR.)	APPROVED BY NIRAJ AGARWAL (GM)
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DRG. NO. THDC/RKSHDSE/MARTHIL-CH-97.040 TO 97.415 KM TD-03

DATE: MAR - 2026

D&E CIVIL, RISHKESH



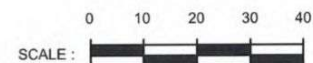
SECTION B-B' (CH. 97.270 KM)

NOTE

1. ALL DIMENSIONS & ELEVATIONS ARE IN METRES UNLESS OTHERWISE SPECIFIED.
2. THE ANGLE OF THE SDRA SHOULD BE PERPENDICULAR TO THE FRACTURE JOINT.

LEGEND

1.	OVERBURDEN	
2.	GRANITE GNEISS	
3.	SLIDE MATERIAL	
4.	RBM	
5.	TRACES OF JOINTS	
6.	HT ROLLED CABLE NET WITH SDRA	
7.	OFFLOADING/REMOVAL	
8.	ANCHORED CC GRAVITY WALL	
9.	RCC STEPPED WALL	



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PROTECTION / TREATMENT WORKS OF LANDSLIDE ZONE JAULJIBI-DHARCHULA
(NH-09) STRETCH.

CONSULTANT:



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SECTION B-B'

STABILITY MEASURES

BETWEEN CH-97.040 TO 97.415 KM.

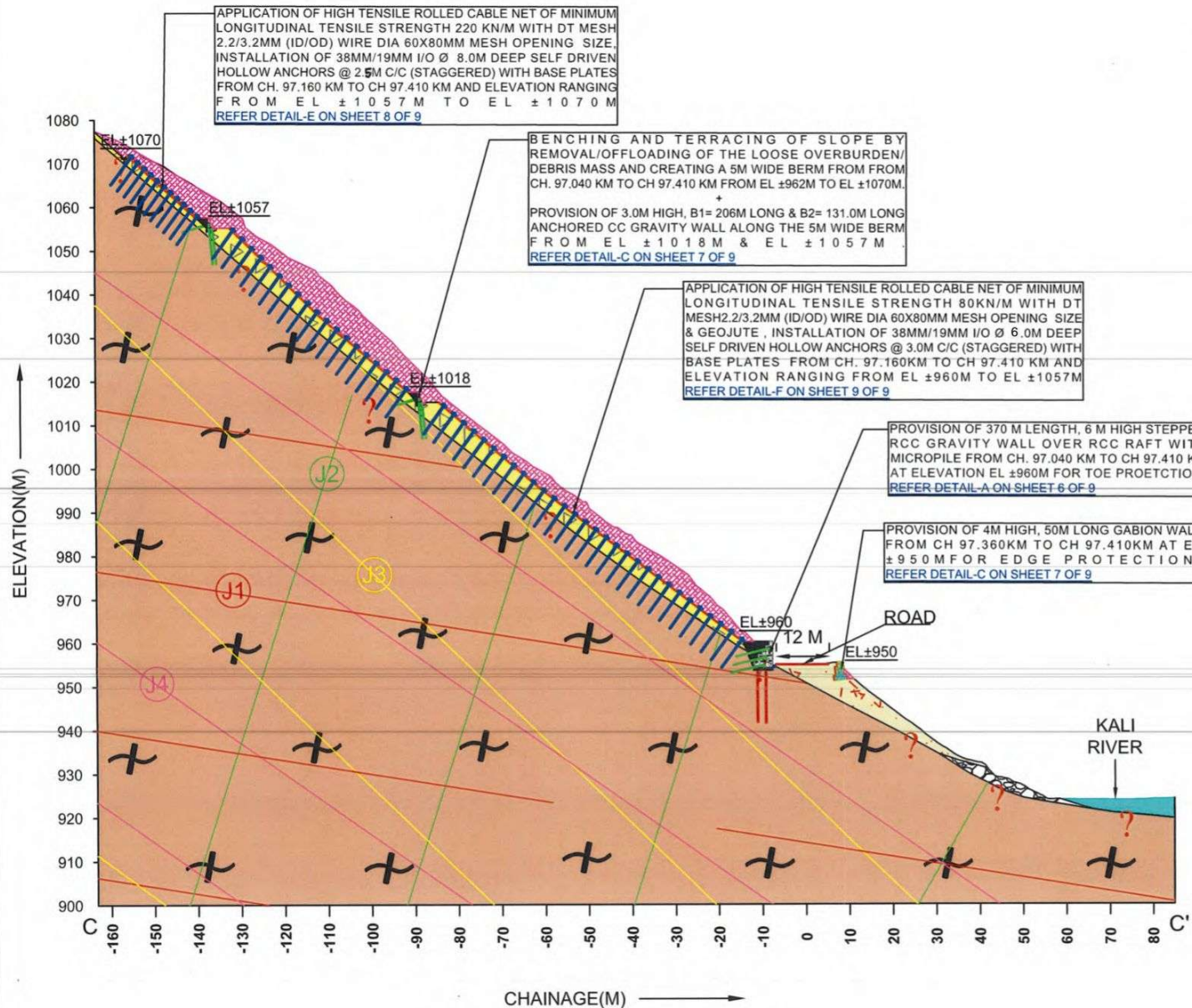
DHARCHULA - GUNJI ROAD (NH-09) UTTARAKHAND

DRAWN BY 	DESIGNED BY 	CHECKED BY 	SUBMITTED BY 	APPROVED BY
ANIL KUMAR (D.MAN)	HEMANT KUMAR (STR. ENR.)	J.P. KOTHARI (STR. ENR.)	NIRAJ AGARWAL (GM)	D/E CIVIL, RISHIKESH

DRG. NO. THDC /RKS/D&E/M/RTH/L-CH-97.040 TO 97.415 KM/ TD-04

DATE: MAR - 2026

D/E CIVIL, RISHIKESH



NOTE

1. ALL DIMENSIONS & ELEVATIONS ARE IN METRES UNLESS OTHERWISE SPECIFIED.
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LEGEND

1.	OVERBURDEN	
2.	GRANITE GNEISS	
3.	SLIDE MATERIAL	
4.	RBM	
5.	TRACES OF JOINTS	
6.	HT ROLLED CABLE NET WITH SDRA	
7.	OFFLOADING/REMOVAL	
8.	ANCHORED CC GRAVITY WALL	
9.	RCC STEPPED WALL	
10.	GABION WALL	

FOR TENDER PURPOSE ONLY

SHEET 5 OF 9



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Ministry of Road Transport and Highways

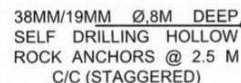
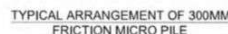
PROTECTION / TREATMENT WORKS OF LANDSLIDE ZONE JAULJIBI-DHARCHULA (NH-09) STRETCH.

CONSULTANT: टीएचडीसी इंडिया लिमिटेड
THDC INDIA LIMITED

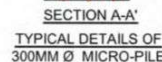
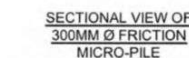
SECTION C-C'
STABILITY MEASURES
BETWEEN CH-97.040 TO 97.415 KM.
DHARCHULA - GUNJI ROAD (NH-09) UTTARAKHAND

DRAWN BY 	DESIGNED BY 	CHECKED BY 	SUBMITTED BY 	APPROVED BY
ARMIT KUMAR (D.MAN)	HIMANSHU MEHRA (STR. ENR.)	VINAY PUROHIT (STR. ENR.)	J.R. KOTHARI (SR. MGR.)	NISHU AGARWAL (GM)

DRG. NO. THDC/RKSHD&M/RTH/L-CH-97.040 TO 97.415 KM/ TD-05 DATE: MAR - 2026 D&E CIVIL, RISHKESH



DETAIL-A



1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.
2. EXCAVATION FOR FOUNDATION SHALL BE DONE IN 6-8M LONG STRECHES ONLY & TREATMENT SHALL BE COMPLETED BEFORE START OF NEW PATCH.
3. CONCRETE SURFACE SHOULD BE ROUGHED AND CLEAN BEFORE POURING THE CONCRETE/FRESH CONCRETE.
4. FOUNDATION SURFACE UPON WHICH CC WALL IS TO BE PLACED SHALL BE APPROVED BY GEOLOGIST/ENGINEER-IN - CHARGE PRIOR TO START OF WORK.
5. HIGH STRENGTH ORDINARY PORTLAND CEMENT CONFORMING TO IS : 8112 CAPABLE OF ACHIEVING THE REQUIRED DESIGN CONCRETE STRENGTH SHALL ONLY BE USED.
6. THE MINIMUM CEMENT CONTENT AND WATER CEMENT RATIO IN THE CONCRETE DESIGN MIX SHALL BE 310 KG PER CUM AND 0.45 RESPECTIVELY.
7. CONCRETE USED SHALL BE OF GRADES AS SPECIFIED BELOW CONFORMING TO IS 456 (LATEST):
RCC RAFT/*MICRO PILE* - M35
STEPPED WALL SECTIONS - M25
LEVELING COURSE - M10.
8. PROPERLY BRACED STEEL PLATES SHALL BE USED AS SHUTTERING.
9. THE GROUTING SHALL BE DONE AT A PRESSURE RANGING FROM 1 TO 3 KG/SQCM.
10. LAPS AND ANCHORAGE LENGTH SHALL BE AS PER IS 456(LATEST).
11. LAPS SHALL BE STAGGERED.

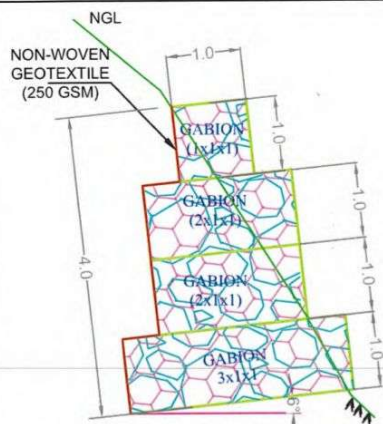


PROTECTION / TREATMENT WORKS OF LANDSLIDE ZONE JAULJIBI-DHARCHULA
(NH-09) STRETCH.

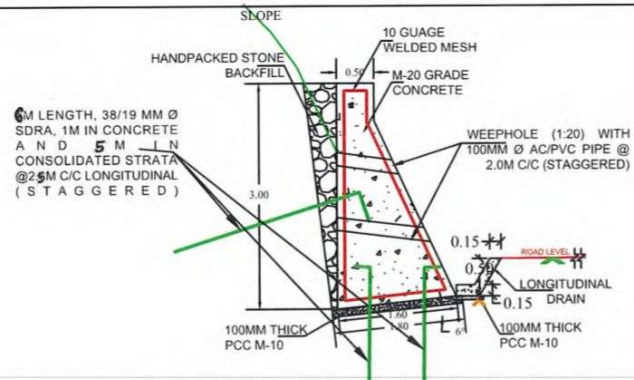

टीएचडीसी इंडिया लिमिटेड
THDC INDIA LIMITED

BETWEEN CH-97.040 TO 97.415 KM,
DHARCHULA - GUNJI ROAD (NH-09) UTTARAKHAND

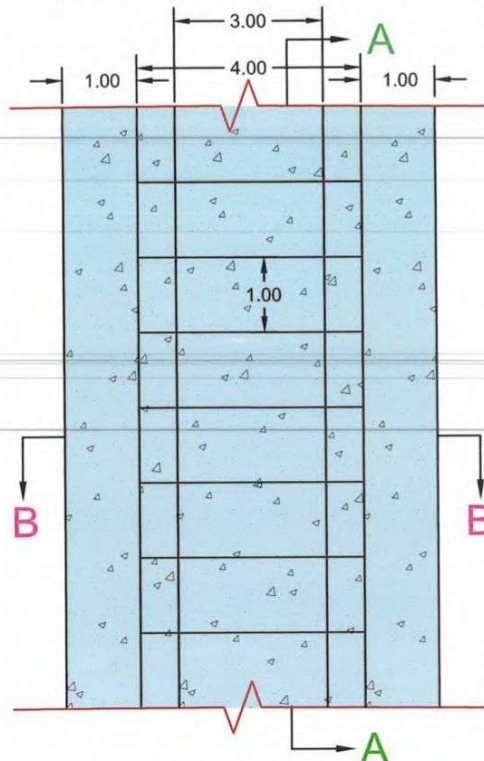
DRAWN BY  ANIL KUMAR (D.MAN)	DESIGNED BY  HMANZARU MEDINA (STR. ENR.)	CHECKED BY  UDAY PUROHIT (STR. ENR.)	SUBMITTED BY  J.R. KOTHARI (SR. MGR.)	APPROVED BY  NIRAJ ACHARYA (SAG)
DRG. NO. THDC /RKSH/D&E/MoRTH/IL-CH-49/040 TO 97.415 KM/ TD-08			DATE MAR - 2026	D&E CIVIL_RISHIKHE



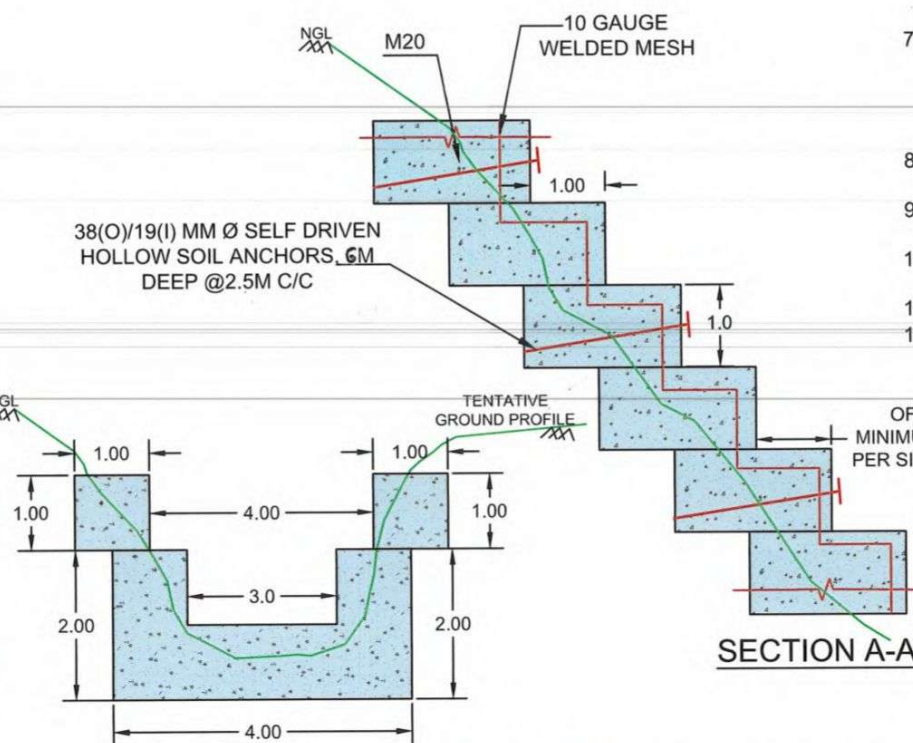
DETAIL-B
TYPICAL DETAIL OF 4.0 M HIGH GABION WALL



DETAIL-C
TYPICAL DETAILS OF 3.00M HIGH CEMENT
CONCRETE GRAVITY WALL



PLAN OF CC CHANNEL



SECTION B-B
TYPICAL DETAIL OF CC CHANNEL
DETAIL-D

NOTES:-

1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.
2. EXCAVATION FOR FOUNDATION SHALL BE DONE IN 6-8M LONG STRETCHES ONLY & TREATMENT SHALL BE COMPLETED BEFORE START OF NEW PATCH.
3. CONCRETE SURFACE SHOULD BE ROUGHED AND CLEAN BEFORE POURING THE CONCRETE/FRESH CONCRETE.
4. FOUNDATION SURFACE UPON WHICH CC WALL IS TO BE PLACED SHALL BE APPROVED BY GEOLOGIST/ ENGINEER-IN - CHARGE PRIOR TO START OF WORK.
5. HIGH STRENGTH ORDINARY PORTLAND CEMENT CONFORMING TO IS : 8112 CAPABLE OF ACHIEVING THE REQUIRED DESIGN CONCRETE STRENGTH SHALL ONLY BE USED.
6. THE MINIMUM CEMENT CONTENT AND WATER CEMENT RATIO IN THE CONCRETE DESIGN MIX SHALL BE 310 KG PER CUM AND 0.45 RESPECTIVELY.
7. CONCRETE USED SHALL BE OF GRADES AS SPECIFIED BELOW CONFORMING TO IS 456 (LATEST):
CC GRAVITY WALL/ CC CHANNEL - M20
LEVELING COURSE- M10.
8. PROPERLY BRACED STEEL PLATES SHALL BE USED AS SHUTTERING.
9. THE GROUTING SHALL BE DONE AT A PRESSURE RANGING FROM 1 TO 3 KG/SQCM.
10. LAPS AND ANCHORAGE LENGTH SHALL BE AS PER IS 456(LATEST).
11. LAPS SHALL BE STAGGERED.
12. ALL GABIONS SHALL BE CONFIRMING TO IS:16014 (LATEST).ENGINEER IN CHARGE MAY DECIDE GABION SIZE AS PER BIS CODE.

FOR TENDER PURPOSE ONLY

SHEET 7 OF 9



सड़क परिवहन और राजमार्ग मंत्रालय
Ministry of Road Transport and Highways

PROTECTION / TREATMENT WORKS OF LANDSLIDE ZONE JAULJIBI-DHARCHULA
(NH-09) STRETCH.

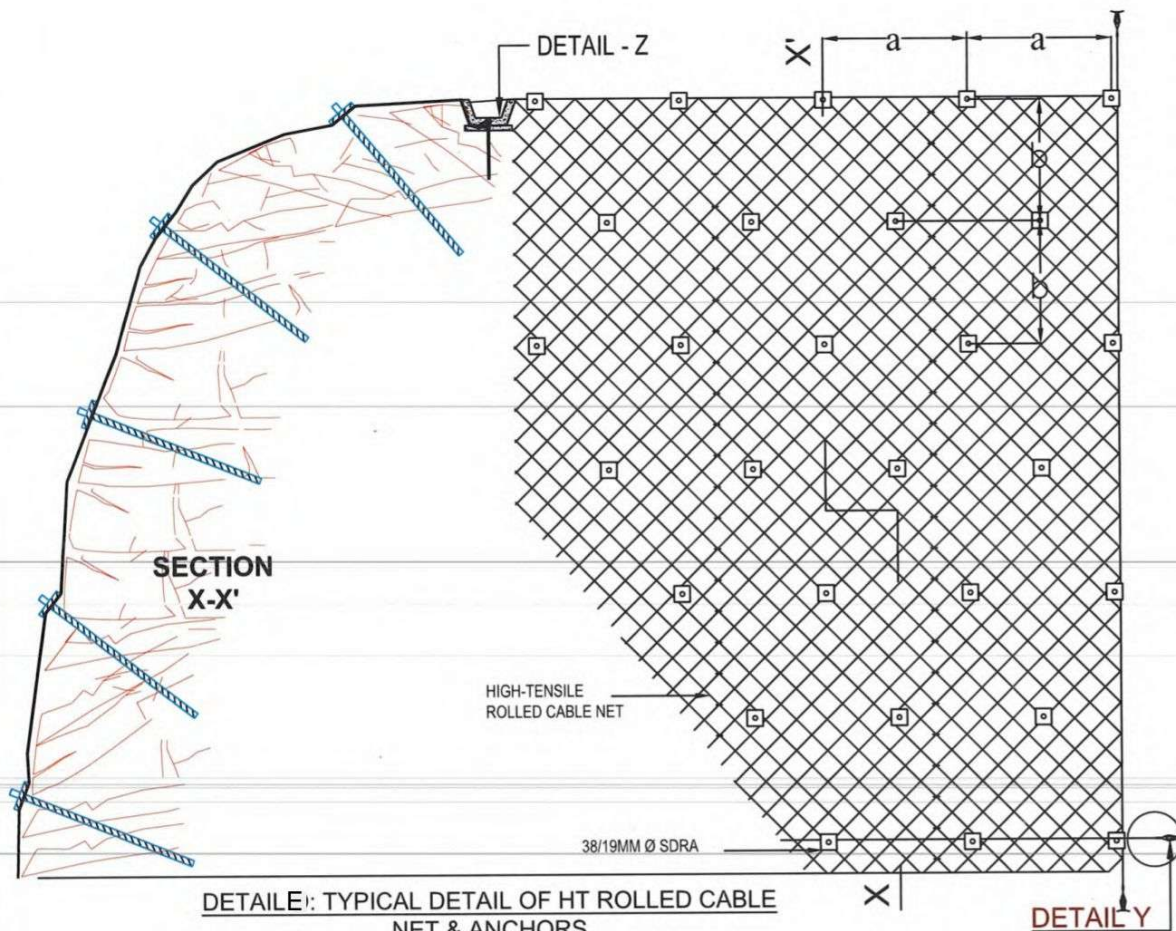
CONSULTANT: टीएचडीसी इंडिया लिमिटेड
THDC INDIA LIMITED

DETAIL B,C & D
STABILITY MEASURES

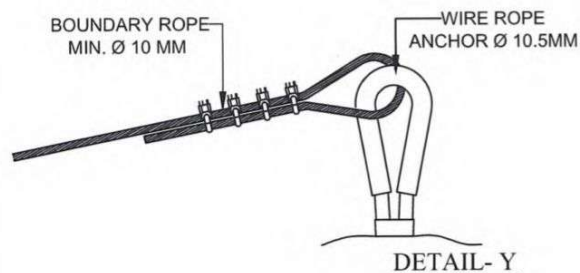
BETWEEN CH-97.040 TO 97.415 KM.
DHARCHULA - GUNJI ROAD (NH-09) UTTARAKHAND

DRAWN BY	DESIGNED BY	CHECKED BY	SUBMITTED BY	APPROVED BY
ANIL KUMAR (D.MAN)	HEMANT KUMAR (STR. ENR.)	VINAY PURCHIT (STR. ENR.)	J.R. KOTHARI (STR. MGR.)	NIRAJ AGARWAL (GM)
DATE: MAR - 2026	DATE: MAR - 2026	DATE: MAR - 2026	DATE: MAR - 2026	DATE: MAR - 2026

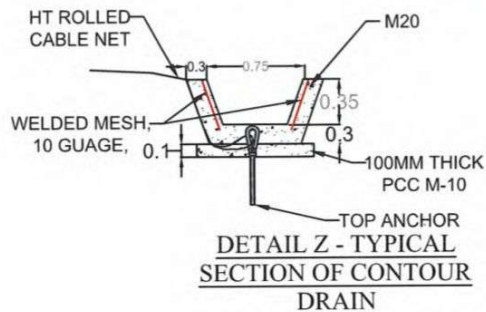
DRG. NO. THDC/RKSHD&MORTHIL-CH-97.040 TO 97.415 KM/ TD-07



DETAIL E: TYPICAL DETAIL OF HT ROLLED CABLE NET & ANCHORS



DETAIL - Y



DETAIL Z - TYPICAL SECTION OF CONTOUR DRAIN

NOTES:-

1. THE GENERAL SPECIFICATIONS OF THE SYSTEM SHALL BE AS BELOW. HOWEVER, MENTIONED BELOW ARE THE MINIMUM VALUES.
2. THE HIGH-TENSILE ROLLED CABLE NETS SHOULD INCLUDE THE SECONDARY MESH.
3. FOR THE INSTALLATION OF HIGH-TENSILE ROLLED CABLE NETS STANDARD SUPPORT ROPES, SEAMING ROPES AND SHACKLES SHOULD BE USED. FOR THE HORIZONTAL CONNECTION STANDARD SHACKLES OR LACES SHALL BE USED.
4. DESIGN SPECIFICATION OF SYSTEM
 - a. TENSILE STRENGTH OF HT ROLLED CABLE NET - 220 KN /M
 - b. PUNCTURING RESISTANCE OF HT ROLLED CABLE NET - 350KN
 - c. APERTURE NOT MORE THAN 300MM IN ONE DIRECTION
 - d. DIA OF CABLE OF HT ROLLED CABLE NET - 10MM
 - e. BREAKING LOAD OF CABLE OF HT ROLLED CABLE NET - 63 KN
 - f. TENSILE STRENGTH OF WIRE OF THE CABLE - 1770 N/SQMM
 - g. COMPOUND FOR CORROSION PROTECTION - 95% ZN AND 5% AL CLASS B OR ZINC COATING CLASS A AS PER IS/ISO-17746-2016.
 - h. AVERAGE LENGTH OF THE 38/19MM DIA. 40 CR SDRA - 8.0 M (7.7M GROUTED+0.3M ABOVE SLOPE SURFACE)
 - i. DRILL BIT SIZE - 76MM
 - j. GRID PATTERN - STAGGERED
 - k. SPACING OF ANCHORS, i.e. (a=b) - 2.5M (AVG.) (DEPENDS ON THE SLOPE ANGLE/ PROFILE, STRATA AT SITE)
 - l. SIZE OF BASE PLATE - 200MM X 200MM X 10MM (MINIMUM)
 - m. GROUTING MATERIAL - CEMENT GROUT
 - n. SIZE OF DOUBLE TWISTED MESH -60MMX80MM, COMPRISING OF MESH WIRE DIA. 2.2/3.2MM DIA GI WIRE AND CORROSION PROTECTION Zn COATING+PVC

FOR TENDER PURPOSE ONLY

SHEET 8 OF 9



सड़क परिवहन और राजमार्ग मंत्रालय
Ministry of Road Transport and Highways

PROTECTION / TREATMENT WORKS OF LANDSLIDE ZONE JAULJIBI-DHARCHULA (NH-09) STRETCH.

CONSULTANT:



टीएचडीसी इंडिया लिमिटेड
THDC INDIA LIMITED

DETAIL E

STABILITY MEASURES

BETWEEN CH-97.040 TO 97.415 KM.

DHARCHULA - GUNJI ROAD (NH-09) UTTARAKHAND

DRAWN BY:

DESIGNED BY:

CHECKED BY:

SUBMITTED BY:

APPROVED BY:

ASIT KUMAR
(D.MAN)

HIMANSHU TEHRA
(STR. ENR.)

RAV PURCHOT
(STR. ENR.)

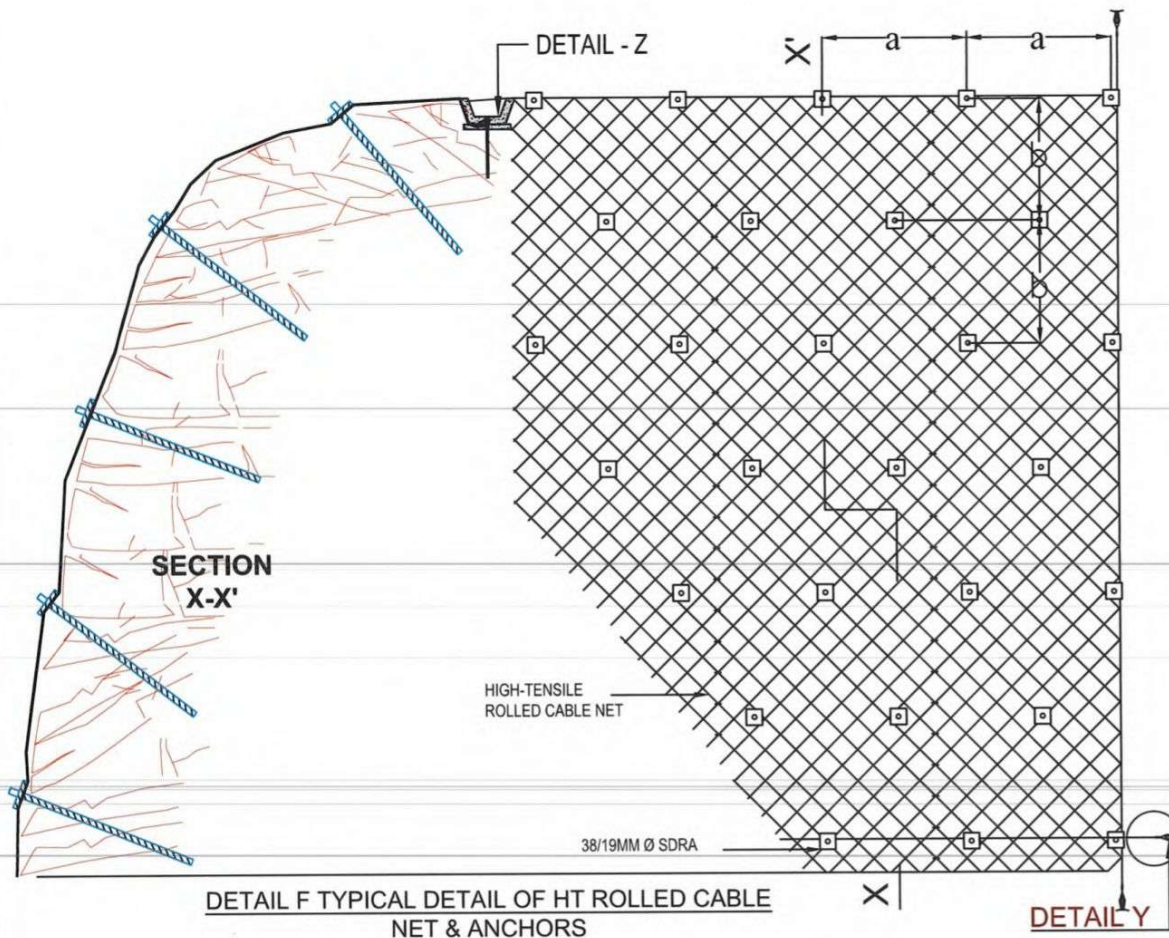
J.R. KOTHARI
(SR. MGR.)

NEELU AGARWAL
(GM)

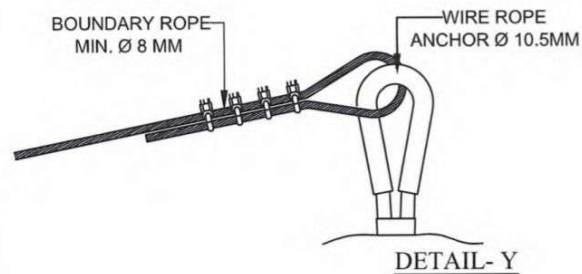
DRG. NO. THDC/RKSHD&MRTH/L-CH-97.040 TO 97.415 KM/ TD-08

DATE: MAR - 2026

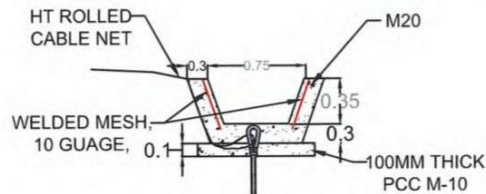
D&E CIVIL, RISHIKESH



DETAIL F TYPICAL DETAIL OF HT ROLLED CABLE NET & ANCHORS



DETAIL - Y



DETAIL Z - TYPICAL SECTION OF CONTOUR DRAIN

NOTES:-

1. THE GENERAL SPECIFICATIONS OF THE SYSTEM SHALL BE AS BELOW. HOWEVER, MENTIONED BELOW ARE THE MINIMUM VALUES.
2. THE HIGH-TENSILE ROLLED CABLE NETS SHOULD INCLUDE THE SECONDARY MESH.
3. FOR THE INSTALLATION OF HIGH-TENSILE ROLLED CABLE NETS STANDARD SUPPORT ROPES, SEAMING ROPES AND SHACKLES SHOULD BE USED. FOR THE HORIZONTAL CONNECTION STANDARD SHACKLES OR LACES SHALL BE USED.
4. DESIGN SPECIFICATION OF SYSTEM
 - a. TENSILE STRENGTH OF HT ROLLED CABLE NET - 80 KN /M
 - b. PUNCTURING RESISTANCE OF HT ROLLED CABLE NET - 150KN
 - c. APERTURE NOT MORE THAN 400MM IN ONE DIRECTION
 - d. DIA OF CABLE OF HT ROLLED CABLE NET - 6MM
 - e. BREAKING LOAD OF CABLE OF HT ROLLED CABLE NET - 35KN
 - f. TENSILE STRENGTH OF WIRE OF THE CABLE - 1770 N/SQMM
 - g. COMPOUND FOR CORROSION PROTECTION - 95% ZN AND 5% AL CLASS B OR ZINC COATING CLASS A AS PER IS/ISO-17746-2016.
 - h. AVERAGE LENGTH OF THE 38/19MM DIA. 40 CR SDRA - 6.0 M (5.7M GROUTED+0.3M ABOVE SLOPE SURFACE)
 - i. DRILL BIT SIZE - 76MM
 - j. GRID PATTERN - STAGGERED
 - k. SPACING OF ANCHORS, i.e. (a=b) - 3.0M (AVG.) (DEPENDING ON THE SLOPE ANGLE/ PROFILE, STRATA AT SITE)
 - l. SIZE OF BASE PLATE - 200MM X 200MM X 10MM (MINIMUM)
 - m. GROUTING MATERIAL - CEMENT GROUT
 - n. SIZE OF DOUBLE TWISTED MESH -60MMX80MM, COMPRISING OF MESH WIRE DIA. 2.2/3.2MM DIA GI WIRE AND CORROSION PROTECTION Zn COATING+PVC

FOR TENDER PURPOSE ONLY

SHEET 9 OF 9



सड़क परिवहन और राजमार्ग मंत्रालय
Ministry of Road Transport and Highways

PROTECTION / TREATMENT WORKS OF LANDSLIDE ZONE JAULJIBI-DHARCHULA (NH-09) STRETCH.

CONSULTANT:



टीएचडीसी इंडिया लिमिटेड
THDC INDIA LIMITED

DETAIL F
STABILITY MEASURES

BETWEEN CH-97.040 TO 97.415 KM.
DHARCHULA - GUNJI ROAD (NH-09) UTTARAKHAND

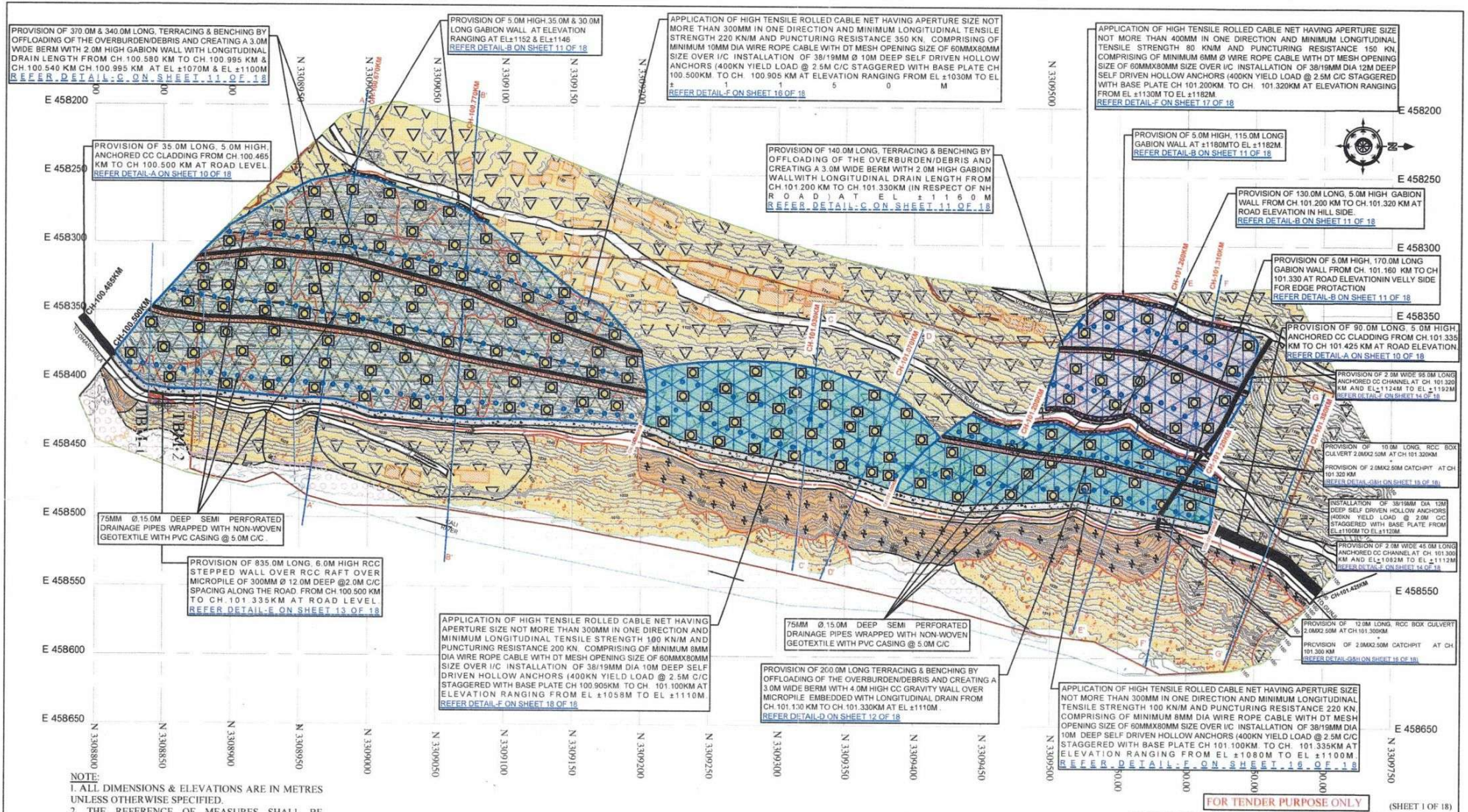
DRAWN BY	DESIGNED BY	CHECKED BY	SUBMITTED BY	APPROVED BY
 ARUN KUMAR (D.MAN)	 HEMANSHU MEHRA (STR. ENR.)	 ARUN PUROHIT (STR. ENR.)	 J.R. KOTHARI (SR. MGR.)	 N.RAJ AGARWAL (CM)

DRG. NO. THDC /RKSHPD&EMRTH/LCH-97.040 TO 97.415 KM/ TD-09

DATE: MAR - 2025

D&E CIVIL, RISHKESH

TCS - 5



NOTE:
1. ALL DIMENSIONS & ELEVATIONS ARE IN METRES UNLESS OTHERWISE SPECIFIED.
2. THE REFERENCE OF MEASURES SHALL BE APPLIED IN ACCORDANCE WITH THE GEOGRAPHIC CO-ORDINATES.

LEGEND	
1. CONTOUR	900
2. ROAD	
3. OVERBURDEN	
4. GRANITIC GNEISS	+
5. SLIDE MATERIAL	
6. GABION WALL	

7. RBM	
8. SLIDE LINE	
9. FOOTPATH	
10. TBM	
11. BUILT UP	
12. RIVER	
13. DIP OF FOLIATION / JOINT	

14. HT ROLLED CABLE NET WITH SDRA	
15. 5M HIGH GABION WALL	
16. 6M HIGH RCC STEPPED WALL	
17. 3M HIGH CC WALL & 3M WIDE BENCH	
18. 2M HIGH GABION & 3M WIDE BENCH	
19. 5M HIGH CC CLADDING	

SCALE: 0 10 20 30 40 50m

FOR TENDER PURPOSE ONLY (SHEET 1 OF 18)

सड़क परिवहन और राजमार्ग मंत्रालय
Ministry of Road Transport and Highways

PROTECTION / TREATMENT WORKS ON LANDSLIDE ZONE NEAR TANAKPUR - DHARCHULA - GUNJI ROAD NH-09 KUMAON REGION (UTTARAKHAND)

CONSULTANT: टीएचडीसी इंडिया लिमिटेड
THDC INDIA LIMITED

PROPOSED TREATMENT MEASURES
BETWEEN CH 100+485 KM TO CH 101+425 KM, LOCATION - TANAKPUR - DHARCHULA - GUNJI ROAD NH-09

DRG. NO. THDC/ROAD/DEVELOPMENT/09/CH. 100+485-101+425KM/TH-01 DATE: APR - 2024 DATE CIVIL: RESHKEISH



NOTE:
1. ALL DIMENSIONS & ELEVATIONS ARE IN METRES UNLESS OTHERWISE SPECIFIED.
2. THE REFERENCE OF MEASURES SHALL BE APPLIED IN ACCORDANCE WITH THE GEOGRAPHIC CO-ORDINATES.

LEGEND	
1. CONTOUR	980
2. ROAD	
3. OVERBURDEN	
4. GRANITIC GNEISS	
5. SLIDE MATERIAL	
6. GABION WALL	

7. RBM	
8. SLIDE LINE	
9. FOOTPATH	
10. TBM	
11. BUILT UP	
12. RIVER	
13. DIP OF FOLIATION / JOINT	

14. HT ROLLED CABLE NET WITH SDRA	
15. 5M HIGH GABION WALL	
16. 6M HIGH RCC STEPPED WALL	
17. 3M HIGH CC WALL & 3M WIDE BENCH	
18. 2M HIGH GABION & 3M WIDE BENCH	
19. 3M HIGH CC CLADDING	

SCALE :- 0 10 20 30 40 50m

SCALE :-
FOR TENDER PURPOSE ONLY

(SHEET 2 OF 18)

सड़क परिवहन और राजमार्ग मंत्रालय
Ministry of Road Transport and Highways

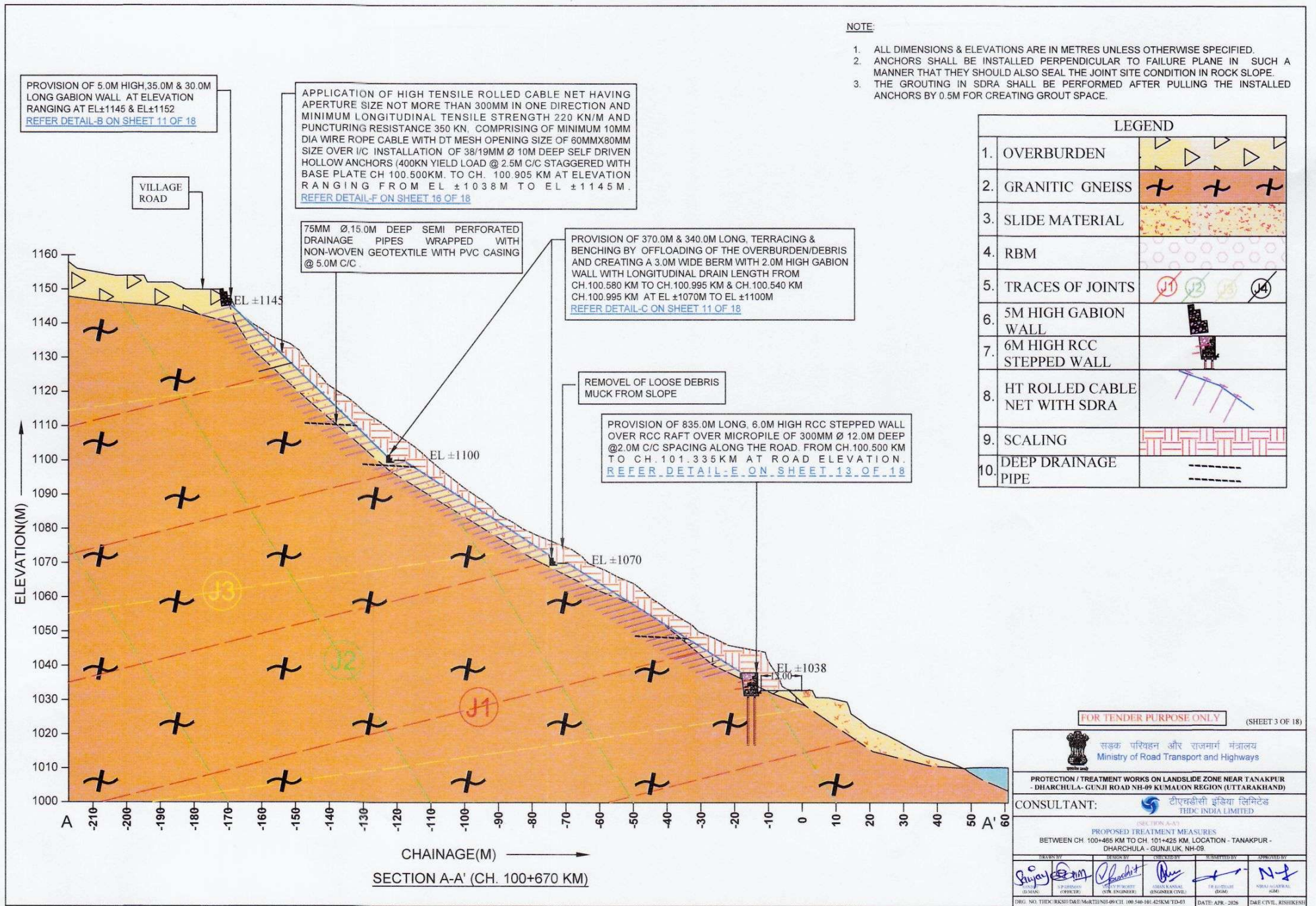
PROTECTION / TREATMENT WORKS ON LANDSLIDE ZONE NEAR TANAKPUR - DHARCHULA - GUNJI ROAD NH-99 KUMAON REGION (UTTARAKHAND)

CONSULTANT: टीएचसी इंडिया लिमिटेड
THDC INDIA LIMITED

PROPOSED TREATMENT MEASURES
BETWEEN CH 100+465 KM TO CH 101+425 KM LOCATION - TANAKPUR - DHARCHULA - GUNJI ROAD NH-99

DESIGNED BY	DRAWN BY	CHECKED BY	REVIEWED BY
<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>
(NAME)	(NAME)	(NAME)	(NAME)
(DESIGNER)	(DRAWER)	(ENGINEER)	(CHECKER)

DATE: APR. 2024 DMT CIVIL, RESHORE

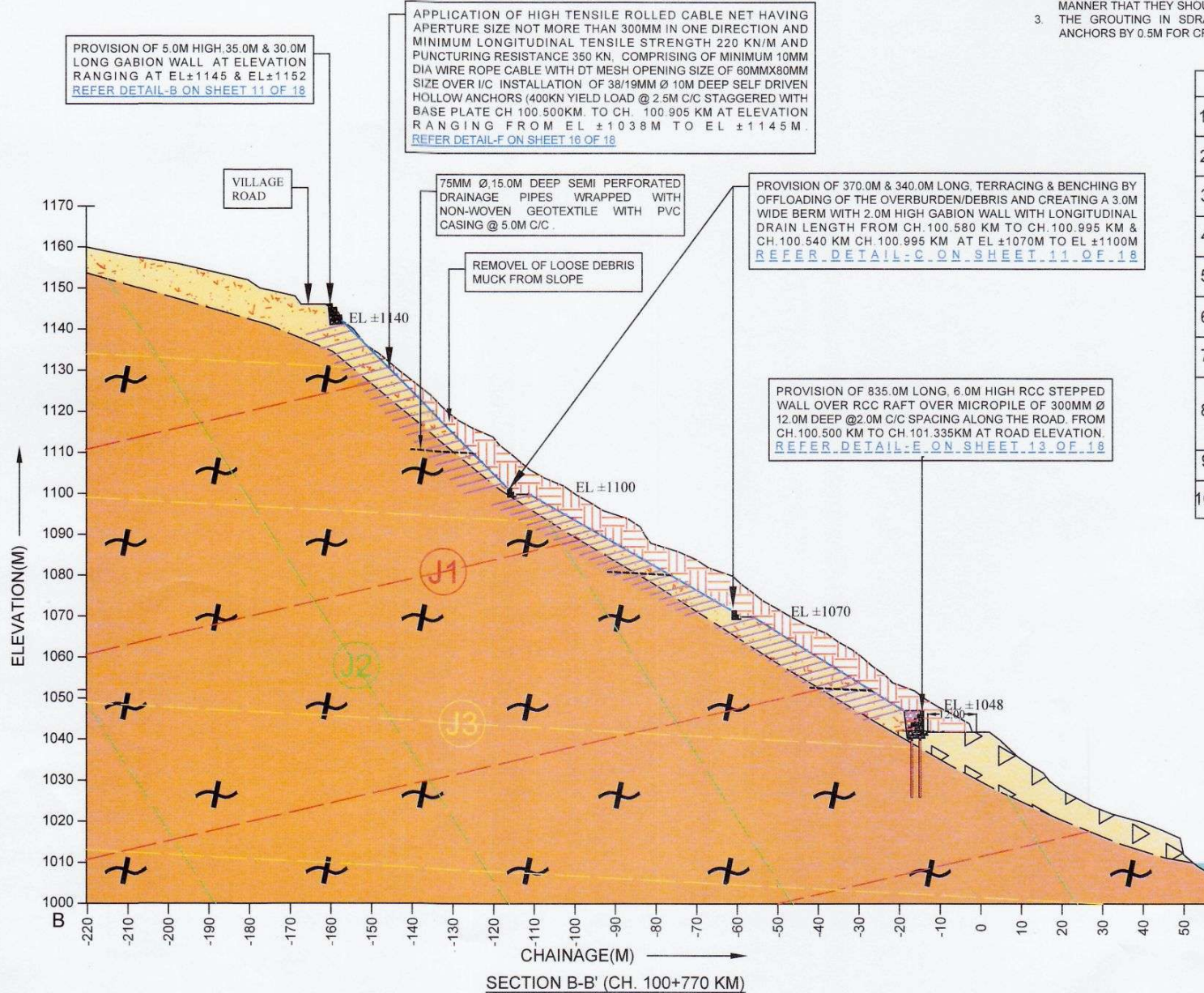


NOTE

1. ALL DIMENSIONS & ELEVATIONS ARE IN METRES UNLESS OTHERWISE SPECIFIED.
2. ANCHORS SHALL BE INSTALLED PERPENDICULAR TO FAILURE PLANE IN SUCH A MANNER THAT THEY SHOULD ALSO SEAL THE JOINT SITE CONDITION IN ROCK SLOPE.
3. THE GROUTING IN SDRA SHALL BE PERFORMED AFTER PULLING THE INSTALLED ANCHORS BY 0.5M FOR CREATING GROUT SPACE.

LEGEND

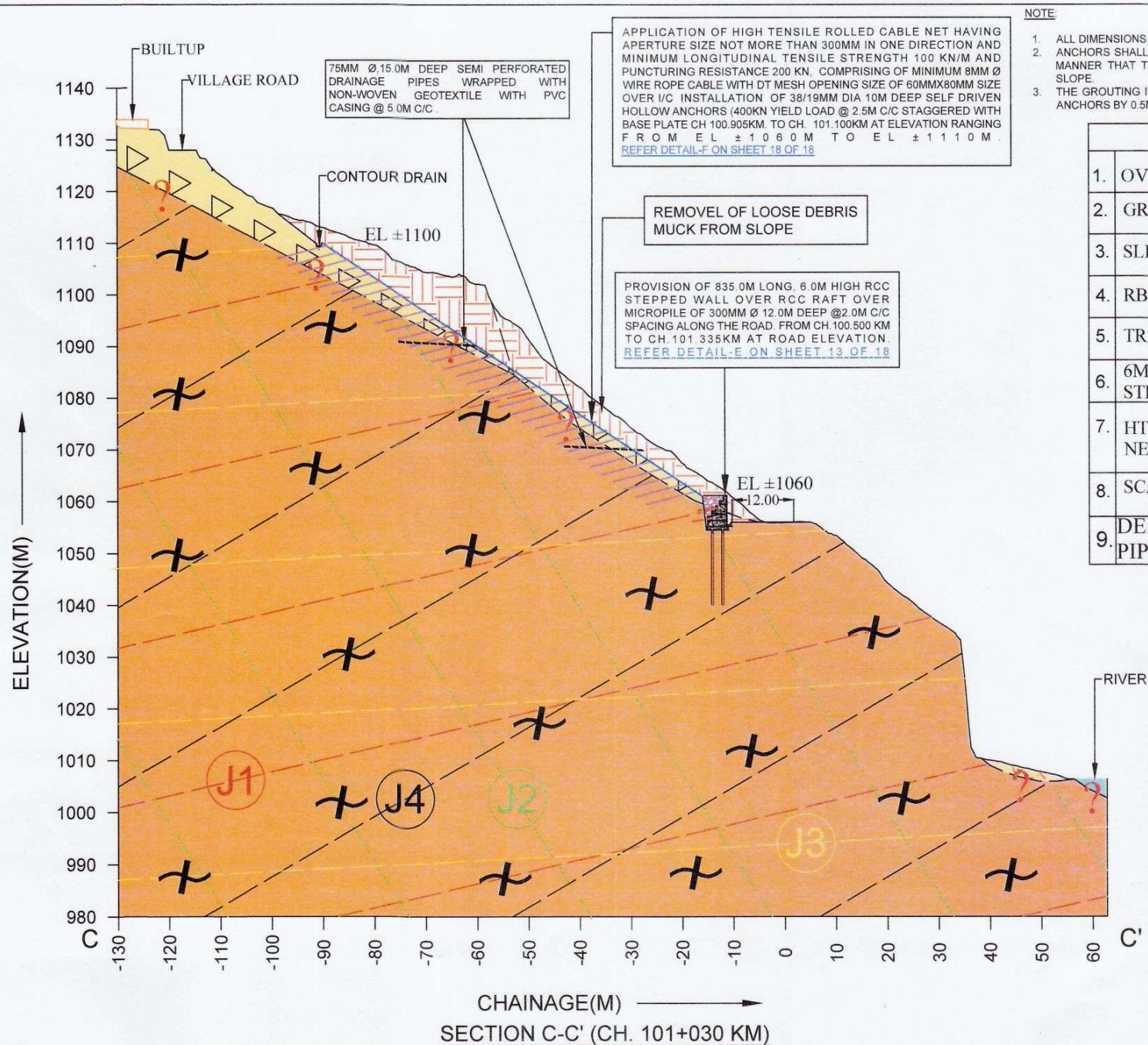
1.	OVERBURDEN	
2.	GRANITIC GNEISS	
3.	SLIDE MATERIAL	
4.	RBM	
5.	TRACES OF JOINTS	
6.	5M HIGH GABION WALL	
7.	6M HIGH RCC STEPPED WALL	
8.	HT ROLLED CABLE NET WITH SDRA	
9.	SCALING	
10.	DEEP DRAINAGE PIPE	



FOR TENDER PURPOSE ONLY

(SHEET 4 OF 18)

सड़क परिवहन और राजमार्ग मंत्रालय Ministry of Road Transport and Highways			
PROTECTION / TREATMENT WORKS ON LANDSLIDE ZONE NEAR TANAKPUR - DHARCHULA - GUNJI ROAD NH-09 KUMAON REGION (UTTARAKHAND)			
CONSULTANT:		टीएचसी लिमिटेड THDC INDIA LIMITED	
PROPOSED TREATMENT MEASURES BETWEEN CH 100+465 KM TO CH 101+425 KM LOCATION - TANAKPUR - DHARCHULA - GUNJI, U.K. NH-09			
DESIGNED BY	CHECKED BY	APPROVED BY	APPROVED BY
(D.M.A.)	(S.D.O.)	(S.D.O.)	(S.D.O.)
DRG: NO. THDC/RS&D/DEPT/09/CH. 100-540-101-425KM-13-04 DATE: APR. 2026 DRE CIVIL, RISHIKESH			



NOTE:

1. ALL DIMENSIONS & ELEVATIONS ARE IN METRES UNLESS OTHERWISE SPECIFIED.
2. ANCHORS SHALL BE INSTALLED PERPENDICULAR TO FAILURE PLANE IN SUCH A MANNER THAT THEY SHOULD ALSO SEAL THE JOINT SITE CONDITION IN ROCK SLOPE.
3. THE GROUTING IN SDRA SHALL BE PERFORMED AFTER PULLING THE INSTALLED ANCHORS BY 0.5M FOR CREATING GROUT SPACE.

LEGEND		
1.	OVERBURDEN	
2.	GRANITIC GNEISS	
3.	SLIDE MATERIAL	
4.	RBM	
5.	TRACES OF JOINTS	
6.	6M HIGH RCC STEPPED WALL	
7.	HT ROLLED CABLE NET WITH SDRA	
8.	SCALING	
9.	DEEP DRAINAGE PIPE	

FOR TENDER PURPOSE ONLY

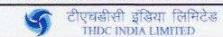
(SHEET 5 OF 18)



सड़क परिवहन और राजमार्ग मंत्रालय
Ministry of Road Transport and Highways

PROTECTION / TREATMENT WORKS ON LANDSLIDE ZONE NEAR TANAKPUR
- DHARCHULA- GUNJI ROAD NH-09 KUMAON REGION (UTTARAKHAND)

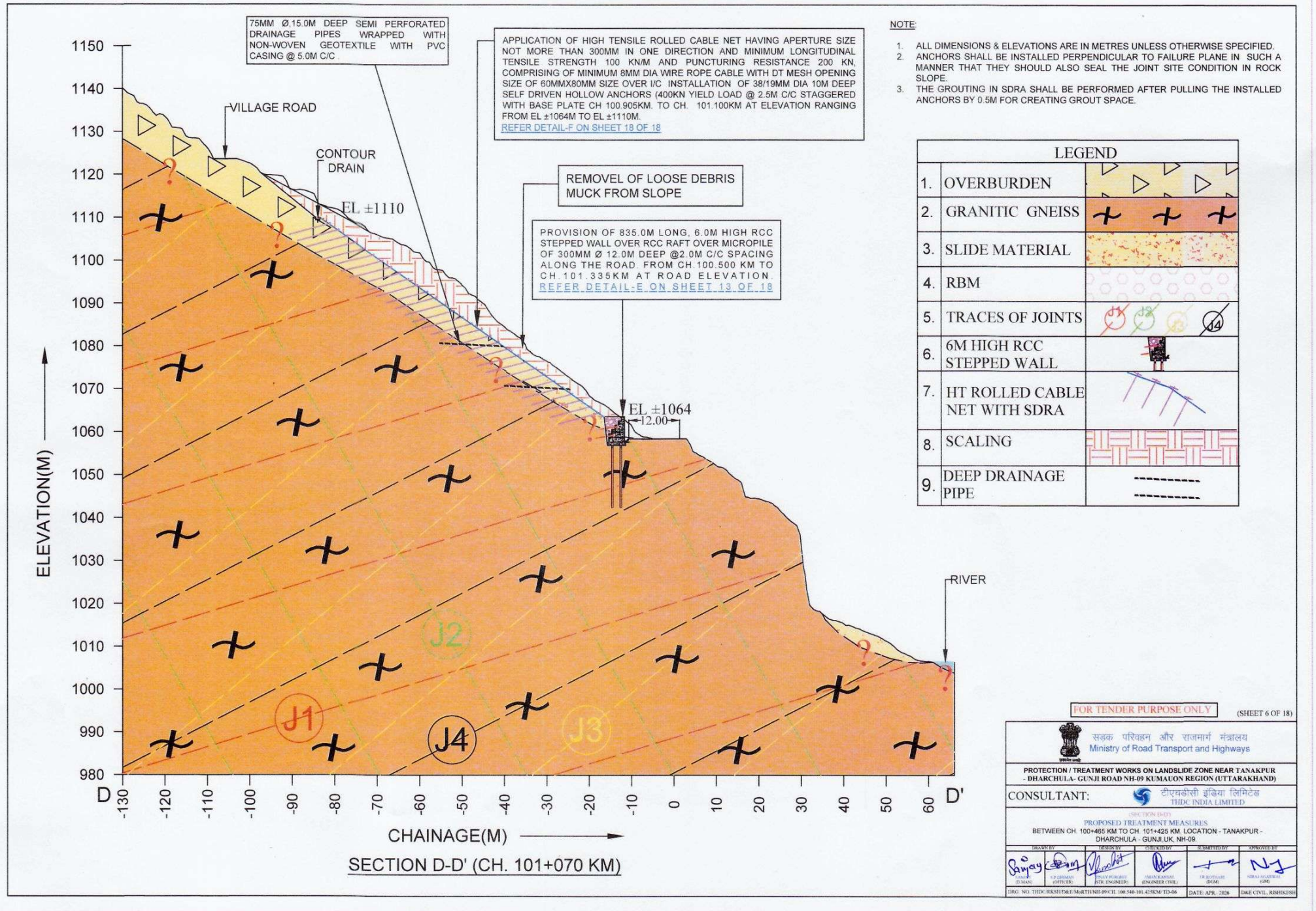
CONSULTANT:

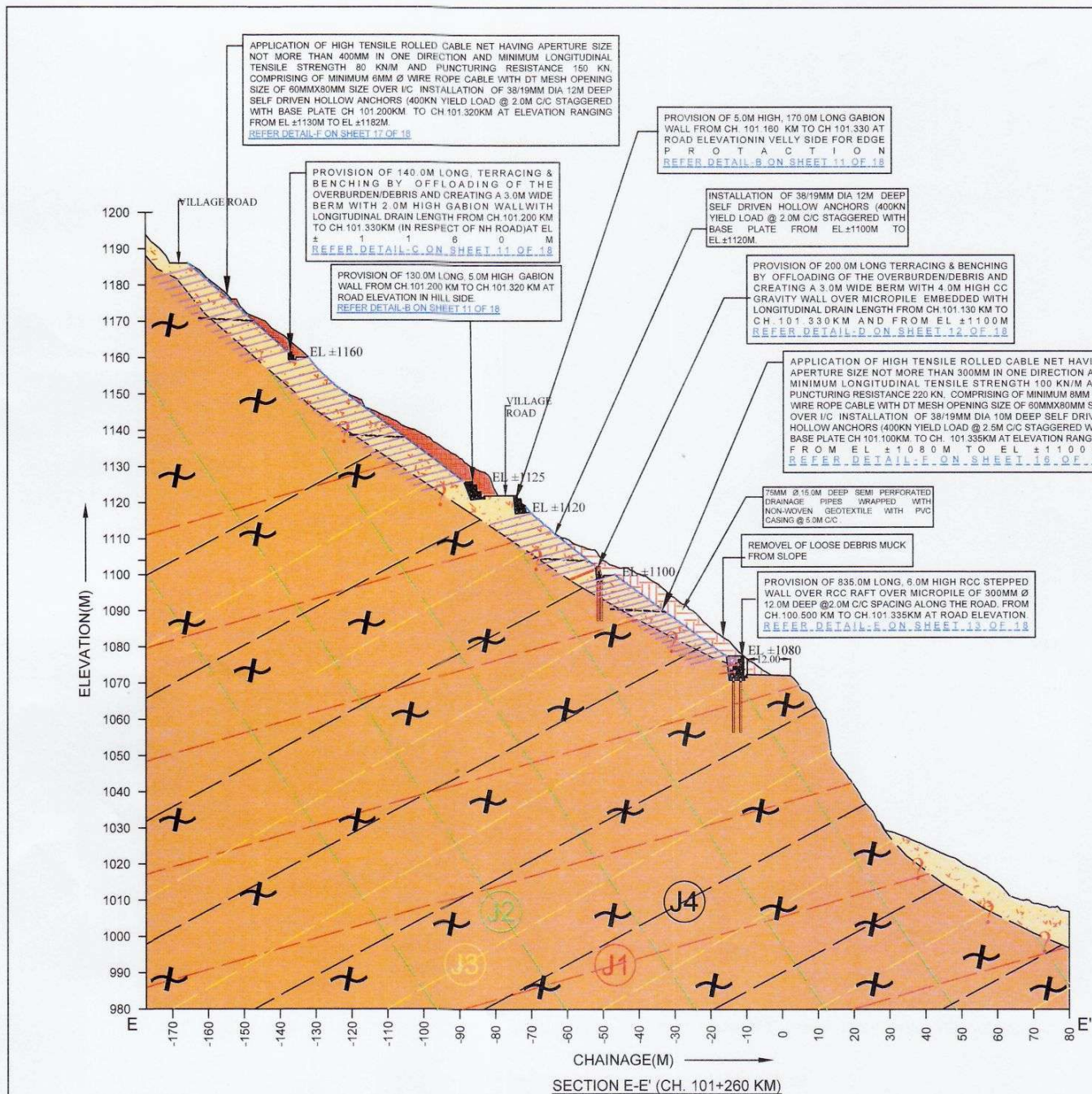


PROPOSED TREATMENT MEASURES

BETWEEN CH. 100+465 KM TO CH. 101+425 KM, LOCATION - TANAKPUR -
DHARCHULA - GUNJI, UK, NH-09.

DRAWN BY		DESIGN BY		CHECKED BY	SUBMITTED BY	APPROVED BY
						
SANYAL (DRAWN)	P. GHOSH (OFFICER)	P. GHOSH (JUNIOR ENGINEER)	AMAN KANNA (ENGINEER CIVIL)	P. GHOSH (JUNIOR ENGINEER)	P. GHOSH (JUNIOR ENGINEER)	P. GHOSH (JUNIOR ENGINEER)
DRG. NO. TTD/RS/ST/DAE/MORTHEN/09/CI. 100.540-101.425/KM-TD-05					DATE: APR - 2026	DAE CIVIL, RSIH/CI





NOTE

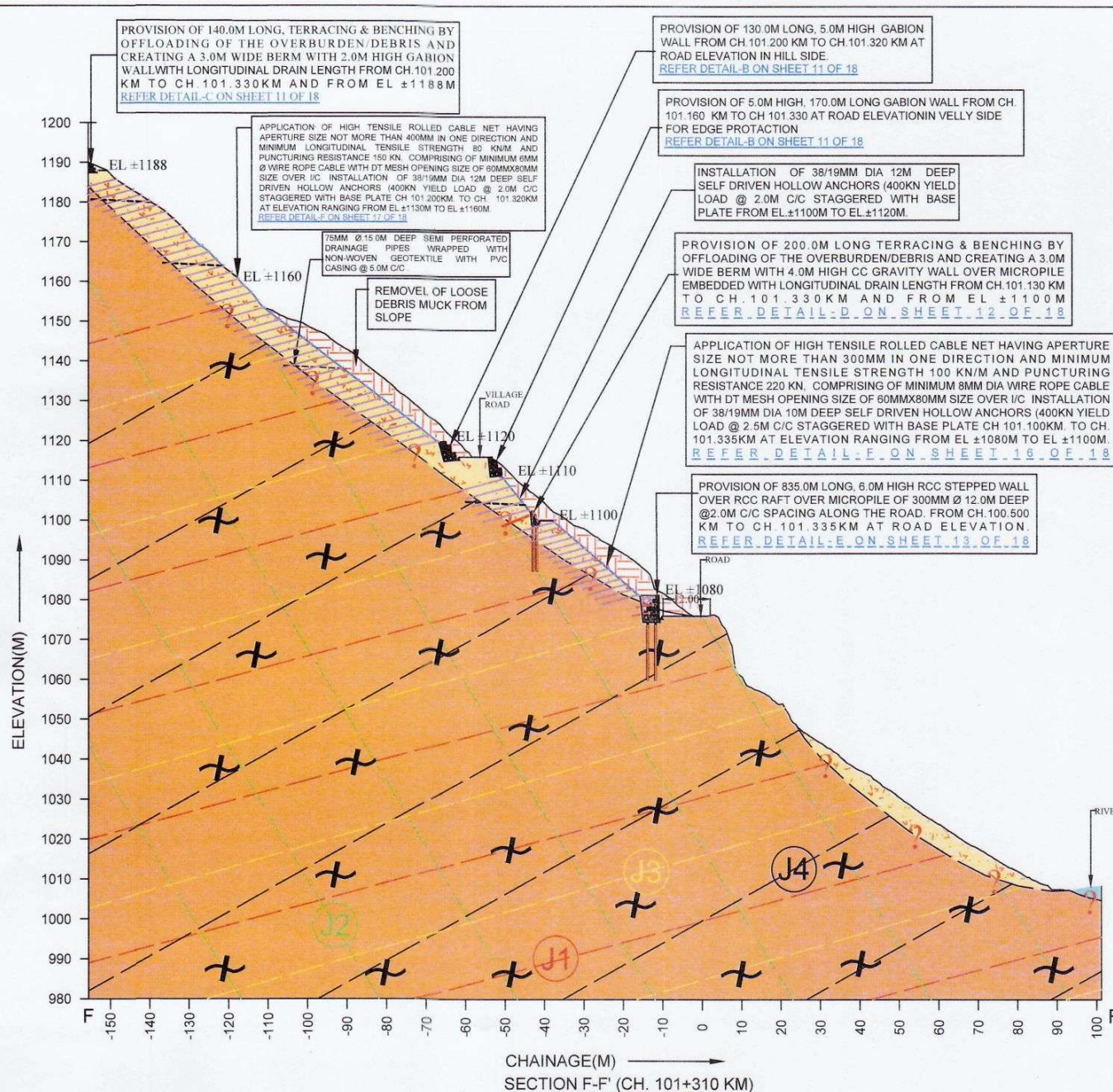
1. ALL DIMENSIONS & ELEVATIONS ARE IN METRES UNLESS OTHERWISE SPECIFIED.
2. ANCHORS SHALL BE INSTALLED PERPENDICULAR TO FAILURE PLANE IN SUCH A MANNER THAT THEY SHOULD ALSO SEAL THE JOINT SITE CONDITION IN ROCK SLOPE.
3. THE GROUTING IN SDRA SHALL BE PERFORMED AFTER PULLING THE INSTALLED ANCHORS BY 0.5M FOR CREATING GROUT SPACE.

LEGEND		
1.	OVERBURDEN	
2.	GRANITIC GNEISS	
3.	SLIDE MATERIAL	
4.	RBM	
5.	TRACES OF JOINTS	
6.	5M HIGH GABION WALL	
7.	3M HIGH CC WALL & 3M WIDE BENCH	
8.	6M HIGH RCC STEPPED WALL	
9.	2M HIGH GABION & 3M WIDE BENCH	
10.	SCALING	
11.	DEEP DRAINAGE PIPE	

FOR TENDER PURPOSE ONLY

(SHEET 7 OF 18)

सड़क परिवहन और राजमार्ग मंत्रालय Ministry of Road Transport and Highways				
PROTECTION / TREATMENT WORKS ON LANDSLIDE ZONE NEAR TANAKPUR - DHARCHULA - GUNJI ROAD NH-09 KUMAON REGION (UTTARAKHAND)				
CONSULTANT: THDC INDIA LIMITED				
PROPOSED TREATMENT MEASURES BETWEEN CH. 100+465 KM TO CH. 101+425 KM. LOCATION - TANAKPUR - DHARCHULA - GUNJI ROAD NH-09				
DESIGNED BY	CHECKED BY	APPROVED BY	SUBMITTED BY	APPROVED BY
DESIGNED BY (NAME)	CHECKED BY (NAME)	APPROVED BY (NAME)	SUBMITTED BY (NAME)	APPROVED BY (NAME)
DR: NO. THDC/RESH/DRA/MAH/2018/46/CH. 100.500-101.425KM/7D-07	DATE: APR. 2024	DATE: APR. 2024		



NOTE

1. ALL DIMENSIONS & ELEVATIONS ARE IN METRES UNLESS OTHERWISE SPECIFIED.
2. ANCHORS SHALL BE INSTALLED PERPENDICULAR TO FAILURE PLANE IN SUCH A MANNER THAT THEY SHOULD ALSO SEAL THE JOINT SITE CONDITION IN ROCK SLOPE.
3. THE GROUTING IN SDRA SHALL BE PERFORMED AFTER PULLING THE INSTALLED ANCHORS BY 0.5M FOR CREATING GROUT SPACE.

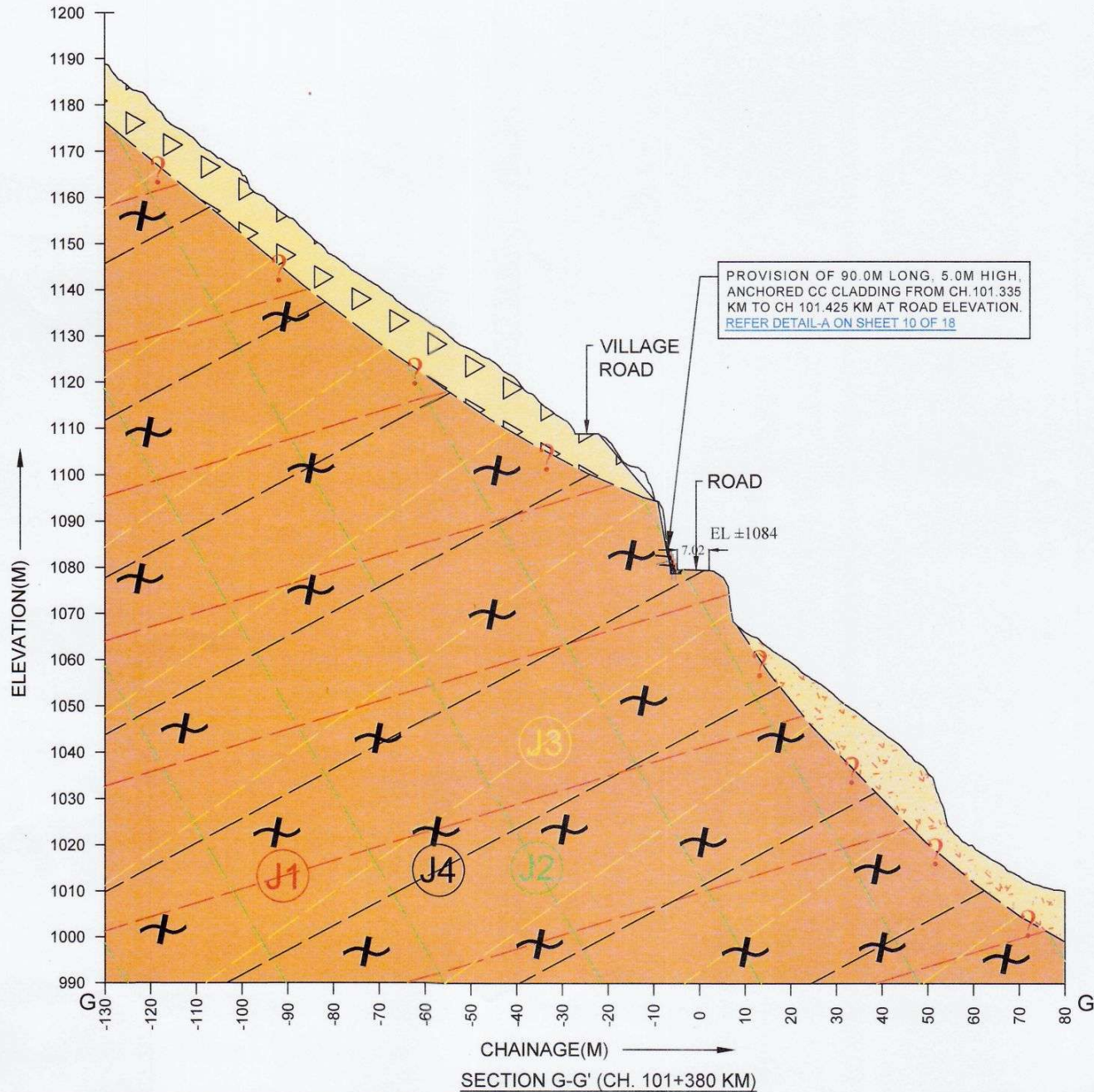
LEGEND

1. OVERBURDEN	
2. GRANITIC GNEISS	
3. SLIDE MATERIAL	
4. RBM	
5. TRACES OF JOINTS	
6. 5M HIGH GABION WALL	
7. 3M HIGH CC WALL & 3M WIDE BENCH	
8. 6M HIGH RCC STEPPED WALL	
9. 2M HIGH GABION & 3M WIDE BENCH	
10. SCALING	
11. DEEP DRAINAGE PIPE	

FOR TENDER PURPOSE ONLY

(SHEET 8 OF 18)

सड़क परिवहन और राजमार्ग मंत्रालय Ministry of Road Transport and Highways				
PROTECTION / TREATMENT WORKS ON LANDSLIDE ZONE NEAR TANAKPUR - DHARCHULA - GUNJI ROAD NH-09 KUMAON REGION (UTTARAKHAND)				
CONSULTANT:		टीएचडीसी इंडिया लिमिटेड THDC INDIA LIMITED		
PROPOSED TREATMENT MEASURES BETWEEN CH. 100+465 KM TO CH. 101+425 KM. LOCATION - TANAKPUR - DHARCHULA - GUNJI ROAD NH-09				
DESIGNED BY	CHECKED BY	APPROVED BY	SUBMITTED BY	APPROVED BY
(NAME)	(NAME)	(NAME)	(NAME)	(NAME)
DRG. NO. THDC/RSST/DMF/MRT/NH-09/CH. 100.540-101.425KM/1D-08	DATE: APR. 2024	DATE: CIVIL, KASHI/KASHI		



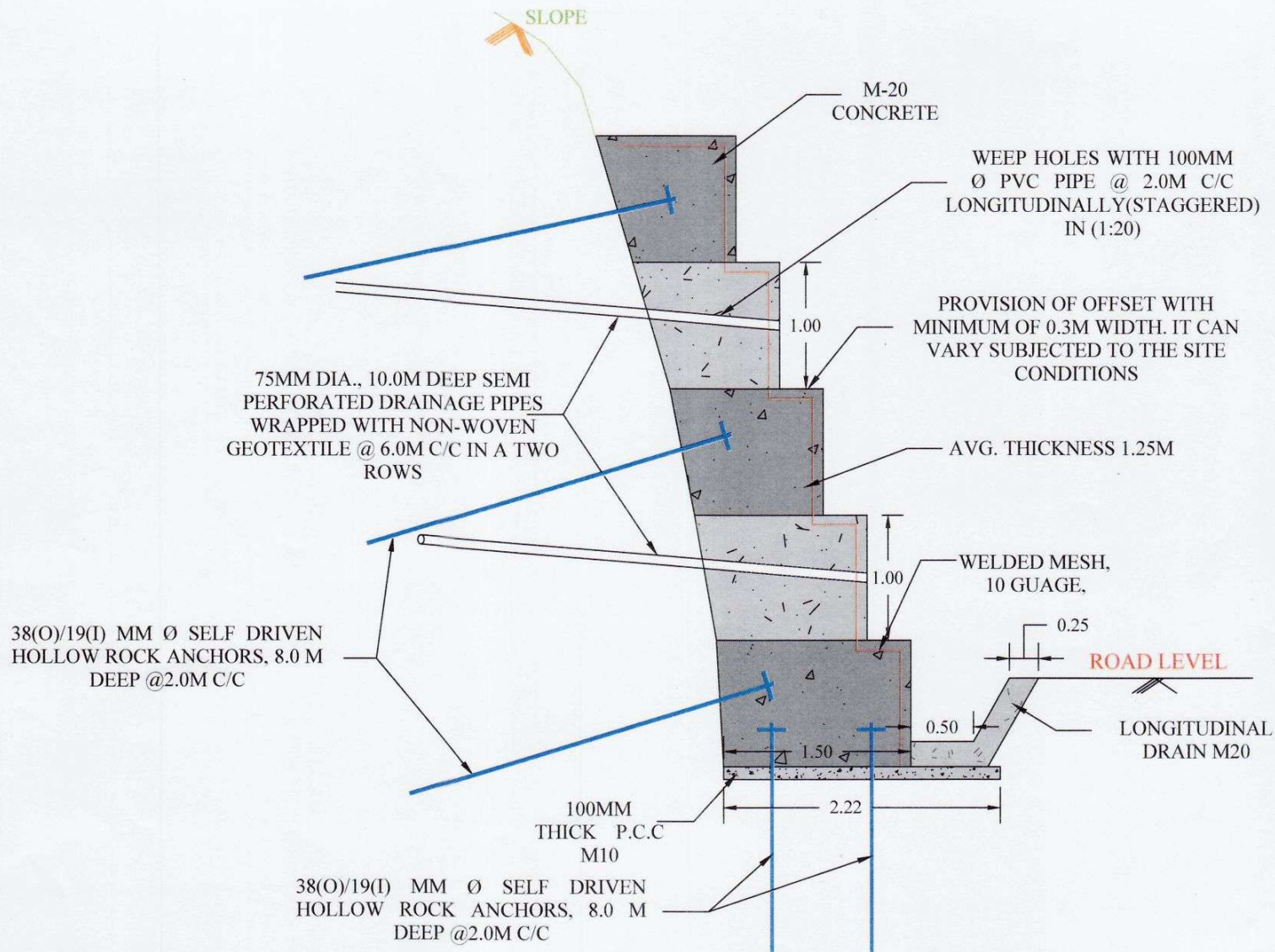
NOTE

1. ALL DIMENSIONS & ELEVATIONS ARE IN METRES UNLESS OTHERWISE SPECIFIED.
2. ANCHORS SHALL BE INSTALLED PERPENDICULAR TO FAILURE PLANE IN SUCH A MANNER THAT THEY SHOULD ALSO SEAL THE JOINT SITE CONDITION IN ROCK SLOPE.
3. THE GROUTING IN SDRA SHALL BE PERFORMED AFTER PULLING THE INSTALLED ANCHORS BY 0.5M FOR CREATING GROUT SPACE.

LEGEND		
1.	OVERBURDEN	
2.	GRANITIC GNEISS	
3.	SLIDE MATERIAL	
4.	RBM	
5.	TRACES OF JOINTS	
6.	5M HIGH CC CLADDING	
7.	SCALING	

FOR TENDER PURPOSE ONLY (SHEET 9 OF 18)

सड़क परिवहन और राजमार्ग मंत्रालय Ministry of Road Transport and Highways			
PROTECTION / TREATMENT WORKS ON LANDSLIDE ZONE NEAR TANAKPUR - DHARCHULA - GUNJI ROAD NH-09 KUMAON REGION (UTTARAKHAND)			
CONSULTANT:		टीएचडीसी इंडिया लिमिटेड THDC INDIA LIMITED	
PROPOSED TREATMENT MEASURES BETWEEN CH 100+465 KM TO CH 101+425 KM. LOCATION - TANAKPUR - DHARCHULA - GUNJI, UK, NH-09			
DESIGNED BY	CHECKED BY	APPROVED BY	DATE
 (NAME)	 (NAME)	 (NAME)	DATE: APR. 2024
DRG. NO. THDC/RSKSD/DEL/MORTH/NE-69/CH. 100.540-FH-425KM/1D-09			



NOTES:

1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.
2. EXCAVATION FOR FOUNDATION SHALL BE DONE IN 6-8M LONG STRECHES ONLY & TREATMENT SHALL BE COMPLETED BEFORE START OF NEW PATCH.
3. HIGH STRENGTH ORDINARY PORTLAND CEMENT CONFORMING TO IS : 8112 CAPABLE OF ACHIEVING THE REQUIRED DESIGN CONCRETE STRENGTH SHALL ONLY BE USED.
4. THE MINIMUM CEMENT CONTENT AND WATER CEMENT RATIO IN THE CONCRETE DESIGN MIX SHALL BE 310 KG PER CUM AND 0.45 RESPECTIVELY.
5. CONCRETE USED SHALL BE OF GRADES AS SPECIFIED BELOW CONFORMING TO IS 456 (LATEST):
CC CLADDING - M20/M25.
CC DRAIN - M20.
RCC RAFT - M30
LEVELLING COURSE - M10.
7. PROPERLY BRACED STEEL PLATES SHALL BE USED AS SHUTTERING.
8. LAPS AND ANCHORAGE LENGTH SHALL BE AS PER IS 456(LATEST).
9. LAPS SHALL BE STAGGERED.
10. CONCRETE SURFACE SHOULD BE ROUGHED AND CLEAN BEFORE POURING THE CONCRETE/FRESH CONCRETE.

DETAIL- A

TYPICAL DETAILS OF 5.0M HIGH ANCHORED CC CLADDING

FOR TENDER PURPOSE ONLY

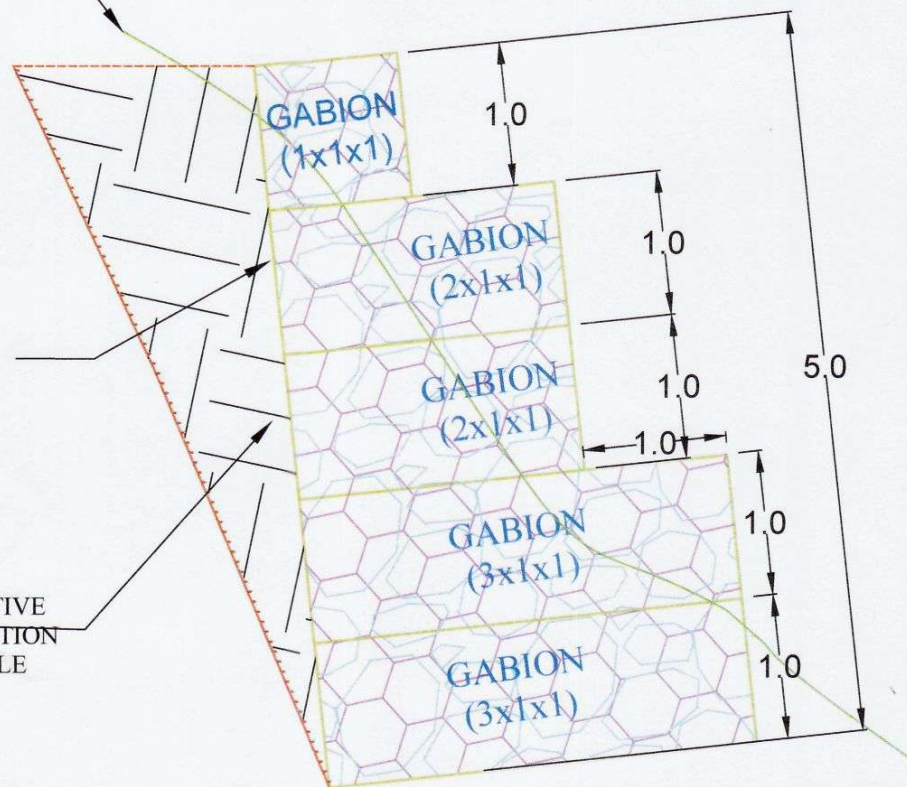
(SHEET 10 OF 18)

सड़क परिवहन और राजमार्ग मंत्रालय Ministry of Road Transport and Highways			
PROTECTION / TREATMENT WORKS ON LANDSLIDE ZONE NEAR TANAKPUR - DHARCHULA- GUNJI ROAD NH-09 KUMAON REGION (UTTARAKHAND)			
CONSULTANT: टीएचडीसी इंडिया लिमिटेड THDC INDIA LIMITED			
(SHEET: A) PROPOSED TREATMENT MEASURES BETWEEN CH 100+465 KM TO CH 101+425 KM. LOCATION - TANAKPUR - DHARCHULA - GUNJI, U.K. NH-09			
DESIGNED BY (S) NAME	CHECKED BY (C) NAME	APPROVED BY (A) NAME	DATE: APR. 2024
FIG. NO. THDC/RS&D/DEL/MDT/NT/09/CH. 100.540-101.425KM TD-10			

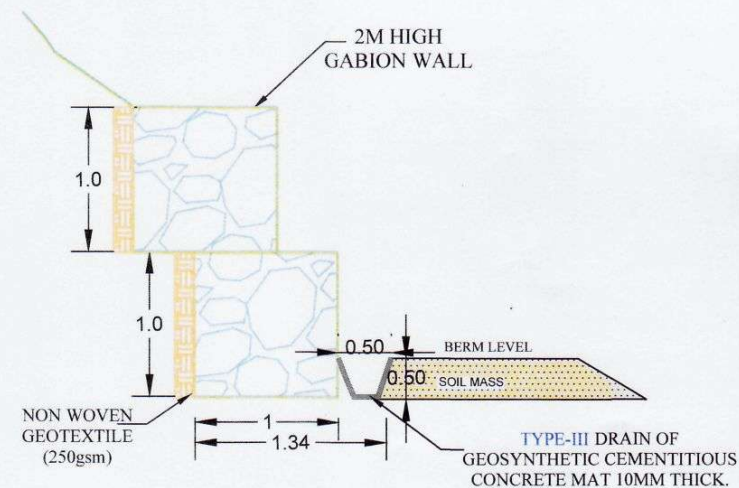
TENTATIVE GROUND
PROFILE

BACK FILLING

TENTATIVE
EXCAVATION
PROFILE



TYPICAL DETAIL OF 5.0M HIGH GABION WALL
(DETAIL-B)



TYPICAL DETAIL OF 2.0M HIGH GABION WALL
WITH DRAIN ON 3.0M WIDE BENCH
(DETAIL-C)

NOTES:-

1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.
2. HIGH STRENGTH ORDINARY PORTLAND CEMENT CONFORMING TO IS : 8112 CAPABLE OF ACHIEVING THE REQUIRED DESIGN CONCRETE STRENGTH SHALL ONLY BE USED.
3. THE MINIMUM CEMENT CONTENT AND WATER CEMENT RATIO IN THE CONCRETE DESIGN MIX SHALL BE 310 KG PER CUM AND 0.45 RESPECTIVELY.
4. CONCRETE USED SHALL BE OF GRADES AS SPECIFIED BELOW CONFORMING TO IS 456 (LATEST):
CC DRAIN - M20.
LEVELING COURSE - M10.
5. PROPERLY BRACED STEEL PLATES SHALL BE USED AS SHUTTERING.
6. CONCRETE SURFACE SHOULD BE ROUGHED AND CLEAN BEFORE POURING THE CONCRETE/FRESH CONCRETE.
7. ALL GABIONS SHALL BE CONFIRMING TO IS: 16014 (LATEST). ENGINEER IN CHARGE MAY DECIDE GABION SIZE AS PER BIS CODE.

FOR TENDER PURPOSE ONLY

(SHEET 11 OF 18)



सड़क परिवहन और राजमार्ग मंत्रालय
Ministry of Road Transport and Highways

PROTECTION / TREATMENT WORKS ON LANDSLIDE ZONE NEAR TANAKPUR
- DHARCHULA - GUNJI ROAD NH-09 KUMAON REGION (UTTARAKHAND)

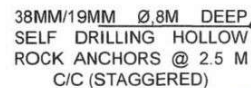
CONSULTANT:

टीएचडीसी इंडिया लिमिटेड
THDC INDIA LIMITED

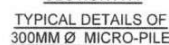
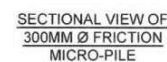
PROPOSED TREATMENT MEASURES
BETWEEN CH 100+465 KM TO CH 101+425 KM. LOCATION - TANAKPUR -
DHARCHULA - GUNJI ROAD NH-09

DESIGNED BY	CHECKED BY	APPROVED BY	DATE
(NAME)	(NAME)	(NAME)	

DRG. NO. THDC/DESIGN/2019/09/01/100-540-101-425KM-TD-11 DATE: APR. 2024 DAE CIVIL, RUDHAKH



TYPICAL DETAILS OF 6M HIGH RCC STEPPED WALL OVER A RAFT & MICROPILE

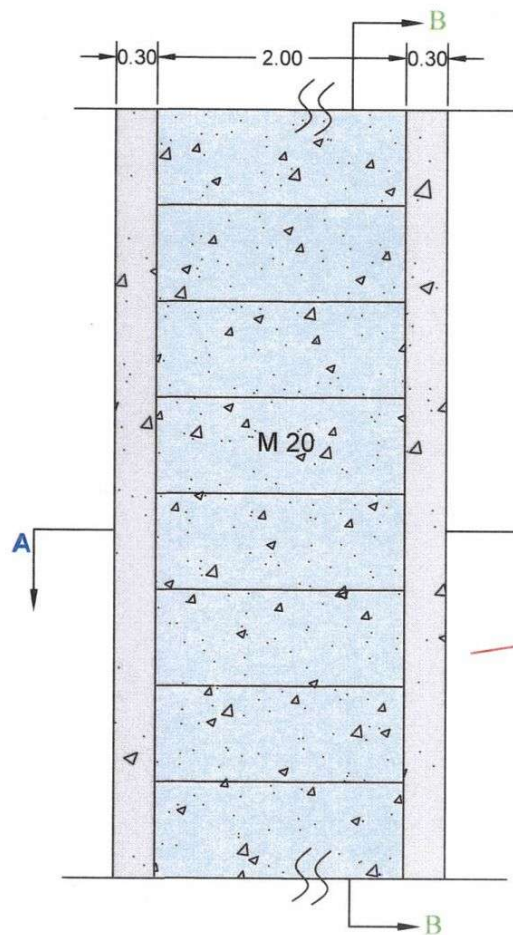


1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.
2. EXCAVATION FOR FOUNDATION SHALL BE DONE IN 6-8M LONG STRECHES ONLY & TREATMENT SHALL BE COMPLETED BEFORE START OF NEW PATCH.
3. CONCRETE SURFACE SHOULD BE ROUGHED AND CLEAN BEFORE POURING THE CONCRETE/FRESH CONCRETE.
4. FOUNDATION SURFACE UPON WHICH CC WALL IS TO BE PLACED SHALL BE APPROVED BY GEOLOGIST/ENGINEER-IN - CHARGE PRIOR TO START OF WORK.
5. HIGH STRENGTH ORDINARY PORTLAND CEMENT CONFORMING TO IS : 8112 CAPABLE OF ACHIEVING THE REQUIRED DESIGN CONCRETE STRENGTH SHALL ONLY BE USED.
6. THE MINIMUM CEMENT CONTENT AND WATER CEMENT RATIO IN THE CONCRETE DESIGN MIX SHALL BE 310 KG PER CUM AND 0.45 RESPECTIVELY.
7. CONCRETE USED SHALL BE OF GRADES AS SPECIFIED BELOW CONFORMING TO IS 456 (LATEST):
RCC RAFT - M35
STEPPED WALL SECTIONS - M25
LEVELING COURSE - M10.
8. PROPERLY BRACED STEEL PLATES SHALL BE USED AS SHUTTERING.
9. THE GROUTING SHALL BE DONE AT A PRESSURE RANGING FROM 1 TO 3 KG/SQCM.
10. LAPS AND ANCHORAGE LENGTH SHALL BE AS PER IS 456(LATEST).
11. LAPS SHALL BE STAGGERED.

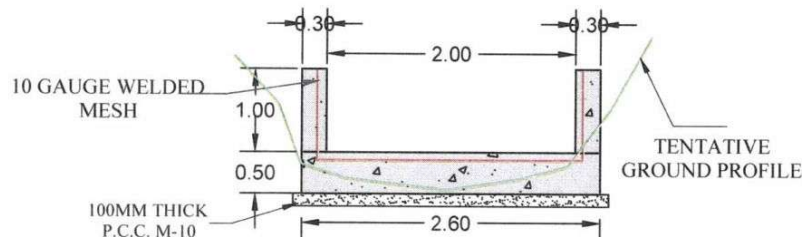
(SHEET 13 OF 18)


टीएचडीसी इंडिया लिमिटेड
THDC INDIA LIMITED

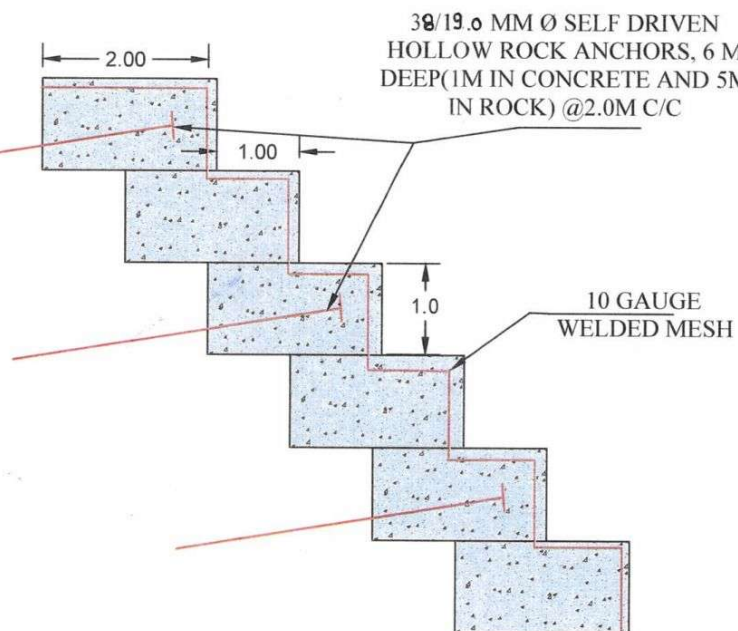
DRAWN BY	DESIGN BY	CHECKED BY	SUBMITTED BY	APPROVED BY
				
S. P. GNANAPRAKASAM (JUNIOR OFFICER)	S. P. GNANAPRAKASAM (JUNIOR OFFICER)	S. P. GNANAPRAKASAM (JUNIOR OFFICER)	S. P. GNANAPRAKASAM (JUNIOR OFFICER)	S. P. GNANAPRAKASAM (JUNIOR OFFICER)
Dwg No: TDC/RES/DAE/MT/THN/06/CH/100.546.101.42/KMC/TH-13			DATE: APR. 2026	DAE (CVIL, RESHKE)



PLAN OF CC CHANNEL



SECTION A-A OF CC CHANNEL



SECTION B-B

DETAIL-F
TYPICAL DETAILS OF GABION CHANNEL

NOTES:

1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.
2. HIGH STRENGTH ORDINARY PORTLAND CEMENT CONFORMING TO IS : 8112 CAPABLE OF ACHIEVING THE REQUIRED DESIGN CONCRETE STRENGTH SHALL ONLY BE USED.
3. THE MINIMUM CEMENT CONTENT AND WATER CEMENT RATIO IN THE CONCRETE DESIGN MIX SHALL BE 310 KG PER CUM AND 0.45 RESPECTIVELY.
4. CONCRETE USED SHALL BE OF GRADES AS SPECIFIED BELOW CONFORMING TO IS 456 (LATEST):
CC CHANNEL - M20.
LEVELING COURSE - M10.
5. PROPERLY BRACED STEEL PLATES SHALL BE USED AS SHUTTERING.
6. CONCRETE SURFACE SHOULD BE ROUGHED AND CLEAN BEFORE POURING THE CONCRETE/FRESH CONCRETE.

FOR TENDER PURPOSE ONLY (SHEET 14 OF 18)



सड़क परिवहन और राजमार्ग मंत्रालय
Ministry of Road Transport and Highways

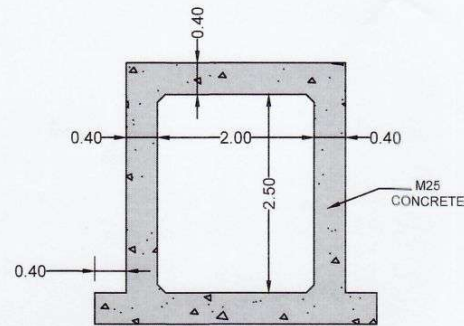
PROTECTION / TREATMENT WORKS ON LANDSLIDE ZONE NEAR TANAKPUR
- DHARCHULA - GUNJI ROAD NH-09 KUMAON REGION (UTTARAKHAND)

CONSULTANT: टीएचडीसी इंडिया लिमिटेड
THDC INDIA LIMITED

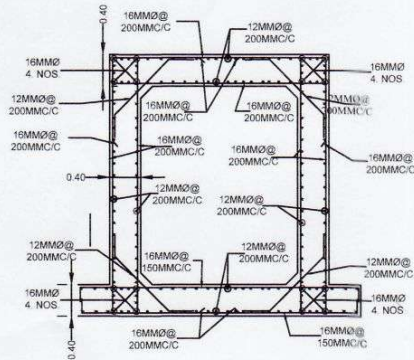
(DETAIL - F)
PROPOSED TREATMENT MEASURES
BETWEEN CH 100+465 KM TO CH 101+425 KM. LOCATION - TANAKPUR -
DHARCHULA - GUNJI, UK, NH-09.

DESIGNED BY	CHECKED BY	APPROVED BY	DATE
			DATE: APR. 2026
DESIGNER	CHECKER	APPROVER	

THDC: NO. THDC/RSST/DM/MT/TH/09/CH/100-540-101-425KM-TD-14



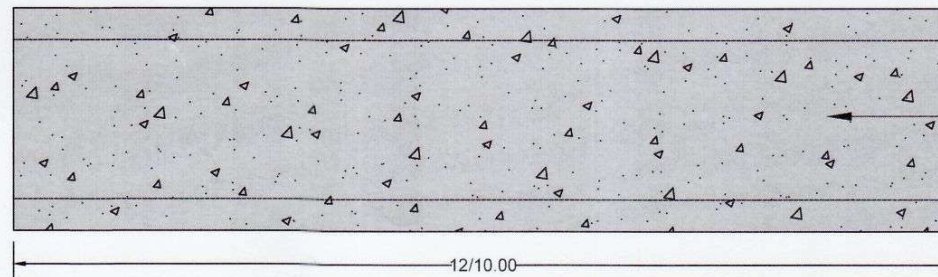
SECTIONAL ELEVATION OF RCC (1BAY)
BOX CULVERT



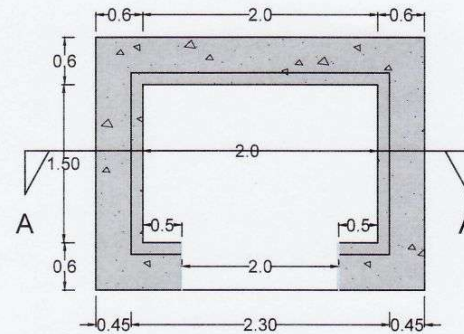
REINFORCEMENT DETAILS OF RCC
(1BAY) BOX CULVERT

TYPICAL DETAIL OF RCC (1BAY) BOX COLVART

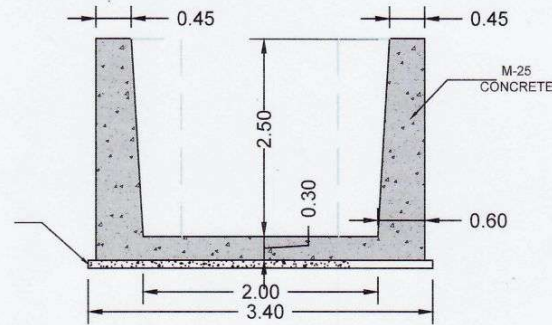
DETAIL-G



PLAN OF RCC BOX CULVERT WITH RETURN WALL



PLAN OF OPEN CATCHPIT



SECTION A-A OF OPEN CATCHPIT

DETAIL - H

TYPICAL DETAILS OF (2.0MX1.5MX2.5M) CC CATCHPIT

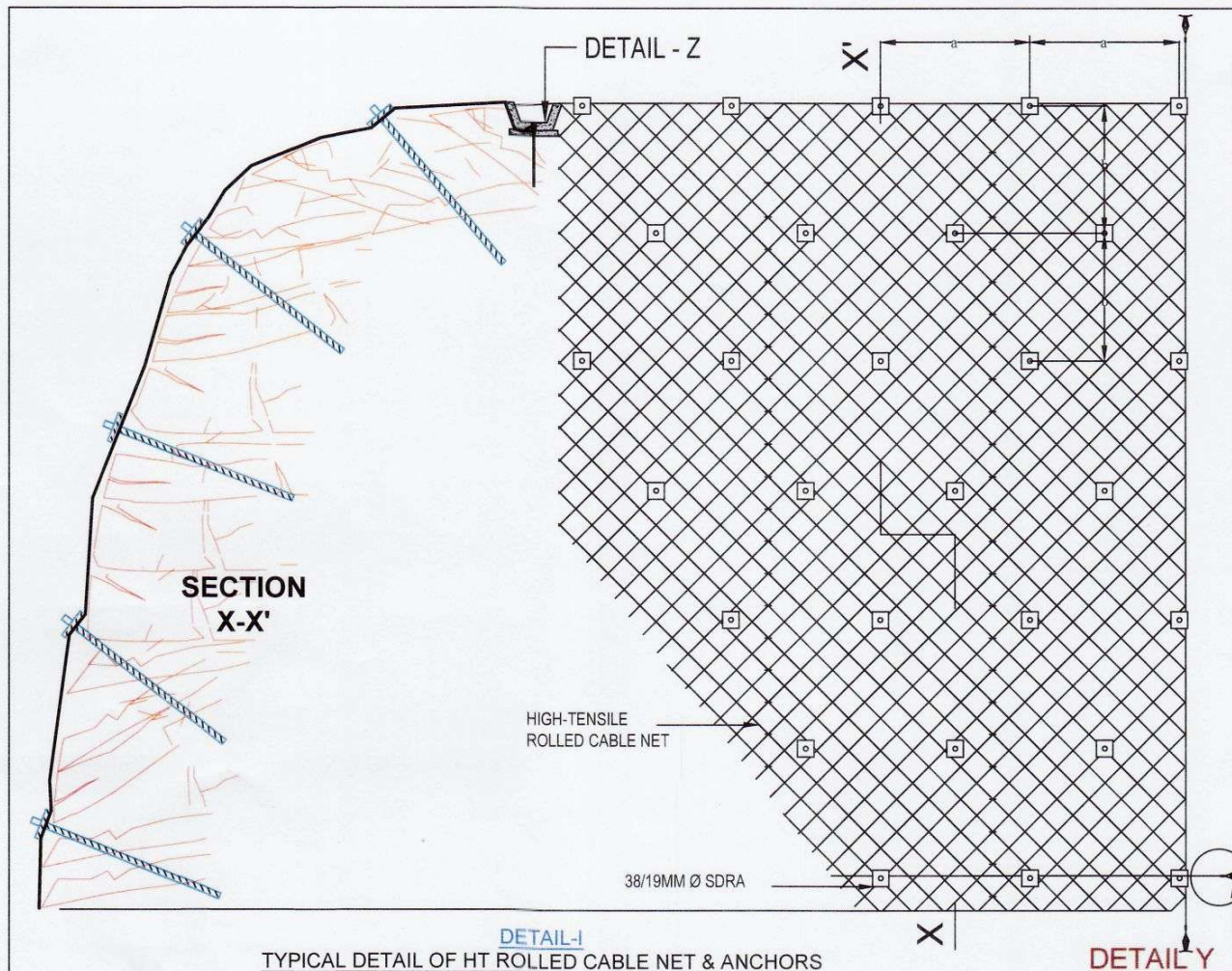
NOTES:-

- ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.
- NO DIMENSIONS SHALL BE SCALED FROM THE DRAWING.
- ALL REINFORCEMENT (R/F) SHALL BE OF HIGH YIELD STRENGTH COLD TWISTED DEFORMED BARS Fe 550 CONFIRMING TO IS:1786 (LATEST).
- ORDINARY PORTLAND CEMENT CONFORMING TO IS : 8112 CAPABLE OF ACHIEVING THE REQUIRED DESIGN CONCRETE STRENGTH SHALL ONLY BE USED.
- CONCRETE USED SHALL BE OF GRADES AS SPECIFIED BELOW CONFORMING TO IS 456 (LATEST):
BOX CULVERT - M25
CC CATCHPIT - M20
LEVELING COURSE - M10.
- MINIMUM CLEAR COVER TO ANY REINFORCEMENT INCLUDING STIRRUPS SHALL BE 50MM UNLESS OTHERWISE SHOWN IN THE DRAWINGS.
- CONSTRUCTION JOINTS :
(i) THE LOCATION AND PROVISION OF CONSTRUCTION JOINTS SHALL BE APPROVED BY ENGINEER-IN-CHARGE. SUGGESTED LOCATION OF CONSTRUCTION JOINTS IN THE DIRECTION PARALLELED TO THE DIRECTION OF WATER FLOW SHOWN IN THE GENERAL ARRANGEMENT DRAWINGS OF BOX CULVERT. THE CONCRETING OPERATION SHALL BE CARRIED OUT CONTINUOUS UPTO THE CONSTRUCTION JOINTS.
(ii) THE CONCRETE SURFACE AT THE JOINT SHALL BE BRUSHED WITH A STIFF BRUSH AFTER CASING WHILE THE CONCRETE IS STILL FRESH AND IT HAS ONLY SLIGHTLY HARDENED.
(iii) BEFORE NEW CONCRETE IS POURED THE SURFACE OF OLD CONCRETE SHALL BE PREPARED AS UNDER :
a. FOR PARTIALLY HARDENED CONCRETE, THE SURFACE SHALL BE TREATED BY WIRE BRUSH FOLLOWED BY AN AIR JET.
b. THE OLD SURFACE SHALL BE SOAKED WITH WATER WITHOUT LEAVING PUDDLES IMMEDIATELY, BEFORE STARTING CONCRETING TO PREVENT THE ABSORPTION OF WATER FROM THE NEW CONCRETE.
c. FOR HARDENED CONCRETE, THE SURFACE SHALL BE THOROUGHLY CLEANED TO REMOVE DEBRIS/LAINTANCE AND MADE ROUGH SO THAT $\frac{1}{4}$ OF THE SIZE OF THE AGGREGATE IS EXPOSED.
(iv) NEW CONCRETE SHALL BE THOROUGHLY COMPACTED IN THE REGION OF THE JOINT.
- PROPERLY BRACED STEEL PLATES SHALL BE USED AS SHUTTERING.
- MINIMUM LAP LENGTH FOR REINFORCING SHALL BE AT LEAST 50 TIMES THE DIAMETER OF SUCH BAR

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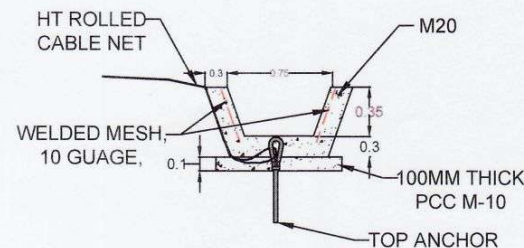
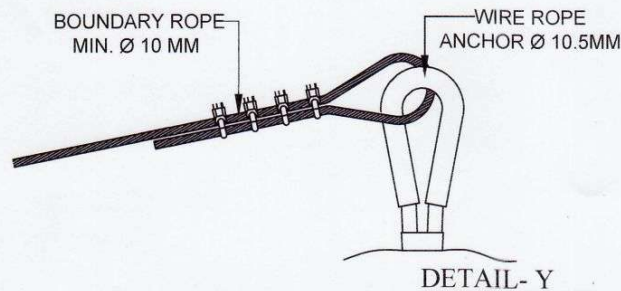
(SHEET 15 OF 18)

सड़क परिवहन और राजमार्ग मंत्रालय Ministry of Road Transport and Highways			
PROTECTION / TREATMENT WORKS ON LANDSLIDE ZONE NEAR TANAKPUR - DHARCHULA - GUNJI ROAD NH-09 KUMAON REGION (UTTARAKHAND)			
CONSULTANT: टीएचडीसी इंडिया लिमिटेड THDC INDIA LIMITED			
PROPOSED TREATMENT MEASURES BETWEEN CH 100+465 KM TO CH 101+425 KM. LOCATION - TANAKPUR - DHARCHULA - GUNJI, U.K. NH-09			
DESIGNED BY	CHECKED BY	SUBMITTED BY	APPROVED BY
 (NAME) (DESIGNER)	 (NAME) (ENGINEER)	 (NAME) (ENGINEER)	 (NAME) (ENGINEER)
DRG. NO. THDC/RECSD/DAE/MARTIND-09/CIL/00/549-101-425KM-TD-15		DATE: APR-2024	



NOTES:-

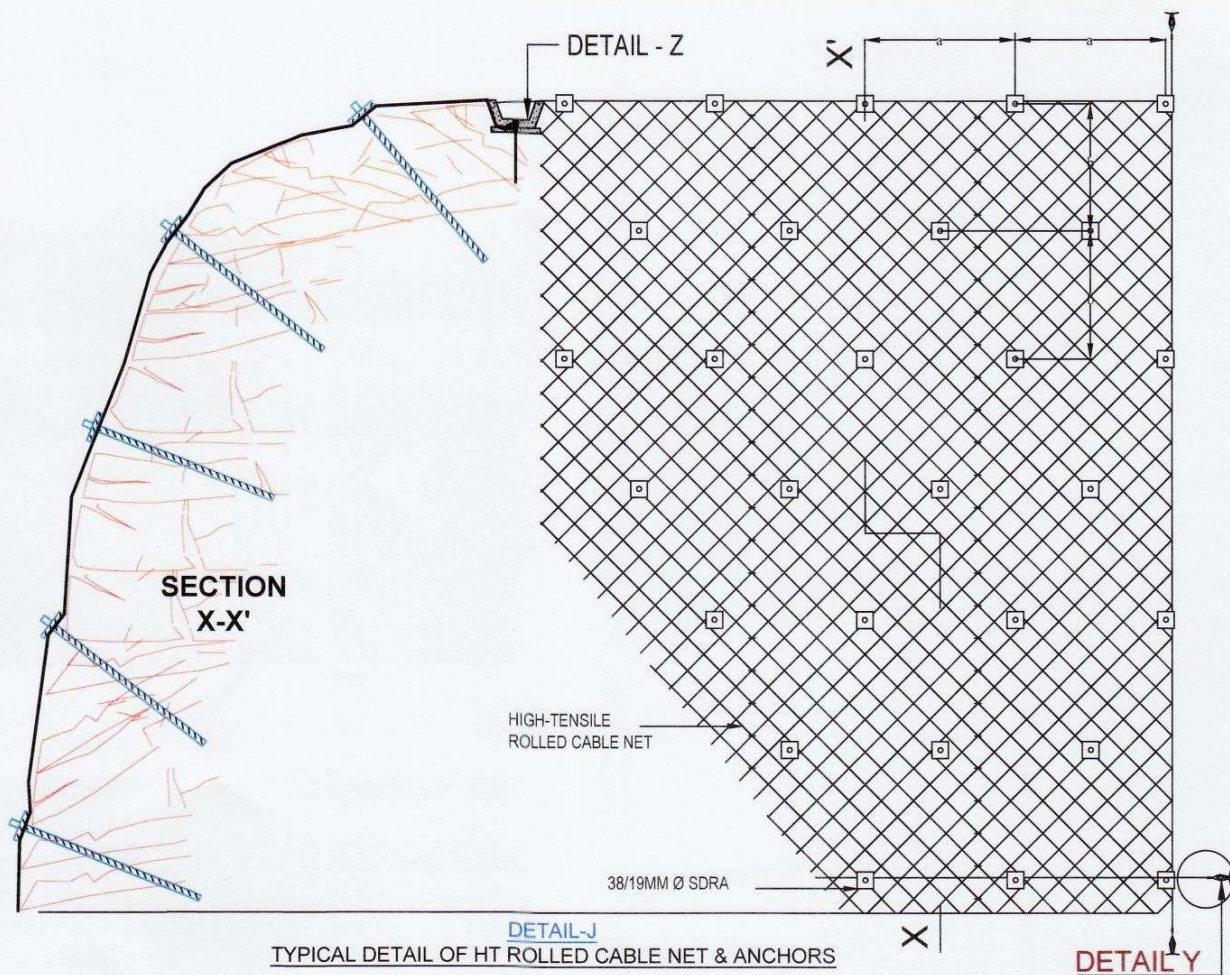
1. THE GENERAL SPECIFICATIONS OF THE SYSTEM SHALL BE AS BELOW. HOWEVER, MENTIONED BELOW ARE THE MINIMUM VALUES.
2. THE HIGH-TENSILE ROLLED CABLE NETS SHOULD INCLUDE THE SECONDARY MESH.
3. FOR THE INSTALLATION OF HIGH-TENSILE ROLLED CABLE NETS STANDARD SUPPORT ROPES, SEAMING ROPES AND SHACKLES SHOULD BE USED. FOR THE HORIZONTAL CONNECTION STANDARD SHACKLES OR LACES SHALL BE USED.
4. DESIGN SPECIFICATION OF SYSTEM
 - a. TENSILE STRENGTH OF HT ROLLED CABLE NET - 220 KN /M
 - b. PUNCTURING RESISTANCE OF HT ROLLED CABLE NET - 350KN
 - c. APERTURE NOT MORE THAN 300MM IN ONE DIRECTION
 - d. DIA OF CABLE OF HT ROLLED CABLE NET - 10MM
 - e. BREAKING LOAD OF CABLE OF HT ROLLED CABLE NET - 63 KN
 - f. TENSILE STRENGTH OF WIRE OF THE CABLE - 1770 N/SQMM
 - g. COMPOUND FOR CORROSION PROTECTION - 95% ZN AND 5% AL CLASS B OR ZINC COATING CLASS A AS PER IS/ISO-17746-2016.
 - h. AVERAGE LENGTH OF THE 38/19MM DIA. 40 CR SDRA - 10.0 M (9.7M GROUTED+0.3M ABOVE SLOPE SURFACE)
 - i. DRILL BIT SIZE - 76MM
 - j. GRID PATTERN - STAGGERED
 - k. SPACING OF ANCHORS, i.e. (a=b) - 2.0M (AVG.) (DEPENDING ON THE SLOPE ANGLE/ PROFILE, STRATA AT SITE)
 - l. SIZE OF BASE PLATE - 200MM X 200MM X 10MM (MINIMUM)
 - m. GROUTING MATERIAL - CEMENT GROUT
 - n. SIZE OF DOUBLE TWISTED MESH -60MMX80MM, COMPRISING OF MESH WIRE DIA. 2.2/3.2MM DIA GI WIRE AND CORROSION PROTECTION Zn COATING+PVC



DETAIL Z - TYPICAL SECTION OF
CONTOUR DRAIN

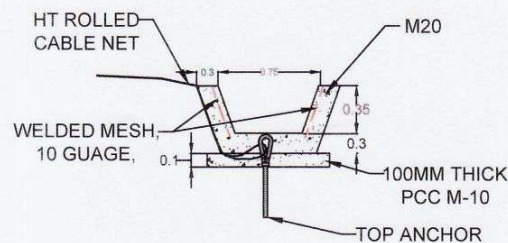
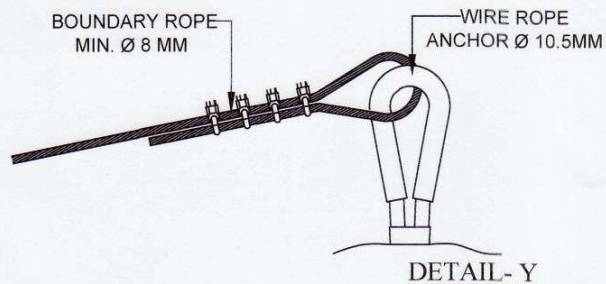
FOR TENDER PURPOSE ONLY (SHEET 16 OF 18)

 सड़क परिवहन और राजमार्ग मंत्रालय Ministry of Road Transport and Highways				
PROTECTION / TREATMENT WORKS ON LANDSLIDE ZONE NEAR TANAKPUR - DHARCHULA - GUNJI ROAD NH-09 KUMAON REGION (UTTARAKHAND)				
CONSULTANT: THDC INDIA LIMITED				
PROPOSED TREATMENT MEASURES BETWEEN CH. 100+465 KM TO CH. 101+425 KM. LOCATION - TANAKPUR - DHARCHULA - GUNJI, U.K. NH-09				
DESIGNED BY	CHECKED BY	REVIEWED BY	APPROVED BY	DATE
				APR-2024
DRG. NO. THDC/RES/1/D&M/TANAKPUR/09/CH. 100+465 TO CH. 101+425 KM-1D-16				



NOTES:-

1. THE GENERAL SPECIFICATIONS OF THE SYSTEM SHALL BE AS BELOW. HOWEVER, MENTIONED BELOW ARE THE MINIMUM VALUES.
2. THE HIGH-TENSILE ROLLED CABLE NETS SHOULD INCLUDE THE SECONDARY MESH.
3. FOR THE INSTALLATION OF HIGH-TENSILE ROLLED CABLE NETS STANDARD SUPPORT ROPES, SEAMING ROPES AND SHACKLES SHOULD BE USED. FOR THE HORIZONTAL CONNECTION STANDARD SHACKLES OR LACES SHALL BE USED.
4. DESIGN SPECIFICATION OF SYSTEM
 - a. TENSILE STRENGTH OF HT ROLLED CABLE NET - 80 KN /M
 - b. PUNCTURING RESISTANCE OF HT ROLLED CABLE NET - 150KN
 - c. APERTURE NOT MORE THAN 400MM IN ONE DIRECTION
 - d. DIA OF CABLE OF HT ROLLED CABLE NET - 6MM
 - e. BREAKING LOAD OF CABLE OF HT ROLLED CABLE NET - 35KN
 - f. TENSILE STRENGTH OF WIRE OF THE CABLE - 1770 N/SQMM
 - g. COMPOUND FOR CORROSION PROTECTION - 95% ZN AND 5% AL CLASS B OR ZINC COATING CLASS A AS PER IS/ISO-17746-2016.
 - h. AVERAGE LENGTH OF THE 38/19MM DIA. 40 CR SDRA - 10.0 M (9.7M GROUTED+0.3M ABOVE SLOPE SURFACE)
 - i. DRILL BIT SIZE - 76MM
 - j. GRID PATTERN - STAGGERED
 - k. SPACING OF ANCHORS, i.e. (a=b) - 3.0M (AVG.) (DEPENDING ON THE SLOPE ANGLE/ PROFILE, STRATA AT SITE)
 - l. SIZE OF BASE PLATE - 200MM X 200MM X 10MM (MINIMUM)
 - m. GROUTING MATERIAL - CEMENT GROUT
 - n. SIZE OF DOUBLE TWISTED MESH -60MMX80MM, COMPRISING OF MESH WIRE DIA. 2.2/3.2MM DIA GI WIRE AND CORROSION PROTECTION Zn COATING+PVC



FOR TENDER PURPOSE ONLY (SHEET 17 OF 18)



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Ministry of Road Transport and Highways

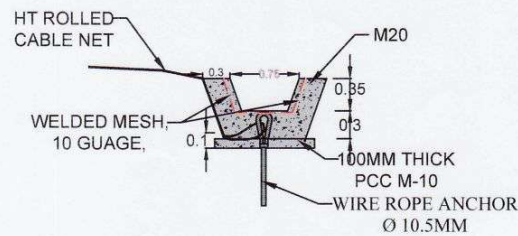
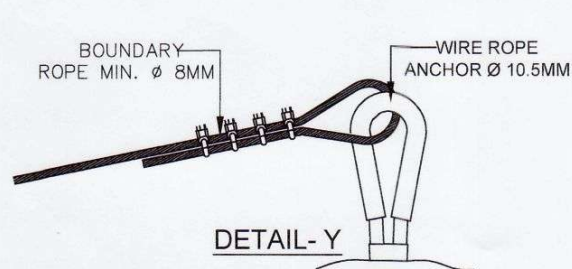
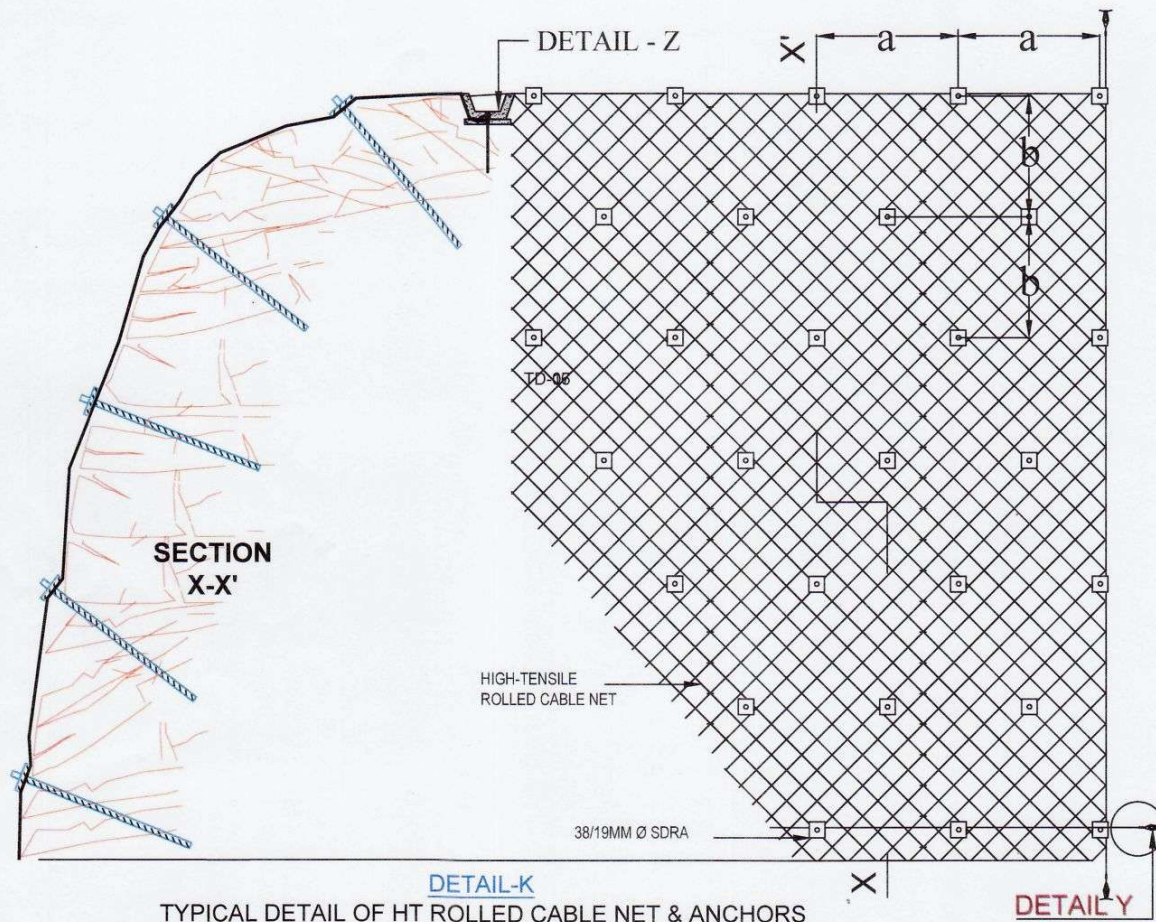
PROTECTION / TREATMENT WORKS ON LANDSLIDE ZONE NEAR TANAKPUR - DHARCHULA - GUNJI ROAD NH-09 KUMAUN REGION (UTTARAKHAND)

CONSULTANT: टीएचडीसी इंडिया लिमिटेड
THDC INDIA LIMITED

PROPOSED TREATMENT MEASURES
BETWEEN CH. 100+465 KM TO CH. 101+425 KM. LOCATION - TANAKPUR - DHARCHULA - GUNJI, U.K. NH-09

DESIGNED BY	CHECKED BY	APPROVED BY	DESIGNED BY	CHECKED BY	APPROVED BY
(NAME)	(NAME)	(NAME)	(NAME)	(NAME)	(NAME)
(DESIGNER)	(CHECKER)	(APPROVER)	(DESIGNER)	(CHECKER)	(APPROVER)

DRG. NO. THDC/RSN/DRG/MARTINI/09/CH. 100+465-101+425KM/1D-17 DATE: APR. 2026 DAE CIVIL, RISHIKESH



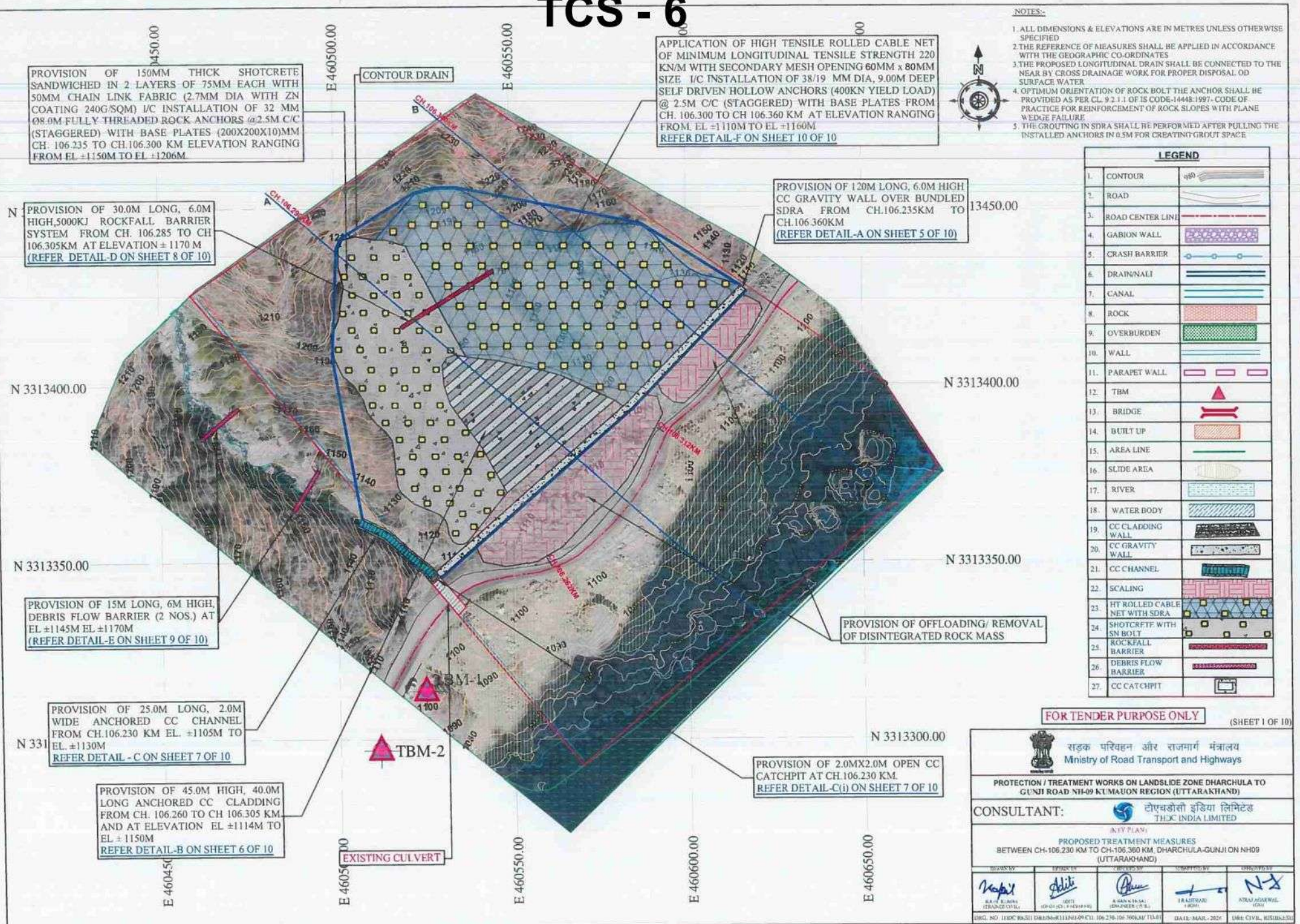
NOTES:-

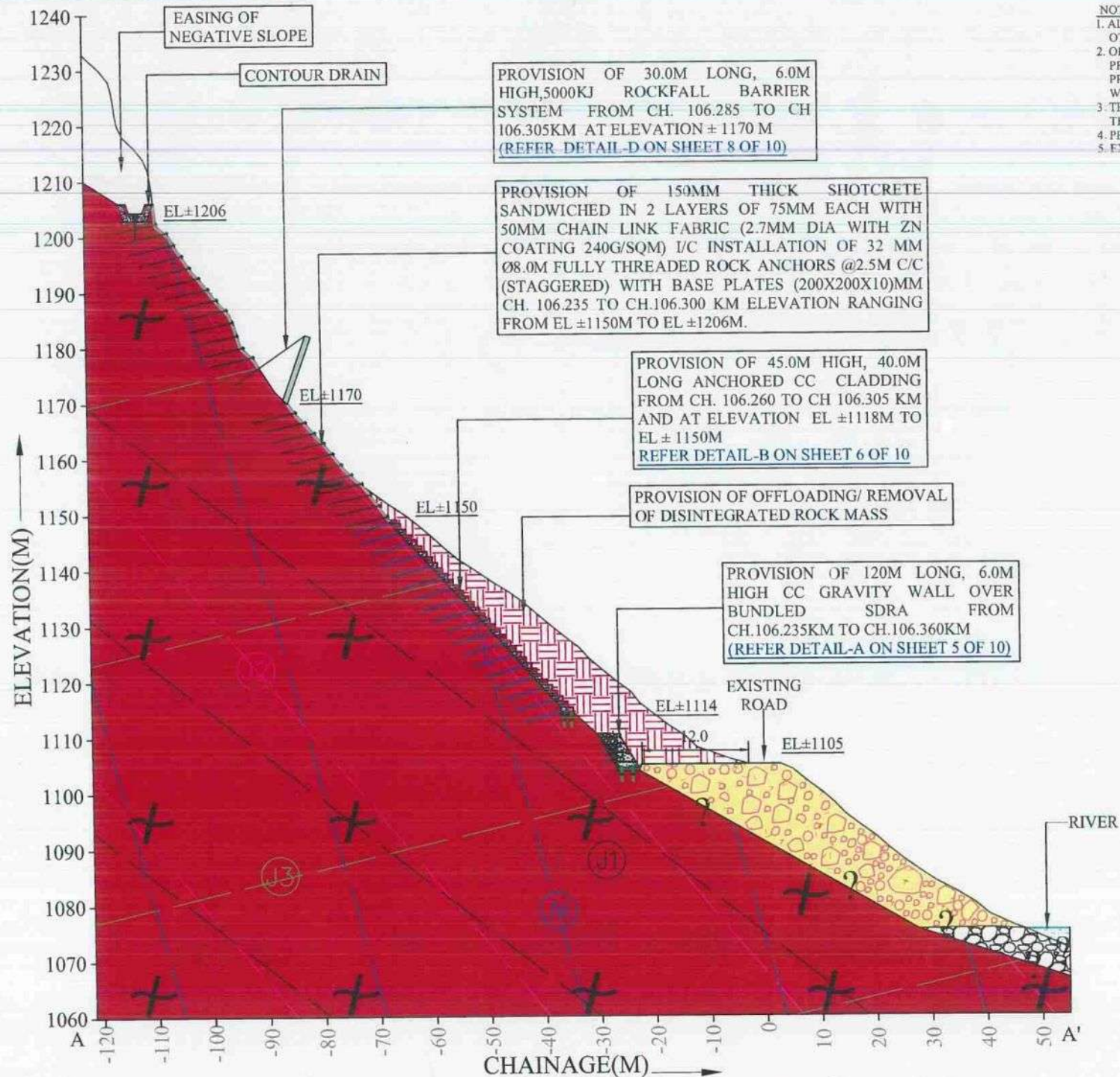
1. THE GENERAL SPECIFICATIONS OF THE SYSTEM SHALL BE AS BELOW. HOWEVER, MENTIONED BELOW ARE THE MINIMUM VALUES.
2. THE HIGH-TENSILE ROLLED CABLE NETS SHOULD INCLUDE THE SECONDARY MESH.
3. FOR THE INSTALLATION OF HIGH-TENSILE ROLLED CABLE NETS STANDARD SUPPORT ROPES, SEAMING ROPES AND SHACKLES SHOULD BE USED. FOR THE HORIZONTAL CONNECTION STANDARD SHACKLES OR LACES SHALL BE USED.
4. DESIGN SPECIFICATION OF SYSTEM
 - a. TENSILE STRENGTH OF HT ROLLED CABLE NET - 100 KN /M
 - b. PUNCTURING RESISTANCE OF HT ROLLED CABLE NET - 200 KN
 - c. APERTURE NOT MORE THAN 300MM IN ONE DIRECTION
 - d. DIA OF CABLE OF HT ROLLED CABLE NET - 8MM
 - e. BREAKING LOAD OF CABLE OF HT ROLLED CABLE NET - 40.7 KN
 - f. TENSILE STRENGTH OF WIRE OF THE CABLE - 1770 N/SQMM
 - g. COMPOUND FOR CORROSION PROTECTION - 95% ZN AND 5% AL CLASS B OR ZINC COATING CLASS A AS PER IS/ISO-17746-2016,
 - h. AVERAGE LENGTH OF THE 38/19MM DIA. 40 CR SDRA - 10.0 M (9.7M GROUTED+0.3M ABOVE SLOPE SURFACE), SPACING OF ANCHORS, i.e. (a=b) - 2.0M (AVG.) (DEPENDING ON THE SLOPE ANGLE/ PROFILE, STRATA AT SITE)
 - i. DRILL BIT SIZE - 76MM
 - j. GRID PATTERN - STAGGERED
 - k. SIZE OF BASE PLATE - 200MM X 200MM X 10MM (MINIMUM)
 - l. GROUTING MATERIAL - CEMENT GROUT
 - m. SIZE OF DOUBLE TWISTED MESH -60MMX80MM, COMPRISING OF MESH WIRE DIA. 2.2/3.2MM DIA GI WIRE AND CORROSION PROTECTION Zn COATING+PVC

FOR TENDER PURPOSE ONLY (SHEET 18 OF 18)

सड़क परिवहन और राजमार्ग नगरालय Ministry of Road Transport and Highways	
PROTECTION / TREATMENT WORKS ON LANDSLIDE ZONE NEAR TANAKPUR - DHARCHULA- GUNJI ROAD NH-09 KUMAON REGION (UTTARAKHAND)	
CONSULTANT: टीएचडीसी इंडिया लिमिटेड THDC INDIA LIMITED	
PROPOSED TREATMENT MEASURES BETWEEN CH. 100+465 KM TO CH. 101+425 KM. LOCATION - TANAKPUR - DHARCHULA - GUNJI, NH-09	
DESIGNED BY	APPROVED BY
Sanjay Singh S.P. (DESIGN) (ENGINEER)	Anil Kumar S.P. (DESIGN) (ENGINEER)
Anil Kumar S.P. (DESIGN) (ENGINEER)	Anil Kumar S.P. (DESIGN) (ENGINEER)
THDC INDIA LIMITED, DHARCHULA, KUMAON REGION, UTTARAKHAND. DATE: APR. 2025. DRA: CIVIL, RESHKEEN	

TCS - 6

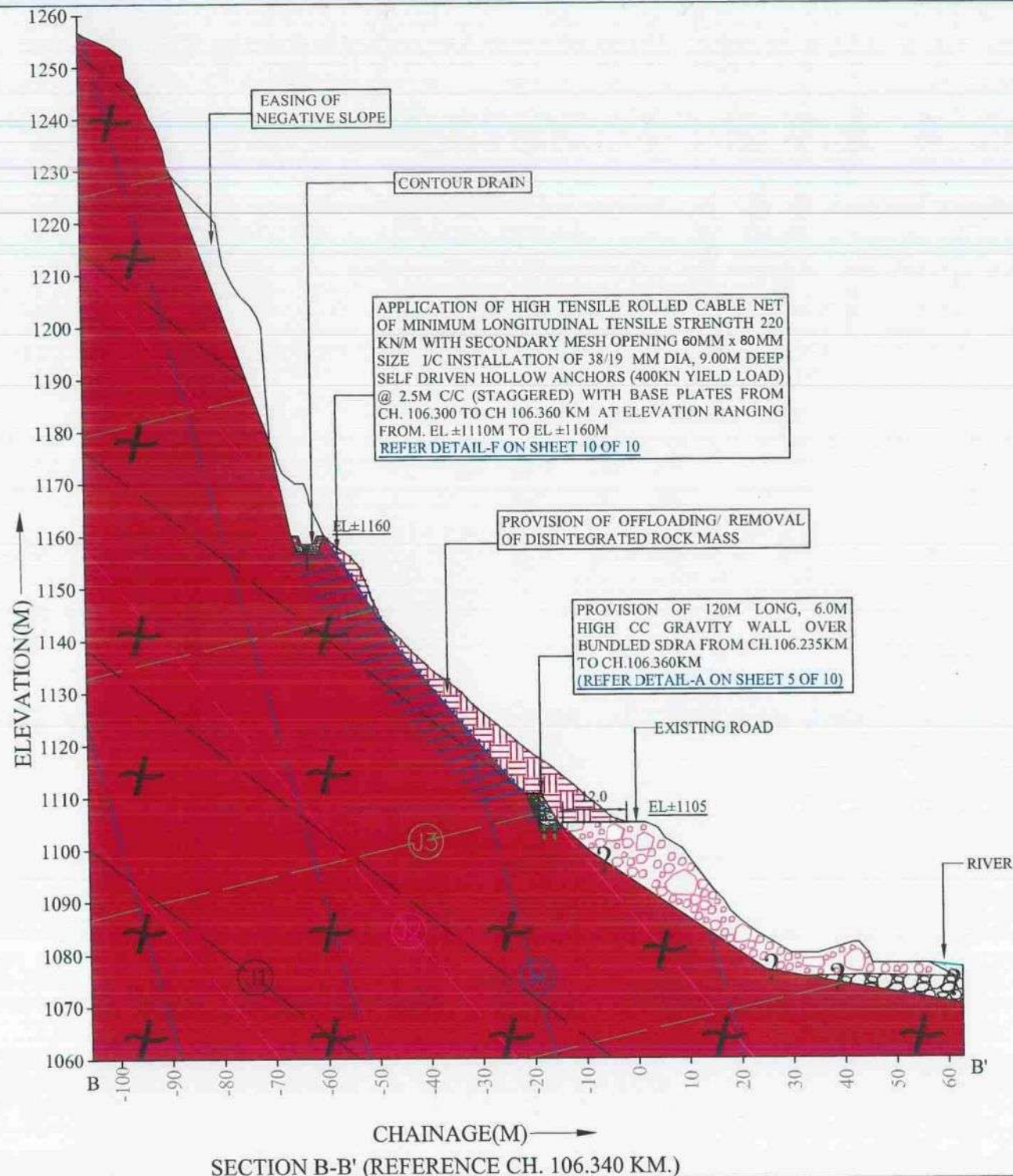




LEGEND		
1.	ROCK BLOCKS / BOULDERS	
2.	SLIDE MASS	
3.	RBM	
4.	BIOTITE GNEISS	
5.	TRACES OF JOINTS	
6.	CC GRAVITY WALL	
7.	CC CLADDING WALL WITH SDRA	
8.	SHOTCRETE WITH SN BOLT	
9.	CONTOUR DRAIN	
10.	SCALING	
11.	ROCKFALL BARRIER	

FOR TENDER PURPOSE ONLY (SHEET 3 OF 10)

सड़क परिवहन और राजमार्ग मंत्रालय Ministry of Road Transport and Highways	
PROTECTION / TREATMENT WORKS ON LANDSLIDE ZONE DHARCHULA TO GUNJI ROAD NH-09 KUMAON REGION (UTTARAKHAND)	
CONSULTANT: टीएचडीसी इंडिया लिमिटेड THDC INDIA LIMITED	
(SECTION A-A') PROPOSED TREATMENT MEASURES BETWEEN CH-106.230 KM TO CH-106.360 KM, DHARCHULA-GUNJI ON NH09 (UTTARAKHAND)	
DESIGNED BY SR. CIVIL ENGINEER	CHECKED BY SR. CIVIL ENGINEER
APPROVED BY SR. CIVIL ENGINEER	DATE: MAR-2024 D&E CIVIL, RISHIKESH



NOTES :-

1. ALL DIMENSIONS & ELEVATIONS ARE IN METRES UNLESS OTHERWISE SPECIFIED
2. OPTIMUM ORIENTATION OF ROCK BOLT THE ANCHOR SHALL BE PROVIDED AS PER CL. 9.2.1.1 OF IS CODE-14448:1997. CODE OF PRACTICE FOR REINFORCEMENT OF ROCK SLOPES WITH PLANE WEDGE FAILURE
3. THE GROUTING IN SDRA SHALL BE PERFORMED AFTER PULLING THE INSTALLED ANCHORS IN 0.5M FOR CREATING-GROUT SPACE
4. PROPOSED ROAD WIDTH= 12.0M
5. EXISTING ROAD WIDTH= 5.74 M

LEGEND		
1.	ROCK BLOCKS / BOULDERS	
2.	SLIDE MASS	
3.	RBM	
4.	BIOTITE GNEISS	
5.	TRACES OF JOINTS	
6.	CC GRAVITY WALL	
7.	HT ROLLED CABLE NET	
8.	CONTOUR DRAIN	
9.	SCALING	

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(SHEET 4 OF 10)



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Ministry of Road Transport and Highways

PROTECTION / TREATMENT WORKS ON LANDSLIDE ZONE DHARCHULA TO GUNJI ROAD NH-09 KUMAON REGION (UTTARAKHAND)

CONSULTANT:



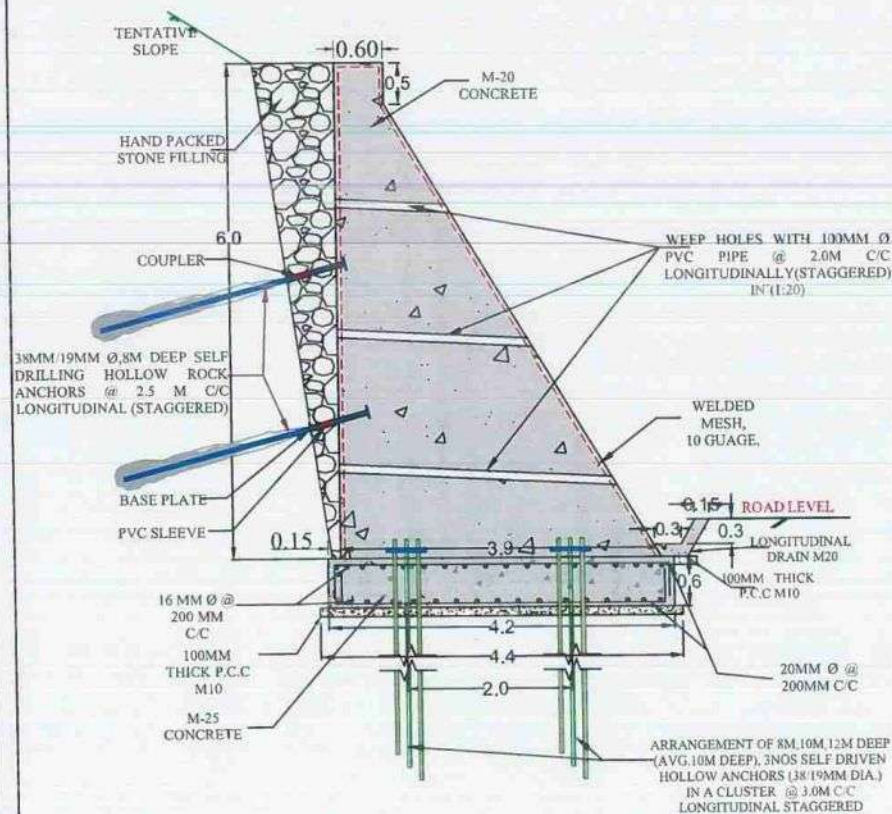
टीएचडीसी इंडिया लिमिटेड
THDC INDIA LIMITED

(SECTION B-D)

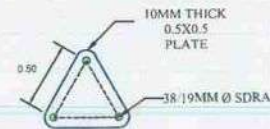
**PROPOSED TREATMENT MEASURES
BETWEEN CH-106.230 KM TO CH-106.360 KM, DHARCHULA-GUNJI ON NH09
(UTTARAKHAND)**

DATE WORK	DESIGN BY	CHECKED BY	APPROVED BY	APPROVED BY
<i>Askipil</i> KUMAR ELIAS (STRUCTURAL E.N.)	<i>Aditi</i> ADITI (STRUCTURAL ENGINEER)	<i>Banu</i> ANAS KANNAL (MECHANICAL E.N.)	<i>+</i> J. KOTTAI AGRAM	<i>NS</i> NIRAJ AGARWAL (CIVIL)

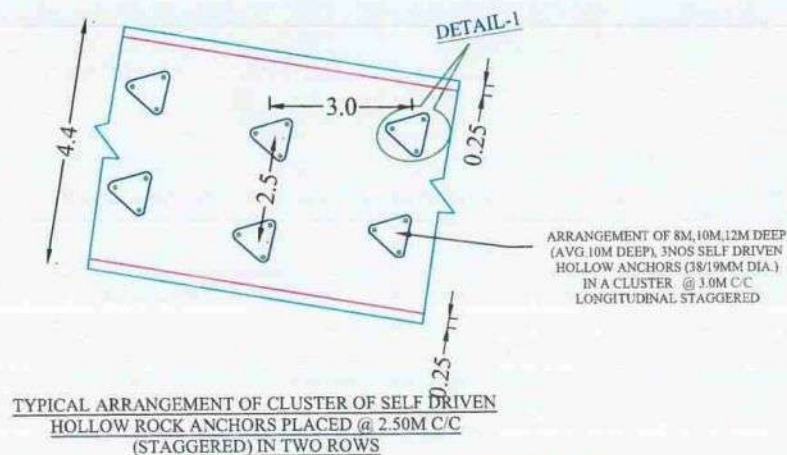
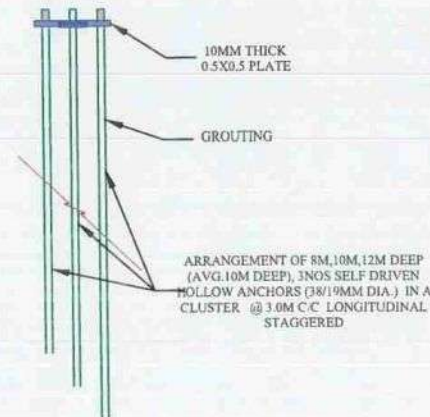
DRG. NO. TIDCRKSTDAEASRTINL09CTI (06.230-106.3608/MTD-04) DATE: MAR - 2024 DME CIVIL, RIISUSEN



TYPICAL ARRANGEMENT OF SDRA CLUSTER
DETAIL-1



SECTIONAL ELEVATION OF SDRA CLUSTER
WITH 500X500X10MM PLATE



TYPICAL ARRANGEMENT OF CLUSTER OF SELF DRIVEN
HOLLOW ROCK ANCHORS PLACED @ 2.50M C/C
(STAGGERED) IN TWO ROWS

DETAIL-A TYPICAL DETAILS OF 6.0M HIGH ANCHORED CC GRAVITY WALL OVER RCC RAFT WITH CLUSTER OF 38/19 MM SDRA

NOTES:

1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.
2. EXCAVATION FOR FOUNDATION SHALL BE DONE IN 6-8M LONG STRECHES ONLY & TREATMENT SHALL BE COMPLETED BEFORE START OF NEW PATCH.
3. HIGH STRENGTH ORDINARY PORTLAND CEMENT CONFORMING TO IS : 8112 CAPABLE OF ACHIEVING THE REQUIRED DESIGN CONCRETE STRENGTH SHALL ONLY BE USED.
4. THE MINIMUM CEMENT CONTENT AND WATER CEMENT RATIO IN THE CONCRETE DESIGN MIX SHALL BE 310 KG PER CUM AND 0.45 RESPECTIVELY.
5. CONCRETE USED SHALL BE OF GRADES AS SPECIFIED BELOW CONFORMING TO IS 456 (LATEST):
CC GRAVITY WALL - M20.
RCC RAFT - M25.
LEVELLING COURSE - M10.
7. REINFORCEMENT SHALL COMPRISE OF FE 500D GRADE DEFORMED BARS, CONFORMING TO IS:1786.
8. PROPERLY BRACED STEEL PLATES SHALL BE USED AS SHUTTERING.
9. LAPS AND ANCHORAGE LENGTH SHALL BE AS PER IS 456(LATEST).
10. LAPS SHALL BE STAGGERED.
11. CONCRETE SURFACE SHOULD BE ROUGHED AND CLEAN BEFORE POURING THE CONCRETE/FRESH CONCRETE.

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(SHEET 5 OF 10)



सड़क परिवहन और राजमार्ग मंत्रालय
Ministry of Road Transport and Highways

PROTECTION / TREATMENT WORKS ON LANDSLIDE ZONE DHARCHULA TO
GUNJI ROAD NH-09 KUMAON REGION (UTTARAKHAND)

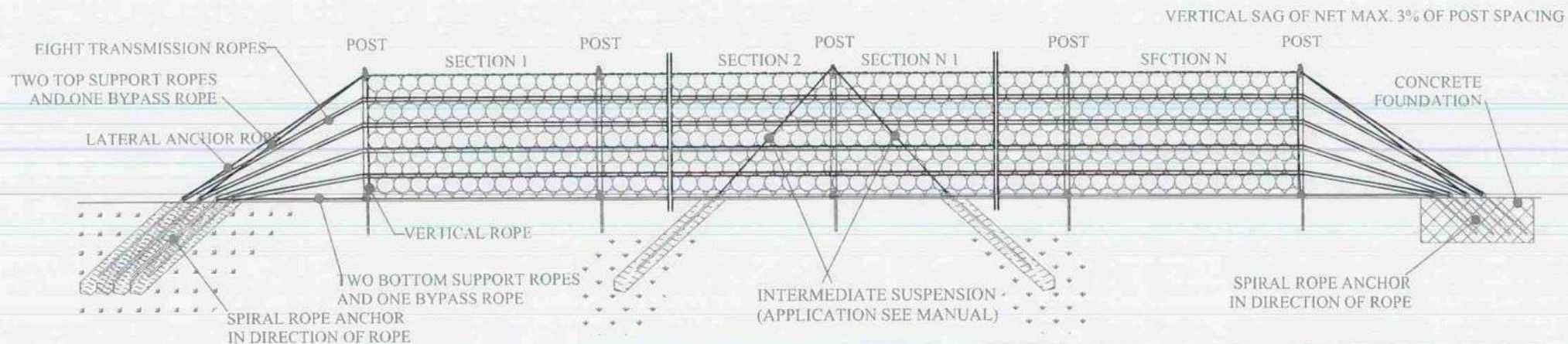
CONSULTANT: टीएचडीएल इंडिया लिमिटेड
THDC INDIA LIMITED

(DETAIL-A)

PROPOSED TREATMENT MEASURES
BETWEEN CH-106,230 KM TO CH-106,350 KM, DHARCHULA-GUNJI ON NH09
(UTTARAKHAND)

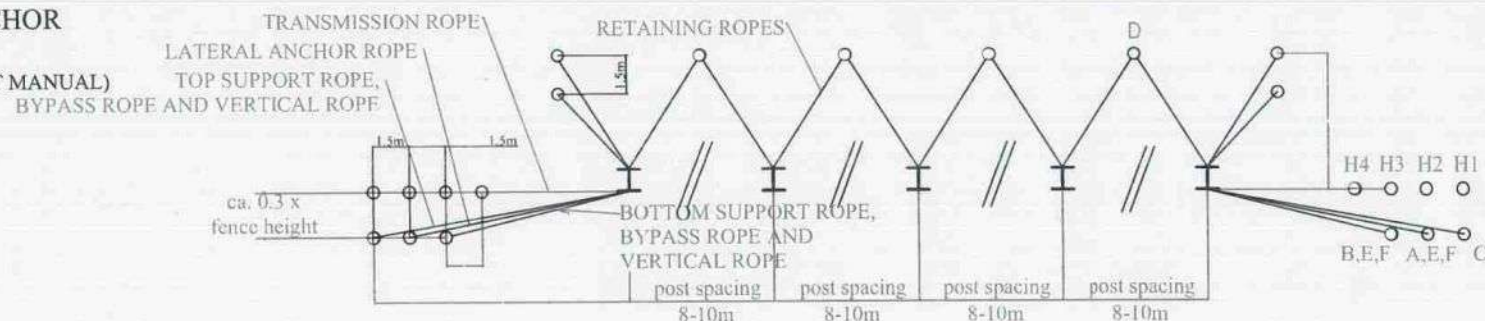
DRAWN BY	CHECKED BY	DESIGNED BY	APPROVED BY	APPROVED BY
<i>Kapil</i>	<i>Aditi</i>	<i>Pr</i>	<i>+</i>	<i>+</i>
E. P. K. K. K.	ADITI	ADITI	J. R. K. K. K.	N. R. K. K. K.
(T. A. S. E. E. E.)	(S. E. E. E. E.)	(S. E. E. E. E.)	(S. E. E. E. E.)	(S. E. E. E. E.)

DWG. NO. THDC/RSK/SDRA/GR/TH/101-09/CT/106-230-106,350/KM/VT/09 DATE: MAR-2020 DATE CIVIL: 20/03/2020

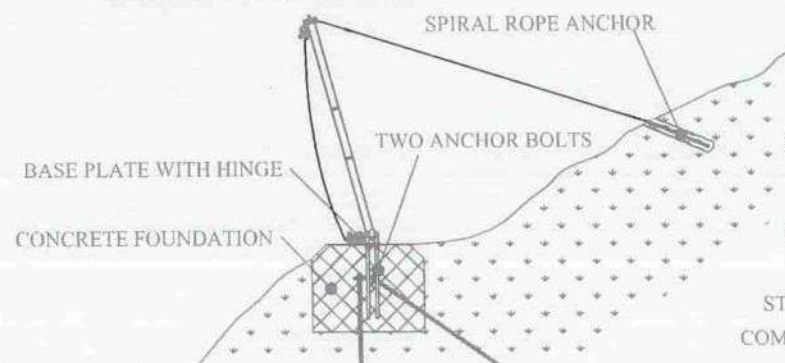


LAYOUT OF ANCHOR POINTS

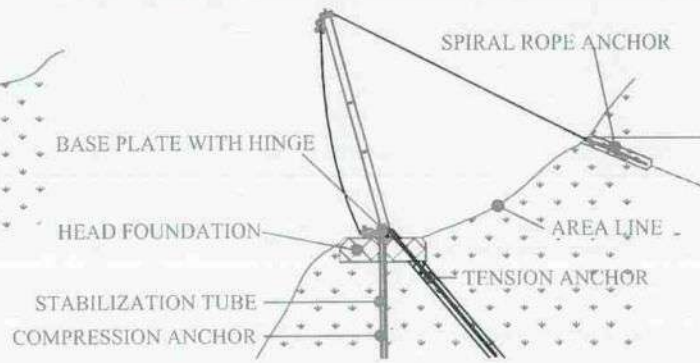
(DETAILS IN PRODUCT MANUAL)



ANCHORING CONCRETE FOUNDATION FOR ALL TYPES OF SOIL



ANCHORING IN LOOSE SOIL: WITH TENSION AND COMPRESSION ANCHOR



ROCKFALL PROTECTION BARRIER 5000KJ SYSTEM(6M HIGH) DETAIL D

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(SHEET 8 OF 10)



सड़क परिवहन और राजमार्ग मंत्रालय
Ministry of Road Transport and Highways

PROTECTION / TREATMENT WORKS ON LANDSLIDE ZONE DHARCHULA TO
GUNJI ROAD NH-09 KUMAUN REGION (UTTARAKHAND)

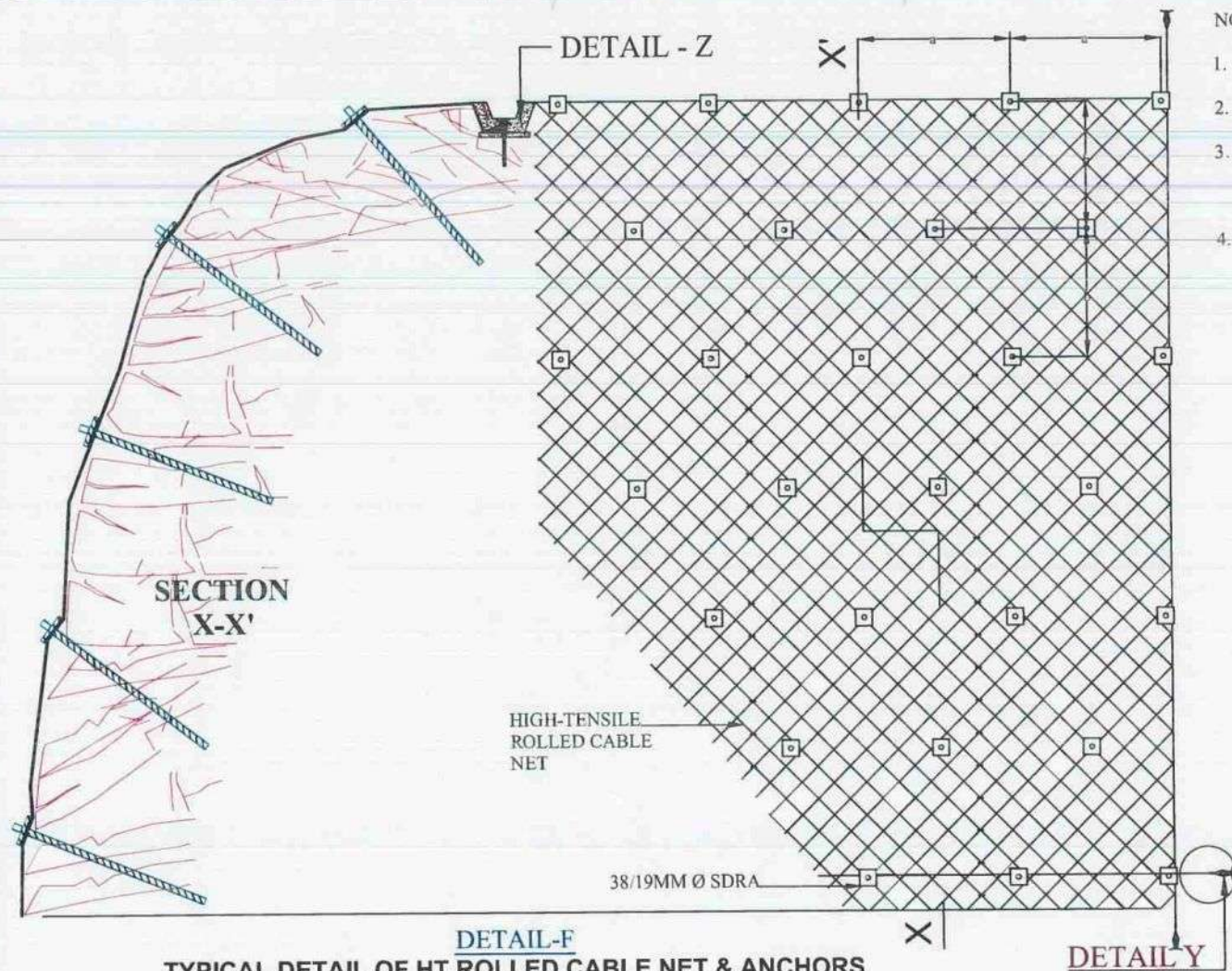
CONSULTANT: टीएचडीसी इंडिया लिमिटेड
THDC INDIA LIMITED

PROPOSED TREATMENT MEASURES
BETWEEN CH-106,230 KM TO CH-106,360 KM, DHARCHULA-GUNJI ON NH09
(UTTARAKHAND)

DESIGNED BY	REVIEWED BY	CHECKED BY	APPROVED BY	DATE
<i>Nakil</i>	<i>Atli</i>	<i>Atli</i>	<i>Atli</i>	
SUPV. CIVIL ENGR. (M. 106/230)	ASST. SUPV. CIVIL ENGR. (M. 106/230)	ASST. SUPV. CIVIL ENGR. (M. 106/230)	IN CHARGE (M. 106/230)	NHAI

DWG. NO. THDC/RSV/DAE/MORTH/NH-09/CH-106,230-106,360/KM/MTD-08 DATE: MAR.-2024 DATE CIVIL. RESUBMIT

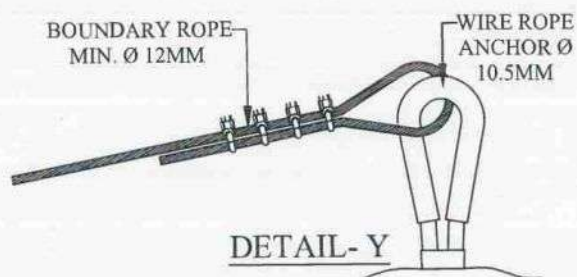
NOTE:
INSPECTION AND MAINTENANCE OF SUCH SYSTEMS ARE AN ABSOLUTE REQUIREMENT TO ENSURE THE DESIRED PROTECTION LEVEL. THE SYSTEM SAFETY CAN ALSO BE IMPAIRED BY EVENTS SUCH AS NATURAL DISASTERS, INADEQUATE DIMENSIONING PARAMETERS OR FAILURE TO USE THE PRESCRIBED STANDARD COMPONENTS, SYSTEMS AND ORIGINAL PARTS; AND/OR CORROSION.



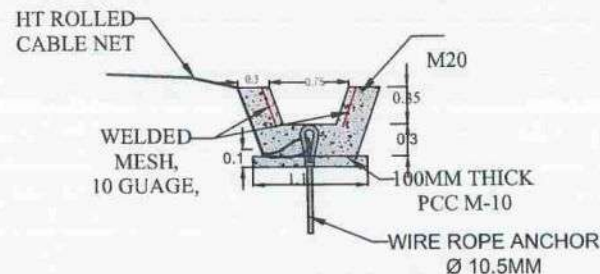
NOTES:-

1. THE GENERAL SPECIFICATIONS OF THE SYSTEM SHALL BE AS BELOW. HOWEVER, MENTIONED BELOW ARE THE MINIMUM VALUES.
2. THE HIGH-TENSILE ROLLED CABLE NETS SHOULD INCLUDE THE SECONDARY MESH.
3. FOR THE INSTALLATION OF HIGH-TENSILE ROLLED CABLE NETS STANDARD SUPPORT ROPES, SEAMING ROPES AND SHACKLES SHOULD BE USED. FOR THE HORIZONTAL CONNECTION STANDARD SHACKLES OR LACES SHALL BE USED.
4. DESIGN SPECIFICATION OF SYSTEM
 - a. TENSILE STRENGTH OF HT ROLLED CABLE NET - 220 KN /M
 - b. PUNCTURING RESISTANCE OF HT ROLLED CABLE NET - 350 KN
 - c. APERTURE NOT MORE THAN 300MM IN ONE DIRECTION
 - d. DIA OF CABLE OF HT ROLLED CABLE NET - 10MM
 - e. BREAKING LOAD OF CABLE OF HT ROLLED CABLE NET - 63 KN
 - f. TENSILE STRENGTH OF WIRE OF THE CABLE - 1770 N/SQMM
 - g. COMPOUND FOR CORROSION PROTECTION - 95% ZN AND 5% AL CLASS B OR ZINC COATING CLASS A AS PER IS/ISO-17746-2016.
 - h. AVERAGE LENGTH OF THE 38/19MM DIA. 40 CR SDRA - 9.0 M (8.7M GROUTED+0.3M ABOVE SLOPE SURFACE)
 - i. DRILL BIT SIZE - 76MM
 - j. GRID PATTERN - STAGGERED
 - k. SPACING OF ANCHORS, i.e. (a-b) - 2.5M (AVG.) (DEPENDING ON THE SLOPE ANGLE/ PROFILE, STRATA AT SITE)
 - l. SIZE OF BASE PLATE - 200MM X 200MM X 10MM (MINIMUM)
 - m. GROUTING MATERIAL - CEMENT GROUT
 - n. SIZE OF DOUBLE TWISTED MESH -60MMX80MM, COMPRISING OF MESH WIRE DIA. 2.2/3.2MM DIA GI WIRE AND CORROSION PROTECTION Zn COATING+PVC

DETAIL-F
TYPICAL DETAIL OF HT ROLLED CABLE NET & ANCHORS



DETAIL- Y



DETAIL Z - TYPICAL
SECTION OF CONTOUR
DRAIN

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(SHEET 10 OF 10)



सड़क परिवहन और राजमार्ग मंत्रालय
Ministry of Road Transport and Highways

PROTECTION / TREATMENT WORKS ON LANDSLIDE ZONE DHARCHULA TO
GUNJI ROAD NH-09 KUMAUN REGION (UTTARAKHAND)

CONSULTANT:



टीएचडीसी इंडिया लिमिटेड
THDC INDIA LIMITED

PROPOSED TREATMENT MEASURES
BETWEEN CH-105.230 KM TO CH-105.360 KM, DHARCHULA-GUNJI ON NH09
(UTTARAKHAND)

DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY	DATE
<i>Neel</i>	<i>Aditya</i>	<i>Dr. Ravi</i>	<i>Dr. Ravi</i>	DATE: MAR - 2024
NEEL KUMAR (TR & E) (P.E.)	ADITYA KUMAR (CIVIL ENGINEER)	DR. RAVI KANWAR (STRUCTURAL ENGINEER)	DR. RAVI KANWAR (CIVIL ENGINEER)	DATE: CIVIL, RISHIKESH

DRG NO. THDC/ST/DM/EN/ART/11/49/CT/06/230-360/60KM/TH-10