BORE LOG SHEET	Centre for Advanced Engineering							Bore Hole No.: BH-12 (Sheet 2)
Project: SOIL_BHEL_NTPC-KAHALGAON_ESP AREA								Job No.: Soil - 1582
Co-ord: E= 3286.00, S= 1974.20		E.G.L.: 33.86		Unit:				Bore Hole Dia. : 150 MM.
Type of Boring	Shell & Auger	FIELDTEST	NOS.	SAMPLES	NOS.	SAMPLES	NOS	Commenced on : 29.03.2018
Depth of Boring	40.000 M.	SPT	21	UDS	8	WS		Completed on : 31.03.2018
Type of Drilling		DCPT		DS	24	RCS		Water Struck At : 0.50 M.
Depth of Drilling		VST		SCPT				Standing Water Table : 0.40 M.

DESCRIPTION	SYMBOL	DEPTH	N-VALUE	SAMPLE NO.	SAMPLE DEPTH
Very stiff to hard brownish grey clayey silt/ silty clay with traces of kankar.		26	N = 31	SPT11	25.00-25.45M
				DS14	25.00-25.45M
		27	N = 35	SPT12	26.50-26.95M
				DS15	26.50-26.95M
		28	N = 38	SPT13	28.00-28.45M
				DS16	28.00-28.45M
		29			
		30	N = 42	SPT14	29.50-29.95M
				DS17	29.50-29.95M
		31	N = 46	SPT15	31.00-31.45M
				DS18	31.00-31.45M
		32			
		33	N = 49	SPT16	32.50-32.95M
				DS19	32.50-32.95M
		34	N = 53	SPT17	34.00-34.95M
				DS20	34.00-34.95M
		35			
		36	N = 55	SPT18	35.50-35.95M
				DS21	35.50-35.95M
		37	N = 54	SPT19	37.00-37.45M
				DS22	37.00-37.45M
		38			
		39	N = 60	SPT20	38.50-38.95M
				DS23	38.50-38.95M
		40	N = 65	SPT21	39.55-40.00M
Termination Depth 40.000 Mtr.				DS24	39.55-40.00M
		41			
		42			
		43			
		44			
		45			
		46			
		47			
		48			
		49			

SPT - Standard Penetration Test DCPT - Dynamic Cone Penetration Test.	VST- Vane Shear Test UDS - Undisturbed Sample	DS - Disturbed Sample SCPT-Static Cone Penetration Test.	WS - Water Sample RCS - Rock Core Sample

BORE LOG SHEET		Centre for Advanced Engineering						Bore Hole No.: BH-21 (Sheet 1)
Project: SOIL_BHEL_NTPC-KAHALGAON_ESP AREA								Job No.: Soil - 1582
Co-ord: E= 3046.50, S= 1950.30		E.G.L.: 34.03		Unit:				Bore Hole Dia. : 150 MM.
Type of Boring	Shell & Auger	FIELDTEST	NOS.	SAMPLES	NOS.	SAMPLES	NOS	Commenced on : 19.03.2018
Depth of Boring	35.000 M.	SPT	17	UDS	8	WS		Completed on : 20.03.2018
Type of Drilling		DCPT		DS	20	RCS		Water Struck At : 1.00 M.
Depth of Drilling		VST		SCPT				Standing Water Table : 0.95 M.

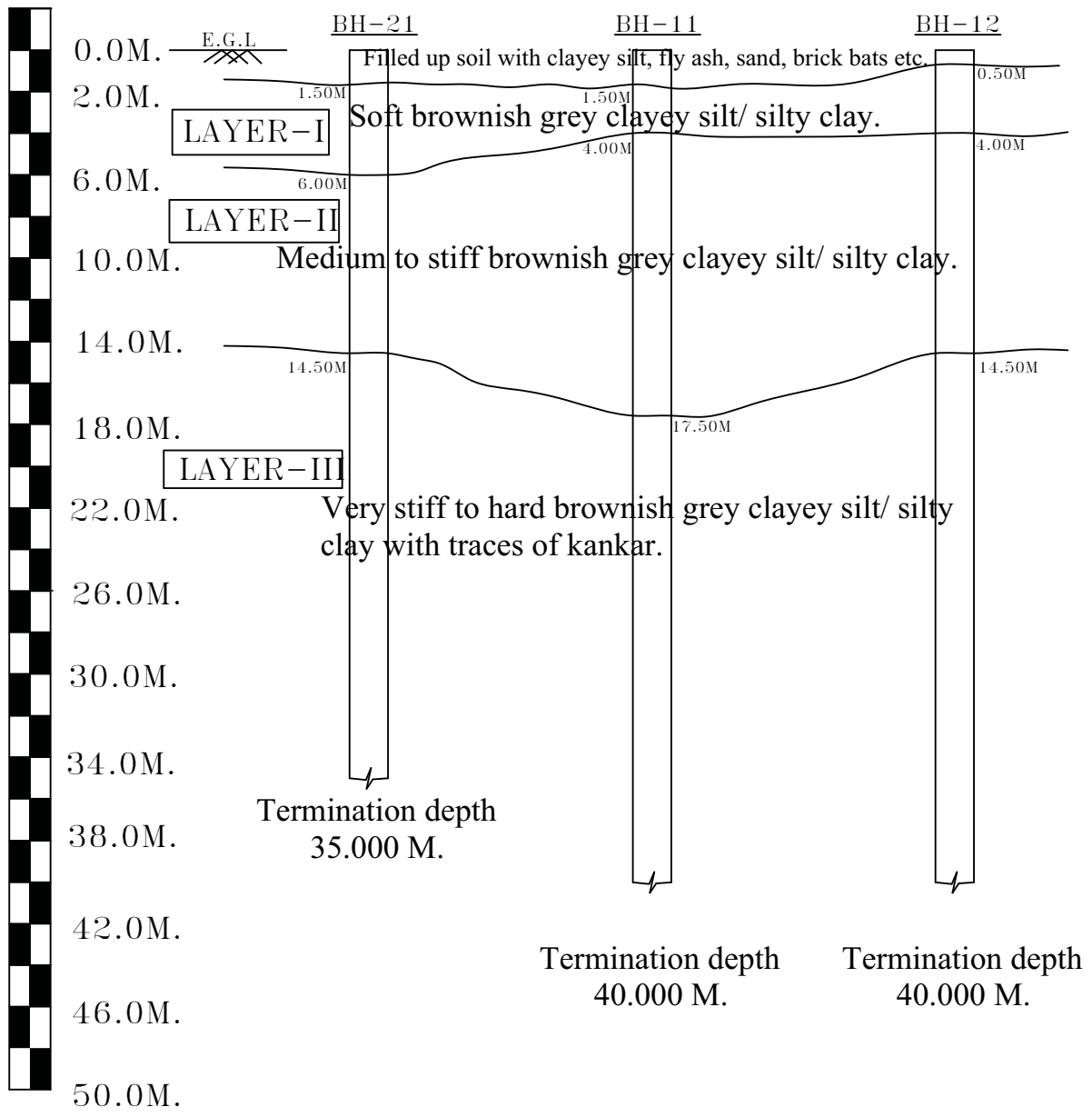
DESCRIPTION	SYMBOL	DEPTH	N-VALUE	SAMPLE NO.	SAMPLE DEPTH
Filled up soil with clayey silt, fly ash, sand, brick bats etc.		01 G.W.T		DS1 DS2	0.50 M 1.00M
Soft brownish grey clayey silt/ silty clay.		02 03 04 05 06	N = 3 N = 3	DS3 UDS1 SPT1 DS4 UDS2 SPT2 DS5	1.50M 2.00-2.45M 3.00-3.45M 3.00-3.45M 4.00-4.45M 5.00-5.45M 5.00-5.45M
Medium to stiff brownish grey clayey silt/ silty clay with traces of kankar.		07 08 09 10 11 12 13 14	N = 4 N = 5 N = 14	UDS3 SPT3 DS6 UDS4 SPT4 DS7 UDS5 SPT5 DS8 UDS6	6.00-6.45M 7.00-7.45M 7.00-7.45M 8.00-8.45M 9.00-9.45M 9.00-9.45M 10.00-10.45M 11.50-11.95M 11.50-11.95M 13.00-13.45M
Very stiff to hard brownish grey clayey silt/ silty clay with traces of kankar. Contd.....		15 16 17 18 19 20 21 22 23 24	N = 21 N = 28 N = 29 N = 31 N = 32	SPT6 DS9 UDS7 SPT7 DS10 UDS8 SPT8 DS11 SPT9 DS12 SPT10 DS13	14.50-14.95M 14.50-14.95M 16.00-16.45M 17.50-17.95M 17.50-17.95M 19.00-19.45M 20.50-20.95M 20.50-20.95M 22.00-22.45M 22.00-22.45M 23.50-23.95M 23.50-23.95M

SPT - Standard Penetration Test DCPT - Dynamic Cone Penetration Test.	VST- Vane Shear Test UDS - Undisturbed Sample	DS - Disturbed Sample SCPT-Static Cone Penetration Test.	WS - Water Sample RCS - Rock Core Sample

BORE LOG SHEET	Centre for Advanced Engineering							Bore Hole No.: BH-21 (Sheet 2)
Project: SOIL_BHEL_NTPC-KAHALGAON_ESP AREA								Job No.: Soil - 1582
Co-ord: E= 3046.50, S= 1950.30		E.G.L.: 34.03		Unit:				Bore Hole Dia. : 150 MM.
Type of Boring	Shell & Auger	FIELDTEST	NOS.	SAMPLES	NOS.	SAMPLES	NOS	Commenced on : 19.03.2018
Depth of Boring	35.000 M.	SPT	17	UDS	8	WS		Completed on : 20.03.2018
Type of Drilling		DCPT		DS	20	RCS		Water Struck At : 1.00 M.
Depth of Drilling		VST		SCPT				Standing Water Table : 0.95 M.

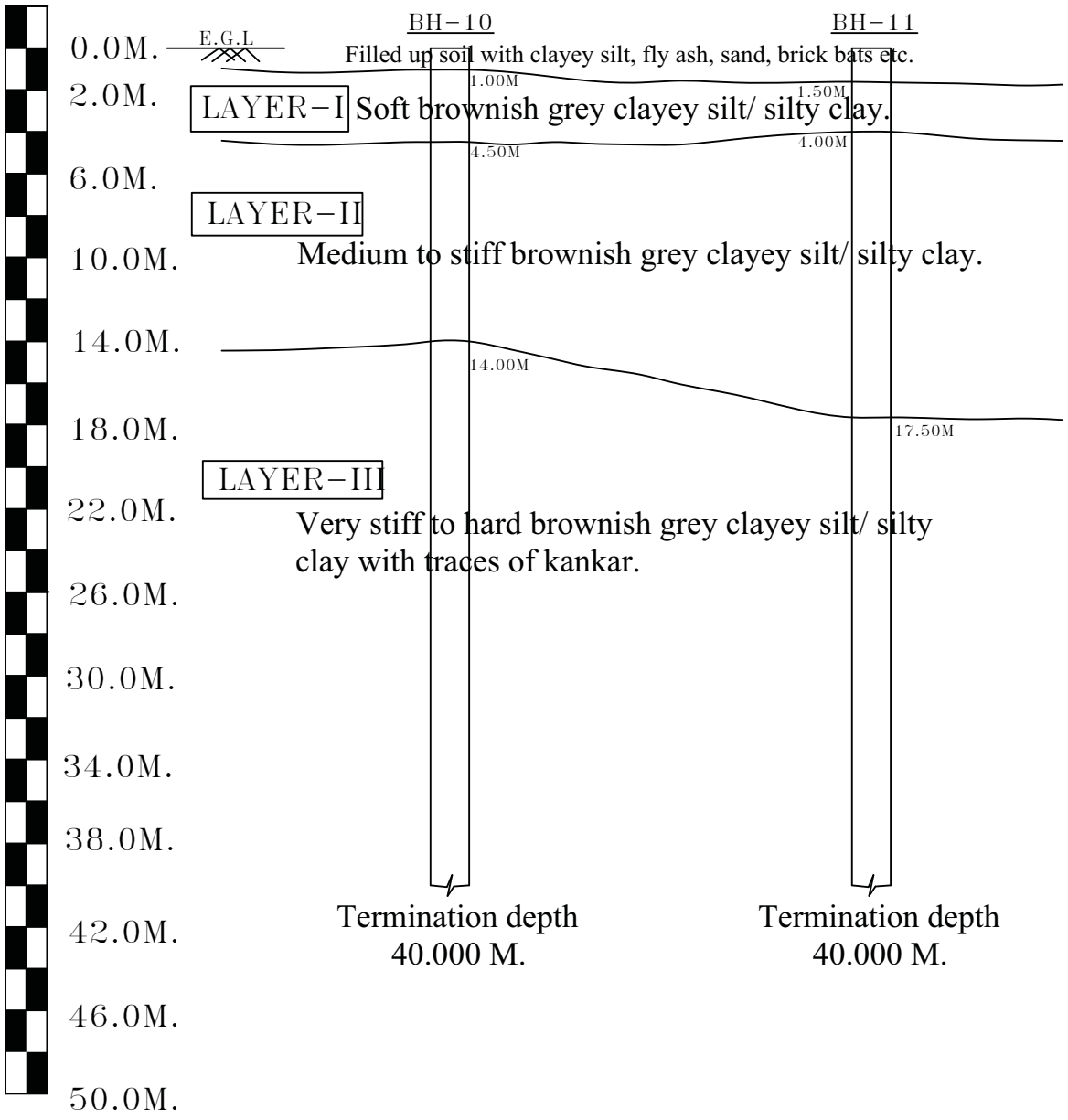
DESCRIPTION	SYMBOL	DEPTH	N-VALUE	SAMPLE NO.	SAMPLE DEPTH
Very stiff to hard brownish grey clayey silt/ silty clay with traces of kankar.		26	N = 34	SPT11 DS14	25.00-25.45M 25.00-25.45M
		27	N = 38	SPT12 DS15	26.50-26.95M 26.50-26.95M
		28	N = 36	SPT13 DS16	28.00-28.45M 28.00-28.45M
		29			
		30	N = 37	SPT14 DS17	29.50-29.95M 29.50-29.95M
		31	N = 32	SPT15 DS18	31.00-31.45M 31.00-31.45M
		32			
		33	N = 39	SPT16 DS19	32.50-32.95M 32.50-32.95M
		34	N = 41	SPT17 DS20	34.55-35.00M 34.55-35.00M
Termination Depth 35.000 Mtr.		35			
		36			
		37			
		38			
		39			
		40			
		41			
		42			
		43			
		44			
		45			
		46			
		47			
		48			
		49			

SPT - Standard Penetration Test DCPT - Dynamic Cone Penetration Test.	VST- Vane Shear Test UDS - Undisturbed Sample	DS - Disturbed Sample SCPT-Static Cone Penetration Test.	WS - Water Sample RCS - Rock Core Sample



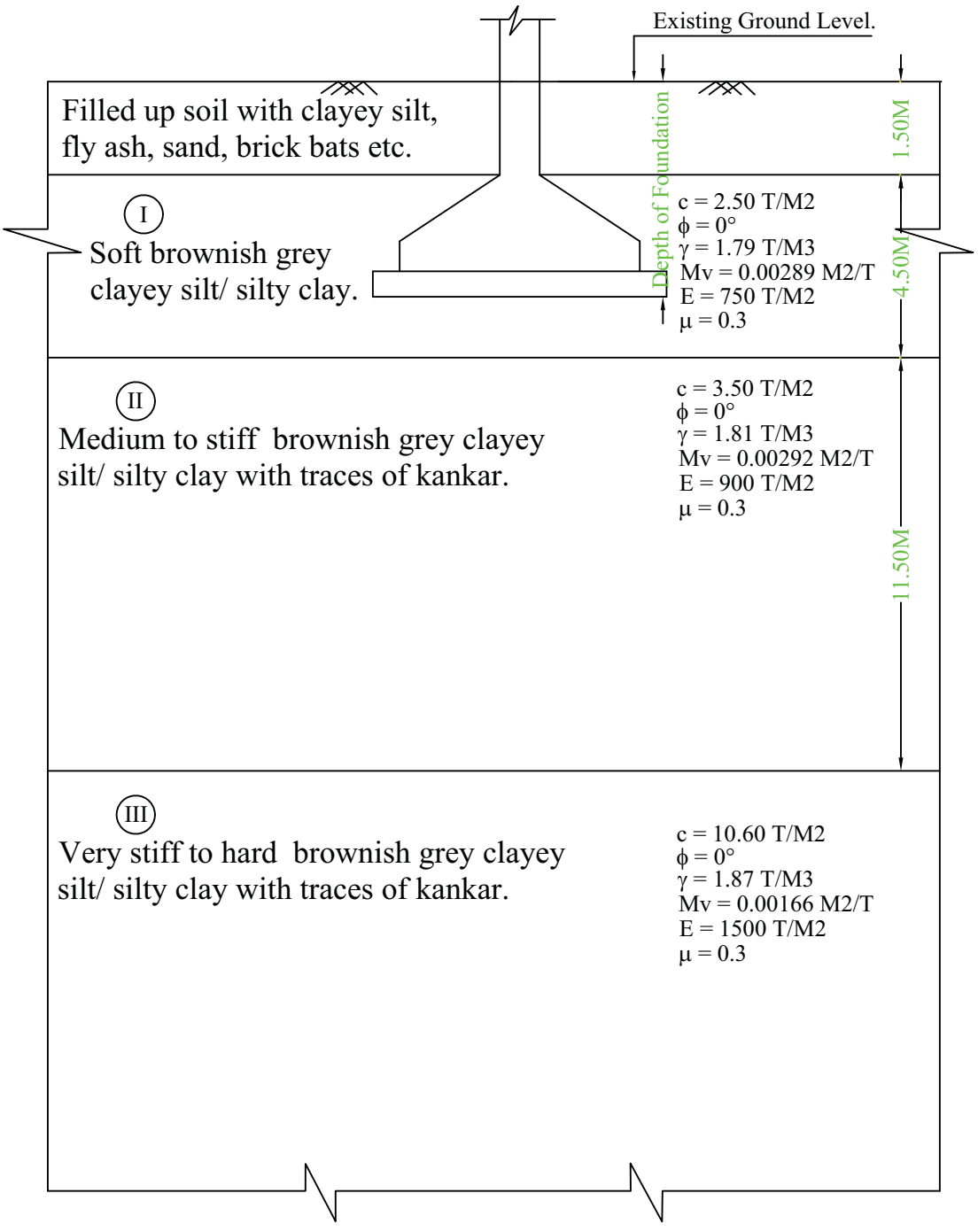
Sub-Soil Profile through BH-21, BH-11 & BH-12

Sketch No.-SK/BHEL-NTPC-KAHALGAON/	CHIMNEY AREA	1582	02	1 of 2



Sub-Soil Profile through BH-10 & BH-11

Sketch No.-SK/BHEL-NTPC-KAHALGAON/	CHIMNEY AREA	1582	02	2 of 2



Foundation Model

Scale :- N.T.S.

Sketch No.-SK/BHEL-NTPC-KAHALGAON/	CHIMNEY AREA	1582	03	1 of 2

DETERMINATION OF BEARING CAPACITY:-

The Net Ultimate Bearing Capacity is given by:

$$q_{ult} = C.Nc.sc.dc.ic + q.(Nq-1).sq.dq.iq + 0.5\gamma.B.N\gamma.s\gamma.d\gamma.i\gamma.W'$$

[Ref. Clause 5.1.2(a), IS 6403:1981 (2002)

Where,

Nc, Nq and Nγ are bearing capacity factors,
sc, sq and sγ are shape factors,
dc, dq and dγ are depth factors,
ic, iq and iγ are inclination factors,
C = Cohesion
q = Overburden pressure,
γ = Effective density below foundation.
B = Width of foundation,
W' = Water Table Correction Factor.

Size of Footing = 3.00M X 3 .00M
Cohesion,C = 2.50 t/sqm
Density, γ = 1.79 t/sqm

Bearing Capacity Factor

For φ = 0 degree, the bearing capacity factors are:

Nc = 5.14
Nq = 1.00 Ref: Table-1 of IS: 6403-1981(2002)
Nγ = 0.00

Foundation Diamentions

Depth of Foundation= Df = 2.50 M (below EGL)
Width of Foundation= B = 3.00 M
Length of Foundation= L = 3.00 M

Now q = (γ - 1) x Df = 0.79 x 2.5 = 1.98 t/sqm

Shape factors are [IS:6403 - 1981]

sc = 1.30 sq = 1.20 sγ = 0.80

Depth factors are [IS:6403 - 1981]

dc = 1.17 dq = 1.00 dγ = 1.00

Computed Net Ultimate Bearing Capacity = 19.54 t/sqm
Using a factor of safety of 2.5, Net Safe Bearing Capacity = 7.82 t/sqm

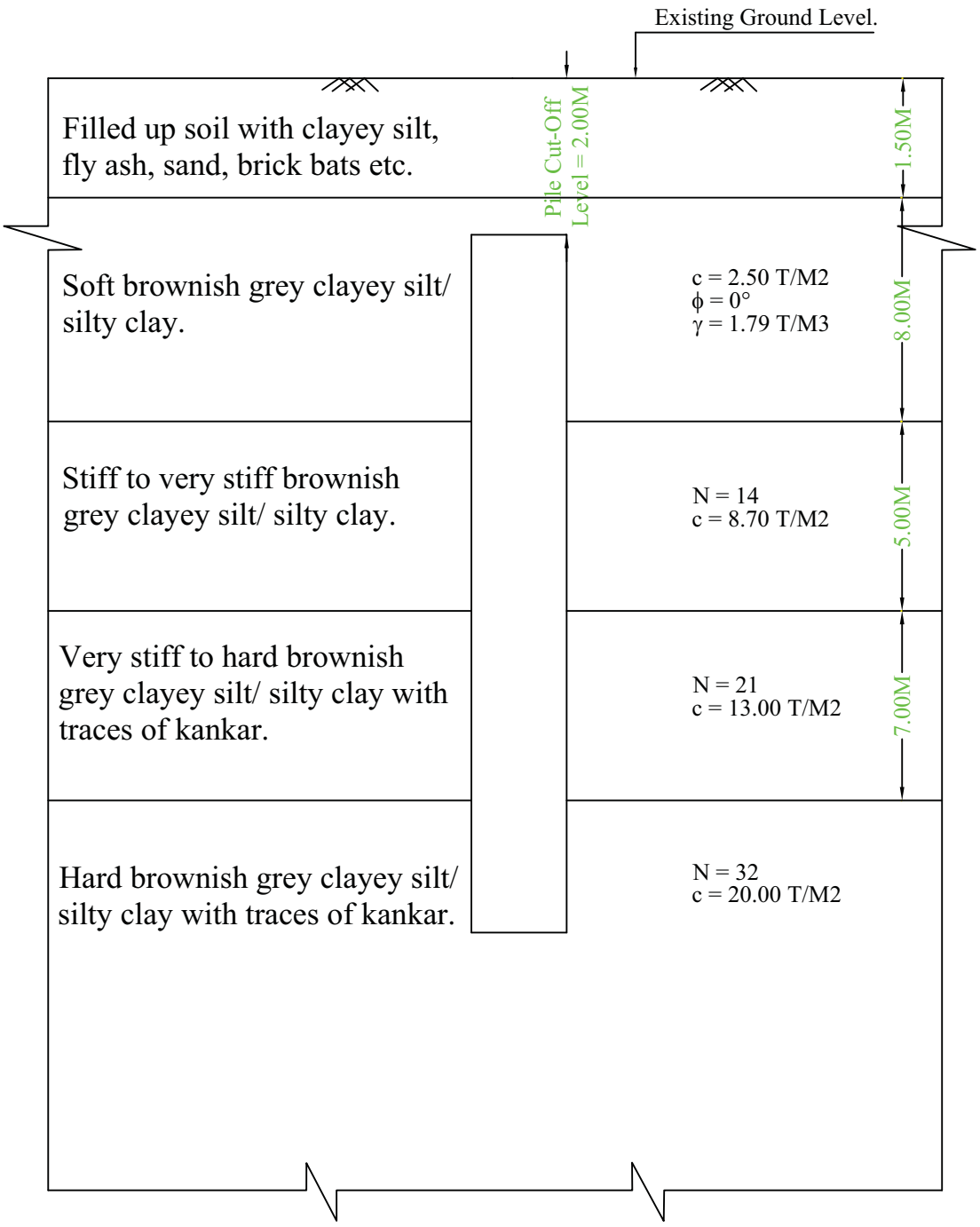
SETTLEMENT CALCULATION:-

Depth of Foundation= Df = 2.50 M (below EGL)
Width of Foundation= B = 3.00 M
Length of Foundation= L = 3.00 M
Net base Pressure, P = 7.82 t/sqm

Strata	From	To (M)	Thickness of compressible	Mid depth below Founding	ΔP	Young's Modulus	Poisson's Ratio μ	Mvc	Influence Factor I	Elastic settlement	Consolidation Settlement	Pore Water Pressure Factor	Corrected Consolidation Settlement	Total Corrected Settlement
	(m)	(m)	(m)	(m)	t/sqm	t/sqm		sqm/t		mm	mm		mm	mm
I	2.50	6.00	3.50	1.75	3.12	750	0.3	0.00289	0.95	**27.04**	**31.55**	0.70	22.09	49.13
II	6.00	8.50	2.50	1.25	1.17	900	0.3	0.00292	0.95	**10.40**	**8.55**	0.70	5.99	16.39

Total Settlement	65.52
Depth Correction Factor	0.77
Rigidity Correction Factor	1.00
Hence, corrected Total Settlement =	**50.50**

The calculated settlement is beyond the settlement limit of 40mm
Hence, Recommended bearing capacity for 40mm settlement is = 6.19 t/sqm



Pile Model

Scale :- N.T.S.

Sketch No.-SK/BHEL-NTPC-KAHALGAON/	CHIMNEY AREA	1582	03	2 of 2

Power calculation of MRC-1 for MRS

1	Material Handled	PYRITES HARD CO/ SHALE / STONE CHIP	
2	Bulk Density (Volume) T/Cu.M.	1.6	
3	Belt Width M	0.5	
4	Troughing Degrees	35	
5	C/S area of material Sq. M.	0.023	
6	Inclination Degrees	15.3	
7	slope factor	0.89	
8	Belt Speed Required MPS	0.45	
9	Actual Belt speed MPS	1	
10	Surges & Unevenness factor	0.75	
11	Maximum Capacity	85	From IS-11592-2000 Page no 12 Table 10
12	Actual Capcity Of Conveyor in TPH Bulk Density x Conv. Speed x Max Capacity x Slope Fac. x Surges & Unevenness factor	90.78	
13	Capacity of Conveyor TPH	40.00	

As Actual Capacity is greater than Design Capacity the selected factors are O.K.

B) **DRIVE FORCE CALCULATIONS**

T_E = **Driving force on the driving pulley in N.**

$T_E = R + R_S + R_{Sp1} + R_{Sp2} + R_{SL}$

a) **R = Main resistance in N**

$R = \alpha \times f \times L \times g \times [Mc + Mr + \{2Mb + Mg\} \times Cos\delta]$

f = FRICTION OF IDLER	0.03
L = CONVEYOR LENGTH IN Meter.	263.75
H = Lift height of conveyor in Meter	5.05
g = GRAVITATIONAL ACCELARATION m/sq. sec	9.802
Mc = MASS OF IDLER CARRYING SIDE Kg/mtr = 3.33 x 3 / 1.2 =	12
Mr = MASS OF IDLER RETURN SIDE kg/mtr = 12 / 3 =	8
Mb = MASS OF BELT Kg/mtr = [(5+2)x1.4 + 4.5] x 0.5 =	6
C = ACTUAL CAPACITY TPH	40
V = SPEED OF CONV MPS	1.00
Mg = MASS OF HANDLED MATERIAL Kg	36.8
DEGREE OF INCLINATION	15.3
ALPHA FROM FIG.6 IS 11592	1.4
R(MAIN RESISTANCE) =α. f.L.g[Mc+Mr+(2.mB+mG)cosd]	**7283**

b) **Rs = Secondary Resistance**

Rs = Ra+Rska+Rw+Rb

i) Ra = Resistance due to the accleration of material at the loading area

Ra = Q x ρ x (V-Vo)

p = DENSITY T / Cu.M 1.6

Q = VOLUMENTRIC CAP OF CONV Cu.M/Sec 0.02047

Q=A x V x K

Vo =M/Sec 0

Ra = **in N** **32.75**

No of Loading Points Added as per yestraday Comments

ii) RsKa = μ2 x Q2 x ρ x g x La x No of Loading Points / [{(V - V0)/2}2 x b12

La = Accelerating length at loading area

La = $V^2-V_0^2$ /(2 x g x μ_1)

Coefficient of friction between material & belt (u1) 0.6

Coefficient of friction bet'n material & skirt plates (u2) 0.6

La = Mtr **0.08502**
No of Loading Points 24
Bw = Mtr 0.5

b1 = Width Bet'n skirt plates M 0.3333

No of Loading Points Added as per yestraday Comments

Rska in N **289.63**

iii) **Rw =** Wrap resistance between belt & Pulley

Rw = N **315**

Wrap Resistant for Drive pulley N	1	0
Wrap Resistant for Tail / Takeup pulley N	1	175
Wrap Resistant for Snub / Bend pulley N	1	140

iv) **Rb =** Pulley bearing resistance = No. of Driven Pulley x 50
0.005 x d /D x Rv (Note This value is negligible)
Therfore we have assumed Rb 50 N Per Pulley
Rb = 50 x 2 Nos Pullley **100**

Rs(SECONDARY RESIST.) = Ra + Rska + Rw + Rb N **737**

TOTAL RESISTANCE = R + Rs N **8020**

c) **Rsp1+Rsp2=** Special Main Resistance In N

Rsp1+Rsp2= Ri + Rsk +Rbc +Rp

i) Ri = Resistance due Idler Tilting 0.00

Ci for 30 Degree troughing	0.4	
Ci for 30 to 45 degree troughinhg	0.5	0.5
Coefficient of friction between idler & belt (u0)		0.35
Li= M		263.80
i=		0

ii) **RsK =** Resistance due to friction against chute flaps or skirt plates

$$\textbf{RsK} = \frac{\mu_2 Q^2 \ 1000 \ p \ g \ lsk \times \text{No of Loading Points}}{V^2 \ b1^2}$$

Lsk = LENFTH OF SKIRT BOARD in Mtr 2.5
No of Loading Points 24
RsK in N **2129.19**

iii) **Rbc =** Frictional resistance Due to Belt Cleaners In N

Pressure due to Scraper N / Sq.M. 65000

A1 = Area of Scrapers Sq.M.

Internal Scrapper Length taken 1.5 times of BW

Thickness of scraper 20 mm	Internal	0.015
Qty Of Blade consider 2 nos of 20 mm thk	External	0.02

Coeffiecient of friction belt & belt cleaner (u3) 0.65

Rbc = in N 1479

iv) **Rp =** Frictional resistance Due to Plough In N 0

Rsp1+Rsp2= Ri + Rsk + Rbc + Rp 3608

d) **RSL** = Slope resistance In N
RSL = Mg. H. g

H = Lift Of Conveyor Belt between Feeding & Discharge End in M 5.05

RSL = in N 1822

Te = R + RS + RSp1 + RSp2 + RSL **in N** 13450

Driving Force = 13450
After Taking Drive Pulley Loss in Account

Pa = $\frac{T_E \cdot V}{1000} + \frac{(Rbd + RWd)V}{1000}$

Rbd = Pulley Bearing Resistance For Drive Pulley in N 17.94

pulley & which higher then Rbd
Rbd = Rb 50 calculated
d = mm 115
D = mm 431

Rwd = Wrap resistance between Belt & Pulley For Drive Pulley in N 34.39 Formula as Per Page No 22 IS 11592

same is higher then the
Rwd = Rwd 315.00 calculated

Angle of Wrap Degrees 210

Angle of Wrap in Radians, φ = 3.66

Drive coefficient
For 3 Ph, Sq. cage motor FOOT mounted with coupling 2.00

TE max N = Te x Drive Coefficient **26899** STARTING
As per equation No.30 IS:11592

Coeffiecient of friction between belt & pulley, μ = 0.38

T2 Min. N = Te x [(1 / eμφ - 1)] 8896

T1 N = Te + T2 22346

Tail Tension (T3=T4) = T2 + [f x L x g x (Mb + Mr) - (H x g x Mb)] 9685 N

So Final Take up Tension = T3+T4 = 19370 N

Pa = $\frac{T_E \cdot V}{1000} + \frac{(Rbd + RWd)V}{1000}$ 13.450 0.050

Pa = ABSORBED POWER In KW **13.500**

Pe = Motor Required Power

Pe = $\frac{P_A \times \text{Overload factor}}{\text{Gear box efficiency x Voltage \& frequency varation factor}}$

PA = 13.500

MARGIN = 1.1

G. BOX EFFICIENCY = 0.85

VOLTAGE & FRQ. VARIATION = 1.1

THERE FORE

Pe = **19.216996**

SELECTED KW (Pm) **22**
MOTOR SHAFT DIAMETER 48 MM

MOTOR RPM (n) 1460
HEAD PULLEY RPM (n2) 44.31

SERVICE FACTOR ON MOTOR RATING 1.25

GEAR BOX RATING ON MOTOR POWER 27.50

SELECT Elecon make SNU series Worm Gear Box

RATING REQUIRED (PN)		27.50	KW	
RATIO REQUIRED		33.0		
TORQUE REQUIRED		4676.81	NM	
DESIGNATION MODEL		**SNU-9**		
RATING	OK	40	KW	As per Elecon Catalouge
STANDARD RATIO AVAILABLE		30		
OUTPUT RPM		44.31		
INPUT SHAFT DIA		50	MM	
OUTPUT SHAFT DIA		75	MM	

HIGH SPEED COUPLING

SERVICE FACTOR	2.25		
RATING REQUIRED = PmxSFx100/MOTOR RPM	3.390410959	KW AT 100 RPM	
			INPUT COPLING CAN BE
SELECTED MODEL	EFC-05	PIN BUSH TYPE	SUPPLIED WITH BRAKE DRUM
RATING	5.6	KW AT 100 RPM	As per Elecon Catalouge
MAKE	ELECON		
MAX BORE	55	MM	

OUTPUT COUPLING

SERVICE FACTOR	2.25		
RATING REQUIRED = Pmxsfx100/PULLEY RPM	111.72	KW AT 100 RPM	
SELECTED MODEL	ED-1600	GEARED	
RATING	167.5	KW AT 100 RPM	As per Elecon Catalouge
MAKE	ELECON		
MAX BORE	110	MM	

BELT CONV. SHAFT DIA. CALCULATIONS :

		Abrv.	Unit	
belt width		BW	mm	500
Te (effective belt tension)		Te	N	13450
Te1 (Effective Belt Tension)		Te1	Kg	1371
Drive coeffiecient				1.0
T2 Min. as per clause 8.5.4.3 = T2 / g		T2 MIN.	Kg	908
T2 Min. as per belt sag% = Carrying Pitch x (Mb+Mg) / 8 x S		T2 MIN.	Kg	321
Sag % to limit				2
T1 tight side tension		T1	kg	1692
Head Pulley Dia.		---	mm	407
Head Pulley Shell Thk.		t	mm	12
Head Pulley Face		F	mm	600
Hd. Pl. Brg. Crs.		C	mm	900
Hd. Pl. Hub Crs.		Ch	mm	500
Hd. Pl. Edge Distance		a	mm	200
Hd. Pl. Hub O.D.		---	mm	160
Hd. Pl. Hub Width		---	mm	90
Hd. Pl. Flange Thk.		---	mm	10
Head Pulley Weight		W	Kg.	215
B.M Vertical = WP x 9.81 x a / 2 x 1000		Mv	N.m	211
B.M Horizontal = 9.81 x (T2 min +T2 max) x a / 2 x 1000		Mh	N.m	1205
Resultant B.M. = ((Mv)2 + (Mh)2) 1/2		Mr	N.m	1224
Torque =	Motor kw x 1000 x 60 / 2 x 3.14 x Pulley rpm	T	N.m	4744
Equivalent Torque = ((Mr)2 + (T)2) 1/2		Te	N.m	4899
Equivalent Bending Moment = (0.5 x Mr + (Mr)2 + (T)2) 1/2		Me	N.m	3061
Service factor for bending		Kb	---	2
Service factor for torsion		Kt	---	1.5
Allowable Shear stress		fs	N/mm2	60
Allowable Bending stress		fb	N/mm2	80
Minimum Shaft Dia.Hd.Pl.				
1. For Twisting Moment = Te x 1000 x 16 / 3.14 x fs x d3		d1	mm	75
2. For Bending Moment = Me x 1000 x kb x 32 / 3.14 x fb x d3		d2	mm	92
Higher of above 1 & 2		d3	mm	92
Shaft Dia. for Deflection				
Inclindation of Tight side belt			degrees	15.3
inclination of Slack side belt			degrees	18
Resultant Force on Pulley =((T1+T2)^2+W^2)^0.5		F	Kg	2547
Youngs Modulus(29x10^6 psi)		E	Kg/sq.mm	20432
Reqd.M.I.for 5 minute Deflection =F.a.Ch / [4.E.Tan(5 min)]		I	mm4	2143759.04
Shaft Dia. For (5 min) Defl. =(64 x I / pi)^0.25		d4	mm	81
Min. Sh. Dia. Reqd. (at Coupl.) (Higher of d3 & d4)		d5	mm	92
Sh.Dia. Min. Reqd. at Brg.		d'	mm	97
Sh.Dia.Selected at Brg. Hd. Pl.		d	mm	**110** OK
MOC of Shaft for Head Pl.		---	---	EN8/C45

BELT SELECTION

MAX. TENSION IN BELT		KG	1692	
MAX. TENSION IN BELT		N	16599	
BELT RATING REQUIRED = Max Tension x SF / BW		KN/Mtr	332	Service Fator 10 Considered for belt
SELECTED BELT RATING FOR 500 B/W		KN/Mtr	400	OK
BELT SELECTED 400/3 PLY HD NYLON / NYLON				
TOP COVER THICKNESS		MM	5	
BOTTOM COVER THICKNESS		MM	2	
RUBBER COVER GRADE			HR	

RADIUS CALCULATION FOR BELT CONEYOR

Tc =	Tension at the curve for both starting & running condition			
Tc=Ttmax - f*l*g* (mc+mb cosδ)-(Rs+Rsp1+Rsp2) WHERE				
Ttmax = Belt loaded up to curve starting point N				
Te as per Equation (5)		N	11368.80	
Rs		N	737.38	
Rsp1+Rsp2		N	3608	
T min. as per equation (33) = Pr x Mb x g / 8 x 0.02		N	1102.73	
Ttmax =	Te + Tmin	N	12471.52	
Tc =	Ttmax-(fxLxg(Mc+MbxCos15.3x3.14/180)-(Rs+Rsp1+Rsp2)	N	6746.64007	
l = distance from point of separation to the points situated on the tangent line from which ordinates are to be drawn=			231.1	Meter
Rc for = Fulley loaded belt	(Tc x BW x 1000) / (Mb+Mg) x g	MM	8041	As per equation no. 42
Rc for = Empty Belt	(Tc x BW x 1000) / Mb x g	MM	57369	As per equation no.41
Rs =		N	348	up to distance where belt is empty
Rsp =		N	3	
Tc Max =	Ttmax-(fxLxg(Mc+MbxCos15.3x3.14/180)-(Rs+Rsp)	N	10912	As per equation no.44
Rc for = partially loaded belt	Tcmax x BW x 1000 / Mb x g	MM	92793	As per equation no. 43
Rc Overstress at center of belt		MM	239	As per equation no. 45
Rc due to Lack of tension at belt edge		MM	3072	As per equation no. 46

Final Selected Concave Radius in GA is 105 Mtr which is grater than all above Calculated Radius

DECELERATION TIME CALCULATION:-

GD2 Value of Motor	Kg Sq Mtr	0.853	As per Standard Catalouge
GD2 Value of Gear Box	Kg Sq Mtr	0.0172	As per Standard Catalouge
GD2 Value of Input Coupling	Kg Sq Mtr	0.048	As per Standard Catalouge
GD2 Value of Output Coupling	Kg Sq Mtr	0.752	As per Standard Catalouge
GD2 Value of Output Coupling with respect to Motor= GD2 Value of Output Coupling / SQ. of Gear Box Ratio	Kg Sq Mtr	0.000836	
GD2 Value of Drive Pulley = 4xHP Weightx(60xGB RatioxBelt Speed)2 / (2x3.14xMotor rpm)2	Kg Sq Mtr	33	
GD2 Value of Drive Pulley with respect to Motor rpm = GD2 Value of Drive Pulley / SQ of Gear Box Ratio	Kg Sq Mtr	0.03678715	
GD2 Value of Drive Unit = GD2 Motor + GD2 GB + GD2 IPC + GD2 OPC + GD2 Drive Pulley	Kg Sq Mtr	0.955823	
WK2 Value of Drive Unit = GD2 of Drive Unit / 4	Kg Sq Mtr	0.23895568	
Drive Equivalent Weight = WK2 Drive Unit x (2x3.14xMotor rpm)2 / (Belt Speed x 60)	Kg	5580.073	
Weight of Tail / Take up Pulley	Kg	200	
Weight of Snub / Bend Pulley	Kg	180	
Quantity of Tail / Take up Pulley	Nos	1	
Quantity of Snub / Bend Pulley	Nos	1	
Total Weight of Non Drive Pulley = Tail Pulley Weight + Snub Pulley Weight	Kg	380	
Weight of Belt = Belt Weight x Conveyor Length x 2	Kg	3165	
Weight of Carrying Idler = Carrying Idler Weight x Conveyor Length	Kg	3165	
Weight of Return Idler = Return Idler Weight x Conveyor Length	Kg	2110	
Weight of Material = Material weight x Conveyor Length	Kg	9706	
Total weight of Conveyor System without Drive=Non Drive Pulley Weight + Belt Weight + CI Weight + RI Weight + Material Weight	Kg	18526	
Total weight of Conveyor System with Drive =Total Conveyor System Weight + Drive Equivalent Weight	Kg	24106.073	
Deceleration Time = Total System Weight with drive x Sq of Belt Speed / Absorb Power in KW x 1000	Second	1.7857	As per IS:11592-Equation no 55

Conveyor Deceleration time is less than 2 Second So Brake is not required

Power calculation of MRC-2 for MRS

1	Material Handled	PYRITES HARD CO/ SHALE / STONE CHIP	
2	Bulk Density (Volume) T/Cu.M.	1.6	
3	Belt Width M	0.5	
4	Troughing Degrees	35	
5	C/S area of material Sq. M.	0.023	
6	Inclination Degrees	15	
7	slope factor	0.89	
8	Belt Speed Required MPS	0.45	
9	Actual Belt speed MPS	1	
10	Surges & Unevenness factor	0.75	
11	Maximum Capacity	85	From IS-11592-2000 Page no 12 Table 10
12	Actual Capcity Of Conveyor in TPH Bulk Density x Conv. Speed x Max Capacity x Slope Fac. x Surges & Unevenness factor	90.78	
13	Capacity of Conveyor TPH	40.00	

As Actual Capacity is greater than Design Capacity the selected factors are O.K.

B) **DRIVE FORCE CALCULATIONS**

T_E = **Driving force on the driving pulley in N.**

$T_E = R + R_S + R_{Sp1} + R_{Sp2} + R_{SL}$

a) **R = Main resistance in N**

$R = \alpha \times f \times L \times g \times [Mc + Mr + \{2Mb + Mg\} \times Cos\delta]$

	f = FRICTION OF IDLER	0.03
	L = CONVEYOR LENGTH IN Meter.	72
	H = Lift height of conveyor in Meter	12.813
	g = GRAVITATIONAL ACCELARATION m/sq. sec	9.802
	Mc = MASS OF IDLER CARRYING SIDE Kg/mtr	12
	Mr = MASS OF IDLER RETURN SIDE kg/mtr	8
	Mb = MASS OF BELT Kg/mtr	6
	C = ACTUAL CAPACITY TPH	40
	V = SPEED OF CONV MPS	1.00
	Mg = MASS OF HANDLED MATERIAL Kg	36.8
	DEGREE OF INCLINATION	15
	ALPHA FROM FIG.6 IS 11592	1
	R(MAIN RESISTANCE) =α. f.L.g[Mc+Mr+(2.mB+mG)cosd]	**1421**

b) **Rs = Secondary Resistance**

Rs = Ra+Rska+Rw+Rb

i) Ra = Resistance due to the accleration of material at the loading area

$Ra = Q \times \rho \times (V-Vo)$

	p = DENSITY T / Cu.M	1.6
	Q = VOLUMENTRIC CAP OF CONV Cu.M/Sec Q=A x V x K	0.02047
	Vo =M/Sec	0

Ra = in N **32.75**

ii) $RsKa = \mu 2 \times Q2 \times \rho \times g \times La / [\{(V - V0)/2\}2 \times b12$

La = Accelerating length at loading area

$La = V^2-V_0^2 /(2 \times g \times \mu_1)$

	Coefficient of friction between material & belt (u1)				0.6	
	Coefficient of friction bet'n material & skirt plates (u2)				0.6	
	La = M				**0.08502**	
	Bw = M				0.5	
	b1 = Width Bet'n skirt plates M				0.3333	
		Rska	in N		**12.07**	
iii)	**Rw =**	Wrap resistance between belt & Pulley				
	Rw = N				**770**	
	Wrap Resistant for Drive pulley N			1	0	
	Wrap Resistant for Tail / Takeup pulley N			2	175	
	Wrap Resistant for Snub / Bend pulley N			3	140	
iv)		**Rb =** Pulley bearing resistance = No. of Driven Pulley x 50				
		0.005 x d /D x Rv (Note This value is negligible)				
		Therfore we have assumed Rb 50 N Per Pulley				
		Rb = 50 x 5 Nos Pullley			**250**	No of Pulley Changed
	Rs(SECONDARY RESIST.) = Ra + Rska + Rw + Rb N				**1065**	
	TOTAL RESISTANCE = R + Rs N				**2486**	
c)		**Rsp1+Rsp2=** Special Main Resistance In N				
		Rsp1+Rsp2= Ri + Rsk +Rbc +Rp				
i)	Ri =	Resistance due Idler Tilting			0.00	
	Ci for 30 Degree troughing			0.4		
	Ci for 30 to 45 degree troughinhg			0.5	0.5	
	Coefficient of friction between idler & belt (u0)				0.35	
	Li= M				73.13	
	i=				0	
ii)		**RsK =** Resistance due to friction against chute flaps or skirt plates				
		RsK $= \frac{\mu 2\, Q^2\ 1000\ p\ g\ lsk}{V^2\ b1^2}$				
		Lsk = LENFTH OF SKIRT BOARD M			4	
		RsK	in N		**141.95**	
iii)		**Rbc =** Frictional resistance Due to Belt Cleaners In N				
		Pressure due to Scraper N / Sq.M.			65000	
		A1 = Area of Scrapers Sq.M.				Internal Scrapper Length taken 1.5 times of BW
		Thickness of scraper 20 mm		Internal	0.015	
		Internal Scrapper Quantity in Nos			2	
		Qty Of Blade consider 2 nos of 20 mm thk		External	0.02	
		Coeffiecient of friction belt & belt cleaner (u3)			0.65	
		Rbc =	in N		2113	
iv)		**Rp =** Frictional resistance Due to Plough In N			0	
		Rsp1+Rsp2= Ri + Rsk + Rbc + Rp			2254	
d)		**RSL** = Slope resistance In N				
		RSL = Mg. H. g				
		H = Lift Of Conveyor Belt between Feeding & Discharge End in M			12.813	
		RSL =	in N		3466	
		Te = R + RS + RSp1 + RSp2 + RSL	**in N**		8207	
		Driving Force =			8207	
		After Taking Drive Pulley Loss in Account				
		Pa = $\frac{T_E \cdot V}{1000} + \frac{(Rbd + RWd)V}{1000}$				
		Rbd = Pulley Bearing Resistance For Drive Pulley	in N		10.95	
						Rb As assumed 50 N for 1 no pulley & which higher then Rbd calculated
		Rbd = Rb			50	
		d = mm			115	
		D = mm			431	
		Rwd = Wrap resistance between Belt & Pulley For Drive Pulley	in N		27.82	Formula as Per Page No 22 IS 11592
		Rwd = Rwd			770.00	Rw is considered for Rwd as the same is higher then the calculated
			Angle of Wrap Degrees		210	
			Angle of Wrap in Radians		3.66	

Drive coefficient
For 3 Ph, Sq. cage motor FOOT mounted with coupling 2.00

TE max N = Te x Drive Coefficient **16414** STARTING

As per equation No.30 IS:11592

Coeffiecient of friction between belt & pulley, μ 0.38

T2 Min. N = Te x [(1 / eμφ - 1)] 5429

T1 N = Te + T2 13636

Tail Tension (T3=T4) = T2 + [f x L x g x (Mb + Mr) - (H x g x Mb)] 4971 N

Take Up Tension = T2 + [f x L1 x g x (Mb + Mr) - (H1 x g x Mb)] 10224 N

L1=Length betn Head & Take up Pulley 16 Mtr
H1=Lift betn Head & Take up Pulley 6.5 Mtr

Pa = $\frac{T_E \cdot V}{1000} + \frac{(Rbd + RWd)V}{1000}$ 8.207
0.050

Pa = ABSORBED POWER In KW **8.257**

Pe = Motor Required Power

Pe = $\frac{P_A \times \text{Overload factor}}{\text{Gear box efficiency x Voltage \& frequency varation factor}}$

PA = 8.257

MARGIN = 1.1

G. BOX EFFICIENCY = 0.85

VOLTAGE & FRQ. VARIATION = 1.1

THERE FORE

Pe = **9.8342792**

SELECTED KW (Pm) **11**
MOTOR SHAFT DIAMETER 42 MM

MOTOR RPM (n) 1460
HEAD PULLEY RPM (n2) 44.31

SERVICE FACTOR ON MOTOR RATING 1.25

GEAR BOX RATING ON MOTOR POWER 13.75

SELECT Elecon make SNU series Worm Gear Box

RATING REQUIRED (PN)		13.75	KW	
RATIO REQUIRED		33.0		
TORQUE REQUIRED		2128.90	NM	
DESIGNATION MODEL		**SNU-7**		
RATING	OK	17	KW	As per Elecon Catalouge
STANDARD RATIO AVAILABLE		30		
OUTPUT RPM		48.67		
INPUT SHAFT DIA		40	MM	
OUTPUT SHAFT DIA		65	MM	

HIGH SPEED COUPLING

SERVICE FACTOR	2.25		
RATING REQUIRED = PmxSFx100/MOTOR RPM	1.695205479	KW AT 100 RPM	
SELECTED MODEL	EFC-03	PIN BUSH TYPE	
RATING	2.2	KW AT 100 RPM	As per Elecon Catalouge
MAKE	ELECON		
MAX BORE	42	MM	

OUTPUT COUPLING

SERVICE FACTOR	2.25		
RATING REQUIRED = Pmxsfx100/PULLEY RPM	55.86	KW AT 100 RPM	
SELECTED MODEL	ED-1000	GEARED	
RATING	104.7	KW AT 100 RPM	As per Elecon Catalouge
MAKE	ELECON		
MAX BORE	95	MM	

BELT CONV. SHAFT DIA. CALCULATIONS :

		Abrv.	Unit		
belt width		BW	mm	500	
Te (effective belt tension)		Te	N	8207	
Te1 (Effective Belt Tension)		Te1	Kg	836	
Drive coeffiecient				1.0	
T2 Min. as per clause 8.5.4.3 = T2 / g		T2 MIN.	Kg	554	
T2 Min. as per belt sag% = Carrying Pitch x (Mb+Mg) / 8 x S		T2 MIN.	Kg	321	
Sag % to limit , S				2	
T1 tight side tension		T1	kg	1157	
Head Pulley Dia.		---	mm	407	
Head Pulley Shell Thk.		t	mm	12	
Head Pulley Face		F	mm	600	
Hd. Pl. Brg. Crs.		C	mm	900	
Hd. Pl. Hub Crs.		Ch	mm	500	
Hd. Pl. Edge Distance		a	mm	200	
Hd. Pl. Hub O.D.		---	mm	140	
Hd. Pl. Hub Width		---	mm	90	
Hd. Pl. Flange Thk.		---	mm	10	
Head Pulley Weight		W	Kg.	178	
B.M Vertical = WP x 9.81 x a / 2 x 1000		Mv	N.m	175	
B.M Horizontal = 9.81 x (T2 min +T2 max) x a / 2 x 1000		Mh	N.m	858	
Resultant B.M. = ((Mv)2 + (Mh)2) 1/2		Mr	N.m	876	
Torque =	Motor kw x 1000 x 60 / 2 x 3.14 x Pulley rpm	T	N.m	2159	
Equivalent Torque = ((Mr)2 + (T)2) 1/2		Te	N.m	2330	
Equivalent Bending Moment = (0.5 x Mr + (Mr)2 + (T)2) 1/2		Me	N.m	1603	
Service factor for bending		Kb	---	2	
Service factor for torsion		Kt	---	1.5	
Allowable Shear stress		fs	N/mm2	60	
Allowable Bending stress		fb	N/mm2	80	
Minimum Shaft Dia.Hd.Pl.					
1. For Twisting Moment = Te x 1000 x 16 / 3.14 x fs x d3		d1	mm	58	
2. For Bending Moment = Me x 1000 x kb x 32 / 3.14 x fb x d3		d2	mm	74	
Higher of above 1 & 2		d3	mm	74	
Shaft Dia. for Deflection					
Inclindation of Tight side belt			degrees	15	
inclination of Slack side belt			degrees	18	
Resultant Force on Pulley =((T1+T2)^2+W^2)^0.5		F	Kg	1671	
Youngs Modulus(29x10^6 psi)		E	Kg/sq.mm	20432	
Reqd.M.I.for 5 minute Deflection =F.a.Ch / [4.E.Tan(5 min)]		I	mm4	1406046.8	
Shaft Dia. For (5 min) Defl. =(64 x I / pi)^0.25		d4	mm	73	
Min. Sh. Dia. Reqd. (at Coupl.) (Higher of d3 & d4)		d5	mm	74	
Sh.Dia. Min. Reqd. at Brg.		d'	mm	79	
Sh.Dia.Selected at Brg. Hd. Pl.		d	mm	**90**	OK
MOC of Shaft for Head Pl.		---	---	EN8/C45	

BELT SELECTION

MAX. TENSION IN BELT		KG	1157	
MAX. TENSION IN BELT		N	11357	
BELT RATING REQUIRED = Max Tension x SF / BW		KN/Mtr	227	Service Fator 10 Considered for belt
SELECTED BELT RATING FOR 500 B/W		KN/Mtr	400	OK

BELT SELECTED 400/3 PLY HD NYLON / NYLON

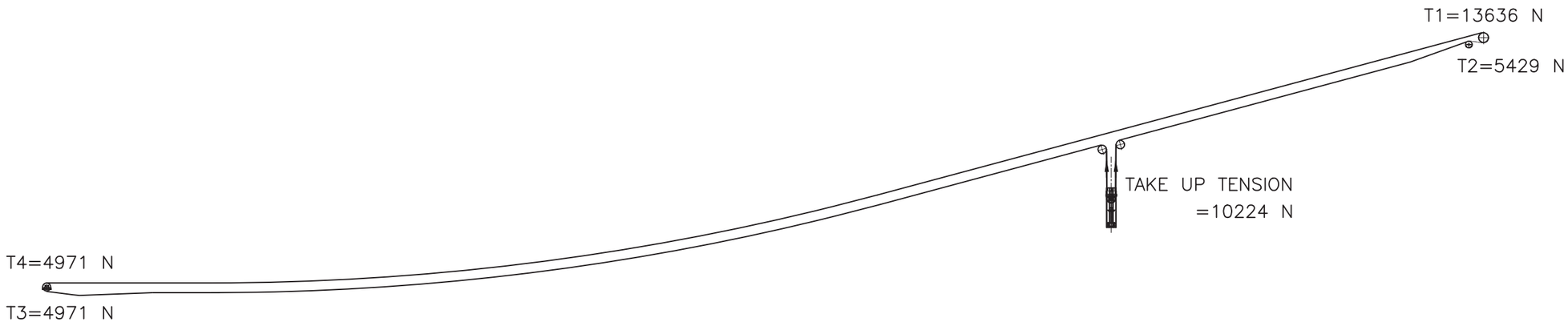
TOP COVER THICKNESS	MM	5	
BOTTOM COVER THICKNESS	MM	2	
RUBBER COVER GRADE		HR	

RADIUS CALCULATION FOR BELT CONEYOR

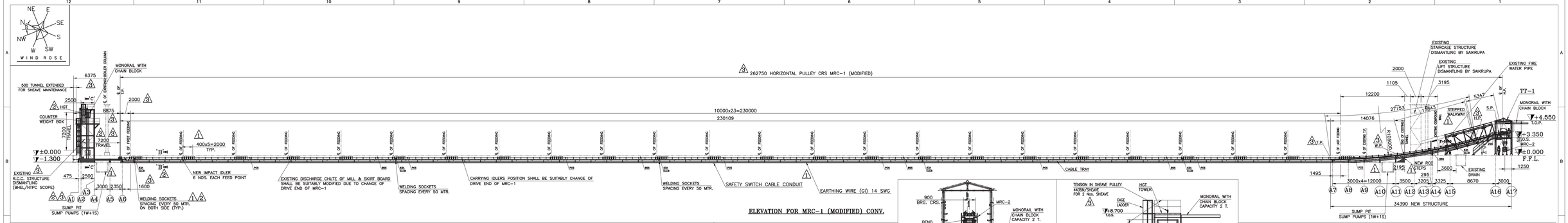
Tc =	Tension at the curve for both starting & running condition			
Tc=Ttmax - f*l*g* (mc+mb cosδ)-(Rs+Rsp1+Rsp2) WHERE				
Ttmax = Belt loaded up to curve starting point N				
Te as per Equation (5)		N	8207.08	
Rs		N	1064.82	
Rsp1+Rsp2		N	2254	
T min. as per equation (33) = Pr x Mb x g / 8 x 0.02		N	1102.73	
Ttmax =	Te + Tmin	N	9309.81	
Tc =	Ttmax-(fxLxg(Mc+MbxCos15.3x3.14/180)-(Rs+Rsp1+Rsp2)	N	5613.7692	
l = distance from point of separation to the points situated on the tangent line from which ordinates are to be drawn=			104.62	Meter
Rc for = Fulley loaded belt	(Tc x BW x 1000) / (Mb+Mg) x g	MM	6691	As per equation no. 42
Rc for = Empty Belt	(Tc x BW x 1000) / Mb x g	MM	47736	As per equation no.41
Rs =		N	803	up to distance where belt is empty
Rsp =		N	4	
Tc Max =	Ttmax-(fxLxg(Mc+MbxCos15.3x3.14/180)-(Rs+Rsp)	N	7956	As per equation no.44
Rc for = partially loaded belt	Tcmax x BW x 1000 / Mb x g	MM	67650	As per equation no. 43
Rc Overstress at center of belt		MM	233	As per equation no. 45
Rc due to Lack of tension at belt edge		MM	3693	As per equation no. 46

Final Selected Concave Radius in GA is 105 Mtr which is grater than all above Calculated Radius

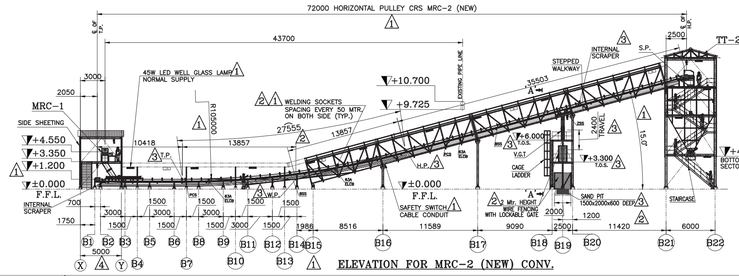
TENSIONS FOR MRC-2



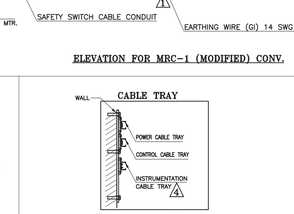
TENSIONS FOR MRC-1

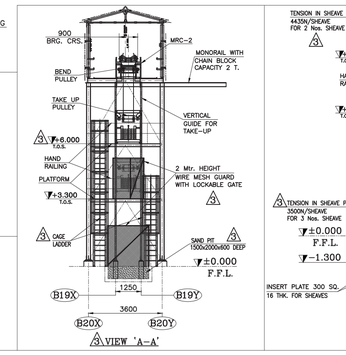


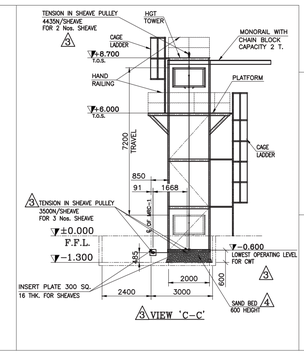
ELEVATION FOR MRC-1 (MODIFIED) CONV.

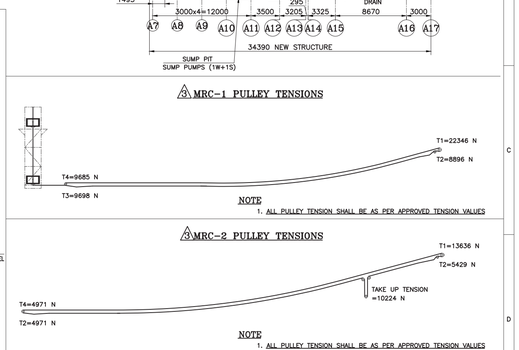


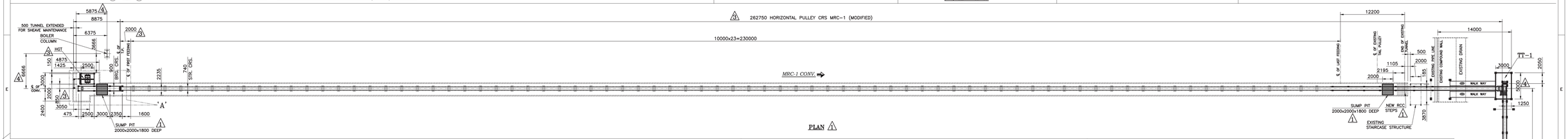
ELEVATION FOR MRC-2 (NEW) CONV.











PLAN

TECHNICAL SPECIFICATION

		BELT CONVEYOR NO.	MRC-1	MRC-2
CONVEYOR		CAPACITY DESIGN/RATED (TPH)	40/36	40/36
		BELT WIDTH (MM)	500	500
		HORIZONTAL CRS. (MM)	262750	72000
		VERTICAL LIFT (MM)	5035	12813
		SPEED (M/SEC.)	1.0	
		INCLINATION (Deg.)	15.3	15.1
MATERIAL HANDLED		MATERIAL	PYRITES/HARD COAL/SHALE/STONE CHIPS	
		BULK DENSITY (T/CU,M)	1.6 T/M3 (VOLUMETRIC) AND 2.4 T/M3 (FOR LOAD)	
		LUMP SIZE (mm)	>40	>40
BELT		TYPE/GRADE	N/N. HR	
		MAKE	NTPC APPROVED VENDER	
		TOP COVER THICKNESS (MM)	5 WITHOUT NEGATIVE TOLERANCE	
		BOTTOM COVER THICKNESS (MM)	2 WITHOUT NEGATIVE TOLERANCE	
		RATING (kN/m)/NO. OF PLIES	400/3	
PULLEYS (IS-8531) DIA.=LG.DIA. BRG.DIA.		DRIVE	ø407x600 LG.12 THK SHELL, ø110 AT BRG. QTY-1 NO.	ø407x600 LG.12 THK SHELL, ø110 AT BRG. QTY-1 NO.
		TAIL/TAKE-UP	ø324x600 LG.12 THK SHELL, ø100 AT BRG. QTY-1 NO.	ø324x600 LG.12 THK SHELL, ø100 AT BRG. QTY-1 NO.
		SNUB/BEND	ø324x600 LG.12 THK SHELL, ø90 AT BRG. QTY-1 NO.	ø324x600 LG.12 THK SHELL, ø90 AT BRG. QTY-3 NO.
		M.O.C. OF PULLEY & SHAFT	EN-8	
		RUBBER LAGGING(HOT VULCANIZED)	HEAD PULLEY-12 mm THK. DIAMOND TYPE & TAIL/TAKE-UP, SNUB/BEND PULLEY-12mm THK.PLAIN TYPE, THE RUBBER FOR LAGGING SHALL BE NATURAL RUBBER BLENDED WITH STYRENE BUTADIENE RUBBER, HARDNESS 55 TO 65 DUROMETER (SHORE A), ELONGATION OVER 300%, STRENGTH 160-245 KG/CMM3 (MAX.) AS PER DIN 53516, SPECIFIC GRAVITY MAX. 1.5 AND ADHESION STRENGHTH 10 KG/CM (MINIMUM).	
IDLERS (IS-8598)	CARRYING	IMPACT IDLER, EQ.LG.3 ROLL(35°) SPACING-400mm AT EACH FEED POINT	88.9 ODX4.05 THK. BRG.ø20 mm BRG.NO.-6204 RUBBER 150mm OD	
			QTY-144 Nos.	QTY-06 Nos.
		CARRYING IDLER,EQ.LG.3 ROLL(35°)	114.3 ODX4.05 THK. BRG.ø20 mm BRG.NO.-6204 SPACING-1200 mm	
			QTY-21 Nos.	QTY-50 Nos.
		S.A.CARRYING IDLER, EQ.LG.3 ROLL(35°)	114.3 ODX4.05 THK. BRG.ø20 mm BRG.NO.-6204 10M FROM HEAD AND TAIL PULLEY WITH INTERMEDIATE SPACING 15M	
			QTY-02 Nos.	QTY-05 Nos.
		TRANSITION IDLER,EQ.LG.3 ROLL (10°,20°)	114.3 ODX4.05 THK. BRG.ø20 mm BRG.NO.-6204, AT HEAD END & TAIL END	
			QTY-04 Nos.	QTY-04 Nos.
	RETURN	RETURN IDLER, SINGLE ROLL	114.3 ODX4.05 THK. BRG.ø20 mm BRG.NO.-6204 SPACING 3000mm	
			QTY-11 Nos.	QTY-21 Nos.
		SELF ALIGNING RETURN IDLER	114.3 ODX4.05 THK. BRG.ø20 mm BRG.NO.-6204 10M FROM HEAD AND TAIL PULLEY WITH INTERMEDIATE SPACING 20M	
			QTY-01 No.	QTY-04 Nos.
		SELF CLEANING RETURN IDLER	88.9 ODX4.05 THK. BRG.ø20 mm BRG.NO.-6204 163 MM OVER RUBBER DISC AT HEAD END	
			QTY-01 No.	QTY-01 No.
		GUIDE ROLL	88.9 ODX4.05 THK. BRG.ø20 mm BRG.NO.-6204	
			QTY-02 Nos.	QTY-05 Nos.
		M.O.C. OF IDLERS & SHAFT	IDLERS- ERW STEEL TUBES & SHAFT - EN-8	
		IDLER/ PULLEY BEARING MAKE	NTPC APPROVED VENDER	
DRIVE DETAILS	MOTOR	MAKE/TYPE (IE3)	NTPC APPROVED VENDER (FOOT MOUNTED)	
		POWER RATING (KW)/RPM	AS PER APPROVED POWER CALCULATION	
	GEAR BOX	TYPE	(SOLID INPUT/OUTPUT) WORM TYPE	
		MAKE	NTPC APPROVED VENDER	
		RATIO/S.F.	55 : 1 / 2	
		HOLD BACK (INTEGRAL WITH GEAR BOX)	YES	
	COUPLING LOW SPEED	TYPE/SIZE	PIN BUSH TYPE/BC-4	PIN BUSH TYPE/BC2A
		MAKE/S.F.	NTPC APPROVED VENDER/2.25	
	COUPLING HIGH SPEED	TYPE/SIZE	GEARED/FGC5	GEARED/FGC4
		MAKE/S.F.	NTPC APPROVED VENDER/2.25	
		TAKE-UP TYPE/ TRAVEL	HGT/7200 MM	VGT/2400 MM

SCRAPER	INTERNAL SCRAPER (TYPE)	V PLOUGH TYPE BELT CLEANER MADE OF MILD STEEL FLATS AND HARD RUBBER STRIPS WITH AUTOMATIC WEAR ADJUSTMENT AND ACCESSORIES.
	EXTERNAL SCRAPER (TYPE)	SPRING LOADED SCRAPER TYPE CLEANER WITH MODULAR SEGMENTED AND REPLACEABLE POLYURETHANE SCRAPERS BLADES COMPLETE WITH MAIN CLEANER, PRE-CLEANER (MOUNTED SEPRATELY) ALONG WITH ACCESSORIES.
MISCELLANEOUS ITEM'S	SKIRT BOARD	SKIRT PLATE THK. 10mm (TISCRAL), TOP COVER THK. 6mm (M.S.), RUBBER SKIRT THK. 10mm, (AT EACH FEED POINT) MAKE :- BMH/SAIKRUPA
	DISCHARGE CHUTE	TISCRAL OR EQUIVALENT MATERIAL OF 20 MM THICKNESS, THE NON-STRIKING SHALL BE OF 10 MM THICK MILD STEEL AND BOLTED TO THE FLANGE. HOOD SHALL BE MADE IN 4 MM M.S. PLATE
	DECK PLATE	3 mm THK. M.S. PLATE CONVEYOR LENGTH
	SEAL PLATE	BOTTOM SEAL PLATE 12 G M.S. AT GALLERY LENGTH OF GALLERY.
	SHEETING	ROOF OF CONVEYOR GALLERY SHALL BE OF SINGLE SKIN TROUGHED PROFILE COLOUR COATED SHEET.
	MANUAL HOIST	5 NOS. 2 TON CAPACITY AT TT-1 & TT-2, HGT., VGT. CHAIN PULLEY BLOCKS
	PAINTING	AS PER TENDER SPECIFICATION
SAFETY SWITCHES	PULL CHORD SWITCH (SPACING/MAKE)	(MANUALLY RESET), 30 MTR. PITCHING/NTPC APPROVED VENDER
	BELT SWAY SWITCH (SPACING/MAKE)	ONE PAIR AT 50 M INTERVAL (MINIMUM 2 PAIRS) LIMIT SWITCH SNAP ACTION TYPE,/NTPC APPRAVED VENDER
	ZERO SPEED SWITCH (LOCATION/MAKE)	AT BEND PULLEY/NTPC APPROVED VENDER
		ALL SWITCHES PROTECTION IP-55
	HOOTER	01 NO. FOR EACH CONVEYOR

LEGEND

MRC	MILL REJECT BELT CONVEYOR
FFL	FINISH FLOOR LEVEL
HP	HEAD PULLEY
TP	TAIL PULLEY
SP	SNUB PULLEY
SB	SKIRT BOARD
VGT	VERTICAL GRAVITY TAKE-UP
HGT	HORIZONTAL GRAVITY TAKE-UP
TOS	TOP OF STEEL
TOP	TOP OF PULLEY
ZSS	ZERO SPEED SWITCH
PCS	PULL CORD SWITCH
BSS	BELT SWAY SWITCH

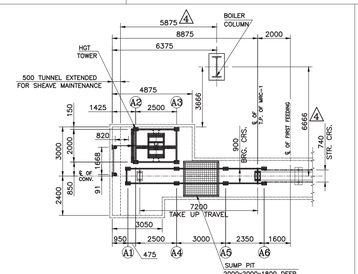
SILO

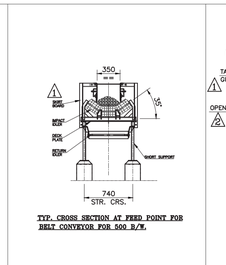
CAPACITY	161 Ton
DIA	ø5600 INSIDE
VER. HEIGHT	3550
ANG. HEIGHT	4250
BOTTOM OPENING	700 INSIDE
SWITCH	LEVEL SWITCHS

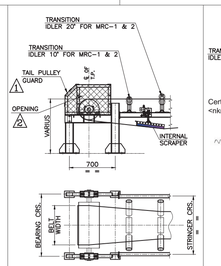
CABLE TRAY DETAILS FOR ALL POWER CABLES

SR. NO	CABLE TRAY MATERIAL AND TYPE	MENTIONED	QUANTITY
1	2mm THK GI PERFORATED CABLE TRAY 100 x 100 mm		570 mtr
2	PULL CORD SWITCH		20 NOS
3	BELT WAY SWITCH		14 NOS
4	ZERO SPEED SWITCH		2 NOS
5	EARTHING LAYOUT GI PATTI 50mm X 6mm TRAY 100 x 100 mm		570 mtr
6	INSTRUMENT CABLE TRAY 100 x 100 mm		570 mtr
7	SAFETY SWITCH CABLE CONDUIT		570 mtr

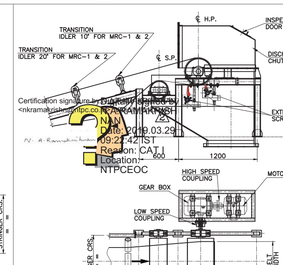
SR.NO/ TYPE	SYMBOL	DESCRIPTION / TYPE	QTY.
1/G1		45W LED WELL GLASS LAMP NORMAL SUPPLY	21 NOS
2		63A, 415V, TPNE INDUSTRIAL RECEPTACLE WITH SWITCH	9 NOS
3	LDB	LIGHTING DISTRIBUTION BOARD (NORMAL SUPPLY). DEAD FRONT DESIGN C/W INC ISOLATOR C/G 6 WAY SPN MCBS, LAMPS ETC.	1 NOS
4	JB	JUNCTION BOX -500(W) X 300(H) X 120(D)	5 NOS



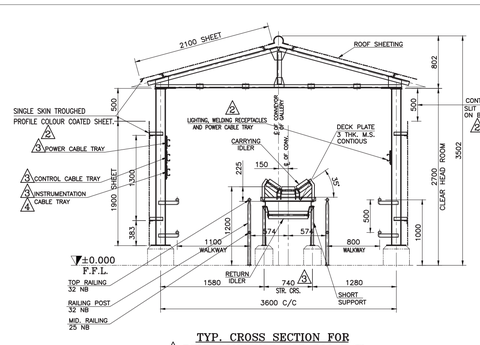


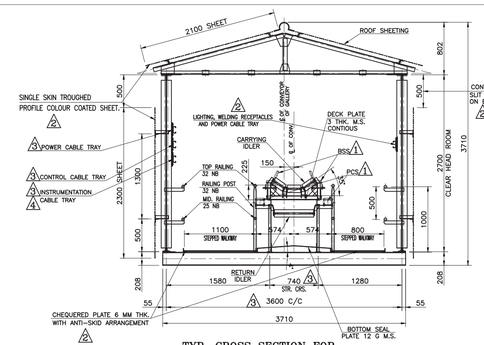


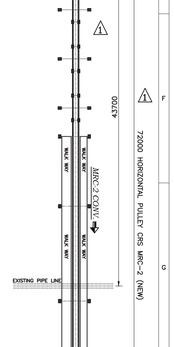
BELT WIDTH	BEARING CRS.	STRINGER CRS.
500 mm	900 mm	740 mm



BELT WIDTH	BEARING CRS.	STRINGER CRS.
500 mm	900 mm	740 mm







NOTES

1. ALL DIMENSIONS ARE IN mm. UNLESS OTHERWISE SPECIFIED.
2. ALL LEVELS ARE IN Mtrs. UNLESS OTHERWISE SPECIFIED.
3. SEAL PLATE TO BE PROVED THOUGHOUT THE GALLERY LENGTH FOR ALL CONVEYORS.
4. WALKWAY SHALL BE OF CHEQUERED PLATE WITH ANTI SKID ARRANGEMENT.
5. STEPPED WALKWAY SHALL BE PROVED WHERE CONV. SLOPE EXCEEDS 10°.
6. THIS IS A G.A. DRAWING & MINOR CHANGES IN DESIGN AND DIMENSIONS MAY OCCUR WHILE DETAILING.
7. EL (±) 0.000M CORRESPONDS TO THE GROUND FLOOR LEVEL OF THE POWR HOUSE BUILDING WHICH IS RL292.760M ABOVE MSL.
8. CABLES FOR PCS AND BCS SHALL BE ROUTED ALONG THE CONVEYORS THROUGH GI CONDUITS.
9. ALL THE MAKE SHALL BE AS PER NTPC APPROVED VENDER LIST.

NTPC KAHALGAON STAGE-I
4X210MW

TITLE

GA OF MRC-1 AND MRC-2 FOR MRS

DO NOT SCALE IF IN DOUBT PLEASE ASK

COMPUTER GENERATED DRAWING SIZE : A0 (1174x820)

1.00	**Surface Preparation For Equipments & Structural Steel**	
1.01	Steel Surface to be painted shall be cleaned in accordance with the latest edition of the following steel structure Painting council surface preparation specification:	
i)	Solvent Cleaning	SSPC-SP-1
ii)	Hand Cleaning	SSPC-SP-2
iii)	Power Tool Cleaning	SSPC-SP-3
iv)	Commercial Blast	SSPC-SP-4 (37 to 75 cleaning Micron Anchor Pattern)
1.02	All surfaces shall be thoroughly cleaned of oil, grease and other foreign matter.	
1.03	Surface will be free of moisture an contamination from chemicals and solvents	
1.04	Surface preparation and painting shall be as per NTPC Technical Specifications Part-B Sub-Section-I-M2-23.	
1.05	Any additional surface preparation specified by Paint manufacturer.	

2.00	**Painting Requirements for Equipments**	
2.01	All equipment like Sump pumps, Motors, Gear Box, MCC & Local Control Panel, Safety switches, Mono Rails & chain pulley systems, storage silos (excluding the supporting steel structures), equipment base plates etc.,	
A	Primer	Conforming to BS:5493, Table-4F, Part-2, Reference FP-3A
	Binder	Alkyd or modified alkyd
	Main Pigment	Zinc Phosphate
	Nominal coating thickness	70 microns (DFT)
B	Under Coat	Conforming to BS: 5493, Table-4F Part-3, Reference FU-2A
	Binder	Alkyd or modified Alkyd
	Main Pigment	Coloured pigments (full colours) suitably extended
	Nominal coating thickness	70 to 80 microns (DFT)

C	Finish Coat	Conforming to BS: 5493, Table-4F, Part-4, Reference FF-38
	Binder	Alkyd or modified Alkyd
	Main Pigment	Fade-resistant coloured pigments
	Nominal coating thickness	50 to 80 microns (DFT)
D	Dry film thickness of system	190 to 240 microns (DFT)

Note:

1	The Primer Coat shall be applied in Shop/site immediately after surface preparation.
2	The Intermediate Coat shall be applied in Shop/site after an interval of minimum overnight (from the application of Primer Coat).
3	The Finish Coat will be built up either in Single application or, in two applications at Site by Brush and / or Spray.
4	Paint shall not be applied to damp surfaces or in raining weather or when the temperature is below 13°C or above 82°C, except when specifically, permitted to do so by the manufacturer's instructions
5	Painting Schedule for Equipments is attached herewith in Annexure-I.
6	Painting shall be done as per NTPC Approved Painting Schedule. Manufacturer's recommendation shall also be followed in handling, storage, surface preparation and application.

3.00	**Surface not to be painted unless otherwise specified**
3.01	Surface of insulation
3.02	Stainless steel, nickel, copper brass, monel, aluminium, haste alloy, lead galvanized steel.
3.03	Valve stem, pump shafts, gauges.
3.04	Bearing, and control surfaces, lined or clad surfaces

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ANNEXURE – I

Sl.No.	ITEM / AREA	COLOUR OF FINISH COAT	PAINTING SPECS
1.0	Pumps	Blue (5012)	As per NTPC Technical Specification Part-B Sub-Section-I-M2-23 pg 1 of 5 to pf 5 of 5.
2.0	Pipe line with fittings & Valves for Sump pump	Grey 9002	-do-
3.0	Support for Pipe line	Black 9011	-do-
4.0	Indoor/outdoor Motors	Blue (RAL 5012)	-do-
5.0	Safety Switches, Sump Pump level switches	Grey 9002	-do-
6.0	Internal & External Scrapper	Grey 9002	-do-
7.0	Pulleys – Head pulley , Tail and take up pulley, Snub/bend pulley	Grey 9002	-do-
8.0	Idlers - Carrying idler, Return idlers, Impact idler, Self-aligning carrying idler, Self-aligning return idler, Self-cleaning return idler, Transition idler	Grey 9002	-do-
9.0	LT MCC Panel, Local Control Panel	Front & Rear Panels in Grey (RAL 9002). End Panels sides in Blue (RAL 5012)	-do-
10.0	Mono Rails & chain pulley systems	Golden yellow (1004)	-do-
11.0	Hook	Signal Red 3001	-do-
12.0	Gear Box, Motor, Coupling, Plummer blocks, Silo, Sector Gate	Grey 9002	-do-

NOTES :	
1	The equipment which are finish painted in shop shall not be repainted except for touch up of damage paint
2	For the Existing system - Painting is not in vendor's Scope (If there is any repair of existing system done by vendor in battery limit , the same will be painted as required)

4.00	**Painting Requirements for Structural Steel**	
4.01	Painting of Steel Surfaces (other than those embedded in Concrete including steel doors, rolling shutters, windows, in all indoor/outdoor structures) Applicable for Supporting Steel Structure of Silo, supporting structures of various other accessories and other equipment's, not covered in this list & Structural steel work fabricated at site including miscellaneous steel supports.	
A	Primer	Conforming to BS:5493, Table-4F, Part-2, Reference FP-3A
	Binder	Alkyd or modified alkyd
	Main Pigment	Zinc Phosphate
	Nominal coating thickness	70 microns (DFT)
B	Under Coat	Conforming to BS: 5493, Table-4F Part-3, Reference FU-2A
	Binder	Alkyd or modified Alkyd
	Main Pigment	Coloured pigments (full colours) suitably extended
	Nominal coating thickness	70 to 80 microns (DFT)
C	Finish Coat	Conforming to BS: 5493, Table-4F, Part-4, Reference FF-38
	Binder	Alkyd or modified Alkyd
	Main Pigment	Fade-resistant coloured pigments
	Nominal coating thickness	50 to 80 microns (DFT)
D	Dry film thickness of system	190 to 240 microns (DFT)

Note:

1	The Primer Coat shall be applied in Shop/site immediately after surface preparation.
2	The Intermediate Coat shall be applied in Shop/site after an interval of minimum overnight (from the application of Primer Coat).
3	The Finish Coat will be built up either in Single application or, in two applications at Site.
4	The Final Finish Coat shall be applied at site by Brush and / or Spray.
5	Refer Annexure – II for Color code
6	Painting of existing structure is not in BHEL/vendor's scope. Touch-up Painting on damaged areas of Employer's Structures, where inter-connection, Welding / modification etc. has been carried out by the Bidder is in Bidders scope.

ANNEXURE – II

Sl.No.	ITEM / AREA	COLOUR OF FINISH COAT	PAINTING SPECS
1.0	Hand rail, Gratings & Ladders	Galvanized as per IS: 4736.	As per Painting Specifications, Technical Specifications Section-VI, Part-B, Sub-Section-IV-C, Clause No. 4.01.04, Page-17 of 77
2.0	Cable Tray	Galvanized as per IS:2629, 75 micron minimum	-do-
3.0	Structural Steel works	Grey (RAL 9002)	-do-
4.0	HGT Tower (Counterweight Box, Chequered plate, Take-up frame, Sliding arrangement),	Grey (RAL 9002)	-do-
5.0	VGT Tower (Sliding Frame, Fencing, Supporting Structure)	Grey (RAL 9002)	-do-
6.0	TT-1 & TT-2 Tower (Column, Beam, Bracing, Platform, Checkered plate, Roof Truss, Purlin for side Sheeting)	Grey (RAL 9002)	-do-
7.0	Take-off units chutes, Interconnecting Chute (MRC-1 to MRC-2)	Grey (RAL 9002)	-do-
8.0	Conveyor Bridges - Conveyor gallery along with its supporting structures, short supports, stringers, deck plate, seal plate, walkway, idler frames, Conveyor Guard, Tail Pulley guard, Skirt Board	Grey (RAL 9002)	-do-
9.0	Silo supporting steel structure, platforms, staircase	Grey (RAL 9002)	-do-

MANUFACTURING QUALITY PLAN

ITEM: SECTOR GATE (CAT-I)

Project : NTPC KAHALGAON STPS STAGE-I (4 X 210 MW)

Package : MRS

Sl No.	Components	Characteristic	Class	Type of check	Quantum of check		Reference DOC	Acceptance Norms	Format of Record	Agency				Remarks
					M	C/N				D	M	C	N	
A	***RAW MATERIALS***													
1	Plates, Shaft	Chemical & Mechanical	Major	Chemical & Mechanical	1/Heat		AD	AD	TC/IR	√	P	V	V	Verification of Test Certificate / Check Test
2	Shaft	UT on shaft for >ø50 mm	Major	UT	100%		ASTM A388	ASTM A388*	TC	√	P	V	V	
B	***IN-PROCESS INSPECTION.***													
1	Welding (Welder and Procedure Qualification)	WPS: Procedure and Welder Qualific	Major	WPS approval Qualification Test	100%		As per Section-IX ASME. Approved –WPS, PQR	As per Section-IX ASME. Approved –WPS, PQR	QW-482, 483, 484 of ASME-IX		P	V	V	Approved WPS/PQR shall be followed. TUV Qualified welder shall be deployed
2	Marking , Cutting, Edge preparation	Dimensi Straightness Surface n after ro aration	Major	Measurement and Visual	100%		AD	AD			P			
3	Welding	W inal Run	Major	DPT	100%		ASTM E-165	No Defect	IR	√	P	V	V	

LEGEND: Records identified with (√) shall be essentially included by supplier in Q.A. document.

M : Manufacturer

C : BHEL / Authorized inspection agency

N : NTPC ; **W:** Witness ; **P:** Perform ; **V:** Verify

IR : Inspection Report ; **TC:** Test Certificate

AD: Approved Drawing

DPT: Dye Penetrant Test ;

DFT: Dry Film Thickness

FOR NTPC USE

REVIEWED BY BHEL

APPROV. BY NTPC

SEAL