



Government of Nepal
Ministry of Physical Infrastructure and Transport
Department of Roads
Development Cooperation Implementation Division
Strategic Road Connectivity & Trade Improvement Project
(SRCTIP)

**Detailed Design of Upgradation of Kamala- Dhalkebar- Pathlaiya
Road Section (130km) of Mahendra Highway and Bridges**

Final Design Report
Volume IV
Design Report & Drawing of Bridges

Bridge Name- Ratu
Volume-2
Detailed Drawing

June, 2023

Joint Venture of:

eptisa EPTISA Servicios De Ingenieria
Madrid, Spain

STUP STUP Consultants Private Limited
India

In Association With
Udaya Consultancy, Geocom International, Sundar Kriti Consultant and Rays Consultant Private Limited

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A. GENERAL

1. ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METERS UNLESS NOTED OTHERWISE.
2. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED. DIMENSIONS ARE NOT TO BE SCALED.
3. THE LAYOUT OF THE BRIDGE/CULVERT SHALL BE SET AS PER RELEVANT HIGHWAY PLAN AND PROFILE DRAWING.
4. THE FORMATION LEVEL GIVEN IN THIS DRAWING SHALL BE VERIFIED FROM THE RELEVANT HIGHWAY DRAWING. IN CASE OF ANY DISCREPANCY THE HIGHWAY DRAWING SHALL BE CONSIDERED CORRECT.

B. DESIGN CRITERIA

1. THE DESIGN HAS BEEN PREPARED BASED ON THE FOLLOWING CODES:
 - a) NEPAL ROAD STANDARD 2070
 - b) IRC-5 2015
 - c) IRC-6 2017
 - d) IRC-78 2014
 - e) IRC-112 2020
 - f) IRC SP-13 2022
2. TOTAL WIDTH OF THE BRIDGE DECK: 11.85 M (8 M WIDE CARRIAGEWAY + 2.5 M WIDE FOOTPATH) HOWEVER THIS BRIDGE IS DESIGNED FOR THE FOLLOWING CARRIAGEWAY LIVE LOADS AS PER IRC:6-2017
 - a) ONE LANE OF IRC CLASS 70R (WHEELED) FOR TWO LANES + ONE LANE OF IRC CLASS A
 - b) THREE LANES OF IRC CLASS A
3. SEISMIC ZONE CONSIDERED IN THE DESIGN IS ZONE-V.
4. LAYING, COMPACTION, & EXTENT OF BACKFILL BEHIND ABUTMENT & RETURN/RETAINING WALLS SHALL CONSIST OF SELECTED EARTH CONFORMING TO THE APPENDIX-6 OF IRC:78-2014 HAVING PROPERTIES C=0, $\phi=30^\circ$ & DENSITY=20KN/m3.
5. 100mm DIA WEEP HOLES AT 1000mm C/C BOTH HORIZONTALLY AND VERTICALLY SHALL BE PROVIDED IN STAGGERED MANNER IN VERTICAL WALLS OF THE ABUTMENT AND RETURN WALL ABOVE GL. IN ONE OR TWO LAYERS AT A SLOPE OF 1 VERTICAL TO 20 HORIZONTAL TOWARDS THE DRAINING FACE.

C. HYDRAULIC DATA: -

1. DESIGN DISCHARGE, (Q100) - 770.95 CUMECs
2. HFL - 218.60 m
3. FREE BOARD (MINIMUM) - 1.500 m
4. MAXIMUM SCOUR LEVEL:

ABUTMENT	-	213.64 m
PIER	-	210.89 m

SCOUR LEVELS WERE CALCULATED AS PER IRC 78:2014 CL 703 WITH APPROPRIATELY INCREASED DESIGN DISCHARGE

D. STRUCTURAL AND OTHER DATA: -

1. SPAN ARRANGEMENT: 41+4x36+41 = 226 m
 2. SUPERSTRUCTURE:

PRECAST PSC LONGITUDINAL GIRDERS & CAST-IN-SITU RCC CROSS GIRDERS AND DECK SLAB.
 3. SUBSTRUCTURE
 - A) ABUTMENTS - RCC WALL TYPE
 4. FOUNDATIONS
 - A) ABUTMENT

-	1200 DIA BORED CAST-IN-SITU PILE
VERTICAL PILE DEMAND	- 1796 kN (NON SEISMIC), 2431 kN (SEISMIC)
 - B) PIER

-	1200 DIA BORED CAST-IN-SITU PILE
VERTICAL PILE DEMAND	- P1 & P5 : 1847 kN (NON SEISMIC), 2825 kN (SEISMIC)
- RCC BORED PILES SHOULD BE CONSTRUCTED AS PER IS: 2911(PART 1/SEC 2)-2010.

5. BEARINGS

POT BEARINGS

6. WEARING COAT:

65 MM THICK ASPHALTIC CONCRETE WEARING COAT AS PER STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE WORKS (2073) ,
DEPARTMENT OF ROADS

7. EXPANSION JOINT -

SLAB SEAL TYPE EXPANSION JOINT OF PROVEN QUALITY SHALL BE PROVIDED IN ACCORDANCE WITH IRC:SP-69-2005 (GUIDELINES AND SPECIFICATIONS OF EXPANSION JOINT)

8. DRAINAGE SPOUTS - AS PER STANDARD SPECIFICATION FOR ROAD & BRIDGE WORKS 2073

9. RAILINGS/CRASH BARRIER:

RCC CRASH BARRIER AT EDGES OF CARRIAGEWAY AND FOOTPATH

10. FOOTPATH

2.5m WIDE FOOTPATH AT OUTER EDGE OF DECK

11. CONCRETE: -

- a. PILE..... M35 (CEMENT CONTENT AS PER SPECIFICATION)
- b. PILE CAP.....M35
- c. BEARING PEDESTALS.....M40
- d. ABUTMENTM35
- e. PIERM35
- f. RETURN WALL.....M35
- g. LEVELING COURSE:
 - I) BELOW APPROACH SLAB.....M15
 - II) BELOW PILE CAP.....M15
- g. APPROACH SLABM30
- h. CAST-IN-SITU CRASH BARRIERM40
- i. KERBM35
- j. DECK SLAB FOR PSC GIRDERS.....M45
- k. PRECAST PSC GIRDERSM50
- l. CAST-IN-SITU CROSS GIRDER FOR PSC GIRDERS.....M45

12. REINFORCEMENT STEEL: -

- a. H.Y.S.D. BARS - GRADE 500 CONFORMING TO IS 1786
- b. REINFORCEMENT WHERE EVER NECESSARY SHALL BE LOCALLY BENT OR ADJUSTED TO ENSURE PROPER CONCRETING.

13. CONCRETE COVER

- a. DECK SLAB, GIRDER, PEDESTAL, CAP : 40 MM
- b. SUBSTRUCTURE AND FOUNDATION : 75 MM

14. LAPS (Ls) ARE TO BE STAGGERED AND MINIMUM LAP LENGTH ARE TO BE AS FOLLOWS:

- a) FOR M 30 GRADE CONCRETE : 57.2 ϕ
- b) FOR M 35 GRADE CONCRETE : 51.48 ϕ
- c) FOR M 40 GRADE CONCRETE : 48.62 ϕ
- d) FOR M 45 GRADE CONCRETE : 45.70 ϕ
- e) FOR M 50 GRADE CONCRETE : 42.00 ϕ

(WHERE ϕ IS THE DIAMETER OF THE BAR)

15. LAP LENGTH SHALL BE INCREASED BY A FACTOR BASED ON THE PERCENTAGE OF LAPPED BAR RELATIVE TO THE TOTAL CROSS SECTIONAL AREA. LAP LENGTH FOR DIFFERENT GRADE OF CONCRETE AS WELL AS DIFFERENT PERCENTAGE OF LAP LENGTH ARE AS FOLLOWS:

GRADE OF CONCRETE	M30	M35	M40	M45	M50
LAPPED BAR <25%	57.20 ϕ	51.48 ϕ	48.62 ϕ	45.70 ϕ	42.00 ϕ
25% $\leq$ LAPPED BAR <33%	65.78 ϕ	59.50 ϕ	55.91 ϕ	52.60 ϕ	48.00 ϕ
33% $\leq$ LAPPED BAR <50%	80.08 ϕ	72.07 ϕ	68.07 ϕ	64.00 ϕ	59.00 ϕ
50% $\leq$ LAPPED BAR	85.80 ϕ	77.22 ϕ	72.93 ϕ	68.60 ϕ	63.00 ϕ

16. THE LAP LENGTH SHALL BE STAGGERED BY MINIMUM DISTANCE OF 1.3 TIMES THE LAP LENGTH.

17. HELICAL REINFORCEMENT SHALL BE LAPPED BY 1.5 TURNS.

18. INSTEAD OF LAPPING SPLICING OF REINFORCEMENT CAN BE DONE WITH WELDED JOINT AS PER CL. 15.2.5.2 OF IRC 112-2020. WELD LENGTH SHALL NOT BE LESS THAN 18D.

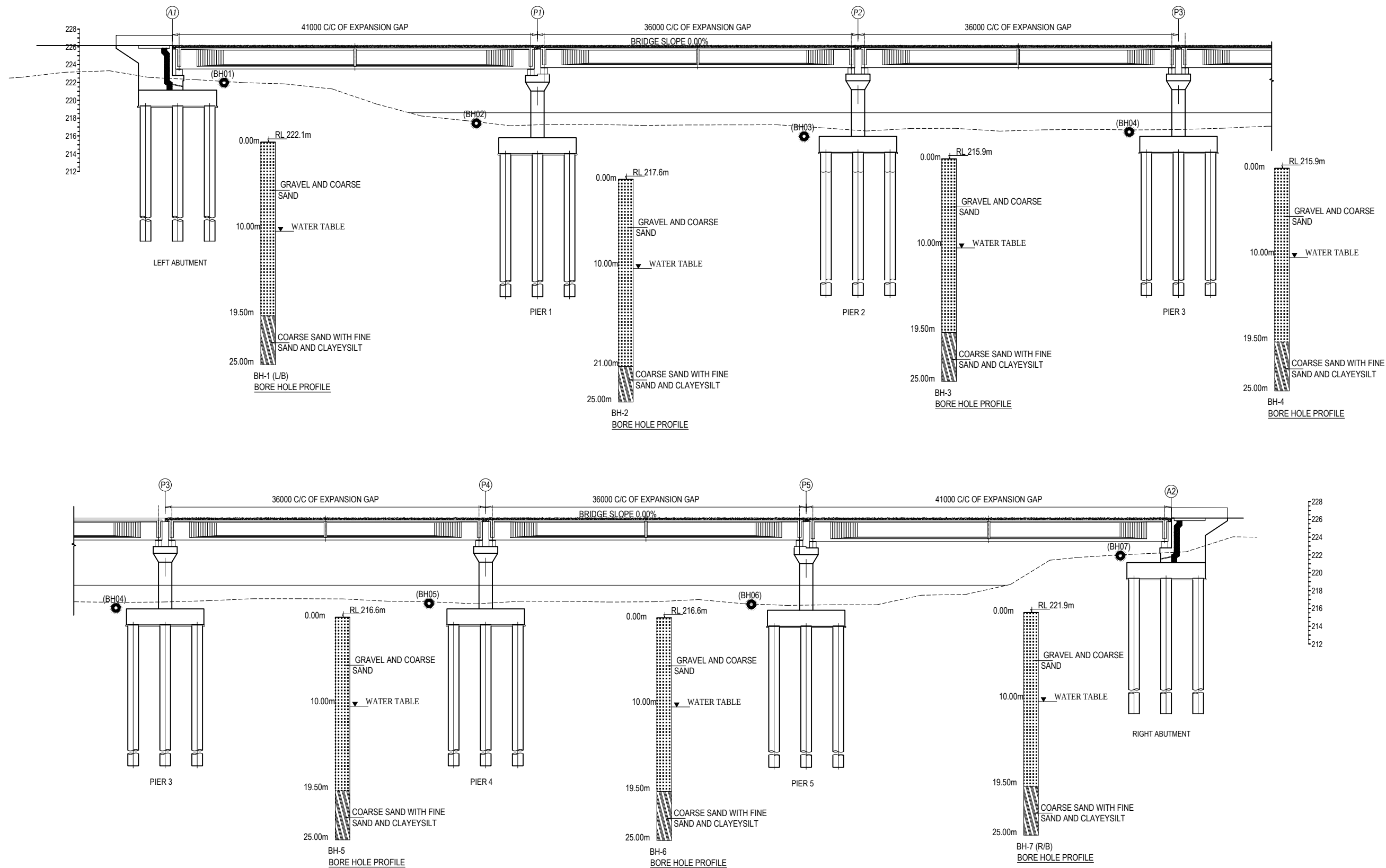
19. SHARP EDGES OF CONCRETE TO BE CHAMFERED MINIMUM 50 X 50

20. LONGITUDINAL AND TRANSVERSE STOPPER SHOULD BE KEPT AT +10MM FROM EXPANSION.

EMPLOYER	PROJECT NAME	DESIGN CONSULTANTS	Designed By	Mr. S.N.R.B Nec.No. 265 Civil "A" Signature	Drawing Name	Scale:	Date:
 Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Strategic Road Connectivity & Trade Improvement Project (SRCTIP) Detailed Design of Upgradation of Kamala-Dhalkebar-Pathlaiya Road Section (130 KM) of Mahendra Highway and Bridges	Joint Venture of	Checked By	Mr. S.M. Nec.No. Signature	GENERAL NOTES OF BRIDGE OVER RIVER RATU	AS SHOWN	JUNE, 2023
		 EPTISA Servicios De Ingeniera Madrid, Spain	Approved By	Mr. H.B. Nec.No. Signature	Reference Drawings	Chainage:	Drawing No. - KDP/DPR/STR/BR/RATU /DD -4
		In Association With Udaya Consultancy, Geocom International, Sundar Kriti Consultant and Rays Consultant Private Limited				265+345	Sheet No. 1 / 1

TO KAMALA

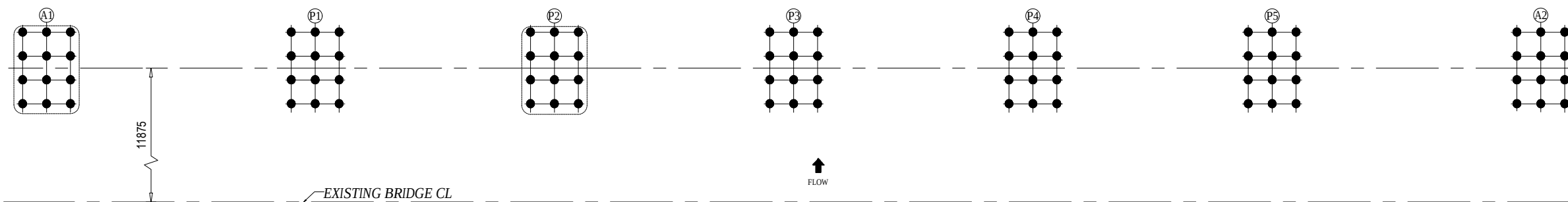
TO PATHALAIYA



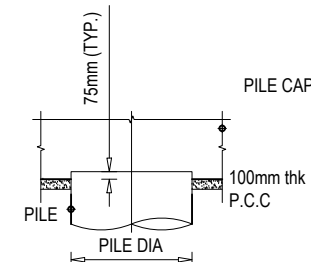
PROPOSED BRIDGE ELEVATION WITH BOREHOLE PROFILE

(SCALE 1 :450 @ A3)

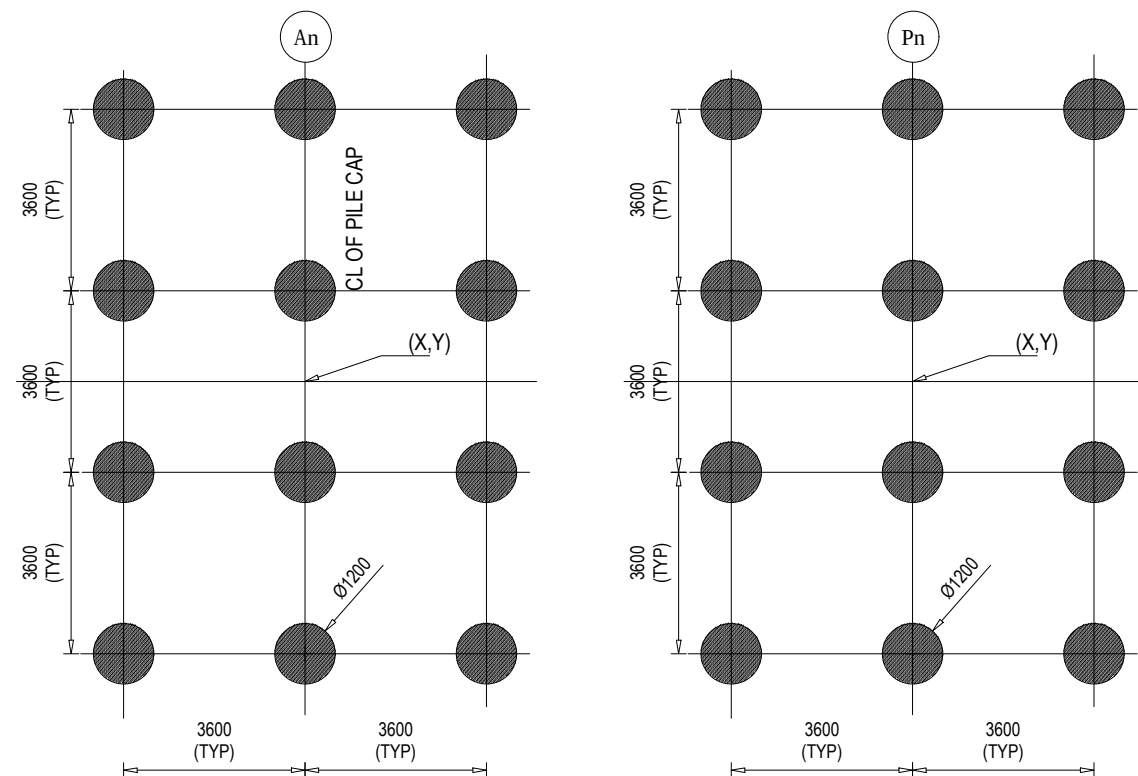
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		 EPTISA Servicios De Ingenieria Madrid, Spain	 STUP Consultants Private Limited Kolkatta, India	Checked By	Mr. S.M.				
				In Association With Udaya Consultancy, Geocom International, Sundar Kriti Consultant and Rays Consultant Private Limited	Approved By	Mr. H.B.			
			Nec.No.			Reference Drawings	Chainage:	265+345	Drawing No.- KDP/DPR/STR/BR/RATU/IDD -5
									Sheet No. 2 / 2



DETAILS AT PILE LAYOUT
SCALE - 1:750



DETAIL AT 3 AND 4
SCALE - 1:75

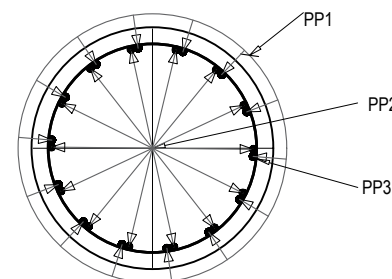


DETAILS AT A
SCALE - 1:150

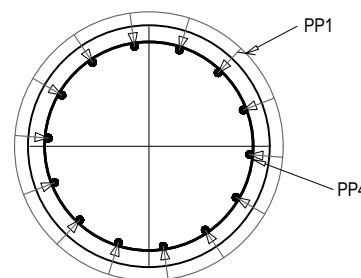
DETAILS AT B
SCALE - 1:150

CO ORDINATES OF PILE LOCATION OF PROPOSED BRIDGE

S.N.	ABUTMENT/PIER	EASTING (X)	NORTHING (Y)
1	ABUTMENT (A1)	391997.1331	2965748.8962
2	PIER (P1)	392034.3356	2965729.3344
3	PIER (P2)	392056.9662	2965714.1277
4	PIER (P3)	392099.5875	2965698.9009
5	PIER (P4)	392132.2287	2965683.674
6	PIER (P5)	392163.8182	2965668.919
7	ABUTMENT (A2)	392200.9702	2965653.578



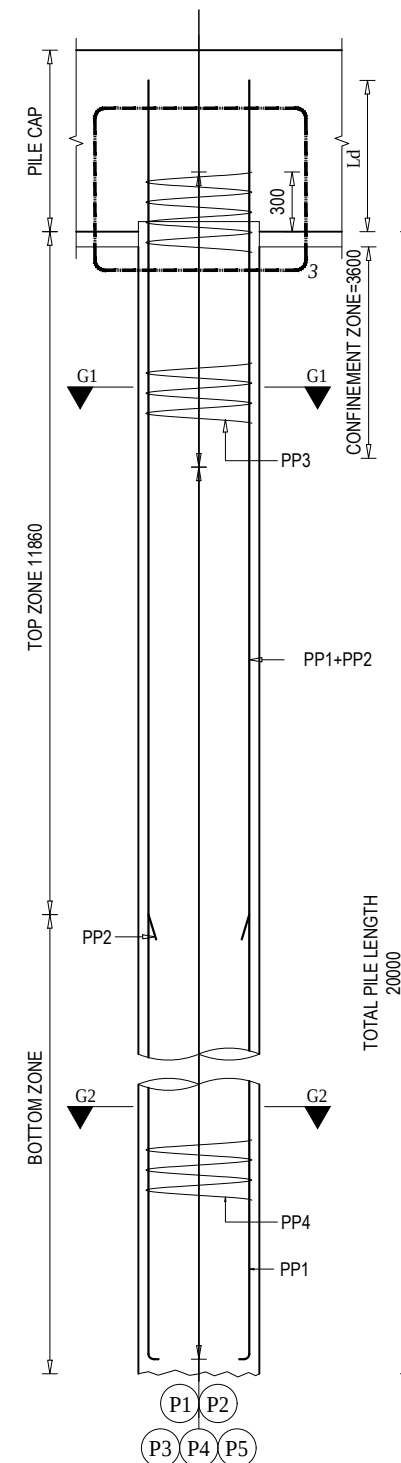
SECTIONAL VIEW AT G1 - G1
SCALE - 1:40



SECTIONAL VIEW AT G2 - G2
SCALE - 1:40

S.No	BAR MARK	DESCRIPTION OF BAR	BAR DIA (MM)	SPACING (MM)	BAR LENGTH (M)	No. OF BARS	UNIT WEIGHT (Kg/m)	TOTAL WEIGHT (Kg)
1	PP1	300	21650	32	21.950	17	6.321	2358.68
2	PP2	18525	18525	32	18.525	17	6.321	1990.637
3	PP3	75	155.965	16	155.965	1	1.580	246.48
4	PP4	150	426.506	16	426.506	1	1.580	673.99
TOTAL (KG) :								5269.76
No. of Pile Per Abutment :								12.00
TOTAL WEIGHT (KG) :								63237.45

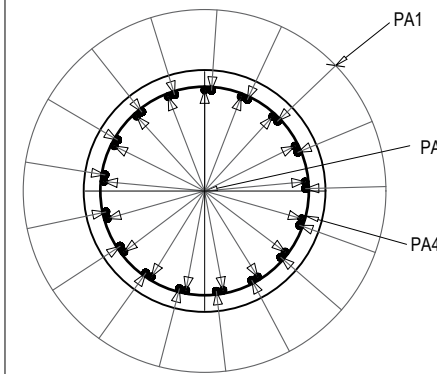
S.No	BAR MARK	DESCRIPTION OF BAR	BAR DIA (MM)	SPACING (MM)	BAR LENGTH (M)	No. OF BARS	UNIT WEIGHT (Kg/m)	TOTAL WEIGHT (Kg)
1	PP1	300	21650	32	21.950	17	6.321	1439.62
2	PP2	18525	18525	32	18.525	17	6.321	871.30
3	PP3	75	155.965	16	155.965	1	1.580	246.48
4	PP4	150	426.506	16	426.506	1	1.580	673.99
TOTAL (KG) :								3112.44
No. of Pile :								12.00
TOTAL WEIGHT (KG) :								3749.84



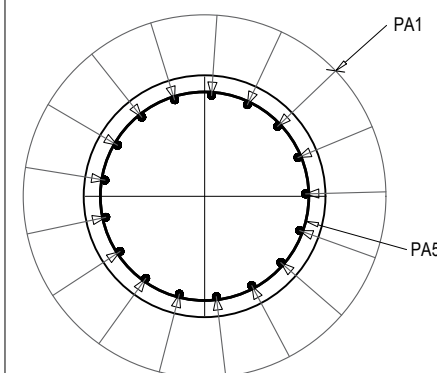
BAR DETAIL AT PIER PILE
SCALE - 1:75

PILE CAPACITY ABUT. (INDIVIDUAL)			
S.N.	DIA (mm)	DEMAND (kN)	
1	1200	SEISMIC	NON SEISMIC
		2431	1796

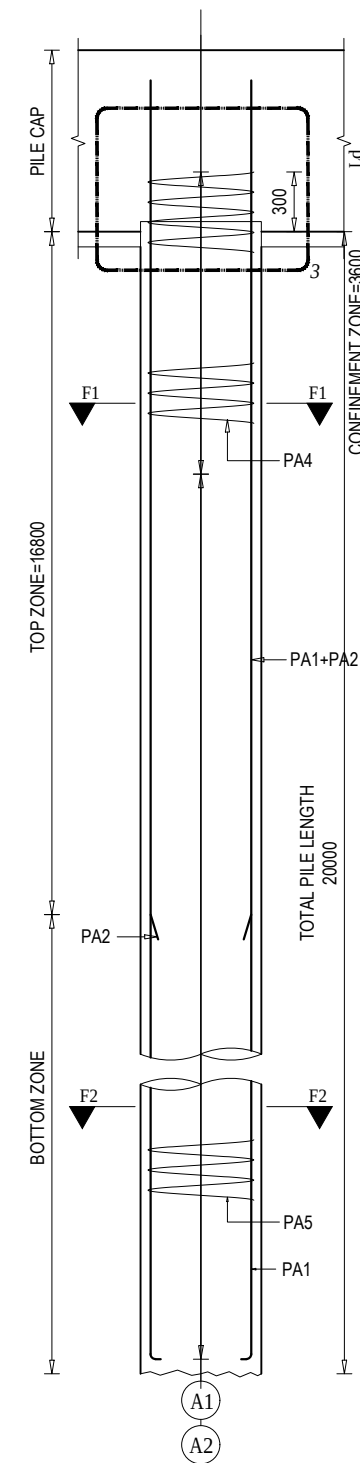
PILE CAPACITY PIER (INDIVIDUAL)			
S.N.	DIA (mm)	DEMAND (kN)	
		SEISMIC	NON SEISMIC
P1, P5	1200	2825	1847
P2, P3 & P4	1200	2712	1722



SECTIONAL VIEW AT F1 - F1
SCALE - 1:40

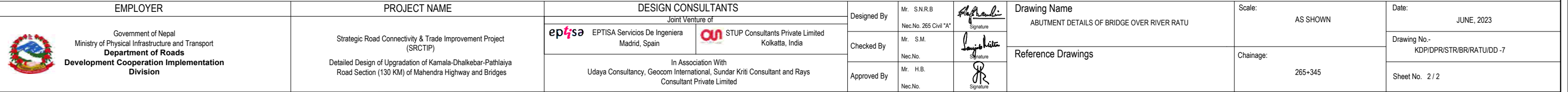


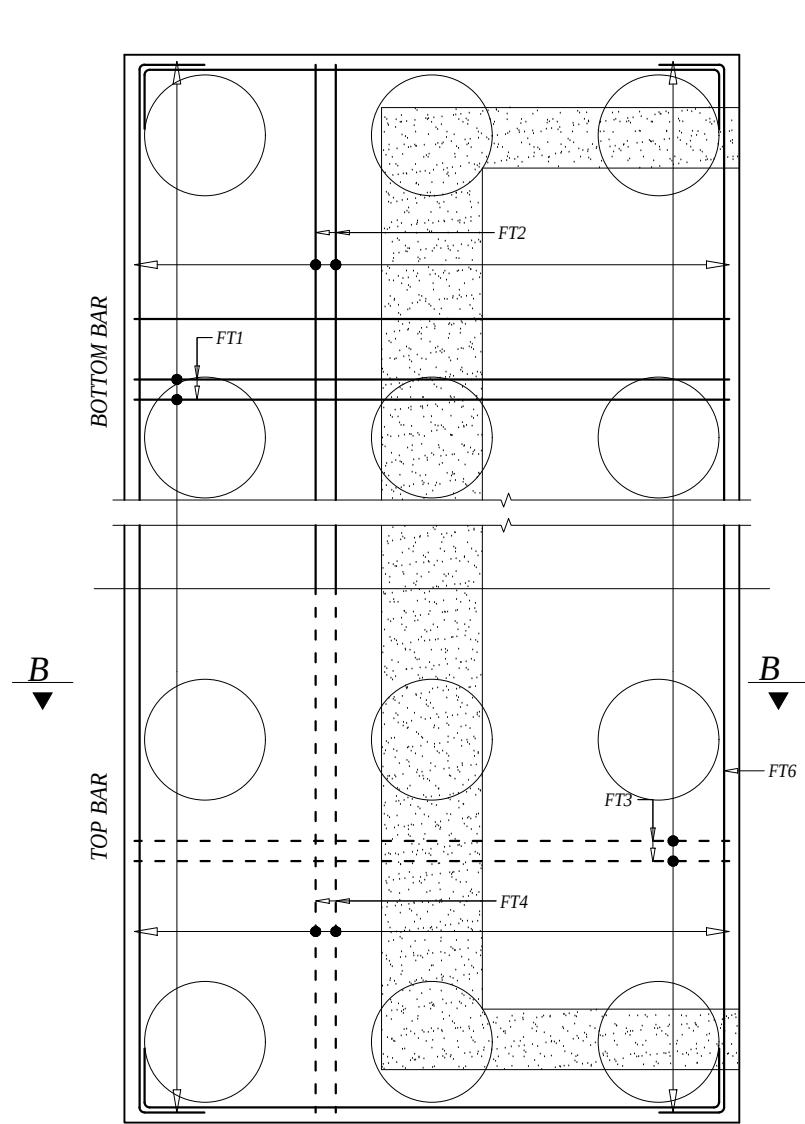
SECTIONAL VIEW AT F2 - F2
SCALE - 1:40



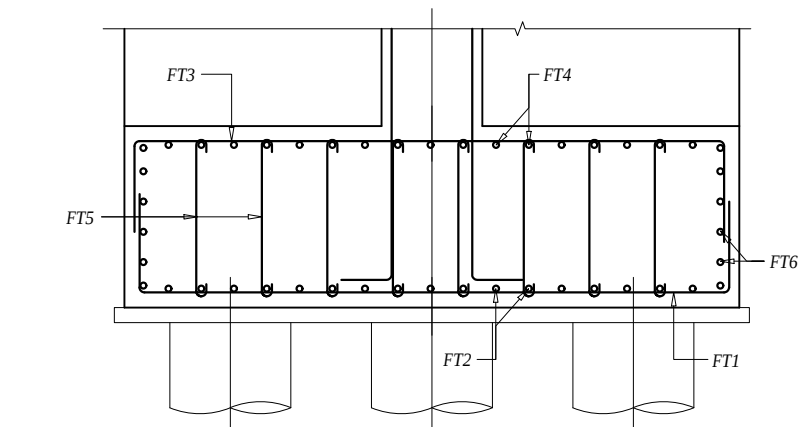
BAR DETAIL AT ABUTMENT PILE
SCALE - 1:75

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											Sheet No. 1/1

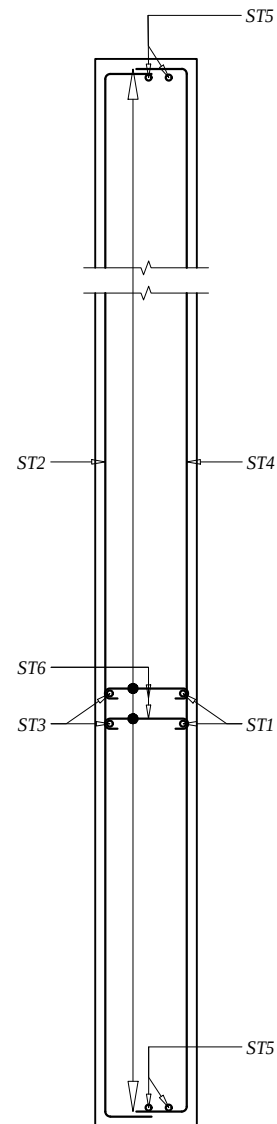




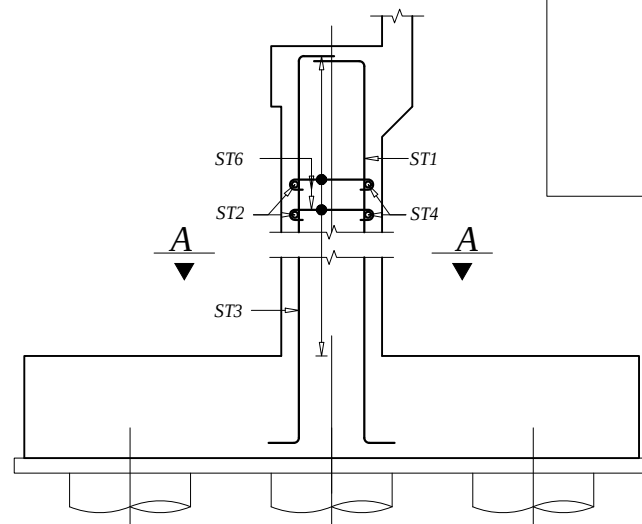
PLAN VIEW OF PILE CAP



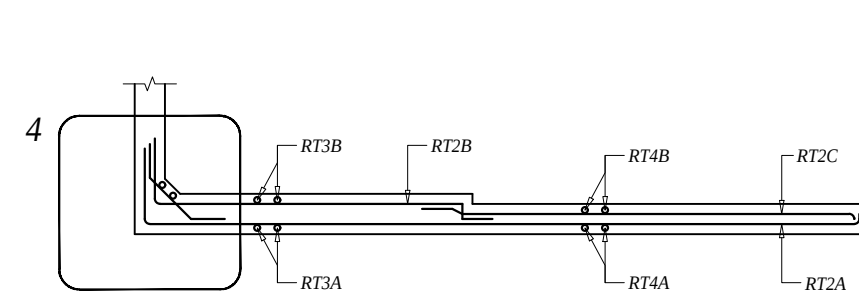
SECTIONAL AT B-B
BAR DETAIL OF PILE CAP
SCALE - 1 : 75



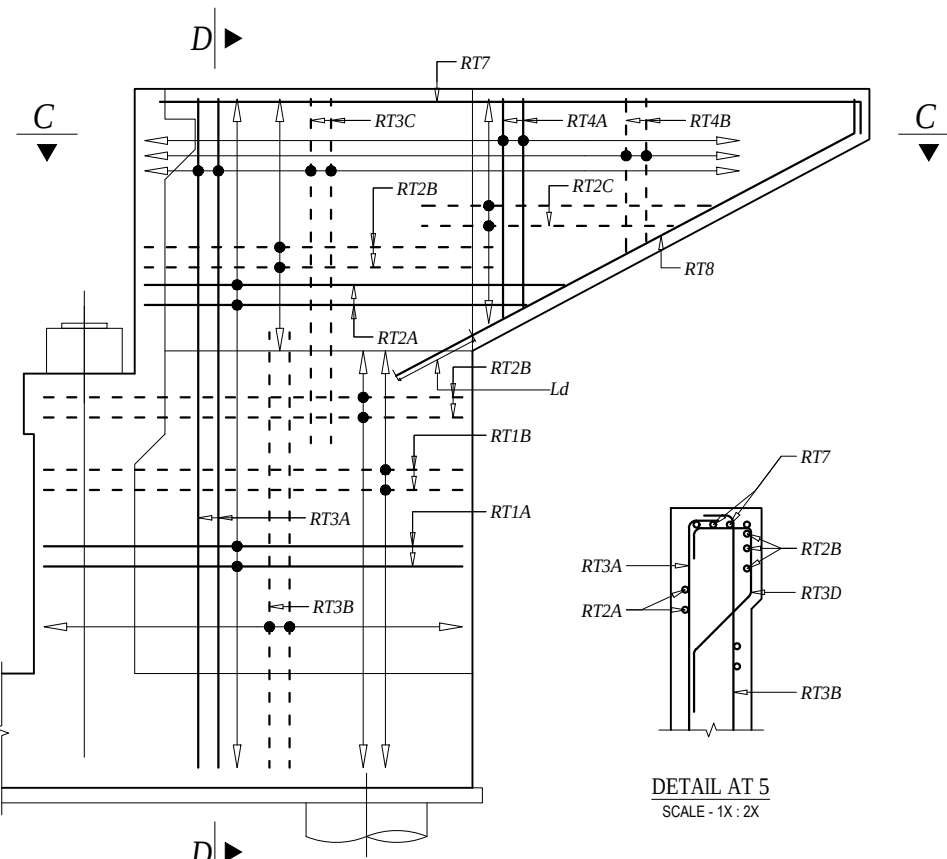
SECTIONAL AT A-A



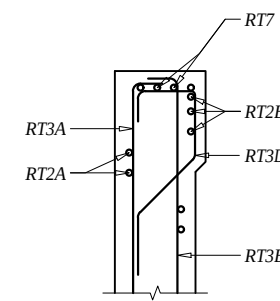
ELEVATION VIEW
BAR DETAIL AT ABUTMENT STEM
SCALE - 1 : 75



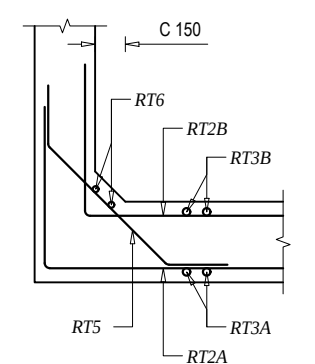
SECTIONAL PLAN VIEW AT C-C



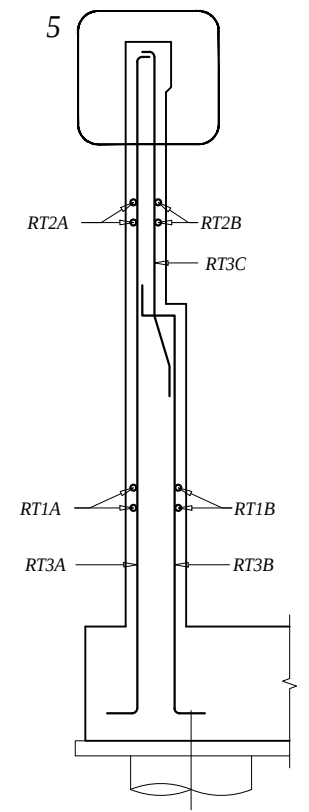
ELEVATION VIEW



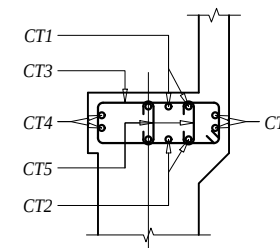
DETAIL AT 5
SCALE - 1X : 2X



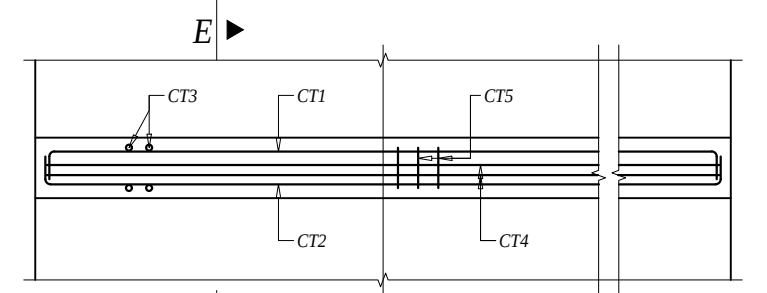
DETAILS AT 4



SECTIONAL SIDE VIEW AT D-D



SECTION VIEW AT E-E

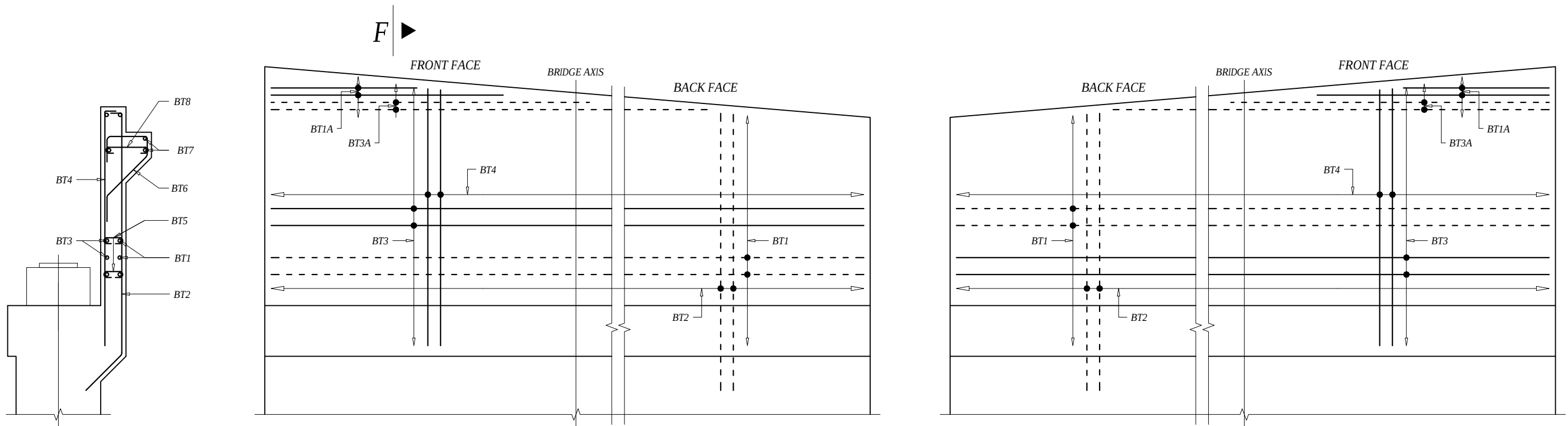


FRONT VIEW

BAR DETAIL AT ABUTMENT CAP
SCALE - 1 : 75

--- TOP BAR/NEAR FACE/
EARTH FACE REINFORCEMENT
--- BOTTOM BAR/ FAR FACE/
OTHER FACE REINFORCEMENT

EMPLOYER  Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	PROJECT NAME Strategic Road Connectivity & Trade Improvement Project (SRCTIP) Detailed Design of Upgradation of Kamala-Dhalkebar-Pathlaiya Road Section (130 KM) of Mahendra Highway and Bridges	DESIGN CONSULTANTS Joint Venture of  EPTISA Servicios De Ingenieria Madrid, Spain  STUP Consultants Private Limited Kolkatta, India In Association With Udaya Consultancy, Geocom International, Sundar Kriti Consultant and Rays Consultant Private Limited	Designed By Mr. S.N.R.B. Nec.No. 265 CIVIL "A" Mr. S.M. Nec.No. Mr. H.B. Nec.No.	Drawing Name ABUTMENT REINFORCEMENT DETAILS OF BRIDGE OVER RIVER RATU Reference Drawings KDP/DPR/STR/BR/RATU/DD -9	Scale: AS SHOWN Chainage: 265+345	Date: JUNE, 2023 Drawing No.- KDP/DPR/STR/BR/RATU/DD -8 Sheet No. 1/2
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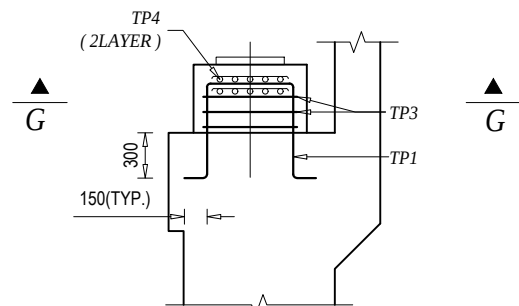
SECTIONAL VIEW AT F-F



ELEVATION VIEW / VIEW AT D1

BAR DETAIL AT DIRT WALL
SCALE - 1 : 50

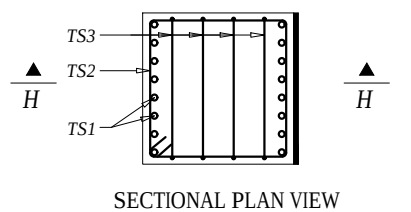
ELEVATION VIEW / VIEW AT D2



SECTIONAL SIDE VIEW

SECTIONAL PLAN VIEW AT G-G

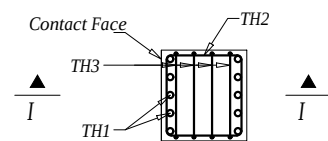
BAR DETAIL AT PEDESTAL
SCALE - 1 : 50



SECTIONAL PLAN VIEW

SECTIONAL VIEW AT H-H

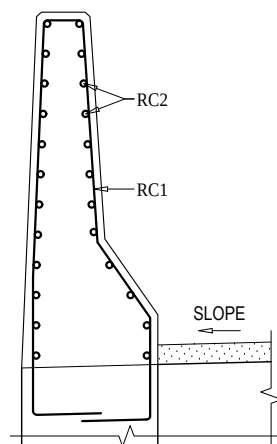
R.C.C STOPPER LEFT
ELEVATION VIEW
SCALE - 1 : 50



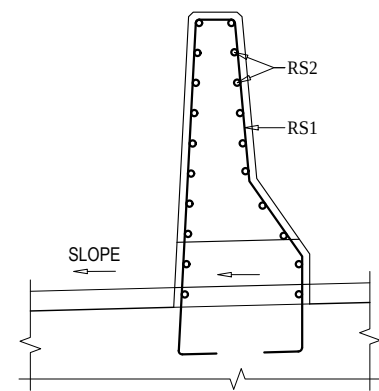
SECTIONAL PLAN VIEW

SECTIONAL VIEW AT I-I

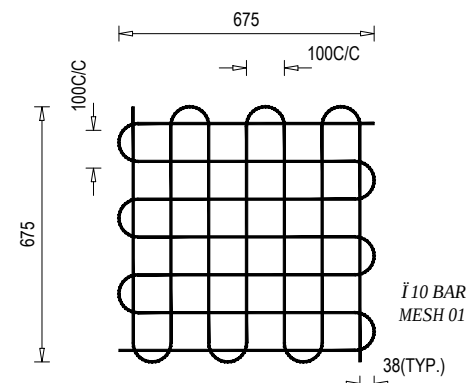
R.C.C LONGITUDINAL
STOPPER SECTION
SCALE - 1 : 50



REINFORCEMENT DETAILS OF
R.C.C BARRIER (B)- SECTIONAL VIEW
SCALE - 1 : 25



REINFORCEMENT DETAILS OF
R.C.C SEPARATOR - SECTIONAL VIEW
SCALE - 1 : 25



REINFORCEMENT DETAILS OF
BEARING MESH
SCALE - 1 : 50

--- TOP BAR OR NEAR FACE REINFORCEMENT
--- BOTTOM BAR OR FAR FACE REINFORCEMENT

EMPLOYER	PROJECT NAME	DESIGN CONSULTANTS	Designed By	Drawing Name	Scale:	Date:
 Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Strategic Road Connectivity & Trade Improvement Project (SRCTIP) Detailed Design of Upgradation of Kamala-Dhalkebar-Pathlaiya Road Section (130 KM) of Mahendra Highway and Bridges	 EPTISA Servicios De Ingenieria Madrid, Spain  STUP Consultants Private Limited Kolkatta, India In Association With Udaya Consultancy, Geocom International, Sundar Kriti Consultant and Rays Consultant Private Limited	Mr. S.N.R.B. Nec.No. 265 CIVIL "A" Mr. S.M. Nec.No. Mr. H.B. Nec.No.	ABUTMENT REINFORCEMENT DETAILS OF BRIDGE OVER RIVER RATU Reference Drawings KDP/DPR/STR/BR/RATU/DD-9	AS SHOWN Chainage: 265+345	JUNE, 2023 Drawing No.- KDP/DPR/STR/BR/RATU/DD-8 Sheet No. 2 / 2

BAR BENDING SCHEDULE OF DIRT WALL								
S.No	BAR MARK	DESCRIPTION OF BAR	BAR DIA.(MM)	SPACING (MM)	BAR LENGTH (M)	No. OF BARS	UNIT WEIGHT (Kg/m)	TOTAL WEIGHT (Kg)
1	BT1	150 11700 150	12	150	12.000	27	0.889	288.00
2	BT1A	Avg. 5850 150	12	150	6.000	3	0.889	16.00
3	BT2	150 3742 Avg. 450	16	100	4.342	120	1.580	823.37
4	BT3	150 11700 150	12	150	12.000	23	0.889	245.33
5	BT3A	Avg. 5850 150	12	150	6.000	3	0.889	16.00
6	BT4	150 3742 Avg.	12	100	3.892	120	0.889	415.15
7	BT5	100 200 100	12	450	0.400	189	0.889	67.20
8	BT6	200 450 720 200 756	16	100	1.826	120	1.580	346.26
9	BT7	11700	12	5 Nos.	11.700	5	0.889	52.00
10	BT8	100 450 100	12	150	0.650	158	0.889	91.29
TOTAL (KG) :								2360.60

BAR BENDING SCHEDULE OF ABUTMENT CAP								
S.No	BAR MARK	DESCRIPTION OF BAR	BAR DIA.(MM)	SPACING (MM)	BAR LENGTH (M)	No. OF BARS	UNIT WEIGHT (Kg/m)	TOTAL WEIGHT (Kg)
1	CT1	300 11700 300	16	150	12.300	12	1.580	233.24
2	CT2	300 11700 300	16	150	12.300	12	1.580	233.24
3	CT3	450 1450 100	16	150	4.000	80	1.580	505.68
4	CT4	300 11700 300	12	150	12.000	8	0.889	85.33
5	CT5	450 100 100	12	Long. 150 Trans 300	0.650	422	0.889	243.82
TOTAL (KG) :								1361.32

BAR BENDING SCHEDULE OF ABUTMENT STEM								
S.No	BAR MARK	DESCRIPTION OF BAR	BAR DIA.(MM)	SPACING (MM)	BAR LENGTH (M)	No. OF BARS	UNIT WEIGHT (Kg/m)	TOTAL WEIGHT (Kg)
1	ST1	300 3296 900	25	130	4.496	92	3.858	1595.80
2	ST2	600 11700 600	16	150	12.900	7	1.580	142.70
3	ST3	300 3296 900	20	130	4.496	92	2.469	1021.31
4	ST4	600 11700 600	16	150	12.900	7	1.580	142.70
5	ST5	300 3296 900	16	200	4.496	14	1.580	99.47
6	ST6	100 1050 100	16	Ver. 450 Hor. 450	1.250	81	1.580	160.00
TOTAL (KG) :								3161.98

BAR BENDING SCHEDULE OF PILE CAP								
S.No	BAR MARK	DESCRIPTION OF BAR	BAR DIA.(MM)	SPACING (MM)	BAR LENGTH (M)	No. OF BARS	UNIT WEIGHT (Kg/m)	TOTAL WEIGHT (Kg)
1	FT1	900 8550 900	32	150	10.450	83	6.321	5462.51
2	FT2	900 12250 900	20	200	14.050	44	2.469	1526.42
3	FT3	900 8550 900	25	150	10.450	83	3.858	3346.28
4	FT4	900 12250 900	16	200	14.050	44	1.580	976.91
5	FT5	1650 150	16	450	1.950	560	1.580	1725.83
6	FT6	8585 12210	16	200	41.892	10	1.580	652.00
TOTAL (KG) :								13719.72

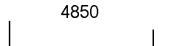
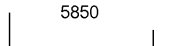
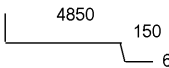
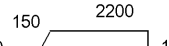
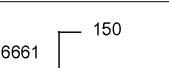
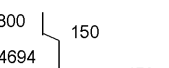
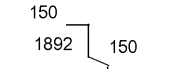
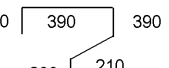
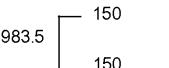
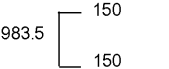
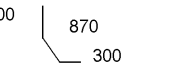
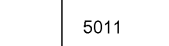
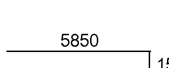
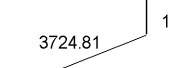
BAR BENDING SCHEDULE OF PEDESTAL								
S.No	BAR MARK	DESCRIPTION OF BAR	BAR DIA.(MM)	SPACING (MM)	BAR LENGTH (M)	No. OF BARS	UNIT WEIGHT (Kg/m)	TOTAL WEIGHT (Kg)
1	TP1	150 700 800	16	150	2.600	6	1.580	24.55
1	TP2	150 700 800	16	150	2.600	6	1.580	24.55
2	TP3	700 700 100	16	150	3.000	4	1.580	18.96
1	TP4	650 650 100 @ 100 Nos.	10	2	10.500	2	0.617	12.96
TOTAL (KG) :								81.23
TOTAL NOS OF PEDESTAL :								4.00
TOTAL WEIGHT (KG) :								324.92

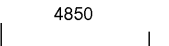
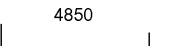
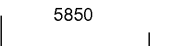
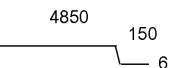
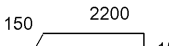
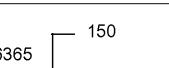
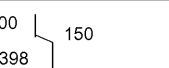
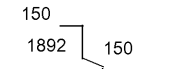
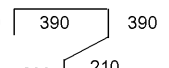
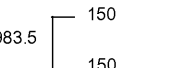
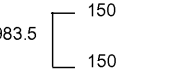
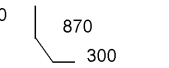
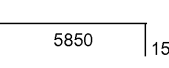
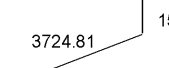
BAR BENDING SCHEDULE OF RCC SEISMIC RESTRAINER - LEFT								
S.No	BAR MARK	DESCRIPTION OF BAR	BAR DIA.(MM)	SPACING (MM)	BAR LENGTH (M)	No. OF BARS	UNIT WEIGHT (Kg/m)	TOTAL WEIGHT (Kg)
1	TS1-L	975 900 850	32		4.550	12	6.321	345.13
2	TS2-L	900 1100 100	16	120	4.200	6	1.580	39.82
3	TS3-L	975 1100 100	16	110	4.350	10	1.580	68.74
TOTAL (KG) :								453.69

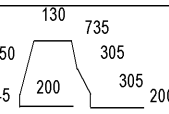
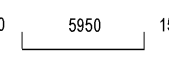
BAR BENDING SCHEDULE OF RCC SEISMIC RESTRAINER - RIGHT								
S.No	BAR MARK	DESCRIPTION OF BAR	BAR DIA.(MM)	SPACING (MM)	BAR LENGTH (M)	No. OF BARS	UNIT WEIGHT (Kg/m)	TOTAL WEIGHT (Kg)
1	TS1-R	1200 900 850	32		5.000	12	6.321	379.26
2	TS2-R	900 1100 100	16	120	4.200	8	1.580	53.10
3	TS3-R	1200 1100 100	16	110	4.800	10	1.580	75.85
TOTAL (KG) :								508.21

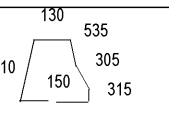
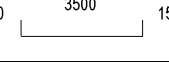
BAR BENDING SCHEDULE OF RCC LONGITUDINAL RESTRAINER								
S.No	BAR MARK	DESCRIPTION OF BAR	BAR DIA.(MM)	SPACING (MM)	BAR LENGTH (M)	No. OF BARS	UNIT WEIGHT (Kg/m)	TOTAL WEIGHT (Kg)
1	TL1	1580 475 850 550	32	100	6.300	6	6.321	202.35
2	TL2	810 475 100	16	150	2.170	8	1.580	27.43
3	TL3	1580 510 100	25	150	4.380	4	3.858	67.59
TOTAL (KG) :								297.35
TOTAL NOS OF LONGITUDINAL RESTRAINER :								3.00
TOTAL WEIGHT (KG) :								892.39

EMPLOYER		PROJECT NAME		DESIGN CONSULTANTS		Designed By		Drawing Name		Scale:		Date:	
 Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division		Strategic Road Connectivity & Trade Improvement Project (SRCTIP) Detailed Design of Upgradation of Kamala-Dhalkebar-Pathlaiya Road Section (130 KM) of Mahendra Highway and Bridges		Joint Venture of		Mr. S.N.R.B		ABUTMENT BAR BENDING SCHEDULE OF BRIDGE OVER RIVER RATU		AS SHOWN		JUNE, 2023	
				 EPTISA Servicios De Ingenieria Madrid, Spain		 STUP Consultants Private Limited Kolkata, India		 Mr. S.M. Nec.No.		Reference Drawings		Chainage:	
				In Association With		 Mr. H.B. Nec.No.		 Mr. S.N.R.B. Nec.No.				Drawing No. - KDP/DP/STR/BR/RATU/DD-9	
				Udaya Consultancy, Geocom International, Sundar Kriti Consultant and Rays Consultant Private Limited						265+345		Sheet No. 1/2	

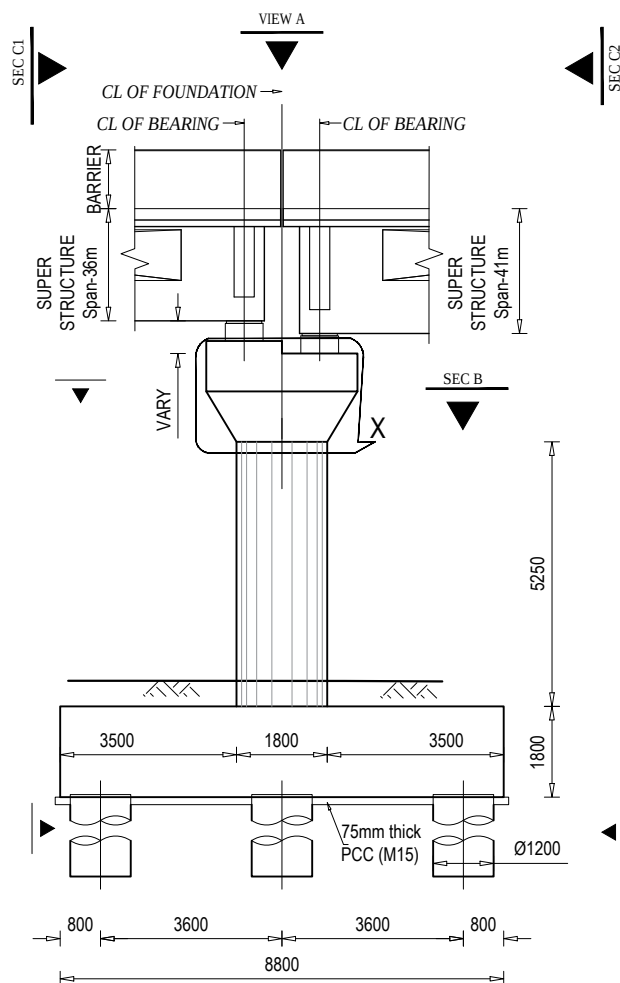
BAR BENDING SCHEDULE OF RETURN WALL - LEFT								
S.No.	BAR MARK	DESCRIPTION OF BAR	BAR DIA.(MM)	SPACING (MM)	BAR LENGTH (M)	No. OF BARS	UNIT WEIGHT (Kg/m)	TOTAL WEIGHT (Kg)
1	RT 1A	450  150	16	150	5.450	34	1.580	292.82
2	RT 1B	450  150	20	150	5.450	34	2.469	457.53
3	RT 2A	450  150	12	150	6.450	15	0.889	86.00
3	RT 2B	150  150 640	16	150	5.790	15	1.580	137.24
4	RT 2C	480  150	12	150	2.980	15	0.889	39.73
5	RT 3A	6661  450	16	150	7.261	27	1.580	309.80
6	RT 3B	800  150 4694	20	150	6.094	27	2.469	406.27
7	RT 3C	150  150 640	16	150	2.832	27	1.580	120.83
8	RT 3D	200  390 210 200	16	150	1.390	41	1.580	90.06
9	RT 4A	983.5  150	12	150	1.284	15	0.889	17.11
10	RT 4B	983.5  150	16	150	1.284	15	1.580	30.42
11	RT 5	300  870 300	12	150	1.470	48	0.889	62.72
12	RT 6	 5011	12	2 Nos.	5.011	2	0.889	8.91
13	RT 7	 5850 150	16		6.000	5	1.580	47.41
14	RT 8	 3724.81 150	12		3.875	5	0.889	17.22
TOTAL (KG) :								2124.08

BAR BENDING SCHEDULE OF RETURN WALL - RIGHT								
S.No.	BAR MARK	DESCRIPTION OF BAR	BAR DIA.(MM)	SPACING (MM)	BAR LENGTH (M)	No. OF BARS	UNIT WEIGHT (Kg/m)	TOTAL WEIGHT (Kg)
1	RT 1A	450  150	16	150	5.450	32	1.580	275.60
2	RT 1B	450  150	20	150	5.450	32	2.469	430.62
3	RT 2A	450  150	12	150	6.450	15	0.889	86.00
4	RT 2B	150  150 640	16	150	5.790	15	1.580	137.24
5	RT 2C	480  150	12	150	2.980	15	0.889	39.73
6	RT 3A	6365  450	16	150	6.965	27	1.580	297.17
7	RT 3B	800  150 4398	20	150	5.798	27	2.469	386.53
8	RT 3C	150  150 640	16	150	2.832	27	1.580	120.83
9	RT 3D	200  390 210 200	16	150	1.390	41	1.580	90.06
10	RT 4A	983.5  150	12	150	1.284	15	0.889	17.11
11	RT 4B	983.5  150	16	150	1.284	15	1.580	30.42
12	RT 5	300  870 300	12	150	1.470	48	0.889	62.72
12	RT 6	 4715	12	2 Nos.	4.715	2	0.889	8.38
13	RT 7	 5850 150	16		6.000	5	1.580	47.41
14	RT 8	 3724.81 150	12		3.875	5	0.889	17.22
TOTAL (KG) :								2047.06

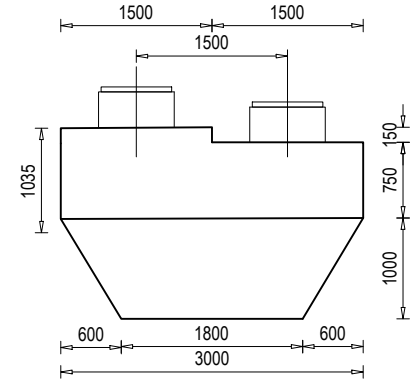
BAR BENDING SCHEDULE OF R.C.C BARRIER								
S.No.	BAR MARK	DESCRIPTION OF BAR	BAR DIA.(MM)	SPACING (MM)	BAR LENGTH (M)	No. OF BARS	UNIT WEIGHT (Kg/m)	TOTAL WEIGHT (Kg)
1	RC-B1		16	150	3.170	41	1.580	205.38
2	RC-B2		10	150	6.250	20	0.617	77.16
TOTAL (KG) :								282.55

BAR BENDING SCHEDULE OF R.C.C SEPARATOR								
S.No.	BAR MARK	DESCRIPTION OF BAR	BAR DIA.(MM)	SPACING (MM)	BAR LENGTH (M)	No. OF BARS	UNIT WEIGHT (Kg/m)	TOTAL WEIGHT (Kg)
1	RS1		16	150	2.695	25	1.580	106.47
2	RS2		10	150	3.800	17	0.617	39.88
TOTAL (KG) :								146.35

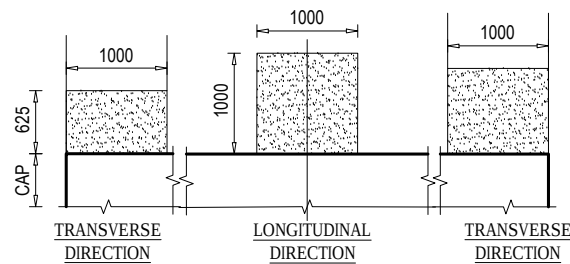
EMPLOYER		PROJECT NAME		DESIGN CONSULTANTS		Drawing Name		Scale:		Date:	
	Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Strategic Road Connectivity & Trade Improvement Project (SRCTIP) Detailed Design of Upgradation of Kamala-Dhalkebar-Pathlaiya Road Section (130 KM) of Mahendra Highway and Bridges	Joint Venture of		Designed By	Mr. S.N.R.B Nec.No. 265 CIVIL "A"	AS SHOWN	AS SHOWN	JUNE, 2023		
			 EPTISA Servicios De Ingeniera Madrid, Spain	 STUP Consultants Private Limited Kolkatta, India	Checked By	Mr. S.M. Nec.No.			Drawing No. - KDP/DPR/STR/BR/RATU/DD -9		
					In Association With Udaya Consultancy, Geocom International, Sundar Kriti Consultant and Rays Consultant Private Limited				Approved By	Mr. H.B. Nec.No.	Reference Drawings
									Chainage: 265+345		Sheet No. 2 / 2



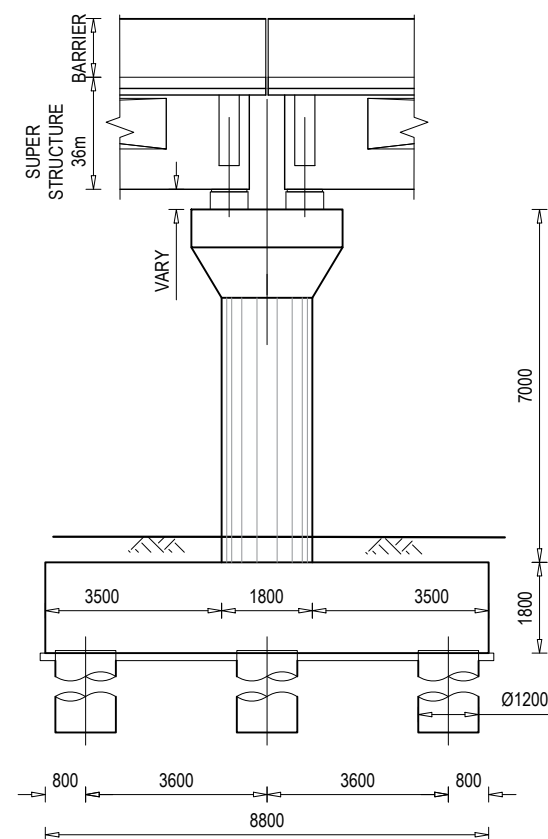
ELEVATION VIEW OF PIER (P1,P5)
SCALE - 1: 150



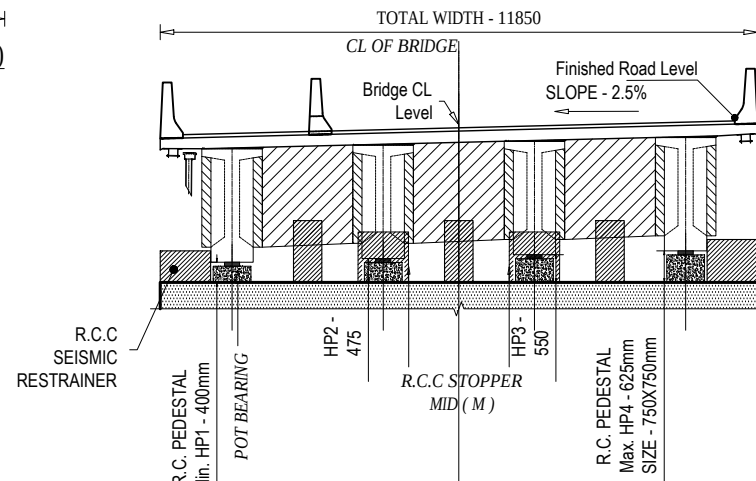
DETAIL AT X
SCALE - 1: 75



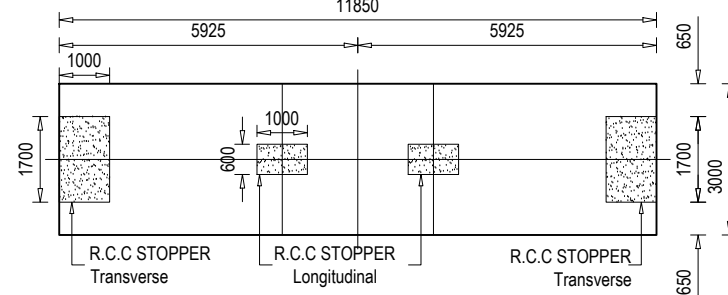
DETAIL OF RCC STOPPER AT PEDESTAL
SCALE - 1: 75



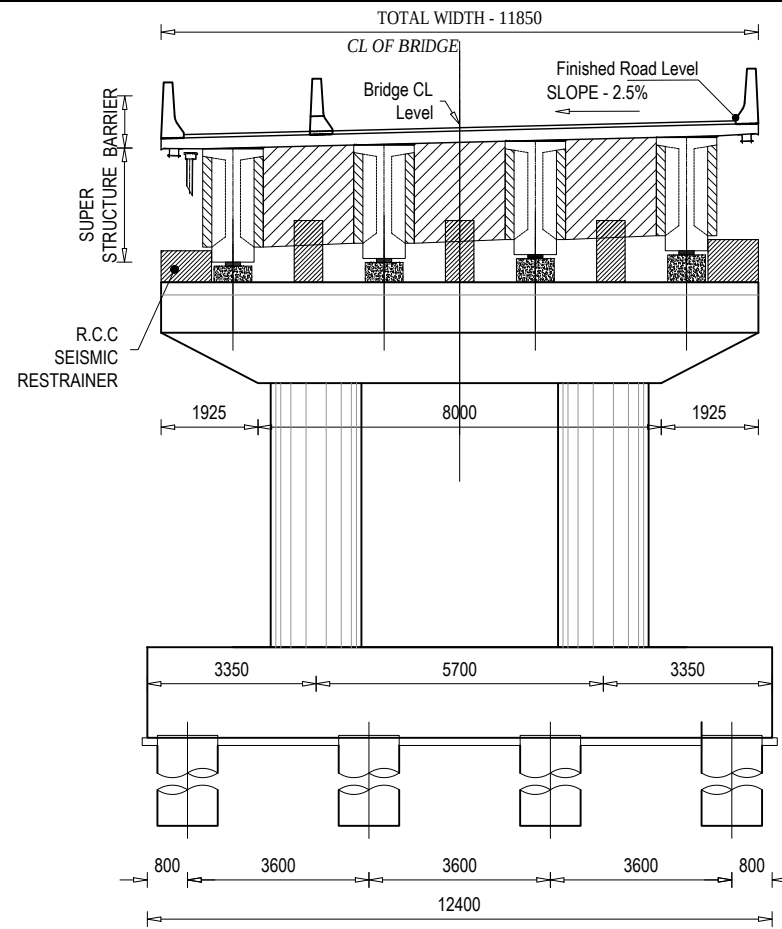
ELEVATION VIEW OF PIER (P2,3,4)
SCALE - 1: 150



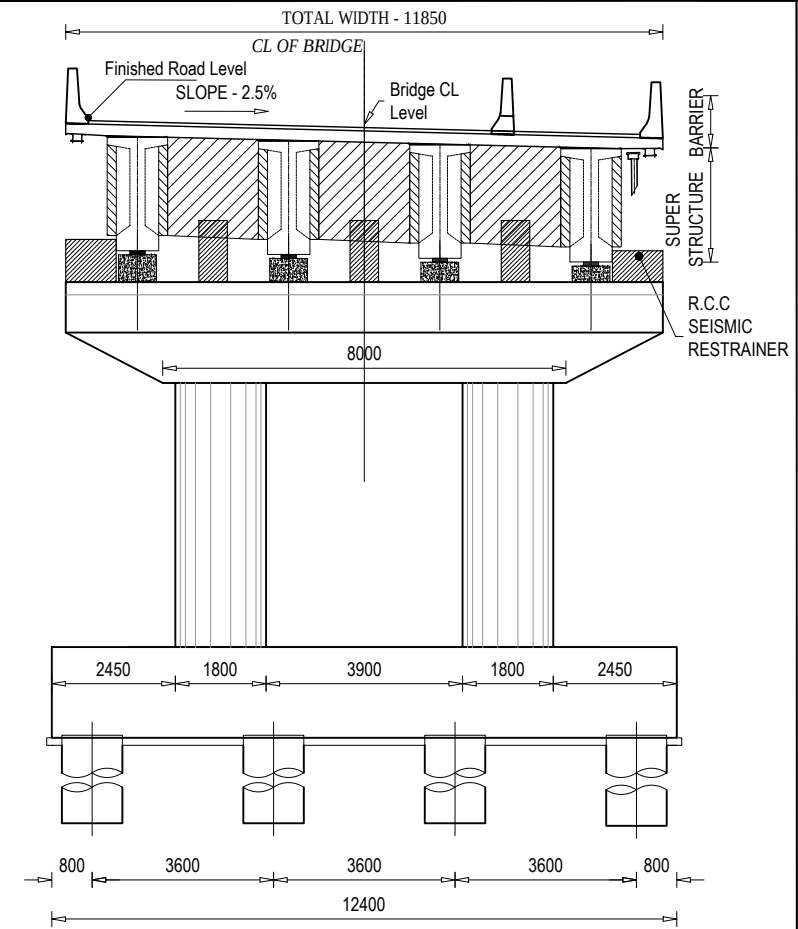
R.C.C PEDESTAL - ELEVATION VIEW
SCALE - 1: 150



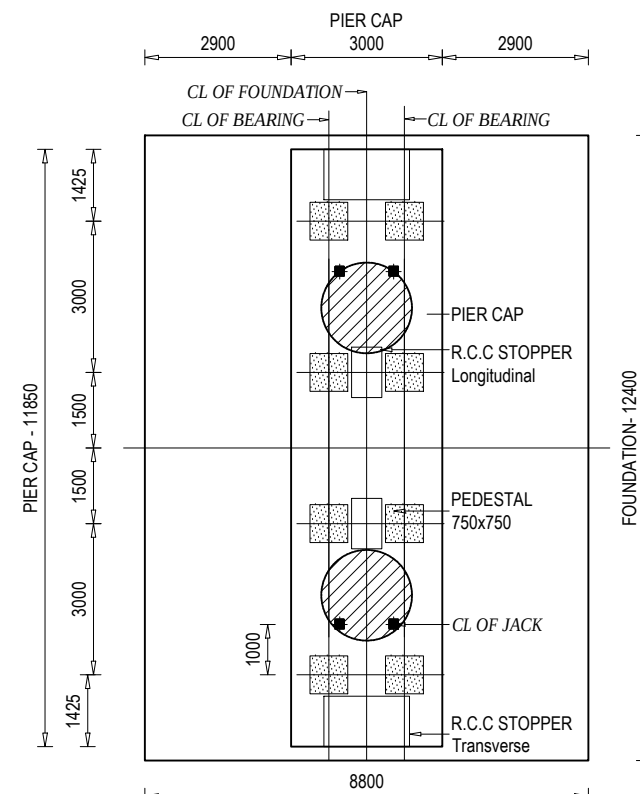
DETAIL AT R.C.C SEISMIC RESTRAINER
NOT SHOWING PEDESTAL
SCALE - 1: 150



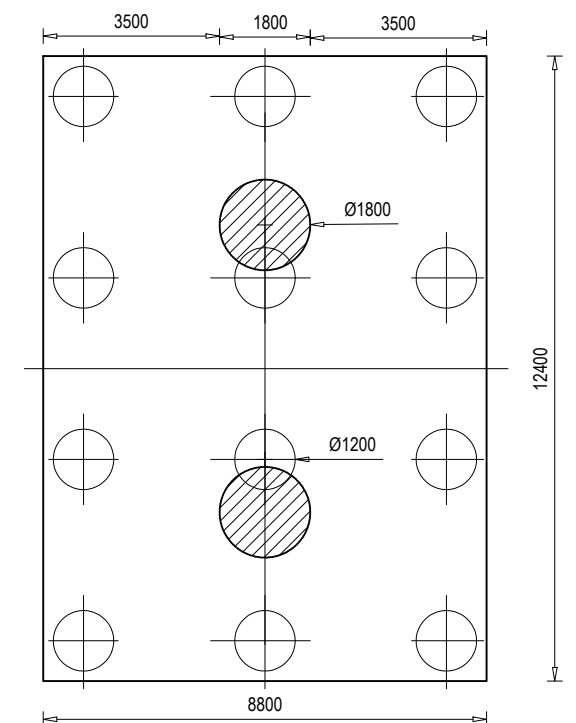
SECTIONAL VIEW AT C1 - C1
SCALE - 1: 150



SECTIONAL VIEW AT C2 - C2
SCALE - 1: 150

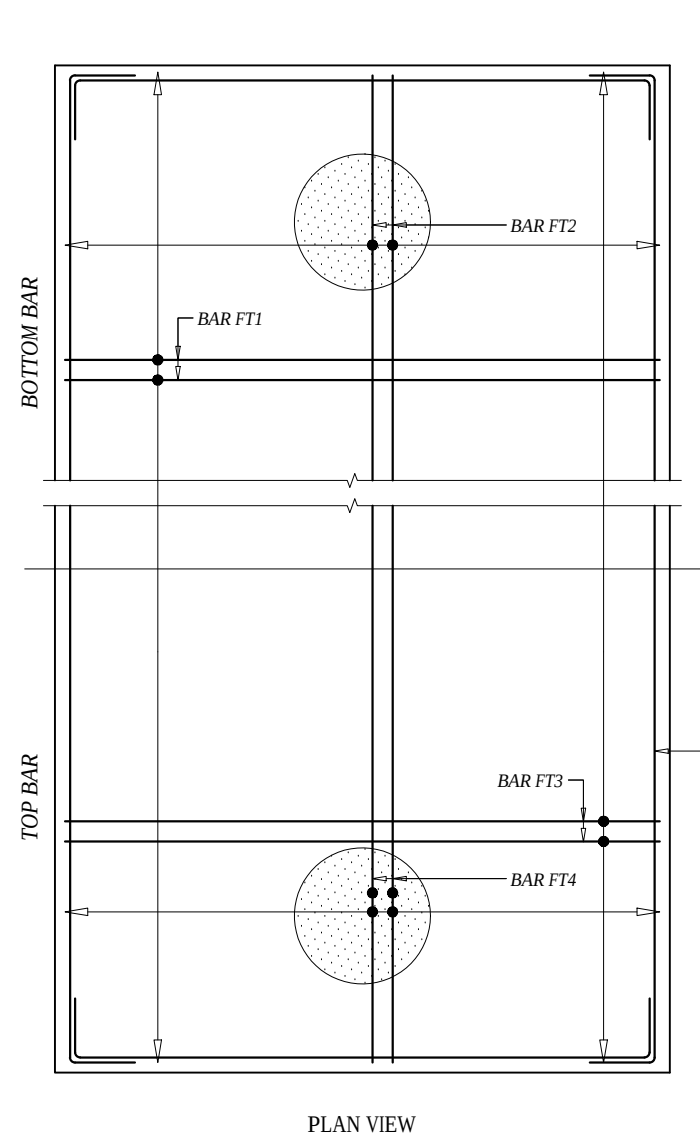


PLAN VIEW OF PIER (VIEW AT A)
SCALE - 1: 150

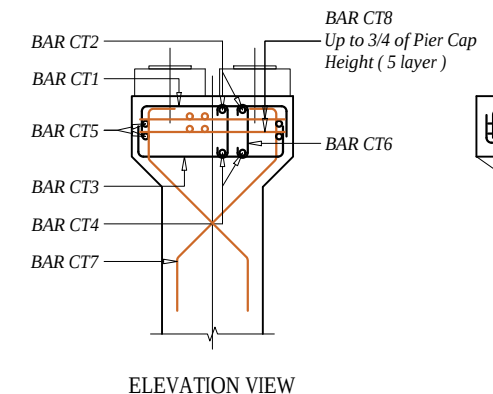


SECTIONAL VIEW AT B - B
SCALE - 1: 150

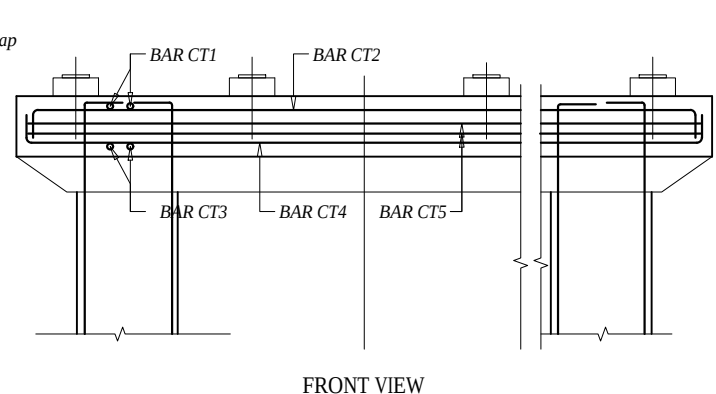
EMPLOYER Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	PROJECT NAME Strategic Road Connectivity & Trade Improvement Project (SRCTIP) Detailed Design of Upgradation of Kamala-Dhalkebar-Pathlaha Road Section (130 KM) of Mahendra Highway and Bridges	DESIGN CONSULTANTS Joint Venture of ep4sa EPTISA Servicios De Ingeniera Madrid, Spain STUP STUP Consultants Private Limited Kolkata, India In Association With Udaya Consultancy, Geocom International, Sundar Kriti Consultant and Rays Consultant Private Limited	Designed By Mr. S.N.R.B. Signature Checked By Mr. S.M. Signature Approved By Mr. H.B. Signature	Drawing Name PIER DETAILS OF BRIDGE OVER RIVER RATU Reference Drawings	Scale: AS SHOWN Chainage: 265+345	Date: JUNE, 2023 Drawing No.- 10 Sheet No. 1/1
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PLAN VIEW

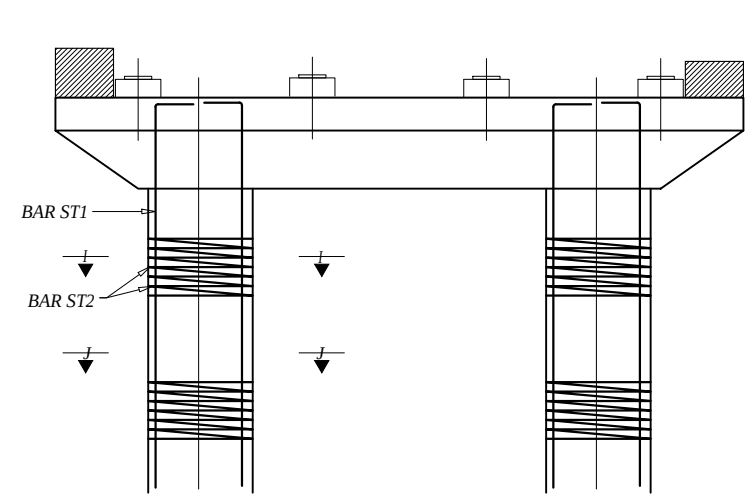


ELEVATION VIEW

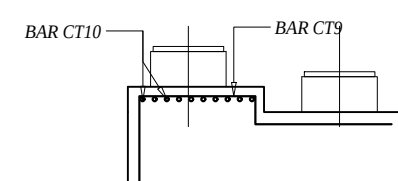


FRONT VIEW

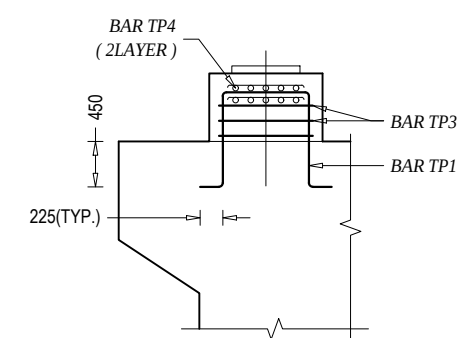
BAR DETAIL AT PIER CAP
SCALE - 1 : 75



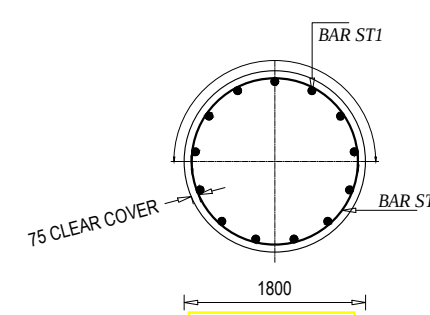
BAR DETAIL AT PIER STEM
SCALE - 1 : 75



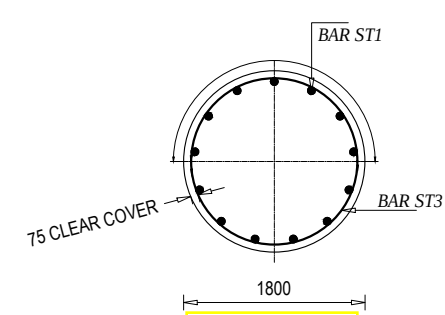
PIER CAP
ONLY SHOWING EXTRA BAR
SCALE - 1 : 40



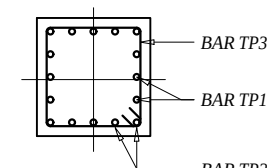
SECTIONAL SIDE VIEW



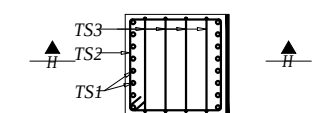
SECTION I-I
SCALE - 1 : 50



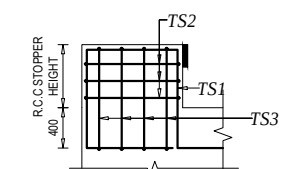
SECTION J-J
SCALE - 1 : 50



SECTIONAL PLAN VIEW
BAR DETAIL AT PEDESTAL
SCALE - 1 : 50

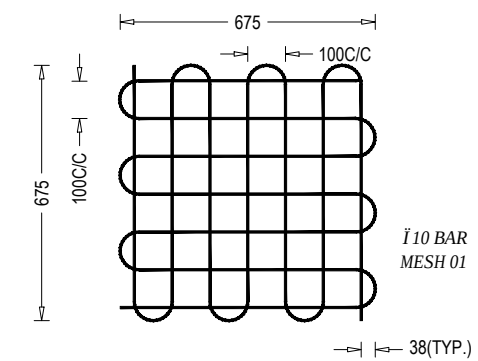


SECTIONAL PLAN VIEW



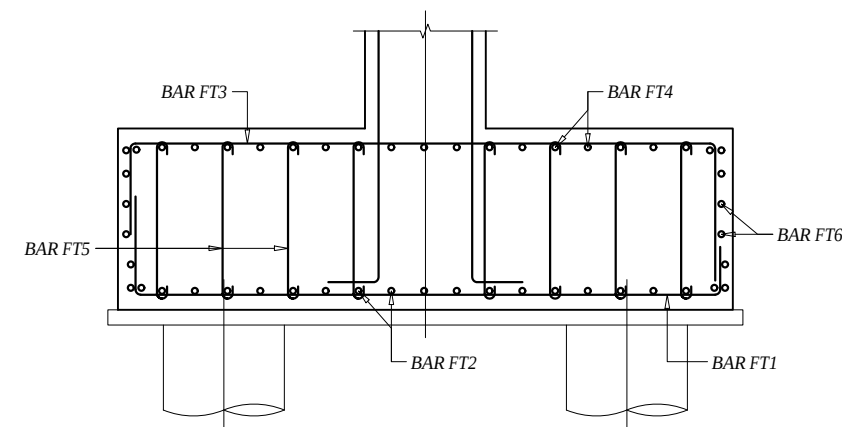
SECTIONAL VIEW AT H-H

R.C.C STOPPER LEFT
ELEVATION VIEW
SCALE - 1 : 50



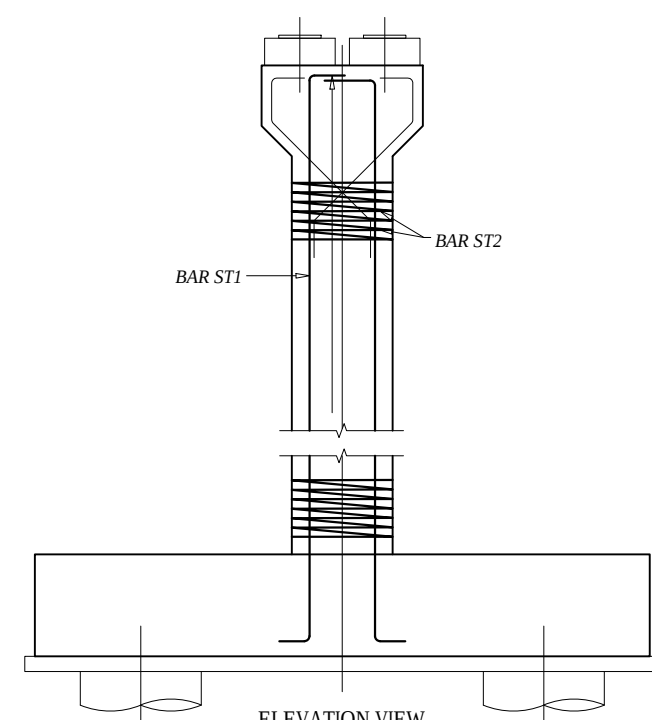
REINFORCEMENT DETAILS OF
BEARING MESH
SCALE - 1 : 50

TOP BAR OR
NEAR FACE REINFORCEMENT
BOTTOM BAR OR
FAR FACE REINFORCEMENT



ELEVATION VIEW

BAR DETAIL OF FOUNDATION
SCALE - 1 : 75



ELEVATION VIEW

BAR DETAIL AT PIER STEM
SCALE - 1 : 75

EMPLOYER  Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	PROJECT NAME Strategic Road Connectivity & Trade Improvement Project (SRCTIP) Detailed Design of Upgradation of Kamala-Dhalkebar-Pathlaiya Road Section (130 KM) of Mahendra Highway and Bridges	DESIGN CONSULTANTS Joint Venture of  EPTISA Servicios De Ingenieria Madrid, Spain  STUP Consultants Private Limited Kolkata, India In Association With Udaya Consultancy, Geocom International, Sundar Kriti Consultant and Rays Consultant Private Limited	Designed By Mr. S.N.R.B. Nec.No. 265 Civil "A" Checked By Mr. S.M. Nec.No. Approved By Mr. H.B. Nec.No.	Signatures   	Drawing Name PIER REINFORCEMENT DETAIL OF BRIDGE OVER RIVER RATU Reference Drawings KDP/IDPR/STR/BR/RATU/DD-12	Scale: AS SHOWN Chainage: 265+345	Date: JUNE, 2023 Drawing No. - 11 Sheet No. 1/1
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