

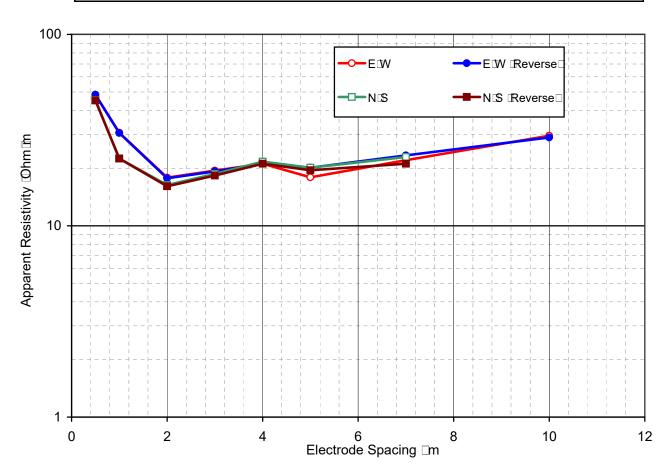
Electrical Resistivity Test No.: ERT-34

IS: 3043 1987 RA 2006

Test Details

Test Designation : ERT 34

Coordinate : 314187.96E 2313179.08N



	Appa	Apparent Resistivity⊡Ohm⊡n		
Electrode Spacing⊡ m	ΕŒW	E∰ Æevers e□	NIS	N.S ⊡Revers e□
0.5	48.4	48.3	45.4	45.1
1.0	30.7	30.5	22.5	22.4
2.0	17.8	17.7	16.3	16.1
3.0	19.4	19.2	18.7	18.3
4.0	21.1	21.1	21.6	21.1
5.0	17.9	20.1	20.1	19.5
7.0	22.0	23.3	22.9	21.1
10.0	29.5	28.9	·	
Mean Resistivity	26	26	24	23

Mean Resistivity Value ohm m : 19.8 ohm m

Apparent Resistivity Values (ERT-34)

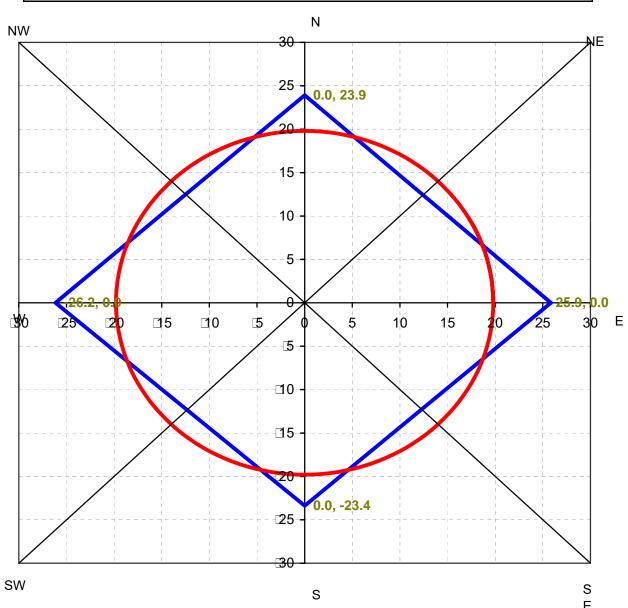
Project No. 222002D Plate 178 of 199



Electrical Resistivity Test No.: ERT-34

IS: 3043 1 987 RA 2006

Test Details
Test Designation : ERTเ34
Co⊡ordinate : 314187.96E⊡2313179.08N



Total Area of Polygon: 1230

Radius of E⊡uivalent Circle⊡Mean Resistivity : 20 ohm⊡m

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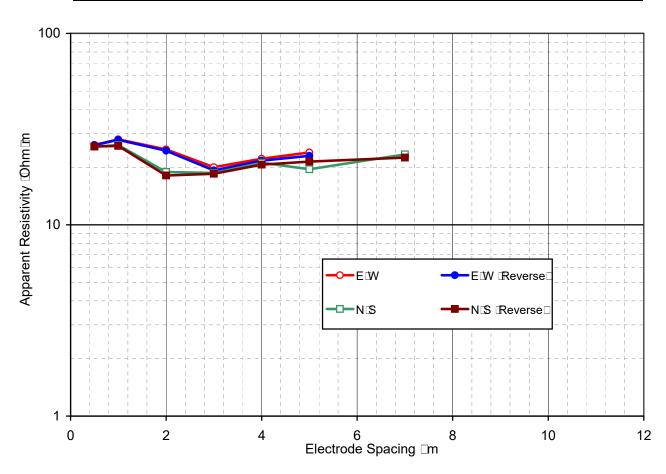
Electrical Resistivity Test No.: ERT-35

IS: 3043 1987 RA 2006

Test Details

Test Designation : ERT 35

Co ordinate : 314166.92E 2313238.38N



	Appa	Apparent Resistivity⊑Ohm⊡n		
Electrode Spacing⊡ m	ΕŒW	E∰ Revers e□	NS	N.S ⊡Revers e□
0.5	26.1	26.1	25.6	25.6
1.0	28.0	27.8	26.1	25.8
2.0	24.8	24.4	18.8	18.1
3.0	20.0	19.2	18.7	18.5
4.0	22.1	21.6	21.1	20.6
5.0	23.9	22.9	19.5	21.4
7.0			23.3	22.4
10.0				
Mean Resistivity	24	24	22	22

Mean Resistivity Value ohm m : 18.2 ohm m

Apparent Resistivity Values (ERT-35)

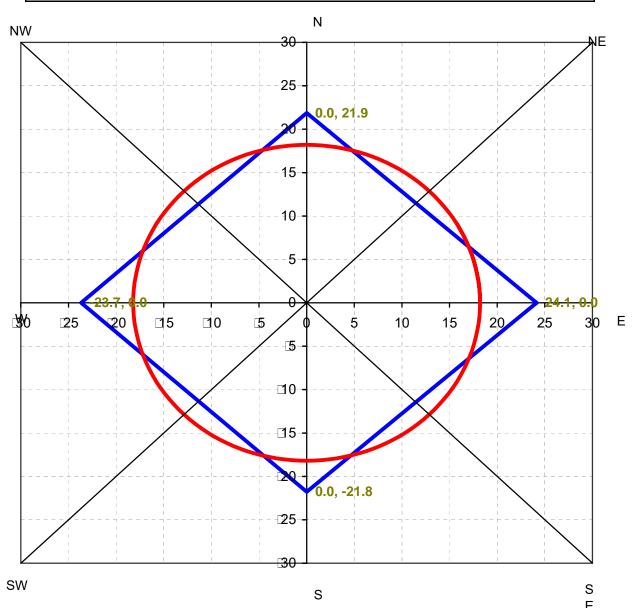
Project No. 222002D Plate 180 of 199



Electrical Resistivity Test No.: ERT-35

IS: 3043 1 987 RA 2006

Test Details
Test Designation : ERT 35
Co⊡ordinate : 314166.92E



Total Area of Polygon: 1043

Radius of E⊡uivalent Circle⊡Mean Resistivity : 18 ohm ⊡m

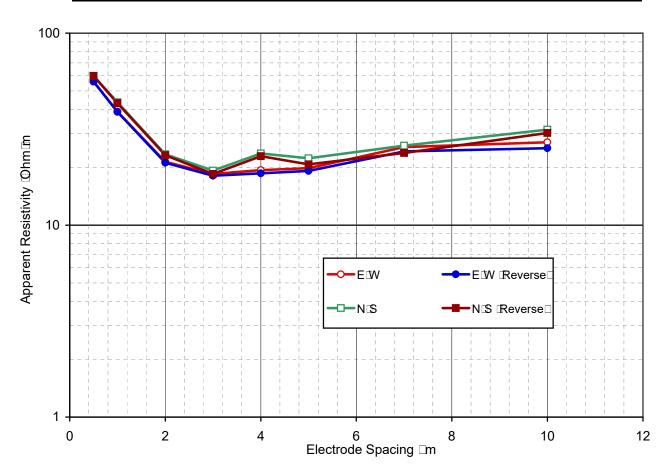
Project No. 222002D Plate 181 of 199



Electrical Resistivity Test No.: ERT-46

IS: 3043 1 987 RA 2006

Test Details
Test Designation : ERT ☑ 46
Test Location : DM□TANK
Co⊡ordinate : 806 E⊡3835 N



	Apparent Resistivity⊡Ohm⊡n			
Electrode Spacing⊡ m	ΕŒW	E∭ Revers e□	NIS	N.S ⊡Revers e□
0.5	56.0	55.9	59.9	59.8
1.0	39.0	38.9	43.6	43.1
2.0	21.4	21.1	23.4	23.1
3.0	18.5	18.1	19.2	18.5
4.0	19.4	18.6	23.6	22.9
5.0	19.8	19.2	22.3	20.7
7.0	25.5	24.2	25.9	23.8
10.0	27.0	25.1	31.4	30.2
Mean Resistivity	28	28	31	30

Mean Resistivity Value ohm in : 23.4 ohm in

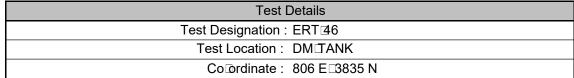
Apparent Resistivity Values (ERT-46)

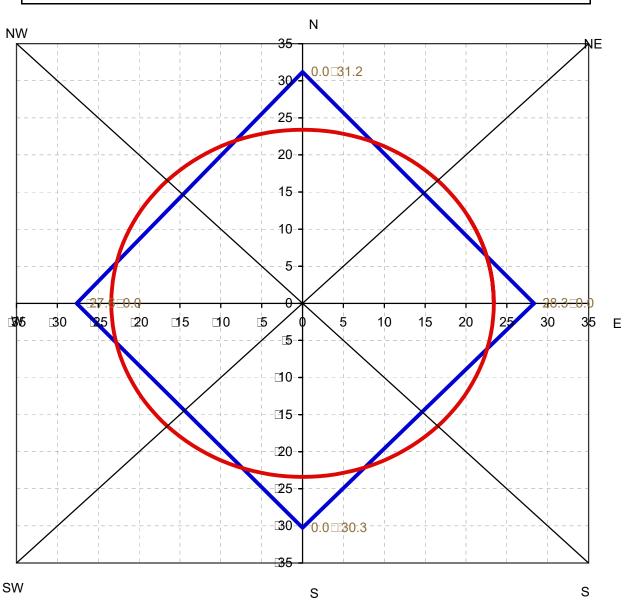
Project No. 222002D Plate 182 of 199



Electrical Resistivity Test No.: ERT-46

IS: 3043 1987 RA 2006





Total Area of Polygon: 1719

Radius of E□uivalent Circle□Mean Resistivity: 23 ohm m̄

Polar Resistivity Curves (ERT-46)

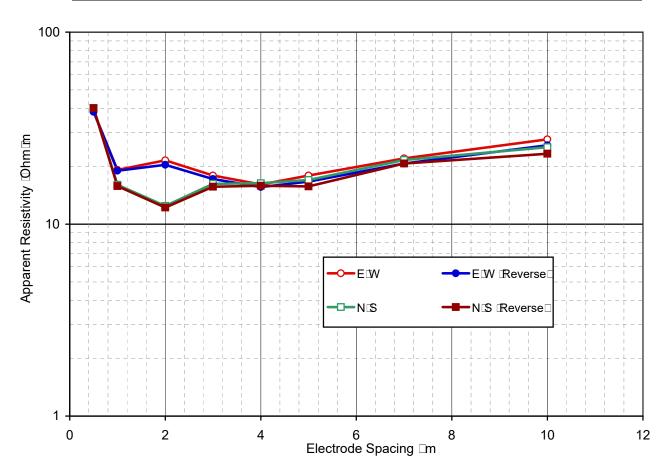
Project No. 222002D Plate 183 of 199



Electrical Resistivity Test No.: ERT-47

IS: 3043 1 987 RA 2006

Test Details
Test Designation : ERT 47
Test Location : DM□TANK
Co⊡ordinate : 732 E⊡3702 N



	Apparent Resistivity⊡Ohm⊡n			
Electrode Spacing□ m	ΕŒW	E∰ Revers e□	NS	N'S □Revers e□
0.5	38.7	38.4	40.2	40.1
1.0	19.2	19.0	16.0	15.8
2.0	21.5	20.4	12.4	12.2
3.0	17.9	17.2	16.2	15.6
4.0	16.1	15.6	16.3	15.8
5.0	17.9	16.7	17.0	15.7
7.0	22.0	20.7	21.6	20.7
10.0	27.6	25.8	25.1	23.2
Mean Resistivity	23	22	21	20

Mean Resistivity Value ohm m: 16.9 ohm m

Apparent Resistivity Values (ERT-47)

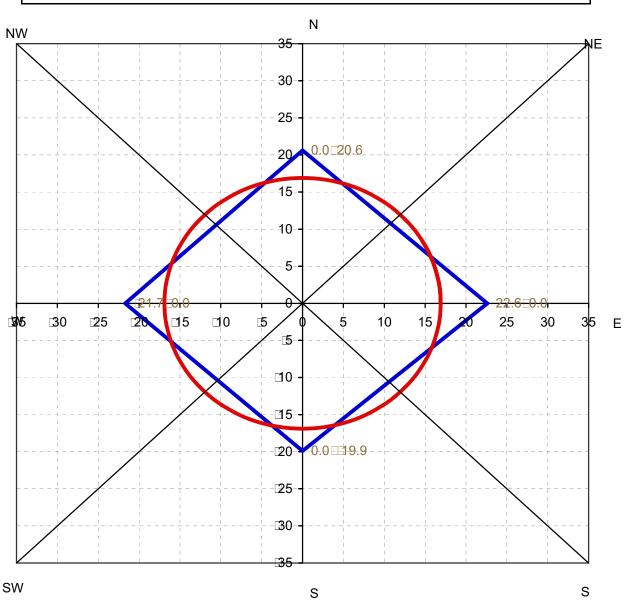
Project No. 222002D Plate 184 of 199



Electrical Resistivity Test No.: ERT-47

IS: 3043 1 987 RA 2006

Test Details
Test Designation : ERT 47
Test Location : DM□TANK
Co⊡ordinate : 732 E⊡3702 N



Total Area of Polygon: 897

Radius of E⊡uivalent Circle⊡Mean Resistivity : 17 ohm⊡m

Polar Resistivity Curves (ERT-47)

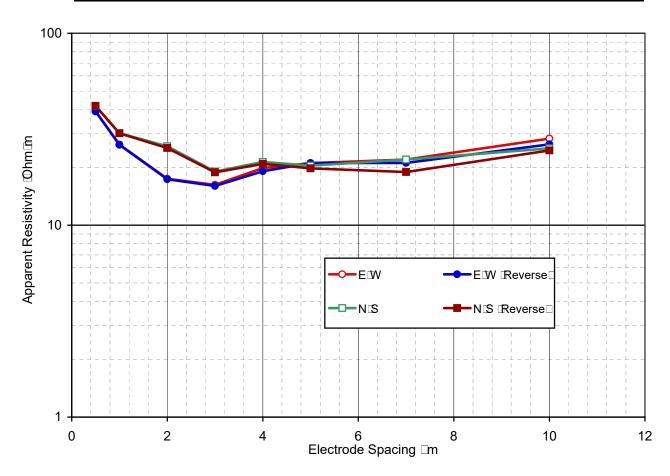
Project No. 222002D Plate 185 of 199



Electrical Resistivity Test No.: ERT-48

IS: 3043 1 987 RA 2006

Test Details
Test Designation : ERT 48
Test Location : DM□TANK
Co⊡ordinate : 845 E⊡3704 N



	Appa	Apparent Resistivity⊡Ohm⊡n		
Electrode Spacing⊡ m	ΕŒW	E∭ Revers e□	NIS	N.S ⊡Revers e□
0.5	39.2	39.2	41.8	41.8
1.0	26.3	26.2	30.2	30.1
2.0	17.5	17.3	25.8	25.3
3.0	16.2	16.0	19.0	18.8
4.0	19.9	19.1	21.4	20.9
5.0	21.0	21.0	20.4	19.8
7.0	22.0	21.1	22.0	18.9
10.0	28.3	26.4	25.1	24.5
Mean Resistivity	24	23	26	25

Mean Resistivity Value ohm m : 19.5 ohm m

Apparent Resistivity Values (ERT-48)

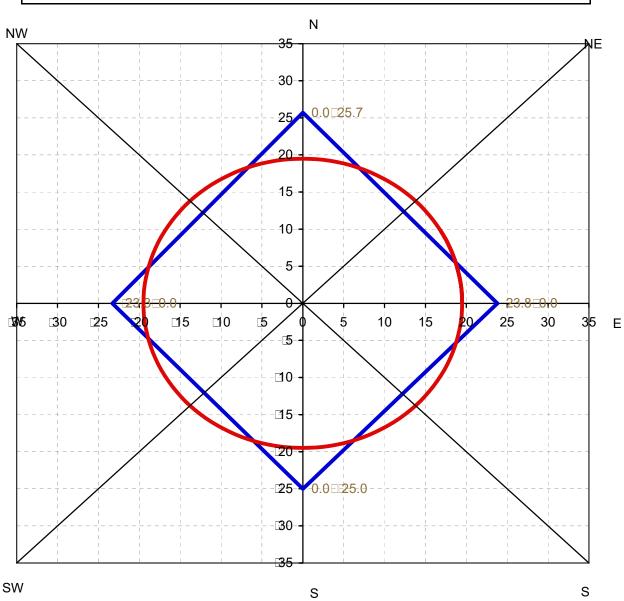
Project No. 222002D Plate 186 of 199



Electrical Resistivity Test No.: ERT-48

IS: 3043 1 987 RA 2006

Test Details
Test Designation : ERT⊡48
Test Location : DM□TANK
Co⊡ordinate : 845 E⊡3704 N



Total Area of Polygon: 1194

Radius of E⊡uivalent Circle⊡Mean Resistivity : 20 ohm⊡m

Polar Resistivity Curves (ERT-48)

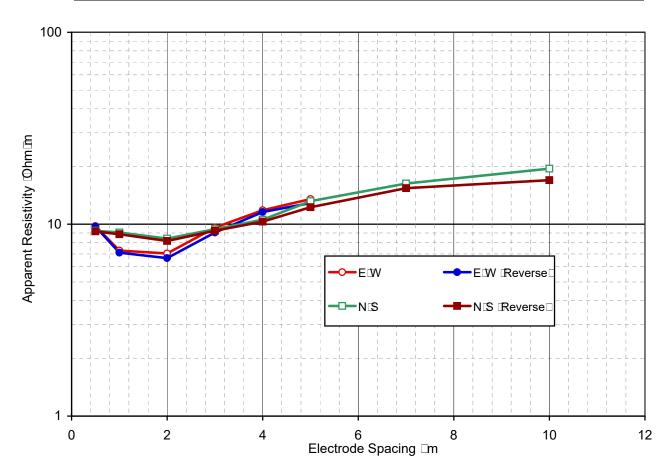
Project No. 222002D Plate 187 of 199



Electrical Resistivity Test No.: ERT-49

IS: 3043 1 987 RA 2006

Test Details			
Test Designation : ERT 49			
Test Location : DM□TANK			
Co⊡ordinate : 806 E⊑3581 N			



	Apparent Resistivity⊡Ohm⊡m			ım⊡m
Electrode Spacing□ m	ΕŒW	E∰ Revers e□	NIS	N.S ⊡Revers e□
0.5	9.8	9.7	9.2	9.2
1.0	7.3	7.1	9.0	8.9
2.0	7.0	6.7	8.4	8.2
3.0	9.6	9.0	9.4	9.2
4.0	11.8	11.6	10.6	10.3
5.0	13.5	12.9	13.2	12.3
7.0	No Space		16.3	15.4
10.0			19.5	17.0
Mean Resistivity	10	9	12	11

Mean Resistivity Value ohm m : 8.5 ohm m

Apparent Resistivity Values (ERT-49)

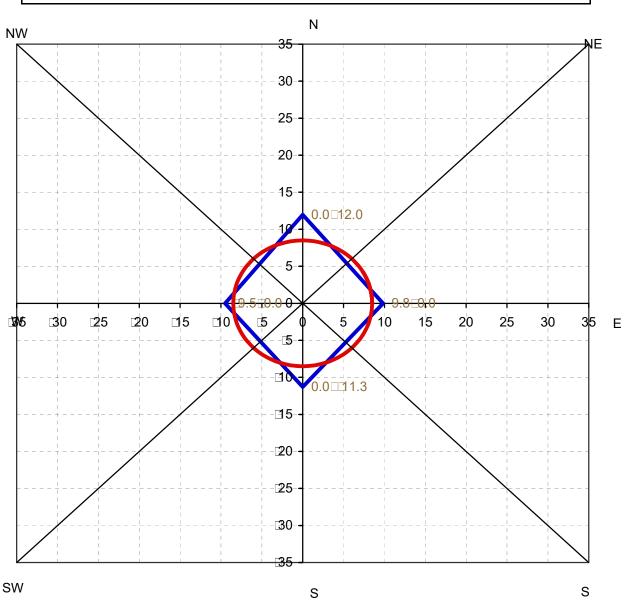
Project No. 222002D Plate 188 of 199



Electrical Resistivity Test No.: ERT-49

IS: 3043 1 987 RA 2006

Test Details			
Test Designation : ERT⊡49			
Test Location : DM□TANK			
Co⊡ordinate : 806 E⊡3581 N			



Total Area of Polygon: 225

Radius of E□uivalent Circle□Mean Resistivity: 9 ohm⊡m

Polar Resistivity Curves (ERT-49)

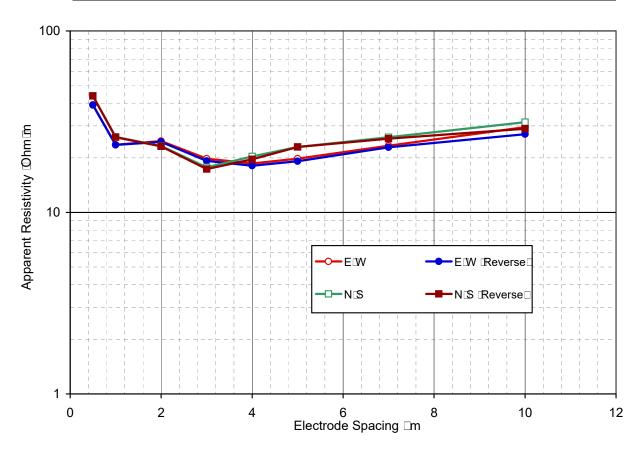
Project No. 222002D Plate 189 of 199



Electrical Resistivity Test No.: ERT-50

IS: 3043 1 987 RA 2006

Test Details			
Test Designation : ERT⊡50			
Test Location: Admin Buillding			
Co⊡ordinate : 1374 E⊡3431 N			



	Apparent Resistivity⊡Ohm⊡n			ım⊡m
Electrode Spacing□ m	EŒW	E∰ Revers e□	NIS	N.S Revers e□
0.5	39.2	39.1	43.9	43.8
1.0	23.6	23.6	26.1	25.9
2.0	24.8	24.5	23.2	23.1
3.0	19.8	19.2	17.7	17.3
4.0	18.6	18.1	20.4	19.6
5.0	19.8	19.2	22.9	22.9
7.0	23.3	22.9	25.9	25.5
10.0	29.5	27.0	31.4	28.9
Mean Resistivity	25	24	26	26

Mean Resistivity Value ohm m: 20.2 ohm m

Apparent Resistivity Values (ERT-50)

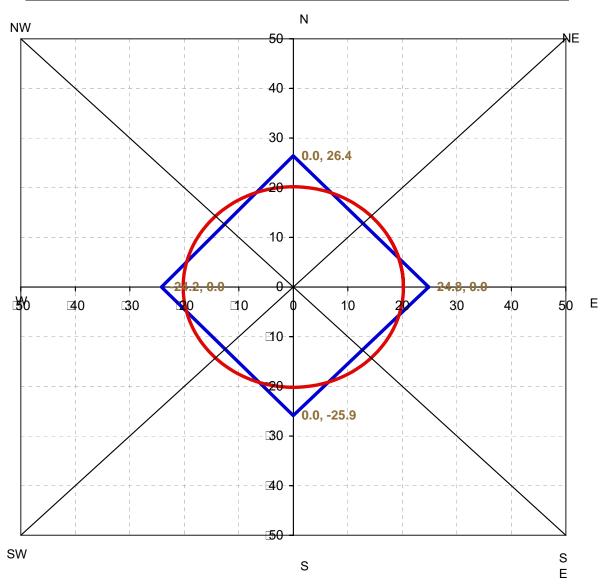
Project No. 222002D Plate 190 of 199



Electrical Resistivity Test No.: ERT-50

IS: 3043 1 987 RA 2006

Test Details			
Test Designation : ERT⊡50			
Test Location: Admin Buillding			
Co⊡ordinate : 1374 E⊡3431 N			



Total Area of Polygon: 1283

Radius of Euivalent Circle Mean Resistivity: 20 ohm m

Polar Resistivity Curves (ERT-50)

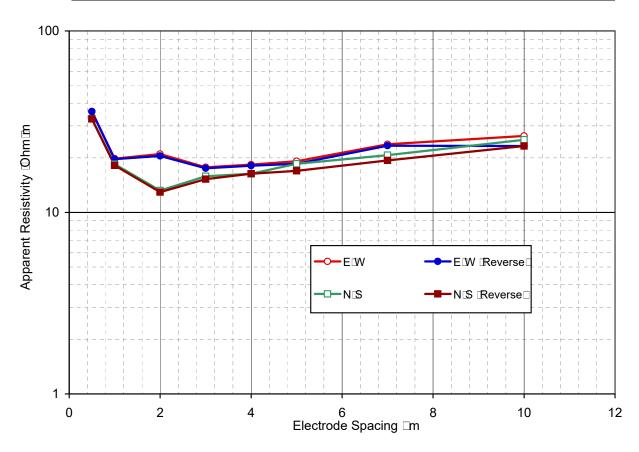
Project No. 222002D Plate 191 of 199



Electrical Resistivity Test No.: ERT-51

IS: 3043 1 987 RA 2006

Test Details			
Test Designation : ERT 51			
Test Location: Permanent office			
Co⊚rdinate : 906 E⊡3164 N			



	Apparent Resistivity□Ohm⊡n			ım Im
Electrode Spacing□ m	EŒW	E∭ Revers e□	NIS	N'S ©Revers e□
0.5	36.0	35.9	32.8	32.7
1.0	19.8	19.7	18.5	18.2
2.0	21.0	20.5	13.2	12.9
3.0	17.7	17.5	15.8	15.3
4.0	18.3	18.1	16.3	16.3
5.0	19.2	18.5	18.5	17.0
7.0	23.8	23.3	20.7	19.4
10.0	26.4	23.2	25.1	23.2
Mean Resistivity	23	22	20	19

Mean Resistivity Value ohm in : 16.8 ohm in

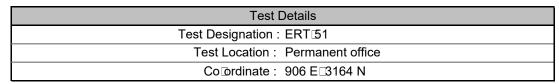
Apparent Resistivity Values (ERT-51)

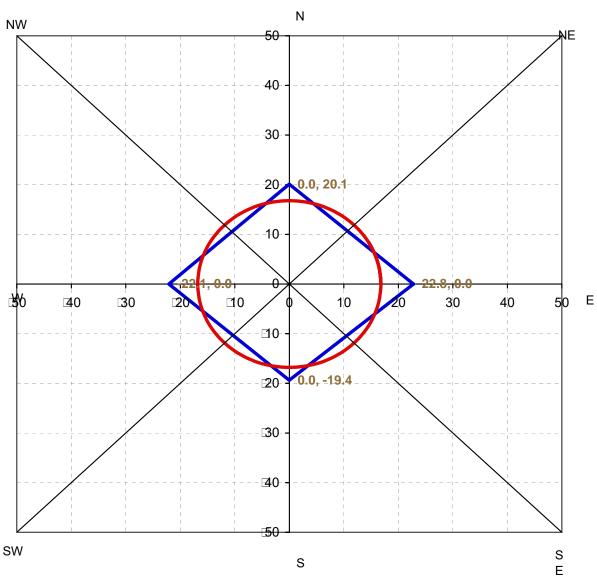
Project No. 222002D Plate 192 of 199



Electrical Resistivity Test No.: ERT-51

IS: 3043 1987 RA 2006





Total Area of Polygon: 886

Radius of Euivalent Circle Mean Resistivity: 17 ohm m

Polar Resistivity Curves (ERT-51)

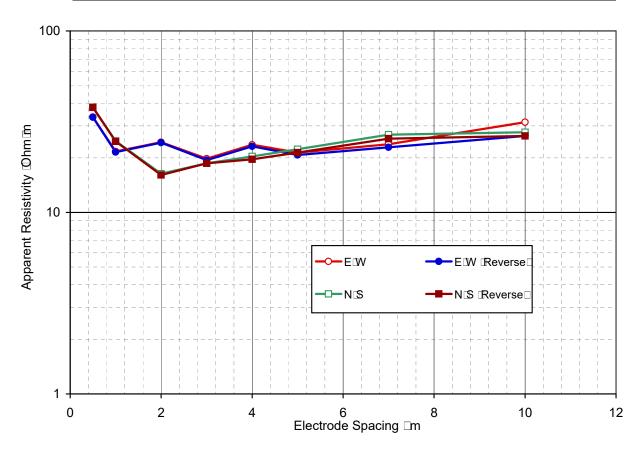
Project No. 222002D Plate 193 of 199



Electrical Resistivity Test No.: ERT-55

IS: 3043 1 987 RA 2006

Test Details			
Test Designation : ERT⊡55			
Test Location: Workshop Area			
Co⊡ordinate : 1017 E⊡3118 N			



	Apparent Resistivity⊡Ohm⊡n			ım⊡m
Electrode Spacing□ m	EŒW	E∰ Revers e□	NIS	N.S ⊡Revers e□
0.5	33.5	33.5	38.0	37.9
1.0	21.7	21.5	24.8	24.6
2.0	24.4	24.3	16.3	16.1
3.0	19.8	19.4	18.7	18.7
4.0	23.6	23.1	20.4	19.6
5.0	21.4	20.7	22.3	21.4
7.0	23.8	22.9	26.8	25.5
10.0	31.4	26.4	27.6	26.4
Mean Resistivity	25	24	24	24

Mean Resistivity Value □ohm ɪm: 19.4 ohm ɪm

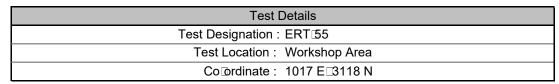
Apparent Resistivity Values (ERT-55)

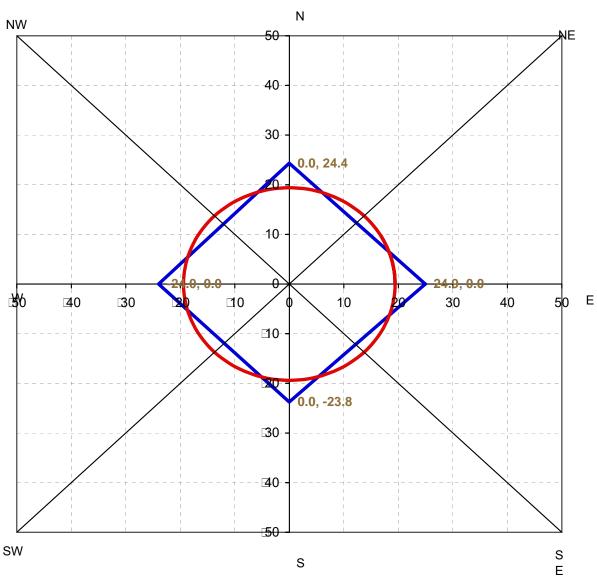
Project No. 222002D Plate 194 of 199



Electrical Resistivity Test No.: ERT-55

IS: 3043 1987 RA 2006





Total Area of Polygon: 1177

Radius of Euivalent Circle Mean Resistivity: 19 ohm m

Polar Resistivity Curves (ERT-55)

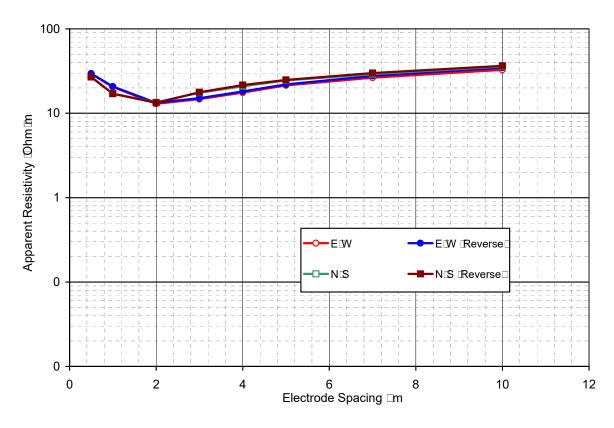
Project No. 222002D Plate 195 of 199



Electrical Resistivity Test No.: ERT-60

IS: 3043 1987 RA 2006

Test Details
Test Designation : ERT 60
Test Location: Boiler Envelop
Co⊡ordinate : 314046 E□2313002 N



	Apparent Resistivity⊡Ohm⊡n			ım⊡m
Electrode Spacing□ m	EŒW	E∰ Revers e□	NIS	N.S Revers e□
0.5	29.3	29.5	26.9	26.9
1.0	20.5	20.8	17.0	17.1
2.0	12.9	13.3	13.4	13.3
3.0	14.7	15.1	17.5	17.7
4.0	17.6	18.1	20.9	21.6
5.0	21.4	22.0	24.5	24.8
7.0	26.4	27.7	29.0	29.9
10.0	32.7	34.6	35.8	36.4
Mean Resistivity	22	23	23	23

Mean Resistivity Value ohm in : 18.2 ohm in

Apparent Resistivity Values (ERT-60)

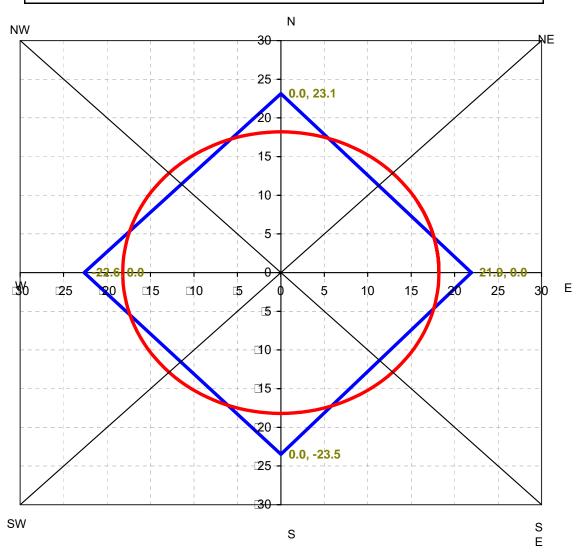
Project No. 222002D Plate 196 of 199



Electrical Resistivity Test No.: ERT-60

IS: 3043 1987 RA 2006

Test Details
Test Designation : ERT 160
Test Location: Boiler Envelop
Cordinate : 314046 E⊏2313002 N



Total Area of Polygon: 1039

Radius of E□uivalent Circle□Mean Resistivity : 18 ohm□m

Polar Resistivity Curves (ERT-60)

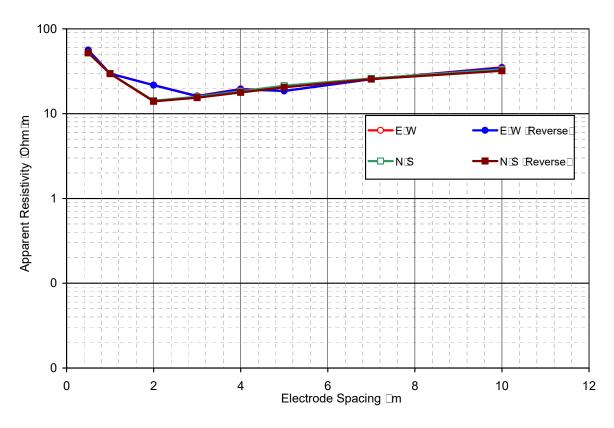
Project No. 222002D Plate 197 of 199



Electrical Resistivity Test No.: ERT-61

IS: 3043 1987 RA 2006

Test Details										
Test Designation : ERT⊡61										
Test Location: Boiler Envelop										
Co⊡ordinate : 314062 E⊡2312951 N										



	Appa	arent Resi	stivity □Oh	ım 🖿
Electrode Spacing□ m	ELW	E∰ Revers e□	NIS	N.S ⊈Revers e□
0.5	56.3	56.2	52.2	52.1
1.0	29.7	29.7	29.8	29.7
2.0	21.7	21.6	14.2	13.9
3.0	16.2	16.0	15.8	15.5
4.0	19.6	19.4	18.3	17.8
5.0	18.5	18.5	21.4	20.4
7.0	25.5	25.5	25.9	25.5
10.0	35.2	34.6	33.3	32.0
Mean Resistivity	28	28	26	26

Mean Resistivity Value ohm m : 21.5 ohm m

Apparent Resistivity Values (ERT-61)

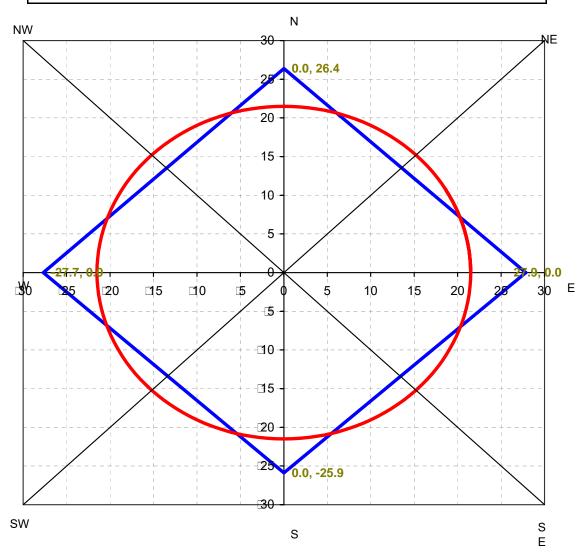
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Electrical Resistivity Test No.: ERT-61

IS: 3043 1987 RA 2006

Test Details										
Test Designation : ERT 61										
Test Location: Boiler Envelop										
Co⊡ordinate : 314062 E⊡2312951 N										



Total Area of Polygon: 1451

Radius of E□uivalent Circle□Mean Resistivity: 22 ohm m̄

Polar Resistivity Curves (ERT-61)

Project No. 222002D Plate 199 of 199



9. CROSS HOLE SHEAR TESTS



REPORT ON CROSS HOLE SHEAR TEST FOR TALCHER THERMAL POWER PROJECT-III (2 X 660MW) AT TALCHER THERMAL, ANGUL, ODISHA.

1. INTRODUCTION

M/s. NTPC Limited has proposed the preliminary geotechnical investigation work for Talcher Thermal Power Project - III (2 X 660MW) at Talcher, Odisha. For designing of various Foundation Structures coming under this project, it was necessary to conduct a Geotechnical Investigation Work to obtain engineering properties of the underlying soil and the job was awarded to **M/s. C. E. Testing Company Pvt. Ltd.**, **Kolkata.** This present report presents the findings of Cross Hole Tests (conducted during the month of July' 2017)

2. SCOPE OF WORK

The Cross Hole Tests were conducted at three (03) locations down to a depth of about 15 meters. One source hole and two Receiver holes at a distance of 3 meter were used.

3. PURPOSE OF INVESTIGATIONS

The aim of the investigation was to determine the soil parameters. The Cross Hole Tests were conducted to determine dynamic soil properties.

4. GENERAL SITE DESCRIPTION

The test was conducted between one Source and two Receiver holes. The holes were drilled down to a depth of maximum 15meter.

5. CROSS HOLE SEISMIC TEST

5.1. LOCATION

Three nos. cross hole tests were conducted. The test locations are given below.

CHST	Co-ore	GL	
No.	East	North	(M)
CST-1	1469	3904	69.906
CST-2	1346	3904	70.045
CST-3	1305	3987	70.006



5.2. EQUIPMENT AND ACCESSORIES

Following equipment and accessories were used:

Seismograph : PASI model 16S24-U

Signal enhancement type fully digital 24 channel

seismograph,

2. Geophones : Moving-coil type digital grade vertical &

Horizontal geophones, natural frequency 10 Hertz.

3. Cable : Geophone spread cables, 10m spacing, water

proof joints, made in Italy

5.2.1. Energy Source:

Shear Wave Hammer was used for generating waves in the Source borehole. The hammer generates waves in both the directions i.e. Up and Down, resulting in polarized energy.





5.2.2. Down Hole Sensors:

Orthogonal down hole sensors were used to receive the waves in two Receiver holes. The sensors have two Horizontal components and one Vertical component Geophones, encased in a steel tube and having water tight arrangement. The sensors were lowered at the same depth as the Hammer in the Source hole, and tube attached to them was inflated so as to make them fixed with the borehole wall.

5.2.3. Seismograph:

PASI 16S 24-U Seismograph was used to record field data. The seismograph has the signal enhancement or stacking capability. The seismograph records the arrival of seismic waves through 24 channels. The seismic waves detected by each geophone are displayed simultaneously on the screen.





5.3 SEISMIC CROSS HOLE TEST

The Seismic Cross Hole Test consists of generation of horizontally traveling P and S waves at a particular level in one borehole (Source hole) and recording their arrivals at same level in one or two nearby boreholes (Receiver holes).

5.4 CROSS HOLE SHEAR TEST DATA INTERPRETATION

5.4.1. Data Processing

The data is stored in the hard disk of the Seismograph at the time of data acquisition. The data was transferred to the computer for further processing.

The processing involves picking the first arrivals. In case of noisy data there are intermediate steps of data processing using filtering, amplitude corrections etc.

5.4.2. Picking of First Arrivals

The picking was done manually to see arrival of P and S waves on the respective Geophones. The time of travel from Source to Receiver hole is used to determine the velocities of P & Shear waves, as distance between the boreholes is known.

5.4.3. Velocity Calculation

Velocity calculation was done using the time derives as above and the distance between the two Receiver holes from the Source hole.



5.5. CALCULATION OF SOIL PARAMETERS:

The dynamic soil parameters are calculated from seismic wave and the bulk density of the corresponding of the subsurface strata. The calculations are based on IS Code 13372 (Part-2).

The Poisson's Ratio is determined directly from the compressional (P) wave and shear (S) wave data. It is expressed by the ratio of transverse strain to longitudinal strain. Its dynamic determination is expressed as:

$$\sigma = (m^2-2)/[2*(m^2-1)]$$
 where m= V_P/V_s

Young's Modulus E is the uni-axial stress-strain ratio. Its dynamic value is expressed by the following equation:

$$E = \rho V_P^2 (1+\sigma)(1-2\sigma)/(1-\sigma)$$

The shear Modulus **G** is the stress-strain ratio for simple shear. Its dynamic value is obtained by the following:

$$G = E/2 (1+\sigma) = \rho V_s^2$$

Where ρ is mass density in kN.s²/m⁴, σ is Poisson's ratio and V_P is P-wave velocity in m/sec, **E & G** are in kN/m².

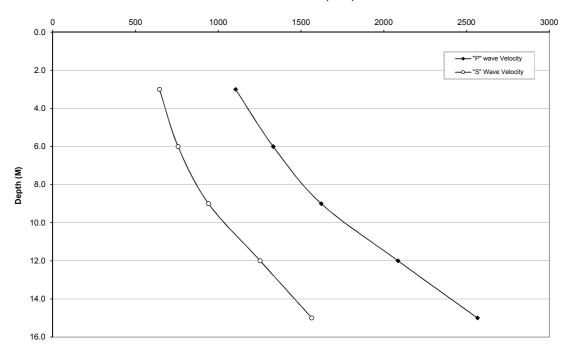
The test results are presented afterwards in a tabular form.

TEST RESULTS



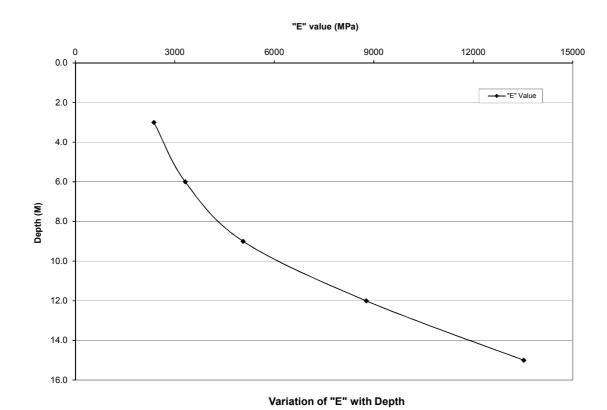
	Cross Hole Shear Test Results - 1 Calculated Values of Dynamic Parameters												
Donth	Vn	Vs			Poisson		Voung's	Shear Modulus	Shear				
Depth (M)	Vp (m/s)	(m/s)	Mass Density	m = V _p /V _s	Ratio,	Young's Modulus	Young's Modulus	(kN/m²)	Modulus				
BGL			(kN.s ² /m ⁴)	•	σ	(kN/m²)	(MPa)	, ,	(MPa)				
3.0	1105	645	2.29	1.71	0.242	2369433	2369.43	954186	954.19				
6.0	1332	757	2.29	1.76	0.261	3315964	3315.96	1314333	1314.33				
9.0	1622	941	2.29	1.72	0.246	5062429	5062.43	2030920	2030.92				
12.0	2086	1253	2.29	1.66	0.218	8770193	8770.19	3600938	3600.94				
15.0	2566	1565	2.29	1.64	0.204	13525245	13525.24	5617489	5617.49				

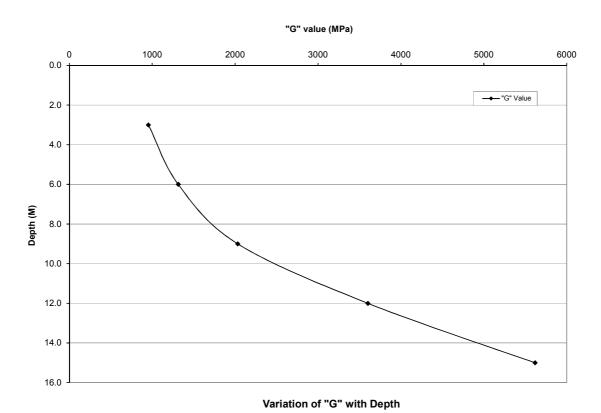
"P" Wave & "S" Wave (m/sec)



Variation of "P" & "S" wave Velocity with Depth



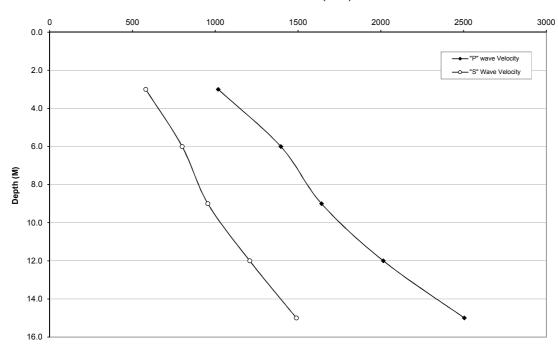




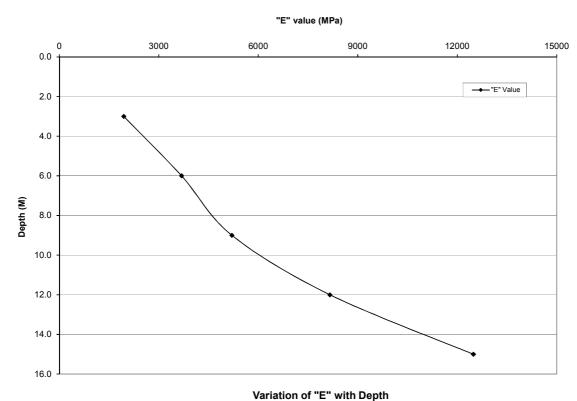


	Cross Hole Shear Test Results - 2 Calculated Values of Dynamic Parameters													
	Calculated values of Dynamic Parameters													
Depth	Vp	Vs	Mass	m	Poisson	Young's	Young's	Shear Modulus	Shear					
(M)	(m/s)	(m/s)	Density	$= V_p/V_s$	/ _s Ratio, Modulus		Modulus	(kN/m²)	Modulus					
BGL			(kN.s ² /m ⁴)		σ	(kN/m²)	(MPa)		(MPa)					
3.0	1018	580	2.29	1.76	0.260	1943849	1943.85	771560	771.56					
6.0	1396	800	2.29	1.75	0.256	3685884	3685.88	1467890	1467.89					
9.0	1642	955	2.29	1.72	0.244	5206104	5206.10	2091800	2091.80					
12.0	2015	1208	2.29	1.67	0.219	8163016	8163.02	3346936	3346.94					
15.0	2505	1490	2.29	1.68	0.226	12488027	12488.03	5091972	5091.97					

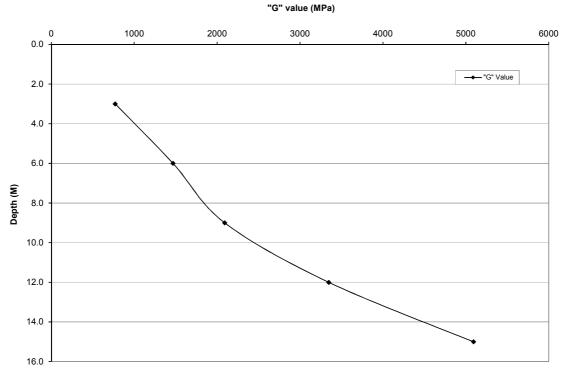
"P" Wave & "S" Wave (m/sec)



Variation of "P" & "S" wave Velocity with Depth



variation of E with Bopti

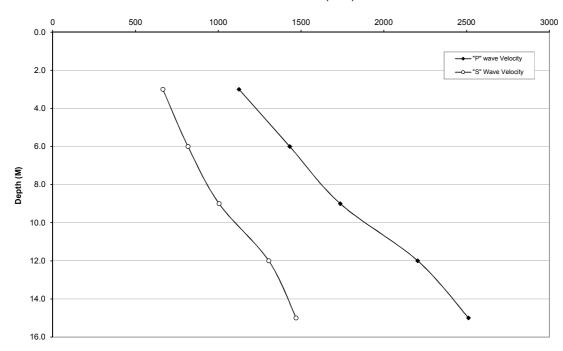


Variation of "G" with Depth



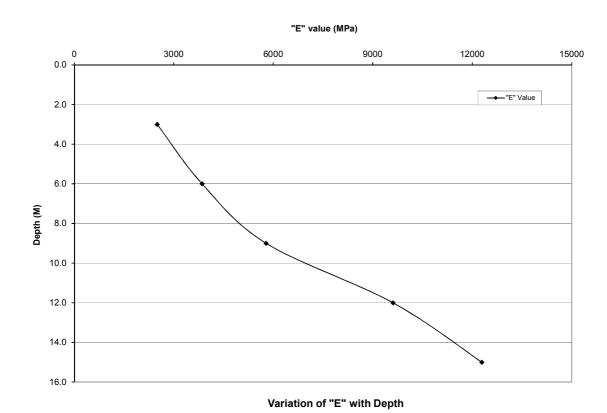
	Cross Hole Shear Test Results - 3													
	Calculated Values of Dynamic Parameters													
Depth	Vp (m/a)	Vs	Mass	m	Poisson	Young's	Young's	Shear Modulus						
(M) BGL	(m/s)	(m/s)	Density (kN.s²/m⁴)	$= V_p/V_s$	Ratio, σ	Modulus (kN/m²)	Modulus (MPa)	(kN/m²)	Modulus (MPa)					
3.0	1125	665	2.29	1.69	0.231	2498093	2498.09	1014278	1014.28					
6.0	1432	817	2.29	1.75	0.259	3853997	3854.00	1530938	1530.94					
9.0	1737	1005	2.29	1.73	0.248	5783980	5783.98	2316571	2316.57					
12.0	2205	1305	2.29	1.69	0.230	9612316	9612.32	3906021	3906.02					
15.0	2512	1470	2.29	1.71	0.240	12287424	12287.42	4956193	4956.19					

"P" Wave & "S" Wave (m/sec)



Variation of "P" & "S" wave Velocity with Depth





"G" value (MPa) 1000 2000 3000 4000 5000 6000 → "G" Value 2.0 4.0 6.0 Depth (M) 8.0 10.0 12.0 14.0 16.0

	Project : Prelimina	ry G.	I. Work	for Tale	cher T	↓ 'hern	nal Po	wer	Projec	et-II	I (2x660 N	MW). C =	TEST
ļ	Job No : 3975										20/09/2017	Sheet N	
	BORE LOG DAT	A S	$HEET \mid$	BORE	E HC)LE	NO.	CS	ST-	01	(M) Co-o	rdinates N=	=1469 =3904
	Field Test	Nos	So	amples		Nos Commencement Date : 16/08/2 Completion Date : 17/08/2 Bore Hole Diameter : 150 mm							
	Penetrometer (SPT)	2	Undistu	rbed (U	DS)								,
	Cone (Pc)		Penetro		(SPT)	2			f Gro			06 m.	
	Vane (V)		Disturbe Water S		(WC)	1 0	Wat						
	<u> </u>			ampie		Ť		มเก่ฐ I−VAI	Water LUE	Levei		SAMPLES	
	DESCR	RIPTION	١		SYMB				N=15C	М	Ref. No	Depth	(m)
				0.00m									
	Greyish yellow, silty Obs. sand mixture.		with ko	ankars.							DS-1	0.60	
			***	- 1.50m		3!	5 54 1 1 3.0	<u> >1</u>	00		UDS-1 SPT-1	1.00-1 1.45-1	
	Very dense, greyish b with decomposed roo			1.90m		10	4	l Rdf	Penth. <u>usal</u>		*SPT-2	1.90-1.93 CR=35%	1,90
Ì	Highly to moderately						3.0	cm	Pentn.		R1	RQD=NIL	2.50
	brown, fine to mediurock.	ım gr	ained, fro	actured – 3.25m		N	X rotar 1.90m	y dri	illing from	om	R2	CR=44% RQD=20%	3.25
											R3	CR=62% RQD=40%	
											R4	CR=56% RQD=23%	4:00 4.75
								R5	CR=72% RQD=42% 5.50	↓			
→	Moderately to slightly weathered, yellowish brown, fine to medium grained,										R6	CR=52% RQD=16%	
	fractured rock.	το π	reaturn g	irainea,							R7	CR=64% RQD=17%	
											R8	CR=80% RQD=44%	
											R9	CR=66% RQD=20%	8.50
				– 9.25m							R10	CR=80% RQD=NIL	9.25
											R11	CR=76% RQD=32%	10.00
											R12	CR=69% RQD=22% CR=84%	10.75
											R13	RQD=18% CR=84%	11.50
	Slightly weathered grey, medium to fin										R14 R15	RQD=40% CR=78%	12:25
	rock.	e gru	inea, mad	cureed							R16	RQD=24% CR=80%	13.00
											R17	RQD=14% CR=72%	13.75
											R18	RQD=52% CR=91%	14.50
											R19	RQD=37% CR=94% RQD=48%	15.25
	NID (*'	0.5:5	nla assi								1.45-40%	16.00	
	N.B. — '*' means be recovered.	sam	pie cou	ia not									
Ĺ					200 7	1				1	i	BH-	1/Sheet-1

	Project : Prelimina	rv G.	I. Work	for Tale	eher T	↓ 'heri	mal	Pov	ver	Proi	ect-I	II (2x660 N	MW). C=	TEST	
	Job No : 3975	<i>y</i>	_									20/09/2017		o:	
	BORE LOG DAT	S S	$HEET \mid$	BORE	E HC	LE	N	0.	CS	ST-	0	1(R1)			
	Field Test	Nos	Sc	Samples Nos Commencement Date : 17/0 Completion Date : 18/0)8/17)8/17				
	Penetrometer (SPT)	3	Undistu	rbed (U	DS)	0					mete		mm./ N.X.		
	Cone (Pc)		Penetro		SPT)	3					ound				
	Vane (V) Disturbed (DS) Water Sample					1					ck At				
				sample		0	3		ing -VAl		Leve	1	SAMPLES		
	DESCR	RIPTION	١		SYMB		EAG			l=15	СМ	Ref. No	Depth	(m)	
	Hard, greyish b with sand mixt			0.00m clay					>1	<u>00</u>		DS-1	0.50		
	Very dense, yello sand with decompos			-1.45m silty _1.95m		10	OC			Pent 00 Pent		SPT-1 *SPT-2 *SPT-3	1.20-1 1.80-1 1.95-1.99		
	Highly to moder yellowish brown, grained, moderate	finé	to me	edium rock.			4			Pent	n.	R1 R2	CR=39% RQD=NIL CR=48% RQD=17%	2.50	
•				– 3.25m			NX r 1.9	tar 5m	y dri to	illing 16.00	from m	R3	CR=56% RQD=20%	3.25 4.00	
												R4	CR=64% RQD=29%		
								R5	R5	CR=58% RQD=16%					
•												R6	CR=73% RQD=32%		H
	Moderately to sl yellowish brown, fine											R7	CR=68% RQD=28%		
	moderately fractured			·								R8	CR=76% RQD=38%	7.75	
												R9	CR=64% RQD=22% CR=74%	8.50	
												R10	RQD=18% CR=80%	9.25	
											R11	RQD=34% CR=66%	10,00		
•				10.75m								R12	RQD=18% CR=82%	10.75	
												R14	RQD=26% CR=80%	11.50	
												R15	RQD=22% CR=78% RQD=16%	12:25	
	Slightly weathered grey, medium to fine	e grai										R16	CR=86% RQD=36%	13.00	
	to slightly fractured	rock.										R17	CR=83% RQD=42%	13.75	
												R18	CR=90% RQD=24%	14:50	
				16.00								R19	CR=93% RQD=46%	15.25	
	N.B. — '*' means be recovered.	sam		16.00m ld not										16:00	
L					200 7	1			ļ			1	BH-10	0/Sheet-1	

Project : Prelimina	ry G.									•		
ob No : 3975	14 0	· I	<u> </u>							20/09/2017	Sheet No:	
BORE LOG DAT	A S	HEET	BORE	S HC	LE					$\frac{1(R2)}{18.66}$	00 /47	
Field Test	Nos	Sc	ımples		Nos	6			nt Date Date)8/17)8/17	
Penetrometer (SPT)	3		,	ed (UDS) 0 Bore Hole Diameter :							mm./ N.X.	
Cone (Pc)		Penetro		SPT)	3				round			
/ane (V)		Disturbe Water S		(MC)	0		Water Struck At : Standing Water Level :					
<u> </u>			umpie			30		ALUE	r Level		SAMPLES	
DESCR	IPTION	١		SYMB		EAC		$\sqrt{N}=15$	БСМ	Ref. No	Depth (m)	
Medium dense / v prown, silty sand. rock pieces. (SM)							8	16 >100		DS-1 SPT-1	0.50 1.00-1.45	
,	- 1.90m		10	5 55 0 5.0 2.0	o cm	Pent fusal Pent		R1	1.60-1.80 1.90-1.92 1.9 CR=34% RQD=NIL 2.5 CR=42%			
Highly to moderately prown, medium to ractured rock.								drilling 16.0	from Om	R2 R3	RQD=16% 3.2 CR=48% ROD=17%	
	- 4.75m							R4	CR=39% RQD=NIL 4.0			
					<u> </u>					R5 R6	CR=54% RQD=16% V CR=41%	
										R7	RQD=NIL	
Moderately weathere nedium to fine gra										R8	7.0 CR=56% RQD=14% 7.7	
nediam to tine gra	meu,	nactarec	TOCK.							R9	CR=53% RQD=28% V 8.5	
										R10	CR=46% RQD=19% 9.2 CR=58%	
										R11 R12	RQD=28% 10.0 CR=53% RQD=16%	
			10.75m							R13	10.7 CR=64% RQD=21% ▼	
										R14	CR=71% RQD=29%	
Slightly weathere										R15	CR=68% 13.0 RQD=23% 13.0 CR=76%	
grey, fine grained, r ock	ctured							R16 R17	RQD=34% 13.7 CR=73%			
										R18	RQD=18% 14.5 CR=69% RQD=27%	
			16.00							R19	15¦2 CR=77% RQD=39% ▼	
N.B. — '*' means be recovered.	sam		16.00m d not								16:0	

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Project : Prelimina	rv G	I Work	for Tale	cher T	↓ 'hern	nal Po	wer Pr	oiect-T	II (2 v 660 l	ww) CETEC	
Job No : 3975	.r.y G.	_						on:	21/09/2017	Sheet No:	
BORE LOG DAT	S S	HEET	BORE	E HC)LE	NO.	CST	·- 02	2(M)	rdinates N=3904	ე 4
Field Test	Nos	Sc	amples		Nos	1		nent Dat		08/17	
Penetrometer (SPT)	3	Undistu	rbed (U	DS)	1		•	n Date Diamete		08/17 mm./ N.X.	
Cone (Pc)		Penetro	meter ((SPT)	3			Ground		45 m.	
Vane (V)		Disturbe		(1110)	1	1		uck At			
vulle (v)		Water S	Sample	(WS)	0		ding Wo	iter Leve	1	SAMPLES	_
DESCR	IOITAIS	١		SYMB			DIVN=		Ref. No	Depth (m)	\dashv
			0.00m								
									DS-1	0.50	
Hard, brownish gre	y, sil	ty clay.	(CI)				81		UDS-1	1.00-1.45	
			- 2.00m		1	3 38 43	1 4 1 9		SPT-1 SPT-2	1.45-1.90 2.05-2.15	
Very dense, yello sand with decompos					10		cm Pe <u>Refus</u>	enth. al	*SPT-3		50
Sand with decompos		CK. (31VI)				-1 1	cm Pe		R1	2.30-2.32 2.3 CR=44% RQD=18%	
Moderately weather medium grained, fi					 N	X rotar	y drillir	ng from	R2	3.0 CR=47%	0
Title division gravited, 11			- 3.75m			2.30m	to 16	.00m		RQD=14% 3.7 CR=61%	5
									R3	RQD=15% 4.5	50
					\top				R4	CR=82% ROD=17%	
					\blacksquare				R5	5'.2 CR=86%	.5
									l KS	RQD=22% 6.0	00
									CR=85%		
									R6	RQD=20%	
										7,5	0
									R7	CR=86%	
					\top					RQD=21%	
					\perp					9.0	0
Slightly weathered									R8	CR=80% RQD=28%	
brown to light grey fractured rock.	y, me	eaium gr	ainea,							•	
										10.5	0
									R9	CR=85% RQD=44%	
										12.0	
									R10	CR=83% RQD=28%	
											50
					\perp					CR=88%	
									R11	RQD=33%	
										15.0	0
					\top				R12	CR=89% RQD=54%	
ND '4'			16.00m							16.0	0
N.B. — '*' means be recovered.	sam	pie coul	la not								
				age 1	1	7156		1 1	1	BH-2/She	 et-1

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	Project : Prelimina	I. Work	for Talo	al Po	wer	Proje	ect-II	I (2x660 M	AW). CETES	T			
	Job No : 3975	• • •	1	•							21/09/2017	Sheet No:	
	BORE LOG DAT	'A S	HEET	BORE	E HC	LE					$\frac{2(R1)}{12.66}$	20.747	
	Field Test	Nos	Sc	amples		Nos			ement tion)8/17)8/17	
	Penetrometer (SPT)	3	Undistu	rbed (U	DS)	1		•	e Dia			mm./ N.X.	
	Cone (Pc)		Penetro		SPT)	3			of Gro				
	Vane (V)		Disturbe Water S		(MC)	1 0			Struc Water				
				dilibre		Ť		มเก่ <u>g</u> I−VA		Level		 SAMPLES	
	DESCR	RIPTION	\		SYMB		EACH	DIVI	V=150	СМ	Ref. No	Depth (m)	
				0.00m		` \							
	Hard, brownish gre	av 6	Ity clay	Ohe	11/1						DS-1	0.50	
	small pieces of bou			. 005.		\\	7 7 4 4 4	1 –	75		UDS-1	1.00-1.45	
-		• 1		- 1.95m			7 34 41 12.0		100		SPT-1 SPT-2	1.45-1.90 2.00-2.12	
	Very dense, yello sand with deconpose			silty 2.30m		1100			Pentr <u>usal</u>	١.	*SPT-3		,
	<u>'</u>							cm	Penth	١.	R1	2.40-2.42 2.40 CR=42% RQD=18% 3.00	
	Madarataly weather	م ما	ما د نست الم	brown		NI NI	rotar 2.40m	y dr	illing 16.00r	from n	R2	CR=43% RQD=16% 3.75	
	Moderately weather medium grained, fr					_ 					R3	CR=45% RQD=14% 4.50	
				- 5.25m							R4	CR=47% RQD=17% 5.25	
•				0.20111							R5	CR=65% ROD=17% V	
											R6	CR=81% RQD=27% 6.75	
											R7	CR=83% RQD=23% 7.50	
											R8	CR=85%	
											No	RQD=28% 9.00	
											R9	CR=81%	,
	Slightly weathered										КЭ	RQD=20%	
	brown to light grey fractured rock.	y, me	edium gr	ained,							D4.0	10.50 CR=83%	,
											R10	RQD=30% ▼	
											D 44	12.00 CR=85%	,
											R11	RQD=53% ▼	
												13.50	ر
											R12	CR=88% RQD=68%	
											R13	15.00 CR=92%)
				16.00m							, , , ,	RQD=70% 16.00	,
	N.B. — '*' means	sam	ple coul										
	be recovered.				<u> </u>	<u> </u>						BH-101/Shee	 t-1

	Project : Prelimina	rv G.	I. Work	for Tale	her T	↓ herm	nal Po	wer 1	Project_I	II (2x660 N	ww). C=T=G 7	 F
	Job No : 3975									21/09/2017		_
	BORE LOG DAT	S S	HEET	BORE	ЕНО	LE				2(R2)		
	Field Test	Nos	Sc	amples		Nos			ement Date ion Date		08/17 08/17	
	Penetrometer (SPT)	3	Undistu			1	1		: Diamete		mm./ N.X.	
	Cone (Pc)		Penetro		SPT)	3	1		Ground			
	Vane (V)		Disturbe Water S		(WS)	1 0	1		truck At Vater Leve			
	DECOL			мирис		Ť	SAMPLES	1				
	DESCR		N 		SYMB		EACH	DIVN	=15CM	Ref. No	Depth (m)]
				0.00m						DC 1	0.50	
	Hard, brownish gre	ey, si	Ilty clay	. Obs.						DS-1	0.50	
	boulders. (CI)						34 46	<u> 8(</u> >1	_	UDS-1 SPT-1	1.00-1.45 1.45-1.90	
-	Very dense, yellowis	h bro	wn, silty	- 1.95m		100	14	.0 cı	m Pentn.	SPT-2	2.00-2.14	
	sand with decompos	2.30m		100) 2.	<u>Refu</u> 0 ¢n	<u>ısal</u> n Penth.	*SPT-3	2.25-2.27 2.25 CR=58%			
						Ц,,					RQD=30% 3.00 CR=65%	
						N	2.25m	y drii to 1	lling from 6.00m	R2	RQD=17% 3.75	
										R3	CR=76% ROD=16% V	
										R4	4.50 CR=82%	
											RQD=26% 5.25 CR=86%	
▶										R5	RQD=19% 6.00	4
											CR=85%	
										R6	RQD=23%	
											7,50	
										 R7	CR=84%	
											RQD=40%	
	Moderately to slig fresh, yellowish br										9.00	
	medium grained, fra			3 ,,						R8	CR=86% RQD=50%	
						\perp					10,50	
											CR=89%	
										R9	RQD=23%	
											12,00	
										R10	CR=94%	
											RQD=40%	
											13.50	
										R11	CR=96% RQD=60%	
						\perp					15,00	
										R12	CR=80% RQD=35%	
	N.D. Sari			16.00m		\blacksquare					16.00	
	N.B. — '*' means be recovered.	sam	pie coul	a not								
					age 1	16/	<u> </u>			1	BH-102/Sheet-	_1 -1

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Project : Prelimina	ry G.	I. Work	for Tale	cher I	↓ 'herm	al Po	wer]	Project-I	II (2x660]	MW). C= 1	rest
Job No : 3975			•						21/09/2017	-	
BORE LOG DAT	ra s	HEET	BORI	E HC	LE					ramates N=	1305 3987
Field Test	Nos	So	amples		Nos			ement Dat ion Date		08/17 08/17	
Penetrometer (SPT)	2	Undistu	rbed (U	DS)	0		•	: Diamete		mm./ N.X.	
Cone (Pc)		Penetro		(SPT)	2	Leve	el Of	Ground	1 : 70.0	06 m.	
Vane (V)		Disturbe		(WC)	1			truck At			
varie (v)		Water S	sample	(WS)	0		ding V -VAL	Vater Leve	1	SAMPLES	
DESCF	IOITAIS	٧		SYMB				=15CM	Ref. No	Depth ((m)
Very dense, grey sand with decompos	ed ro	ck. (SM)	– 1.00m		76		Refu	Pentn.	DS-1 *SPT-1 *SPT-2 R1	0.50 0.60-0. 1.00-1.02 CR=53% RQD=29%	1.00
	oderately weathered, brownish yellow nedium to fine grained, fractured ock.————————————————————————————————————						y dril to 1	ling from 6.00m	R2 R3	CR=56% RQD=51% CR=65% RQD=51%	1.75 2.50
 Moderately weathered to fine grained, frac									R4	CR=67% RQD=36%	3.25
			– 4.20m						R5	CR=48% RQD=35%	4.00 4.75
	Slightly weathered / fresh, yellowish grey, medium to fine grained, fractured rock								R6	CR=65% RQD=28%	5.50
			– 6.25m						R7	CR=87% RQD=45%	6.25
			- 0.25m						R8	CR=72% RQD=64%	7.00
									R9	CR=82% RQD=56%	3,50
									R10	CR=83% RQD=82%	8.50
Slightly weathered fine grained, fractur			grey,						R11	CR=84% RQD=74%	10.00
j									R12	CR=85% RQD=82%	11.50
									R13	CR=81% RQD=73%	13.00
			16.00-						R14	CR=83% RQD=72%	14.50
N.B. — '*' means be recovered.	sam	ple cou	16.00m ld not								16.00
				age 7	T	156				BH-3	3/Sheet-1

Project : Prelimin Job No : 3975	ary G.	I. Work for Tal								1 = 5
BORE LOG DA'	ΓA S	<u> </u>						3(R1)	1 222000 1.	
Field Test Penetrometer (SPT) Cone (Pc)	Nos 2	Samples Undisturbed (l Penetrometer Disturbed (DS)	JDS) (SPT)	Nos 0 2 1	Cor Co Bor Lev	nmenco mplet e Hole	ement Da ion Dat Diamet Groun truck A	te: 11/0 e: 12/0 er: 150 d:	08/17 08/17 mm./ N.X	
Vane (V)		Water Sample	(WS)	0	Sta	nding	Water Lev	el:		
DESC	RIPTION	N	SYMB			N-VAL	UE =15CM	Ref. No	SAMPLES Depth	()
Very dense, gresand with decompose Moderately weather medium to fine grave. Slightly weathered grey, medium to firock.		100 100 N	0 6.0 0 3.0	≥1 cm Refu	<u>00</u> Pentn.	DS-1 SPT-1 *SPT-2 R1	0.50 0.70-0 1.10-1.13 CR=52% RQD=30% CR=58% RQD=50% CR=63% RQD=54% CR=69% RQD=36% CR=50% RQD=39% CR=69% RQD=30%	.76 1.1 1.8 2.6 3.3 4.1		
Fresh, deep grey, f						R7 R8 R9 R10 R11 R12	CR=90% RQD=50% CR=93% RQD=65% CR=84% RQD=54% CR=82% RQD=80% RQD=75% CR=90% RQD=75% CR=87% RQD=75% CR=87% RQD=75%	6.3 7.1 8.6 10.1 11.6		
N.B. — '*' means pe recovered.	sam	16.00m ple could not								16.0

	ry G.	I. Work										TES
Job No : 3975										21/09/2017	Sheet N	o:
BORE LOG DAT	l'A S	HEET	BORI	S HC	LE					3(R2)		
Field Test	Nos	Sa	mples	Nos Nos Commencement Date : 12/08/ Completion Date : 13/08/								
Penetrometer (SPT)	2	Undistur	bed (U	DS)	0	1			Date ameter		mm./ N.X	
Cone (Pc)		Penetror	neter ((SPT)	2	1			round			
		Disturbe			1				ck At			
/ane (V)		Water S	ample	(WS)	0	l			r Leve		CAMPLEC	
DESCF	RIPTIO	٧		SYMB				ALUE 'N=15	5CM	Ref. No	SAMPLES Depth	(m)
Very dense, brownswith decomposed ro Moderately weathers medium to fine gro Moderately / slight grey, fine to mediun	ed, brined,	rownish y fractured	- 1.20m vellow, rock. - 2.75m deep		100 100 N	2.0	cm <u>Re</u> cm	100 Pent fusal Pent rilling 16.00	n. from	R3 R4 R5	0.50 0.75-0 1.20-1.22 CR=45% RQD=26% CR=50% RQD=30% CR=55% RQD=38% CR=62% RQD=23% CR=54% RQD=33% CR=60%	2.0 2.7 3.5 4.2
Slightly weathered grey, medium to fir ock.										R6 R7 R8	RQD=30% CR=72% RQD=42% CR=81% RQD=50% CR=84%	5:7 6:5
										R9 R10	RQD=44% CR=82% RQD=33%	8:0
										R11	CR=84% RQD=40%	
Fresh, deep grey, fi rock.	ne gr	ained, fra	ctured							R12	CR=86% RQD=43%	11.0
										R13	CR=82% RQD=50%	
										R14	CR=86% RQD=62%	14.0
N.B. — '*' means			1 _. 6.00ṃ							R15	CR=89% RQD=70%	

Page A49/A156

SI	SL. SPECIFICATION REFERENCE			NCE		
NO.	SEC/ PART	SUB SEC.	PAGE NO.	CLAUSE NO.	Existing	Read as
A- MH-1	Sectio n-VI, Part E		47 & 48 of 73		4540-001-POM-A-039 (option-01), Rev-A 4540-001-POM-A-040 (option-01), Rev-A 4540-001-POM-A-040 (option-02), Rev-A 4540-001-POM-A-041	4540-001-POM-A-039 (option-01), Rev-B 4540-001-POM-A-040 (option-01), Rev-B 4540-001-POM-A-040 (option-02), Rev-B Withdrawn drw. 4540-001-POM-A-041
A- MH-2	Sectio n-VI, Part-A	SUB- SECTI ON- IIA-15	1 of 7	1.00.01 (iii)	via Pent house (PH-1). Suspended magnets (SM-1 and SM-2) shall be provided on Conveyor 1A/1B at pent house for removal of tramp Iron pieces. Metal detectors MD-1 and MD-2 shall be provided on Conveyors 1A/1B to detect non-magnetic metallic materials present in the "as received" coal. Further Conveyor 1A/1B shall have facility for manual stone picking, at a suitable location. Two (2) numbers Belt Scale (BS-1& BS-2) shall also be provided, one each on Conveyor 1A and 1B for measurement of coal flow rate. Two (2) nos. In line magnetic separators (ILMS-1 & ILMS-2) shall be provided at discharge end of Conveyor 1A/1B for removal of	2A/2B to detect non-magnetic metallic materials present in the "as received" coal. Further Conveyor 1A/1B & 2A/2B shall have facility for manual stone picking, at a suitable location. Two (2) numbers Belt Scale (BS-1& BS-2) shall also be provided, one each on Conveyor 1A and 1B for measurement of coal flow rate. Two (2) nos. In line magnetic separators (ILMS-1

A- MH-3	Sectio n-VI, Part-A	SUB- SECTI ON- IIA-15	1 of 7	1.00.01 (iv)	Conveyor 1A/1B evacuating coal from Track Hopper shall feed coal to crusher house. Coal sampling unit (CSU-1) shall be provided to sample the coal of (-) 250 mm size. Further, a passenger cum goods elevator (EL-1) as specified elsewhere shall also be provided in Crusher House (CH). In Crusher house (CH), coal from incoming Conveyor 1A will pass through two (2) numbers (dedicated) Vibrating Feeder (VF-1 & VF-2) and two (2) number (dedicated) Crushers (CR-1 & CR-2) respectively. Similarly, coal from incoming Conveyor-1B will pass through two (2) numbers (dedicated) Vibrating Feeders (VF-3 & VF-4) and two (2) numbers (dedicated) Crushers (CR-3 & CR-4) respectively. Each dedicated stream shall have a set of Rod gate and Rack & Pinion Gate before VF. The dedicated coal flow stream shall permit maintenance of equipment, hoppers and chutes in one stream without affecting the operation of other stream.	Conveyor 1A/1B evacuating coal from Track Hopper shall feed coal to crusher house via Conveyor 2A/2B. Coal sampling unit (CSU-1) shall be provided to sample the coal of (-) 250 mm size. Further, a passenger cum goods elevator (EL-1) as specified elsewhere shall also be provided in Crusher House (CH). In Crusher house (CH), coal from incoming Conveyor-2A will pass through two (2) numbers (dedicated) Vibrating Feeder (VF-1 & VF-2) and two (2) number (dedicated) Crushers (CR-1 & CR-2) respectively. Similarly, coal from incoming Conveyor-2B will pass through two (2) numbers (dedicated) Vibrating Feeders (VF-3 & VF-4) and two (2) numbers (dedicated) Crushers (CR-3 & CR-4) respectively. Each dedicated stream shall have a set of Rod gate and Rack & Pinion Gate before VF. The dedicated coal flow stream shall permit maintenance of equipment, hoppers and chutes in one stream without affecting the operation of other stream.
A- MH- 04	Sectio n-VI, Part-A	SUB- SECTI ON- IIA-15	7 of 7	Addition al clause 1.46.00		Compressed air system (pipes, valves, fitting etc) with suitable flow & pressure for opening doors of eight numbers of BOBR Wagon Doors at one time, with tapping along the length of Track Hopper at three locations, shall be provided.

A- MH-5	Sectio n-VI, Part-A	SUB- SECTI ON- IIA-15	2 of 7	1.00.01 (viii)	At Transfer Point TP-3, Conveyor 4A/4B shall drop coal on to either Conveyor 5A or 5B. Inline magnetic separators (ILMS-3 & ILMS-4) shall be mounted at the discharge end of Conveyor 4A/4B to remove tramp iron pieces. Coal TP-3.	At Transfer Point TP-3, Conveyor 4A/4B shall drop coal on to either Conveyor 5A or 5B. Provisions shall be kept for future conveyors from discharge of Conveyor 4A/B. Inline magnetic separators (ILMS-3 & ILMS-4) shall be mounted at the discharge end of Conveyor 4A/4B to remove tramp iron pieces. Coal TP-3.
A- MH-6	SECTI ON-VI, PART- B	SUB SECTI ON-A- 20	8 of 101	4.4.1	The Contractor shall supply under extreme moisture. Coal Chutes shall be fabricated from wear resistant steel plates, Hardox 400, 400 HBN or higher quality. However, Limestone/Gypsum chute may be fabricated from Tiscral or equivalent. The material selection shall assist the free flow of coal. The thickness of the chutes shall be 20 mm for the three sides where material slides/impacts the chute and 10 mm for the chute wall that is not subject to abrasion. The chutes shall include shall be provided for all chutes. Chutes shall be provided with 12 mm thick abrasion resistant wear plates at impact points and bolted with countersunk screws. Chutes, which feed to include a blocked chute.	The Contractor shall supply under extreme moisture. Coal Chutes shall be fabricated from Tiscral or equivalent. The material selection shall assist the free flow of coal. The thickness of the chutes shall be 20 mm for the three sides where material slides/impacts the chute and 10 mm for the chute wall that is not subject to abrasion. The chutes shall include shall be provided for all chutes. Chutes, which feed to include a blocked chute.
A- MH-7	SECTI ON-VI, PART- B	SUB SECTI ON-A- 20	49 of 101	2.1.2	(b) Sliding zones & adjacent sides: 20 mm thk. Hardox 400, 400 HBN or higher quality for Coal 20 mm thk. Tiscral or equivalent for Limestone/Gypsum	(b) Sliding/impact zones & adjacent sides: 20 mm Tiscral or equivalent.

A- MH-8	SECTI ON-VI, PART- B	SUB SECTI ON-A- 20	9 of 101	4.4.3	Skirt board belt Conveyor. 'Skirt Material' shall be of low friction, high tear resistance & abrasion resistant polyester-based polyurethane/Rubber with Durometer Shore A Hardness of '65 (+/-) 5 and min thickness should be 15 mm. Chamfering to be done at one edge of the skirt. Skirt Plate of each side shall be in single piece.	Skirt board belt Conveyor. Skirt sealing Material shall be of low friction, high tear resistance & abrasion resistant polyester-based polyurethane /Rubber with Durometer Shore A Hardness of '65 (+/-) 5 and min thickness should be 15 mm. Chamfering to be done at one edge of the skirt. Skirt sealing material of each side shall be in single piece.
A- MH-9	SECTI ON-VI, PART- B	SUB SECTI ON-A- 20	20 of 101	4.11.7		
A- MH- 10	SECTI ON-VI, PART- B	SUB SECTI ON-A- 01	97 of 101	4.02.19	Minimum clear cross section of chute: 1800 mm X 1200 mm (inside both ways) for Coal Handling plant	Minimum clear cross section of chute: 1400 mm X 1000 mm (inside both ways) for Coal Handling plant
A- MH- 11	SECTI ON-VI, PART- B	SUB SECTI ON-A- 01	94 of 101	4.02.08 (b)	Minimum 2 no. sprinkler nozzles shall be considered per each stacker reclaimer for sizing of the pumps. For this purpose both stacker cum reclaimer shall be considered as working.	Minimum 2 no. sprinkler nozzles shall be considered for sizing of the pumps.
A- MH- 12	SECTI ON-VI, PART- B	SUB SECTI ON-A- 01	95 of 101	4.02.12	No. of days of crushed coal storage based on BMCR Design coal consumption at 100% PL: Bidder to maximize the coal stockyard storage capacity by utilizing the available space. However, stockyard capacity in any case shall not be less than 8 days	Bidder to maximize the coal stockyard storage capacity by utilizing the available space. However, stockyard capacity in any case shall not be less than 1,50,000 million tonne in the stockpile considering 800 T/cum bulk density for coal.

A- MH- 13	SECTI ON-VI, PART- B	SUB SECTI ON-A- 20	21 of 101	4.11.19	The dust suppression system for the track hopper shall consist of fifteen (15) zone headers, each of 15 meters length , routed along the entire length of track hopper on each side. Each nozzle header shall be provided with adequate number of spray nozzles spaced at 500 mm interval. Further, at the track hopper the water spray shall be of fogging type with a minimum pressure of 2.5 kg/sq.cm(g) at spray nozzle inlet. It should be possible to operate maximum four (4) number of zones simultaneously on both sides of track hopper.	The dust suppression system for the track hopper shall consist of maximum fifteen (15) zone headers, each of 20 meters length , routed along the entire length of track hopper on each side. Each nozzle header shall be provided with adequate number of spray nozzles of suitable range spaced at max. 500 mm interval. Further, at the track hopper the water spray shall be of fogging type with a minimum pressure of 4.5 kg/sq.cm(g) at spray nozzle inlet. It should be possible to operate minimum four (4) number of zones simultaneously on both sides of track hopper.
A- MH- 14	SECTI ON-VI, PART- B	SUB SECTI ON-A- 20	2 Of 101	3.01.0. (b)	"As received" limestone shall be fed on the double stream conveyors from where the same shall be conveyed upto the crushers. The crushed limestone shall be conveyed by double stream conveyors/ Bucket elevators up to the limestone storage shed/Silo. From the limestone storage shed/Silo paddle feeders will extract/ reclaim crushed limestone and feed the same onto double stream conveying system up to the limestone day silos.	

A- MH- 15	SECTI ON-VI, PART- B	SUB SECTI ON-A- 20	79-80 of 101	2.01.02 (d)	(1) Capacity of each nozzle: 2.0 lpm at 4.5 kg/cm ² (2) Nozzle spacing.: 500 mm (3) No. of dust suppression nozzles that can be operated simultaneously on both side of Hopper: min. one zone or four (4) such zones (one zone means 20 mtr. Length of header on both sides)	(1) Capacity of each nozzle: Min. 2.0 lpm at 4.5 kg/cm ² (2) Nozzle spacing.: Max. 500 mm (3) No. of dust suppression nozzles that can be operated simultaneously on both side of Hopper: Min. four (4) such zones (one zone means min. 20 mtr. Length of header on both sides)
A- MH- 16	SECTI ON-VI, PART- B	SUB SECTI ON-A- 20	79 of 101	2.01.02 (b)(1)	Maximum number of nozzles operating simultaneously for each stacker cum reclaimer:- Two numbers	Maximum number of nozzles operating simultaneously: - Two numbers
A- MH- 17	SECTI ON-VI, PART- A	SUB- SECTI ON-VI	1 to 23	Chapter- 04	COAL HANDLING PLANT	COAL, LIMESTONE & GYPSUM HANDLING PLANT
A- MH- 18	SECTI ON-VI, PART- A	SUB- SECTI ON-VI Chapter -03, AHP	12 of 13	10.03.00	ASH POND FUGITIVE DUST SUPPRESSION SYSTEM	Deleted
A- MH- 19	SECTI ON-VI, PART- A	SUB- SECTI ON-VI Chapter -04, CHP	2 of 23 9 of 23 12 of 23 13 of 23 15 of 23	8. Q) (ix) U) 1 to 9 W)1 – 27 X) 1 - 16	Cable reel drive Festoon Roller assembly for flexible cable SIDE ARM CHARGER Wagon Tippler and Accessories APRON FEEDERS	Deleted

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A- MH- 20	SECTI ON-VI, PART- A	SUB- SECTI ON-VI Chapter -03, AHP	5 of 13 7 of 13 12 of 13	4.04.00 4.04.01 - 4.04.11 4.06.00 4.06.01 to 4.06.06 11.02.03 11.02.04	Instrument Air Compressor Air Drying Plant for IA System Motor/IAC Compressor Air Blower for drying plant	Deleted.
A- MH- 21	SECTI ON-VI, PART- A	SUB- SECTI ON-VI Chapter -03, AHP	9 of 13	6.00.00	FLY ASH STORAGE SILO (Quantities as specified shall be applicable for fly ash Storage silo and HCSD silo separately)	FLY ASH STORAGE SILO
A- MH- 22	SECTI ON-VI, PART- A	Sub Section -IIA-16	4 of 18	1.01.05, (C), iii)	Two (2) numbers (1 working + 1 standby) economizer ash water pumps along with valves, pipes & fittings for both the units. These pumps shall be located in the ash water pump house.	Three (3) numbers (2 working + 1 standby) economizer ash water pumps along with valves, pipes & fittings for both the units. These pumps shall be located in the ash water pump house.
A- MH- 23	SECTI ON-VI, PART- A	Sub Section -IIA-16	13 of 18	1.02.01. 02 (e)	The water requirement for disposal of fly ash in slurry form shall be met by one (1) number working and one (1) number standby fly ash water pumps.	The water requirement for disposal of fly ash in slurry form shall be met by two (2) number working and one (1) number standby fly ash water pumps.
A- MH- 24	SECTI ON-VI, PART- A	Sub Section -IIA-16	6 of 18	1.01.06 (A) (a) (iv)	Six (6) nos. fly ash surge-cum-collection buffer hoppers (3 working + 3 Standby) complete with structural steel structures, platforms, stairs, aeration system, primary collector and secondary collector (if applicable) along with bag filter, target box etc for each unit	Twelve (12) nos. fly ash surge-cum-collection buffer hoppers (6 working + 6 Standby) complete with structural steel structures, platforms, stairs, aeration system, primary collector and secondary collector (if applicable) along with bag filter, target box etc for each unit.

A MI 2:	I- ON-VI.	Sub Section -IIA-16	11 of 18	1.02.00 c)	Seal water pumps (one working + one standby) for meeting the seal water requirement of Combined slurry disposal pumps and drain water pump of Combined slurry pump house, etc. These pumps shall be located in the Combined ash slurry disposal pump house.	HP & LP, Seal water pumps (one working + one standby, each) for meeting the seal water requirement of Combined slurry disposal pumps and drain water pump of Combined slurry pump house, etc. These pumps shall be located in the Combined ash slurry disposal pump house.
A MI 20	I- ON-VI.	Sub Section -IIA-16	15 of 18	1.04.06	Eight (8) nos. Pump tanks/Air lock tank for each coarse ash silo and four (4) nos. of pump tanks/air locks tank for fine ash hopper for transportation of coarse fly ash and fine fly ash respectively, to silos provided for dry fly ash storage silos meant for Road and Rail loading.	Eight (8) nos. Pump tanks/Air lock tank for each coarse ash hopper and four (4) nos. of pump tanks/air locks tank for fine ash hopper for transportation of coarse fly ash and fine fly ash respectively, to silos provided for dry fly ash storage silos meant for Road and Rail loading.
A MI 2'	I- PART-	SUB SECTI ON-A- 21	3 of 40	1.03.00, b)	Jet Pumps: Rated Capacity (M3/hr): Three (3) nos. pumps shall evacuate 4 hr. collection of bottom ash in 65 minutes . incl. 5 minutes time for start/stop/changeover/flushing etc.	Jet Pumps: Rated Capacity (M3/hr): Three (3) nos. pumps shall evacuate 4 hr. collection of bottom ash in 75 minutes . incl. 5 minutes time for start/stop/changeover/flushing etc.

Doc. No.: CS-4540-001A-2-TECH-AMDT. 01

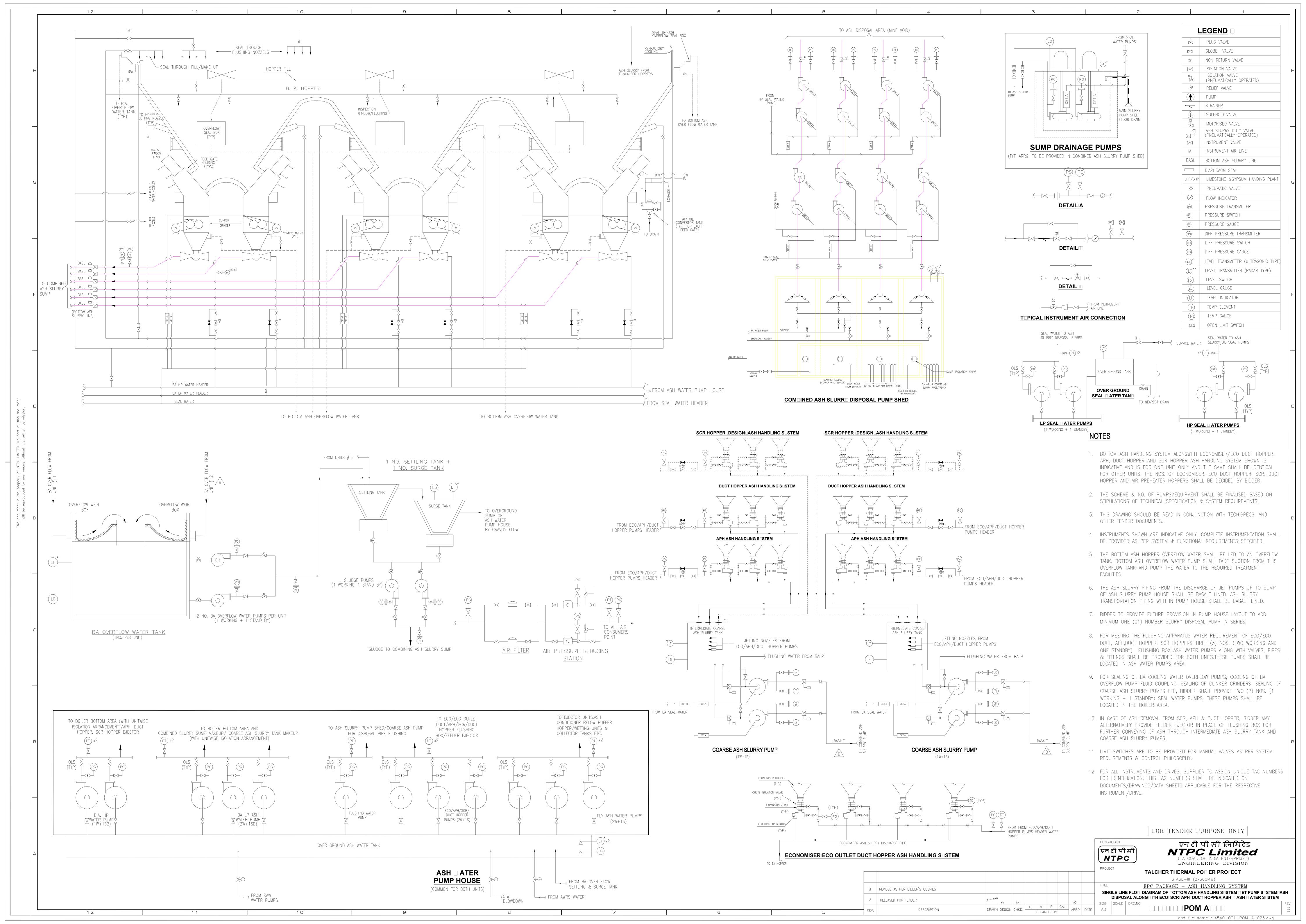
EPC Package for Talcher Thermal Power Project, Amendment No. 01 to Technical Stage-III (2x660 MW) Specifications Section-VI

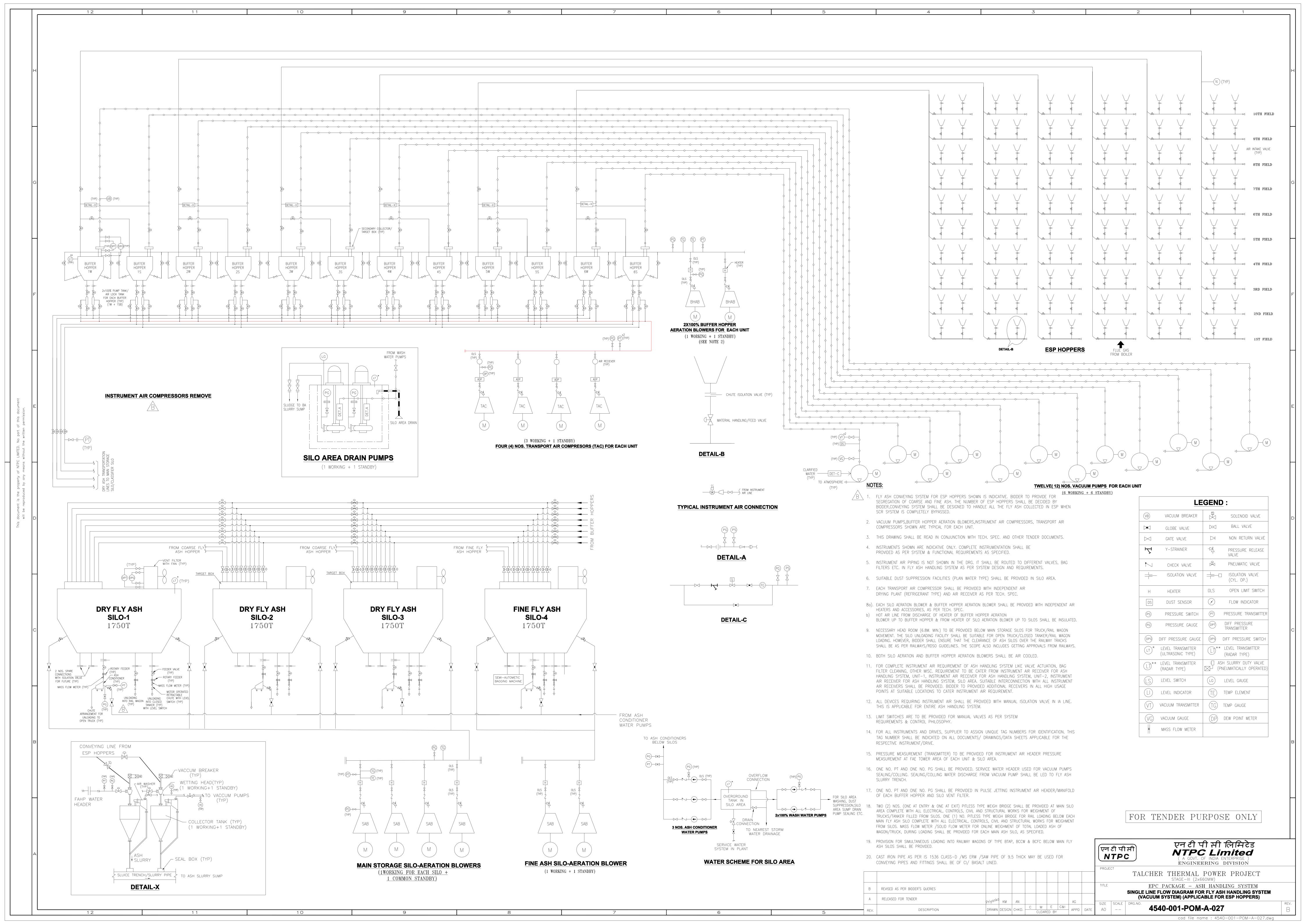
A- MH- 28	SECTI ON-VI, PART- A	SUB- SECTI ON-IV FUNCT IONAL GUARA NTEES	34 of 73	1.03.09 (A) (i)		
A- MH- 29	Section -VI, Part E		92- 99 of 268		4540-001-POM-A-025, Rev-A 4540-001-POM-A-027, Rev-A 4540-001-POM-A-028, Rev-A 4540-001-POM-A-029, Rev-A	4540-001-POM-A-025, Rev-B 4540-001-POM-A-027, Rev-B 4540-001-POM-A-028, Rev-B 4540-001-POM-A-028A, Rev-A 4540-001-POM-A-029, Rev-B
A- MH- 30	SECTI ON-VI, PART- A	Sub Section -IIA-13	1 of 2	1.04.00	The LDO shall be pumped to two (2) nos. storage tanks each of capacity 1700 cu. meter. One (1) number day oil tank of capacity 100 cu. meter for auxiliary boiler shall be provided. The day oil tank shall be fed from a separate set of transfer pumps and pipe line.	The LDO shall be pumped to two (2) nos. storage tanks each of capacity 1700 cu. Meter.

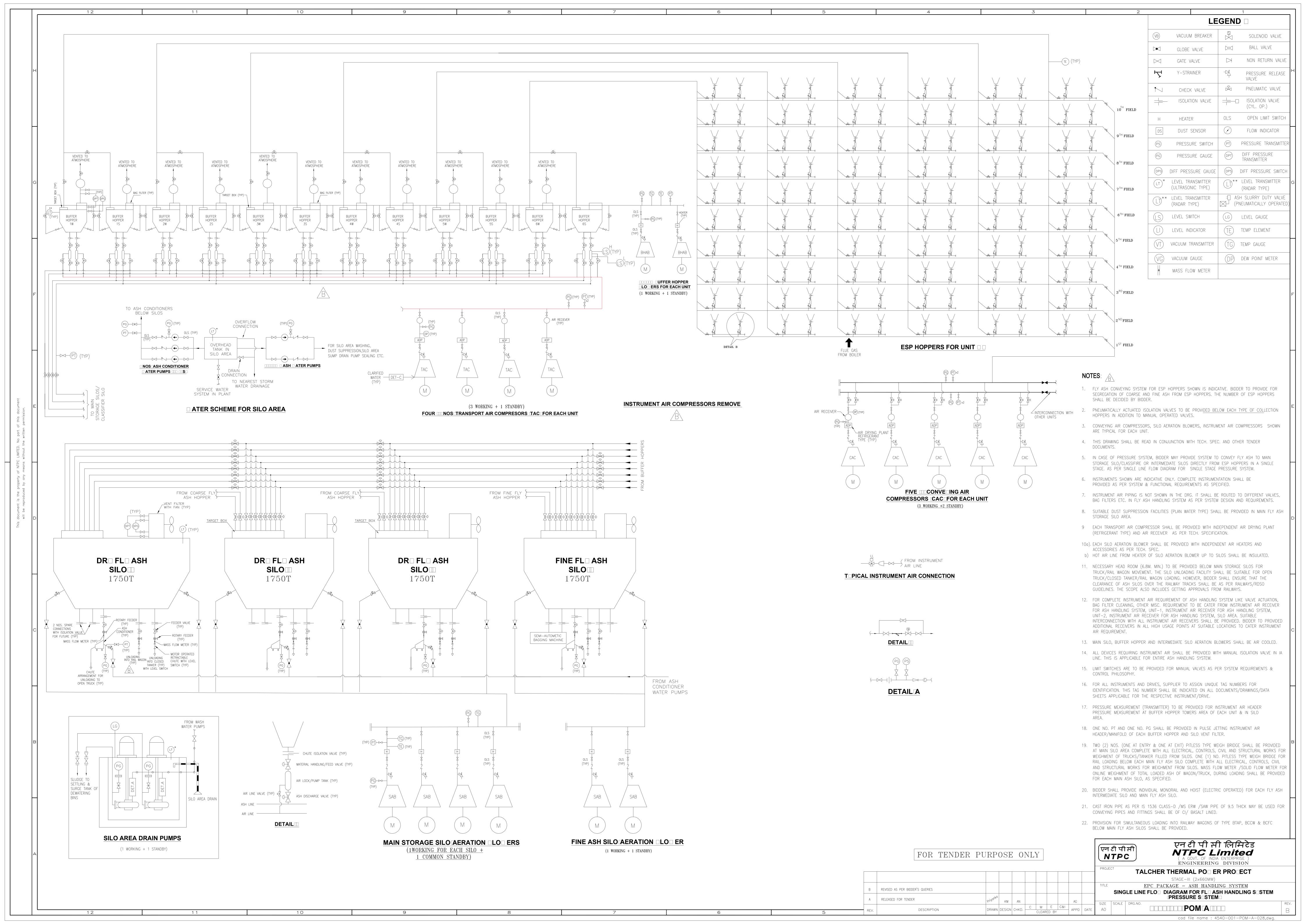
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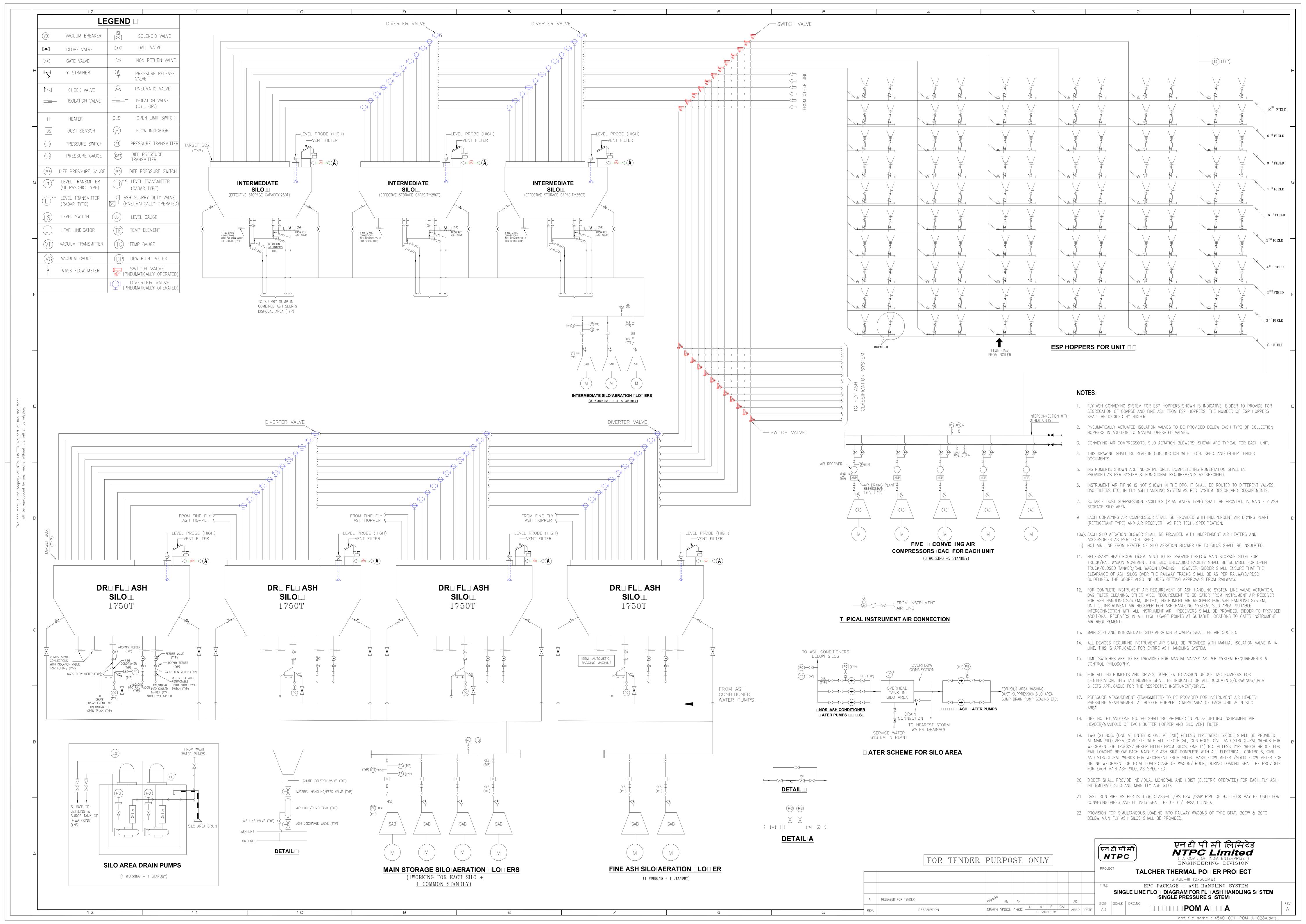
A- MH- 31	Sectio n-VI, Part-A	SUB- SECTI ON- IIA-15	7 of 7	Addition al clause 1.47.00		One (1) no. pendent controlled electrically operated overhead travelling crane for CHP workshop building of minimum 5 T capacity complete with runway rails, necessary rail clamps, bolts, splice bars and stops for each of the runway.
A- MH- 32	SECTI ON-VI, PART- A	SUB- SECTI ON-VI Chapter -04, CHP	21 of 23	(O)	PLC (STACKER / RECLAIMER & WAGON TIPPLER)	PLC (STACKER / RECLAIMER)

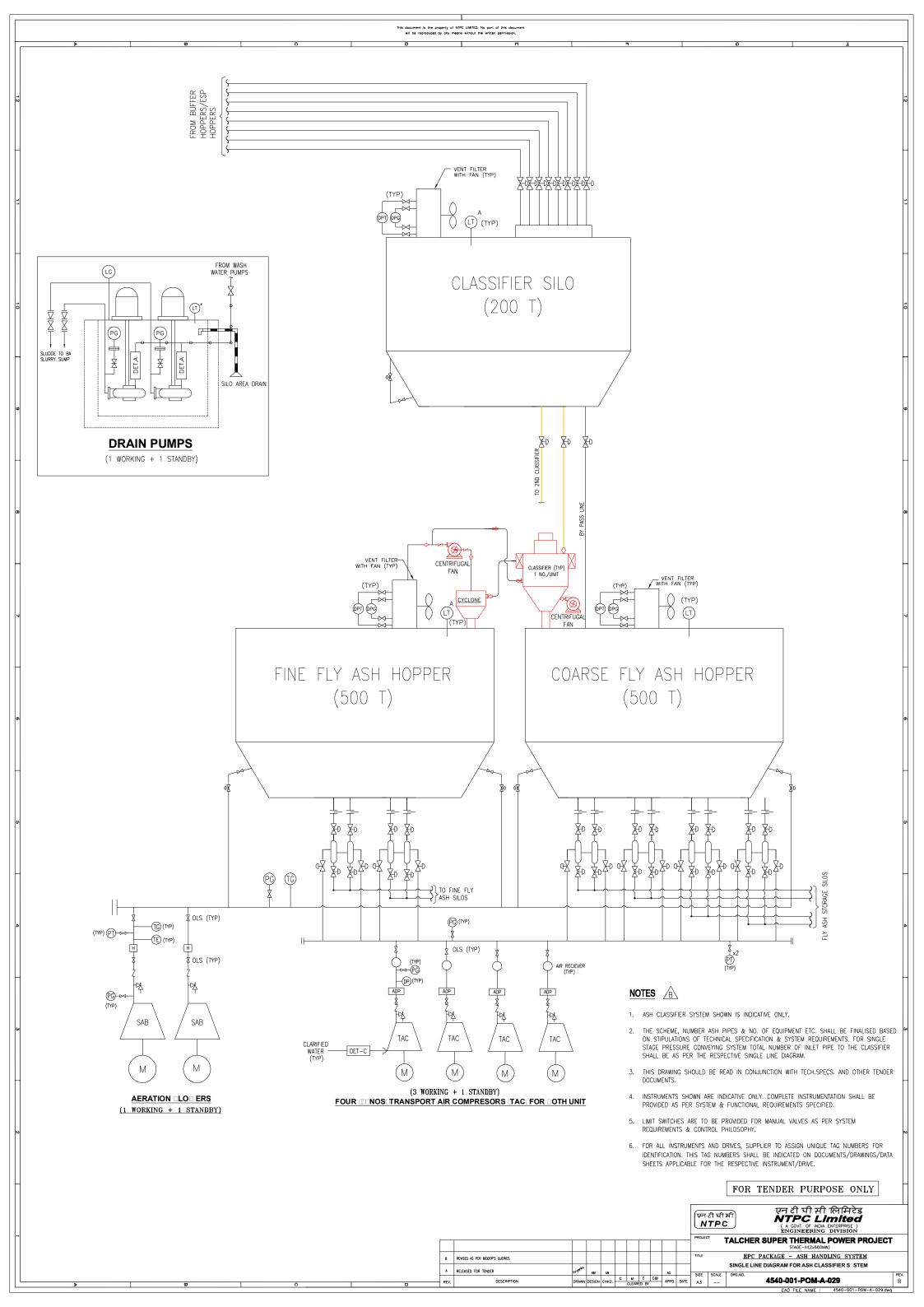
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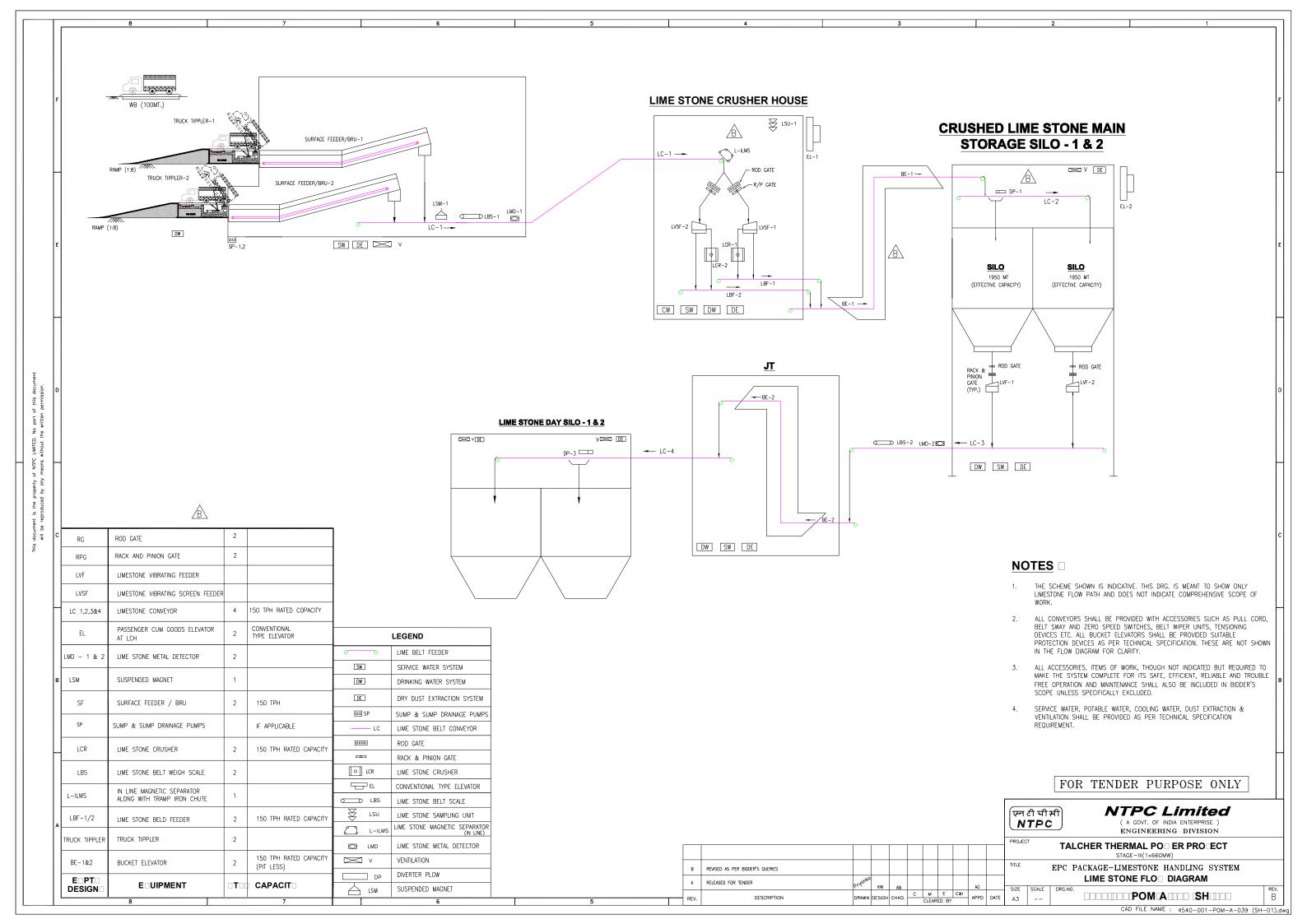


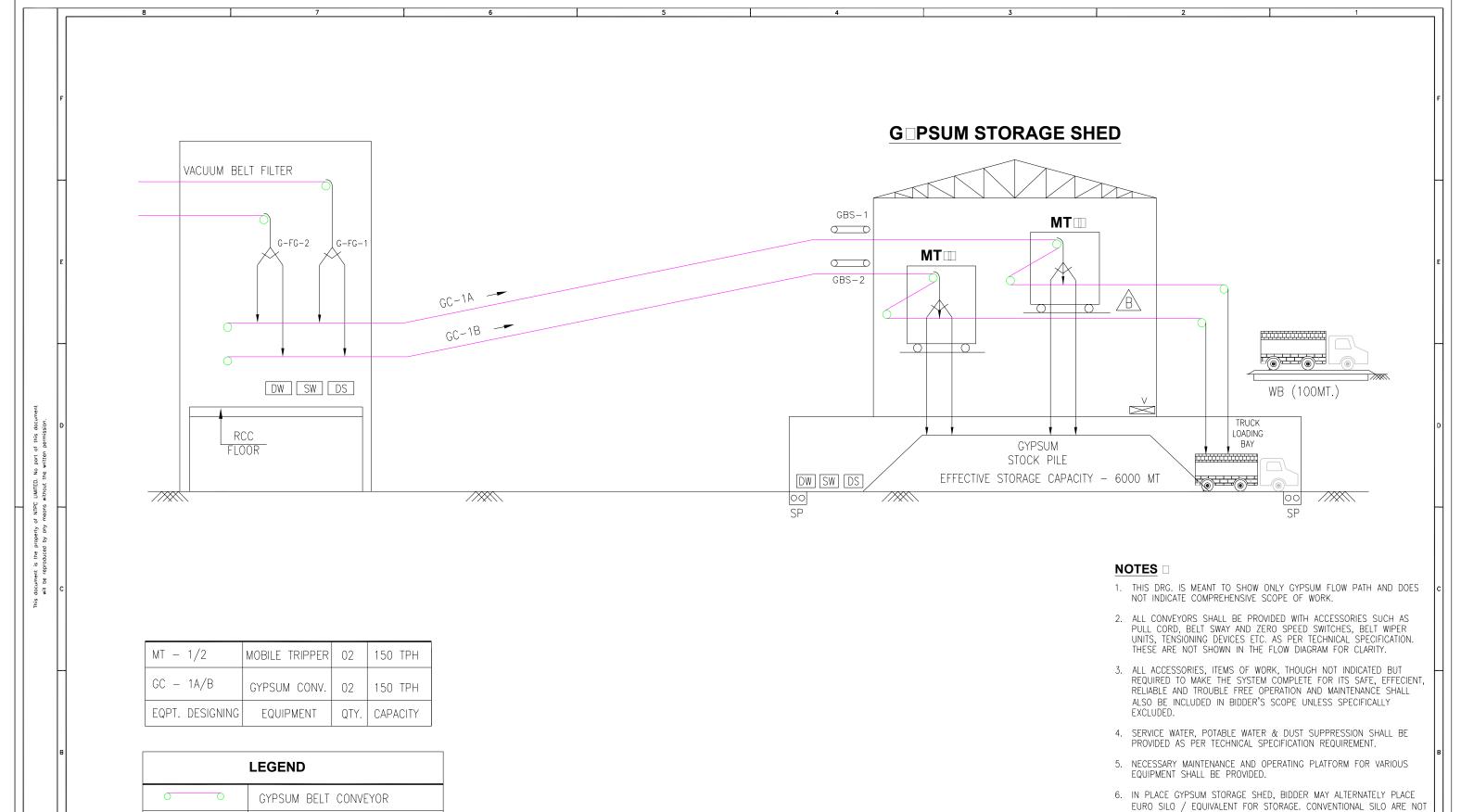












REVISED AS PER BIDDER'S QUERIES

RELEASED FOR TENDER

	LEGEND
0 0	GYPSUM BELT CONVEYOR
SW	SERVICE WATER SYSTEM
DW	DRINKING WATER SYSTEM
DS	DUST SUPPRESSION SYSTEM
SP	SUMP & SUMP DRAINAGE PUMPS
G-FG	GYPSUM FLAP GATE
G-BS	GYPSUM BELT SCALE

FOR TENDER PURPOSE ONLY

एन ਟੀ ਧੀ ਸੀ NTPC (A GOVT. OF INDIA ENTERPRISE) ENGINEERING DIVISION

ACCEPTABLE.

DRAWN DESIGN CHKD. C M E C&I APPD DATE

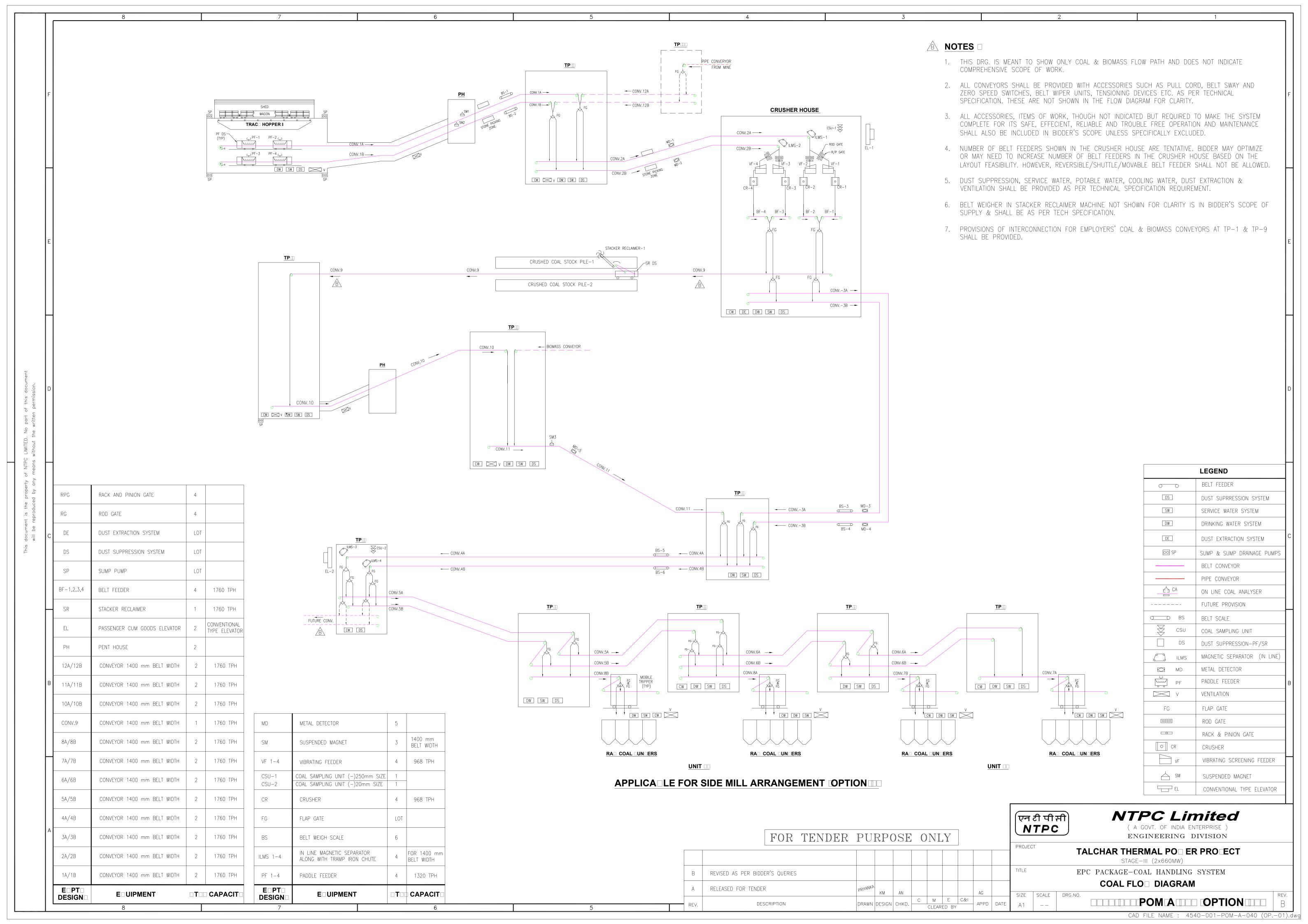
TALCHER THERMAL PO ER PRO ECT

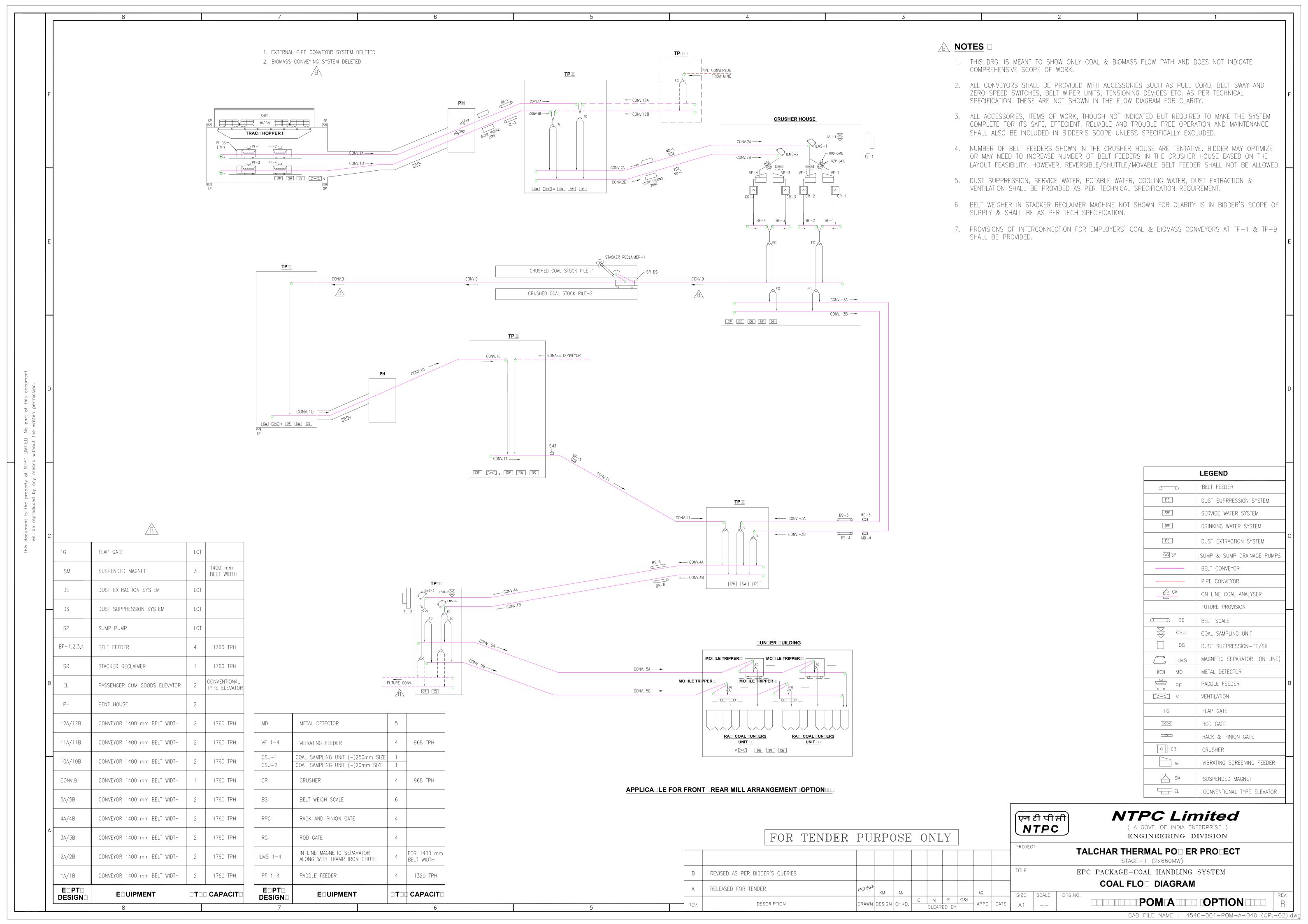
TITLE EPC PACKAGE-GYPSUM HANDLING SYSTEM

G PSUM FLO DIAGRAM

POM A SH B

CAD FILE NAME: 4540-001-POM-A-039 (SH-02).dwg





NTPC Ltd TALCHER SUPER THERMAL POWER STATION KANIHA CHEMISTRY LABORATORY

Name of sample: Quarry-4 of Jagannath mine void area water sample

Sample Date - 01/04/22

Collected by: EMG Dept., TTPS

Sample name:	pН	TSS (ppm)	Turbidity (NTU)
Drinking water stg-1	7.56	11.2	20

ज्योति प्रकाश पंडा JYOTI PRAKASHA PANDA ज्य प्रबंधक (रसायन विज्ञान विभाग) Dy. Manager (Chemistry Dept.) एनटोपोसी लिमिटेड / तालचेर किन्हा प्रमुटोपोसी लिमिटेड / तालचेर कानाव

		Specifica	ation Reference		Existing	Read As
Sl. No	Sec/Part	Sub Sec	Page No.	Clause No.	7	
A-PU-1	VI/B	A-01	70 of 101	3.12.02, iv)	All the landings of boiler staircases, turbine building, crusher house, transfer points/junction house of internal & external CHP , bunker floors, service building, administrative building, etc. and other multi-storied structures of the entire plant shall be provided with hydrant landing valves.	All the landings of boiler staircases, turbine building, crusher house, transfer points/junction house of CHP , bunker floors, service building, administrative building, etc. and other multi-storied structures of the entire plant shall be provided with hydrant landing valves.
A-PU-2	VI/B	A-01	72 of 101	3.12.05, i.	The PLC based panel at fire water pump house and	The PLC based panel at fire water pump house andcent ral monitoring station and DDCMIS.
A-PU-3	VI/B	A-01	72 of 101	3.12.05, iii.	The panel at	The panel at
A-PU-4	VI/B	A-01	72 of 101	3.12.05, iv.	and protection system of the complete plant including external CHP. This shall give audio-visual annunciations for fire in each of the risk area / equipment / status of the fire protection system as well as system operator open / short circuit status of detector or control cabling, etc. Further, this	The central monitoring station to be located at Central Control Room shall cover the fire detection and protection system of the complete plant. This shall give audio-visual annunciations for fire in each of the risk area / equipment / status of the fire protection system as well as system operator open / short circuit status of detector or control cabling, etc. Further, this shall activate a hooter/sounder in each of the area provided with fire/smoke detection system.

Doc. No.: CS-4540-001A-2-TECH-AMDT. 01

EPC PACKAGE FOR TALCHER THERMAL POWER PROJECT, STAGE-III (2x660 MW)

Amendment No. 01 to Technical Specifications Section-VI of Bidding Document No.: CS-4540-001A-2

		Specifica	tion Reference		Existing	Read As
Sl. No	Sec/Part	Sub Sec	Page No.	Clause No.		
A-PU-5	VI/B	G-04	218 of 224	PG Test Procedure for Compressed Air System	For eventual noise, from the discharge line, accessories and /or ancillary equipment which are not included, a correction factor of Maximum 4 dB (A) shall be allowed for background & ambient noise.	For eventual noise, from the discharge line, accessories and /or ancillary equipment which are not included, a correction factor of Maximum 8 dB (A) shall be allowed for background & ambient noise.
A-PU-6	VI/B	A-17	1 of 30	3.01.00, d)	Administrative Building: i) Screw type water chilling units: 2X50% ii) Primary Chilled water pumps: 2X50% iii) Secondary chilled water pumps (with VVVFD): 2X50% iv) Condenser water pumps: 2X50% v) Cooling Towers (with VVVFD Fan): 2X50%	Administrative Building: i) Screw type water chilling units: 2X50% ii) Primary Chilled water pumps: 2X50% iii) Secondary chilled water pumps (with VVVFD): 2X50% iv) Condenser water pumps: 2X50% v) Cooling Towers (with VVVFD Fan): 2X50% vi) AHUs (with VVVFD Fan): All working & no standby.
A-PU-7	VI/B	A-17	2 of 30	4.02.00	Type: Water-cooled type. (Chillers for main plant shall be with multiple compressors)	Type: Water-cooled type. (Chillers for main plant shall preferably be with multiple compressors)

Doc. No.: CS-4540-001A-2-TECH-AMDT. 01

		Specification	Reference		Existing	Read As
SI. No	Sec/Part	Sub Sec	Page No.	Clause No.		
A-SG-01	SECTION-VI, PART-A	SUB-SECTION-VI- Chapter 01	PAGE 23 OF 38	1.24.00	1.24.00 SCR System (Mandatory Spares) 1.24.01 - Soot Blower/ Sonic Horn Assy,	1.24.00 Not Applicable
A-SG-02	SECTION-VI, PART-A	SUB-SECTION-I-A PROVEN-NESS	PAGE 118&19 OF 36	Notes below 4.23 & 4.24	Notes:- A) to D)	Add E) Notes for 4.23.2, 4.23.3 & Notes-A-4 DJU and Bank guarantee will not be applicable in case of order of SCR ready/Hybrid ready plant system.
A-SG-03	Sec VI/ Part-B	- A-06	3 of 4	1.13.00	Aux Boiler Canopy: To offer protection to the Boiler against rainfall, a rain canopy shall be provided.	Aux Boiler area Canopy provisions: To offer protection to the Boiler against rainfall, a rain canopy shall be provided. Bidder to ensure that all equipments & Instrumentations needs to be protected against rain-fall. Suitable local canopy shall be provided where such equipment/instruments (fan, pump, drum floor, burner floor etc.) are placed.
A-SG-04	Sec VI/ Part-B	- A-06	3 of 4	1.17.00	Equipment Handling Arrangement Where it is necessary to handle any item in excess of 55 kg. weight on the boiler for pur-pose of erection or maintenance, a suitable lifting beam arrangement is to be provided. For loads one ton and above on lifts exceeding three me-ters electric hoists shall be provided.	Equipment Handling Arrangement Where it is necessary to handle any item in excess of 200 k g. weight on the boiler for purpose of erection or maintenance, a suitable lifting beam arrangement is to be provided. For loads one ton and above on lifts exceeding three meters electric hoists shall be provided.
A-SG-05	Sec VI/ Part-B	- A-06	4 of 4	1.21.00	Valves For valves of Fuel Oil system for auxiliary boil-er, the Contractor shall comply with requirements stipulated for Fuel oil system for main boiler in relevant clauses of Sub-Section-A- 03, Part-B, Section-VI.	A-06, Part-B, Cl.1.21.00: Valves For valves of Fuel Oil system for auxiliary boiler, the Contractor shall comply with requirements stipulated for Fuel oil system for main boiler in relevant clauses of Sub-Section-A-02, Part-B, Section-VI. Alternatively, gate and globe valves can also be used for isolation and regulating purpose respectively while complying to the leakage & fire prrof requirements as specified at above clause.

A-SG-06	VI/A	IIA-02A, Annexure-SG- 04	3 of 3	2, b).		Duct up to SCR Inlet Gate including SCR Inlet Gate. (Following para shall be added at the last of cl. 2) Scope shall be as per "Typical SCR Sketch" at Annexure-1. Further, Bidder to ensure that there should be proper arrangement (Flange & Bolt) of connecting ducts for SCR wherever Blanking plate is being provided at Terminal Points. Bidder to also ensure that the future erection of the SCR system and its integration with Terminal Points can be done without any trouble and optimized resources. Related procedure for the erection of the same shall be provided to the employer.
A-SG-07	VI/A	IIA-02A, Annexure-SG- 04	3 of 3	2, o).	considering the loading of complete SCR/Hybrid system as per Subsection-IIA-02/IIA-02A. However, structures for SCR reactors above the APH shall not be supplied and constructed.	Structures and foundations in Boiler/APH/Other areas considering the loading of complete SCR/Hybrid system as per Subsection-IIA-02/IIA-02A. However, structures for SCR reactors above the APH shall not be supplied and constructed. Structures and foundations in other areas like Ammonia/Urea unloading, storage, handling & injection area are not included for De-NOX ready system however, only space requirement and location will be identified.
A-SG-08	VI-B	SS-A-01	4 of 101	1.05.01-v	Heat Input per burner(*) - 600 X10 ⁵ kCal/Hr (Maximum) (*) Minimum number of coal pulverisers to be provided for each steam generator shall not be less than Seven (7).	Heat Input per burner(*) - 650 X10 ⁵ kCal/Hr (Maximum) (*) Minimum number of coal pulverisers to be provided for each steam generator shall not be less than Seven (7).

A-SG-09	VI-B	SS-A-02	17 of 65	9.01.03	S.N.#1 to 5	Add S.N6 APH Guarantee Condition 1.Air Leakage (at 100% TMCR i.e. 660 MW unit load for design coal) — 10% (Max.) 2.Design Ambient Temperature & Relative Humidity: 25 deg.C & 60% RH 3.Excess Air — 20% 4.The maximum air-in-leakage to flue gas after 3000 hours continuous operation of the Steam Generator with coal shall be guaranteed. 5.Contractor shall demonstrate that the air-heater air-in-leakage do not exceed the guaranteed or specified value (whichever is lower) as per description at Sub section-A-01 & A-02, Part-B (Mechanical), of Technical specifications.
A-SG-10	SECTION – VI, PART-B	SUB SECTION-A-02 - SG AND AUXILLARIES	19 of 65	10.02.01 b)	Bunker Shut Off Gates shall be motor operated & RC Feeder outlet gates shall be pneumatic operated	Bunker Shut Off Gates shall be motor operated & RC Feeder outlet gates shall be motor / pneumatic operated
A-SG-11	SECTION- VI, PART-A	SUB SECTION-II A-01 STEAM GENERATOR & AUXILIARIES INCLUDING ESP	28 of 28	7.00.00	1. Boiler enclosure shall be covered with colour coated metal sheeting. The metal sheet shall display a visually appealing painting (which will be informed later) on outside. The height covered for sheeting will be from boiler roof to Penthouse and 15 m below from penthouse. During Overhauling or repair, the covering should not restrict material movement from Top and Sides of the boiler. Accordingly, removable type sheet shall be provided for such location. Necessary approach and lugs shall be provided for this purpose. 2. Provision for ventilators / glazed windows shall be made as per functional requirements. The boiler enclosure shall have flat roof with access through staircase / lift.	Boiler enclosure shall be covered with colour coated metal sheeting. The metal sheet shall display a visually appealing painting (which will be informed later) on outside. The height covered for sheeting will be from boiler roof to Penthouse and 15 m below from penthouse bottom. During Overhauling or repair, the covering should not restrict material movement from Top and Sides of the boiler. Accordingly, removable type sheet shall be provided for such location. Necessary approach and lugs shall be provided for this purpose. 2. Provision for ventilators / glazed windows shall be made as per functional requirements. The boiler enclosure shall have sloped (Up to 10deg) roof with access through staircase / lift.
A-SG-12	SECTION – VI, PART-B	SUB SECTION-A-02 STEAM GENERATOR & AUXILIARIES INCLUDING ESP	39 OF 65	13.01.06	Material of construction : (iii) Pipe struts, trusses, bracing : ASTM A 53 or equivalent seamless steel pipe.	Material of construction: (iii) Pipe struts, trusses, bracing: ASTM A 53 or equivalent seamless steel pipe. Material conforming to equivalent Indian standard shall also be acceptable.
A-SG-13	SS1 SELECTIVE	ANNEXURE-SS1 SELECTIVE CATALYTIC REDUCTION	4 OF 22	4.02.01	The reactor casing shall be fabricated from all welded reinforced, 6 mm minimum thickness, carbon steel plates conforming to ASTM A36.	The reactor casing shall be fabricated from all welded reinforced, 6 mm minimum thickness, carbon steel plates conforming to ASTM A36. Material conforming to equivalent Indian standard shall also be acceptable.

A-SG-14	SECTION - VI PART-B	SUB SECTION A-01 - EQUIPMENT SIZING CRITERIA	3 of 101	1.04.00 (a)	Step load change: Minimum ± 10% per minute	Step load change : Minimum ± 10% per minute
A-SG-15	SECTION - VI PART-B	SUB SECTION A-01 - EQUIPMENT SIZING CRITERIA	10 of 101	1.05.06.01-2 (iv)	a) Load Range - 60% BMCR with design / best / worst coal and max moisture b) Load Range - 100% BMCR with Design/Best/worst coal and maximum moisture	a) Load Range - 60% TMCR with design / best / worst coal and max moisture b) Load Range - 100% TMCR with Design/Best/worst coal and maximum moisture
			11 of 101	1.05.06.02-2 (iv)	a) Load Range -a) 60% BMCR with worst coal and maximum moisture with one set of RAPH in service b) 100% BMCR with worst coal and maximum moisture with both sets of RAPH in service	a) Load Range -a) 60% TMCR with worst coal and maximum moisture with one set of RAPH in service b) 100% TMCR with worst coal and maximum moisture with both sets of RAPH in service
A-SG-16	SECTION - VI PART-B	SUB SECTION A-01 - EQUIPMENT SIZING CRITERIA	12 of 101	1.05.07.02	Design SCAPH and connected air ducts to handle flows corresponding to 60% BMCR loads with one of the two streams working	Design SCAPH and connected air ducts to handle flows corresponding to 60% TMCR loadswith one of the two streams working
A-SG-17	SECTION - VI PART-B	SUB SECTION A-01 - EQUIPMENT SIZING CRITERIA	18 of 101	1.05.13.03	The fans shall also fulfill following sizing criteria in addition to those mentioned at Clause 1.05.13.02 above Each fan to be sized for 50% TMCR flow calculated taking into following conditions occurring together. FD ID (i) Margin over 100% BMCR flow: 20% 20% (ii) Margin over 100% BMCR pressure requirement: 44% 44%	The fans shall also fulfill following sizing criteria in addition to those mentioned at Clause 1.05.13.02 above Each fan to be sized for 50% TMCR flow calculated taking into following conditions occurring together. FD ID (i) Margin over 100% TMCR flow: 20% 20% (ii) Margin over 100% TMCR pressure requirement: 44% 44%
A-SG-18	SECTION - VI PART-B	SUB SECTION A-01 - EQUIPMENT SIZING CRITERIA	25 of 101	1.05.19.03	Height of catalyst module (maximum)(mm): 1300	Height of catalyst module (maximum)(mm): 1400
A-SG-19		SUB-SECTION-IIA-04 FLUE GAS DESULPHURISATION SYSTEM	4 of 7	5.03.00		This system shall be comprising of 2x100% gypsum dewatering system with each stream sized to dewater 110% of the maximum gypsum produced by all the two units operating simultaneously at FGD DESIGN POINT , with any coal from the specified range of coals (whichever gives the maximum gypsum flow)

A-SG-22 VI/B A-SG 20 VI/B A-SG	A-SG-20	SECTION- VI, PART-B	SUB-SECTION-A-05 (FGD)	15 of 28	6.07.03	The limestone slurry pipes shall be sized to minimize erosion and avoid settling of the limestone at part load operation. The slurry pipes shall be lined with replaceable wear resistant natural rubber lining of minimum 10mm thickness. Additional thickness of 2 mm in rubber lining shall be provided at bends.	The limestone slurry pipes shall be sized to minimize erosion and avoid settling of the limestone at part load operation. The slurry pipes shall be lined with replaceable wear resistant natural rubber lining of minimum 6 mm thickness. Additional thickness of 2 mm in rubber lining shall be provided at bends.
A-SG-22 VI/B A-05 S of 28 3.03.04 Section the bypass damper and gate in the bypass duct and gate at Absorber outlet shall be made of Carbon steel with C276 cladding of sheet of minimum thickness 1.6 mm or better material. A-SG-24 VI/B A-13 1 of 8 1.00.0 (b) (i) (i) (ii) (ii) (iii)	A-SG-21			17 of 28	7.04.09	hopper onto belt conveyor. The elevation of discharge point of vacuum belt filter shall be	The elevation of discharge point of vacuum belt filter shall be atleast 10.0 m above GL. The elevation of vacuum belt filter shall be suitable to discharge the
bypass damper and gate in the bypass duct and gate at Absorber outlet shall be made of Carbon steel with C276 cladding of sheet of minimum thickness 1.6 mm or better material. A-GG-24 VI/B A 13 1 of 8 1.00.0 (b) (i) (i) (a) Shot content: 5% by weight (maxm.), size of any shot not to exceed 5 mm in diameter. 5% by weight (maxm.), size of any shot not to exceed 5 mm in diameter. 6 (a) Shot content: 5% by weight (maxm.), size of any shot not to exceed 5 mm in diameter. 6 (a) Shot content: 5% by weight (maxm.), size of any shot not to exceed 5 mm in diameter. 7 (details, as applicable, shall be as per above referred standard). The complete absorber vessel (absorber ovidation tank, absorber tower & absorber outlet duct) shall be made of clad sheet of C276 / Alloy 59 (minimum 2 mm thickness) having minimum 7 mm thick carbon steel as base materia. 7 (minimum 2 mm thickness) having minimum 7 mm thick carbon steel as base material. 8 (a) Shot content: 5% by weight (maxm.), size of any shot not to exceed 5 mm in diameter. 8 (a) Shot content: 5% by weight (maxm.), size of any shot not to exceed 5 mm in diameter. 8 (a) Shot content: 5% by weight (maxm.), size of any shot not to exceed 5 mm in diameter. 8 (a) Shot content: 5% by weight (maxm.), size of any shot not to exceed 5 mm in diameter. 9 (details, as applicable, shall be as per above referred standard). 9 (minimum 2 mm thick carbon steel as base material. 9 (a) Shot content: 5% by weight (maxm.), size of any shot not to exceed 5 mm in diameter. 9 (details, as applicable, shall be as per above referred standard). 9 (minimum 2 mm thick carbon steel as base material. 9 (a) Shot content: 5% by weight (maxm.), size of any shot not to exceed 5 mm in diameter. 9 (details, as applicable, shall be as per above referred standard). 9 (minimum 2 mm thick carbon steel as base material. 9 (a) Shot content: 5 (a) Shot content: 5 (b) Weight (maxm.), size of any shot not to exceed 5 mm in diameter. 9 (details, as applicable, shall be asper above referred standard). 9 (minimum 2 mm	A-SG-22			4 of 28	3.01.00		6. Recirculation Slurry pH: Not less than 5.5 under all operating conditions For JBR (Jet Bubbling Reactor) technology, pH range - between 4 and 6 (Justification of the selected pH shall be provided with proven references).
A-SG-24 VI/B A 13 1 of 8 1.00.0 (b) (i) 5% by weight (maxm.), size of any shot not to exceed 5 mm in diameter. 5% by weight (maxm.), size of any shot not to exceed 5 mm in diameter. 5% by weight (maxm.), size of any shot not to exceed 5 mm in diameter. 5% by weight (maxm.), size of any shot not to exceed 5 mm in diameter. 5% by weight (maxm.), size of any shot not to exceed 5 mm in diameter. 5% by weight (maxm.), size of any shot not to exceed 5 mm in diameter. 5% by weight (maxm.), size of any shot not to exceed 5 mm in diameter. 5% by weight (maxm.), size of any shot not to exceed 5 mm in diameter. 5% by weight (maxm.), size of any shot not to exceed 5 mm in diameter. 5% by weight (maxm.), size of any shot not to exceed 5 mm in diameter. 5% by weight (maxm.), size of any shot not to exceed 5 mm in diameter. 5% by weight (maxm.), size of any shot not to exceed 5 mm in diameter. 5% by weight (maxm.), size of any shot not to exceed 5 mm in diameter. 5% by weight (maxm.), size of any shot not to exceed 5 mm in diameter. 5% by weight (maxm.), size of any shot not to exceed 5 mm in diameter. 5% by weight (maxm.), size of any shot not to exceed 5 mm in diameter. 5% by weight (maxm.), size of any shot not to exceed 5 mm in diameter. 5% by weight (maxm.), size of any shot not to exceed 5 mm in diameter. 5% by sealing and seal shot of the site of t	A-SG-23	VI/B	A-05	5 of 28	3.03.04	bypass damper and gate in the bypass duct and gate at Absorber outlet shall be made of Carbon steel with C276 cladding of sheet of minimum thickness 1.6 mm or better	The blade and other components in the gas path, of the bypass damper and gate in the bypass duct and gate at Absorber outlet shall be made of Carbon steel with C276 cladding of sheet of minimum thickness 1.6 mm or better material.
A-SG-25 VI/B A-05 10 of 28 5.06.11 & absorber outlet duct) shall be made of clad sheet of C276 / Alloy 59 (minimum 2 mm thick-ness) having minimum 7 mm thick carbon steel as base material The duct from Absorber outlet to bypass duct & duct after by pass damper/gate to chimney inlet shall be made of cladded sheet of minimum 2 mm thickness of either Titanium (Grade 2 as per ASME SB265) or C-276 over 8 mm thick (minimum) mild steel base metal The spray headers (if provided) and air supply headers shall be made of FRP or Carbon Steel with Chlorobutyl / Bromobutyl rubber lining (minimum 10 mm natural rubber lining), corrosions and erosion resistant in the inner and outer side (Silicon Carbide coating on metal/FRP surface exposed to slurry).	A-SG-24	VI/B	A 13	1 of 8	1.00.0 (b) (i)		5% by weight (maxm.), size of any shot not to exceed 5 mm in diameter (size
A-SG-26 VI/B A-05 S of 28 3.02.04 damper/gate to chimney inlet shall be made of cladded sheet of minimum 2 mm thickness of either Titanium (Grade 2 as per ASME SB265) or C-276 over 8 mm thick (minimum) mild steel base metal The spray headers (if provided) and air supply headers shall be made of FRP or Carbon Steel with Chlorobutyl / Bromobutyl rubber lining (minimum 10 mm natural rubber lining), corrosions and erosion resistant in the inner and outer side (Silicon Carbide coating on metal/FRP surface exposed to slurry). A-SG-27 VI/B A-05 11 of 28 5.06.17 damper/gate to chimney inlet shall be made of cladded sheet of minimum 2 mm thickness of either Titanium (Grade 2 as per ASME SB265) or C-276 over 8 7 mm thick (minimum 5 steel base metal The spray headers (if provided) and air supply headers (if provided) and air supply headers (exposed to slurry) shall be made of FRP or Carbon Steel with Chlorobutyl / Bromobuty lining (minimum 10 mm natural rubber lining), corrosions and erosion resistant in the inner and outer side (Silicon Carbide coating on metal/FRP surface exposed to slurry).	A-SG-25	VI/B	A-05	10 of 28	5.06.11	& absorber outlet duct) shall be made of clad sheet of C276 / Alloy 59 (minimum 2 mm thick-ness) having minimum 7 mm thick carbon steel as	The complete absorber vessel (absorber oxidation tank, absorber tower & absorber outlet duct) shall be made of clad sheet of Titanium/ C276 / Alloy 59 (minimum 2 mm thick-ness) having minimum 7 mm thick carbon steel as base material
A-SG-27 VI/B A-05 11 of 28 5.06.17 FRP or Carbon Steel with Chlorobutyl / Bromobutyl rubber lining (minimum 10 mm natural rubber lining), corrosions and erosion resistant in the inner and outer side (Silicon Carbide coating on metal/FRP surface exposed to slurry). formula from the inner and outer side (Silicon Carbide coating on metal/FRP surface exposed to slurry).	A-SG-26	VI/B	A-05	5 of 28	3.02.04	damper/gate to chimney inlet shall be made of cladded sheet of minimum 2 mm thickness of either Titanium (Grade 2 as per ASME	The duct from Absorber outlet to bypass duct & duct after by pass damper/gate to chimney inlet shall be made of cladded sheet of minimum 2 mm thickness of either Titanium (Grade 2 as per ASME SB265) or C-276 over & 7 mm thick (minimum) mild steel base metal
A-SG-28 VI/B A-01 23 of 101 1.05.19.01, 2 Each Reactor shall be sized - ii) 25% excess air Each Reactor shall be sized - ii) 25% 20% excess air	A-SG-27	VI/B	A-05	11 of 28	5.06.17	FRP or Carbon Steel with Chlorobutyl / Bromobutyl rubber lining (minimum 10 mm natural rubber lining), corrosions and erosion resistant in the inner and outer side (Silicon Carbide coating on	The spray headers (if provided) and air supply headers (exposed to slurry in any form) shall be made of FRP or Carbon Steel with Chlorobutyl / Bromobutyl rubber lining (minimum 10 mm natural rubber lining), corrosions and erosion resistant in the inner and outer side (Silicon Carbide coating on metal/FRP surface exposed to slurry).
	A-SG-28	VI/B	A-01	23 of 101	1.05.19.01, 2	Each Reactor shall be sized - ii) 25% excess air	Each Reactor shall be sized - ii) 25% 20 % excess air

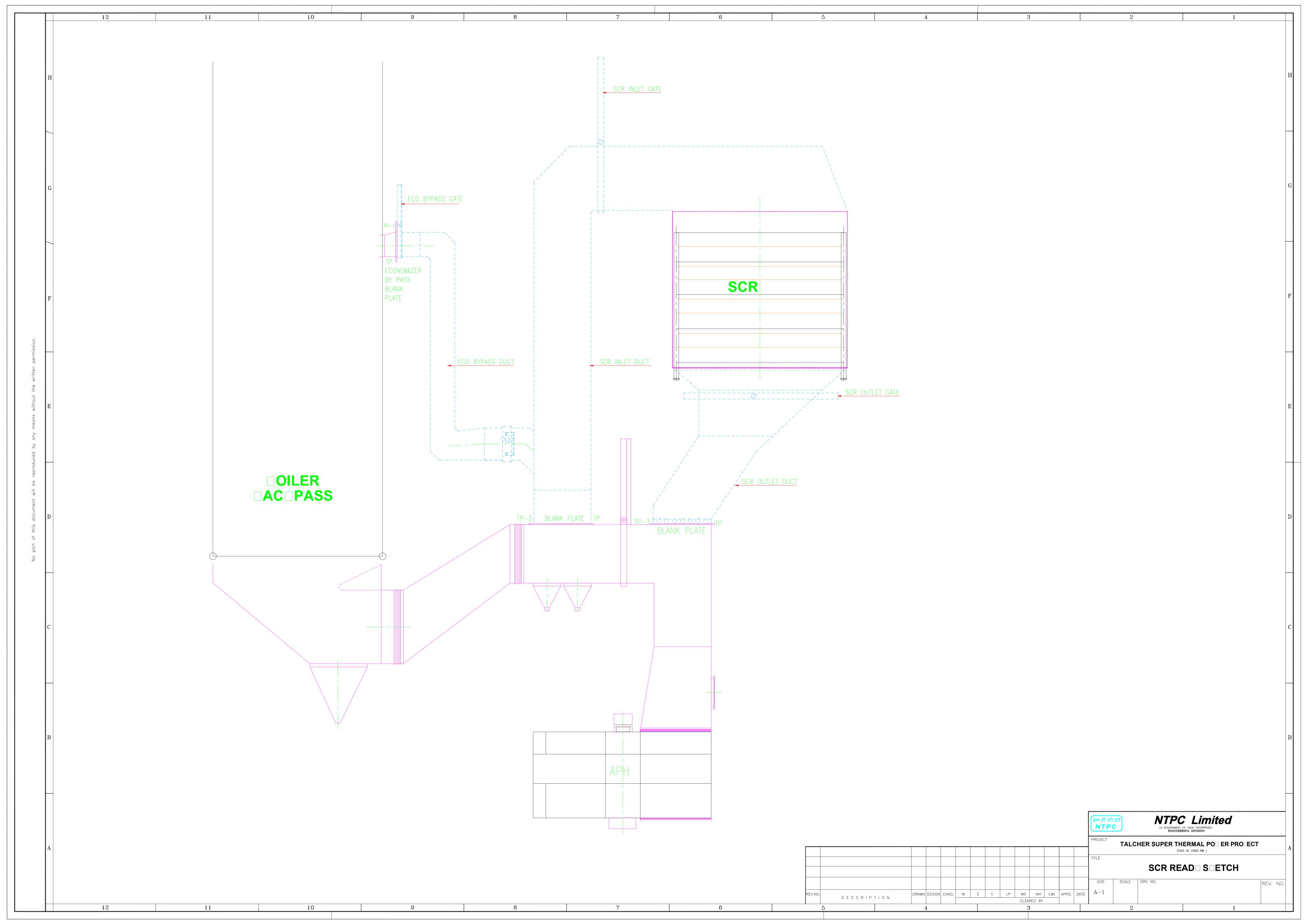
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VI/A II A-01 13 of 28 2.15.05 Seal Air Fanselectrically operated Inlet Guide Vanes, Seal Air Fanselectrically operated Inlet Guide Vanes (Alternatively Electrically operated 'Inlet dampers' shall also be acceptable based on bidd	eady scope) ch as in the
proven practice),	
VI/B A-02 22 of 65 22 of 65 A-02 22 of 65 A-02 3 eal Air System (a)2x100% centrifugal seal air fans with electrically operated linet Guide Vanes common for all the pulverizers of one Steam Generator unit shall be provided Seal Air System (a)2x100% centrifugal seal air fans with electrically operated linet Guide Vanes (Alternatively Electrically operated 'Inlet dampers' shall al acceptable based on bidder's proven practice) common for all the pulverizers of one Steam Generator unit shall be provided	II also be
A-SG-31 VI/A II A-01 27 of 28 Architectural Features for Steam Generator Enclosure2. Provision for ventilators / glazed windows shall be made as per functional requirements. The boiler enclosure shall have flat roof with access through staircase / lift. Architectural Features for Steam Generator Enclosure2. Provision for ventilators / glazed windows shall be made as per functional requirements. The boiler enclosure shall have flat roof (alternatively pitched roof can also be provided with min. 10 deg with basis during detail engineering stage) with access through staircase / lift.	deg. slope
A-SG-32 VI/B A-02 In 12 of 65 To 1.01, (3) To 1.01, (3) Construction of Superheaters & Reheaters Maximum depth of tube banks/ sections in the direction of gas flow: 2 metres or maximum soot blowing radius, whichever is lower lower. Bidder also provide the higher depth limited to 2.5 m also, only if it's a light proven practice. References shall be provided in support of the However it will be limited to maximum soot blower radius.	der can s a bidder's
A-SG-33 SECTION-VI, PART-B SUB SECTION-A-02 24 of 65 10.05.22 (a) Mill reject system shall automatically discharge the tramp iron and other non grindable material through an outlet connection at suitable height (to be approved by Employer) to a dense phase proved by Employer). (a) Mill reject system shall automatically discharge the tramp iron and on grindable material through an outlet connection at a suitable height (to be approved by Employer) to a dense phase proved by Employer). (a) Mill reject system shall automatically discharge the tramp iron and non grindable material through an outlet connection at a suitable height (to be approved by Employer) to a dense phase proved by Employer). (b) a dense phase proved by Employer). The conveying system shall be as defined elsewhere in specifications.	height (to ying
A-SG-34 SECTION - VI PART-B SUB SECTION A-01 - EQUIPMENT SIZING CRITERIA SUB SECTION A-01 - EQUIPMENT SIZING CRITERIA SUB SECTION A-01 - EQUIPMENT SIZING CRITERIA Loss 19.02 Max flue gas pressure drop across SCR system (mmwc): 150 Max flue gas pressure drop across SCR system design or actual, whichever is high	
A-SG-35 NOT USED	

A-SG-36	SECTION- VI, PART-A BID	SUB SECTION-II A-01 STEAM GENERATOR & AUXILIARIES INCLUDING ESP	1 OF 28	1.03.03	Supply of all consumables (except coal oil and limestone) like chemicals for chemical cleaning, passivation, inhibition etc., Catalysts, fuel oil & coal for firing be-yond declared quantity (during bid stage as per SS-I, part-A), oil for line flushing, nitrogen for blanketing, consumables for air/ gas tightness tests and any other consumable as may be required for above precommissioning/ commissioning activities. And the total required limestone shall be issued free of charge by the employer for such	Supply of all consumables (except coal oil and limestone) like chemicals for chemical cleaning, passivation, inhibition etc., Catalysts, fuel oil & coal for firing be-yond declared quantity (during bid stage as per SS-I, part-A), oil for line flushing, nitrogen for blanketing, consumables for air/ gas tightness tests and any other consumable as may be required for above precommissioning/ commissioning activities. And the total required limestone shall be issued free of charge by the employer for such purposes. Further, the 'Supply of Anhydrous Ammonia' and 'Catalyst' as envisaged for the operation of SCR system & Ammonia Storage & Handling System will be excluded from bidder's scope.
A-SG-37	TECHNICAL SPECIFICA TIONS SECTION- VI, PART-B, SUB- SECTION-A- 05 (FGD)	SUB-SECTION-A-05 (FGD)	3.01.00	4 of 28	conditions:	The entire flue gas system, flue gas ducts inlet to absorber and bypass duct etc. shall be designed to meet the following conditions: 2. Design Inlet Gas Temperature (deg.C) 450 145 or as per Design Point conditions, whichever is higher
A-SG-38		SUB-SECTION-A-05 (FGD)	10 of 28	5.06.06	The ME system shall be equipped with washing and drain provisions, where drains are directed into the absorber. Washing provisions shall include external and internal piping systems with replaceable nozzles, water pressure booster pumps complete with all piping, valves, instrumentation and controls. The mist eliminator wash piping shall be constructed of Chlorolobutyl/Bromobutyl rubber lined carbon steel or glass fiber reinforced plastics. The mist eliminator spray headers shall be made of FRP or rubber lined Carbon Steel, corrosions and erosion resistant in the inner and outer side (Silicon Carbide coating on metal/FRP surface exposed to slurry).	"The ME system shall be equipped with washing and drain provisions, where drains are directed into the absorber. Washing provisions shall include external and internal piping systems with replaceable nozzles, water pressure booster pumps (if required) complete with all piping, valves, instrumentation and controls. The mist eliminator wash piping/header shall be constructed of Chlorobutyl / Bromobutyl rubber lined carbon steel or glass fiber reinforced plastics. Polypropylene or PVC is also acceptable for mist eliminator wash headers provided Contractor or its Collaborator has proven experience for the same." Carbon steel pipe can be selected outside pipe up to the nozzles at Mist Eliminator casing only for the portion which is not exposed to slurry. Ease of replace ability and placement of the mist eliminator on maintenance platforms is an important requirement. The ME shall be designed to allow for efficient cleaning in process.

A-SG-39	SECTION- VI, PART-B	SUB-SECTION-A-05 (FGD)	11 of 28	5.06.17	The spray headers (if provided) and air supply headers shalllife of 20,000 hrs. The design of the spray nozzles shall be such that rapid wear, encrustation and plugging are avoided. Nozzle pipes and slurry spray nozzles shall be with bolted flanged connections. Nozzle pipes shall be installed easily to be removed partially through absorber modules.	The spray headers (if provided) and air supply headers shalllife of 20,000 hrs. The design of the spray nozzles shall be such that rapid wear, encrustation and plugging are avoided. Nozzle pipes and slurry spray nozzles shall be with bolted flanged connections. Nozzle pipes shall be installed easily to be removed partially through absorber modules. In case of JBR technology, following shall apply: 1. Slurry spray headers shall be made of Nickel based alloy in gas cooling section. 2. Air supply header inside JBR shall be made of FRP. 3. Slurry spray nozzles in gas cooling section shall be made of SiC. Other slurry spray nozzles are made of SiC or High Alumina or equivalent having a minimum guaranteed life of 20,000 hrs. All wash and water nozzles and pipes shall be made of FRP. SiC coating shall be provided inside FRP slurry pipes."
A-SG-40	SECTION- VI, PART-B / SUB SECTION-A- 01 EQUIPMEN T SIZING CRITERIA		18 of 101	1.05.13.03	Margin over 100% BMCR pressure requirement : 44%	Margin over 100% TMCR pressure requirement: 44% Further for booster fan sizing, bidder to consider the margin over pressure requirement as 44% over the calculated head value excluding the static head. Margin on Static head shall be taken as 10%. For bubbling type Absorber, Bidder shall consider choking/blockage of 10% sparger tubes while calculating the head requirements of fan.
A-SG-41		SUB-SECTION-IIA-04 FLUE GAS DESULPHURISATION SYSTEM	4 of 7	5.03.00	passenger cum goods elevator of minimum capacity of 1000kgs	One (1) number passenger cum goods elevator of minimum capacity of 1000kgs for each Absorber (to be provided in case height of absorber is higher than 15 m), One (1) number passenger cum goods elevator of minimum capacity of 1000kgs in Limestone Grinding System Building, One (1) number passenger cum goods elevator of minimum 1000 kgs for gypsum dewatering building and One (1) no. 680 Kg elevator for control room building shall be provided for easy access & movement of man/materials.
A-SG-42	VI/A	IV	16 of 73	1.01.05.01	The performance test on electrostatic precipitator will commence after a minimum period of three thousand (3000) hours of cumulative operation after completion of initial operation.	The performance test on electrostatic precipitator will commence after a minimum- period of three thousand (3000) hours of cumulative operation after completion of initial operation. be conducted soon after completion of trial operation or along with Boiler PG test whichever is earlier.

A-SG-43	VI/B	A-05	7 of 28	5.02.00	contractor, shall be provided for thorough mixing of the re-circulating slurry. In case the Contractor's Absorber includes side entry agitators, the contractor shall offer and demonstrate mixing arrangement such that n-1 number of agitators are sufficient to avoid the slurry settlement in the absorber tank in case of one agitator under breakdown (n-total no. of working agitators). In case vertical absorber agitators are offered, one complete mechanical assembly of agitator shall be supplied as warehouse spare for each	Sufficient number of agitators, as per the prov-en practice of the contractor, shall be provided for thorough mixing of the re-circulating slurry. In case the Contractor's Absorber includes side entry agitators, the contractor shall offer and demonstrate mixing arrangement such that n-1 number of agitators are sufficient to avoid the slurry settlement in the absorber tank in case of one agitator under breakdown (n-total no. of working agitators). In case vertical absorber agitators are offered, one complete mechanical assembly of agitator shall be supplied as warehouse spare for each Absorber. In alternate cases of absorber design also, the bidder to provide no.of agitators as per its proven practice (minimum two (02) nos.) and aditional one agitator shall be provide as ware house spare.
A-SG-44	SCHEME	OF FGD ABSORBER SYSTEM	4540-001- POM-A-022		TYPICAL FOR ONE UNIT	OF B ODD OTHER
					SEA, AR SYSTEM	2000 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
A-SG-45		SECTION-VI, PART-A, SUB SECTION-IIA-03	1 of 1		feeding to coal bunkers along with all the associated systems. The storage area shall be provided with suitable firefighting system like fire hydrants and water monitors. The entire feeding system shall be provided with firefighting system including conveyors, storage silo, bunkers etc.	monitors. The entire reeding system shall be provided with tirefighting



		Specification	on Reference		Existing	Read As
SI. No	Sec/Part	Sub Sec	Page No.	Clause No.	1	
A-TG-1	VI/A	FGLD/IV	Page 1 of 73	1.00.01/(b)	The guaranteed performance parameters indicated in furnished by the bidder in his offer, shall be without any tolerance values whatsoever and all margins required for instrument inaccuracies and other uncertainties shall be deemed to have been included in the guaranteed figures.	The guaranteed performance parameters indicated / furnished by the bidder in his offer, shall be without any tolerance values whatsoever and all margins required for instrument inaccuracies and other uncertainties shall be deemed to have been included in the guaranteed figures.
A-TG-2	VI/B	A-07	10 of 25	5.02.00/(a)	Horizontal/Vertical, Spray-cum-tray with integral direct contact vent condenser	Horizontal/Vertical, Spray-cum-tray with integral direct contact vent condenser Bidders to provide Stainless Steel cladding on internal surfaces of storage tank above Low low level to meet HEI requirements and/or-Stainless Steel vessel.
A-TG-3	VI/B	A-07	11 of 25	5.02.00/(d)	All pressure parts like shell, heads and nozzles shall be of carbon steel as per ASTM A-516 Gr. 70. Shell plate min. thickness 15.8mm of welded construction.	All pressure parts like shell and heads shall be of carbon steel as per ASTM A-516 Gr. 70. Shell plate min. thickness 15.8mm of welded construction. Nozzles shall of carbon steel as per ASTM A-105.
A-TG-4	VI/A	IIA-06	6 of 10	7.01.00	One thirty percent capacity (1x30%	One thirty percent capacity (1x30%) One (1) number portable centrifuge of adequate capacity per station shall also be provided.
A-TG-5	VI/B	A-01	54 of 101	2.08.00/(a)	<u> </u>	Ensure HP bypass aggregate capacity not less than 65% of the main steam flow
A-TG-6	VI/B	A-07	1 of 25	1.03.01/(a)	Adequate drainage facility and temp. sensing devices in casings, strainers housings, stop and control valves, extraction lines etc and in drain lines at downstream of the isolating valve to detect any chocking and passing of high energy drains.	Adequate drainage facility and temp. sensing devices in casings, strainers housings, stop and control valves, extraction lines etc and in drain lines at downstream upstream of the isolating valve to detect any chocking and passing of high energy drains. The power operated high energy drain isolating valves seat tightness shall be conforming to MSS SP61.
A-TG-7	VI/B	A-01	47 of 101	2.02.03/(11)	Additional 10% margin on cumulative Hydraulic pressure drop across LP & HP condenser shall be considered for CW (Cooling water) pump head selection. This will be exclusive of margin considered for frictional losses in CW pump sizing.	Clause deleted

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A-TG-8	VI/C		27 of 114	13.02.00	As far as possible lubricants marketed by the	As far as possible lubricants marketed by the Indian Oil
					Indian Oil Corporation shall be used. The variety of	Corporation shall be used. The variety of lubricants shall be
					lubricants shall be kept to a minimum possible.	kept to a minimum possible. However, the lube oil for Main
						Turbine, Drive Turbine, TDBFP and MDBFP shall be kept
						same in view of ease of operation and maintenance.
A-TG-9	VI/B	A-07	4 of 25	1.16.00 (a)	Seat tightness of the HP bypass valves shall be	Seat tightness of the HP bypass valves shall be equivalent to
					equivalent to block valve tightness conforming to MSS SP61.	block valve tightness conforming to MSS SP61.
A-TG-10	VI/B	A-07	5 of 25	1.16.00 (j)	HP Bypass should have the provision of removable	HP Bypass should have the provision of removable valve
					valve seat arrangement for ease of maintenance.	seat/any other arrangement for ease of maintenance.
A-TG-11	VI/A	II-A-24	2 of 17	Annexure-I S.	Vertical Turret Lathe- Main motor spec. 42 Kw, 40	Vertical Turret Lathe- Main motor spec. 42 Kw, 40 HP, 415 V,
				No. (1)	HP, 415 V, 3 Phase. AC.	3 Phase. AC.
A-TG-12	VI/A	VI	11 of 31	XXV	Valve seat for HPSV,HPCV,IPSV HPBYPASS VALVE,	Valve seat for HPSV,HPCV,IPSV,IPCV, HPBYPASS VALVE,
					HPBYPASS SPRAY VALVES 1 No. of each kind of	HPBYPASS SPRAY VALVES, HP BYPASS SPRAY ISOLATION
					valve	VALVE 1 No. of each kind of valve
A-TG-13	VI/B	G-06	7 of 14	3.03.04 (ii) (b)	Oxygen content in condensate, at condensate	Oxygen content in condensate, at condensate collection tank
					collection tank outlet, shall not	Hotwell outlet, shall not exceed 0.015 CC per litre over the
					exceed 0.015 CC per litre over the entire load	entire load range and shall be determined according to
					range and shall be determined	calorimetric Indigo - Carmine method.
					according to calorimetric Indigo - Carmine method.	
A-TG-14	VI/B	A-07	15 of 25	6.05.06 (b)		New Clause added-
						The lube oil for Main Turbine, Drive Turbine, TDBFP and
						MDBFP shall be kept same in view of ease of operation and
						maintenance.
A-TG-15	VI/B	G-	Page 2 of 4	1.04.01	Bidder shall design Turbine-Generator system	Bidder shall design Turbine-Generator system meeting the
		01/OPERATIN			meeting the load cycling conditions as	load cycling conditions as
		G			indicated at clause no 1.04.00. In no case the	indicated at clause no 1.03.00. In no case the design life of
		CAPABILITY OF			design life of Turbine-Generator system shall	Turbine-Generator system shall
		PLANT	<u> </u>		be affected due to	be affected due to

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		Specificat	on Reference		Existing	Read As
SI. No	Sec/Part	Sub Sec	Page No.	Clause No.		
A-WS-01	VI /A	IA	9 OF 36	4.8	Water Pre-treatment Plant & Liquid Effluent Treatment Plant The Bidder/its sub-vendor should have designed, supplied, erected and commissioned at least one (1) number water/waste water treatment plant having capacity of not less than 1000 Cu.m/hr., comprising of clarifiers/tube settlers/thickeners or a combination thereof including civil works. The plant should have been in successful operation for at least one (1) year.	Water Pre-treatment Plant The Bidder/its sub-vendor should have designed, supplied, erected and commissioned at least one (1) number water/waste water treatment plant having capacity of not less than 1000 Cu.m/hr., comprising of clarifiers/tube settlers/thickeners or a combination thereof including civil works. The plant should have been in successful operation for at least one (1) year.
A-WS-02	VI/ A	VI	11 OF 27	2.00.00 (4)	4) Absorbant circulation Pumps – CW Chlorine Leak Absorption system Name of Items-Unit -QTY a) Impeller-Set- 1 b) Wearing rings – Impeller (if applicable)- Set-1 c) Wearing rings – Casing (if applicable) Set-1 d) Shaft -Set 1 e) Shaft Sleeves -Set -1 f) Mechanical Seal -Set -1 g) Pump bearings- Set- 1 Note: One set consists of quantity required for complete replacement for one pump	Deleted
A-WS-03	VI/ A	IIA-11	2 OF 4	1.02.01 (7)	Provision of six (6) numbers of Isolation (Gate valve) Valves (in the stub connections) for each unit at the locations where flow measurement is to be carried out by means of pitot tubes.	Provision of three (3) numbers of Isolation (Gate valve) Valves (with the stub connections) for each unit at the locations where flow measurement is to be carried out by means of pitot tubes.

A-WS-04	VI/ B	A-01	56 OF 101	3.01.01		The common recirculation line for CW pumps shall be sized for minimum 30% (VT type) or 50% (CV type) of design flow of single pump operation or the recommended flow of the pump manufacturer whichever is higher.
A-WS-05	VI/ B	A-15	20 OF 31	2.05.00	Clarified water from the clarified water tank shall be used as service water. Service water pumps shall take suction from this tank and supply water to the service water pipe network. Service water distribution shall be used for effective cleaning /washing of each area and shall also fill the service water (PVC tank of 100 liter capacity) tank provided on roof top of each building to supply water to toilets.	Clarified water from the clarified water tank shall be used as service water. Service water pumps shall take suction from this tank and supply water to the service water pipe network. Service water distribution shall be used for effective cleaning /washing of each area and shall also fill the service water tank provided on roof top of each building.
A-WS-06	6	VI/ A	IIA-11	2 OF 4	1.03.00	(1) 3X50% for TG and 2 X100% for SG Primary (DM) cooling water pumps of required capacity and head. (3) 3 X 50% for TG and 2 X 100% for SG Plate Heat Exchangers.

A-WS-07	6	VI/ B	A-01	57 OF 101	Primary (DM) Cooling Water Pumps (TG and SG separate)- Horizontal Centrifugal Pumps 1 (a) Quantity - 3 X 50% for TG ECW system 2 X 100% for SG system
					Plate Heat Exchangers (TG and SG separate) 3 (a) Quantity - 3 X 50% for TG ECW system 2 X 100% for SG ECW system
					, and the second

S. No.		Specification Refere	nce		Existing	Read As
	Sec/Part	Sub Sec	Page No.	Clause No.		
B-1	VI/ Part-B	Sub Sec- B-0 General Electrical Specifications	4 of 15	3.01.00 - d)	d) For the Generator and its excitation system specific design features incorporated and design/process improvements which are being offered considering modes of operation as per Sub Section A-01 - Operating Capability of Plant - in Technical Specification shall be submitted within 4 weeks of award of contract. Such design features and design/process improvements over and above conventional design, results of design analysis are required to be submitted as part of the EIFS (Engineering information flow system).	d) For the Generator and its excitation system specific design features incorporated and design/process improvements which are being offered considering modes of operation as per Sub Section G-01 - Operating Capability of Plant - in Technical Specification shall be submitted within 4 weeks of award of contract. Such design features and design/process improvements over and above conventional design, results of design analysis are required to be submitted as part of the EIFS (Engineering information flow system).
B-2	VI/ Part-B	Sub Sec- B-0 General Electrical Specifications	1 of 15	1.05.00 (d)	d) 220V/110V/48 V DC +/-15% to +10%	d) 220V/110V/48 V DC -15% to +10%
B-3	VI/ Part-A	Section-IIB ELECTRICAL SYSTEM / EQUIPMENTS	10 of 17	1.16.05 Vi)	Supply of all items for civil and structural works to include detailed route survey including survey for PTCC clearance, route marking, survey and selection of tower locations (including all crossings), route clearance / tree cutting, geo-technical investigation of soil, tower foundations for all types of soil at each location etc.	Supply of all items for civil and structural works to include Preliminary , detailed route survey including survey for PTCC clearance, route marking, survey and selection of tower locations (including all crossings), route clearance / tree cutting, geo-technical investigation of soil, tower foundations for all types of soil at each location etc.
B-4	VII/ Book 2 of 3 Price Bid			PRICE SCHEDULE - 10, SR. NO. 27	ADDITION OF NEW CLAUSE.	GIS Line Bay , Qty: 1no
B-5	VII/ Book 2 of 3 Price Bid			PRICE SCHEDUL	one complete 400KV GIS Dia (Line-III-TIE-Line-IV) Along with Associated GIS duct, AIS equipment, Termination, cable, cabling, control & protection and metering, civ works etc complete in all repect as per SLD and Technical specification.	TO BE DELETED.
B-6	VII/ Book 2 of 3 Price Bid			PRICE SCHEDUL	ADDITION OF NEW CLAUSE	one complete 400KV GIS Dia (Line-III-TIE-Line-IV) Along with Associated GIS duct, AIS equipment, Termination, cable, cabling, control & protection and metering, civil works etc complete in all repect as per SLD and Technical specification.

	т.	Т		T		_		
B-7	VI/ Part-A		3 of 17	1.05.03	Switchgear / Numerical Relay Networking		/Numerical Relay Networking	
1					The Contractor's scope of work shall include the following for all the 33kV/11kV/ 3.3kV and LV Switchgears under this package. The communication architecture and design criteria have			the following for all the 33kV/11KV/ 3.3KV and munication architecture and design criteria have
					been explained in chapter B-05(B) of the specification.		ears under this package. The com ined in chapter B-05(B) of the spe	
					The Contractor's scope of work shall include complete design, engineering, supply, installation,			complete design, engineering, supply, installation,
					testing and commissioning and AMC (Three Years) of the following.		commissioning and AMC (Three	
					a) Communicable Numerical Relays (with IEC 61850) in all MV Switchgears & LV			61850) in all MV Switchgears & LV
					Switchgears in the bidder's scope.		s in the bidder's scope.	,
					b) IEC 61850 Ethernet switches in Switchgear panels – Sufficient quantity of Ethernet			panels – Sufficient quantity of Ethernet
					switches as per requirement for all boards under bidder's scope. At least 2 ports per	switches as	per requirement for all boards u	nder bidder's scope. At least 2 ports per
					switch shall be kept as spare ports.	switch sha	I be kept as spare ports.	
					c) Cat5e Ethernet cable / FO cable for connection of Numerical Relays to Ethernet			tion of Numerical Relays to Ethernet
		0 11 110			switches in all Switchgears.		all Switchgears.	
		Section-IIB			d) Optical Fibre Cable with fire-retardant outer sheath as required for the complete			er sheath as required for the complete
		ELECTRICAL			numerical relay network.		relay network.	
		SYSTEM /			e) Optical Fibre Cable termination equipment such as LIU, patch cord, etc. for the			t such as LIU, patch cord, etc. for the
		EQUIPMENTS			complete network.	complete r		10.0
					f) HMI stations (Engineering & Operator Work Stations and printers) & suitable arrangement for integration of HMI to LVS in Control Room.		ions (Engineering & Operator Woi nt for integration of HMI to LVS ir	k Stations and printers) & suitable
					g) GPS, Time synchronizing equipment & Digital Clocks.		nt for integration of Hivil to LVS if ie synchronizing equipment & Dig	
					h) Laptops – 5 Nos & Interface cable for connection of Numerical relay front port to the			tal Clocks. section of Numerical relay front port to the
					laptop – One No. cable of length at least 5m per switchboard under bidder's scope.			per switchboard under bidder's scope.
					i) All other equipment required to meet the intended specification.		equipment required to meet the i	
					j) The scope shall include the AMC Contract for the above specified system for a period			or the above specified system for a period
					of three years from the date of takeover by the Employer.		ars from the date of takeover by t	
					k) Relay Test Equipment. 2 Nos.		st Equipment. 2 Nos.	· ·
					The typical configuration of such a proposed system is as enclosed in Drawings 0000-205-			system is as enclosed in Drawings 0000-205-
					POE-A-001 & 0000-205-POE-A-002. The numerical relay network shall include relays on all		. The numerical relay network sha	
					MV & LV switchgears being supplied under this package including Employer's requirement	MV & LV sv	vitchgears being supplied under t	nis package including Employer's requirement
					indicated at 1.19.00.	indicated a	t 1.19.00.	
B-8	VI / B	Sub- Section B-03	6 OF 11	12.08.00	Temperature rise: For dry type transformer the winding temperature rise shall be 95 Deg. C for Class-H insulation or 70 Deg.C for Claas – F Insulation. 2.15.00 LIGHTING TRANSFORMER/WELDING TRANSFORMER 1) Type & Rating Dry type/ 100 KVA (Welding TRF), 2) Voltage Ratio 415/415, 4/- 5% taps in steps of 2.5% 3) Class of insulation B or better 4) One minute power frequency 2.5 kV 5) Enclosure protection IP-42 6) Type Test As per IS 2026 7) Fault level 3-5 kA secondary side	F (90 De		
B-9	VI / B	Sub- Section B-06	8 OF 18	2 15 00		1		
ا ا	, -	222 30000011 2 00	3 3. 13			+		
B-10	VI-PartB	Chap:17	4 of 60	1.06.01	TYPE TEST REQUIREMENTS FOR EQUIPMENTS OTHER THAN GIS & 400KV AIS CIRCUIT BREAKER	TYPE TE	ST REQUIREMENTS FOR E	QUIPMENTS OTHER THAN 400KV GIS .
						ТҮРЕ ТЕ	ST REQUIREMENTS FOR G	ilS ,
1								-
		CI 47		4 00 00	THE TEST DECLUDE ASSITE FOR CIC & ACCIO AND CID CUIT DE LA CES			
	VI-PartB	Chap:17	4 of 60	1.06.01	TYPE TEST REQUIREMENTS FOR GIS & 400KV AIS CIRCUIT BREAKER			
B-11								
		1				deleted	Not applicable.	
						deleted.	пот аррисаріе.	
1	VI-PartB	Chap:17	6 of 60	1.07.00	Type tests to be conducted on 400KV AIS Circuit Breaker			
1					1.53	1		
	1	1						
B-12								

	VI/Part A	Section-IIB ELECTRICAL	13 of 17	19.00.00 (3)		Requirement of employer's load of 2 MVA on each colony feeder and 5 MVA on each ext. CHP feeder to be considered for ST sizing and associated systems.
		SYSTEM / EQUIPMENTS			addition of new clause	on educations contributed to the constant of the state of
B-13						
		Sub Sec- B-0	5 of 15	3.04.01	Station Transformer Scheme:	Station Transformer Scheme:
		General Electrical Specifications			Unit Transformers	Unit Transformers
		specifications			These transformers would be sized to meet the loads corresponding to auxiliaries required to	These transformers would be sized to meet the loads corresponding to auxiliaries required to
					meet the peak load requirements of the unit. Further, the unit transformers shall	meet the peak load requirements of the unit. Further, the unit transformers shall
					be able to	be able to
					withstand over voltages up to 140% for 5 seconds.	withstand over voltages up to 140% for 5 seconds.
					Each unit transformer shall be sized for the following:	Each unit transformer shall be sized for the following:
					a) The loads of One set of unit auxiliaries corresponding to 60% TMCR plus b) Loads due to outage of largest transformer connected to the bus plus	a) The loads of One set of unit auxiliaries corresponding to 60% TMCR plus b) Loads due to outage of largest transformer connected to the bus plus
					d) SCR load requirement of 1 MVA plus	d) SCR load requirement of 1 MVA plus
					c) Multiplied by no load voltage correction factor as defined at Cl. 3.04.00.	c) Multiplied by no load voltage correction factor as defined at Cl. 3.04.00.
	VI-PartB				Station Transformer	Station Transformer
					Each Station transformer shall be sized to meet the requirements of the worst case	· ·
					of following	case of following
					contingencies:	contingencies:
					Case I : Outage of One Unit transformer a) Loads served by fully loaded Unit transformer as defined above plus	Case I : Outage of One Unit transformer a) Loads served by fully loaded Unit transformer as defined above plus
					b) MDBFP load for one unit plus	b) MDBFP load for one unit plus
					c) Meeting the station loads distributed on the respective station boards plus	c) Meeting the station loads distributed on the respective station boards plus
					d) Loads due to outage of largest transformer /outgoing feeder (except station to	d) Loads due to outage of largest transformer /outgoing feeder (except station to
					unit/station tie feeders) connected to the bus plus	unit/station tie feeders) connected to the bus plus
					e) Multiplied by no load voltage correction factor as defined at 3.04.00.	e) owner's requirement as mentioned in clause 1.19.00 (3) of Part A sub section
					Case II: Outage of any one of the Station Transformer and all the connected loads	
B-14					on the set of Station boards are fed from other available Station transformer.	(f) Multiplied by no load voltage correction factor as defined at 3.04.00.
	SECTION-VI, PART-B	SUB-SECTION B-0 GENERAL ELECTRICAL	4 OF 15	3.03.00	Generator Busduct	Generator Busduct
		SPECIFCIATION			Isolated phase busduct, continuous, natural air cooled and positive pressure type,	Isolated phase busduct, continuous, natural air cooled and positive pressure type
		0			with enclosure of weather-proof, dust tight, non-magnetic minimum flux type.	with enclosure of weather-proof, dust tight, non-magnetic minimum flux type.
					The continuous rating of the Generator circuit breaker and Generator busducts	The continuous rating of the Generator busducts shall be such
					shall be such	that the maximum continuous peak output of the steam turbine unit under VWO
						HP heater out
					HP heater out	condition etc. at any ambient temperature between 0 deg C and 50 deg. C can be
					condition etc. at any ambient temperature between 0 deg C and 50 deg. C can be	delivered at
					delivered at	the rated power factors and allowable generator voltage variations without
					the rated power factors and allowable generator voltage variations without	exceeding the
B-15					exceeding the permissible temperature rise limits as specified for these equipments.	permissible temperature rise limits as specified for these equipments.
0-13	SECTION-VI, PART-B	SUB-SECTION B-	26 OF 60	5.0.04	CORE DETAILS OF 400kV VT(GIS)	CORE DETAILS OF 400kV VT(GIS)
		17 SWITCHYARD	3. 30		Output Burden – Minimum 75 VA	Output Burden – MAXIMUM 50 VA
B-16						
	SECTION – VI, PART-B	SUB-SECTION-B-	2 of 4	8.01.01	These motors shall be provided with VPI insulation and insulated bearing on one	VFD shall be used to drive three (3) phase squirrel cage inverter duty Induction
		15			side and shall be suitable for Inverter duty.	motor with VPI insulation (Resin poor) suitable for VFD application. These motors
						shall be provided with insulated bearing on at least one side for motor frame size
						above 250 frame. However, contractor's proven practice with respect to use of
						insulated bearing in VFD driven motor may be accepted subject to Employer's
B-17						approval.

		SUB-SECTION-B-	-	-	Annexure to Chapter B-13	Annexure to Chapter B-13
B-18	1	13				

CLAUSE NO.	TECHNICAL REQUIREMENTS TECHNICAL REQUIREMENTS THE PROPERTY OF THE PROPERTY O
	Annexure I to Chapter 13
	Network Configuration and Equipment Characteristics
1.1	INTRODUCTION
	This section describes the Fiber Optic Communication network configuration and the equipment characteristics for communication system to be installed under the project. The subsystems addressed within this section are:
	(1) Fiber Optic Transmission System (FOTS)
	(2) DDF and Cabling (3) Craft Terminal based Network Management System (NMS)
	The requirements described herein are applicable to and in support of network requirements. The equipment supplied shall support existing regional network for Power system operational requirements.
	The security related requirements of the equipment shall be as per DoT (Department of Telecommunication) guidelines and all similar security requirements as amended by DoT on time to time basis shall be followed/complied by the vendor.
	The manufacturer shall allow the Employer and/or its designated agencies to inspect the hardware, software, design, development, manufacturing, facility and supply chain and subject all software to a security /threat check any time during the supplies of equipment
	The contractor shall ensure that the supplied equipment's have been got tested as per relevant contemporary Indian or International Security Standards e.g. IT and IT related elements against ISO/IEC 15408 standards, for Information Security Management System against ISO 27000 series Standards, Telecom and Telecom related elements against 3GPP security standards, 3GPP2 security standards etc. from any international agency/ labs of the standards e.g. Common Criteria Labs in case of ISO/IEC 15408 standards until 31st March 2013. The certification shall be got done from authorized and certified agency/lab in India.
	The Contractor shall also ensure that the equipment supplied has all the contemporary security related features and features related to communication security as prescribed under relevant security standards. A list of features, equipment's, software etc. supplied and implemented in the project shall be given for use by the Employer
	The contractor shall get the Employer's equipment audited from security point of view once a year from a network audit and certification agency as identified by DoT. The audit of the equipment shall be carried once in a financial year till the maintenance service contract in the

bid.

In case of any deliberate attempt for a security breach at the time of procurement or at a later stage after deployment/installation of the equipment or during maintenance, liability and criminal proceedings can be initiated against the Contractor as per guidelines of DoT and any other Government department.

1.2 **General Network Characteristics**

1.2.1 Description

The fibre optic network shall be based on the Synchronous Digital Hierarchy (SDH) having bit rate of STM-16. The network shall consist of overhead fibre optic links with a minimum bit rate of

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	higher		Module-16 (STM-16). The Contr , if required, so as to meet the li nt.		
	The co		evelop numbering plan for the pr	oposed voice communica	tion system
1.2.2	Functi	ional Requireme	nt		
	committee for new Schemer Substantial RTUs	unication system w technological ne, Grid Security ation Automation , PMUs system administrative vo	the communication network is to for grid operation in support of trequirements of Power System (Expert System, Load Managem System. The communications s & EPABX system is for low & higher circuits as defined in apprequirements is as follows:	he SCADA/EMS, RTUs & Operation such as Special nent, Advanced Protection upport requirement for SO gh speed data, express v	PMUs and I Protection System & CADA/EMS, oice circuits
	(a)	High speed E1	channel support		
	(b)	64kbps & nx64l	kbps data channel support		
	(c)	Low speed (300	0 -1200 bps) data channel suppor	t	
	(d)	,	4 wires) channel support and inte X System shall be provided durin	-	n. The
	(e)	Data transport	supporting Network Management	channels	
	(f)		y envisaged between Substation acce for various services of data a		
1.2.3	Gener	al Systems Req	uirements		
	1 .	ed characteristic	s are defined and specified hereir	at the system level, subs	ystem level,
1.2.3.1	Syste	m Synchronizati	on		
	procur as per ITU-T	ed under the Sul standard ITU-T	synchronize the equipments uno ostation Package. The contractor G.811. All sync equipments prop The holdover quality of slave c	shall submit the synchronosed under this contract s	isation plan should meet
	telecor	m network and co	provide system wide synchronize onnected to all equipments new 8 on for the entire network meeting the	existing. The Contractor	shall submit
	clockir	ng.For this purpos nent being suppli	requiring "clock" shall be connnoted appropriate interfaces(s) in the ed and all other associated hardw	transmission & terminatio	n
STA		VER PROJECT DMW)	TECHNICAL SPECIFICATIONS SECTION VI, PART B BID DOC.NO.:CS:4540-001A-2	ANNEXURE -I TO SUB SECTION B 13	PAGE 2 OF 16

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1.2.3.2	System Maintainabilit	y		
	shall permit in-service of	ce trending, efficient diagnosis a diagnostic testing to be executed tional operation of the system.		
1.2.3.3	System Upgradeabilit	y and Expandability		
	subsystem expansion t Equipment units provis	nall be sized (though not necesto full capacity as provided by spinoned for equipped subunits shall be blocks. Power supplies shall be	pecified aggregate transmi be terminated at appropria	ssion rates. ate patching
1.2.3.4	Equipment Availability	у		
	calculated availability calculation based on (MTTR) of the compone of at least 4 hours sh considered in the afore	ility of each fibre optic link (E1 to is defined as the theoretical at the mean-time-between-failure (ents and subsystems comprising all be assumed. The down time esaid availability calculations. The ailabilities of the equipment beinded engineering.	vailability determined by a (MTBF) and the mean-tir the FOTS. For this analysis of the fibre optic cable se calculated failure rates	a statistical ne-to-repair s, an MTTR shall not be of the units
1.2.3.5	Revision Levels and M	Revision Levels and Modifications		
	All hardware, firmware and software delivered as part of the communications network shall be field proven and at the most of current revision level. All modifications and changes necessary to meet this requirement shall be completed prior to the start of the factory tests or under special circumstances, on written approval by Employer, prior to the completion of SAT.			
1.2.3.6	Equipment Capacities	:		
	meetcomplete system	all be sized and equipped with surequirement Each subsystem sureful subsystem expansion.		
1.2.3.7	Redundancy Requirer	nents and Protection Schemes		
		and Automatic Protection Schemement shall not prevent the use of		
	ERMAL POWER PROJECT			
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CLAUSE NO.	TECHNICAL REQUIREMENTS		T N
	Table 2-1 Equipment Redundancy Requirements Summary		
	Fiber Optic transmission Equipment : SDH equipment		
	Power Supply & ConvertersCommon Control* Cards	1:1 APS distributed p supply 1:1 APS	or oower
	* = Common control cards which are essentially required for operation of the equipment.		
	The offered equipment shall support at least SNCP as per standard equipment offered by the Bidder does not support the above mention methods, the bidder shall have to provide all additional equipment level of flexibility, redundancy and functionality at no additional cost to shall provide details of protection schemes supported in the Bid documents.	oned minimum needed to prov o Employer. Th	proted ide s
	The offered equipment shall support automatic switchover function modules and all required modules and hardware to support the auton provided by the Contractor.		
2.3.8	Lost Signal Recovery		
	At any digital signal level, reapplication of a lost signal sh resynchronization and full restoration to normal operation without		

alarms incident to the signal failure, shall be automatically cleared at the equipment, rack and

The Contractor shall provide antivirus software along with all the computer hardware/software which shall be upgraded periodically till the maintenance services contract in the bid. Further, to meet all the specifications requirements during implementation and maintenance, if upgrade in the hardware/software of supplied item is required, the same shall be done by the contractor

All fiber optic links up to 150kms/175kms/200kms/225kms/250kms transmission line length (as applicable) shall be implemented by the Contractor without repeaters. In order to meet the link budget requirement, the Contractor shall provide all the necessary equipments for remote end stations as well. The contractor may provide the optical amplifier, wave length translator, optical cards or high capacity SDH equipment with suitable rack/sub rack to meet the maximum distance

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limit.. The contractor will have to integrate all the new equipments with the existing NMS.

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monitoring levels and normal operation indications restored and reported if applicable.

1.2.3.9

1.2.3.10

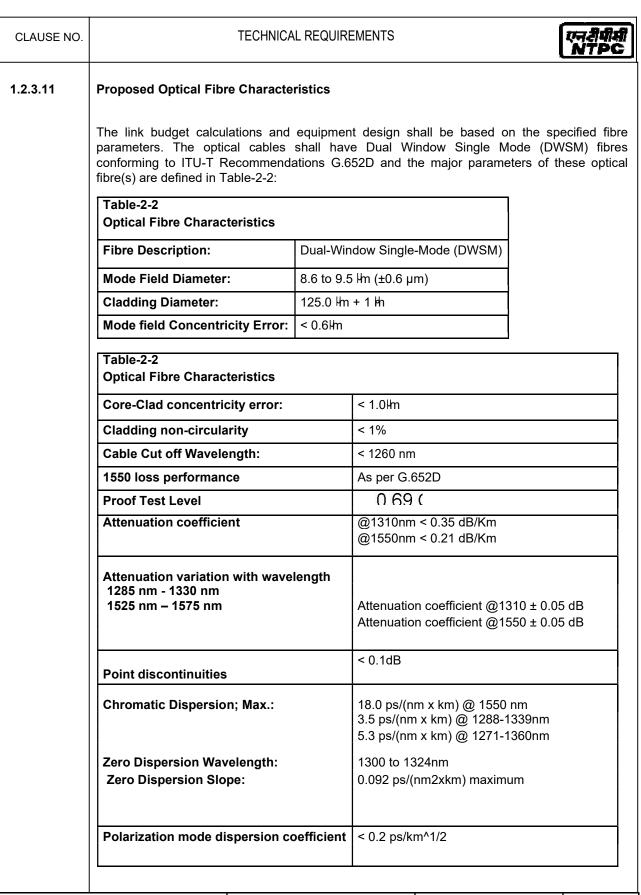
Software Upgrades

TALCHER THERMAL POWER PROJECT STAGE-III (2x660MW)

EPC PACKAGE

without any additional cost to the Employer.

General Site Considerations



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CLAUSE NO.		TECHNICAL REQUIR	EMENTS		एनरीपीसी NTPC
	Temperature Depend	dence:	Induced at +85 deg C	ttenuation < 0.05 dB (-60 d	eg C -
	Bend performance:		turns; Attenuatio @1550nm turns; Attenuatio @1550nm	n (75+2 mm dia Mandrel), 1 n rise $_{-}$ 0.05 dB $_{0}$ (30+1 mm dia Mandrel), 1 n rise $_{-}$ 0.10 dB $_{0}$ (32+0.5 mm dia Mandrel), n rise $_{-}$ 0.50 dB	00
1.2.4	Fibre Optic Link Leng				
1.3	The exact cable lengths	·	ring detailed	engineering.	
131	Fibre Optic Transmission System The Fibre Optic Transmission System (FOTS) is defined herein to include ETSI digital optical line termination equipment. The FOTS shall be based on SDH technology. Minimum aggregate bit rate shall be STM-4/STM-16 and equipped with minimum 16nos. E1 interfaces (G.703) and minimum 16 nos. Ethernet interfaces (IEEE 802.3/IEEE 802.3u) supporting layer 2 switching as tributaries. The Ethernet interfaces shall support VLAN (IEEE 802.1P/Q), spanning tree (IEEE 802.1D) quality of service. Protection scheme for Ethernet traffic should be ERPS based (Ethernet ring protection scheme) as per ITU-T G.8032. The Contractor shall provide (supply and install) connectorised jumpers (patch cords) for FODP-to-equipment and equipment-to-equipment connection. Two number spare jumpers shall be provided for each equipment connection. Fiber jumpers shall be of sufficient lengths as to provide at least 0.5m of service loop when connected for their intended purpose.			n aggregate (G.703) and 2 switching anning tree RPS based cords) for re jumpers ient lengths	
1.3.1	SDH Equipment	ant.			
1.3.1.1	Optical interface/SFP, Mbps) and Base Equip Power supply cards, installation of equipmer	OQ, the SDH Equipme Tributary interfaces (E ment (Consisting of C sub-rack, cabinet, nt i.e. everything besid	Electrical trib Common Car other hard es optical in	dered to be divided in thre utaries such as E1 & Ethe rds, Control Cards, Optical ware and accessories re tterface/SFP and tributary i	rnet 10/100 base card, equired for nterfaces).
	with optical interface/s considered as Commo interface/SFP is ember shall be offered to mee	SFP or tributary inte n control card and sh dded with control card et the redundancy req	rface, such all be the pa d, the adequ uirements o	such as cross-connect or on type of multifunction call art of base equipment. In output art of united the specifications. Further, and there shall not be single.	rd shall be case optical erface/SFPs r, main and
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CLAUSE NO.		TECHNICAL REQUIREMENTS		नरीपीमी NTPC	
	1	The equipment shall be configurable either as Terminal Multiplexer (TM) as well as ADM with software settings only. SDH ADM			
	At present the e	erfaces shall be (at least) STM-16 towa quipment shall be equipped with min num 16 nos. Ethernet interfaces. The	nimum16 nos. E-1 electrica	I tributary	
1.3.1.2	Redundancy and	l Protection			
		nall be implemented wherever the netward links using 4 fibres shall be implemen	•	ons of the	
1.3.1.3	Service Channel				
	with Service Cha wire) with analog	shall be provided as a function of the s nnel Muldems that shall provide at a interface (0.3 to 3.4 kHz) and one da stem order-wire to any other system or	minimum: One voice chant ta channel. There shall be a	nel (order	
1.3.1.4	Supervision and	Supervision and Alarms			
	ISM (In Service Monitoring) circuitry shall be provided as a function of the SDH equipment. Local visual alarm indicators shall be provided on the equipment, as a rack summary alarm panel. Alarms shall be as per ITU-T Standards G.774, G.783 and G.784. Additionally, F2/Q2 interfaces for a local craftsperson terminal interface and remote equipment monitoring is required.				
	The Equipment shall support collection of at least four (4) external alarms for monitoring and control of station.				
1.3.1.5	Synchronisation				
		hall provide synchronisation as per T equipment shall be provided.	able 2-3. One 2MHz synch	ronisation	
1.3.1.6	Electrical and Op	otical I/O Characteristics and Genera	l Parameters		
	Table 2-3 provio	les the electrical and optical chara DH equipment.	acteristics as well as othe	r general	
	Table 2-3 Electrical and C	optical I/O Characteristics and Gener	al Parameters		
	Optical Waveler	ngth NOTE (1) 1310/1	550nm		
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TECHNICAL REQUIREMENTS



Optical Source NOTE (2)	Laser
Optical Source Lifespan	Better than 5 X105 hours
Optical Fibre Type	G.652 D
Optical Connectors	Type FC-PC
Transmission Quality	Per ITU-T G.821, G.823, G.826
Source Primary Power	-48 Vdc
Equipment Specifications	Per ITU-T G.783
	Per ITU-T G.703, 75
Tributary, Electrical Interface Ethernet Interface	10/100 Mbps
SDH Bit Rates	Per ITU-T G.703
Optical Interfaces	Per ITU-T G.957, G.958
Frame and Multiplexing Structure for SDH	Per ITU-T G.707
Synchronization	Per ITU-T G.813
Management Functions	Per ITU-T G.774, G.784
Protection Architectures	Per ITU-T G.841
Built In Testing and Alarms	Per ITU-T G.774, G.783, G.784

NOTE (1) Optical wavelength shall be finalised during detailed engg

NOTE (2) Eye Safety for Laser Equipment: To avoid eye damage, when a receiver detects a line interruption, it is required that the optical power of the laser shall be reduced to safe limits on the transmitter in the opposite direction as per ITU-T G.958.

NOTE (3) In case other than FC-PC connector is provided in the equipment, suitable patch cord with matching connector are to be provided to connect with FODP.

1.3.2.1 FODP to SDH Equipment

The Contractor shall be responsible for connectivity between the FODP and the SDH equipment. The Contractor shall provide FC PC coupled patch cords. The patch-cord length between the FODP & equipment rack shall be suitably protected from rodents, abrasion, crush or mechanical damage.

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CLAUSE NO.		TECHNICAL REQUIREMENTS		एनदीपीमी NTPC		
1.4	DDF and Cabling					
	patching facilities to t components for DDF ar responsibility to provide and shall be in acco	For the purposes of the specification, the contractor shall provide cabling, wiring and DDF patching facilities to the wideband telecommunications system. Equipment and material components for DDF and cabling are also part of this procurement. It shall be the Contractor's responsibility to provide all cable support required for full supplied equipment interconnection and shall be in accordance with communications industry standard practices and the requirements mentioned in the technical specifications.				
1.4.1	Digital Distribution Fra	ame Functional Requirements				
	(better than 20 MHz) p	rovide DDF for Digital Signal Cro atching facilities configured "nor DFs shall provide the following ba	mally-thru" with Equipmer			
	(ii) Circuit rerouting	i) Circuit rerouting via patch cord assemblies				
	equipment. Independer shall provide for separ patch jack assemblies s	d and equipped to support the it Transmit and Receive patch ja ate transmit and receive single- shall be located side-by-side such oth transmit and receive for the sa	ack assemblies (line and plug patching. Transmit a that dual-plug patch cord	equipment) and receive		
1.5	Patch Cords	·				
	The Contractor has to supply FC PC coupled Patch cords. The Patch cord return loss shall be equal to or better than 40 dB and insertion loss equal to or less than 0.5 dB.					
1.6	Craft terminal based /Telecommunication Management Network/Network Management System					
	Each equipment on the fibre optic communication network shall include provision fo connecting a portable personal computer (PC) to be known as craft terminal to support local commissioning and maintenance activities. Through the use of this PC and local displays/controls, the operator shall be able to:					
	a. Change the corb. Perform testsc. Get detailed fau	figuration of the station & the con	nected NEs.			
	equipment. Portable (I	all be connected to the interfa aptop) computers (Craft termina software to support the functions	als), each complete with	necessary		
1.6.1	Hardware Requirements - Craft Terminal					
	GHz, 2 GB RAM, 256 N keyboard, mouse etc. Data/Fax modem and a	Hardware Requirements - Craft Terminal Craft Terminal shall be a laptop. The craft terminal shall have minimum configuration of 2.4 GHz, 2 GB RAM, 256 MB Video Graphics Memory, DVD RW drive, 160 GB Hard Disk Drive, keyboard, mouse etc., LAN port, serial/USB (2.0) ports to accommodate printers, and Data/Fax modem and a battery back-up of at least 60 minutes. VDUs shall be 15" TFT active matrix color LCD with a minimum resolution of 1024 X 768.				
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CLAUSE NO.		TECHNICAL REQUIREMENTS		एनरीपीमी NTPC	
1.6.2	General Software/Firmware Requirements				
	software and firmware of guidelines that help to er	Due to various alternative design approaches, it is neither intended nor possible to specify all software and firmware characteristics. It is the intent herein to provide design boundaries and guidelines that help to ensure a demonstrated, integrated program package that is maintainable and meets both hardware systems requirements and the customer's operational requirements.			
1.6.3	Operating System Sof	Operating System Software			
	application programs, a communications among	vare shall be provided to contro and management devices, to allo the system processors. The con stem, except as provided as USE	ocate system resources, a stractor shall make no mod	nd manage	
1.6.4	Applications Software				
	developed using indust the system. The contra	All applications software shall be written in a high-level programming language unless developed using industry proven application programs and development tools provided with the system. The contractor shall make no modifications to the applications program except as provided as USER development tools.			
1.6.5	Software Utilities				
	A utility shall be provided to convert all reports into standard PC application formats such as excel.			ats such as	
1.6.6	Revisions, Upgrades, Maintainability				
	All firmware and software delivered under this specification shall be the latest field proven version available at the time of contract approval. Installed demonstration for acceptance shall be required. All firmware provided shall support its fully equipped intended functional requirements without additional rewrite or programming.				
	All software shall be easily user expandable to accommodate the anticipated system growth, as defined in this specification. Reassembly recompilation or revision upgrades of the software or components of the software, shall not be necessary to accommodate full system expansion.				
2.0	Software provided shall List of Type Tests	be compliant with national and in	ternational industry standa	rds.	
		g type tests shall be submitted . Re accredited by the national accredit ble.			
	(a) SDH Equipment with	n all types of cards (optical card &	Tributary card)		
2.1	List of type test to be	conducted on Telecom equipme	ent		
		Equipment with all types of cards			
2.1.1	Temperature and Hum	•			
	-	re defined in IEC Publication 600	68.		
		ure Test: Operation to Specifica			
TAL OUED TU		are reen eperanente eperane			
STA	ERMAL POWER PROJECT GE-III (2x660MW) PC PACKAGE	TECHNICAL SPECIFICATIONS SECTION VI, PART B BID DOC.NO.:CS:4540-001A-2	ANNEXURE -I TO SUB SECTION B 13	PAGE 10 OF 16	

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			-	re tests shall be conducted as de , with the following specifications		068-2-1,
		(1)	been re	uration: The equipment is started eached and operated for sixteen the test.	-	
		(2)	Degree	of Severity: Test shall be done a	at 0°C	
		(3)	Accept	ance Criteria: No degradation of	performance during and aft	er the test.
	(b)	Low	Temperat	ure Test : Operation without Da	amage	
			-	re tests shall be conducted as , with the following specifications		60068-2-1
		(1)	been rethe	uration: The equipment is started eached and operated for 72 hout and after the test as soon as the emperature (<i>Post-test</i>).	irs. Its performance is che	cked during
		(2)	Degree	of Severity: Test shall be done a	t -10° C	
		(3)		ance Criteria: Degradation of pe er there shall be no degradation o		
	(c)	Dry F	leat Test:	Operation to Specifications		
		-		hall be done as defined in IEC Fing specifications:	Publication 60068-2-2, test	method Bo
		(1)		uration: The equipment is started eached and operated for 96 hou t.		
		(2)	Degree	of Severity: As per table 3-1: ope	eration to specification rang	ge.
		(3)	Accept	ance Criteria: No degradation of	performance during and aft	er the test.
	(d)	Dry F	leat Test:	Operation without Damage		
		-		shall be done as defined in IEC Fing specifications:	Publication 60068-2-2, test	method Bo
		(1)	been rethe	uration: The equipment is started eached and operated for 96 hout and after the test as soon as the emperature (<i>Post-test</i>).	irs. Its performance is che	cked durin
		(2)	Degree	of Severity: Test shall be done a	nt 55°C.	
		(3)	-	ance Criteria: Degradation of per er there shall be no degradation o		•
TALCHER THE		WER PROJI	ECT	TECHNICAL SPECIFICATIONS	ANNEXURE -I TO	

CLAUSE NO).	TECHNICAL REQUIREMENTS									
	(e)	Damp Heat	Гest								
		basically to e	Damp heat testing reveals aging with respect to the humidity level and applies basically to electronic equipment. This test shall be done as defined in IEC Publication 60068-2-78 with the following specifications:								
			Duration: The creached and c								
		test. (2) Degr	ee of Severity:	Test shall be	e done at (40 :	£ 2) °C & (93	± 3) % F	RH			
		, ,	ptance Criteria shall not be ar			et the specifi	ied requi	rement and			
	(f)	Temperature	e Variation Tes	st							
		Variations, M	Temperature variation testing shall be as per IEC Publication 60068-2-14 (Gradual Variations, Method Nb). The equipment shall be powered on and various parameters shall be monitored continuously during the test period.								
		(1) Number of cycles required is five (5)									
(2) The degree of severity: temperature TL:0°C, TH: As per table specification range)							ble 3-1 (Operation to				
		(3) Cycle	e duration for e	ach tempera	ture is three (ເ	3) hours.					
		(4) Ram	p : 1 oC/minute	э.							
		, ,	ptance Criteria shall not be ar			et the specifi	ied requi	rement and			
2.1.2	Powe	er Supply and E	MI/EMC tests								
	The to	est procedure a	nd acceptance	criteria shall	be as defined	I in IEC 6087	0-2-1.				
	(a)	(a) Immunity Tests									
		The list of Im	e list of Immunity tests are specified below in Table 4-4:								
		Table 4-4:	Recommende	d Immunity	Tests						
S. No.	Immunity Test AC Power Power Supply Control & Telecom Para- metres Supply Supply						S				
1	Volta	ge Fluctuations	Yes	Yes	N/A	N/A	Table 11 of IEC 60870-2-1: 1995 Level : 1				
					1		<u> </u>				
	LCHER THER GE-III (2x660) PACKAG		TECHNICA SECTI	TECHNICAL SPECIFICATIONS SECTION VI, PART B BID DOC.NO.:CS: 4540-001A-2 -			ANNEXURE -ITO SUB SECTION B 13				

CLAUSE NO.	TECHNICAL REQUIREMENTS									
2	Voltage dips and Interruptions	Yes	Yes	N/A		N/A				
3	1.2/50 - 8/20 s surges μ	Yes	Yes	Yes		N/A	Table 60870-	-2-1: 1995 -		
4	Fast transient bursts	Yes	Yes	Yes		Yes				
5	Damped oscillatory waves	Yes	Yes	Yes		Yes				
6	10/700 s surges	N/A	N/A	N/A		Yes				
7	μ Electrostatic discharge	Yes					Table 13 of IEC 60870-2-1: 1995 - Level : 4			
8	Power frequency magnetic field	Yes					Table 14 of IEC 60870-2-1: 1995 - Level : 4			
9	Damped oscillatory magnetic field	Yes								
	Table 4-4: Recommended Immunity Tests									
S. No.	Immunity Test	AC Power Supply	DC Power Supply	Control Signal	&	Telecom Line	Para- metre	s		
10	Radiated electromagnetic field	Yes	Yes			Table 15 of IEC 60870-2-1: 1995 - Level : 4				
11	Power Frequency voltage on control and signal lines	N/A	N/A	Yes Yes		Yes	IEC 61000-4-16 : 2002-07			
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12	DC voltage on contr and signal lines	ol N/A	N/A	A	Yes		N/A		IEC 6100 : 2002-0	
	(b) Emission Tests The list of Emission tests are specified below in Table 4-5									
S. NO.	li i	AC Power	C Power DC Power Control		I & Telecom		n	Para- metres		
1	LF disturbance voltages CCITT recommendation P.53	N/A	I/A Yes		N/A	N/A N//		N/A		of IEC 1: 1995 -
2	RF disturbance voltages CISPR 22	Yes Yes		N/A			N/A			
3	RF disturbance currents CISPR 22	N/A	N/A N/A		N/A		Yes			•
	Table 4-5: Recommended Em	ission Tests								
S. NO.	Emission test	AC Po	ower DC F Supply		Power Col			& Telecom Line		Para- metres
4	RF radiated fields Yes CISPR 22									
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	(c)	Insulation Witl	nstand Voltages					
		As per section	of IEC 870-2-1. Recommended of	class : VW1 of Table 18.				
2.1.3	Mech	anical Tests						
	(a)	Mechanical Vi	bration Test					
			for this test is described in IEC I be carried out in the sequence 8-2-6.					
		carried out ove (described late	on response investigation (clause r a sweep cycle under the same r), but the vibration amplitude an anditions so that the determination	conditions as for the end d the sweep rate may be	durance test decreased			
The endurance test conditions are selected according to the vibr requirements.								
		Transportation Contractor's sp	tests shall be performed with the ecifications.	e equipment packed acco	rding to the			
	(b)		of this test is defined in IEC Publ	lication 60068-2-27 (each	test) with a			
			ded severity shall be A = 294 m/s nall be applied to the equipment					
		Or Free Fall Te	est					
This test could be performed as an alternative to the shock or Bu procedure is defined in IEC publication 60068-2-32. The equipment shaccording to the Contractor's specifications. The drop height shall accordance with IEC 68-2-32. The surface of the packing case which contact with the ground is the surface on which the packing case normal packing does not have any features (inscription, special shape, etc.) is surface, the test is carried out successively on all the surfaces of the packing the surfaces of the packing does not have any features (inscription, special shape, etc.) is surface, the test is carried out successively on all the surfaces of the packing the surfaces of t								
	Or Bump Test							
This test could be performed as an alternative to Shock test or Free Fall te procedure is defined in IEC 60068-2-29.								
		Hands-on traini	ng shall be provided to O&M perso	onnel at site .				
	L POWER MW) EPC P	PROJECT STAGE-III ACKAGE	TECHNICAL SPECIFICATIONS SECTION VI. PART B	ANNEXURE –I TO SUB SECTION B 13	PAGE			

SECTION VI, PART B

BID DOC.NO.:CS: 4540-001A-2

SUB SECTION B 13

SUBSTATION AUTOMATION SYSTEM

15 OF 16

Optical Fibre & Approach Cable Parameters

1. Required Optical Fibre Characteristics

The optical fibre to be provided should have following characteristics:

1.1 Physical Characteristic

Dual-Window Single mode (DWSM), G.652D optical fibres shall be provided in the fibre optic cables. DWSM optical fibres shall meet the requirements defined in Table 1-1(a):

1.1.1 Attenuation

The attenuation coefficient for wavelengths between 1525 nm and 1575 nm shall not exceed the attenuation coefficient at 1550 nm by more than 0.05 dB/km. The attenuation coefficient between 1285 nm and 1330 nm shall not exceed the attenuation coefficient at 1310 nm by more than 0.05 dB/km. The attenuation of the fibre shall be distributed uniformly throughout its length such that there are no point discontinuities in excess of 0.10 dB. The fibre attenuation characteristics specified in table 1-1 (a) shall be "guaranteed" fibre attenuation of any & every fibre reel.

Table 1-1(a) DWSM Optical Fibre Characteristics

Fibre Description:	Dual-Window Single-Mode				
Mode Field Diameter @ 1310nm:	8.6 to 9.5 μm (± 0.6μm)				
Cladding Diameter:	125.0 μm ± 1 μm				
Mode field concentricity error	≤ 0.6µm				
Cladding non-circularity	≤ 1%				
Cable Cut-off Wavelength λcc	≤ 1260 nm				
1550 nm loss performance	As per G.652 D				
Proof Test Level	≥ 0.69 Gpa				
Attenuation Coefficient:					
Chromatic Dispersion; Maximum:	18 ps/(nm x km) @ 1550 nm 3.5 ps/(nm x km) 1288-1339nm 5.3 ps/(nm x km) 1271-1360nm				
Zero Dispersion Wavelength: Zero Dispersion Slope:	1300 to 1324nm 0.092 ps/(nm ² xkm) maximum				
Polarization mode dispersion coefficient	≤ 0.2 ps/km ^{^1} / ₂				
Temperature Dependence:	Induced attenuation ≤ 0.05 dB (-60°C to +85°C)				
Bend Performance:	@ 1310 nm (75±2 mm dia Mandrel), 100 turns; Attenuation Rise ≤ 0.05 dB/km				
	@ 1550 nm (75±2 mm dia Mandrel), 100 turns;				
	Attenuation Rise ≤ 0.10 dB/km @ 1550 nm (32±0.5 mm dia Mandrel, 1 turn; Attenuation Rise ≤ 0.50 dB/km				

2 Fibre Optic Approach Cables

A fibre optic approach cable is defined as the Armoured underground fibre optic cable required to connect Overhead Fibre Optic Cable (OPGW) between the final in line splice enclosure on the gantry / tower forming the termination of the fibre cable on the power line and the Fibre Optic Distribution Panel (FODP) installed within the building.

2.1. Basic Construction

The cable shall be suitable for direct burial, laying in trenches & PVC/Hume ducts, laying under false flooring and on indoor or outdoor cable raceways.

2.2 Jacket Construction & Material

The Approach Cable shall be a UV resistant, rodent proof, armoured cable with metallic type of armouring. The outer cable jacket for approach cable shall consist of carbon black polyethylene resin to prevent damage from exposure to ultra-violet light, weathering and high levels of pollution. The jacket shall conform to ASTM D1248 for density.

2.3 Optical, Electrical and Mechanical Requirements

Approach cable shall contain fibres with identical optical/ physical characteristics as those in the OPGW cables. The cable core shall comprise of tensile strength member(s), fibre support/bedding structure, core wrap/bedding, and an overall impervious jacket.

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SL.	SPECIFICATION REFERENCE					
NO.	SEC/	SUB	PAGE		EXISTING	READ AS
	PART	SEC.	NO.	NO.		
C-01	VI/B	A-20				
						C&I Annexure I to Sub Section A-20 has been enclosed as "Annexure I_C&I" to this amendment
C-02	VI/A	II-B	5 of 17	1.08.00 (u)	Supply and Installation of Robotic cable tray cleaning. Refer IIIC-19 chapter in C&I part B for technical details and specifications.	Deleted

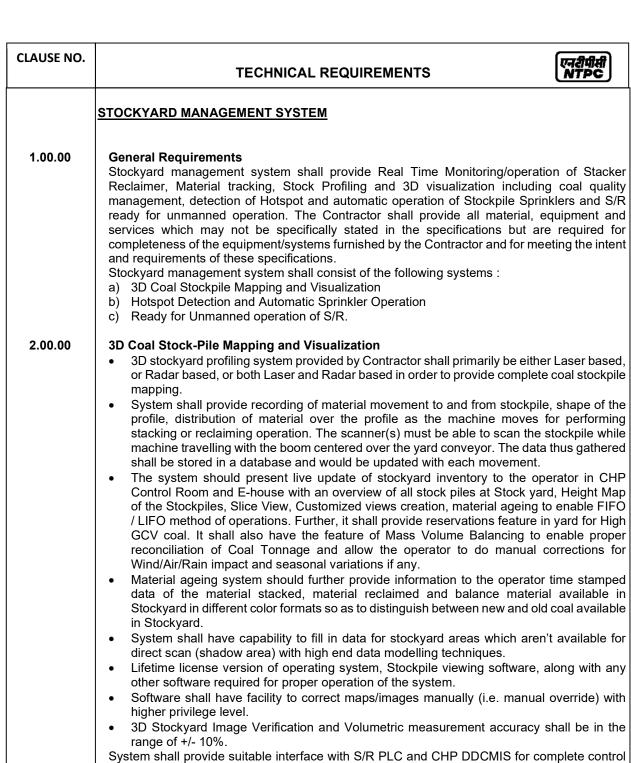
Doc. No.: CS-4540-001A-2-TECH-AMDT. 01

EPC Package for Talcher Thermal Power Project, Stage-III (2x660 MW) Amendment No. 01 to Technical Specifications Section-VI

SL.	SPE	CIFICATIO	TION REFERENCE									
NO.	SEC/	SUB	PAGE	CLAUSE		EXISTING			READ AS			
110.	PART	SEC.	NO.	NO.								
C-03	VI/B	IIIC-12	4 of 6	3.01.00			<u>.</u>					
					Requirements	Total Iron (Fe)		Requirements	Total Iron (Dissolved+ Un-dissolved with digestion system)			
					Туре	Continuous Flow Through sample	1 +		, ,			
					Accuracy	<±5 % of reading or ±0.005 ppm		Туре	Continuous Flow Through sample			
			Response Time ≤ 15 min.		≤ 15 min.		Accuracy	<±5 % of reading				
					(90 % of Full	(including sample switching)		Response Time	≤ 30 min.			
		Scale)	,	(90 % of Full	(including sample switching)							
					Range	0-50ppb, 0-150ppb, 0-300ppb, 0-		Scale)				
			1ppm, 0-5ppm freely programmable or as per the process requirement.	programmable or as per the		Range	2-500ppb freely programmable or as per the process requirement.					
					No. of Streams	Multi stream with sequencer/ stream selector (min. 4streams)		No. of Streams	Multi stream with sequencer/ stream selector (min. 4streams)			
					Temperature Compensation	Automatic		Temperature Compensation	Automatic			
					Sample Flow	200ml/min (max)		Sample Flow	200ml/min (max)			
					Analog output	4-20 mA output to DDCMIS		Analog output	4-20 mA output to DDCMIS			
						· · · · · · · · · · · · · · · · · · ·						

EPC Package for Talcher Thermal Power Project, Stage-III (2x660 MW)

Doc. No.: CS-4540-001A-2-TECH-AMDT. 01



System shall provide suitable interface with S/R PLC and CHP DDCMIS for complete control and operation of the machine.

3.00.00

Hotspot Detection and Automatic Sprinkler Operation

- 1. Hotspot Detection cameras shall be based on Infrared Thermal Imaging Technology.
- 2. No. of cameras, masts location etc. shall be planned such that they cover more than 90 % of the coal piles and shall be finalized during detailed engineering. Camera should be capable to detect hot spot patch of 0.3 x 0.3 mtr, effectively with correct temperature measurement having accuracy of +/- 2% of measured value or better.

TALCHER TPP STAGE-III (2X660 MW) EPC PACKAGE

TECHNICAL SPECIFICATION
SECTION – VI, PART-B
BID DOC NO.:

C&I ANNEXURE TO SUB-SECTION-A-20 COAL & BIOMASS HANDLING PLANT

PAGE 1 OF 4

CLAUSE NO.			,						
CLAUSE NO.		TECHNICAL REQUIREMEN	тѕ	एनरीपीसी NTPC					
	 Thermal Images of all the installed cameras should be seen live on server screen. Operator should be able to see temperature of any and every spot by moving mouse cursor on thermal image for manual image analysis purpose. Thermal images should be saved automatically with temperature details in event of alarm. Alarm will be raised based on user defined temperature threshold setting. This alarm shall be immediately recorded in stockyard management system and in CHP DDCMIS. Entire coal pile area to be divided into zones/sub-zones and alarm should be raised with location information to ensure pin pointed and fast action. The zones shall be limited to maximum of 10MX10M for ease of location. Lifetime license version of operating system, application software along with any other software required for proper operation of the system shall be provided. Automatic Solenoid sprinklers (of Stainless Steel material) based plain water sprinkler system operation shall be integrated with Hot spot detection system specified above. Group of Sprinklers identified in this system should start automatically based on fire alarm generated by Hot spot detection system. Separate PLC for performing the input and output operation for controlling the Sprinklers is to be provided by the Contractor under this system located at CHP control room. 								
4.00.00	 Stockyard Manage Stacker / Reclaim / reclaimer can be Once an order has machine to the co The Automation sany of the system to validate operate The simulator must orders and shows Positioning system the stacker reclaim The stacker / reclaim unmanned operations System shall be Start/intermediate 	aimer machine shall ensure safe of tion of the stacker/ reclaimer man ply to SIL2 safety level. ovide the accuracy of +/-10% of the expensive capable of stacking and received of the identified pile. designed to operate inside cove	way from the machines so remote or local in manual ion system must be able order without any operate imulator" functionality whice-execute order scheduling mates for simulated stacking ements. In all modes. According a long with necess the order value (in TPH) for slaiming from all the position of the properties of the properties of the order value (in TPH) for slaiming from all the position of the properties of the order value (in TPH) for slaiming from all the position of the properties of the order value (in TPH) for the properties of the order value (in TPH) for the properties of the order value (in TPH) for the o	that stacker I mode. to locate the or actions. ch can mimic g information ag/reclaiming operation of cordingly, the ary sensors/ or unmanned ositions (pile					
6.00.00	Operating modes for S/R Machine in Stockyard Management System Following Operating modes shall be provided in this system: Manual Mode: An operator should be able to control the stockyard machine locally from the onboard cabin. Safety devices or functions such as Anti-collision avoidance system and overload protection as well as all necessary interlocks must remain active in this mode and assure suitable safety level for people and other machines. Automatic Mode: Stacking and reclaiming process in this mode shall be performed from the central control room based on the available information from the instruments i.e., piles location and scanning data, algorithms, parameters inputted by an operator or other required information. All protections and interlocks of S/R machine shall be seamlessly integrated with the system.								
7.00.00		tic operation the surface profile from the obta to take into account already							
STAGE	LCHER TPP E-III (2X660 MW) C PACKAGE	TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC NO.:	C&I ANNEXURE TO SUB- SECTION-A-20 COAL & BIOMASS HANDLING PLANT	PAGE 2 OF 4					

CLAUSE NO. TECHNICAL REQUIREMENTS stacking operations. The automatic stacking operation must allow for stacking operation to continue on existing piles (where possible) for stacking in extension, on top or next to an existing pile. The system must provide continuously updated estimates for the remaining tonnage available for current stacking order. While reclaiming the system shall ensure that the reclaiming bucket is at least 80%full. System shall have adequate built in intelligence for Un-commanded movement detection so that the system is able to detect uncommand movements due to malfunctions of PLC or other controls for e.g. variable frequency drives (VFDs) etc., in order to prevent accidents. Encoders, inclinometers, limit switches and other back up devices shall also be provided so as to bring the machine to parking position in case failure of positioning system. System must take into account the scanned surface profile of the stockyard to calculate potential collision points to avoid collisions of the boom against the pile, Machine to Machine collision, Machine to any personnel etc. If any additional instrument/ system is required to implement anti-collision system, then same shall be provided in this package. 8.00.00 **CCTV** The cameras provided for the system shall be colored, suitable for day and night operation and network compatible & with Full HD resolutions. PTZ cameras shall be high speed integrated dome type. Minimum 4 nos. of cameras per S/R shall be provided covering the complete S/R and stockyard, however the exact location shall be finalized during detailed engineering after checking the coverage. Basic Video analytics features e.g. Object identification based on shape, big boulders, sharp metal objects etc. should also be provided 9.00.00 Interfacing with Other Systems and Packages at Site The system shall be interfaced with CHP DDCMIS, the Station LAN and other third party systems as required. It shall be capable to exchange data via web services. It shall be able to interface with ERP system available with Employer and help in planning and procurement of 10.00.00 **System Hardware** Following system hardware / equipment for Stockyard Management System shall be provided but not limited to: Redundant servers with suitable networking components and ports for interfacing various systems, for stockyard management system Redundant PLC system along with HMI for Stacker/ Reclaimer. PLC for Automatic Sprinkler system located in CHP control room Separate Operator work Stations (OWS) of size 21" in Control Room and S/R operating cabin for 3D profiling, unmanned operation and Hotspot Detection. Suitable furniture & control desk shall be provided to be located in CHP control room. UPS power supply in redundant configuration along with distribution and cabling shall be provided for the system by the Contractor All the clamps and fixtures of the sensors for Anti-Collision, Wireless Antennas, Limit switches, Boom Boxes, Scanners etc. shall be suitably designed such that they are shock proof and are suitable for dusty environment like Coal Stockyard. All the sensors shall be mounted inside protective cover as required. 11.00.00 Online Healthiness Monitoring of Bearings & Gearboxes of Stacker & Reclaimer Machine For online monitoring of healthiness of bearings and gearboxes of Stacker and Reclaimer machines a real time health monitoring system shall be installed on the Stacker Reclaimer machines. The system shall at all the times provide the operator a health report card of all major drives / equipments of the S/R machine in form of a report / alarms. The system shall be capable of providing predictive information of all incipient failures in bearings and gearboxes at a very initial stage so that the same can be identified at its initial stage and attended / arrested. **TALCHER TPP C&I ANNEXURE TO SUB-TECHNICAL SPECIFICATION** STAGE-III (2X660 MW) SECTION-A-20 PAGE

SECTION - VI. PART-B

BID DOC NO.:

COAL & BIOMASS

HANDLING PLANT

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EPC PACKAGE

CLAUSE NO. **TECHNICAL REQUIREMENTS** 12.00.00 **Comprehensive Annual Maintenance Contract** The contractor shall provide comprehensive Annual Maintenance Contract (AMC) for 3 years after completion of defect liability period (warranty). This shall cover total maintenance of hardware & software related to Stockyard Management System & shall include free repair/replacement of all components/cables/equipment etc. In case, any part of the system/ equipment is to be taken out for servicing / calibration etc., then substitute equipment / device shall be available at plant up to end of AMC period so that at no stage operation of Stacker / Reclaimer machine and Stockyard management system is affected in anyway. The above shall also include provision of software updates for software & database servers including OS security updates & firmware upgrades. During AMC period, the contractor's engineers shall reach site within 48 hours of reporting of the complaint. 13.00.00 Site Acceptance test All the systems specified herein shall be fully integrated i.e. 3D profiling, Thermal imaging, S/R PLC, GPS etc. Further other systems like CHP DDCMIS, Solenoids of Sprinkler System, station LAN, Employer ERP system shall also be interfaced to make system complete. Stacker/ Reclaimer shall be commissioned along with all sensors/ systems like anti-collision. GPS. Laser/ Radar sensors for 3D profiling etc. and should be operational both in manned and unmanned modes of operation. When above conditions are ready, the SAT shall be conducted for 7 days to demonstrate all the specified features as per SAT procedure finalized during detailed engineering. OEM expert of each system shall be available at site during complete Site Acceptance Test. 14.00.00 **Training** The contractor shall include training for all the systems at the OEM works. The training shall include design, installation and commissioning, operation, programming/configuration and diagnostic/ troubleshooting aspects of the hardware and software being supplied in this package. **TALCHER TPP C&I ANNEXURE TO SUB-TECHNICAL SPECIFICATION** STAGE-III (2X660 MW) SECTION-A-20 PAGE SECTION - VI. PART-B **EPC PACKAGE COAL & BIOMASS** 4 OF 4 BID DOC NO.:

HANDLING PLANT

	Specification	n Reference			Existing	Read As
S. No.	Sec/Part	Sub Sec	Page No.	Clause No.		
D1-1	VI/A		7 of 8	4.10.00	The Contractor shall also jointly facilitate in resolution of Land Acquisition issues related to the Project. Any due payments arising out of the Land Acquisition process shall however be paid by NTPC to the appropriate Authorities. The vendor / contractor shall visit the site to ascertain the position of land acquisition etc. and it is presumed that the contractor submitted his bid after considering the facts on the ground and that once vendor / contractor is successful in his bid, he will work in cooperation with the client for smooth execution of the project.	The vendor / contractor shall visit the site to ascertain the position of land acquisition etc. and it is presumed that the contractor submitted his bid after considering the facts on the ground and that once vendor / contractor is successful in his bid, he will work in cooperation with the client for smooth execution of the project.
D1-2	VI/A	IA	36 of 37	9.0	Bidder shall have the option of awarding the BOP system(s) on EPC basis to qualified sub vendor(s). The qualified sub-vendor(s) for BOP EPC shall meet the following requirements: The BOP EPC sub vendor should have executed on Engineering, Procurement and Construction (EPC) basis, minimum one (1) no. coal based/Lignite based power plant of at least 500 MW unit capacity comprising of at least a) Coal/Lignite handling plant, b) Cooling Tower, c) Water / waste water treatment plant or DM plant ,including associated civil works, Structural and Electrical systems for the above equipment(s) and systems as a single package, which is in successful operation for a period of not less than one (1) year prior to the date of techno-commercial bid opening. The BOP EPC sub vendor shall source the equipment(s)/ Sub system(s) from such qualified vendors who meet the provenness requirements as stipulated in technical specification for the respective equipment(s)/ Sub system(s).	
D1-3	VI/A	IID	3 of 13	1.00.00	b. Dismantling of facilities at Sl. No. 4(a)-xv is in employers scope.	b. Dismantling of facilities at Sl. No. 4(a)-xv is in employers scope. However dismatling, clearance and disposal of substructure of these facilities is in bidder's scope.
D1-4	VI/A	IID	3 of 13	1.00.00	d. ETP Facility at SI No. 4(a)-xvi shall not be dismantled. Same is to be utilized for Stage-III.	d. Dismantling of ETP facility at SI No. 4(a)-xvi is in bidder's scope.
D1-5	VI/A	IID	3 of 13	1.00.00	j. Demarcation between township and stage-III in the scope of bidder. It is to be done at the beginning of works.	j. Demarcation by providing temporary fencing between township and stage-III is in the scope of bidder. It is to be done at the beginning of works. Construction of boundary wall in between township and Stage-III is also in bidder's scope.

D1-6	VI/B	D-1-5	64 of 120	5.17.05.07	1	(i) The tower shall be provided with two numbers external RCC Staircase, leading to a heavy duty door giving access to the distribution system. Staircase shall be minimum 1000 mm wide (clear), with landings of minimum width of 1000 mm at not more than 2500 mm height intervals unless approved otherwise. The steps shall have a rise of about 175 mm and tread of about 250 mm. Anti - skid nosing at each step shall be provided
D1-7	VI/B	D-1-5	64 of 120	5.17.05.07	direction, shall be provided inside the tower at distribution pipe level. walkways shall be at least 1000mm wide with 50 mm (minimum) safety kerbs along each edge. These walkways and platforms shall provide safe and clear access to all sprayers and all distribution pipes. A FRP platform of 1500 mm clear width shall be provided around the tower periphery which will be a means of access to next walkways and all end valves. Access ways shall be clear of all obstructions such as distribution pipe support beams, drift eliminator support beams, etc. The walkways shall be	Walkways and platforms, atleast two in each orthogonal direction, shall be provided inside the tower at distribution pipe level. walkways shall be at least 1000mm wide with 50 mm (minimum) safety kerbs along each edge. These walkways and platforms shall provide safe and clear access to all sprayers and all distribution pipes. A RCC platform of 1500 mm clear width shall be provided around the tower periphery which will be a means of access to next walkways and all end valves. Access ways shall be clear of all obstructions such as distribution pipe support beams, drift eliminator support beams, etc. The walkways shall be provided with transverse slots or other opening which will permit the free passage of air and water. FRP handrails shall be provided on all sides of over ground platforms and around hot water basin and cold water outlet.
D1-8	VI/E				Drg No. 4540-001-POC-A-007 Rev-A "RAW WATER RESERVOIR LAYOUT"	Drg No. 4540-001-POC-A-007 Rev-B "RAW WATER RESERVOIR LAYOUT"
D1-9	Section- VI/Part-B	D-1-5	97 OF 120	5.23.02	At the location where the overhead conveyor gallery crosses road / rail line, minimum clearance of 8.0m above the road crest / rail top shall be provided.	At the location where the overhead conveyor gallery crosses road / rail line, minimum clearance of 8.5 m above the road crest / rail top shall be provided
D1-10	Section- VI/Part-B	D-1-5	104 OF 120	5.23.17.01		Drainage of the complete coal stock pile, area around stacker reclaimer rails etc. shall be discharged into the coal slurry settling pond.

D1-11	Section- VI/Part-B	D-1-5	107 OF 120	5.23.20.2	minimum 8 mm dia bars placed at 200 mm C / C in	The grade slab shall consists of 230 mm thick rubble soling (63 mm downgraded hard stone aggregate as per IRC specification, watering and compaction to minimum of 90% Standard Proctor density, including filling the interstices of stone aggregates with sand), over well compacted earth, overlaid by 75 mm thick P. C. C. M-7.5 and 100 mm thick RCC of grade M-25 with minimum 8 mm dia bars placed at 200 mm C / C in either direction respectively. There will be minimum 50 mm thick metallic hardener finish over the RCC slab. All buildings (including Track Hopper and machinery hatches, truck hopper, penthouse, MCC rooms, pump houses, transfer houses and crusher house) and ground conveyors shall be provided with 750 mm wide plinth protection all around. It consists of 50 mm thick P.C.C. M-25 grade with 12 mm maximum size aggregate over 200 mm thick stone soling using 40 mm nominal size rammed, consolidated and grouted with fine sand. An area of 5 m width all round the water tanks near pump house, transfer houses and crusher house, Gypsum storage shed, truck tippler area, lime storage silo shall be paved. This paving will be in addition to plinth protection. The paving construction shall be as per specifications for the grade slab at ground level. Paving shall also be provided in HGTU and VGTU
	Section- VI/Part-B	D-1-6	8 OF 24	6.03.08 5.23.12	The loads for all railway load bearing structures e. g. wagon tippler, tunnel, culverts and underground transfer houses etc. and the analysis and the design of these structures shall be made strictly in accordance with the provisions of Indian Railway Bridge rules (latest edition), and Indian Railway Codes of practice (latest edition) with all amendments up to the date of opening of bids. The axle load for analysis and design shall be considered as "DFC loading (32.5t axle load)" of Heavy mineral loading as per Indian railway standard. Coal heap of 1.2m height shall be considered above hopper top for design of hopper and supporting elements of wagon tippler.	The loads for all railway load bearing structures e. g. Track hopper , tunnel, culverts and underground transfer houses etc. and the analysis and the design of these structures shall be made strictly in accordance with the provisions of Indian Railway Bridge rules (latest edition), and Indian Railway Codes of practice (latest edition) with all amendments up to the date of opening of bids. The axle load for analysis and design shall be considered as "DFC loading (32.5t axle load)" of Heavy mineral loading as per Indian railway standard. Coal heap of 1.2m height shall be considered above hopper top for design of hopper and supporting elements of Track hopper .

D1-13	Section- VI/Part-B	D-1-6	9 OF 24 102 OF 120	6.03.08 5.23.12	For design of all underground structures / foundations, ground water table shall be assumed at the formation level (i. e. the adjoining ground level).For all underground structures like wagon tippler, tunnels and underground transfer points crack width shall be restricted to 0.2 mm.	For design of all underground structures / foundations, ground water table shall be assumed at the formation level (i. e. the adjoining ground level). For all underground structures like Track hopper , tunnels and underground transfer points crack width shall be restricted to 0.2 mm
D1-14	VI/ Part-B				Service Building Architectural Features This building shall be four storeyed (Ground + 3 stories above) and shall be provided with floor area of 3700 sq.m with RCC framed structure. Autoclave Aerated Concrete Block masonry wall shall be provided for the full height of the building for both external and internal walls. Floor-to-floor height shall be minimum 4.25m.	Service Building Architectural Features This building shall be five storeyed (Stilt + 4 stories above) and shall be provided with floor area of 3700 sq.m with RCC framed structure. Autoclave Aerated Concrete Block masonry wall shall be provided for the full height of the building for both external and internal walls. Floor-to-floor height above the stilt floor shall be minimum 4.25m . Height of stilt floor shall be 8 meters (clear)
D1-15	VI/ Part-B	D-1-5	45 of 120	5.12.04	Fuel Oil Unloading Pump House Fuel Oil Unloading Pump house shall be a covered building with RCC columns and Structural Steel Roof truss (with rafter and tie level plan bracings), purlins and roof slab. The roof slab shall comprise minimum 40 mm thick (above the crest of metal deck sheet) RCC slab supported on profiled metal deck. 250mm thick external brick wall shall be provided with provisions for fire proof door, windows & rolling shutters.	Fuel Oil Unloading Pump House Fuel Oil Unloading Pump house shall be a covered building with RCC columns and Structural Steel Roof truss (with rafter and tie level plan bracings), purlins and roof slab. The roof slab shall comprise minimum 40 mm thick (above the crest of metal deck sheet) RCC slab supported on profiled metal deck. One Brick thick external brick wall shall be provided with provisions for fire proof door, windows & rolling shutters.
D1-16	VI/ Part-B	D-1-5	47 of 120	5.14.00	GATE COMPLEX Gate Complex shall include Central Industrial Security Force (CISF) building. The CISF Building shall be a two (2) storied RCC super structure with office complex in ground floor & first floor. The building shall be constructed with 250mm thick brick wall with provisions for doors, windows & ventilators.	GATE COMPLEX Gate Complex shall include Central Industrial Security Force (CISF) building. The CISF Building shall be a two (2) storied RCC super structure with office complex in ground floor & first floor. The building shall be constructed with One Brick thick brick wall with provisions for doors, windows & ventilators.
D1-17	VI/ Part-B	D-1-5	102 of 120	5.23.12	Staircases	GATE COMPLEX All stairs of over ground portion of transfer houses & crusher house shall be of steel (minimum 1200 mm wide) and maximum rise should not be more than 180 mm and minimum tread width 275 mm.
D1-18	VI/ Part-B	D-1-5	1/2 of 31	9.03.01	Water Supply and Sanitation	Water Supply and Sanitation

D	1-19	VI/ Part-B	D-1-5	9 of 31	Pre-Fabricated Insulated Metal Sandwich Panels For buildings where Pre-Fabricated (Factory made) Insulated Metal Sandwich Panels shall be used for Roofing, the sandwich panelsbefore starting sheeting work at site.	Pre-Fabricated Insulated Metal Sandwich Panels For buildings where Pre-Fabricated (Factory made) Insulated Metal Sandwich Panels shall be used for Roofing, the sandwich panelsbefore starting sheeting work at site. The insulation shall be of Polyurethane type. The polyurethane shall be Chlorofluorocarbon (CFC) free and self-extinguishing and shall conform to IS 12436: 1988. It shall have Modular Density 40 +/- 2 Kg/m3 and Thermal Conductivity @ 10 Deg.C 0.017 - 0.020 W/M 0k, Water absorption (% by vol) 3.1, Critical Oxygen Index 23 and Compressive Strength 1.2 Kg/sq.cm.
D	1-20	VI/ Part-B	D-1-5	11 of 120	Main Power House iii Architectural Features B Row portion in TG Hall fronting Control Room & CER and glazed partitions in CER/ CCR/Offsite Control room shall be of 25 mm thick Hermetically sealed double glass of Fire resistant of min 11mm thick clear, toughened, interlayered 120 minute fire rated for both integrity & radiation control and 6 mm thick toughened tinted glass with 8 mm gap and with suitable fire resistant frame of 1.6 mm thick powder coated steel sheet. Mullion-less charged glass wall shall be provided in between the control room and the Visitor's gallery.	Main Power House iii Architectural Features B Row portion in TG Hall fronting Control Room & CER and glazed partitions in CER/ CCR/Offsite Control room shall be of 30 mm thick Hermetically sealed double glass of Fire resistant of min 14mm thick clear, toughened, interlayered 120 minute fire rated for both integrity & radiation control (EW 120) with symmetrical (Bi-Directional) fire protection and 6 mm thick toughened tinted glass with 10 mm gap and with suitable fire resistant frame of 1.6 mm thick powder coated steel sheet . Mullion-less glass wall with motorized curtain shall be provided in between the control room and the Visitor's gallery.

D1-21	VI/ Part-B	In 1 0	14 of 21	9.12.06	Internal placed neutition Ones think shouter to a dele-	Internal placed neutition. Once this balance and along the U.S. and al
D1-21	VI/ Pail-D	D-1-9	14 of 31	9.12.00		
					shall be provided.	Internal Glazed partition in in MPH shall be Vetrotech Saint-Gobain fully
						glazed fire rated fixed partition with 120 minutes of integrity and radiation
						control (EW 120) with symmetrical (Bi-Directional) fire protection. The frames
						shall be cold rolled profiles As per EN standard EN 10327/Indian Standard (IS
						513) . The frames are cold rolled from 1.5 mm steel sheet to form a profile of
						50 mm x 50 mm on all sides. he system shall be tested as per EN 1364-
						1/(Indian Standars) IS 16945:2018 in an accredited laboratory.
						The glass shall be Contraflam Lite 14mm (MADE IN INDIA)clear 120 min fire
						rated for Integrity, Radiation control (EW 120) and partially insulation (EI 20)
						Non Wired Toughened Interlayered glass with a light transmission of 86% and
						a sound reduction of 38 dB and manufactured in UL & TUV audited Facility
						and including UL-EU Certification and compliant to class 1(B)1 category of
						Impact Resistance as per EN 12600. The glass shall be tested and certified for
						no formation of bubbles or yellowing after 5000 hours of exposure to UV
						radiation by TUV Rheinland as per EN 12543-4 The glass shall provide bi-
						directional (Symmetrical) fire protection. The base glass and processed glass
						must be made in INDIA.
						The glass shall be held in its place with the help of 1.5 mm cold rolled steel
						beading and Kerafix 2000 ceramic tape with cross section of 4 x 15 mm as per
						the test evidence. Beading shall be clipped on using Stainless Steel self-
						tapping screws fixed at a distance of 70 mm from the edges and 150 mm c/c
						henceforth. The glass panes are to be supported on non-combustible 5 mm
						Calcium Silicate setting blocks. The maximum glazing size shall be as per the
						test certification. The profile has to be fixed to the supporting construction by
						means of M10 or bigger steel bolts at every 150 mm from the edges and every
					_	500 mm (approx.) c/c.
						The Partitions shall offer C4 level of wind resistance when tested as per
						EN12211 and shall provide class 4 level of air permeability as per EN 1026. The
						Partitions shall also be tested for class 5 of impact resistance when tested as
						per EN 13049. The Partitions shall also be tested for class 4 level of
						Mechanical strength when tested as per EN13115. The Partitions shall have
						water tightness level of 8A when tested as per EN 1027. Partitionr shall be of
						Makes - Saint Gobain, Acodor , IGI , Matrix , Tata Pravesh.
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D1-22	VI/ Part-B	D-1-9	14 of 31	9.11.11	Electrically operated, self operable/closing, aluminium	Electrically operated, self operable/closing, aluminium framed with tinted
51-22	r unt B		1-7 01 31		framed with tinted glass, sliding doors	glass, sliding doors shall be provided at the entrance of all common control
					shall be provided at the entrance of all common control	rooms, entrance lobby of facility building.
					rooms, entrance lobby of facility building.	At the entrance of all commomn control rooms in MPH G.I. framed with fire
					,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	resistamt glass, sliding doors shall be provided. The oter doors in commomn
						control rooms in MPH shall be G.I. framed with fire resistamt glass as per fire
						zoning .FIRE RESISTANT GLAZED DOOR SYSTEM shall be of UNIFORM PROFILE
						50X50 mm with 14mm EI 20 GLASS For Interior Application
						FIRE RESISTANT GLAZED DOOR SYSTEM shall have 120 minutes of integrity
						and radiation control (EW 120) with symmetrical (Bi-Directional) fire
						protection. The frames shall be cold rolled profiles as per EN standard EN
						10327/ Indian Standard IS 513 . The door frames are cold rolled from 1.5 mm
						steel sheet to form a profile of 50 mm x 50 mm on all sides. The door shutter
						shall have the top rail, side rail and bottom rail dimensions of 50 mm x 50 mm.
						The overall door opening shall be as per tested evidence and tested as per EN
						1634-1/ ISO 834-1 / ISO 3009 /(Indian Standard) IS 16947:2018 in an
						accredited laboratory.
						The glass must be minimum 14mm clear (MADE IN INDIA)120 min fire rated
						for Integrity, Radiation control (EW 120) and partially insulation (EI 20) Non
						Wired Toughened Interlayered glass with a light transmission of 86% and a
						sound reduction of 38 dB and manufactured in UL & TUV audited Facility and
						including UL-EU Certification and compliant to class 1(B)1 category of Impact
						Resistance as per EN 12600. The glass shall be tested and certified for no
						formation of bubbles or yellowing after 5000 hours of exposure to UV
						radiation by TUV Rheinland as per EN 12543-4. The base glass and finished
						glass must made in India .
					-	The shutters shall be fixed to the frame using Weld-on hinges of dimensions
						179mm X 20mm. The profiles shall have groves to incorporate Fire Resistant gaskets. The glass shall be held in its place with the help of 1.5 mm cold rolled
						steel beading and Kerafix 2000 ceramic tape with cross section of 4 x 15 mm
						as per the test evidence. Beading shall be clipped on using Stainless Steel self-
						tapping screws fixed at a distance of 70 mm from the edges and 150 mm c/c
						henceforth. The glass panes are to be supported on non-combustible 6 mm
						Calcium Silicate setting blocks. The door shall be fitted with offset pull handle
						and door closer of Dorma (TS 73V, TS 83V, TS93V), Geze (TS 2000NV) or
						equivalent. The inactive leaf (in case of double leaf only)shall be fixed to the
						frame using a tower bolt at meeting edge at top or as per the tested evidence.
						The doors shall be manufactured in a TUV audited facility. The maximum
						glazing size shall be as per the test certification. The profile has to be fixed to
						the supporting construction by means of M10 or bigger steel bolts at every
						150 mm from the edges and every 500 mm (approx.) c/c. The doors shall offer
						C4 level of wind resistance when tested as per EN12211 and shall provide
						class 4 level of air permeability as per EN 1026. The door shall also be
						subjected to durability tests as per EN 12400 for C5 classification (200,000
						cycles). The doors shall also be tested for class 5 of impact resistance when
						tested as per EN 13049. The doors & partition shall also be tested for class 4
						level of Mechanical strength when tested as per EN13115. The door shall have
						water tightness level of 8A when tested as per EN 1027. Fire Rated Door shall be of Makes- Saint Gobain, Acodor , IGI, Matrix.
						DE OF IVIANES- SAILLE GODAIN, ACOUOF, ICH, IVIALITY.
-	•	•	•	•	•	

D1-23	VI/ Part-B	D-1-5	48 of 120	5.15.00 & 5.16.00	Watch Towers & Safety Park Building	Table-A Changed in subsection D-1-9
	VI/ Part-B	D-1-5		5.26.00 & 5.27.00	Canteen & Fire Station Building	Table-A Changed in subsection D-1-9
	VI/ Part-B	D-1-9	19 of 31	9.17.00 Table A	Toilet False ceiling - Main Power House building	Table-A Changed in subsection D-1-9
	VI/ Part-B	D-1-9	25 of 31	9.17.00 - Table A - 05	Fire Water Pump House - Not used	Table-A Changed in subsection D-1-9
	VI/ Part-B	D-1-9	26 of 31	9.17.00 - Table A - 07	Ash slurry pump house/ Ash water pump house / Silo Area Utility Building / Ash Water recirculation Pump House/ Transport air compressor house/ HCSD pump house/Fuel Oil Unloading Pump House with switchgear building& control room /H2 generation Building/ Miscellaneous Switchgear room CW Pump house, Switchgear room, control room/ RW Pump house, Switchgear room, control room/Any other Building	Table-A Changed in subsection D-1-9
D1-24	VI/ Part-B	Section- D 1-5	38 of 120	5.05.15	Architectural Features of Ash Handling and Ash Water Recirculation System Buildings a. All buildings shall be fully covered with brick masonry cladding and Aluminium and Steel doors/ windows/ rolling shutters / ventilators. b. Safety norms shall be followed as applicable. The buildings shall be provided for Pump houses, Switch Gear Room, Control Room etc. as per ash handling system requirements	Architectural Features of Ash Handling and Ash Water Recirculation System Buildings a. Building shall have Aluminium and Steel doors/windows/ rolling shutters / ventilators. b. Safety norms shall be followed as applicable. The buildings shall be provided for Pump houses, Switch Gear Room, Control Room etc. as per ash handling system requirements

-	D1-25	VI/ Part-B	Section- D-	6 of 31	9.07.04	Aerated Concrete Block. Autoclaved Aerated Concrete (AAC) block masonry shall be with blocks having dimensions of 625 mm x 250 mm. thickness ranging from 100 mm to 300 mm conforming to 1.5. :2185(part III). The jointing cement sand mortar in the composition of 1: 6 (Cement: sand) shall be used with suitable plasticizer(optional). Sand having modulus of fineness 1.1 shall be used. The horizontal and vertical joint thickness shall be approximately 10 mm. In case of partition walls (100 mm /125 mm thk.) the joint reinforcement i.e. 1 number of 6-8 mm diameter bars shall be placed at every alternate course to be anchored properly with the main structure. All other structural requirements like stiffening of masonry, joint reinforcement etc. in the AAC masonry work strictly be carried out as per instructions laid down in IS 6041 – 1985, IS - 1905.	For ESP Control Room Building, wall shall be of Autoclaved Aerated Concrete Block. Autoclaved Aerated Concrete (AAC) block masonry shall be with blocks having dimensions of 625 mm x 250 mm. thickness ranging from 100 mm to 300 mm conforming to I.S. :2185(part III). The jointing cement sand mortar in the composition of 1: 6 (Cement: sand) shall be used with suitable plasticizer(optional). Sand having modulus of fineness 1.1 shall be used. The horizontal and vertical joint thickness shall be approximately 10 mm. In case of partition walls (100 mm /125 mm thk.) the joint reinforcement i.e. 1 number of 6-8 mm diameter bars shall be placed at every alternate course to be anchored properly with the main structure. All other structural requirements like stiffening of masonry, joint reinforcement etc. in the AAC masonry work strictly be carried out as per instructions laid down in IS 6041 – 1985, IS - 1905. For control room, control equipment room in MPH Building, walls shall be of factory made composite modular light weight aerated concrete panels, (minimum 2 hours of fire rating) consisting of 2 fiber reinforced cement sheets (minimum 4 mm thick) on either side of light weight concrete core, having minimum compressive strength of 35 Kg / Cm2 and the density in the range of 700-900 Kg. / cu.m. of the thickness and fire rating as specified below, to provide external wall and internal partition at all levels, capable of sustaining wind pressure of 3.00 M height (H) within limiting deflection of span/250, fixed in position in tongue and groove jointing system by screwing the panels to top and bottom U channels, (channels minimum 1.25 mm thick and galvanised to grade 180 (minimum) as per IS: 277), fixing U profiled top and bottom channels to concrete / primary steel members which are placed at the maximum vertical spacing of 4.5m with the help of galvanised steel expansion fasteners, filling the joints from both faces with silicon acrylic paste and making the same water tight by covering with fibre glass tape (minimum 50
	D1-26	VI/B	D-1-5	37 of 120	5.05.09		All ash handling system/ ash water recirculation system pipe crossings with Railway Lines including MGR lines shall be laid by method accepted by concerned railway authorities for existing rail lines & by cast in situ RCC box culvert for future envisaged rail lines. The railway track crossings are to be designed in accordance with railway Standard/RDSO guidelines and all necessary approvals from the concerned Railway authorities shall be obtained by the Bidder, without any financial implications to the owner.

D1 27	Tyu/p		T40 of 120	Tr 07.00	TOTAL CONCTENT	TOTALEDA OF CVCTEAA.
D1-27	VI/B	D-1-5	40 of 120	5.07.00	SEWERAGE SYSTEM: Complete sewerage system including Sewage Treatment Plant for facilities within the plant is in bidder's scope. Bidder shall provide 'De-centralized Sewage Treatment' units. The capacity of the Decentralized Sewage Treatment' units should be as per the design requirements, subject to minimum combined capacity of 75 Cum/day. Design of Sewage treatment plant shall be as per CPHEEO manual. Primary, Secondary and Tertiary treatment to be provided. Cement concrete pipes of class NP-3 as per IS 458 shall be used below ground level for sewage disposal in all areas other than main plant area. However, for pressure pipes and in main plant areas, and under roads spun Cast Iron pipes conforming to IS 1536 of required class shall be used. RCC manholes with CI cover shall be provided at every 30m along the length, at connection points, and at every change of alignment, gradient or diameter of a sewer pipeline. This shall be as per IS 4111. Sewage pump stations shall be provided as per IS 4111. BIDDER SHALL HAVE TO PROVIDE COMPLETE ARRANGEMENT for sewage disposal up to the sewage treatment plant including pumping facilities.	SEWERAGE SYSTEM: Complete sewerage system including Sewage Treatment Plant for facilities within the plant is in bidder's scope. Bidder shall provide 'De-centralized Sewage Treatment' units. The capacity of the Decentralized Sewage Treatment' units should be as per the design requirements, subject to minimum combined capacity of 75 Cum/day. Design of Sewage treatment plant shall be as per CPHEEO manual. Primary, Secondary and Tertiary treatment to be provided. Treated sewage water shall be used for horticulture purpose as per quality requirement of CPHEEO manual. Cement concrete pipes of class NP-3 as per IS 458 shall be used below ground level for sewage disposal in all areas other than main plant area. However, for pressure pipes and in main plant areas, and under roads spun Cast Iron pipes conforming to IS 1536 of required class shall be used. RCC manholes with CI cover shall be provided at every 30m along the length, at connection points, and at every change of alignment, gradient or diameter of a sewer pipeline. This shall be as per IS 4111. Sewage pump stations shall be provided as per IS 4111. FBIDDER SHALL HAVE TO PROVIDE COMPLETE ARRANGEMENT for sewage disposal up to the sewage treatment plant including pumping facilities.
D1-28	VI/A	IID	3 of 13	1.00.00	5. Construction of Raw Water Reservoir and dismantling, removal, disposal of waste material of existing reservoirs and levelling to FGL.	Construction of Raw Water Reservoir and dismantling, removal, disposal of waste material of existing reservoirs and levelling to FGL. The interconnection of Stage -III reservoir inlet pipe with existing MUW pipe line of Stage-II & I including booster pump, if required, shall be under Bidder's scope.
D1-29	VI/B	D-1-12(P)			Annexure-P	Annexure-P
D1-30	VI/E	Tender Drawings		<u> </u>	4540-001-POC-A-006, Rev 0	4540-001-POC-A-006, Rev 1
D1-31	VI/B	D-1-6	11 of 24	6.03.08.18	All Insert plates (except edge protection angles) provided in liquid retaining structures shall be 12 mm thick GI with lugs	
D1-32	VI/B	D-1-5	11 of 127	5.02.09	Windows on south side at accessible level at operating floor level shall have Building Integrated Photovoltaic Cell as Glazing. The glazing area shall be increased accordingly for proper lighting.	Deleted
	VI/B	D-1-5	13 of 127	5.02.10	Windows on south side shall have Building Integrated Photovoltaic Cell as Glazing. The glazing area shall be increased accordingly for proper lighting.	Deleted
	VI/B	D-1-5	114 of 127	5.30.00	Windows on south side shall have Building Integrated Photovoltaic Cell as Glazing. The glazing area shall be increased accordingly for proper lighting.	Deleted
D1-33	VI/B	D-1-5	83 OF 127	5.19.02.02.01	The tank foundation shall be as per IS:803 and as specified in Cl. No.7.01.04.	The tank foundation shall be as per IS:803 and as specified in relevent clause of foundation chapter.

$\label{eq:epc_package} \begin{tabular}{ll} EPC PACKAGE FOR TALCHER THERMAL POWER PROJECT, STAGE-III (2x660 MW) \\ Amendment No. 01 to Technical Specifications Section-VI of Bidding Document No.: CS-4540-001A-2 \\ \end{tabular}$

D1-34	VI/E	Tender Drawings			4540-999-POC-F-001	4540-999-POC-F-001
D1-35	VI/A	IID	12 of 13	2.02.00	Construction Power Scope of supply of construction power is specified in SECTION – VI, PART-B, SUB SECTION B-19 of Technical specification.	Construction Power Scope of supply of construction power is specified in SECTION – VI, PART-B, SUB SECTION B-18 of Technical specification.
D1-36	VI/A	IID	11 of 13	2.01.00		a)Development of Bidders temporary staff colony and labour colony along with toilets & fencing etc. Bidder shall use Area-A for Labour Colony. For safety of labour, bidder to provide separate approach road for their movement, as per site conditions, which shall be completely isolated from material movement road/path. No material movement shall be allowed on approach road meant for Labour colony.
D1-37	VI/A	IID	13 of 13	2.03.00	Bidder shall use abandoned ash dyke as a Lay down area. Details of proposed laydown area along with approach to laydown area is indicated in Annexure-J of Part-B (Civil works). Three areas marked as 'A','B' and 'C' totalling 70 acres (approx.) are identified as laydown /preassembly area. Fencing of the laydown area and raising/lowering of 33kV line in the area marked for laydown is in Owner's scope.	DEVELOPMENT OF LAYDOWN AREA Bidder may use abandoned ash dyke as a Lay down area and/or any other area arranged by him in the vicinity of the project site. The area used for laydown has to be developed as per requirement inline with technical specifications. Details of proposed laydown area in abandoned ash dyke along with approach to laydown area is indicated in Annexure-J of Part-B (Civil works). Areas marked as 'B' and 'C' totalling 55 acres (approx.) are identified as laydown /preassembly area. Fencing of the laydown area and raising/lowering of 33kV line in the area marked for laydown is in Owner's scope. Construction of wire fencing in the proposed laydown area shall be completed within 4 months from NOA. Contractor can do the site preparation work parallelly.

D1-38	VI/B	D-1-5	5.25.00	O&M WORKSHOP BUILDING	O&M WORKSHOP BUILDING
D1-20	VI/D	D-1-2	3.23.00	The O&M Workshop Building shall be a two bay fully	The O&M Workshop Building shall be a two bay fully covered building. The two
				covered building. The two bays shall comprise of workshop	bays shall comprise of workshop bay and office complex bay. The minimum span
				bay and office complex bay. The minimum span of	of workshop bay shall be 20m with RCC columns with structural steel roof truss
				workshop bay shall be 25m with RCC columns with	and purlins supporting pitched roof. Roofing shall be permanently colour coated
				structural steel roof truss and purlins supporting pitched	insulated sandwiched metal roofing sheet. The Gantry girder for the EOT crane
				roof. Roofing shall be permanently colour coated insulated	in the workshop building shall be structural steel plate girder supported on RCC
				sandwiched metal roofing sheet. The Gantry girder for the	corbels at column locations. The gantry girder shall be complete with chequered
					1
				EOT crane in the workshop building shall be structural steel plate girder supported on RCC corbels at column locations.	plate walkways (at both sides) and the cage ladder. The Central Workshop Building shall be designed considering EOT crane of 50T capacity.
				ļ ··	'
				The gantry girder shall be complete with chequered plate	The adjacent Office Complex bay shall have RCC superstructure. The minimum
				walkways (at both sides) and the cage ladder. The Central	bay width shall be 6.50m.
				Workshop Building shall be designed considering EOT	Architectural Features:
				crane of 50T capacity.	The building shall be fully covered with brick wall masonry in office portion. For
				The adjacent Office Complex bay shall have RCC	workshop portion brickwall shall be provided upto lintel level and permanently
				superstructure. The minimum bay width shall be 6.50m.	colour coated insulated sandwiched metal cladding sheet above lintel level upto
				Architectural Features:	the roof. Provision of doors, windows & Rolling shutters shall be included based
				The building shall be fully covered with brick wall masonry	on architectural detailed drawing to be developed by the bidder. The rainwater
				in office portion. For workshop portion brickwall shall be	down comers shall be provided at every column location and they shall be
				provided upto lintel level and permanently colour coated	suitably connected to the building surface drain.
				_	1 ' '
				upto the roof. Provision of doors, windows & Rolling	The minimum head room of workshop bay shall be evaluated by the bidder
				shutters shall be included based on architectural detailed	based on approved EOT Crane Clearance diagram and crane rail level.
				drawing to be developed by the bidder. The rainwater down	The office complex shall be 6.50mX50m in plan area. The office complex shall be
				comers shall be provided at every column location and they	made 2 storied for adequate space for operating personnel, MCC room, stores,
				shall be suitably connected to the building surface drain.	Laboratories, Toilets, Conference room & Tool room. The floor to floor/ roof
	†			The minimum operating floor area for the workshop bay	clear height shall be 4.50m.
				shall be 20mX50m.	
				The minimum head room of workshop bay shall be	
				evaluated by the bidder based on approved EOT Crane	
				Clearance diagram and crane rail level.	
				The office complex shall be 6.50mX110m in plan area. The	
				office complex shall be made 2 storied for adequate space	
				for operating personnel, MCC room, stores, Laboratories,	
				Toilets, Conference room & Tool room. The floor to floor/	
				roof clear height shall be 4.50m.	

D1-39	VI/B	D-1-5	64 of 120	5.17.05.03	Exterior surfaces of cooling tower shell and all surfaces of raker columns shall be given three coats of waterproof cement paint of approved make and colour. No painting is envisaged for internal surfaces of cooling tower shell and internal grillage columns and beams.	Exterior surfaces of cooling tower shell and all surfaces of raker columns shall be given three coats of waterproof cement paint of approved make and colour. All concrete surfaces below Eliminator level such as internal surface of CT shell, all surfaces of raker columns, beams & internal columns, platforms, walkways and any other RCC/PCC components shall receive high build heavy duty polyurethane coating having formulation of 100 % solids, solvent free after grit blasting of the concrete surface. Thickness of polyurethane coating shall be 2.0 mm. Suitable primer as per standard practice/manufacturers' recommendation shall be used. The detailed specification of the coating system on concrete surfaces is given in Annexure Q.



ı	DESCRIPTION OF AREA	FLOOR FINISH	WALL FINISH	CEILING FINISH
١.	Main power house Building.			
	a) Unloading Bay	Cement concrete with Metallic hardener topping	Acrylic distemper	Acrylic distemper (except metal deck area)
	b) Cable vault	Cement concrete with Metallic hardener topping	Acrylic distemper	Acrylic distemper (except metal deck area)
	c) Balance area including passage	Cement concrete with Metallic hardener topping	Acrylic distemper	Acrylic distemper (except metal deck area)
	d) SWAS Room	Matt Finished Vitrified ceramic tiles.	Aluminium composite panel cladding on walls and columns upto false ceiling level	Alluminium false ceiling in combination with G plaster board border in column depth or as approved design
	e) Equipment Area, ESP SWGR/ ACP Room/ UAF Room	Cement concrete with Metallic hardener topping	Acrylic distemper.	Acrylic distemper (except metal deck area
	f) UPS Battery charger room	Matt finished Vitrified ceramic tiles.	Aluminium composite panel cladding on walls and columns upto false ceiling level	Alluminium false ceiling in combination with G plaster board border in column depth or as approved design
	g)Deaerator floor	Cement concrete with Metallic hardener topping.		-

TALCHER THERMAL POWER PROJECT
STAGE-III (2X660 MW)
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INTERIOR FINISHING SCHEDULE					
S.N O.	DESCRIPTION OF AREA	FLOOR FINISH	WALL FINISH	CEILING FINISH	
	h) Operating Floor	20 mm thick heavy duty anti skid full body vitrified tile in TG Hall. Rubber flooring at TG deck.	Colour coated Metal cladding on A-Row& Gable end, up to crane girder level.	Metal deck roofing (bottom of sheeting with RAL 9002 finish)	
	i) General circulation and movement areas	20 mm thick heavy duty anti skid full body vitrified tile	-	Acrylic distemper (except metal deck area).	
	j) Switchgear room	Heavy duty tiles (Cement Concrete tiles 300mmx300mm)	Acrylic distemper	Acrylic distemper (except metal deck area)	
	k)MCC Room	Heavy duty tiles (Cement Concrete tiles 300mmx300mm)	Acrylic distemper	Acrylic distemper (except metal deck area)	
	I) Control room area including control room	Matt Finish Vitrified ceramic tiles flooring of size 1000 x1000 mm	Partition in fire rated glass with fire rated frames with 2 hr fire rating & Aluminium composite panel cladding for columns and walls	Designer metal false ceiling	

TALCHER THERMAL POWER PROJECT	
STAGE-III (2X660 MW)	
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	INTERIOR I INIGHING SCHEDOLE					
S.N O.	DESCRIPTION OF AREA	FLOOR FINISH	WALL FINISH	CEILING FINISH		
	m) control equipment room,	Matt finish Vitrified ceramic tiles.	Partition in fire rated glass with fire rated frames with 2 hr fire rating & Aluminium composite panel cladding for columns and walls	Designer metal false ceiling		
	n)Conference room, senior executive room., Computer Room	Matt finish Vitrified ceramic tiles	Partition in fire rated glass with fire rated frames with 2 hr fire rating & Aluminium composite panel cladding for columns and walls	Designer metal false ceiling		
	o)Record room	ceramic tiles	Acrylic distemper.	Designer metal false ceiling		
	p)Locker room	Ceramic Tiles	Acrylic Emulsion Paint	Allu Designer metal false ceiling		
	q)Toilet area	ceramic tiles	Digitally glazed ceramic wall tiles up to False Ceiling Height	Calcium Silicate False Ceiling		

TALCHER THERMAL POWER PROJECT	TECHNICAL SPECIFICATION	SUB-SECTION-D-1-9	
STAGE-III (2X660 MW)	SECTION - VI, PART-B	CIVIL WORKS	PAGE 20 OF 33
EPC PACKAGE	BID DOC NO. CS-4540-001-2	ARCHITECTURAL CONCEPTS AND DESIGN	



TABLE –A INTERIOR FINISHING SCHEDULE

	INTERIOR FINISHING SCHEDULE					
S.N O.	DESCRIPTION OF AREA	FLOOR FINISH	WALL FINISH	CEILING FINISH		
	r) Office Room, Staff Room	Matt Finished Vitrified ceramic tiles.	Partition in fire rated glass with fire rated frames with 2 hr fire rating & Aluminium composite panel cladding for columns and walls	Alluminium false ceiling in combination with GRG plaster board border in column depth or as per approved design		
	s)Laboratory area	Vitrified Ceramic / Acid/alkali resistant tiles.	Designer ceramic wall tiles up to False Ceiling Height/ Aluminium composite panel cladding for columns and walls in case of A.C Panel	Alluminium false ceiling in combination with GRG plaster board border in column depth or as per approved design		
	t) RCC Stair case	18mm thick Granite (Polished and honed Finished) stone	Polished Granite Stone up to 1.2m. ht. & Acrylic Distemper Paint over wall putty finish for balance height.	Acrylic Distemper		
	u) Lift and Staircase Lobby	18mm thick polished granite stone as pattern.	18mm thick polished granite & glass mosaic tile cladding up to False Ceiling Height	Alluminium false ceiling in combination with GRG plaster board border in column depth or as per approved design		
	v) Passages and general circulation areas.	Deleted	Deleted	Deleted		

TALCHER THERMAL POWER PROJECT				
STAGE-III (2X660 MW)				
EPC PACKAGE				

TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC NO. CS-4540-001-2 SUB-SECTION-D-1-9 CIVIL WORKS ARCHITECTURAL CONCEPTS AND DESIGN

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S.N O.	DESCRIPTION OF AREA	IPTION OF AREA FLOOR FINISH		CEILING FINISH
	w) Battery Room	Acid and alkali resistant tile.	Acid and alkali resistant tile up to 1.2m height and chemical resistant paint for balance height	Chemical Resistant paint except in locations where Metal deck has been provided
	x) Oil canal, oil room, oil purification Tank and other areas where oil spillage is likely to occur.	Oil resistant paint (epoxy based) 150 micron over primer.	As above except oil canal Oil resistant Paint	As above except oil canal.
	y)Pathways including roof area.	22mm thick concrete chequered tiles.	-	-
2.	Service Building/Administration Building			

TALCHER THERMAL POWER PROJECT
STAGE-III (2X660 MW)
EPC PACKAGE



S.N O.	DESCRIPTION OF AREA	SCRIPTION OF AREA FLOOR FINISH		CEILING FINISH	
	a) Entrance Lobbies and Lift areas/Foyer/Exhi bition space.	, ,	Combination of 18mm thick polished granite cladding, lacquered glass cladding and Fiber Reinforced Plastic murals based on local art in lift lobby & foyer	Alluminium false ceiling in combination with GRG plaster board border in column depth or as per approved design	
	b) Conference room, senior executive room.		Glazed partition with Aluminium frame/ Acrylic emulsion paint.	Mineral fiber board false ceiling in combination with GRG plaster board border in column depth or as per approved design.	
	c) Office Room, Staff Room	Digitally glazed Vitrified ceramic tiles.	Acrylic emulsion paint./ Designer Glass mosaic tile mural in combination with textured paint in Canteen	Mineral fiber board false ceiling in combination with GRG plaster board border in column depth or as per approved design	
	d) Passage	Digitally glazed Vitrified ceramic tiles.	Acrylic emulsion paint.	Alluminium false ceiling in combination with GRG plaster board border in column depth or as per approved design	

TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW)	TECHNICAL SPECIFICATION SECTION – VI, PART-B	SUB-SECTION-D-1-9 CIVIL WORKS ARCHITECTURAL CONCEPTS AND DESIGN	PAGE 23 OF 33
EPC PACKAGE	BID DOC NO. CS-4540-001-2	ARCHITECTURAL CONCEPTS AND DESIGN	



	INTERIOR FINISHING SCHEDULE				
S.N O.	DESCRIPTION OF AREA	FLOOR FINISH	WALL FINISH	CEILING FINISH	
	e) RCC Stair case	18mm thick Granite (Polished and Honed Finished) stone	Glass Mosaic Tile cladding in murals and pattern based on local art upto ceiling level	Acrylic Distemper.	
	f) Toilet/ Pantry/ Kitchen	ceramic tiles	Digitally glazed ceramic wall tiles up to False Ceiling Height	Acrylic distemper in kitchen / Calcium Silicate false ceiling in toilet and pantry	
	g) AHU/ A.C. Plant room/MCC Room/Store	Cement concrete with Metallic hardener topping.	Acrylic distemper / Wall insulation in AHU as per HVAC Requirement	Acrylic distemper / Underdeck insulation in AHU as per HVAC Requirement	
	h) Stilt parking area	Cement concrete with Non-Metallic hardener topping.	_	-	
	i) Pathways including roof area.	22mm thick concrete chequered tiles.			
3	ESP control building/Air compressor house				
	a) Operating/Mainte nance areas	Cement concrete with Metallic hardener topping	Pre color coated metal panel cladding.	Acrylic distemper (except metal deck area)	

TALCHER THERMAL POWER PROJECT	TECHNICAL SPECIFICATION	SUB-SECTION-D-1-9	
STAGE-III (2X660 MW)	SECTION - VI, PART-B	CIVIL WORKS	PAGE 24 OF 33
EPC PACKAGE	BID DOC NO. CS-4540-001-2	ARCHITECTURAL CONCEPTS AND DESIGN	



TABLE –A INTERIOR FINISHING SCHEDULE

S.N O.	DESCR	IPTION OF AREA	FLOOR FINISH	WALL FINISH	CEILING FINISH
	b)	Office Room, Staff Room	Digitally glazed Vitrified ceramic tiles.	Aluminium composite panel cladding on walls and columns	Mineral fiber Board False Ceiling
	c)	Control Room	Digitally glazed Vitrified ceramic tiles.	Aluminium composite panel cladding on walls and columns in ESP Control Room Building	Alluminium false ceiling in combination with GRG plaster board border in column depth or as per approved design
	d)	MCC Room	Heavy duty tiles (Cement Concrete tiles 300mmx300mm)	Acrylic distemper	Acrylic distemper (except metal deck area)
	e)	RCC Stair case	18mm thick Granite (Polished and Honed Finished) stone	Polished Granite stone up to 1.2m.ht. & Acrylic Distemper	Acrylic Distemper (except metal deck area)
	f)	Battery Room	Acid, Alkali resistant tile	Acid, Alkali resistant tile 1.2m height / chemical resistant paint above dado	Chemical resistant paint (except metal deck area)
	g)	AHU/ AC Plant room/ Cable vault	Cement concrete with Metallic hardener topping	Acrylic Distemper	Acrylic Distemper (except metal deck area)
	h)	Toilets	ceramic tiles.	Designer ceramic wall tiles dado up to false ceiling level.	Calcium silicate false ceiling.

TALCHER THERMAL POWER PROJECT
STAGE-III (2X660 MW)
FPC PACKAGE

TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC NO. CS-4540-001-2 SUB-SECTION-D-1-9 CIVIL WORKS ARCHITECTURAL CONCEPTS AND DESIGN

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TABLE –A INTERIOR FINISHING SCHEDULE

.N	DESCRIPTION OF AREA	FLOOR FINISH	WALL FINISH	CEILING FINISH
•	Mill & Bunker building/ T.P.s / Conveyor Galleries	Cement concrete with Metallic hardener topping	Acrylic distemper on masonry walls/ color coated Metal panel cladding	color coated Metal panel cladding
	Canteen Building			
	Dining area/ billing counter/ waiting area			
	Preparation area/wet storage area/ Serving area/ Pot cleaning area	Ceramic tiles.	Digitally glazed ceramic wall tiles dado up to 2200	Acrylic distemper
	Dry storage area/Gas storage	Cement concrete with Metallic hardener topping	Acrylic distemper	Acrylic distemper (except metal deck area)
	Toilet/Hand wash	Ceramic tiles.	Digitally glazed ceramic wall tiles dado up to false ceiling level	Acrylic distemper
•	Fire water pump house/ Fire water booster water pump house.			
	a) Maintenance /Pump floor/PLC	Cement concrete with Metallic hardener topping	Acrylic distemper	Acrylic distemper (except metal deck area)
	b) Control room /PLC.	Matt Finished Vitrified Ceramic Tiles	Acrylic emulsion paint.	Mineral fiber board false ceiling.

TALCHER THERMAL POWER PROJECT
STAGE-III (2X660 MW)
EPC PACKAGE

TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC NO. CS-4540-001-2 SUB-SECTION-D-1-9 CIVIL WORKS ARCHITECTURAL CONCEPTS AND DESIGN

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	INTERIOR FINISHING SCHEDOLE				
S.N O.	DESCRIPTION OF AREA	FLOOR FINISH	WALL FINISH	CEILING FINISH	
	Toilet area	ceramic tiles.	Digitally glazed ceramic wall tiles dado up to 2200 mm	Acrylic distemper	
7.	Ash slurry pump house/ Ash water pump house / Silo Area Utility Building / Ash Water recirculation Pump House/ Transport air compressor house/ HCSD pump house/Fuel Oil Unloading Pump House with switchgear building& control room /H2 generation Building/ Miscellaneous Switchgear room CW Pump house, Switchgear room, control room/ RW Pump house, Switchgear room, control room/Any other Building				
	a) Operating/Mainte nance areas/ MCC room	Cement concrete with Metallic hardener topping	Acrylic distemper	Acrylic distemper (except metal deck area)	

TALCHER THERMAL POWER PROJECT	TECHNICAL SPECIFICATION
STAGE-III (2X660 MW)	SECTION - VI, PART-B
EPC PACKAGE	BID DOC NO. CS-4540-001-2
, ,	BID DOC NO. CS-4540-001-2



	INTERIOR FINISHING SCHEDULE					
S.N O.	DESCRIPTION OF AREA	FLOOR FINISH	WALL FINISH	CEILING FINISH		
	b) Control room /PLC /Office area.	Matt Finished Vitrified Ceramic Tiles	Acrylic emulsion paint.	Mineral fiber board false ceiling.		
	c) Toilet/Pantry area	ceramic tiles.	Digitally glazed ceramic wall tiles dado up to 2200 mm	Acrylic distemper		
8.	Fire Station Building					
	Fire tender area/ storage area	Cement concrete with Metallic hardener topping	Acrylic distemper	Acrylic distemper (except metal deck area)		
	Office area, rest rooms, locker room	Matt Finished Vitrified Ceramic Tiles	Acrylic emulsion paint.	Mineral fiber board false ceiling.		
	Toilet/Pantry area	ceramic tiles.	Digitally glazed ceramic wall tiles dado up to 2200 mm	Acrylic distemper		
9.	O&M store building/Dozer Shed					
	a) Stores/dozer shed	Cement concrete with Metallic hardener topping.	Acrylic distemper/ color coated Metal panel cladding	Acrylic distemper (except metal deck area)		

TALCHER THERMAL POWER PROJECT	TECHNICAL SPECIFICATION	SUB-SECTION-D-1-9	
STAGE-III (2X660 MW)	SECTION - VI, PART-B	CIVIL WORKS	PAGE 28 OF 33
EPC PACKAGE	BID DOC NO. CS-4540-001-2	ARCHITECTURAL CONCEPTS AND DESIGN	



S.N O.	DESCRIPTION OF AREA	FLOOR FINISH	WALL FINISH	CEILING FINISH
	b)Office Room, Staff Room/ Electronic Store	Matt Finished Vitrified ceramic tiles.	Acrylic emulsion paint.	Acrylic Emulsion Paint. / Mineral Fibre Board False Ceiling in A.C area
	c)Passages	Matt Finished Vitrified Ceramic Tiles	Acrylic distemper	Acrylic distemper
	d)RCC Stair case	18mm thick polished Marble stone finish.	Marble stone up to 1.2m.ht. & Acrylic Distemper above.	Acrylic Distemper
	e) Toilets	ceramic tiles.	Designer ceramic wall tiles dado up to 2.1 m Height from FFL.	Acrylic distemper
10	Rest Room for O&M Workers			
	Rest room	Cement concrete with Metallic hardener topping.	Acrylic distemper	Metal roof

TALCHER THERMAL POWER PROJECT
STAGE-III (2X660 MW)
EPC PACKAGE



	INTERIOR THUSTHING SCHEDOLE									
S.N O.	DESCRIPTION OF AREA	FLOOR FINISH	WALL FINISH	CEILING FINISH						
	Toilets	ceramic tiles.	Digitally glazed ceramic wall tiles dado up to 2100 high, Acrylic Distemper paint above	Metal roof						
10	Occupational Health Centre with Crèche Facilities									
	a)Waiting Lobby cum Reception/ Doctor's Chamber /First Aid Room/ Patient Room	Matt finish vitrified tiles	Acrylic Emulsion paint	Acrylic Emulsion paint						
	b)Driver's Room	Digitally Glazed vitrified tiles	Acrylic Distemper Paint	Acrylic Distemper Paint						
	c)Toilet area	ceramic tiles.	Digitally glazed ceramic wall tiles dado up to false ceiling level.	Calcium Silicate False Ceiling						

TALCHER THERMAL POWER PROJECT	TECHNICAL SPECIFICATION	SUB-SECTION-D-1-9	
STAGE-III (2X660 MW)	SECTION - VI, PART-B	CIVIL WORKS	PAGE 30 OF 33
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TABLE –A INTERIOR FINISHING SCHEDULE

S.N O.	DESCRIPTION OF AREA	FLOOR FINISH	WALL FINISH	CEILING FINISH
	Creche	5 mm thick vinyl flooring	Glass mosaic tiles in murals & patterns and Acrylic Emulsion Paint	Acrylic Emulsion paint
11	Watch Tower			
	Viewing area	Cement concrete with Metallic hardener topping	Acrylic distemper	Acrylic distemper

Note:

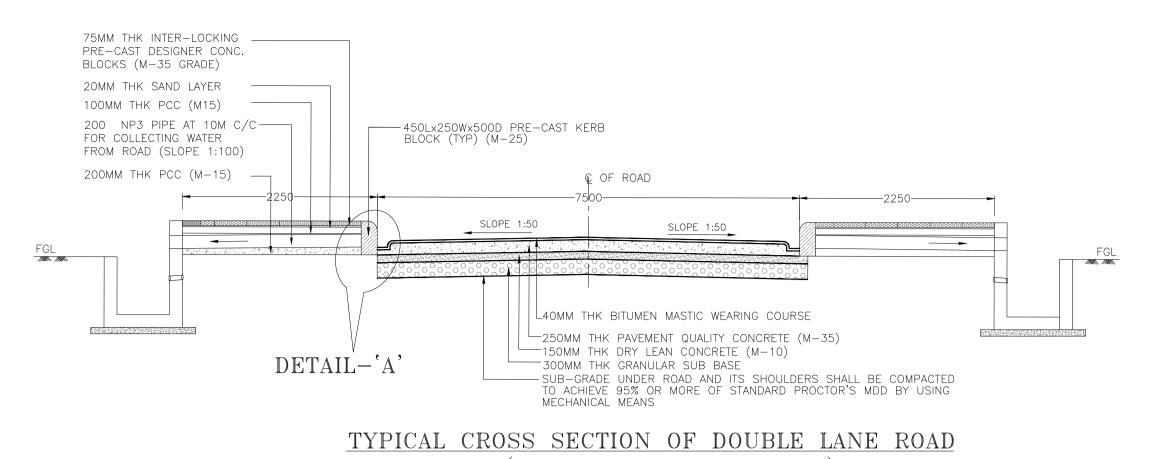
- 1. All wall and roof areas above false ceiling shall be plastered.
- 2. The colour and pattern of finish shall be as per approved details.
- 3. All materials shall be of reputed and established brand approved by Engineer-in-charge.
- 4. Wherever alternative materials are specified, the final selection rests with Engineer-in-charge.
- 5. This finishing schedule shall also be applicable to similar functional areas for all other buildings and facilities.
- 6. All the finishing materials shall be applied/provided as per manufacturer specification and guidelines under the supervision & guidelines of manufacturer.
- 7. Requirement given above are suggestive and minimum. Bidder is welcome to suggest alternative scheme conforming to design functional requirement subject to approval of the Engineer-in-charge.

TALCHER THERMAL POWER PROJECT STAGE-III (2X660 MW)	TECHNICAL SPECIFICATION SECTION - VI. PART-B	SUB-SECTION-D-1-9 CIVIL WORKS	PAGE 31 OF 33
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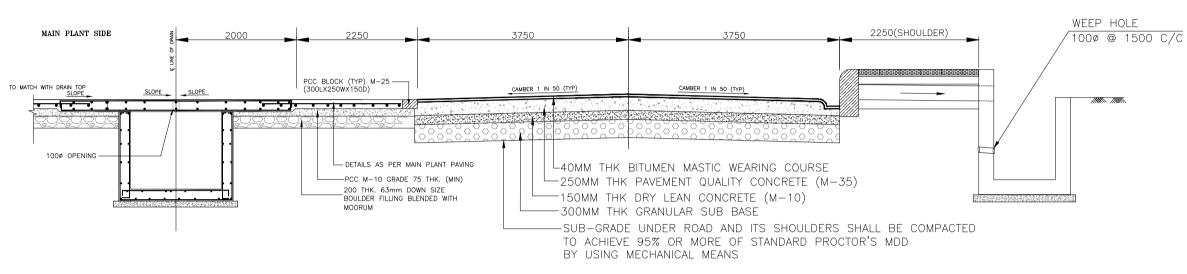
Annexure-P

Details of facilities to be dismantled

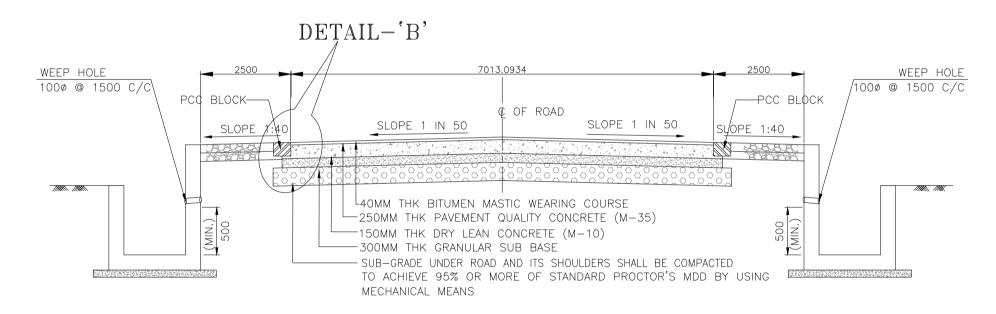
		T	1				1	1		
SI. No.	Name of facility	Total No. of Units	Plinth Area per Unit {Sq.m.}	Total Plinth Area {Sq.m.}	Type of Super-structure	Type of Sub-structure	Storey Configuration	Scope of Dismantling	Facilities envisaged under TTPS Stage-III	Type & Present Location of facility
1	E-type & F-type Qrts in BHEL sector	39	150	5850	Brick masonry load bearing walls	Brick masonry foundation with PCC mudmat	Triple storey	Sub-structure	PT Plant	
2	4R3/4 - Temp Sector	1	620	620	Brick masonry load bearing walls	Brick masonry foundation with PCC mudmat	Single Storey	Sub-structure	Inplant Railway siding	
3	3R21/22 - Sector 2	1	350	350	Brick masonry load bearing walls	Brick masonry foundation with PCC mudmat	Single Storey	Sub-structure	Main Plant - Transformer Yard	
5	2R 49-68 - Sector 2	5	190	950	Brick masonry load bearing walls	Brick masonry foundation with PCC mudmat	Single Storey	Sub-structure	Main Plant - TG Bay	
6	2R 69-108 - Sector 2	10	150	1500	Brick masonry load bearing walls	Brick masonry foundation with PCC mudmat	Single Storey	Sub-structure	Main Plant - tranformer Yard & FO Handling area	
9	1R type - Sector 2	16	220	3520	Brick masonry load bearing walls	Brick masonry foundation with PCC mudmat	Single Storey	Sub-structure	FO handling area, Aux. Boiler, CT & Switchyard	Desidential
10	2RB type - Setor 3	4	140	560	Brick masonry load bearing walls	Brick masonry foundation with PCC mudmat	Single Storey	Sub-structure	Admin Building area	Residential
11	C 3/4 - Sector 1	1	220	220	Brick masonry load bearing walls	Brick masonry foundation with PCC mudmat	Double Storey	Sub-structure	Inplant Railway siding	facilities in
12	C9-12 - Sector 3	2	220	440	Brick masonry load bearing walls	Brick masonry foundation with PCC mudmat	Double Storey	Sub-structure	Admin Building area	
13	D type 9-13/21-32 - Sector 3	5	300	1500	Brick masonry load bearing walls	Brick masonry foundation with PCC mudmat	Double Storey	Sub-structure	Switchyard	Township
14	2R 7 2RA - Sector 4	15	200	3000	Brick masonry load bearing walls	Brick masonry foundation with PCC mudmat	Single Storey	Sub-structure	Construction Office & Workshop	area
15	3R 1-16 Sector 2	8	350	2800	Brick masonry load bearing walls	Brick masonry foundation with PCC mudmat	Single Storey	Sub-structure	Main Plant - TG Hall & FO handling area	uica
16	3R 17-21/ 62-65	4	350	1400	Brick masonry load bearing walls	Brick masonry foundation with PCC mudmat	Single Storey	Sub-structure	Inplant Railway siding	
17	NC 1-4 Temp sector	1	400	400	Brick masonry load bearing walls	Brick masonry foundation with PCC mudmat	Double Storey	Sub-structure	Inplant Railway siding	
18	ND 1-8 Temp sector	8	200	1600	Brick masonry load bearing walls	Brick masonry foundation with PCC mudmat	Single Storey	Sub-structure	Inplant Railway siding	
19	E 139-186 Temp sector	8	150	1200	Brick masonry load bearing walls	Brick masonry foundation with PCC mudmat	Triple storey	Sub-structure	Track Hopper + Ash Silo	
20	F 1-56 Sector 4	7	300	2100	Brick masonry load bearing walls	Brick masonry foundation with PCC mudmat	Double Storey	Sub-structure	BOP Batching Plant area	
21	Club Auditorium	1	698	698	RCC structure with Brick in-fill panels + Structural Steel roof	RCC foundation with PCC mudmat	Single Storey	Sub-structure	Main Plant area - ESP	
22	Club dining hall	1	556	556	RCC structure with Brick in-fill panels	RCC foundation with PCC mudmat	Single storey	Sub-structure	Main Plant area - ESP	
23	Stadium gallery	1	1170	1170	Brick masonry load bearing walls	Brick masonry foundation with PCC mudmat	Double Storey	Sub-structure	Main Plant area - Boiler	
24	POLICE OUTPOST	1	128	128	Brick masonry load bearing walls	Brick masonry foundation with PCC mudmat	Single storey	Sub-structure	Main Plant - TG Bay	
25	Outpost front shop	1	49	49	Brick masonry load bearing walls	Brick masonry foundation with PCC mudmat	Single storey	Sub-structure	Main Plant - TG Bay	
26	Medicine store	1	32	32	Brick masonry load bearing walls	Brick masonry foundation with PCC mudmat	Single storey	Sub-structure	Main Plant - TG Bay	
27	ATM (SBI)	1	15	15	Brick masonry load bearing walls	Brick masonry foundation with PCC mudmat	Single storey	Sub-structure	Main Plant - TG Bay	
28	Cable tv room	1	46	46	Brick masonry load bearing walls	Brick masonry foundation with PCC mudmat	Single storey	Sub-structure	Main Plant - Transformer Yard	Non
29	Mangla mandir	1		75	Brick masonry load bearing walls	Brick masonry foundation with PCC mudmat	Single storey	Sub-structure	Main Plant - Transformer Yard	Non-
30	Kalayani Mandap	1	82	82	Brick masonry load bearing walls	Brick masonry foundation with PCC mudmat	Single storey	Sub-structure	Main Plant - Transformer Yard	residential
31	shopping centre	1	600	600	Brick masonry load bearing walls	Brick masonry foundation with PCC mudmat	Single storey	Sub-structure	Main Plant - Transformer Yard	
33	Durga Mandap	1	575	575	Brick masonry load bearing walls	Brick masonry foundation with PCC mudmat	Single storey	Sub-structure	Main Plant - Transformer Yard	facilities in
37	DAV TT HIGH SCHOOL	1	1410	1410	Brick masonry load bearing walls	Brick masonry foundation with PCC mudmat	Single storey	Sub-structure	Main Plant area -ID Fan	Township
39	LITTLE ANGEL SCHOOL	1	250	250	Brick masonry load bearing walls	Brick masonry foundation with PCC mudmat	Double storey	Sub-structure	Main Plant area - Boiler	area
40	DAV TT HIGH SCHOOL	1	1053	1053	Brick masonry load bearing walls	Brick masonry foundation with PCC mudmat	Single storey	Sub-structure	Main Plant area -ID Fan	
44	BADMINTON HALL	1	406	406	Structurel Steel with sheet cladding	RCC foundation with PCC mudmat	Single Storey	Sub-structure	Main Plant area - Boiler	
45	OAT Stage	1	298	298	Structurel Steel with Brick in-fill panels	RCC foundation with PCC mudmat	Single Storey	Sub-structure	Main Plant area - ESP	
46	OLD EWA Building	1	221	221	Structurel Steel with Brick in-fill panels	RCC foundation with PCC mudmat	Single Storey	Sub-structure	Main Plant - Transformer Yard	
53	RC	1	2880	2880	RCC structure with Brick in-fill panels + Structural Steel roof	RCC foundation with PCC mudmat	Single Storey	Sub-structure	Main Plant - Transformer Yard	
54	Security barrack	1	1084	1084	Structural Steel shed	RCC foundation with PCC mudmat	Single Storey	Sub-structure	Main Plant area - ESP	
55	DAV TT H.SCHOOL C.STAND	1	365	365	Structural Steel shed	RCC foundation with PCC mudmat	Single Storey	Sub-structure	Main Plant area -ID Fan	
58	Vehicle Parking Sheds	1	400	400	Structural Steel shed	RCC foundation with PCC mudmat	Single Storey	Sub-structure	Main Plant area	
59	Store Sheds	28	640	17920	Structural Steel shed	RCC foundation with PCC mudmat	Single Storey	Sub-structure	Main Plant - Ash handling, TAC,CAC & ESP	
60	Under ground Diesel tank	1	100	100		Under ground RCC sump		Sub-structure	Main Plant - ID fan area	
61	Watch Towers	7	20	140	Brick masonry load bearing walls	Brick masonry foundation with PCC mudmat	Triple storey	Sub-structure	Main Plant & CHP area	
62	Admin Building	1	2998	2998	RCC structure with Brick in-fill panels	RCC foundation with PCC mudmat	Double storey	Sub-structure	Main Plant area -CPU area	Facilities in
63	C&M office Building	1	378	378	RCC structure with Brick in-fill panels	RCC foundation with PCC mudmat	Double storey	Sub-structure	Main Plant area -TAC	Plant area
64	Old Admin BUILDING	1	1622	1622	RCC structure with Brick in-fill panels	RCC foundation with PCC mudmat	Double storey	Sub-structure	Main Plant area - Boiler	
65	Safety building	1	103	103	Brick masonry load bearing walls	Brick masonry foundation with PCC mudmat	Single storey	Sub-structure	Main Plant area -CPU area	
66	Weigh Bridge Room	1	40	40	Brick masonry load bearing walls	Brick masonry foundation with PCC mudmat	Single storey	Sub-structure	Main Plant area -TAC	
67	DG room	1	53	53	Brick masonry load bearing walls	Brick masonry foundation with PCC mudmat	Single storey	Sub-structure	Main Plant area -CPU area	
68	plant tea stall	1	86	86	Brick masonry load bearing walls	Brick masonry foundation with PCC mudmat	Single storey	Sub-structure	Main Plant area - Boiler	
69	ETP Building with associated equipments	1	NA	NA	RCC and Brick	RCC	-	Sub-structure and Super Structure	Coal stock Pile	
70	Coal conveyor#16,17,R1,R2,TP#14&10B,stacker cum Reclaimer,stacker,R2 shed	NA	NA	NA	RCC, Steel Structure	RCC	-	Sub-structure and Super Structure		
71	Heavy Machinery Shed	NA	NA	NA	RCC, Steel Structure	RCC	-	Sub-structure and Super Structure		



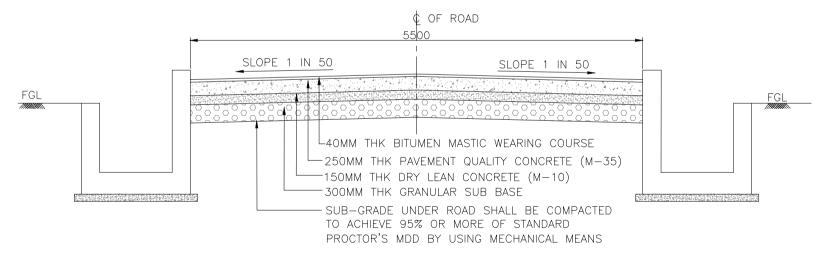
(WITH RAISED SHOULDERS)



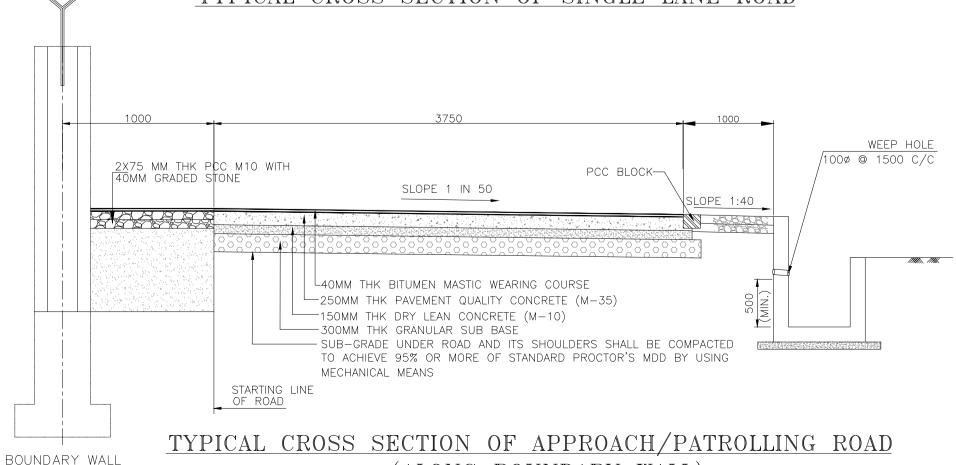
TYPICAL CROSS SECTION OF DOUBLE LANE SURROUNDING MAIN POWER HOUSE



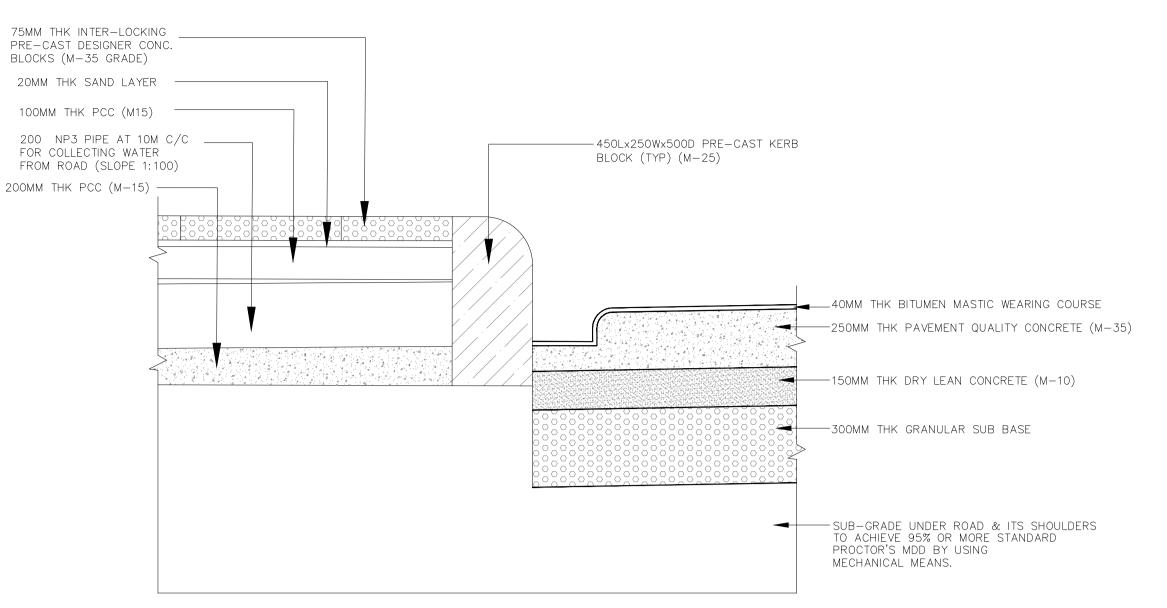
TYPICAL CROSS SECTION OF DOUBLE LANE ROAD (WITH FLAT SHOULDERS)



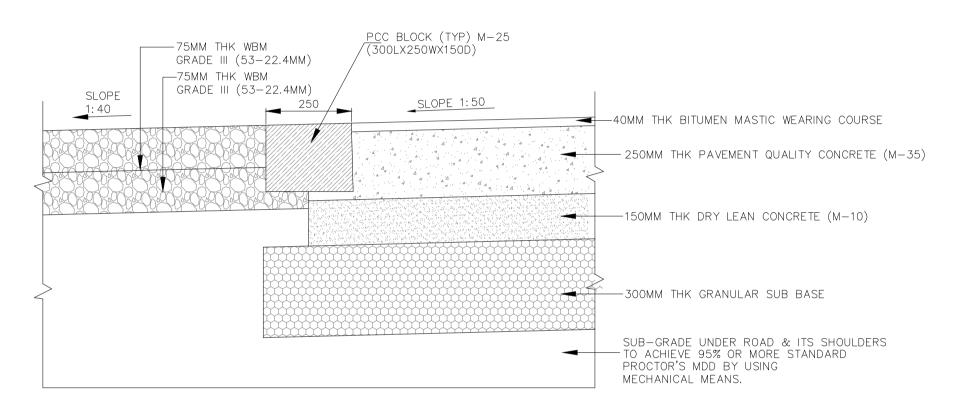
TYPICAL CROSS SECTION OF SINGLE LANE ROAD



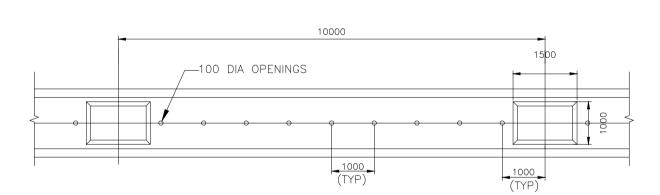
(ALONG BOUNDARY WALL)



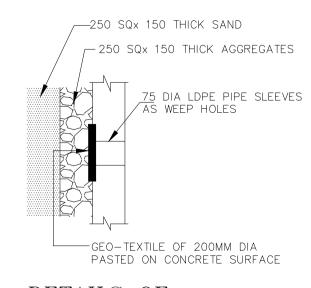
DETAIL-'A'



DETAIL-'B'



MANHOLE/DRAIN COVER LAYOUT PLAN IN MAIN PLANT AREA (TYPICAL)



DETAILS OF WEEP HOLES

NOTES

- 1. ALL DIMENSIONS ARE IN MM AND LEVELS ARE IN METRES.
- 2. TOP OF ROAD CREST LEVEL SHALL BE 350MM ABOVE THE FINISHED GROUND LEVEL(FGL).
- 3. THE CREST LEVEL OF THE ROAD SHALL CORRESPOND TO THE LEVEL AT THE TOP OF CONCRETE PAVEMENT AT THE CENTRE OF ROAD.
- 4. CAMBER SHALL BE PROVIDED AT SUBGRADE LEVEL.
- 5. ALL EXCAVATION WORK, BACK FILLING, LAYING OF VARIOUS LAYERS OF ROAD CONSTRUCTION SHALL BE AS PER TECHNICAL SPECIFICATIONS.
- 6. NO MATERIAL WITH CBR VALUE LESS THAN 100% SHOULD BE USED IN
- BASE CONSTRUCTION. 7. THE SHOULDERS ON BOTH SIDES OF THE ROAD SHALL BE PROPERLY
- COMPACTED.
- 8. ROAD CONSTRUCTION SHALL BE DONE AS PER DETAIL DRAWING OF ROAD.
- 9. CONCRETE SHALL BE OF GRADE M25 FOR DRAINS AND CULVERTS AS PER IS: 456-2000.

ISOMETRIC VIEW OF

KERB BLOCK

DETAILS OF

KERB BLOCK

SECTION B

DETAILS OF 200 DIA NP3 PIPES LAYING AT 10M C/C

(CONTINUOUS CRADLE BEDDING)

— 200¢ NP3 PIPE

FOR COLLECTING

WATER FROM ROAD 150 (SLOPE 1:100)

(WITH 20 MM DOWN AGGREGATE)

REFERENCE DRAWING

- 1. 4540-999-POC-F-001 TITLED 'GENERAL LAYOUT PLAN'
- 2. 4540-001-POC-A-004 TITLED 'LAYOUT OF ROADS'

FOR TENDER PURPOSE ONLY



NTPC L (A GOVERNMENT OF INDIA ENTERPRISE) ENGINEERING DIVISION

TALCHER THERMAL POWER STATION STAGE-III (2X660 MW)

THICKNESS OF PQC CHANGE AS PER TECHNICAL SPECIFICATION MANOJ KK O FOR TENDER PURPOSE ONLY MANOJ KK - CS 30.11.2 DRN DESIGN CHKD. C C&I ES DESCRIPTION CLEARED BY

DETAILS OF ROADS

SIZE 4540-001-POC-A-006

REV. NO.

SL. NO. ANNEXURE – Q

SPECIFICATIONS FOR 100% SOLIDS, HIGH BUILD, ELASTOMERIC POLYURETHANE COATING FOR CONCRETE IN SEAWATER APPLICATIONS

- 1.00.00 The coating shall meet minimum requirements for materials, equipment, application, inspection, repair and handling aspects associated with the coating of Concrete In Sea water Applications using 100% Solids (Solventless) Two Component, Fast Curing Elastomeric Polyurethane Coating classified under ASTM D -16, Type V.
 1.01.00 The polyurethane on the external / internal surface of the Concrete shall provide a hard
- 1.01.00 The polyurethane on the external / internal surface of the Concrete shall provide a hard yet flexible, impermeable barrier with outstanding adhesion impact and abrasion resistance as well as crack spanning capability to protect the Concrete from corrosion and abrasion. It shall cover all variations associated with operating conditions of NDCT.
- 1.02.00 Supplier or his licensed applicator shall obtain prior written approval from the Owner for any deviations from the requirements of this specification and / or the standard referred herein.
- 1.03.00 The work shall conform to following documents (latest revision or as specified) and as referred in this specification.
 - a) SSPC-PS Guide 17.00, 1 Aug, 1991 Guide for Selecting Urethane Painting System
 - b) RP 0892-92 NACE International

Linings Over Concrete For Immersion

Service

c) RP 0187-96 NACE International

Design Considerations For Corrosion Control of Reinforcing Steel In Concrete.

d) ASTM D 4541 Method for Pull Off Strength of Coatings
Using Portable Adhesion Testers

2.00.00 GENERAL REQUIREMENT

2.01.00 The bidder shall perform all work in accordance with this specification and other requirements noted herein.

Bidder shall submit a detailed written description in the form of a manual covering coating equipment, procedure, materials, inspection, tests and repair etc, for Owner's approval.

2.02.00 The bidder shall also supply copies of test reports conducted by in internationally reputed test agencies evidencing that materials conform to minimum performance requirements. The bidder shall also supply certificates from coating manufacturer as under.

- That the materials (with batch numbers, dates of manufacture and shelf life) are free from all manufacturing defects.
- That the materials will meet performance criteria as given below when applied.
- That the bidder or his applicator possesses the necessary technical skills and equipment to apply these materials and is authorized by the manufacturer for this purpose.

100% Solids, Two Component Polyurethane are specialized coatings characterized by very short pot lives. The coating shall be applied either by the coating material manufacturer himself or by his authorized applicator. The authorized applicator should have been trained and certified by the coating manufacturer and shall possess the necessary specialized equipment, trained crew and experience in spraying fast setting plural component polyurethane coatings. Contractor shall provide, for the owner's approval, details of coating manufacturer's authorized applicator including details of equipment, experience in spraying fast setting 100% Solids Polyurethane Coatings and client references for verification. In no case shall coating application be undertaken by coating contractors without prior track record of applying these materials. In addition, contractor shall provide certificate from coating materials manufacturers that the applicator possesses the necessary technical skills and equipment to apply these materials and is authorized by the manufacturer for this purpose.

2.03.00 Applied coating will be tested for dry film thickness and adhesion and hardness.

All coating operations shall be performed under the supervision of, and performed by, personnel skilled in the application of the coating system.

- 2.04.00 The bidder shall provide access, during all phases of work, to the Owner and their representatives.
- 2.05.00 All cleaning, priming and coating machines shall be equipped with rubber or wheels overlaid with hard fiber to prevent damaging the concrete surface.
- 2.06.00 The materials shall be applied by Airless Spray System, as per the standards specified by the material manufacturer.
- 2.07.00 100% Solids Polyurethane systems are solvent free eliminating solvent health hazards and flammability concerns All safety precautions warranted by good industrial hygiene practices and regulated by local, state or central laws must be taken into consideration while applying these coatings.
- 3.00.00 MATERIAL SPECIFICATIONS
- 3.01.00 ELASTOMERIC POLYURETHANE COATING:

Spray applied, Impermeable, 100% Solids, Elastomeric Aromatic Polyurethane Coating (Non Tar Extended), as per ASTM D-16, Type V (Two Component, Chemical Cure). Shall meet following criteria. All tests at ambient (25 C) unless otherwise specified.

2,000 Microns NOMINAL THICKNESS TENSILE STRENGTH $17 \text{ N} / \text{mm}^2$ **ASTM D-638** $2 \text{ N}/\text{mm}^2$ **ADHESION** ASTM D-4541 (Elcometer Pull Off) • RECOVERABLE ELONGATION 50% Min. **ASTM D-638** 50 Min. • SURFACE HARDNESS ASTM D 2240 (Cured Film - Shore D) 0.3 gms. / 24 Hour / M2 Max. WATER VAPOUR PERMEABILITY ASTM E - 96 / F-1249-90 0° C to 60°C RESISTANCE TEMPERATURES **FLEXIBILITY** Pass over 12 mm Mandrel 180° Bend -1.0 mm thick **ASTM D 1737** Excellent. Some Discoloration. ACCELERATED WEATHERING ASTM G – 154 53 / BS 3800 2,000 Hours Weight Loss 0.05 gms. Max ABRASION RESISTANCE ASTM D 4060 /FTMS 141 Taber Abraser H - 10 Wheel 1,000 gms., 1,000 cycles CHEMICAL RESISTANCE Immersion of 30 days in sea water followed by (%) Weight Change < 1.0 % < 5.0 % (%) Hardness (Shore D) Change (%) Tensile Strength Change < 5.0 %

3.02.00 **PRIMER**

Primer shall be used on new concrete surfaces before application of PU coating.

Damp tolerant, penetrating, sealing primer shall be applied at 100-125 Microns Wet Film Thickness in accordance with the recommendation of the Polyurethane Coating manufacturer.

4.00.00 **SURFACE PREPARATION**

4.01.00 The bidder shall be responsible for the structural integrity of the concrete.

The use of form release agents shall be compatible to the coating. Contractor shall take measures in concrete casting to provide a suitable surface finish that shall be compatible with subsequent application of coating. The measures shall include providing well compacted, dense concrete with minimal air entrainment and a relatively smooth surface finish. Pond floor shall be vacuum dewatered.

Remove any fins or protrusions using power grinding. These may also be required to be removed for applications requiring an even finish.

Residual bug – holes beneath the surface of the coating shall be opened by sweep blasting and flooded with Polyurethane coating during spray application. Any larger voids shall be filled with Elastomeric Polyurethane hand mix material or compatible grout. Active cracks shall be bridged by using Elastomeric Polyurethane over Industrial Nylon / Polyester Fabric. Any exposed steel surfaces shall be wire brush cleaned and primed before coating application.

- 4.02.00 Exterior waterproofing shall be applied to the structure below the finished ground level and upto atleast 300 mm above it. The structure shall be sealed from the exterior (soil side) to block capillary action of moisture through the concrete. Leaks from groundwater can permeate the entire concrete thickness. The exterior waterproofing system must be suitable for the expected exposure condition.
- 4.03.00 Before general surface preparation, surface contaminants (if any) shall be removed. Oil and Grease shall be removed by multiple detergent wash, preferably using steam. (Solvents shall not be used as they will cause the petroleum products to penetrate the concrete surface). Chemically contaminated concrete shall be neutralized prior to complete surface preparation. Acidic surfaces shall be neutralized using an alkaline cleaner and rinsed with fresh water and then cleaned with steam and detergent. After chemical cleaning, surface will be tested for residual chemicals. pH shall be tested using ASTM D 4262 using pH test paper on rinse water. Concrete shall be dried thoroughly thereafter.
- 4.04.00 Sweep blast the concrete surface using expendable abrasive. The blast nozzle should be kept at sufficient distance to avoid over blast and exposing of aggregate. Following blasting remove dust using air jet (with the abrasive turned off).
- 4.05.00 Any of the following methods of surface preparation may be used to achieve a near white blast cleaned surface:
 - a) Dry abrasive blasting using compressed air, blast nozzles and abrasive.
 - b) Dry abrasive blasting using a dosed cycle, re-circulating abrasive system, with compressed air, blast nozzle, and abrasive, with or without vacuum for dust and abrasive recovery.
 - c) Dry abrasive blasting using a dosed cycle, re-circulating abrasive system with centrifugal, wheels and abrasive (such as Wheelabrator).
- 4.06.00 Compressed air used for blast cleaning shall be dean, dry and free of moisture and oil. Moisture separators, oil separators, traps or other equipment may be necessary to achieve dean, dry air.

- 4.07.00 Blast cleaning operations shall be done in such a manner that no damage is done to partially or entirely completed portions of the work.
- 4.08.00 Dry blast cleaning shall not be concluded during times when the surface will become wet after blast cleaning.
- 4.09.00 Non-metallic disposable mineral abrasive such as silica sand shall be the chosen abrasive for open blasting operations Steel grit and shot are approved abrasive media for blast cleaning in closed cycle, recirculating abrasive systems (compressed air, vacuum and centrifugal wheel). No other abrasive media shall be used without prior approval.
- 4.10.00 The cleanliness and size of recycled abrasive shall be maintained to ensure compliance with this standard.
- 4.11.00 The blast cleaning abrasive shall be dry and free of oil, grease and other contaminants. Applicator shall use abrasive media of size that will ensure the necessary roughness desired.
- 4.12.00 Dust and residues shall be removed from prepared surface by brushing, blowing off with dean, dry air or vacuum cleaning. Moisture separators, oil separators, traps or other equipment may be necessary to achieve clean, dry air.
- 4.13.00 Prior to the application of Elastomeric Urethane on new concrete surface, sufficient time must pass to allow the excess moisture to evaporate. This time will vary on conditions and is normally 14-28 days. After the curing period has elapsed, concrete must be checked for the presence of excess moisture on and beneath the surface using a Delmhorst BD-8 Moisture Detector. A reading of 2% and under indicates that the concrete is ready to be coated. The moisture content must not only be checked on the surface but beneath it by driving nails 6-12 mm into the concrete and placing the probes on the nail heads. Alternatively the moisture may be tested by the Plastic Sheet Test ASTM D-4263. The test involves taping a 450 mm X 450 mm, 0.1 mm thick dear plastic sheet to the surface of the concrete for a duration of 16 hours. Absence of any droplets of moisture underneath the plastic sheet indicates that the concrete is ready for coating.

In cases of continued ingress of moisture from localised areas of concrete, apply propane blow torch to ensure that the moisture content as specified above is achieved.

5.00.00 **PRIMING**

- 5.01.00 Before beginning priming and coating, measure the humidity using a sling psychrometer and calculate the dew point. The relative humidity must be lower than 85%. Temperature of concrete surface must be at least 3°C higher than the dew point. Under controlled conditions, it is possible to heat the concrete surface to eliminate condensation problems.
- 5.02.00 The type of primer used shall be as described in the coating specification 3.02.00.
- 5.03.00 Primer shall be sprayed onto the cleaned surface with a wet film thickness of 75-125 Microns. Since the primer penetrates into the concrete surface, no DFT measurements

will be taken and estimation shall be on volumetric basis. The primer on application shall be free from runs or drips or areas of excessive thickness.

- 5.04.00 The primed surface shall be protected so that it will not come into contact with rain, dust or other substances until completely hardened and coated with the Elastomeric Polyurethane Top Coat.
- 5.05.00 Primed surface should be over coated within the time recommended for the approved type of primer. In the event that the re-coat interval of primed surface is exceeded without top-coating with the Elastomeric Polyurethane, the surface must be re-primed.

6.00.00 **COATING**

6.01.00 Nominal thickness of the Elastomeric Polyurethane shall be 2,000 Microns, measured in accordance with 7.02.02. Being a thixotropic, high build, non-levelling coating, the Elastomeric Polyurethane coating shall take the contour / profile of the substrate.

Coating shall be done only at times when the substrates temperature is at least 3°C over the dew point. Hourly measurements of dew point and surface temperatures shall be made prior to and when coating is under progress. Surface temperature should be minimum 5°C and should not exceed 70°C.

- 6.02.00 Equipment for the spray application shall be in conformity with system specification, meeting minimum specified by the coating manufacturer. Equipment shall consist of Material Feed Pumps, Purge Pump, Proportioning Pump, Mix Manifold, Static Mixer, Interconnecting Hoses etc.
- 6.03.00 Partially used and unused material drums must be tightly sealed and contain a blanket of nitrogen to prevent moisture contamination when not in use.
- Before application on the substrate apply a test patch for runs or drips and gel time as well as tack free time.
- 6.05.00 The proportioning pump shall be fitted with a numeric counter to keep track of the volume while spraying.
- 6.06.00 Entire thickness shall be built up in a single application (with a number of passes). If the surface is large enough to require more than one day for the coating, the edges of the coated areas shall be feathered and roughened with a grinding too) prior to beginning priming and coating.
- 6.07.00 Areas not to be coated shall be masked with disposable plastic sheets, cardboard etc.
- 6.08.00 Visual inspection shall be made for film discontinuities such as air bubbles, blowholes, skips, shadows. Such defects will be marked and repaired with Elastomeric Polyurethane hand mix kit with slower pot life after roughening the edges.

7.00.00 INSPECTION

7.01.00

All work under this specification shall be subject to inspection by the owner or his representative. All parts of work shall be accessible. The applicator shall correct such work as is found defective and not as per the specifications.

7.02.00

The following tests shall be made:

During coating application the wet film thickness will be measured using Nordson wet Film Gauge as per ASTM D 4414.

7.02.01

Adhesion

Pull Off adhesion to Concrete measured using an portable adhesion tester such as Positest AT-CM Elcometer or equivalent as per ASTM D4541 on fully cured (7 days) concrete. Frequency shall be 3 readings per 1,000 Sq.M of coated area. The average of readings from three five randomly selected areas shall constitute the adhesion and shall be minimum 2 N/mm2 (see below). Test area to be flat (without curvature). The following method will be used to determine whether coating meets adhesion requirements

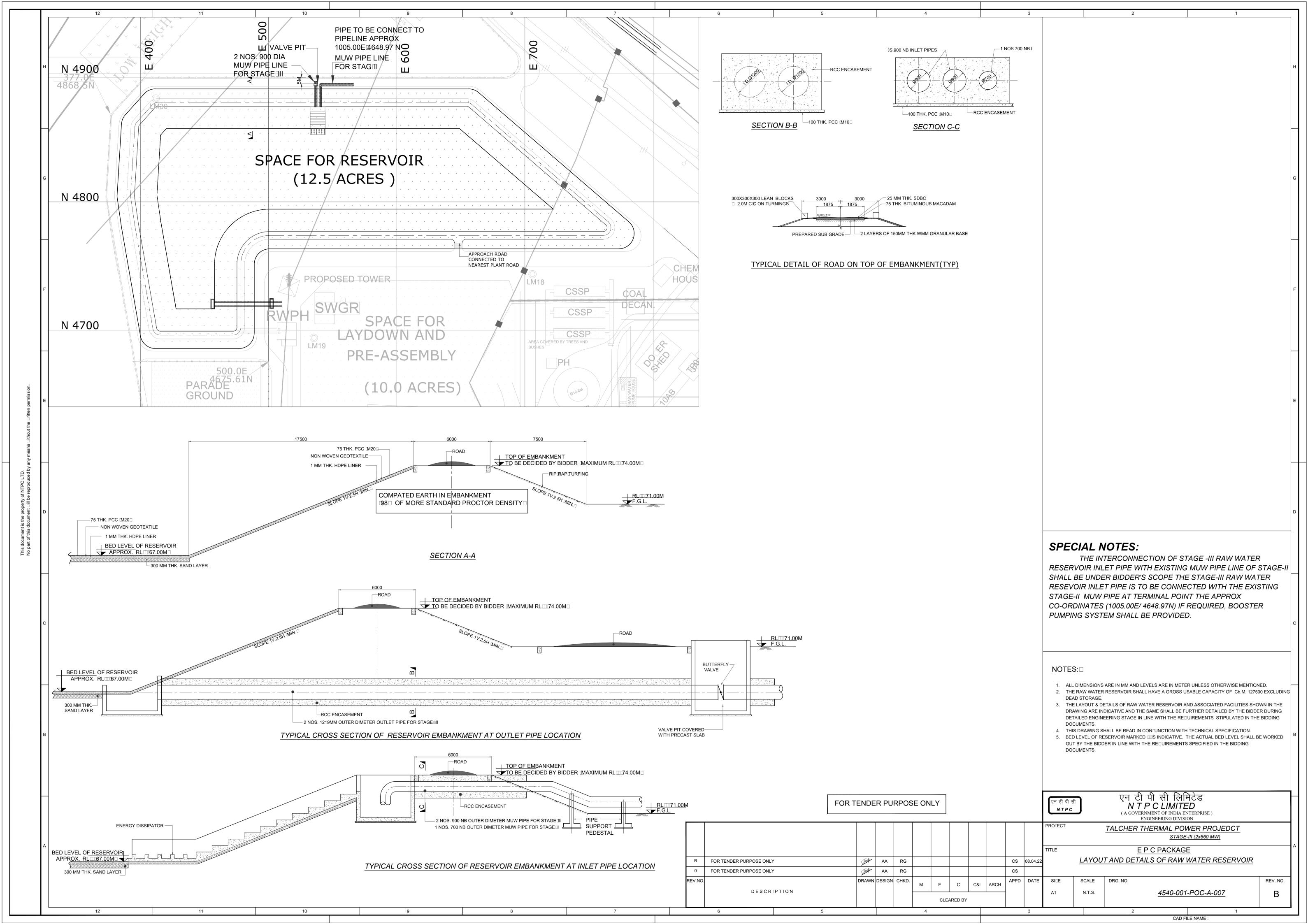
Elcometer Reading	Type	of Failure	Result / Conclusion	
> 2 N / mm ²	T1	90% or more of break at coating - concrete interface	Take actual reading of bond	
	T2	90% of more of break within the concrete	2	
< 2 N / mm ²	Т1	90% or more of break at coating - concrete interface		
	T2	90% of more of break within the concrete		

7.02.02 Film Thickness (DFT)

The film thickness shall be determined from the thickness of the coating detached along with the Elcometer dollies of the adhesion test and the readings shall be recorded. Frequency shall be identical to adhesion test. Average of 3 reading shall constitute the film thickness and shall be al least 2,000 Microns. Minimum spot reading shall be 1,800 Microns. Recommended spread rate by the manufacturer for the specified thickness of the PU coating shall be ascertained and adhered to during the coating process.

7.02.03 Hardness (Durometer)

Cured films (7 days) shall be tested for hardness using Durometer (Shore D) as per ASTM D 2240.



		Specification Refer	ence		Existing	Read As
SI. No	Sec/Part	Sub Sec	Page No.	Clause No.		
E-QA-01	SECTION - VI /PART - B	SUB-SECTION-E-2 ELECTROSTATIC PRECIPITATOR	Page 1 of 1	1.03.00 c	(ii) For plates of 25mm < thickness < 32mm - 10% RT and 100% MPI.	(ii) Please refer Chapter E-01clause no. 1.02.11, c, ii for NDT requirements.
E-QA-02	SECTION - VI /PART - B	SUB-SECTION-E-4 FLUE GAS DESULPHURISATION SYSTEM	Page 3 of 5	1.08.03	ii) For plates of 25mm<=thickness<32mm-10% RT and 100% MPI.	(ii) Please refer Chapter E-01clause no. 1.02.11, c, ii for NDT requirements.
E-QA-03	SECTION - VI /PART – A	Annexure-B to subsection II C SMART PROJECT MANAGEMENT SYSTEM	PAGE 3 OF 4	6.04.0	Computed RT shall be used as an advanced Engineering Practice. Main contractor to ensure minimum 10% computed radiography of weld joint to be performed in construction phase. Main contractor to ensure the transfer & storage of these records in Server	6.04.00 Computed Radiographic Testing (RT)—Computed RT shall be used as an advanced Engineering Practice. Main contractor to ensure minimum 10% computed radiography of weld joint to be performed in construction phase for scope agreed in FWS for boiler pressure parts. Main contractor to ensure the transfer & storage of these records in Server

Doc. No.: CS-4540-001A-2-TECH-AMDT. 01

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TALCHER SUPER THERMAL POWER PROJECT STAGE - III	DOC NO.	Annexure-III
FQA – NETRA LABORATORY – LIST OF EQUIPMENT	REV NO.	01
LIST OF MEASURING & TESTING EQUIPMENT	DATE	06.04.2022

SN **EQUIPMENT DESCRIPTION**

QUANTITY

A NON – DESTRUCTIVE TESTING (NDT) EQUIPMENT

1 Digital Radiography

1 no

Portable X-ray Source: It should have following minimums specification:

- a. Portable constant potential metal ceramic x-ray tube with maximum capacity not less than 300 KV. The working voltage should be adjustable and lowest working voltage should be 50KV or less.
- b. Focal Spot size (As per EN12543) not be more than 1 mm.
- c. Minimum current adjustment ranges at least from 0.5 to 4.5 mA.
- d. Max tube power not less than 900 W.
- e. Emergent Beam shall be of $\sim 30 \text{ X } 60^{\circ}$.
- f. Capability to operate in ambient temp and shall be rugged enough to work in industrial environment
- g. Continuous exposure at full capacity for at least 1 Hr at 25°C.
- h. It should comply with the DIN 54113 or other international Standards.

Flat Panel Detector: A flat panel detector to be used with X-ray source (up to 300 KV) and Gamma radiation source such Iridium 192 & Cobalt 60, is required radiographic inspection of power plant components in the field conditions as well as in laboratory.

- 2.1 **Detector:** It shall have following minimums specification:
 - a. It should be rugged enough to use in industrial field application.
 - b. Amorphous silicon based flat panel detector with suitable scintillating material such as Gadolinium Oxysulfide etc. Pixel pitch should be equal or better than 200 micron.
 - c. Size of the detector shall not be less than 8*8 inch and active/imaging area of the detector shall not be less than 200*200 mm.
 - d. Weight of the detector shall not be more than 5.5 kgs.
 - e. It shall have wireless and wired interface/communication with acquisition/analysis work station (either laptop or tablet). A suitable communication cable of 50 meters length shall also be supplied.
 - f. It shall able to operate in ambient temperature conditions (-10 to 50°C)
 - g. Equipment shall work with AC power supply (230V, 50Hz). Necessary attachments/charger/adaptor to be supplied for making the equipment work/charge with Indian style 3 pin sockets.
 - h. Equipment shall also work rechargeable batteries and same shall be supplied. Separate battery charger required shall also be supplied.

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TALCHER SUPER THERMAL POWER PROJECT STAGE - III	DOC NO.	Annexure-III
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LIST OF MEASURING & TESTING EQUIPMENT	DATE	06.04.2022

	LIST OF MEASURING & TESTING EQUIPMENT DATE 0	06.04.2022
SN	EQUIPMENT DESCRIPTION	QUANTITY
2	Radiation Survey Meter as per requirement	1 no
3	Radiography film viewer as per requirement	2 nos
4	Personal digital dosimeter as per requirement	2 no
5	Radiography Film densitometer as per requirement	1 no
6	Radiography Film samples (ASME) as per requirement	1 no
7	Computed Radiography (CR) Scanner Computed Radiography Scanner:	1 no
	 a. It shall have basic spatial resolution of 50 microns or better. b. Built in erasing feature to erase the IP. c. Scanner shall be capable of scanning image plates of size of at least up to 14-inch width. d. Scanning capture/grey level – 16 bit or better for higher sensitivity e. It shall comply with the requirements of ASME (Sec-V, article-2), EN 14784-1 or ASTM 2445 or EN 2446-06 or ISO 17636-2 specifications or related national / international Standards. f. Provision for output in each of the image formats-DICONDE. TIFF, JPEG etc. g. Provision for PC Connectivity h. Scanner should be BAM certified i. Capability to operate in ambient conditions (at least up to 35° C) and shall be rugged enough to work in industrial environment. j. Equipment shall work with AC power supply (230V, 50Hz, single phase). Necessary attachments/charger/adaptor to be supplied for making the equipment work/charge with Indian style 3 pin sockets. If equipment is capable on working with rechargeable battery, same shall also be supplied. 	r , , , , , , , , , , , , , , , , , , ,
8	Ultrasonic testing machine -Conventional with Probes and calibration blocks ULTRASONIC FLAW DETECTOR (A- SCAN AND 'B' FACILITY)	1 no
	AND ITS ACCESSORIES. Portable ultrasonic equipment for flaw detection in power plant components	5
	(with A scan and B facility) with following features – 1. Test range: Minimum 0- 2mm (steel velocity), Maximum 0- 5000 mm (steel velocity)	1
	velocity) 2. Test mode should be pulse echo and transmit/receive (dual type). 3. Gain range should be 0 to 110 db (minimum) with provision of digital adjustment of gain.	1