





EMPLOYER  RAIL INFRASTRUCTURE DEVELOPMENT COMPANY (KARNATAKA) LIMITED	PROJECT BENGALURU SUBURBAN RAILWAY PROJECT (BSRP) K-RIDE	
	DRAWING TITLE NUMERATION AND RC DETAILS FOR TYPICAL PRECAST SACRIFICIAL RETAINING WALL WITH SLOPED EARTH FILL FOR HEIGHT h1=1000 TO 2500mm AND h2=1000mm	
GENERAL CONSULTANTS    AECOM-EGIS-WSP	DRAWING NO. O22077-BSRP-CR2-C-AG-PSRW-20-1347	REVISION DWG STATUS
SCALE _____ DATE _____		_____



GEOMETRIC PROPERTY																				
SL.NO	TOTAL HEIGHT (H) (m)	h1	h2	a	b	c	d1	d2	d3	d4	e1	e2	D	Y1	L1	L2	L3	C1	MAXIMUM BASE PRESSURE t/m ²	
		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm		
1	2.50	1000	1500	1550	200	1050	250	200	200	200	300	250	3600	1000	-	-	-	-	11.26	
2	2.51 TO 3.00	1500	1500	1750	200	1200	300	200	200	200	350	250	3600	1500	-	-	-	-	13.81	
3	3.01 TO 3.50	2000	1500	1950	200	1400	350	200	200	200	350	250	3600	2000	-	-	-	-	17.10	
4	3.51 TO 4.00	2500	1500	2200	200	1600	400	200	200	200	400	250	3600	2000	-	-	-	1030	19.65	
5	4.01 TO 4.50	3000	1500	2500	250	1750	450	200	200	200	500	250	3600	2000	-	-	-	1000	20.80	
6	4.51 TO 5.00	3500	1500	2800	300	1950	500	200	200	200	550	250	3600	2000	-	-	-	1010	22.08	
7	5.01 TO 5.50	4000	1500	3100	350	2150	550	250	200	200	600	250	3600	2000	-	-	-	1010	23.40	
8	5.51 TO 6.00	4500	1500	3500	400	2450	600	300	200	200	650	250	3600	2000	-	-	-	1100	24.26	
9	6.01 TO 6.50	5000	1500	4000	400	2850	700	300	200	200	750	250	3600	2000	-	-	-	1190	24.84	



7. DEVELOPMENT LENGTH $L_d = 46 \text{ TIMES DIA OF BAR.}$
8. LAP LENGTH SHALL BE 64 TIMES DIA OF BAR, NOT MORE THAN 50% OF BARS ARE LAPPED IN SAME PLACE.
9. SAFE BEARING CAPACITY AT BOTTOM OF BASE SLAB SHALL BE CONFIRMED BY DOING PLATE LOAD TEST AND SBC CONFIRMED SHALL BE GREATER THAN THE BEARING PRESSURE.
10. IN CASE OF ANY EXCAVATION TO BE CARRIED OUT IN THE FRONT SIDE OF RETAINING WALL AT/NEAR TOE SLAB, PRIOR APPROVAL/CONSENT SHALL BE OBTAINED FROM RELEVANT AUTHORITY AND WALL STABILITY NEED TO BE RECHECKED.
11. HEIGHT 'H/2' NEED TO BE MAINTAINED IN FRONT OF RETAINING WALL FOR ITS INTENDED LIFE.
12. SOIL WITH INTERNAL FRICTION $\phi \geq 30^\circ$ IS CONSIDERED IN DESIGN.
13. BACKFILL MATERIAL SHALL CONSIST OF GRANULAR MATERIAL OF GW, GP, SW, GROUPS AS PER IS:1498-1970. IF REQUIRED, DURING CONSTRUCTION ADDITIONAL LINKS TO BE PROVIDED TO PLACE THE VERTICAL BARS IN POSITION.
15. THE COMPACTION FACTOR OF 0.95 OR ABOVE HAS TO BE ENSURED AT THE BASE OF PCC.
16. STRICTLY, FOR THE FULL DEVELOPMENT OF PASSIVE EARTH PRESSURE, IT IS NECESSARY THAT AFTER THE CONSTRUCTION OF THE WALL, THERE SHOULD BE NO DISTURBANCE TO THE SOIL AGAINST WHICH THE CONCRETE IN THE TOE SLAB IS PLACED.
17. ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BEPAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.45kg/sqm.
18. IF ANY AMBIGUITY IS FOUND IN DRAWINGS OR AT SITE, THE SAME SHALL BE BROUGHT TO DESIGNER'S ENGINEER'S NOTICE BEFORE EXECUTION

CL - CENTER LINE
TYP - TYPICAL
THK. - THICKNESS
DN - DOWN

S.NO	TOTAL HEIGHT (H) (m)	REINFORCEMENT DETAILS																			
		(1)	(2)	(2a)	(3)	(3a)	(4)	(4a)	(5)	(6)	(7)	(7a)	(8)	(8a)	(9)	(10)	(11)	(12)	(S1) Y x Z	(S2) X x Z	(S3) X x Z
1	1.00 TO 2.50	Y12 AT 220	-	Y12 AT 220	-	Y12 AT 220	-	Y10 AT 220	Y10 AT 220	Y10 AT 220	Y10 AT 250	Y8 AT 200	Y8 AT 250	Y8 AT 200	Y8 AT 200	Y8 AT 200	Y8 AT 250	Y8 AT 250	-	-	-
2	2.51 TO 3.00	Y12 AT 240	Y10 AT 240	Y12 AT 240	Y10 AT 240	Y12 AT 240	-	Y10 AT 240	Y10 AT 240	Y10 AT 240	Y10 AT 220	Y8 AT 200	Y8 AT 220	Y8 AT 200	Y8 AT 160	Y8 AT 160	Y8 AT 250	Y8 AT 250	-	-	-
3	3.01 TO 3.50	Y12 AT 220	Y10 AT 220	Y12 AT 220	Y10 AT 220	Y12 AT 220	-	Y10 AT 220	Y10 AT 220	Y10 AT 220	Y10 AT 200	Y8 AT 200	Y8 AT 200	Y8 AT 200	Y10 AT 200	Y8 AT 200	Y8 AT 250	Y8 AT 250	-	-	-
4	3.51 TO 4.00	Y12 AT 200	Y12 AT 200	Y12 AT 200	Y10 AT 200	Y16 AT 200	-	Y10 AT 200	Y10 AT 200	Y10 AT 200	Y10 AT 175	Y8 AT 200	Y8 AT 175	Y8 AT 200	Y10 AT 175	Y8 AT 175	Y8 AT 250	Y8 AT 250	-	-	-
5	4.01 TO 4.50	Y12 AT 200	Y16 AT 200	Y12 AT 200	Y12 AT 200	Y16 AT 200	-	Y10 AT 200	Y10 AT 200	Y10 AT 200	Y12 AT 200	Y8 AT 200	Y10 AT 200	Y8 AT 200	Y10 AT 160	Y8 AT 160	Y8 AT 250	Y8 AT 250	-	-	-
6	4.51 TO 5.00	Y16 AT 250	Y20 AT 250	Y16 AT 250	Y16 AT 250	Y20 AT 250	-	Y12 AT 250	Y10 AT 250	Y10 AT 250	Y12 AT 175	Y8 AT 200	Y10 AT 175	Y8 AT 200	Y12 AT 200	Y10 AT 200	Y8 AT 250	Y8 AT 250	-	-	-
7	5.01 TO 5.50	Y16 AT 250	Y20 AT 250	Y16 AT 250	Y16 AT 250	Y20 AT 250	-	Y12 AT 250	Y12 AT 250	Y10 AT 250	Y12 AT 170	Y8 AT 200	Y10 AT 170	Y8 AT 200	Y12 AT 190	Y10 AT 190	Y8 AT 190	Y8 AT 190	-	-	-
8	5.51 TO 6.00	Y16 AT 220	Y20 AT 220	Y16 AT 220	Y16 AT 220	Y20 AT 220	-	Y12 AT 220	Y10 AT 220	Y10 AT 220	Y12 AT 150	Y8 AT 200	Y10 AT 150	Y8 AT 200	Y12 AT 160	Y10 AT 160	Y8 AT 160	Y8 AT 160	-	-	-
9	6.01 TO 6.50	Y16 AT 250	Y25 AT 250	Y16 AT 250	Y20 AT 250	Y25 AT 250	-	Y16 AT 250	Y12 AT 250	Y10 AT 250	Y12 AT 125	Y8 AT 200	Y10 AT 125	Y8 AT 200	Y12 AT 125	Y10 AT 125	Y8 AT 150	Y8 AT 150	-	-	-
	SHAPE OF BARS																				

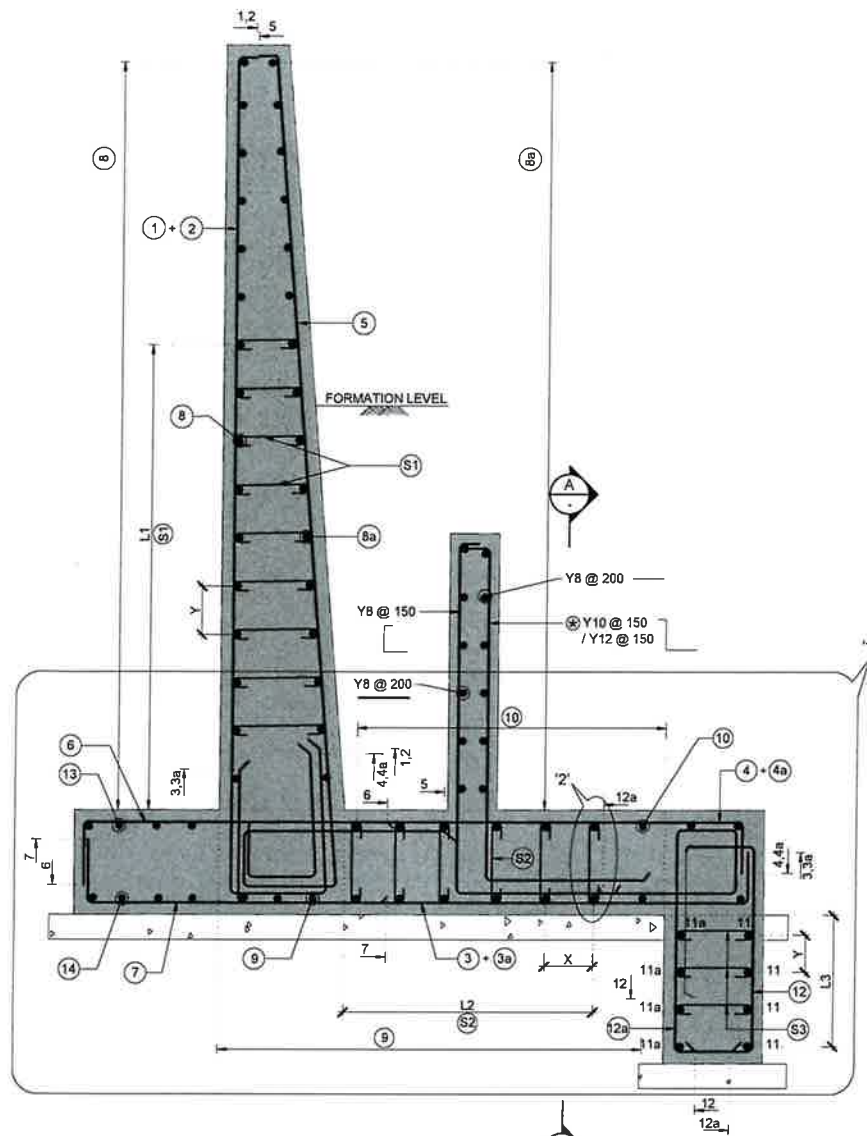
1. ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METERS UNLESS OTHERWISE SPECIFIED.
2. DIMENSIONS ARE NOT TO BE SCALE, ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED.
3. CONCRETE GRADE SHALL BE M35
4. REINFORCEMENT GRADE SHALL BE Fe500.
5. CLEAR COVER TO ANY REINFORCEMENT SHALL BE 50mm.
6. PARAMETERS CONSIDERED FOR DESIGN -
 - a) ANGLE OF INTERNAL BACFILL $\theta = 30^\circ$
 - b) COHESION OF BACKFILL $c = 3'$
 - c) WALL FRICTION ANGLE $\delta = 10^\circ$
 - d) SATURATED DENSITY OF BACKFILL $\gamma = 20\text{ kN/m}^3$

EGIS-AECOM-WSP

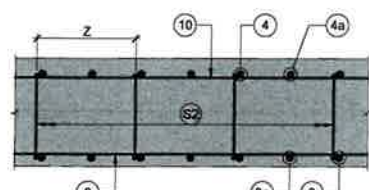
BENGALURU SUBURBAN RAILWAY PROJECT(BSRP)
BETWEEN STATIONS HEELALIGE AND RAJANUKUNTE

TYPICAL DETAILS OF EMBANKMENT RETAINING WALL
FOR FILLING PORTION WITHOUT SLOPE -
(h1=1000mm TO 5000mm, h2=1500mm)

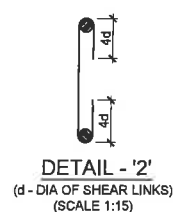
SCALE - 1 : 100 (UNLESS SPECIFIED OTHERWISE)	EXIDE DPO NO: 024008-BSRP-CR4-C-AG-ERS-20-6001	REVISOR	DWG STATUS
PRELIMINARY DWG (P), DEFINITIVE DWG (D), CONSTRUCTION DWG (C), AS BUILT DWG (B), SHOP DWG (N), MANUFACTURED DWG (M), SHEET SIZE - A1			



RC DETAILS OF EMBANKMENT RETAINING WALL
(SCALE 1:15)

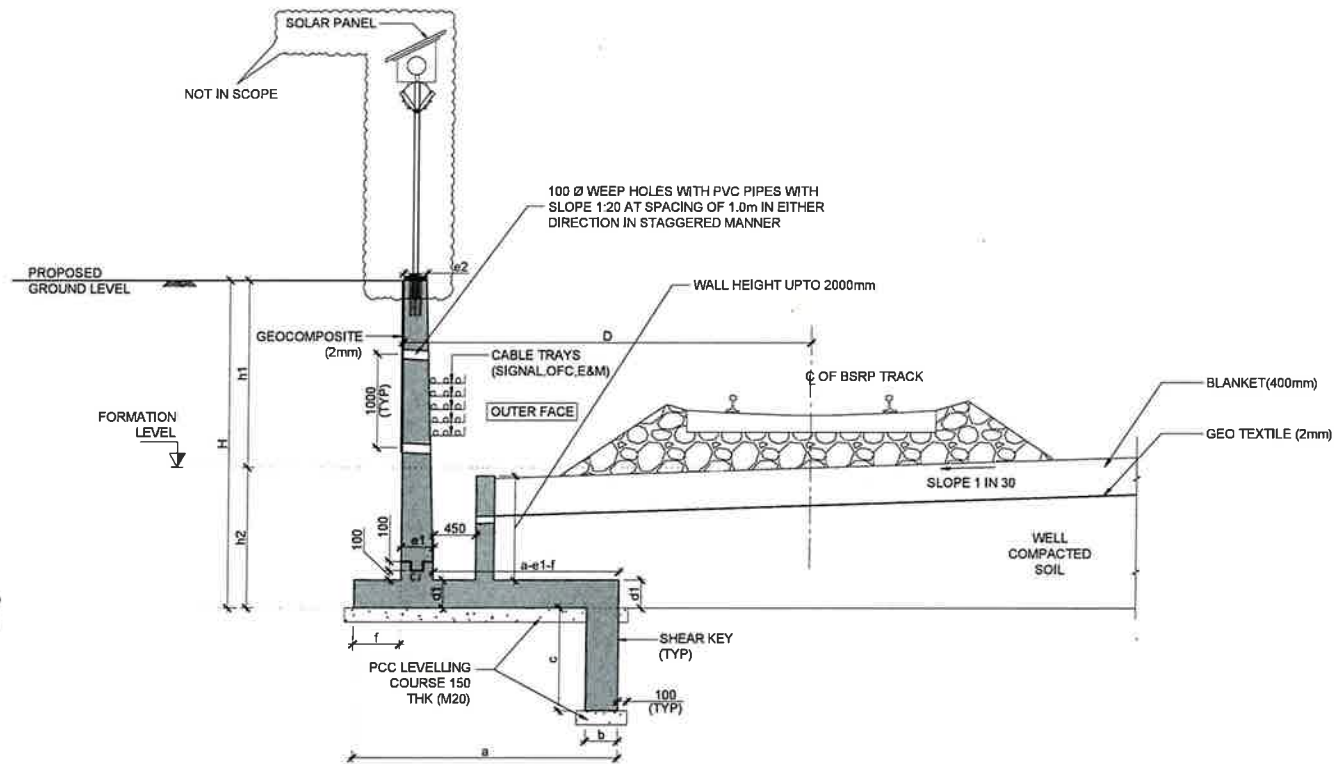


SECTION A-A
(SCALE 1:15)



DETAIL - '2'
(SCALE 1:15)

ABBREVIATIONS :
CL - CENTER LINE
TYP - TYPICAL
THK. - THICKNESS
DN - DOWN






















DETAILS OF EMBANKMENT RETAINING WALL
(SCALE 1:40)

SCHEDULE OF DIMENSIONS FOR RETAINING WALL

SL.NO	TOTAL HEIGHT (H) (m)	GEOMETRIC PROPERTY													MAXIMUM BASE PRESSURE kN/m ²
		h1	h2	a	b	c	d1	e1	e2	f	D	L1	L2	L3	
1	2.00 TO 2.50	1000	1500	1700	250	650	300	300	250	500	4400	-	-	-	14.23
2	2.51 TO 3.00	1500	1500	2100	250	800	350	350	250	500	4400	-	-	-	13.37
3	3.01 TO 3.50	2000	1500	2500	350	1000	350	400	250	500	4400	-	-	-	13.14

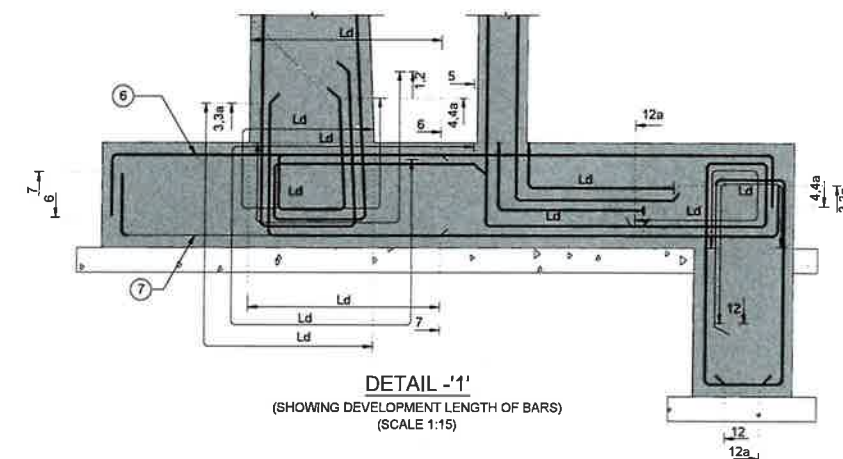
SCHEDULE OF REINFORCEMENT FOR RETAINING WALL

S.NO	TOTAL HEIGHT (H) (m)	REINFORCEMENT DETAILS																					
		①	②	③	③a	④	④a	⑤	⑥	⑦	⑧	⑧a	⑨	⑩	⑪	⑪a	⑫	⑫a	⑬	⑭	Ⓢ1 Y x Z	Ⓢ2 X x Z	Ⓢ3 Y x Z
1	2.00 TO 2.50	Y16 AT 230	-	Y12 AT 230	-	Y10 AT 230	-	Y10 AT 230	Y12 AT 230	Y10 AT 230	Y10 AT 240	Y8 AT 240	Y10 AT 240	Y8 AT 240	Y10 AT 240	Y8 AT 240	Y12 AT 230	Y10 AT 230	Y10 AT 240	Y8 AT 240	-	-	-
2	2.51 TO 3.00	Y16 AT 180	-	Y12 AT 180	-	Y10 AT 180	-	Y10 AT 180	Y12 AT 180	Y10 AT 180	Y10 AT 220	Y8 AT 220	Y10 AT 220	Y8 AT 220	Y10 AT 240	Y8 AT 240	Y12 AT 180	Y10 AT 180	Y10 AT 220	Y8 AT 220	-	-	-
3	3.01 TO 3.50	Y16 AT 180	-	Y16 AT 160	-	Y10 AT 160	-	Y10 AT 160	Y12 AT 160	Y10 AT 160	Y10 AT 190	Y8 AT 190	Y10 AT 190	Y8 AT 190	Y10 AT 220	Y8 AT 220	Y12 AT 160	Y10 AT 180	Y10 AT 220	Y8 AT 220	-	-	-
	SHAPE OF BARS																				VARIES		

Y10 BAR IS USED FOR WALL HEIGHT UPTO 1000
Y12 BAR IS USED FOR WALL HEIGHT FROM 1001 TO 2000

ADDITIONAL NOTES:

- DEVELOPMENT LENGTH $L_d = 46 \text{ TIMES DIA OF BAR}$.
- LAP LENGTH SHALL BE 64 TIMES DIA OF BAR, NOT MORE THAN 50% OF BARS ARE LAPPED IN SAME PLACE.
- SAFE BEARING CAPACITY AT BOTTOM OF BASE SLAB SHALL BE CONFIRMED BY DOING PLATE LOAD TEST AND SBC CONFIRMED SHALL BE GREATER THAN THE BEARING PRESSURE.
- IN CASE OF ANY EXCAVATION TO BE CARRIED OUT IN THE FRONT SIDE OF RETAINING WALL AT NEAR TOE SLAB, PRIOR APPROVAL/CONSENT SHALL BE OBTAINED FROM RELEVANT AUTHORITY AND WALL STABILITY NEED TO BE RECHECKED.
- HEIGHT h_2 NEED TO BE MAINTAINED IN FRONT OF RETAINING WALL FOR ITS INTENDED LIFE AND FOR CONSIDERATION OF PASSIVE PRESSURE.
- SOIL WITH INTERNAL FRICTION $\phi \geq 30^\circ$ IS CONSIDERED IN DESIGN.
- BACKFILL MATERIAL SHALL CONSIST OF GRANULAR MATERIAL OF GW, GP, SW, GROUPS AS PER IS-1498-1970.
- IF REQUIRED, DURING CONSTRUCTION ADDITIONAL LINKS TO BE PROVIDED TO PLACE THE VERTICAL BARS IN POSITION.
- THE COMPACTION FACTOR OF 0.95 OR ABOVE HAS TO BE ENSURED AT THE BASE OF PCC.
- STRICTLY, FOR THE FULL DEVELOPMENT OF PASSIVE EARTH PRESSURE, IT IS NECESSARY THAT DURING THE CONSTRUCTION OF THE WALL, THERE SHOULD BE NO DISTURBANCE TO THE SOIL AGAINST WHICH THE CONCRETE IN THE TOE SLAB IS PLACED.
- ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.46kg/sqm.
- IF ANY AMBIGUITY IS FOUND IN DRAWINGS OR AT SITE SAME SHALL BE BROUGHT TO DESIGNERS ENGINEERS NOTICE BEFORE EXECUTION.
- EXPANSION JOINT SHALL BE PROVIDED AT MAXIMUM INTERVAL OF 20m. EXPANSION JOINT TO BE FILLED WITH BITUMINOUS IMPREGNATED FIBRE BOARD.
- SBC CONSIDERED IN THE DESIGN IS 20 kN/m².



DETAIL - '1'
(SHOWING DEVELOPMENT LENGTH OF BARS)
(SCALE 1:15)

- NOTES :
- ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METERS UNLESS OTHERWISE SPECIFIED.
 - DIMENSIONS ARE NOT TO BE SCALED, ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED.
 - CONCRETE GRADE SHALL BE M35.
 - REINFORCEMENT GRADE SHALL BE Fe500.

- NOTES :
- CLEAR COVER TO ANY REINFORCEMENT SHALL BE 50mm.
 - PARAMETERS CONSIDERED FOR DESIGN -
a) ANGLE OF INTERNAL BACKFILL - $\phi = 30^\circ$
b) COHESION OF BACKFILL - $C = 0$
c) WALL FRICTION ANGLE - $\delta = 10^\circ$
d) SATURATED DENSITY OF BACKFILL - $\gamma = 20 \text{ kN/m}^3$

EMPLOYER :
RAIL INFRASTRUCTURE
DEVELOPMENT COMPANY
(KARNATAKA) LIMITED

GENERAL CONSULTANTS :
AECOM egis wsp AECOM-EGIS-WSP

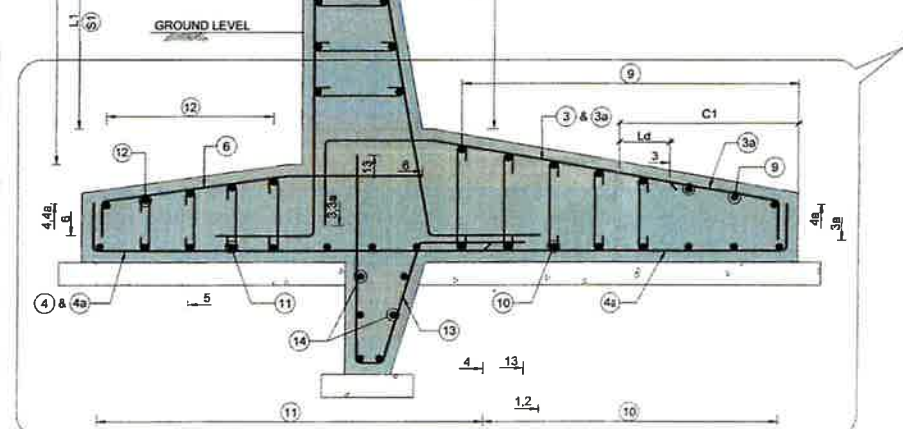
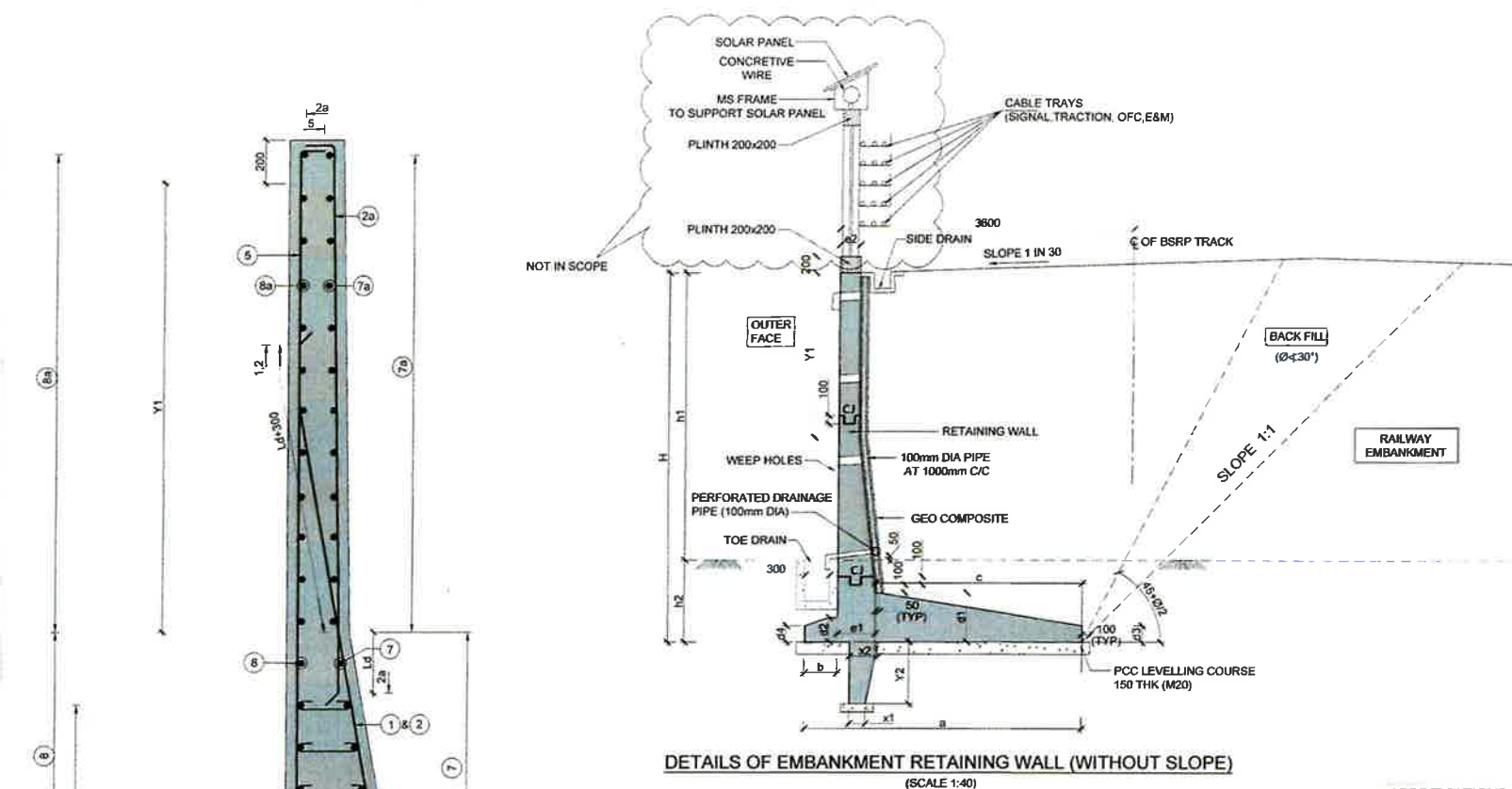
PROJECT : BENGALURU SUBURBAN RAILWAY PROJECT (BSRP)
K-RIDE

DRAWING TITLE :
TYPICAL DETAILS OF EMBANKMENT RETAINING WALL IN CUTTING
PORTION WITHOUT SLOPED EARTH (h1-1000mm TO 2000mm)

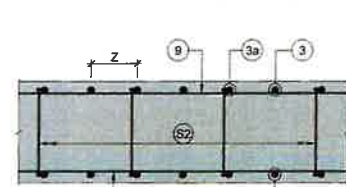
DRAWING NO. : O22077-BSRP-CR2-C-AG-ERS-30-1352

SCALE : DATE : REVISION DWG STATUS

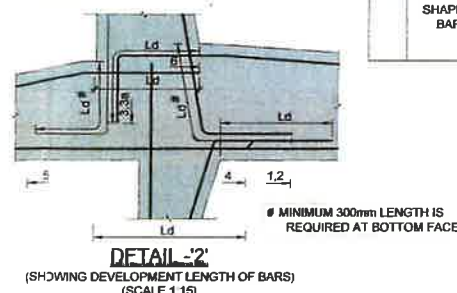
PRELIMINARY DWG (P), DEFINITIVE DWG (D), CONSTRUCTION DWG (C), AS BUILT DWG (B), SHOP DWG (S), MANUFACTURED DWG (M), SHEET SIZE - A1



RC DETAILS EMBANKMENT RETAINING WALL
(SCALE 1:15)



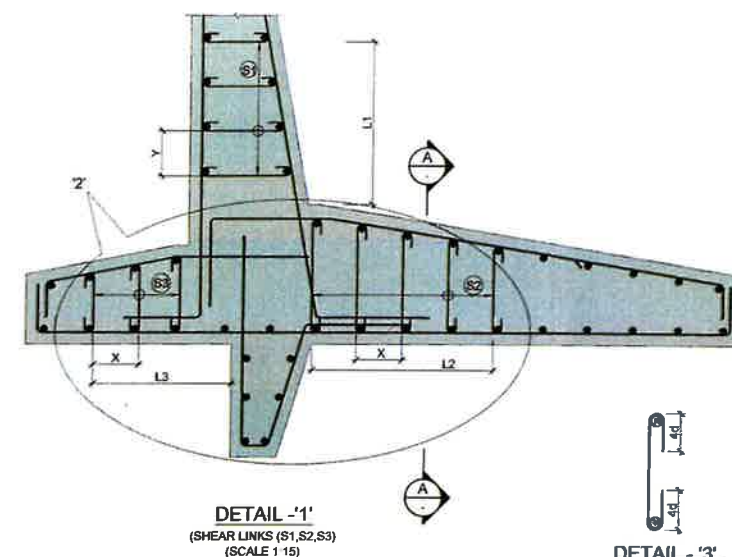
SECTION A-A
(SCALE 1:15)



DETAIL - 2'
(SHOWING DEVELOPMENT LENGTH OF BARS)
(SCALE 1:15)

- NOTES:
- ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METERS UNLESS OTHERWISE SPECIFIED.
 - DIMENSIONS ARE NOT TO BE SCALED, ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED.
 - CONCRETE GRADE SHALL BE M35.
 - REINFORCEMENT GRADE SHALL BE Fe500.

- NOTES:
- CLEAR COVER TO ANY REINFORCEMENT SHALL BE 50mm.
 - PARAMETERS CONSIDERED FOR DESIGN:
 - ANGLE OF INTERNAL BACKFILL - $\theta = 30^\circ$
 - COHESION OF BACKFILL - $C = 0$
 - WALL FRICTION ANGLE - $\delta = 10^\circ$
 - SATURATED DENSITY OF BACKFILL - $\gamma = 20 \text{ kN/m}^3$



DETAIL - 1'
(SHEAR LINKS (S1, S2, S3))
(SCALE 1:15)

DETAIL - 3'
(d - DIA OF SHEAR LINKS)
(SCALE 1:15)

SCHEDULE OF DIMENSIONS FOR RETAINING WALL

		GEOMETRIC PROPERTY																		MAXIMUM BASE PRESSURE N/m²		
SL.NO	TOTAL HEIGHT (H) (m)	h1	h2	a	b	c	d1	d2	d3	d4	e1	e2	D	Y1	Y2	X1	X2	L1	L2		L3	C1
		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm		mm	mm
1	6.51 TO 7.00	5500	1500	4500	400	3300	750	300	200	200	800	250	3800	2000	-	-	-	-	-	-	1410	25.87
2	7.01 TO 7.50	6000	1500	5000	400	3750	800	300	200	200	850	250	3800	2000	-	-	-	-	-	-	1530	26.91
3	7.51 TO 8.00	6500	1500	5500	400	4100	850	300	200	200	1000	250	3800	2000	-	-	-	-	-	-	1640	28.11
4	8.01 TO 8.50	7000	1500	6200	400	4750	950	300	200	200	1050	250	3800	2000	-	-	-	-	-	-	1800	28.45
5	8.51 TO 9.00	7500	1500	6850	400	5150	1000	300	200	200	1100	250	3800	2000	-	-	-	-	-	-	1840	29.86
6	9.01 TO 10.00	8000	2000	7500	400	5800	1200	300	200	200	1200	250	3800	2000	-	-	-	-	-	-	1470	32.86
7	10.01 TO 10.50	8500	2000	8000	400	6300	1350	300	200	200	1300	250	3800	2000	-	-	-	-	4650	-	1700	34.14
8	10.51 TO 11.00	9000	2000	8400	400	6800	1450	300	200	200	1400	250	3800	2000	-	-	-	-	1600	5000	1650	35.72
9	11.01 TO 11.50	9500	2000	8800	400	6950	1500	300	250	200	1450	250	3800	2000	-	-	-	-	1800	5400	1450	37.29
10	11.51 TO 12.00	10000	2000	9200	400	7300	1600	300	300	200	1500	250	3800	2000	-	-	-	-	2100	5650	1530	38.87

SCHEDULE OF REINFORCEMENT FOR RETAINING WALL

S.NO	TOTAL HEIGHT (H) (m)	REINFORCEMENT DETAILS																					
		①	②	2a	③	3a	④	4a	⑤	⑥	⑦	7a	⑧	8a	⑨	10	11	12	13	14	S1 Y x Z	S2 X x Z	S3 X x Z
1	6.51 TO 7.00	Y16 AT 240	Y25 AT 240	Y16 AT 240	Y20 AT 240	Y25 AT 240	-	Y16 AT 240	Y12 AT 240	Y10 AT 240	Y16 AT 220	Y8 AT 200	Y12 AT 220	Y8 AT 200	Y16 AT 240	Y12 AT 240	Y8 AT 160	Y8 AT 160	-	-	-	-	-
2	7.01 TO 7.50	Y16 AT 220	Y25 AT 220	Y16 AT 220	Y20 AT 220	Y25 AT 220	-	Y16 AT 220	Y12 AT 220	Y10 AT 220	Y16 AT 200	Y8 AT 200	Y12 AT 200	Y8 AT 200	Y16 AT 220	Y12 AT 220	Y8 AT 160	Y8 AT 160	-	-	-	-	-
3	7.51 TO 8.00	Y25 AT 280	Y25 AT 280	Y25 AT 280	Y25 AT 280	Y32 AT 280	-	Y16 AT 280	Y16 AT 280	Y10 AT 280	Y16 AT 170	Y8 AT 200	Y12 AT 170	Y8 AT 200	Y16 AT 180	Y12 AT 180	Y8 AT 160	Y8 AT 160	-	-	-	-	-
4	8.01 TO 8.50	Y25 AT 260	Y25 AT 260	Y25 AT 260	Y25 AT 260	Y32 AT 260	-	Y16 AT 260	Y16 AT 260	Y10 AT 260	Y16 AT 160	Y8 AT 200	Y12 AT 160	Y8 AT 200	Y16 AT 180	Y12 AT 180	Y8 AT 160	Y8 AT 160	-	-	-	-	-
5	8.51 TO 9.00	Y25 AT 280	Y32 AT 280	Y25 AT 280	Y32 AT 280	Y32 AT 280	-	Y16 AT 280	Y16 AT 280	Y10 AT 280	Y16 AT 150	Y8 AT 200	Y12 AT 150	Y8 AT 200	Y16 AT 160	Y12 AT 160	Y8 AT 160	Y8 AT 160	-	-	-	-	-
6	9.01 TO 10.00	Y25 AT 270	Y36 AT 270	Y25 AT 270	Y32 AT 270	Y36 AT 270	-	Y16 AT 270	Y16 AT 270	Y10 AT 270	Y16 AT 140	Y8 AT 200	Y12 AT 140	Y8 AT 200	Y16 AT 140	Y12 AT 140	Y8 AT 160	Y8 AT 160	-	-	-	-	-
7	10.01 TO 10.50	Y25 AT 260	Y36 AT 260	Y25 AT 260	Y32 AT 260	Y36 AT 260	-	Y16 AT 260	Y16 AT 260	Y10 AT 260	Y20 AT 200	Y8 AT 200	Y16 AT 200	Y8 AT 200	Y20 AT 200	Y16 AT 200	Y10 AT 250	Y8 AT 250	-	-	-	Y8 AT 200x260	-
8	10.51 TO 11.00	Y25 AT 250	Y36 AT 250	Y25 AT 250	Y32 AT 250	Y36 AT 250	-	Y20 AT 250	Y16 AT 250	Y10 AT 250	Y20 AT 180	Y8 AT 200	Y16 AT 180	Y8 AT 200	Y20 AT 180	Y16 AT 180	Y10 AT 250	Y8 AT 250	-	-	Y8 AT 180x250	Y8 AT 180x250	-
9	11.01 TO 11.50	Y32 AT 270	Y36 AT 270	Y32 AT 270	Y36 AT 270	Y36 AT 270	-	Y20 AT 270	Y20 AT 270	Y10 AT 270	Y20 AT 180	Y8 AT 200	Y16 AT 180	Y8 AT 200	Y20 AT 170	Y16 AT 170	Y10 AT 250	Y8 AT 250	-	-	Y8 AT 180x270	Y8 AT 170x270	-
10	11.51 TO 12.00	Y32 AT 260	Y36 AT 260	Y32 AT 260	Y36 AT 260	Y36 AT 260	-	Y20 AT 260	Y20 AT 260	Y10 AT 260	Y20 AT 180	Y8 AT 200	Y16 AT 180	Y8 AT 200	Y20 AT 170	Y16 AT 170	Y10 AT 250	Y8 AT 250	-	-	Y8 AT 180x260	Y8 AT 170x260	-
	SHAPE OF BARS																						

EMPLOYER:
RAIL INFRASTRUCTURE
DEVELOPMENT COMPANY
(KARNATAKA) LIMITED

GENERAL CONSULTANTS

AECOM © egis wsp AECOM-EGIS-WSP

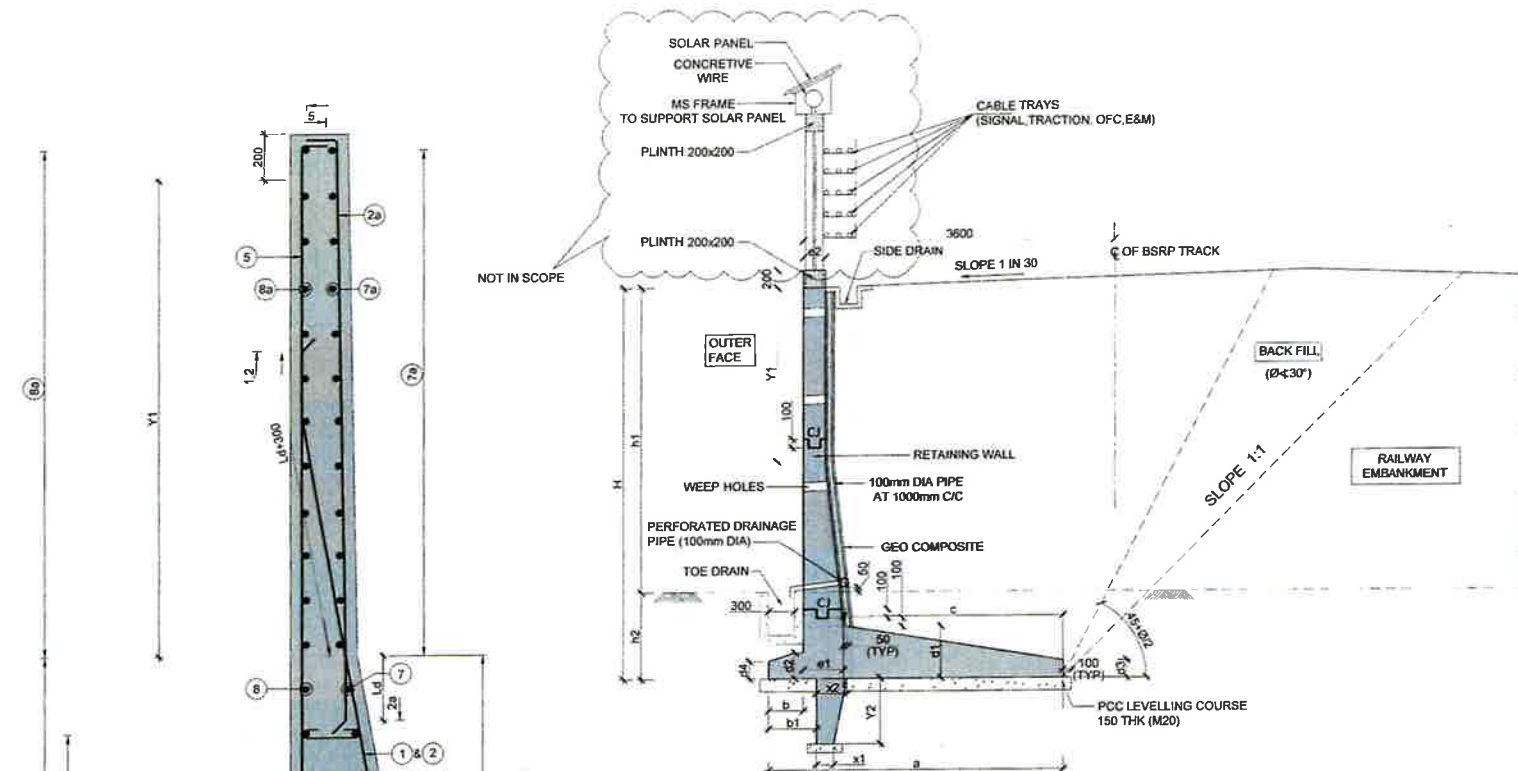
PROJECT:
BENGALURU SUBURBAN RAILWAY PROJECT (BSRP)
K-RIDE CORRIDOR - 2

DRAWING TITLE:
TYPICAL DETAILS OF EMBANKMENT RETAINING WALL FOR FILLING
PORTION WITHOUT SLOPE - (h1=5500 TO 10000mm)

DRAWING NO: O22077-BSRP-CR2-C-AG-ERS-30-1344

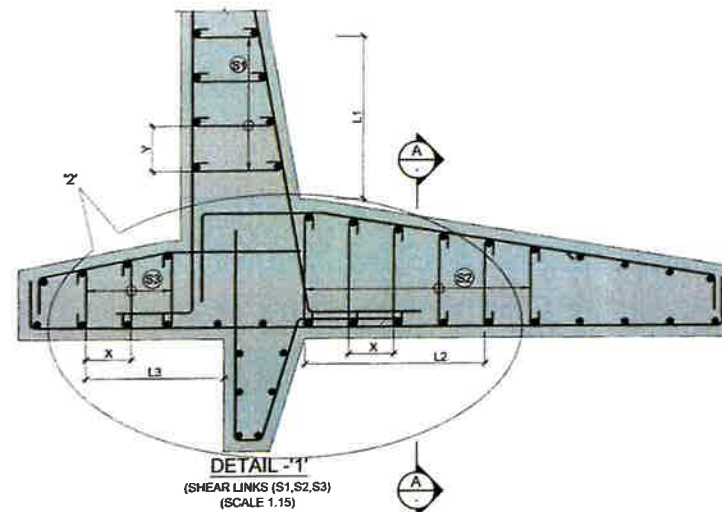
SCALE: DATE: REVISION: DWG STATUS:

PRELIMINARY DWG (P) DEFINITIVE DWG (D) CONSTRUCTION DWG (C) AS BUILT DWG (B) SHOP DWG (S) MANUFACTURED DWG (M) SHEET SIZE - A1



DETAILS OF EMBANKMENT RETAINING WALL (WITHOUT SLOPE)
(SCALE 1:40)

ABBREVIATIONS:
Q - QUANTITY
TYP - TYPICAL
THK - THICKNESS
DN - DOWN



DETAIL - 3'
(d - DIA OF SHEAR LINKS)
(SCALE 1:15)

SCHEDULE OF DIMENSIONS FOR RETAINING WALL

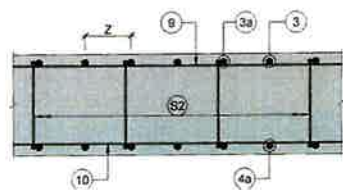
GEOMETRIC PROPERTY																							
SL.NO	TOTAL HEIGHT (H) (m)	h1	h2	a	b	c	d1	d2	d3	d4	e1	e2	D	Y1	Y2	X1	X2	b1	L1	L2	L3	C1	MAXIMUM BASE PRESSURE kN/m²
		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm		
1	1.00 TO 2.50	1000	1500	1350	200	900	250	200	200	200	250	250	3600	1000	250	200	283	338	-	-	-	-	12.84
2	2.51 TO 3.00	1500	1500	1650	200	1000	300	200	200	200	350	250	3600	1500	250	200	283	338	-	-	-	-	15.71
3	3.01 TO 3.50	2000	1500	1850	200	1300	350	200	200	200	350	250	3600	2000	250	200	283	338	-	-	-	-	17.75
4	3.51 TO 4.00	2500	1500	2200	200	1600	400	200	200	200	400	250	3600	2000	-	-	-	-	-	-	-	-	19.65
5	4.01 TO 4.50	3000	1500	2500	250	1750	450	200	200	200	500	250	3600	2000	-	-	-	-	-	-	-	-	20.80
6	4.51 TO 5.00	3500	1500	2800	300	1950	500	200	200	200	550	250	3600	2000	-	-	-	-	-	-	-	-	22.08
7	5.01 TO 5.50	4000	1500	3100	350	2150	550	250	200	200	600	250	3600	2000	-	-	-	-	-	-	-	-	23.40
8	5.51 TO 6.00	4500	1500	3500	400	2450	600	300	200	200	650	250	3600	2000	-	-	-	-	-	-	-	-	24.26
9	6.01 TO 6.50	5000	1500	4000	400	2850	700	300	200	200	750	250	3600	2000	-	-	-	-	-	-	-	-	24.84

SCHEDULE OF REINFORCEMENT FOR RETAINING WALL

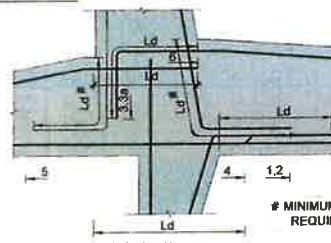
S.NO	TOTAL HEIGHT (H) (m)	REINFORCEMENT DETAILS																(S1) Y x Z	(S2) X x Z	(S3) X x Z
		(1)	(2)	(2a)	(3)	(3a)	(4)	(4a)	(5)	(6)	(7)	(7a)	(8)	(8a)	(9)	(10)	(11)	(12)	(13)	(14)
1	1.00 TO 2.50	Y12 AT 240	-	Y12 AT 240	-	Y12 AT 240	-	Y10 AT 240	Y10 AT 240	Y10 AT 240	Y10 AT 250	Y8 AT 200	Y8 AT 250	Y8 AT 200	Y8 AT 200	Y8 AT 200	Y8 AT 250	Y8 AT 250	Y12 AT 240	Y10 AT 250
2	2.51 TO 3.00	Y12 AT 240	Y10 AT 240	Y12 AT 240	Y10 AT 240	Y12 AT 240	-	Y10 AT 240	Y10 AT 240	Y10 AT 240	Y10 AT 220	Y8 AT 200	Y8 AT 220	Y8 AT 200	Y8 AT 180	Y8 AT 180	Y8 AT 250	Y8 AT 250	Y12 AT 240	Y10 AT 250
3	3.01 TO 3.50	Y12 AT 220	Y10 AT 220	Y12 AT 220	Y10 AT 220	Y12 AT 220	-	Y10 AT 220	Y10 AT 220	Y10 AT 220	Y10 AT 200	Y8 AT 200	Y8 AT 200	Y8 AT 200	Y10 AT 200	Y8 AT 200	Y8 AT 250	Y8 AT 250	Y12 AT 220	Y10 AT 250
4	3.51 TO 4.00	Y12 AT 210	Y12 AT 210	Y12 AT 210	Y10 AT 210	Y16 AT 210	-	Y10 AT 210	Y10 AT 210	Y10 AT 210	Y10 AT 180	Y8 AT 200	Y8 AT 180	Y8 AT 200	Y10 AT 180	Y8 AT 180	Y8 AT 250	Y8 AT 250	-	-
5	4.01 TO 4.50	Y12 AT 200	Y16 AT 200	Y12 AT 200	Y12 AT 200	Y16 AT 200	-	Y10 AT 200	Y10 AT 200	Y10 AT 200	Y12 AT 200	Y8 AT 200	Y10 AT 200	Y8 AT 200	Y10 AT 160	Y8 AT 160	Y8 AT 250	Y8 AT 250	-	-
6	4.51 TO 5.00	Y16 AT 260	Y20 AT 260	Y16 AT 260	Y16 AT 260	Y20 AT 260	-	Y12 AT 260	Y10 AT 260	Y10 AT 260	Y12 AT 180	Y8 AT 200	Y10 AT 170	Y8 AT 200	Y12 AT 180	Y10 AT 190	Y8 AT 190	Y8 AT 250	-	-
7	5.01 TO 5.50	Y16 AT 250	Y20 AT 250	Y16 AT 250	Y16 AT 250	Y20 AT 250	-	Y12 AT 250	Y12 AT 250	Y10 AT 250	Y12 AT 170	Y8 AT 200	Y10 AT 170	Y8 AT 200	Y12 AT 160	Y10 AT 180	Y8 AT 180	Y8 AT 250	-	-
8	5.51 TO 6.00	Y16 AT 220	Y20 AT 220	Y16 AT 220	Y16 AT 220	Y20 AT 220	-	Y12 AT 220	Y12 AT 220	Y10 AT 220	Y12 AT 150	Y8 AT 200	Y10 AT 150	Y8 AT 200	Y12 AT 140	Y10 AT 160	Y8 AT 160	Y8 AT 250	-	-
9	6.01 TO 6.50	Y16 AT 270	Y25 AT 270	Y16 AT 270	Y20 AT 270	Y25 AT 270	-	Y16 AT 270	Y16 AT 270	Y10 AT 270	Y12 AT 130	Y8 AT 200	Y10 AT 130	Y8 AT 200	Y12 AT 140	Y10 AT 140	Y8 AT 160	Y8 AT 250	-	-

⊗ - IF BAR MARK (2) IS NOT USED, THEN BAR MARK (1) SHOULD GO UPTO THE TOP OF RETAINING WALL

RC DETAILS EMBANKMENT RETAINING WALL
(SCALE 1:15)



SECTION A-A
(SCALE 1:15)



DETAIL - 2'
(SHOWING DEVELOPMENT LENGTH OF BARS)
(SCALE 1:15)

MINIMUM 300mm LENGTH IS REQUIRED AT BOTTOM FACE

NOTES

- ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METERS UNLESS OTHERWISE SPECIFIED
- DIMENSIONS ARE NOT TO BE SCALED, ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED
- CONCRETE GRADE SHALL BE M35
- REINFORCEMENT GRADE SHALL BE Fe500

NOTES

- CLEAR COVER TO ANY REINFORCEMENT SHALL BE 50mm
- PARAMETERS CONSIDERED FOR DESIGN:-
 - ANGLE OF INTERNAL BACKFILL - $\phi = 30^\circ$
 - COHESION OF BACKFILL - $C = 0$
 - WALL FRICTION ANGLE - $\delta = 10^\circ$
 - SATURATED DENSITY OF BACKFILL - $\gamma = 20kN/m^3$

EMPLOYER
RAIL INFRASTRUCTURE
DEVELOPMENT COMPANY
(KARNATAKA) LIMITED

GENERAL CONSULTANTS

AECOM egis wsp AECOM-EGIS-WSP

PROJECT
BENGALURU SUBURBAN RAILWAY PROJECT (BSRP)
K-RIDE

DRAWING TITLE

TYPICAL DETAILS OF EMBANKMENT RETAINING WALL FOR FILLING
PORTION WITHOUT SLOPE - (h1=1000mm TO 5000mm, h2=1500mm)

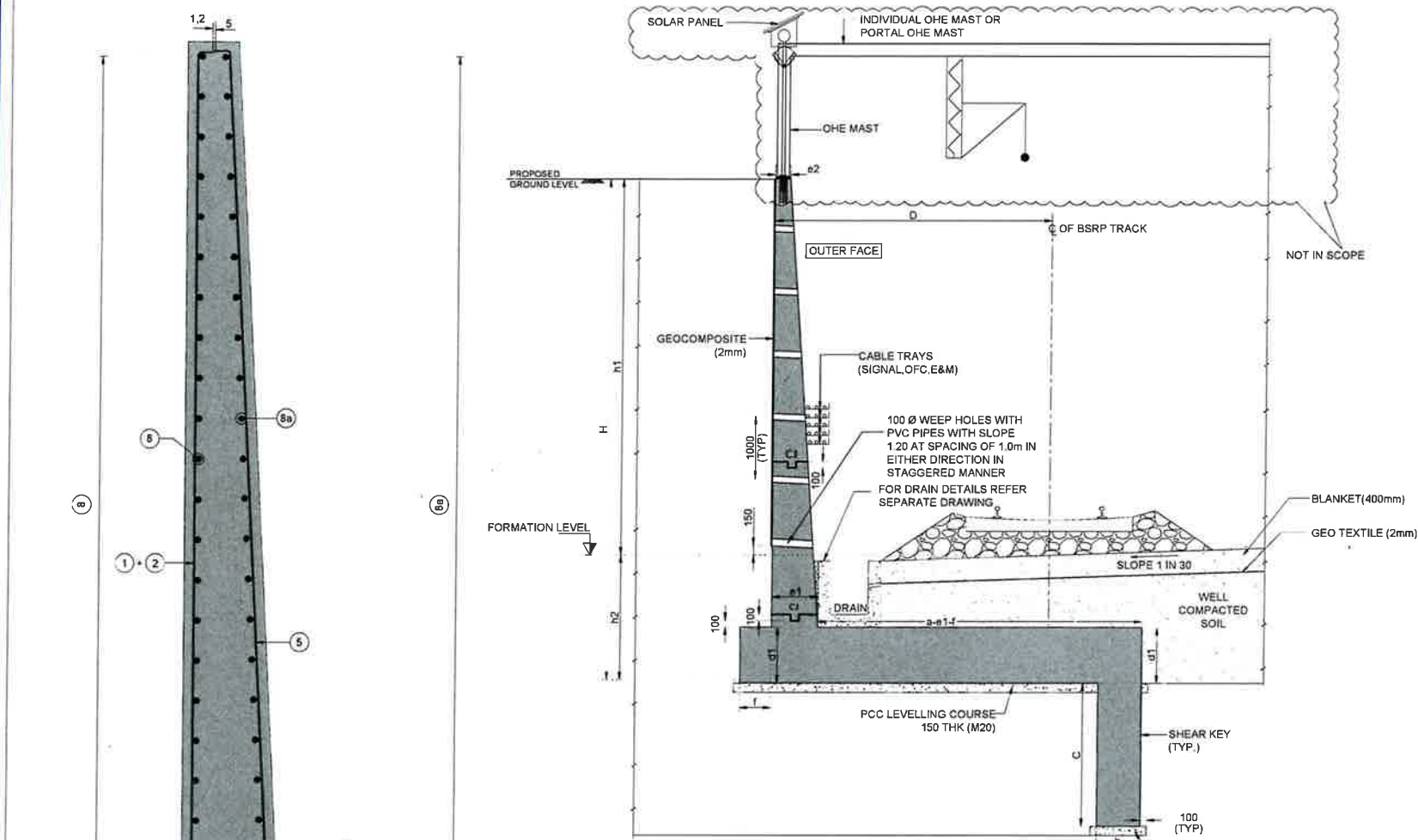
DRAWING NO. O22077-BSRP-CR2-C-AG-ERS-30-1343

REVISION DWG STATUS

SCALE PRELIMINARY DWG (P), DEFINITIVE DWG (D), CONSTRUCTION DWG (C), AS BUILT DWG (B), SHOP DWG (S), MANUFACTURED DWG (M), SHEET SIZE - A1

DATE

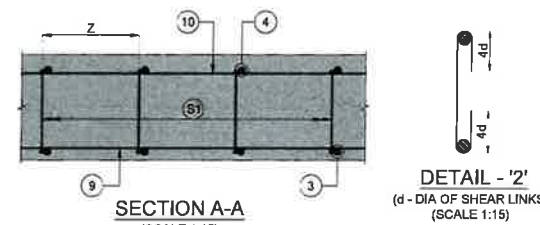
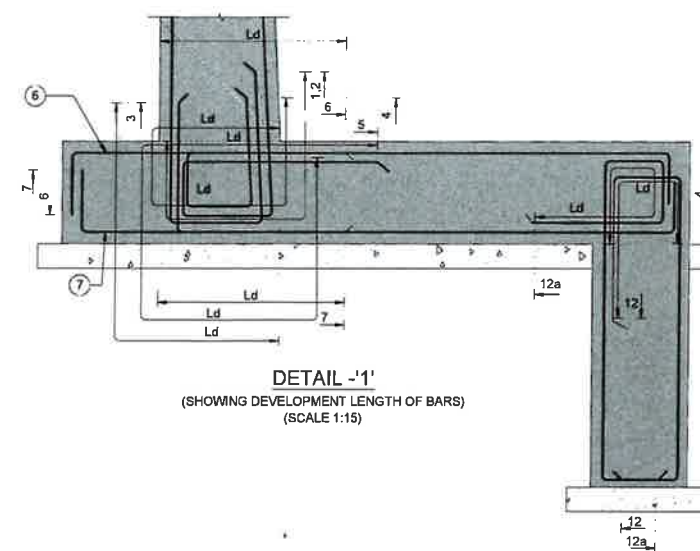
FILE NAME



DETAILS OF EMBANKMENT RETAINING WALL
(SCALE 1:50)

SCHEDULE OF REINFORCEMENT FOR RETAINING WALL

S.NO	TOTAL HEIGHT (H) (m)	REINFORCEMENT DETAILS																			
		①	②	③	④	⑤	⑥	⑦	⑧	⑧a	⑨	⑩	⑪	⑪a	⑫	⑫a	⑬	⑭	⑮	S1 X x Z	S2 Y x Z
1	4.01 TO 4.50	Y20 AT 170	-	Y20 AT 170	Y12 AT 170	Y12 AT 170	Y16 AT 170	Y12 AT 170	Y10 AT 160	Y8 AT 160	Y10 AT 160	Y8 AT 160	Y10 AT 200	Y8 AT 200	Y20 AT 170	Y10 AT 170	Y10 AT 160	Y8 AT 160	Y10 AT 170	-	Y8 AT 200X170
2	4.51 TO 5.00	Y20 AT 160	-	Y20 AT 160	Y12 AT 160	Y12 AT 160	Y16 AT 160	Y12 AT 160	Y12 AT 200	Y10 AT 200	Y12 AT 200	Y10 AT 200	Y10 AT 180	Y8 AT 180	Y20 AT 160	Y10 AT 160	Y12 AT 200	Y10 AT 200	Y10 AT 160	-	Y8 AT 180X160
3	5.01 TO 5.50	Y20 AT 140	-	Y20 AT 140	Y12 AT 140	Y12 AT 140	Y16 AT 140	Y12 AT 140	Y12 AT 190	Y10 AT 190	Y12 AT 190	Y10 AT 190	Y10 AT 160	Y8 AT 160	Y20 AT 140	Y10 AT 140	Y12 AT 190	Y10 AT 190	Y10 AT 140	-	Y8 AT 160X140
4	5.50 TO 6.00	Y25 AT 180	-	Y25 AT 180	Y16 AT 180	Y16 AT 180	Y16 AT 180	Y16 AT 180	Y12 AT 170	Y10 AT 170	Y12 AT 170	Y10 AT 170	Y12 AT 200	Y10 AT 200	Y25 AT 180	Y12 AT 180	Y12 AT 170	Y10 AT 170	Y10 AT 180	-	Y10 AT 200X180
5	6.01 TO 6.50	Y25 AT 150	-	Y25 AT 150	Y16 AT 150	Y16 AT 150	Y16 AT 150	Y16 AT 150	Y12 AT 170	Y10 AT 170	Y12 AT 160	Y10 AT 160	Y12 AT 190	Y10 AT 190	Y25 AT 150	Y12 AT 150	Y12 AT 150	Y10 AT 150	Y10 AT 150	-	Y10 AT 190X150
6	6.50 TO 7.00	Y25 AT 155	-	Y25 AT 155	Y16 AT 155	Y16 AT 155	Y20 AT 155	Y16 AT 155	Y12 AT 160	Y10 AT 160	Y16 AT 240	Y12 AT 240	Y12 AT 170	Y10 AT 170	Y25 AT 155	Y12 AT 155	Y16 AT 240	Y12 AT 240	Y10 AT 155	-	Y10 AT 170X155
7	7.01 TO 7.50	Y25 AT 140	-	Y25 AT 140	Y16 AT 140	Y16 AT 140	Y20 AT 140	Y16 AT 140	Y12 AT 140	Y10 AT 140	Y16 AT 200	Y12 AT 200	Y12 AT 170	Y10 AT 170	Y25 AT 140	Y12 AT 140	Y16 AT 220	Y12 AT 220	Y10 AT 140	Y8 AT 200X140	Y10 AT 170X140
8	7.51 TO 8.00	Y25 AT 130	-	Y25 AT 130	Y16 AT 130	Y16 AT 130	Y20 AT 130	Y16 AT 130	Y12 AT 135	Y10 AT 135	Y16 AT 190	Y12 AT 190	Y12 AT 140	Y10 AT 140	Y25 AT 130	Y12 AT 130	Y16 AT 190	Y12 AT 190	Y10 AT 130	Y8 AT 190X130	Y10 AT 140X130
	SHAPE OF BARS																				



ABBREVIATIONS :

- C - CENTER LINE
- TYP - TYPICAL
- THK - THICKNESS
- DN - DOWN

SCHEDULE OF DIMENSIONS FOR RETAINING WALL

SL.NO	TOTAL HEIGHT (H) (m)	GEOMETRIC PROPERTY															MAXIMUM BASE PRESSURE Um^2
		h1	h2	a	b	c	d1	e1	e2	f	D	L1	L2				
1	4.01 TO 4.50	2500	2000	3550	350	1400	450	450	250	500	4400	-	1400				13.42
2	4.51 TO 5.00	3000	2000	4000	400	1550	500	500	250	500	4400	-	1550				13.47
3	5.01 TO 5.50	3500	2000	4300	450	1650	550	550	250	500	4400	-	1650				14.16
4	5.51 TO 6.00	4000	2000	4600	500	1750	600	600	250	500	4400	-	1750				14.31
5	6.01 TO 6.50	4500	2000	5200	550	1950	650	650	250	500	4400	-	1950				14.78
6	6.50 TO 7.00	5000	2000	5550	550	2000	750	650	250	500	4400	-	2000				14.89
7	7.01 TO 7.50	5500	2000	6000	600	2150	800	700	250	500	4400	2400	2150				15.05
8	7.51 TO 8.00	6000	2000	6450	700	2300	900	750	250	500	4400	2600	2300				

ADDITIONAL NOTES:

- DEVELOPMENT LENGTH $L_d = 48 \text{ TIMES DIA OF BAR}$.
- LAP LENGTH SHALL BE 64 TIMES DIA OF BAR, NOT MORE THAN 50% OF BARS ARE LAPPED IN SAME PLACE.
- SAFE BEARING CAPACITY AT BOTTOM OF BASE SLAB SHALL BE CONFIRMED BY DOING PLATE LOAD TEST AND SBC CONFIRMED SHALL BE GREATER THAN THE BEARING CAPACITY.
- IN CASE OF ANY EXCAVATION TO BE CARRIED OUT IN THE FRONT SIDE OF RETAINING WALL AT/NEAR TOE SLAB PRIOR APPROVAL/CONSENT SHALL BE OBTAINED FROM RELEVANT AUTHORITY AND WALL STABILITY NEED TO BE RECHECKED.
- HEIGHT 'h2' NEED TO BE MAINTAINED IN FRONT OF RETAINING WALL FOR ITS INTENDED LIFE AND FOR CONSIDERATION OF PASSIVE PRESSURE.
- SOIL WITH INTERNAL FRICTION $\phi 30^\circ$ IS CONSIDERED IN DESIGN.
- BACKFILL MATERIAL SHALL CONSIST OF GRANULAR MATERIAL OF GW, GP, SW, GROUPS AS PER IS 1498-1970.
- IF REQUIRED, DURING CONSTRUCTION ADDITIONAL LINKS TO BE PROVIDED TO PLACE THE VERTICAL BARS IN POSITION.
- THE COMPACTION FACTOR OF 0.95 OR ABOVE HAS TO BE ENSURED AT THE BASE OF PCC.
- STRICTLY, FOR THE FULL DEVELOPMENT OF PASSIVE EARTH PRESSURE, IT IS NECESSARY THAT DURING THE CONSTRUCTION OF THE WALL, THERE SHOULD BE NO DISTURBANCE TO THE SOIL AGAINST WHICH THE CONCRETE IN THE TOE SLAB IS PLACED.
- ALL RCC SURFACES COMING IN CONTACT WITH SOIL SHOULD BE PAINTED WITH BITUMEN OR COAL TAR OF APPROVED QUALITY @ 1.46kg/sqm.
- IF ANY AMBIGUITY IS FOUND IN DRAWINGS OR AT SITE SAME SHALL BE BROUGHT TO DESIGNERS' ENGINEERS' NOTICE BEFORE EXECUTION.
- EXPANSION JOINT SHALL BE PROVIDED AT MAXIMUM INTERVAL OF 20m. EXPANSION JOINT TO BE FILLED WITH BITUMINOUS IMPREGNATED FIBRE BOARD.
- SBC CONSIDERED IN THE DESIGN IS 20 Um^2 .

- NOTES
- ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METERS UNLESS OTHERWISE SPECIFIED.
 - DIMENSIONS ARE NOT TO BE SCALED, ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED.
 - CONCRETE GRADE SHALL BE M35.
 - REINFORCEMENT GRADE SHALL BE Fe500.
 - CLEAR COVER TO ANY REINFORCEMENT SHALL BE 50mm.
- NOTES
- PARAMETERS CONSIDERED FOR DESIGN -
 - a) ANGLE OF INTERNAL BACKFILL - $\phi = 30^\circ$
 - b) COHESION OF BACKFILL - $c = 0$
 - c) WALL FRICTION ANGLE - $\delta = 10^\circ$
 - d) SATURATED DENSITY OF BACKFILL - $\gamma = 20 \text{ kN/m}^3$

REV	DATE	BRIEF DESCRIPTION

EMPLOYER RAIL INFRASTRUCTURE DEVELOPMENT COMPANY (KARNATAKA) LIMITED GENERAL CONSULTANTS AECOM-EGIS-WSP	PROJECT BENGALURU SUBURBAN RAILWAY PROJECT (BSRP) K-RIDE DRAWING TITLE TYPICAL DETAILS OF EMBANKMENT RETAINING WALL IN CUTTING PORTION WITHOUT SLOPED EARTH (h1-2000mm TO 6000mm) DRAWING NO. O22077-BSRP-CR2-C-AG-ERS-20-1355 SCALE PRELIMINARY DWG (P) DEFINITIVE DWG (D) CONSTRUCTION DWG (C) AS BUILT DWG (S) SHOP DWG (S) MANUFACTURED DWG (M) SHEET SIZE - A1
REVISION DWG STATUS	DATE