



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 ighway and Bridges**

Final Design Report
Volume IIIA
Design Report & Drawing of Box Culvert
Volume-2
Detailed Drawing

April,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 MILLIMETER AND LEVELS ARE IN METERS UNLESS NOTED OTHERWISE.
2. THESE DRAWINGS ARE APPLICABLE FOR RIGHT CROSSING WITH OVERALL WIDTH OF 11m FOR THE ROADWAY TOP.
3. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED. DIMENSIONS ARE NOT TO BE SCALED.
4. THE LAYOUT OF THE BRIDGE/CULVERT SHALL BE SET AS PER RELEVANT HIGHWAY PLAN AND PROFILE DRAWING
5. 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.
6. DESIGN CRITERIA
 - I. 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
 - II. 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
7. LAYING, COMPACTION, & EXTENT OF BACKFILL BEHIND CULVERT & 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.
8. FILTER MEDIA SHALL BE PROVIDED IN ACCORDANCE TO STANDARD SPECIFICATION FOR ROAD AND BRIDGES WORKS (2073) , DEPARTMENT OF ROADS
9. 100mm DIA WEEP HOLES AT 1000mm C/C BOTH HORIZONTALLY AND VERTICALLY SHALL BE PROVIDED IN STAGGERED MANNER IN VERTICAL WALLS OF THE CULVERT AND RETURN WALL ABOVE GL. IN ONE OR TWO LAYERS AT A SLOPE OF 1 VERTICAL TO 20 HORIZONTAL TOWARDS THE DRAINING FACE.
10. WEARING COAT SHALL BE CONSIST OF THE FOLLOWING FOR BOX CULVERT WITHOUT CUSHION
65 MM THICK ASPHALTIC CONCRETE WEARING COAT AS PER STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE WORKS (2073) , DEPARTMENT OF ROADS
11. RAILINGS/CRASH BARRIER:
RCC CRASH BARRIER AT EDGES OF CARRIAGEWAY /BOX CULVERT
12. INVERT LEVEL OF TOP SURFACE OF BOTTOM SLAB IS ASSUMES AS 1000mm BELOW LOWEST BED LEVEL (LBL).
13. THE CONTRACTOR MAY OPT. FOR PRECAST CONSTRUCTION, SUBJECT TO ENGINEER'S APPROVAL.

B. MATERIAL SPECIFICATION

CONCRETE: -

1. CONCRETE SHALL BE DESIGN MIX AND SHALL HAVE MINIMUM 28 DAY'S CHARACTERISTIC STRENGTH ON 150MM CUBES FOR ALL ELEMENTS OF STRUCTURE AS INDICATED BELOW
 - a) BOX CULVERT.....M35
 - b) RETURN WALL/RETAINING WALL.....M35
 - c) LEVELING COURSEM15
 - d) APPROACH SLABM35
 - e) CAST-IN-SITU CRASH BARRIERM35
 - f) CURATIN WALL.....M20
 - b) HIGH STRENGTH/ORDINARY PORTLAND CEMENT/ AGGREGATE/REINFORCEMENT, DRAINAGE SPOUT, FILTER MATERIALS AND OTHER CONSTRUCTION MATERIAL SHALL CONFIRM TO STANDARD SPECIFICATION OF ROAD AND BRIDGE WORKS (2073), DEPARTMENT OF ROAD.
2. USE OF ADMIXTURES SUCH AS SUPER PLASTICISER FOR CONCRETE MAY BE MADE WITH THE PRIOR APPROVAL OF THE ENGINEER.

REINFORCEMENT

1. ALL REINFORCEMENT SHALL BE HIGH YEILD STRENGTH DEFORMED BARS (GRADE DESIGNATION FE 500) CONFORMING NEPAL STANDARD (NS).
2. SPACING GIVEN FOR ALL REINFORCEMENTS IS PERPENDICULAR TO BAR UNLESS OTHERWISE SHOWN ON DRAWING.

EARTH FILL/ EMBANKMENT

1. BACK FILLING MATERIAL SHOULD CONFORM TO STANDARD SPECIFICATION FOR ROAD AND BRIDGE WORK (2073), DEPARTMENT OF ROADS.

WATER

1. WATER TO BE USED IN CONCRETE AND CURING SHALL CONFORM TO STANDARD SPECIFICATIONS FOR ROAD AND BRIDGES WORKS (2073), DEPARTMENT OF ROADS.

B. WORKMANSHIP/DETAILING

1. CONCRETE COVER
 - a) MINIMUM CLEAR COVER INCLUDING STIRRUPS SHALL BE 75MM EXCEPT TOP SLAB UNLESS OTHERWISE NOTED IN THE DRAWING
 - b) MINIMUM CLEAR COVER TO TOP SLAB INCLUDING STIRRUPS SHALL BE 50MM UNLESS OTHERWISE NOTED IN THE DRAWING.
2. CONSTRUCTION JOINTS
 - I. THE LOCATION AND PROVISION OF CONSTRUCTION JOINT SHALL BE APPROVED BY ENGINEER. SUGGESTED LOCATION OF CONSTRUCTION JOINTS IN THE DIRECTION PARALLEL TO THE DIRECTION OF WATER FLOW IS SHOWN IN GENERAL ARRANGEMENT DRAWING OF BOX CELL STRUCTURES. THE CONCRETING OPERATION SHALL BE CARRIED OUT CONTINUOUS UP TO THE CONSTRUCTION JOINTS.
 - II. THE CONCRETE SURFACE AT THE JOINT SHALL BE BRUSHED WITH A STIFF BRUSH AFTER CASTING WHILE THE CONCRETE IS STILL FRESH AND IT HAS SLIGHTLY HARDENED.
 - III. BEFORE THE NEW CONCRETE IS POURED THE SURFACE OF OLD CONCRETE SHALL BE PREPARED AS UNDER :
 - a. FOR HARDENED CONCRETE THE SURFACE SHALL BE THOROUGHLY CLEANED TO REMOVE DEBRIS AND MADE ROUGH SO THAT $\frac{1}{4}$ OF THE SIZE OF AGGREGATE IS EXPOSED.
 - b. FOR PARTIALLY HARDENED CONCRETE THE SURFACE SHALL BE TREATED BY WIRE BRUSH

FOLLOWED BY AIR JET.

- c. THE OLD SURFACE SHALL BE SOAKED WITH WATER WITHOUT LEAVING PUDDLES, IMMEDIATELY BEFORE STARTING CONCRETING TO PREVENT THE ABSORPTION OF WATER FROM NEW CONCRETE.
- d. NEW CONCRETE SHALL BE THOROUGHLY COMPACTED THROUGH THE REGION OF THE JOINT.

3. LAPS (Ls) ARE TO BE STAGGERED AND MINIMUM LAP LENGTH ARE TO BE AS FOLLOWS (UNLESS NOTED OTHERWISE):

- | | |
|----------------------------|---------|
| a) FOR M 30 GRADE CONCRETE | : 57.20 |
| b) FOR M 35 GRADE CONCRETE | : 51.48 |
| c) FOR M 40 GRADE CONCRETE | : 48.62 |
| d) FOR M 45 GRADE CONCRETE | : 48.62 |
| e) FOR M 50 GRADE CONCRETE | : 48.62 |

(WHERE ϕ IS THE DIAMETER OF THE BAR)

4. 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
LAPPED BAR $\leq 25\%$	57.2 ϕ	51.48 ϕ	48.62 ϕ
25% < LAPPED BAR $\leq 33\%$	65.78 ϕ	62.65 ϕ	55.91 ϕ
33% < LAPPED BAR $\leq 50\%$	80.08 ϕ	72.07 ϕ	68.07 ϕ
50% < LAPPED BAR	85.8 ϕ	77.22 ϕ	72.93 ϕ

5. NOT MORE THAN 50% REINFORCEMENT SHALL BE LAPPED AT ANY LOCATION.
6. 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.
7. BENDING OF REINFORCEMENT BAR SHALL BE AS PER IS:2502
8. SUPPORTING CHAIR OF 12 MM DIA SHALL BE PROVIDED AT SUITABLE INTERVALS.
9. PROPER COMPACTION OF CONCRETE SHALL BE ENSURED BY USE OF FULL WIDTH SCREED VIBRATOR FOR CONCRETE.
10. PROPER BRACED STEEL PLATES SHALL BE USED FOR SHUTTERING.
11. SHARP EDGES OF CONCRETE CAN BE CHAMFERED.
12. FILTER MEDIA SHALL BE PROVIDED IN ACCORDANCE TO STANDARD SPECIFICATION FOR ROAD AND BRIDGE WORKS (2073), DEPARTMENT OF ROADS.
13. IN PRESENCE OF SOIL WITH AGGRESSIVE SOIL CONDITION, THE CONCRETE FACES IN CONTACT WITH EARTH SHALL BE PROTECTED WITH APPROVED BITUMINOUS PAINT OR COATING AS DECIDED BY ENGINEER.

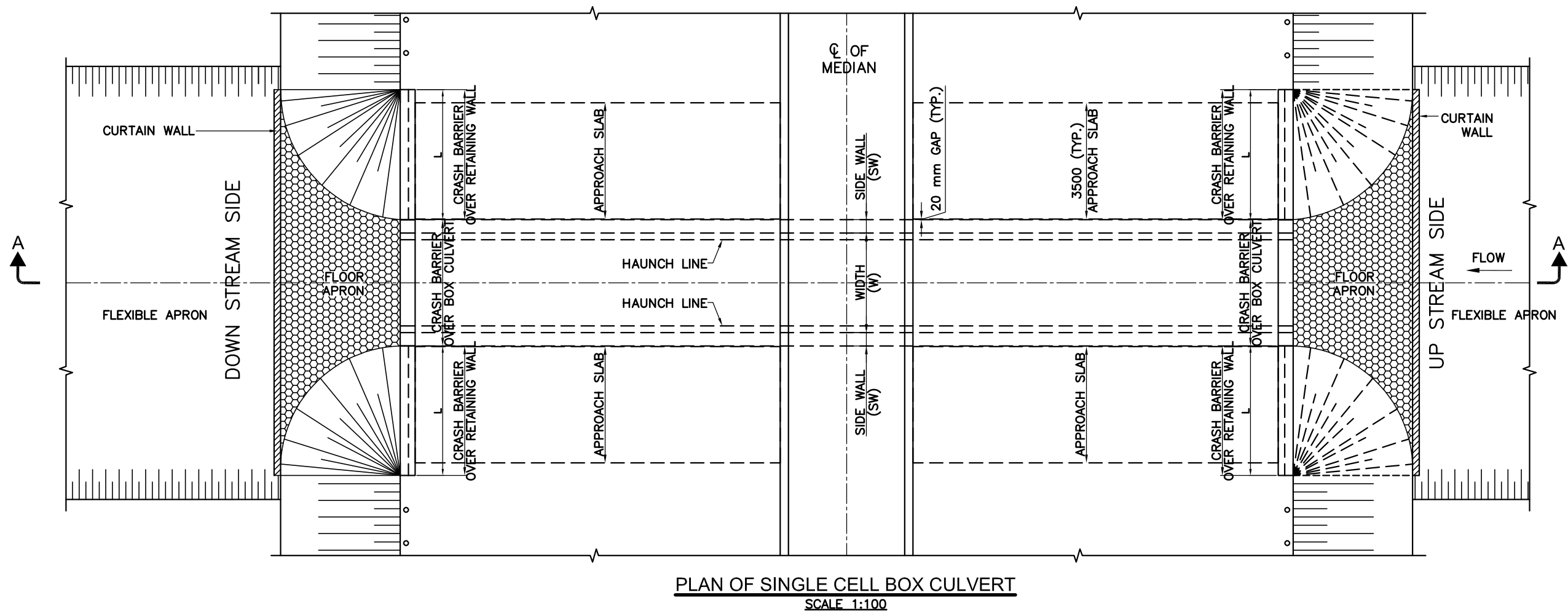
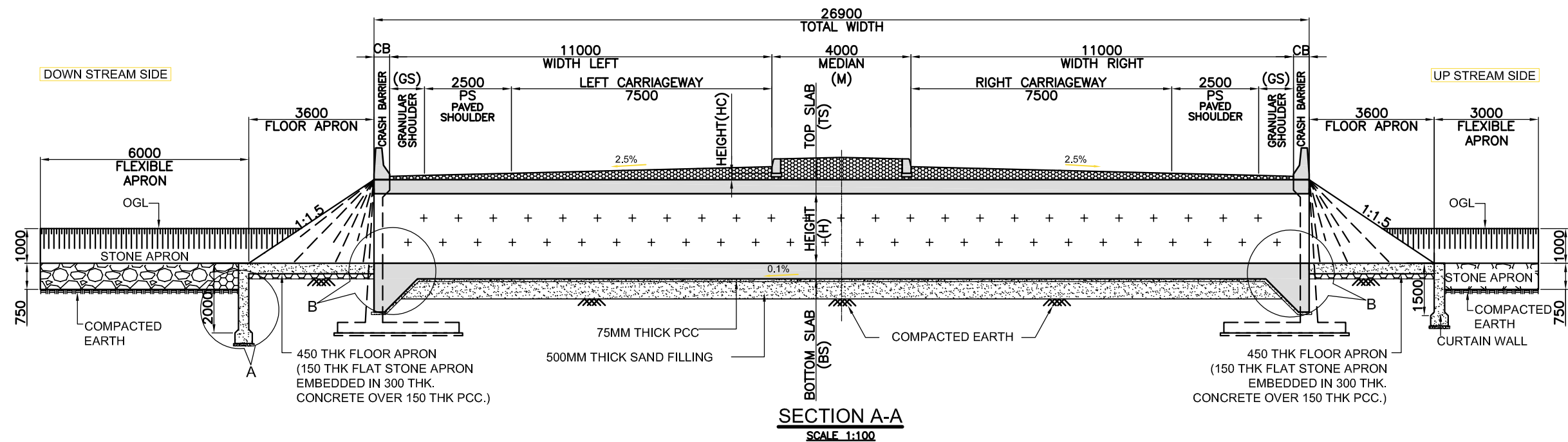
D. GENERAL SPECIFICATION

1. THE WORK SHALL BE EXECUTED IN ACCORDANCE WITH STANDARD SPECIFICATION FOR ROAD AND BRIDGE WORKS (2073), DEPARTMENT OF ROADS.
2. THE WORK OF RAILING POST, ROAD KERB,RCC FOOTPATH SLAB SHALL BE EXECUTED IN ACCORDANCE WITH STANDARD SUPERSTRUCTURE DRAWING FOR ROAD AND BRIDGES PUBLISHED BY BRIDGE BRANCH.

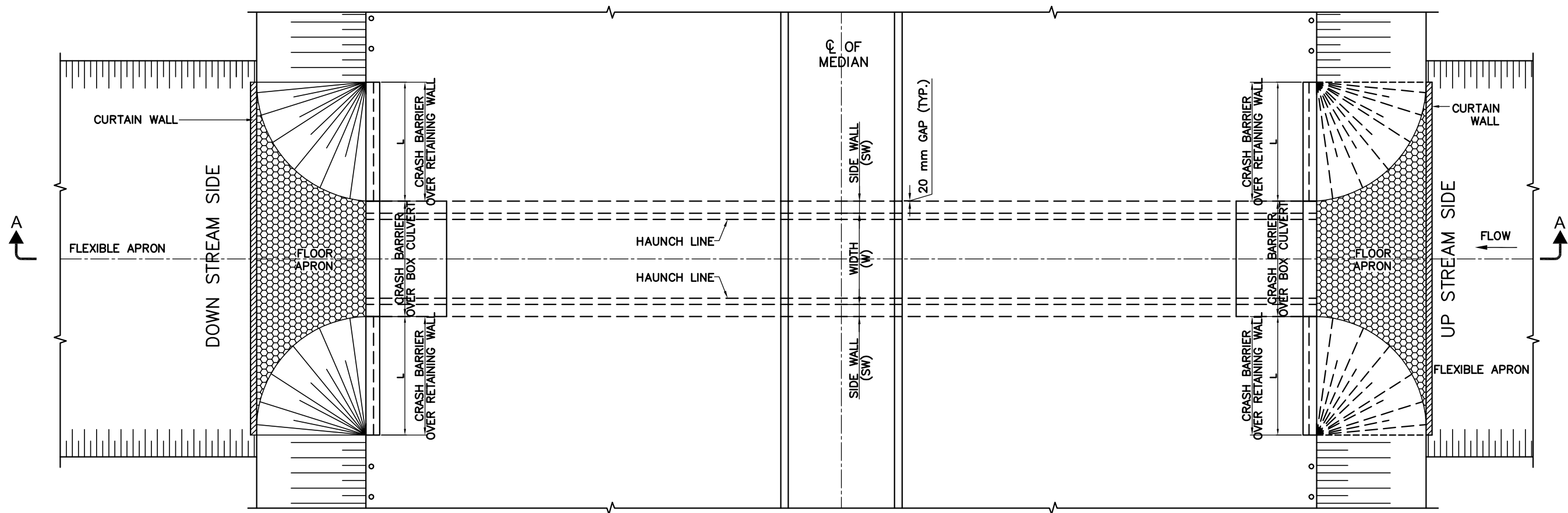
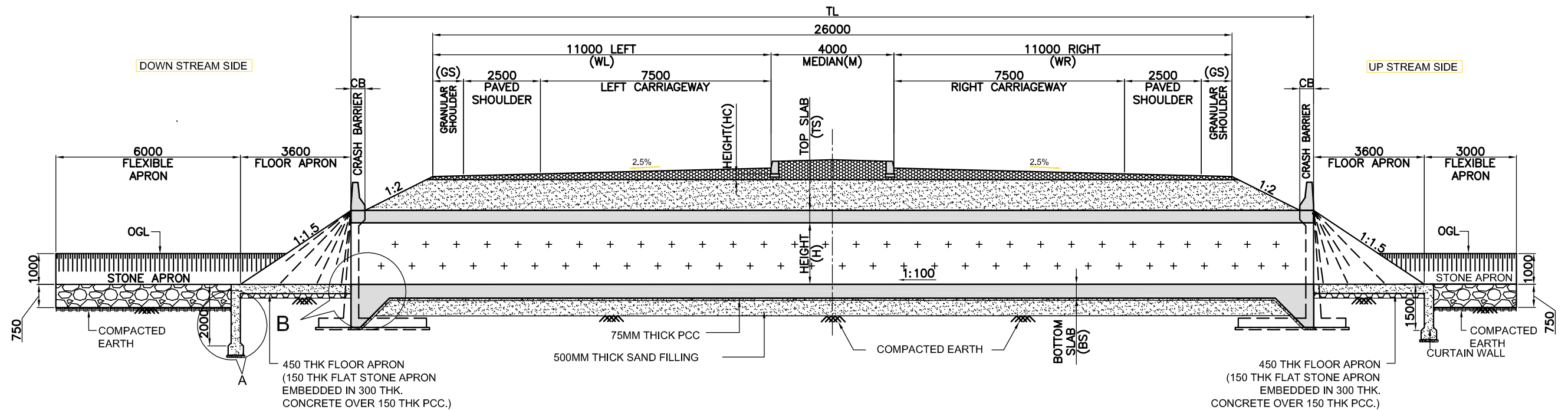
EMPLOYER	PROJECT	DESIGN CONSULTANT	Designed By	Mr. BISHNU GUPTA	Signature	Drawing Name:	Scale:	AS NOTED	Date:	
 Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Strategic Road Connectivity & Trade Improvement Project (SRCTIP) Detailed Design of Upgradation of Kamala-Dhalkebar-Pathlaiya Road Section (130 KM) of Mahendra Highway and Bridges	Joint Venture of				GENERAL NOTES OF CULVERTS			28.03.2024	
		 EPTISA Servicios De Ingenieria Madrid, Spain	 STUP Consultants Private Limited Kolkata, India	Checked By	Mr. SANJIB MITRA	Signature			Reference Drawings:	Drawing No.: KDP/DPR/STR/CULVERT/DD-01
		In Association With Udaya Consultancy, Geocom International, Sundar Kriti Consultant and Rays Consultant Private Limited		Approved By	Mr. Harikrishna Bhavsar	Signature				Sheet No.: 1/1

S.N.	Chainage	BOX SIZE			TOP SLAB	SIDE WALL	BOTTOM SLAB	INNER WALL	HAUNCH	Invert Level D/S	FRL at left curb edge	Width (left)	FRL at Median Left Edge	Median Width	FRL at Median Right Edge	Width (Right)	FRL at Right Kerb Edge	Invert Level U/S	GL at 15m right	Length of the Return Wall, L	Height of the Return Wall, H1	Cushion Depth at U/S	Total Width of box	Reference Drawing for GAD	Reference Drawing for RC	Reference Drawing for Retaining Wall
		CELL	W	H																						
		km	no	mm						mm	mm	mm	mm	mm	mm	m	m	m								
1	238+960	1	3000	2000	400	400	450	0	200x200	112.574	115.308	11.45	115.583	4	115.583	11.45	115.308	112.843	114.235	1.512	4.000	0.000	26.900	KDP/DPR/STR/CULVERT/DD-03	KDP/DPR/STR/CULVERT/DD-15	KDP/DPR/STR/CULVERT/DD-20
2	239+198	1	3000	2000	400	400	450	0	200x200	113.171	115.905	11.45	116.180	4	116.180	11.45	115.905	113.440	114.820	1.530	4.000	0.000	26.900	KDP/DPR/STR/CULVERT/DD-03	KDP/DPR/STR/CULVERT/DD-15	KDP/DPR/STR/CULVERT/DD-20
3	240+140	1	3000	2500	400	400	450	0	200x200	115.011	118.245	11.45	118.520	4	118.520	11.45	118.245	115.280	116.540	2.460	4.000	0.000	26.900	KDP/DPR/STR/CULVERT/DD-03	KDP/DPR/STR/CULVERT/DD-15	KDP/DPR/STR/CULVERT/DD-20
4	240+329	1	3000	2000	400	400	450	0	200x200	116.371	119.105	11.45	119.380	4	119.380	11.45	119.105	116.640	117.920	1.680	4.000	0.000	26.900	KDP/DPR/STR/CULVERT/DD-03	KDP/DPR/STR/CULVERT/DD-15	KDP/DPR/STR/CULVERT/DD-20
5	240+500	1	3000	2000	400	400	450	0	200x200	117.141	119.875	11.45	120.150	4	120.150	11.45	119.875	117.410	118.710	1.650	4.000	0.000	26.900	KDP/DPR/STR/CULVERT/DD-03	KDP/DPR/STR/CULVERT/DD-15	KDP/DPR/STR/CULVERT/DD-20
6	240+650	1	3000	2000	400	400	450	0	200x200	117.821	120.555	11.45	120.830	4	120.830	11.45	120.555	118.090	119.730	1.140	4.000	0.000	26.900	KDP/DPR/STR/CULVERT/DD-03	KDP/DPR/STR/CULVERT/DD-15	KDP/DPR/STR/CULVERT/DD-20
7	240+727	1	3000	2000	400	400	450	0	200x200	118.171	120.905	11.45	121.180	4	121.180	11.45	120.905	118.440	119.821	1.529	4.000	0.000	26.900	KDP/DPR/STR/CULVERT/DD-03	KDP/DPR/STR/CULVERT/DD-15	KDP/DPR/STR/CULVERT/DD-20
8	241+008	1	3000	2000	400	400	450	0	200x200	120.081	122.815	11.45	123.090	4	123.090	11.45	122.815	120.350	121.757	1.489	4.000	0.000	26.900	KDP/DPR/STR/CULVERT/DD-03	KDP/DPR/STR/CULVERT/DD-15	KDP/DPR/STR/CULVERT/DD-20
9	242+266	1	3000	3000	400	400	450	0	200x200	122.320	126.315	11.45	126.590	4	126.590	11.45	126.315	122.610	123.611	3.599	5.000	0.600	29.020	KDP/DPR/STR/CULVERT/DD-04	KDP/DPR/STR/CULVERT/DD-15	KDP/DPR/STR/CULVERT/DD-20
10	242+436	1	3000	2000	400	400	450	0	200x200	123.711	126.445	11.45	126.720	4	126.720	11.45	126.445	123.980	125.850	3.405	4.000	0.000	26.900	KDP/DPR/STR/CULVERT/DD-03	KDP/DPR/STR/CULVERT/DD-15	KDP/DPR/STR/CULVERT/DD-20
11	242+558	1	3000	2000	400	400	450	0	200x200	124.421	127.155	11.45	127.430	4	127.430	11.45	127.155	124.690	125.837	1.880	4.000	0.000	26.900	KDP/DPR/STR/CULVERT/DD-03	KDP/DPR/STR/CULVERT/DD-15	KDP/DPR/STR/CULVERT/DD-20
12	242+764	1	3000	3000	400	400	450	0	200x200	124.732	128.535	11.45	128.810	4	128.810	11.45	128.535	125.015	126.020	3.592	5.000	0.600	28.280	KDP/DPR/STR/CULVERT/DD-04	KDP/DPR/STR/CULVERT/DD-15	KDP/DPR/STR/CULVERT/DD-20
13	242+860	1	3000	3000	400	400	450	0	200x200	125.179	129.185	11.45	129.460	4	129.460	11.45	129.185	125.470	126.470	3.600	5.000	0.600	29.060	KDP/DPR/STR/CULVERT/DD-04	KDP/DPR/STR/CULVERT/DD-15	KDP/DPR/STR/CULVERT/DD-20
14	242+965	1	3000	3000	400	400	450	0	200x200	125.472	129.729	17.70	130.160	4	130.160	17.70	129.729	125.892	126.900	3.588	5.000	0.600	42.047	KDP/DPR/STR/CULVERT/DD-04	KDP/DPR/STR/CULVERT/DD-15	KDP/DPR/STR/CULVERT/DD-20
15	244+162	1	3000	2000	400	400	450	0	200x200	134.598	137.332	15.58	137.710	4	137.710	15.58	137.332	134.867	135.940	1.990	4.000	0.000	26.900	KDP/DPR/STR/CULVERT/DD-03	KDP/DPR/STR/CULVERT/DD-15	KDP/DPR/STR/CULVERT/DD-20
16	245+526	1	3000	2000	400	400	450	0	200x200	138.791	141.525	11.45	141.800	4	141.800	11.45	141.525	139.060	140.420	1.560	4.000	0.000	26.900	KDP/DPR/STR/CULVERT/DD-03	KDP/DPR/STR/CULVERT/DD-15	KDP/DPR/STR/CULVERT/DD-20
17	245+711	1	3000	2000	400	400	450	0	200x200	140.181	142.915	11.45	143.190	4	143.190	11.45	142.915	140.450	141.500	2.025	4.000	0.000	26.900	KDP/DPR/STR/CULVERT/DD-03	KDP/DPR/STR/CULVERT/DD-15	KDP/DPR/STR/CULVERT/DD-20
18	246+041	1	3000	2000	400	400	450	0	200x200	141.661	144.395	11.45	144.670	4	144.670	11.45	144.395	141.930	143.550	1.170	4.000	0.000	26.900	KDP/DPR/STR/CULVERT/DD-03	KDP/DPR/STR/CULVERT/DD-15	KDP/DPR/STR/CULVERT/DD-20
19	246+498	1	3000	2500	400	400	450	0	200x200	145.211	148.445	11.45	148.720	4	148.720	11.45	148.445	145.480	146.730	2.475	4.000	0.000	26.900	KDP/DPR/STR/CULVERT/DD-03	KDP/DPR/STR/CULVERT/DD-15	KDP/DPR/STR/CULVERT/DD-20
20	247+074	1	3000	2500	400	400	450	0	200x200	148.241	151.475	11.45	151.750	4	151.750	11.45	151.475	148.510	149.830	2.370	4.000	0.000	26.900	KDP/DPR/STR/CULVERT/DD-03	KDP/DPR/STR/CULVERT/DD-15	KDP/DPR/STR/CULVERT/DD-20
21	247+472	1	3000	2000	400	400	450	0	200x200	150.019	152.753	18.09	153.194	4	153.194	18.09	152.753	150.288	152.467	0.725	4.000	0.000	26.900	KDP/DPR/STR/CULVERT/DD-03	KDP/DPR/STR/CULVERT/DD-15	KDP/DPR/STR/CULVERT/DD-20
22	248+155	1	3000	2000	400	400	450	0	200x200	151.981	154.715	11.45	154.990	4	154.990	11.45	154.715	152.250	153.250	2.100	4.000	0.000	26.900	KDP/DPR/STR/CULVERT/DD-03	KDP/DPR/STR/CULVERT/DD-15	KDP/DPR/STR/CULVERT/DD-20
23	248+476	1	3000	2500	400	400	450	0	200x200	152.971	156.205	11.45	156.480	4	156.480	11.45	156.205	153.240	154.580	2.340	4.000	0.000	26.900	KDP/DPR/STR/CULVERT/DD-03	KDP/DPR/STR/CULVERT/DD-15	KDP/DPR/STR/CULVERT/DD-20

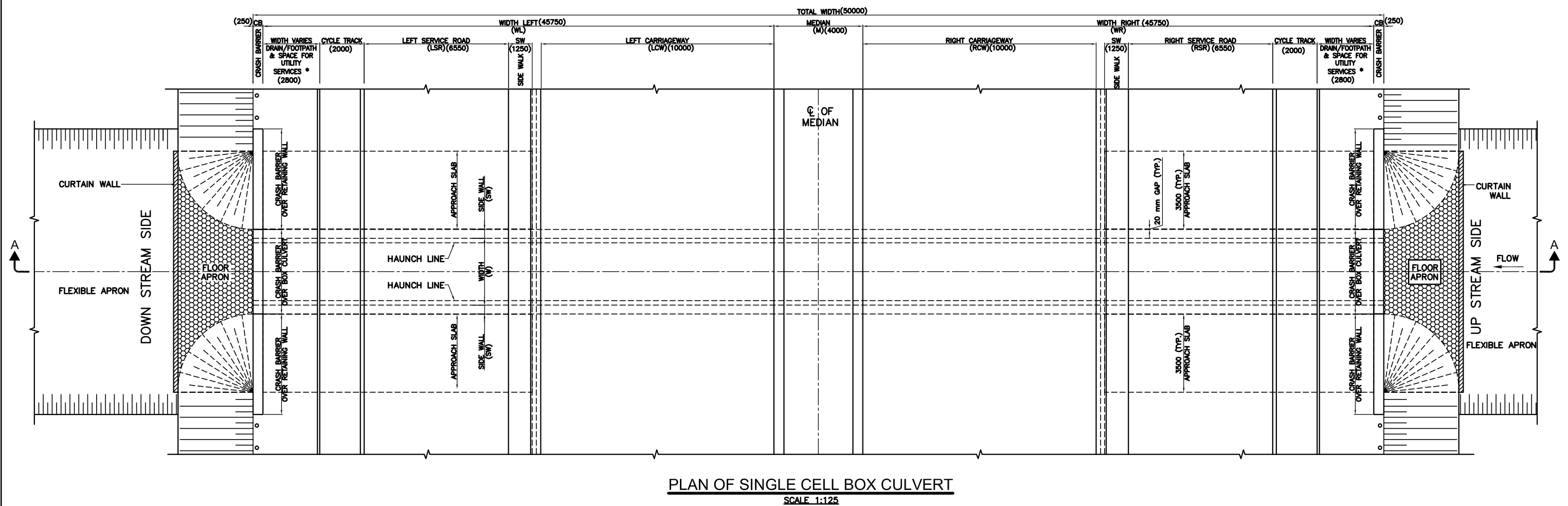
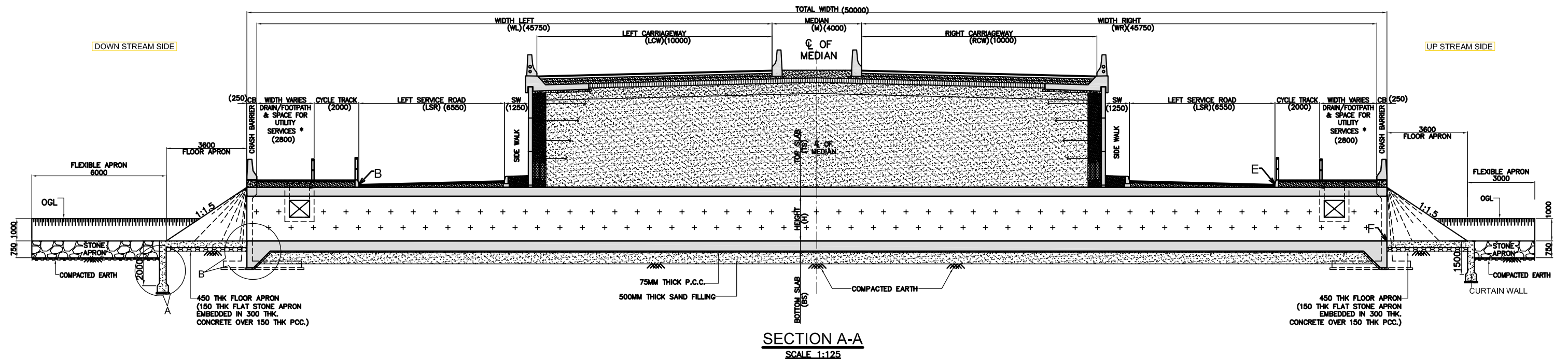
	S.N.	Chainage	BOX SIZE			TOP SLAB	SIDE WALL	BOTTOM SLAB	INNER WALL	HAUNCH	Invert Level D/S	FRL at left curb edge	Width (left)	FRL at Median Left Edge	Median Width	FRL at Median Right Edge	Width (Right)	FRL at Right Kerb Edge	Invert Level U/S	GL at 15m right	Length of the Return Wall, L	Height of the Return Wall, H1	Cushion Depth at U/S	Total Width of box	Reference Drawing for GAD	Reference Drawing for RC	Reference Drawing for Retaining Wall
			CELL	W	H																						
			km	no	mm						mm	mm	mm	mm	mm	mm	m	m	m	m	m	m	m	m			
	72	290+826	1	3000	2500	400	400	450	0	200x200	159.461	162.695	11.45	162.970	4	162.970	11.45	162.695	159.730	161.220	2.115	4.000	0.000	26.900	KDP/DPR/STR/CULVERT/DD-03	KDP/DPR/STR/CULVERT/DD-15	KDP/DPR/STR/CULVERT/DD-20
	73	297+020	1	3000	2000	400	400	450	0	200x200	140.171	142.905	11.45	143.180	4	143.180	11.45	142.905	140.440	141.810	1.545	4.000	0.000	26.900	KDP/DPR/STR/CULVERT/DD-03	KDP/DPR/STR/CULVERT/DD-15	KDP/DPR/STR/CULVERT/DD-20
	74	297+671	3	6000	4000	750	800	800	800	450x450	138.634	144.135	11.45	144.410	4	144.410	11.45	144.135	138.930	139.930	5.625	6.000	0.500	29.620	KDP/DPR/STR/CULVERT/DD-12	KDP/DPR/STR/CULVERT/DD-19	KDP/DPR/STR/CULVERT/DD-20
	75	298+696	3	6000	4000	750	800	800	800	450x450	138.023	143.545	11.45	143.820	4	143.820	11.45	143.545	138.320	139.320	5.625	6.000	0.500	29.700	KDP/DPR/STR/CULVERT/DD-12	KDP/DPR/STR/CULVERT/DD-19	KDP/DPR/STR/CULVERT/DD-20
	76	299+405	1	3000	3000	600	700	700	0	200x200	139.365	147.137	20.15	147.629	4	147.629	20.15	147.137	139.865	140.865	3.900	5.000	4.000	50.000	KDP/DPR/STR/CULVERT/DD-06	KDP/DPR/STR/CULVERT/DD-15	KDP/DPR/STR/CULVERT/DD-20
	77	299+833	1	3000	3000	400	400	450	0	200x200	138.614	143.680	20.15	144.172	4	144.172	20.15	143.680	139.114	140.114	3.600	5.000	1.500	50.000	KDP/DPR/STR/CULVERT/DD-06	KDP/DPR/STR/CULVERT/DD-15	KDP/DPR/STR/CULVERT/DD-20
	78	301+052	2	3000	3000	450	450	500	400	350x350	137.215	143.202	11.45	143.477	4	143.477	11.45	143.202	137.580	138.580	3.675	5.000	2.500	36.488	KDP/DPR/STR/CULVERT/DD-08	KDP/DPR/STR/CULVERT/DD-17	KDP/DPR/STR/CULVERT/DD-20
	79	301+197	2	6000	4500	850	850	850	800	350x350	137.042	143.409	11.45	143.684	4	143.684	11.45	143.409	137.348	138.348	6.525	7.000	1.000	30.644	KDP/DPR/STR/CULVERT/DD-08	KDP/DPR/STR/CULVERT/DD-18	KDP/DPR/STR/CULVERT/DD-20
	80	301+336	2	3000	3000	450	500	550	400	350x350	137.133	143.602	11.45	143.877	4	143.877	11.45	143.602	137.516	138.516	3.675	5.000	3.000	38.344	KDP/DPR/STR/CULVERT/DD-08	KDP/DPR/STR/CULVERT/DD-17	KDP/DPR/STR/CULVERT/DD-20
	81	303+385	1	6000	3000	650	700	700	0	350x350	141.352	145.386	11.45	145.661	4	145.661	11.45	145.386	141.621	143.132	3.209	5.000	0.000	26.900	KDP/DPR/STR/CULVERT/DD-03	KDP/DPR/STR/CULVERT/DD-16	KDP/DPR/STR/CULVERT/DD-20
	82	304+010	1	3000	3000	600	700	700	0	200x200	142.425	149.473	20.15	149.965	4	149.965	20.15	149.473	142.925	143.925	3.900	5.000	4.000	50.000	KDP/DPR/STR/CULVERT/DD-06	KDP/DPR/STR/CULVERT/DD-15	KDP/DPR/STR/CULVERT/DD-20
	83	304+710	1	3000	3000	400	400	450	0	200x200	139.277	144.008	20.15	144.500	4	144.500	20.15	144.008	139.763	140.855	3.461	5.000	1.000	48.580	KDP/DPR/STR/CULVERT/DD-06	KDP/DPR/STR/CULVERT/DD-15	KDP/DPR/STR/CULVERT/DD-20
	84	305+069	1	3000	3000	400	400	450	0	200x200	137.697	141.515	11.45	141.790	4	141.790	11.45	141.515	137.980	138.980	3.600	5.000	0.600	28.340	KDP/DPR/STR/CULVERT/DD-04	KDP/DPR/STR/CULVERT/DD-15	KDP/DPR/STR/CULVERT/DD-20
	85	305+191	1	3000	2500	400	400	450	0	200x200	137.471	140.705	11.45	140.980	4	140.980	11.45	140.705	137.740	138.996	2.466	4.000	0.000	26.900	KDP/DPR/STR/CULVERT/DD-03	KDP/DPR/STR/CULVERT/DD-15	KDP/DPR/STR/CULVERT/DD-20
	86	305+227	1	3000	3000	400	400	450	0	200x200	136.891	140.625	11.45	140.900	4	140.900	11.45	140.625	137.160	138.610	2.925	5.000	0.000	26.900	KDP/DPR/STR/CULVERT/DD-03	KDP/DPR/STR/CULVERT/DD-15	KDP/DPR/STR/CULVERT/DD-20
	87	305+636	1	3000	3000	400	400	450	0	200x200	136.311	140.045	11.45	140.320	4	140.320	11.45	140.045	136.580	137.750	3.345	5.000	0.000	26.900	KDP/DPR/STR/CULVERT/DD-03	KDP/DPR/STR/CULVERT/DD-15	KDP/DPR/STR/CULVERT/DD-20
	88	306+500	1	3000	2000	400	400	450	0	200x200	136.912	139.646	13	139.960	4	139.960	13	139.646	137.181	138.790	1.187	4.000	0.000	26.900	KDP/DPR/STR/CULVERT/DD-03	KDP/DPR/STR/CULVERT/DD-15	KDP/DPR/STR/CULVERT/DD-20
	89	307+370	2	3000	3000	400	450	500	400	350x350	133.873	138.648	20.15	139.140	4	139.140	20.15	138.648	134.361	135.360	3.601	5.000	1.000	48.748	KDP/DPR/STR/CULVERT/DD-10	KDP/DPR/STR/CULVERT/DD-17	KDP/DPR/STR/CULVERT/DD-20
	90	308+645	1	6000	3500	700	700	750	0	350x350	133.511	138.045	11.45	138.320	4	138.320	11.45	138.045	133.780	134.820	4.740	6.000	0.000	26.900	KDP/DPR/STR/CULVERT/DD-03	KDP/DPR/STR/CULVERT/DD-16	KDP/DPR/STR/CULVERT/DD-20
	91	309+033	1	6000	3000	650	700	700	0	350x350	131.801	135.835	11.45	136.110	4	136.110	11.45	135.835	132.070	133.680	3.060	5.000	0.000	26.900	KDP/DPR/STR/CULVERT/DD-03	KDP/DPR/STR/CULVERT/DD-16	KDP/DPR/STR/CULVERT/DD-20
	92	310+698	2	3000	2000	400	400	450	300	350x350	127.408	130.142	11.45	130.417	4	130.417	11.45	130.142	127.677	129.337	1.110	4.000	0.000	26.900	KDP/DPR/STR/CULVERT/DD-07	KDP/DPR/STR/CULVERT/DD-17	KDP/DPR/STR/CULVERT/DD-20
	93	311+289	1	6000	3000	650	700	700	0	350x350	127.111	131.145	11.45	131.420	4	131.420	11.45	131.145	127.380	128.900	3.195	5.000	0.000	26.900	KDP/DPR/STR/CULVERT/DD-03	KDP/DPR/STR/CULVERT/DD-16	KDP/DPR/STR/CULVERT/DD-20
	94	313+430	1	3000	2000	400	400	450	0	200x200	132.430	135.164	20.15	135.656	4	135.656	20.15	135.164	132.699								



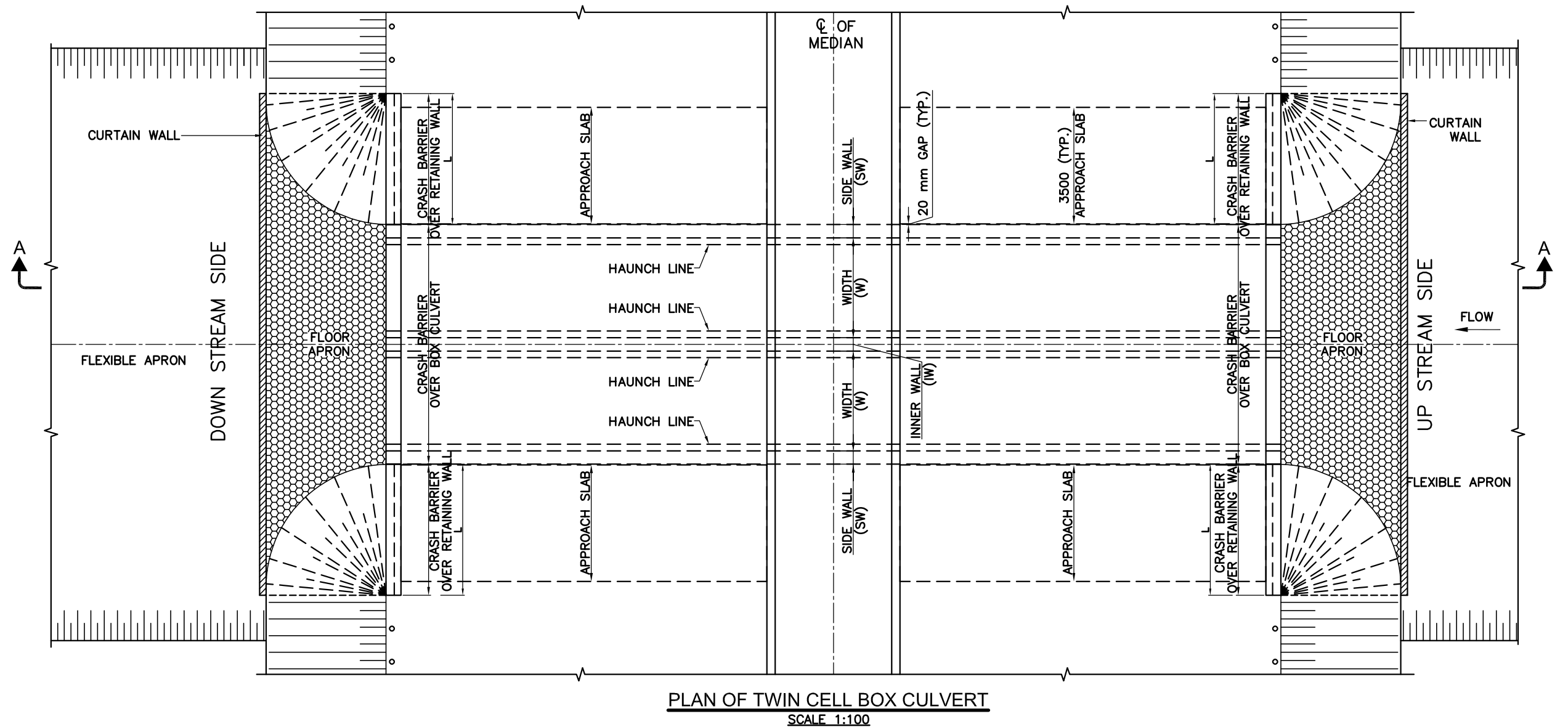
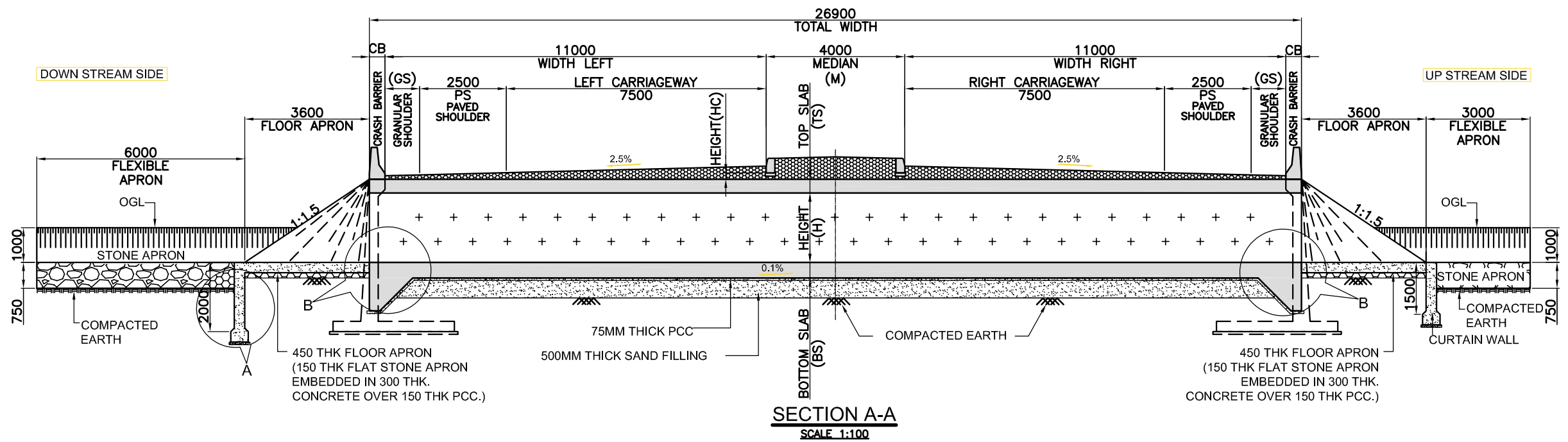
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 Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Strategic Road Connectivity & Trade Improvement Project (SRCTIP) Detailed Design of Upgradation of Kamala–Dhalkebar–Pathlaiya Road Section (130 KM) of Mahendra Highway and Bridges	Joint Venture of			Checked By	Mr. SANJIB MITRA			
		 EPTISA Servicios De Ingenieria Madrid, Spain	 STUP Consultants Private Limited Kolkatta, India	Approved By	Mr. Harikrishna Bhavsar	Signature	Reference Drawings: 1. MISCELLANEOUS DRAWING 2. PLAN & PROFILE DRAWING		
			In Association With Udaya Consultancy, Geocom International, Sundar Kriti Consultant and Rays Consultant Private Limited						
									Sheet No.: 1/1



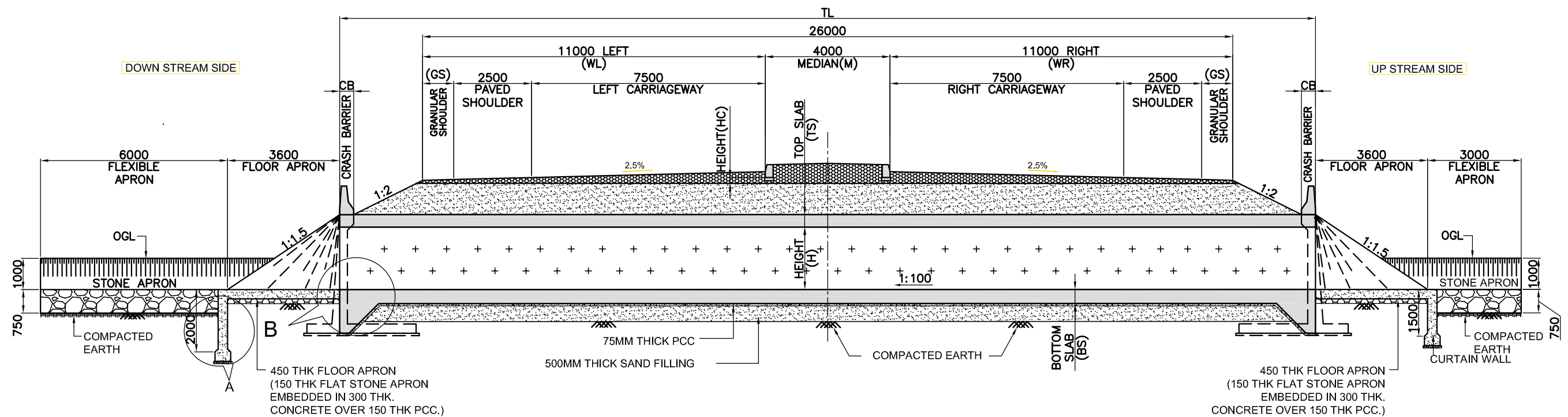
EMPLOYER	PROJECT	DESIGN CONSULTANT	Designed By	Signature	Drawing Name:	Scale:	Date:
 Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Strategic Road Connectivity & Trade Improvement Project (SRCTIP) Detailed Design of Upgradation of Kamala– Dhalkebar–Pathlaiya Road Section (130 KM) of Mahendra Highway and Bridges	Joint Venture of  EPTISA Servicios De Ingeniera Madrid, Spain  STUP Consultants Private Limited Kolkatta, India In Association With Udaya Consultancy, Geocom International, Sundar Kriti Consultant and Rays Consultant Private Limited	Mr. BISHNU GUPTA		GENERAL ARRANGEMENT DRAWING FOR SINGLE CELL WITH CUSHION (RURAL SECTION) Reference Drawings: 1. MISCELLANEOUS DRAWING 2. PLAN & PROFILE DRAWING	AS NOTED	28.03.2024
			Mr. SANJIB MITRA				Drawing No.: KDP/DPR/STR/CULVERT/DD-04
			Mr. Harikrishna Bhavsar				Sheet No.: 1/1



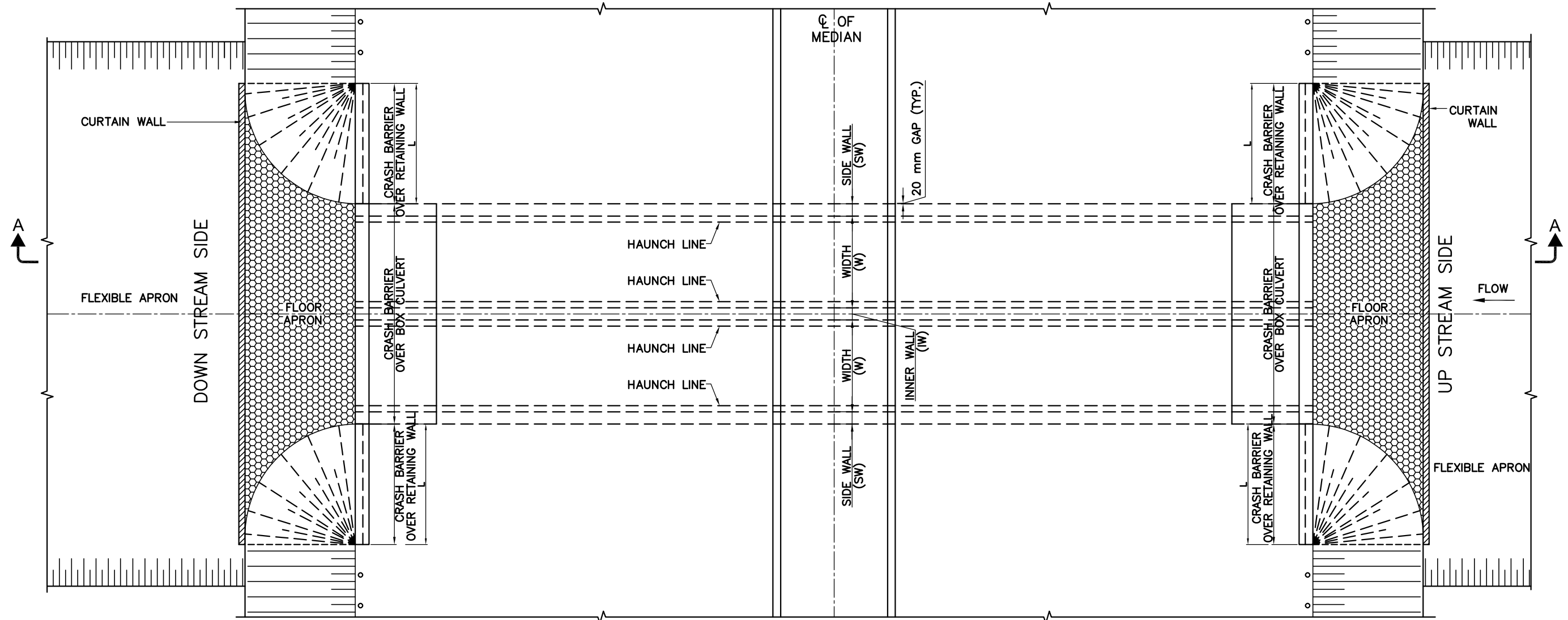
EMPLOYER	PROJECT	DESIGN CONSULTANT	Designed By	Signature	Drawing Name:	Scale:	Date:
 Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Strategic Road Connectivity & Trade Improvement Project (SRCTIP) Detailed Design of Upgradation of Kamala–Dhalkebar–Pathlaiya Road Section (130 KM) of Mahendra Highway and Bridges	Joint Venture of	Mr. BISHNU GUPTA		GENERAL ARRANGEMENT DRAWING FOR SINGLE CELL AT VUP LOCATION (URBAN SECTION) Reference Drawings: 1. MISCELLANEOUS DRAWING 2. PLAN & PROFILE DRAWING	AS NOTED	28.03.2024
		 EPTISA Servicios De Ingeniera Madrid, Spain  STUP Consultants Private Limited Kolkatta, India	Mr. SANJIB MITRA				Drawing No.: KDP/DPR/STR/CULVERT/DD-06
		In Association With Udaya Consultancy, Geocom International, Sundar Kriti Consultant and Rays Consultant Private Limited	Mr. Harikrishna Bhavsar				Sheet No.: 1/1



EMPLOYER	PROJECT	DESIGN CONSULTANT	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  EPTISA Servicios De Ingeniera 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. BISHNU GUPTA Signature  Checked By Mr. SANJIB MITRA Signature  Approved By Mr. Harikrishna Bhavsar Signature 	GENERAL ARRANGEMENT DRAWING FOR TWIN CELL WITH OUT CUSHION (RURAL SECTION) Reference Drawings: 1. MISCELLANEOUS DRAWING 2. PLAN & PROFILE DRAWING	AS NOTED 28.03.2024 Drawing No.: KDP/DPR/STR/CULVERT/DD-07 Sheet No.: 1/1

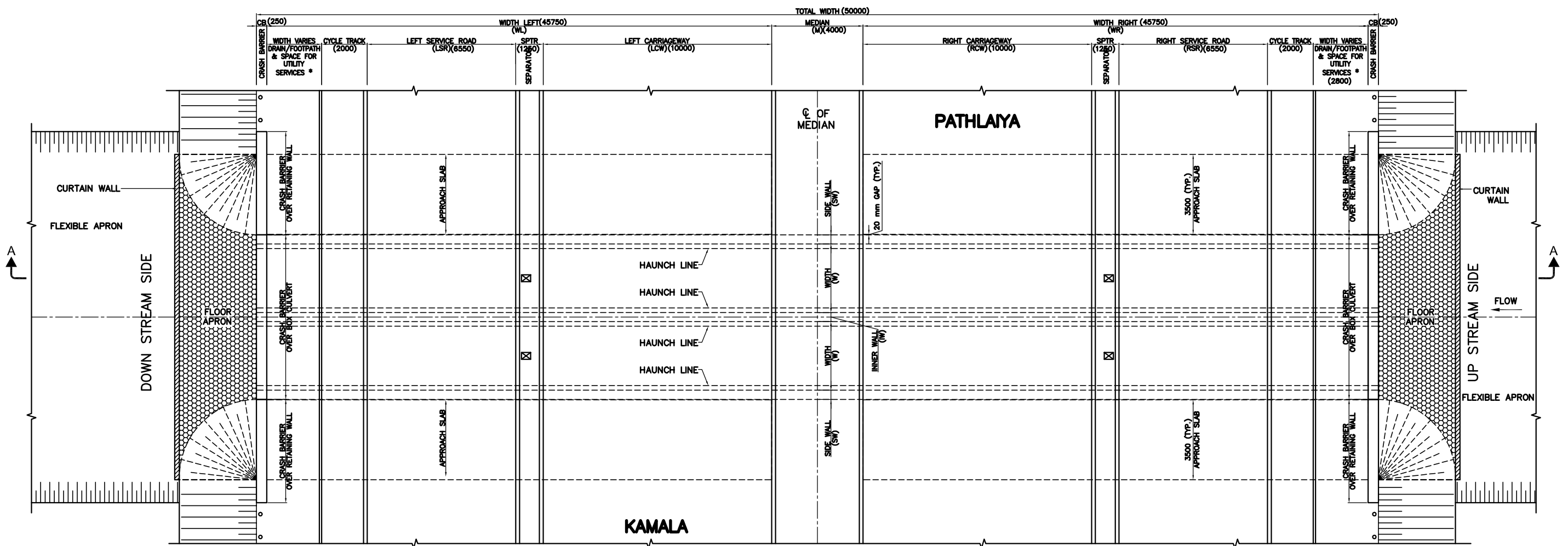
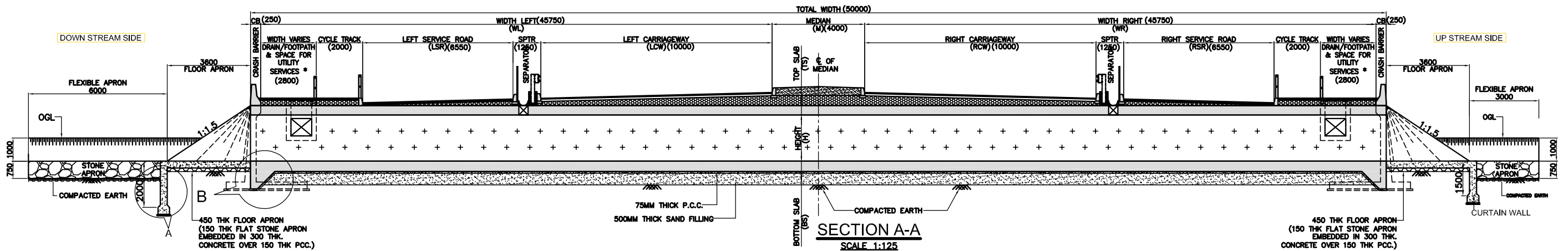


SECTION A-A
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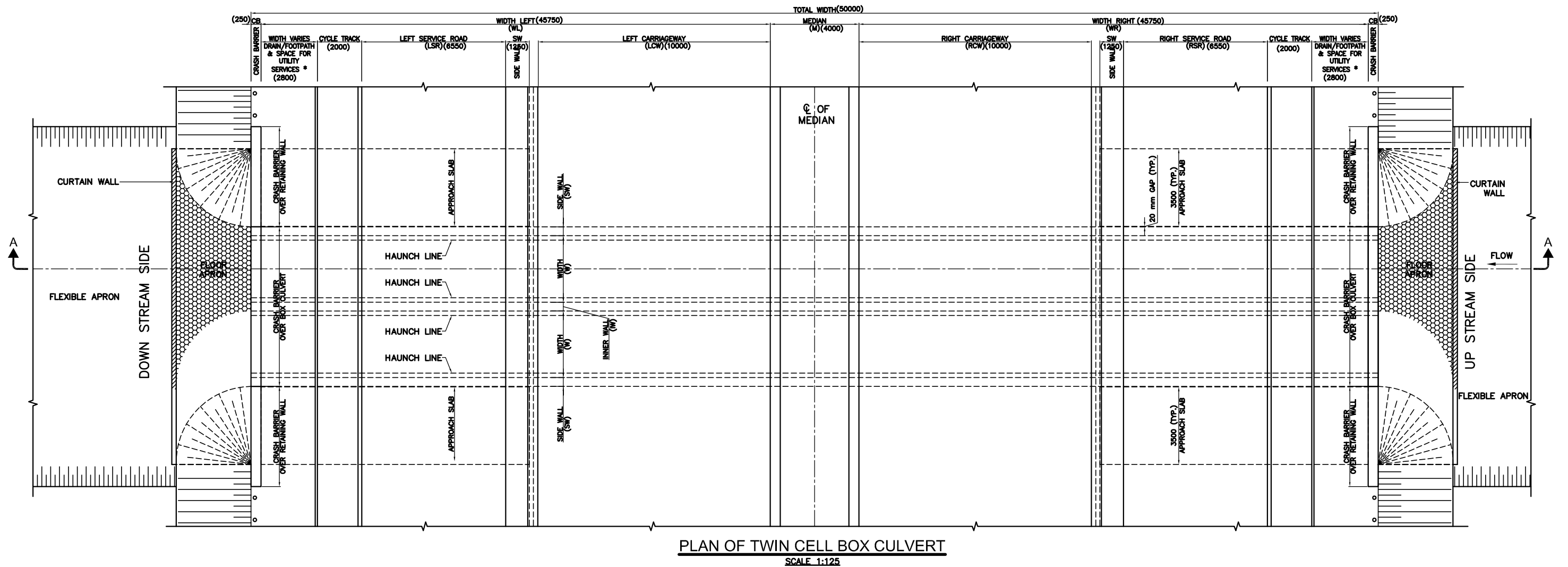
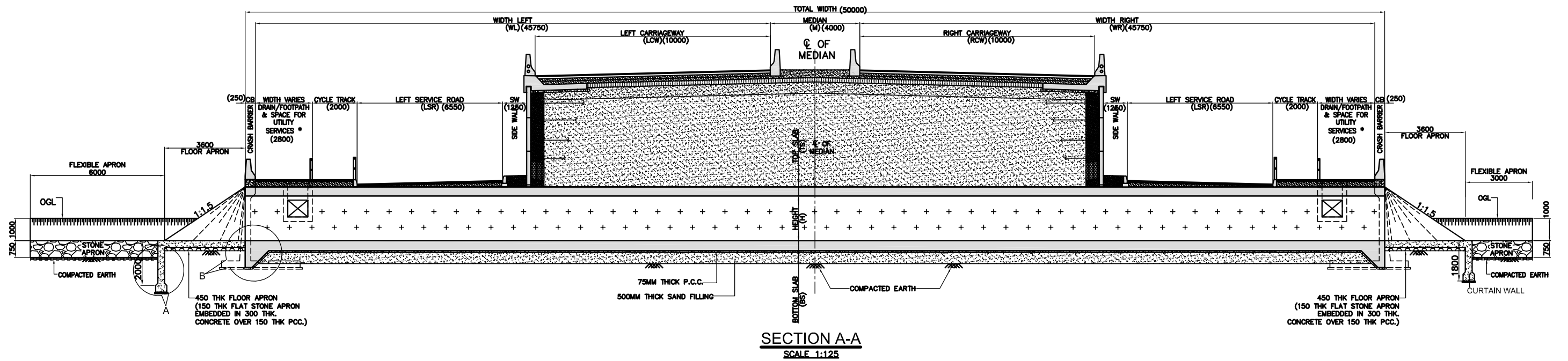
PLAN OF TWIN CELL BOX CULVERT
SCALE 1:100

EMPLOYER	PROJECT	DESIGN CONSULTANT	Designed By	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  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. BISHNU GUPTA		GENERAL ARRANGEMENT DRAWING FOR TWIN CELL WITH CUSHION (RURAL SECTION) Reference Drawings: 1. MISCELLANEOUS DRAWING 2. PLAN & PROFILE DRAWING	AS NOTED	28.03.2024
			Checked By Mr. SANJIB MITRA				Drawing No.: KDP/DPR/STR/CULVERT/DD-08
			Approved By Mr. Harikrishna Bhavsar				Sheet No.: 1/1

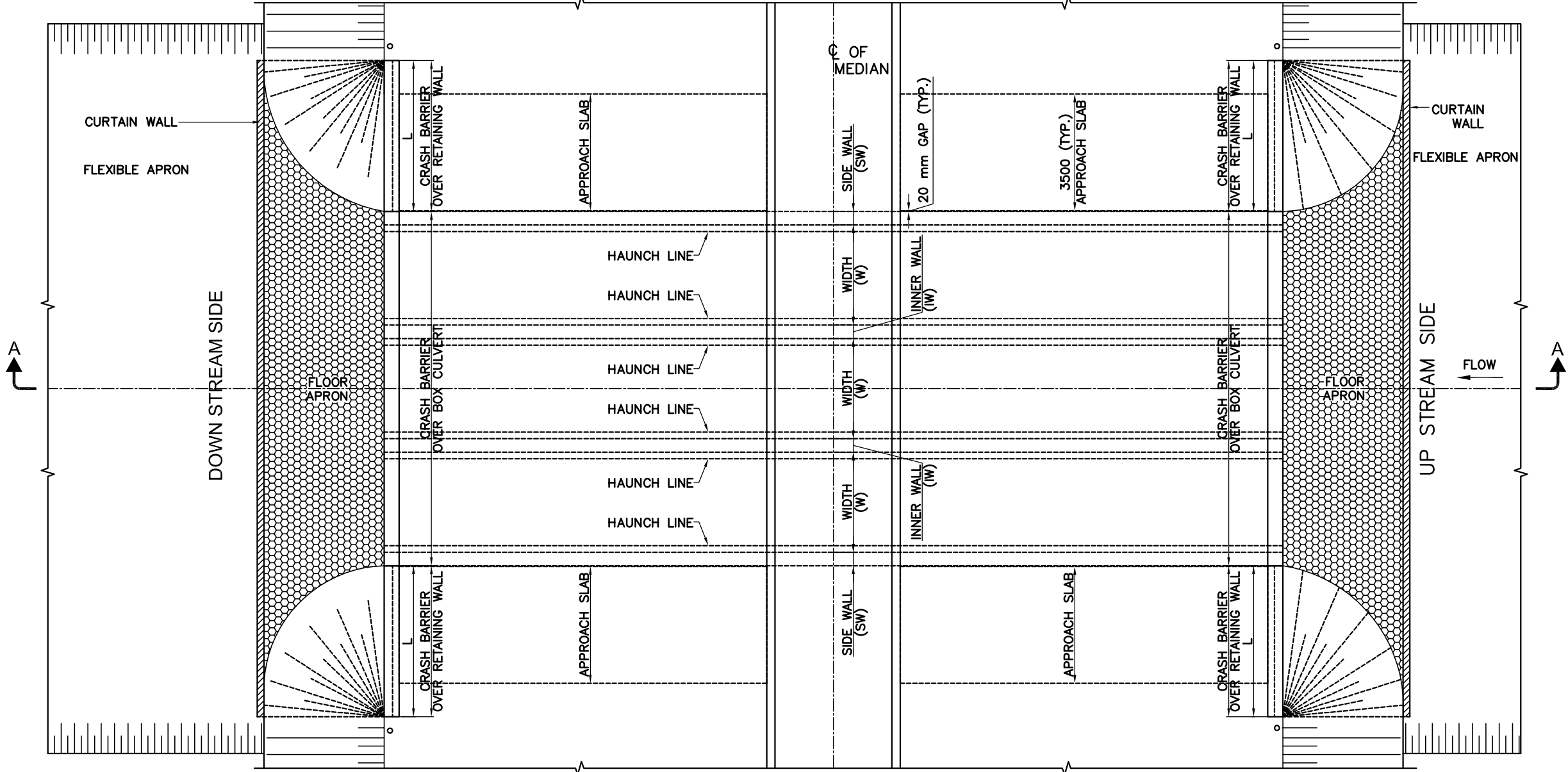
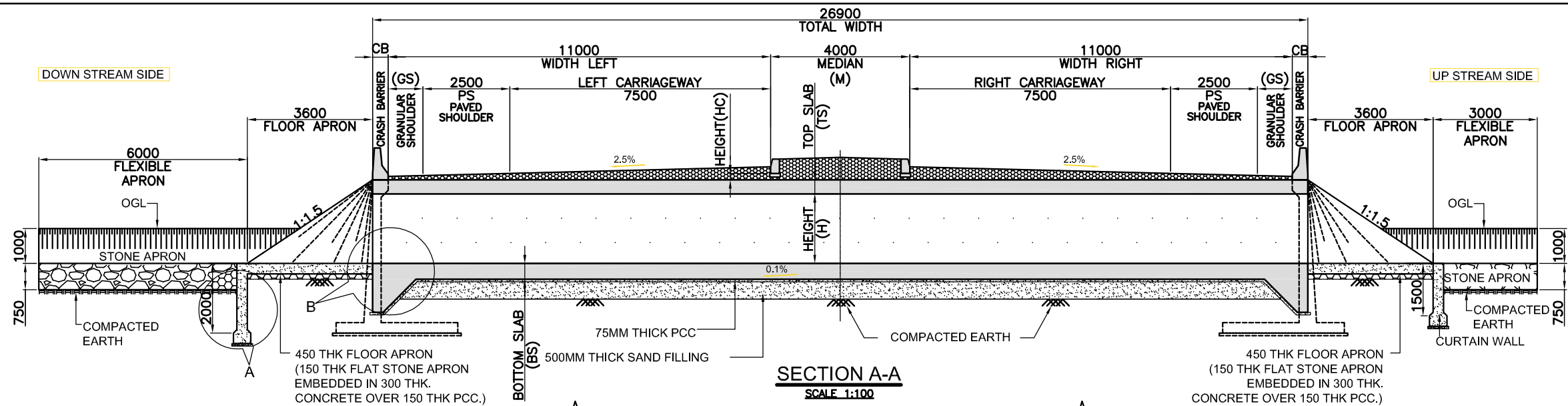


PLAN OF TWIN CELL BOX CULVERT
SCALE 1:125

EMPLOYER	PROJECT	DESIGN CONSULTANT	Designed By	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  EPTISA Servicios De Ingeniera Madrid, Spain  STUP Consultants Private Limited Kolkatta, India In Association With Udaya Consultancy, Geocom International, Sundar Kriti Consultant and Rays Consultant Private Limited	Mr. BISHNU GUPTA		GENERAL ARRANGEMENT DRAWING FOR TWIN CELL WITH OUT CUSHION (URBAN SECTION) Reference Drawings: 1. MISCELLANEOUS DRAWING 2. PLAN & PROFILE DRAWING	AS NOTED	28.03.2024
			Mr. SANJIB MITRA				Drawing No.: KDP/DPR/STR/CULVERT/DD-09
			Mr. Hari Krishna Bhavsar				Sheet No.: 1/1

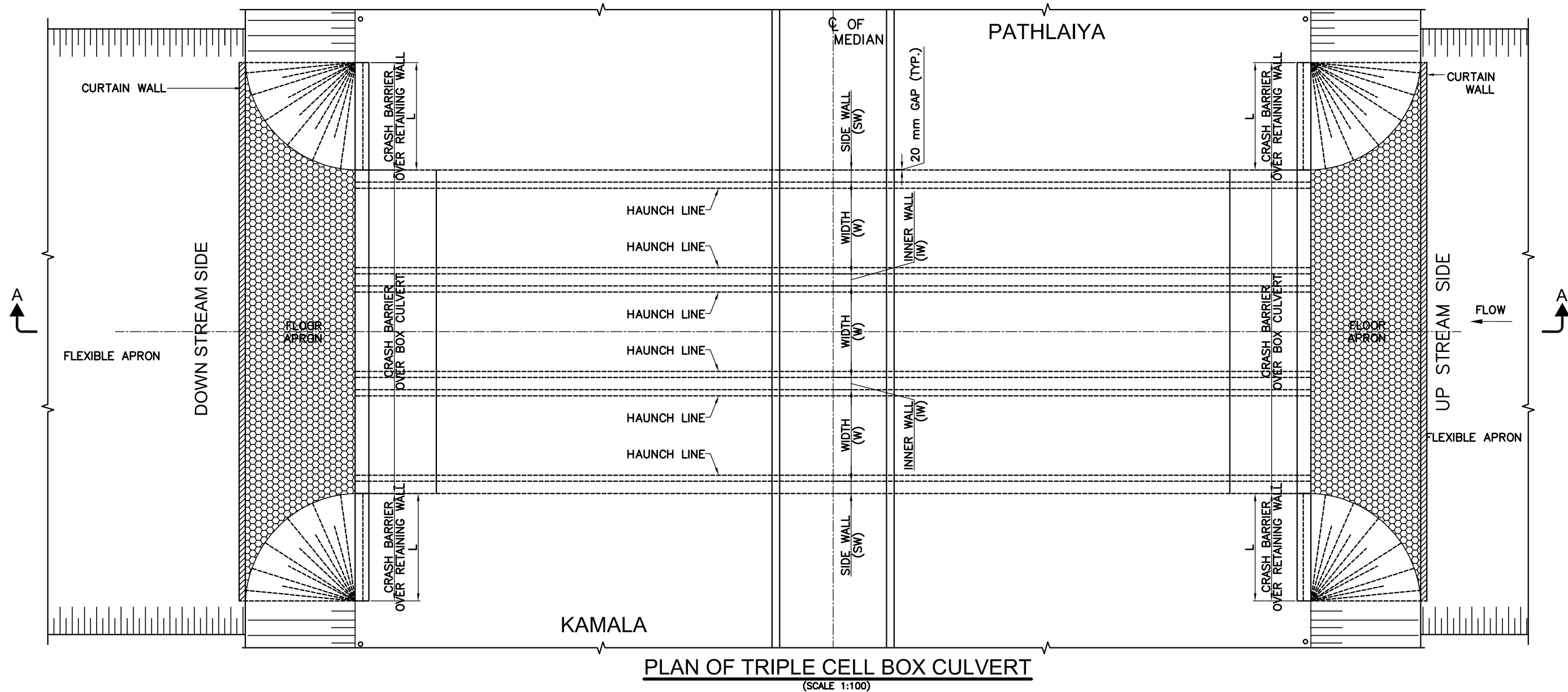
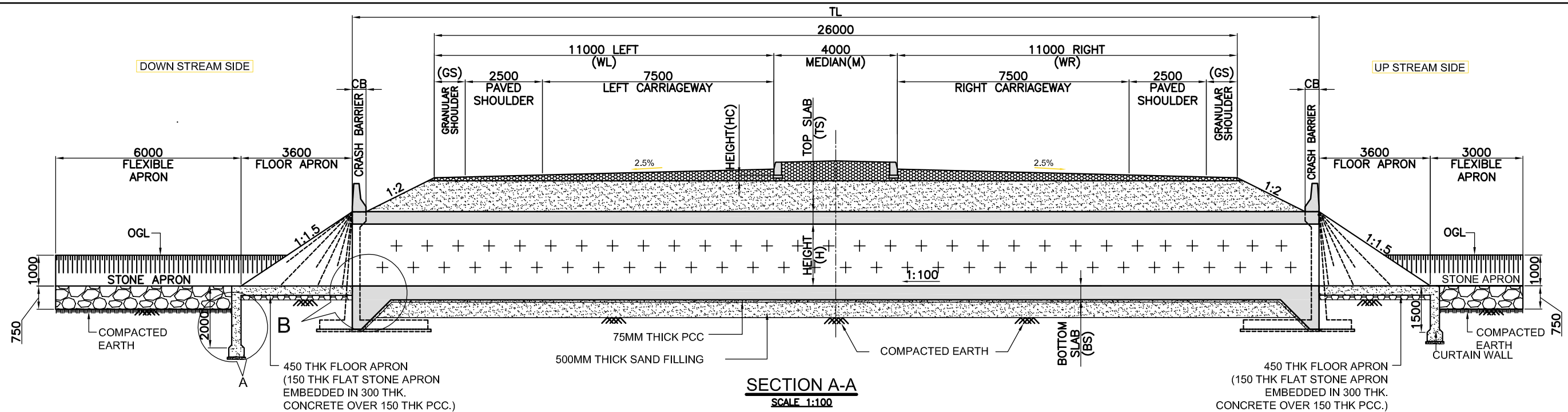


EMPLOYER	PROJECT	DESIGN CONSULTANT	Designed By	Signature	Drawing Name:	Scale:	Date:
 Government of Nepal Ministry of Physical Infrastructure and Transport Department of Roads Development Cooperation Implementation Division	Strategic Road Connectivity & Trade Improvement Project (SRCTIP) Detailed Design of Upgradation of Kamala– Dhalkebar–Pathlaiya Road Section (130 KM) of Mahendra Highway and Bridges	Joint Venture of  EPTISA Servicios De Ingeniera Madrid, Spain  STUP Consultants Private Limited Kolkatta, India In Association With Udaya Consultancy, Geocom International, Sundar Kriti Consultant and Rays Consultant Private Limited	Mr. BISHNU GUPTA		GENERAL ARRANGEMENT DRAWING FOR TWIN CELL AT VUP LOCATION (URBAN SECTION) Reference Drawings: 1. MISCELLANEOUS DRAWING 2. PLAN & PROFILE DRAWING	AS NOTED	28.03.2024
			Checked By Mr. SANJIB MITRA				Drawing No.: KDP/DPR/STR/CULVERT/DD-10
			Approved By Mr. Harikrishna Bhavsar				Sheet No.: 1/1



PLAN OF TRIPLE CELL BOX CULVERT
(SCALE 1:100)

EMPLOYER	PROJECT	DESIGN CONSULTANT	Designed By	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  EPTISA Servicios De Ingeniera Madrid, Spain  STUP Consultants Private Limited Kolkatta, India In Association With Udaya Consultancy, Geocom International, Sundar Krti Consultant and Rays Consultant Private Limited	Mr. BISHNU GUPTA		GENERAL ARRANGEMENT DRAWING FOR TRIPLE CELL WITH OUT CUSHION (RURAL SECTION) Reference Drawings: 1. MISCELLANEOUS DRAWING 2. PLAN & PROFILE DRAWING	AS NOTED	28.03.2024
			Checked By	Mr. SANJIB MITRA			Drawing No.:
			Approved By	Mr. Harikrishna Bhavsar			KDP/DPR/STR/CULVERT/DD-11
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EMPLOYER	PROJECT	DESIGN CONSULTANT	Designed By	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-Pathlalya Road Section (130 KM) of Mahendra Highway and Bridges	Joint Venture of EPTISA Servicios De Ingeniera Madrid, Spain STUP Consultants Private Limited Kolkata, India In Association With Udaya Consultancy, Geocom International, Sundar Kirti Consultant and Rays Consultant Private Limited	Mr. BISHNU GUPTA Mr. SANJIB MITRA Mr. Harikrishna Bhavsar	 	GENERAL ARRANGEMENT DRAWING FOR TRIPLE CELL WITH CUSHION (RURAL SECTION) Reference Drawings: 1. MISCELLANEOUS DRAWING 2. PLAN & PROFILE DRAWING	AS NOTED	28.03.2024
							Drawing No.: KDP/DPR/STR/CULVERT/DD-12 Sheet No.: 1/2