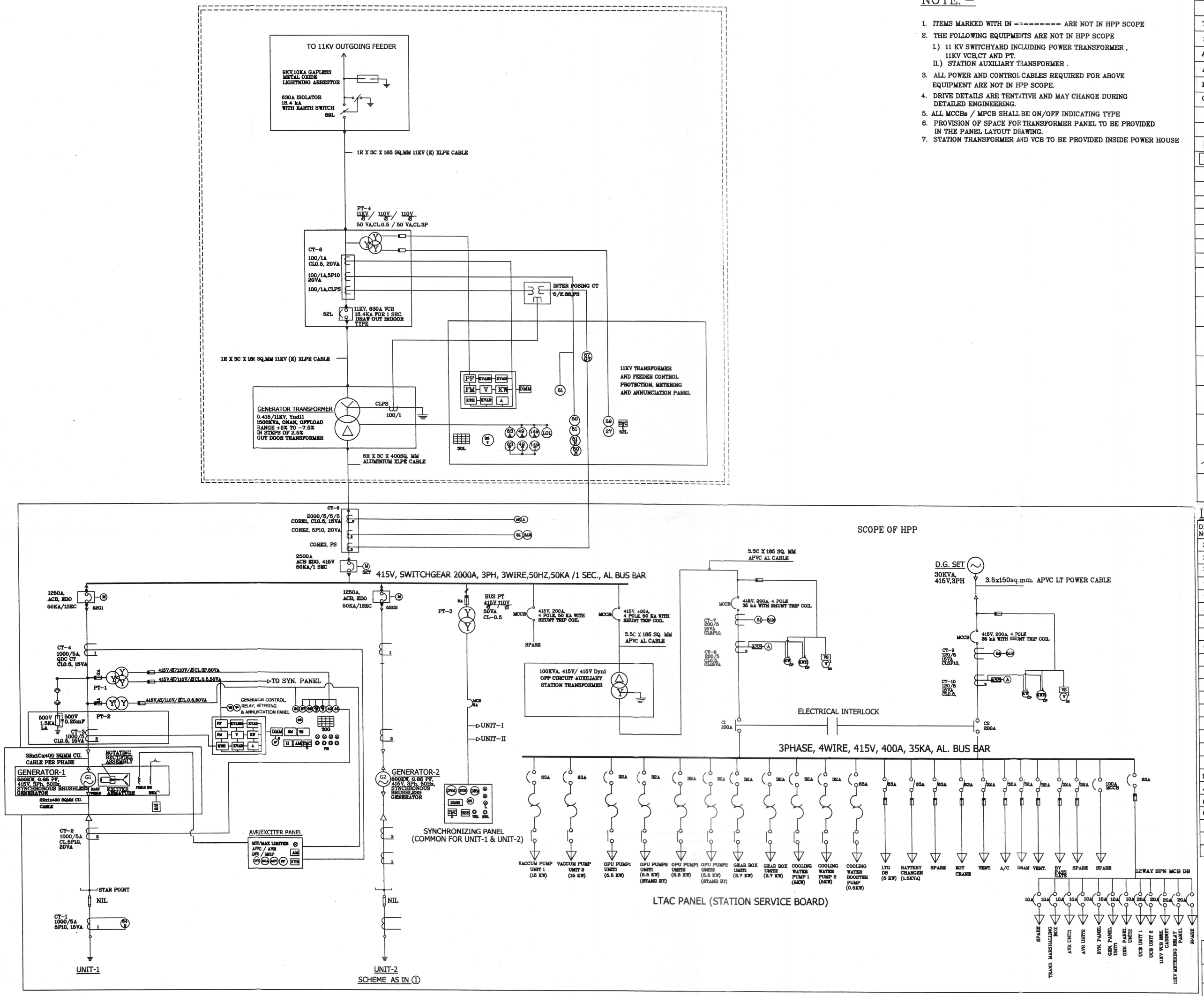

TO 11KV OUTGOING FEEDER
9KV,10KA GAPLESS METAL OXIDE LIGHTNING ARRESTOR
630A ISOLATOR 18.4 kA WITH EARTH SWITCH
89L
1R X 3C X 185 SQ.MM 11KV (E) XLPE CABLE
PT-4
11KV/√3 / 110V/√3 / 110V/√3
50 VA,CL0.5 / 50 VA,CL3P
CT-6
100/1A CL0.5, 20VA
100/1A,5P10 20VA
100/1A,CLPS
52L
11KV, 630A VCB 18.4KA FOR 1 SEC. DRAW OUT INDOOR TYPE
INTER POSING CT 5/2.88,PS
1R X 3C X 185 SQ.MM 11KV (E) XLPE CABLE
GENERATOR TRANSFORMER
0.415/11KV, Ynd11
1500KVA, ONAN, OFFLOAD
RANGE +5% TO -7.5%
IN STEPS OF 2.5%
OUT DOOR TRANSFORMER
CLPS
100/1
PF
KVARH
KVAH
FM
V
KW
DMM
KWH
KVAR
A
81
87 GT
50
51
51 N
50 N
59
27
TNC
52L
63 A
49 A
149 A
LOL
63 T
49 T
149 T
86 T
30L
11KV TRANSFORMER AND FEEDER CONTROL PROTECTION, METERING AND ANNUNCIATION PANEL
6R X 3C X 400SQ. MM ALUMINIUM XLPE CABLE
CT-5
2000/5/5/5
CORE1, CL0.5, 15VA
CORE2, 5P10, 20VA
CORE3, PS
2500A ACB EDO, 415V 50KA/1 SEC
52T
M
415V, SWITCHGEAR 2000A, 3PH, 3WIRE,50HZ,50KA /1 SEC., AL BUS BAR
SCOPE OF HPP
1250A, ACB, EDO 50KA/1SEC
52G1
CT-4
1000/5A, QDC CT CL0.5, 15VA
PT-1
415V/√3/110V/√3CL.3P,50VA
415V/√3/110V/√3CL0.5,50VA
TO SYN. PANEL
415V/√3/110V/√3CL0.5,50VA
PT-2
500V 1.5KA LA
500V 0.25mF
CT-3 1000/5 CL0.5, 15VA
GENERATOR CONTROL, RELAY, METERING & ANNUNCIATION PANEL
DMM
SM
TS
H
AM
TNC
30G
PB
3Rx1Cx400 SQMM CU. CABLE PER PHASE
ROTATING RECTIFIER ASSEMBLY
GENERATOR-1
500KW, 0.85 PF, 415V, 3Ph, 50Hz, SYNCHRONOUS BRUSHLESS GENERATOR
G1
MAIN FIELD
EXCITER ARMATURE
FIELD SH
RTD
TS 49
2Rx1x400 SQMM CU. CABLE
CT-2 1000/5A CL.5P10, 20VA
AVR/EXCITER PANEL
MIN/MAX LIMITER
APFC / AVR
DFR / MOP
DCV
DCA
ACV
PF
AM
SYN
STAR POINT
NIL
CT-1 1000/5A 5P10, 15VA
64 S
UNIT-1
1250A, ACB, EDO 50KA/1SEC
52G2
GENERATOR-2
500KW, 0.85 PF, 415V, 3Ph, 50Hz, SYNCHRONOUS BRUSHLESS GENERATOR
G2
NIL
UNIT-2
SCHEME AS IN ①
2A
BUS PT 415V/√3 / 110V/√3 50VA CL-0.5
PT-3
MCB 2A
UNIT-I
UNIT-II
DVM
SYN
DFM
25SS
25
TNC
BSS
VRL
SRL
SYNCHRONIZING PANEL (COMMON FOR UNIT-1 & UNIT-2)
MCCB
415V, 200A, 4 POLE, 50 KA WITH SHUNT TRIP COIL
SPARE
MCCB
415V, 400A, 4 POLE, 50 KA WITH SHUNT TRIP COIL
3.5C X 185 SQ. MM APVC AL CABLE
100KVA, 415V/ 415V Dyn1 OFF CIRCUIT AUXILIARY STATION TRANSFORMER
3.5C X 185 SQ. MM APVC AL CABLE
MCCB
415V, 200A, 4 POLE 35 kA WITH SHUNT TRIP COIL
CT-7 200/5 15VA CL5P10,
51
51N
CT-8 200/5 CL0.5, CL15VA
ASS
A
KW
KWH
VS
V
D.G. SET
30KVA, 415V,3PH
3.5x150sq.mm. APVC LT POWER CABLE
MCCB
415V, 200A, 4 POLE 35 kA WITH SHUNT TRIP COIL
CT-9 120/5 15VA CL5P10,
CT-10 120/5 15VA CL0.5,
ELECTRICAL INTERLOCK
C1 200A
C2 200A
3PHASE, 4WIRE, 415V, 400A, 35KA, AL. BUS BAR
63A
32A
100A MCCB
VACCUM PUMP UNIT 1 (15 KW)
VACCUM PUMP UNIT 2 (15 KW)
OPU PUMP1 UNIT1 (5.5 KW)
OPU PUMP2 UNIT1 (5.5 KW) (STAND BY)
OPU PUMP1 UNIT2 (5.5 KW)
OPU PUMP2 UNIT2 (5.5 KW) (STAND BY)
GEAR BOX UNIT1 (3.7 KW)
GEAR BOX UNIT2 (3.7 KW)
COOLING WATER PUMP 1 (5KW)
COOLING WATER PUMP 2 (5KW)
COOLING WATER BOOSTER PUMP (0.5KW)
LTG DB (5 KW)
BATTERY CHARGER (1.5KVA)
SPARE
EOT CRANE
VENT.
A/C
DRAN
VENT.
BY PASS GATE
SPARE
SPARE
12WAY SPN MCB DB
10A
20A
SPARE
TRANS. MARSHALLING BOX
AVR UNIT1
AVR UNIT2
SYN. PANEL
GEN. PANEL UNIT1
GEN. PANEL UNIT2
UCB UNIT 1
UCB UNIT 2
11KV VCB BRK. CABINET
11KV METERING RELAY PANEL
SPARE
LTAC PANEL (STATION SERVICE BOARD)

NOTE: –

1. ITEMS MARKED WITH IN ========== ARE NOT IN HPP SCOPE
2. THE FOLLOWING EQUIPMENTS ARE NOT IN HPP SCOPE
   - I.) 11 KV SWITCHYARD INCLUDING POWER TRANSFORMER , 11KV VCB,CT AND PT.
   - II.) STATION AUXILIARY TRANSFORMER .
3. ALL POWER AND CONTROL CABLES REQUIRED FOR ABOVE EQUIPMENT ARE NOT IN HPP SCOPE.
4. DRIVE DETAILS ARE TENTATIVE AND MAY CHANGE DURING DETAILED ENGINEERING.
5. ALL MCCBs / MPCB SHALL BE ON/OFF INDICATING TYPE
6. PROVISION OF SPACE FOR TRANSFORMER PANEL TO BE PROVIDED IN THE PANEL LAYOUT DRAWING.
7. STATION TRANSFORMER AND VCB TO BE PROVIDED INSIDE POWER HOUSE

ABBREVATION: –

EDO	ELCTRICAL DRAWOUT TYPE	PB	PUSH BUTTON
QDC	QUADRATURE DROOP CT	ACB	AIR CIRCUIT BREAKER
SH	SPACE HEATER		
TS	TEMPERATURE SCANNER	NIL	NEUTRAL LINK
SM	SPEED MONITOR	H	HOOTER
AVR	AUTOMATIC VOLTAGE REGULATOR	DFR	DIODE FAILURE RELAY
APFC	AUTOMATIC POWER FACTOR CONTROLLER	MOP	MOTORISED OPERATED POTENTIOMETER
MCCB	MOULDED CASE CIRCUIT BREAKER	DMM	DIGITAL MULTIFUNCTION METER
C1, C2	CONTACTORS	A/M	AUTOMANUAL SELECTOR SWITCH
Ⓐ	AMMETER	Ⓕ	FREQUENCY METER
(DFM)	DOUBLE FREQUENCY METER	(DVM)	DOUBLE VOLT METER
KWH	KILOWATT HOUR METER	VS	VOLTMETER S/SWITCH
25SS	SYNCHRONISING S/SWITCH	GRP	GENERATOR RELAY PANEL
UCB	UNIT CONTROL BOARD	TRP	TRANSFORMER RELAY PANEL
Ⓥ	VOLTMETER	DCA	DC EXCITATION AMMMETER
TNC	TRIP NEUTRAL CLOSE SWITCH	MC	METERING CUBICLE
DCV	DC VOLTMETER	(SYN)	SYNCHROSCOPE
(PF)	POWER FACTOR METER	(KW)	KILO WATT METER
(BSS)	UNIT SELECTION SWITCH	ASS	AMMETER S/SWITCH
VRL	VOLTAGE RAISE /LOWER SWITCH	SRL	SPEED RAISE/LOWER SWITCH
	DRAW OUT TYPE CIRCUIT BREAKER	⊘	SEMAPHORE IDICATOR
	CAPACITOR		BUSHING MTD. CT
	LIGHTNING ARRESTOR		FUSE
	CURRENT TRANSFORMER		DISCONNECTING LINK
	POTENTIAL TRANSFORMER		CABLE TERMINATION
	MCB	Ⓖ	GENERATOR
	ISOLATOR WITH EARTH SWITCH		TWO WINDING TRANSFORMER
	MOTOR PROTECTION CIRCUIT BREAKER WITH OVER LOAD DEVICE		

LEGEND:

DEVICE NO.	DESCRIPTION
25	CHECK SYNCHRONISING RELAY
27	GEN. UNDER VOLTAGE RELAY
32P	GEN. REVERSE POWER SUPPLY (ACTIVE POWER)
40	GEN. FIELD FAILURE RELAY (WITH UNDER VOLTAGE)
46	GEN. NEGATIVE SEQUENCE RELAY (SINGLE STAGE)
51V	VOLTAGE RESTRAINED OVER CURRENT RELAY
59	GEN. OVER VOLTAGE RELAY
60	PT CIRCUIT MONITORING RELAY (FOR AVR PT)
64S	EARTH FAULT RELAY
86	MASTER TRIP RELAY
30	ANNUNCIATOR
52	BREAKER
87GT	GENERATOR TRANSFORMER DIFFERENTIAL RELAY
51	IDMT O/C RELAY
50	INSTANTANEOUS O/C RELAY
50N	INSTANTANEOUS E/F RELAY
51N	IDMT E/F RELAY
149A/T	OIL TEMPERATURE, ALARM/TRIP AUX. RELAYS
49-A/T	WINDING TEMPERATURE, ALARM/TRIP AUX. RELAYS
63-A/T	BUCHHOLZ RELAY, ALARM/ TRIP AUX. RELAYS
64GT	RESTRICTED EARTH FAULT RELAY
89	ISOLATOR
LOL	LOW OIL LEVEL ALARM
81	FREQUENCY RELAY FOR 11KV FEEDER PROTECTION

CHECKED & RECOMMENDED
FORAPPROVAL
Head
A.H.E.C.
Date : 05/04/06 I.I.T., Roorkee

24/5/06

Rev	DATE	DRAWN	CH. BY	DESCRIPTION
B	31/03/06	N.Kishore	M. Ravin.	SLD Rev. Vide disc. held on 29/03/06
A	19/11/05	NVerma	Ravindran	SLD Rev. Vide disc. held on 10/11/05

CUSTOMER:
M/s. M.K. ENTERPRISES CORP. LTD.

M/S HPP ENERGY (INDIA) PVT. LTD.
L-71/A-B,F.F. MALVIYA NAGAR,
NEW DELHI - 110017.-INDIA

PROJECT:
2 x 500KW BELSAR SHP

TITLE:
SINGLE LINE DIAGRAM

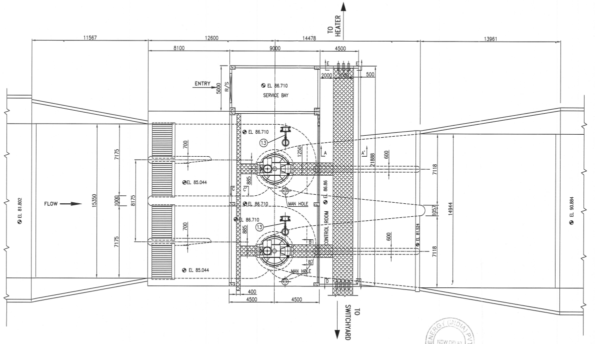
	NAME	SIGN	DATE
APPROVED BY:	M.RAVINDRAN		31.03.06
DRAWN BY:	NANDKISHORE		31.03.06

DRG. No. HPP/120/SLD/EE-001 R-B

SCALE: NTS

IF,IN DOUBT ASK

1574



TO HEATER
11567
12600
14478
13961
8100
9000
4500
E
E
2000
2000
500
ENTRY
5000
R/S
EL 86.710
SERVICE BAY
EL 86.710
13
700
1250
A
A'
1888
600
7118
EL 85.044
885
C
C'
EL 86.86
CONTROL ROOM
EL 81.802
FLOW
15350
7175
1000
8175
EL 86.710
MAN HOLE
1057
14944
EL 90.884
EL 86.710
13
700
885
B
B'
600
EL 81.524
7175
7118
EL 85.044
MAN HOLE
D
D'
400
4500
4500
TO SWITCHYARD

Rev.	Modification	Date	Sign

Break all sharp corners 0.2 mm max.

TOLERANCES UNLESS OTHERWISE STATED

MACHINING		FABRICATION	
01–100 mm	± 0.15 mm	01–300 mm	± 1 mm
100–300 mm	± 0.4 mm	300–1000 mm	± 2 mm
300–1000 mm	± 0.8 mm	1000–2000 mm	+ 3 mm

HPP
ENERGY (INDIA) PVT. LTD.

	Format	Scale
	A2	
Drawn	N.K.	23.07.07
Checked	ALEKH	23.07.07
Approved		
Comp. Ref.		

Material | Qty. | Weight

Project: BELSAR (2x500KW)

Client: BIHAR STATE HYRO POWER CORPORATION

Title: CABLE TRENCH DETAILS (PLAN)

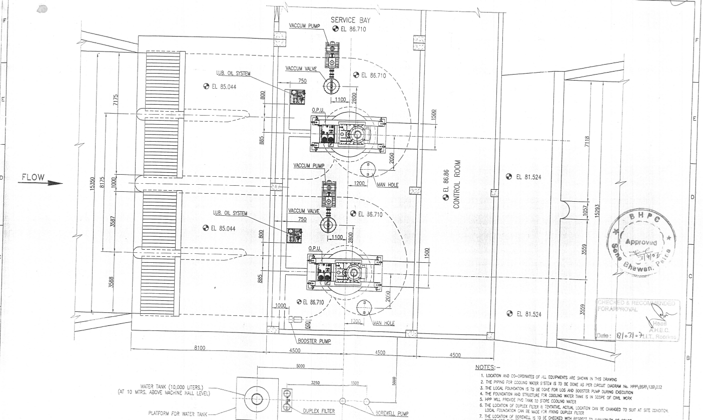
Drg. No. HPP/BHPC/ELE/120/004

Rev. 0

Sheet 2 / 3

IF IN DOUBT ASK

(28)


SERVICE BAY
VACCUM PUMP
EL 86.710
VACCUM VALVE
EL 86.710
LUB. OIL SYSTEM
EL 85.044
750
800
1100
2800
O.P.U.
1500
885
2050
VACCUM PUMP
MAN HOLE
1200
FLOW
15350
7175
8175
1000
3587
3588
LUB. OIL SYSTEM
EL 85.044
VACCUM VALVE
750
EL 86.710
800
1100
2800
O.P.U.
1500
885
2050
EL 86.710
1000
600
1200
MAN HOLE
BOOSTER PUMP
EL 86.86
CONTROL ROOM
EL 81.524
EL 81.524
7118
1057
15293
3559
3559
8100
4500
4500
4500
5000
3250
1500
5000
WATER TANK (10,000 LITERS.)
(AT 10 MTRS. ABOVE MACHINE HALL LEVEL)
PLATFORM FOR WATER TANK
DUPLEX FILTER
BOREWELL PUMP

BHPC
Sone Bhawan, Patna
Approved
3/4/07

CHECKED & RECOMMENDED FOR APPROVAL
Head
A.H.E.C.
I.I.T., Roorkee
Date: 8/03/07

NOTES:-

1. LOCATION AND CO-ORDINATES OF ALL EQUIPMENTS ARE SHOWN IN THIS DRAWING
2. THE PIPING FOR COOLING WATER SYSTEM IS TO BE DONE AS PER CIRCUIT DIAGRAM No. HPP\BSR\120\032
3. THE LOCAL FOUNDATION IS TO BE DONE FOR LOS AND BOOSTER PUMP DURING EXECUTION
4. THE FOUNDATION AND STRUCTURE FOR COOLING WATER TANK IS IN SCOPE OF CIVIL WORK
5. HPP WILL PROVIDE PVC TANK TO STORE COOLING WATER
6. THE LOCATION OF DUPLEX FILTER IS TENTATIVE, ACTUAL LOCATION CAN BE CHANGED TO SUIT AT SITE CONDITION, LOCAL FOUNDATION CAN BE MADE FOR FIXING DUPLEX FILTER
7. THE LOCATION OF BOREWELL IS TO BE CHECKED WITH RESPECT TO AVAILABILITY OF SPACE BORING FOR SUBMERSIBLE PUMP IS IN CIVIL SCOPE OF WORK
8. THE DEPTH OF BOREWELL IS CONSIDERED AS 60 FEET AND THE SIZE OF BOREWELL SHALL BE 10 INCHES
9. ALL EQUIPMENTS ARE DRAWN IN SCALE

Rev.	Modification	Date	Sign

Break all sharp corners 0.2 mm max.

TOLERANCES UNLESS OTHERWISE STATED			
MACHINING		FABRICATION	
01–100 mm	± 0.15 mm	01–300 mm	± 1 mm
100–300 mm	± 0.4 mm	300–1000 mm	± 2 mm
300–1000 mm	± 0.8 mm	1000–2000 mm	± 3 mm

HPP
ENERGY (INDIA) PVT. LTD.

Format A2	Scale	Material	Qty.
Drawn	SAJI	18.01.07	Project: BELSAR M.H.P. (2x500 KW)
Checked			
Approved			Client
Comp. Ref.			

Weight

Title: EQUIPMENT LAYOUT PLAN

Drg. No. HPP/BSR/120/034

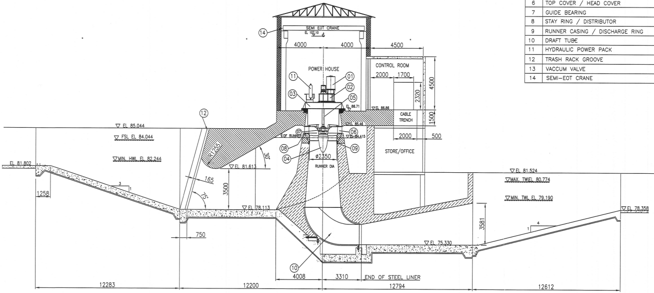
Rev. 0

Sheet 1/1

IF, IN DOUBT ASK

LS35

S.NO	DESCRIPTION
1	GENERATOR
2	GEAR BOX / SPPED INCREASOR
3	GEAR BOX BASE FRAME / CHASSIS
4	RUNNER ASSEMBLY
5	TURBINE SHAFT
6	TOP COVER / HEAD COVER
7	GUIDE BEARING
8	STAY RING / DISTRIBUTOR
9	RUNNER CASING / DISCHARGE RING
10	DRAFT TUBE
11	HYDRAULIC POWER PACK
12	TRASH RACK GROOVE
13	VACCUM VALVE
14	SEMI-EOT CRANE


SEMI EOT CRANE
EL 107.10
14
4000
4000
4500
POWER HOUSE
CONTROL ROOM
2000
1700
2320
4500
11
01
02
03
05
EL 86.71
▽EL 86.86
CABLE TRENCH
1500
12
▽ EL 85.044
▽EL 85.46
07
06
℄ OF RUNNER
▽EL 84.415
2000
500
▽ FSL EL 84.044
R1235
08
09
STORE/OFFICE
30°
04
ø2350
RUNNER DIA
▽MIN. HWL EL 82.244
EL 81.802
▽ EL 81.613
▽ EL 81.524
▽MAX. TWIEL 80.774
165
3
1
3500
1258
75°
▽MIN. TWL EL 79.190
▽ EL 78.113
▽ EL 78.358
3581
1
4
750
▽ EL 75.330
10
4008
3310
END OF STEEL LINER
12283
12200
12794
12612

▨ FIRST STAGE CONCRETE

▨ SECOND STAGE CONCRETE

▨ THIRD STAGE CONCRETE

Rev.	Modification	Date	Sign

Break all sharp corners 0.2 mm max.

TOLERANCES UNLESS OTHERWISE STATED			
MACHINING		FABRICATION	
01–100 mm	± 0.15 mm	01–300 mm	± 1 mm
100–300 mm	± 0.4 mm	300–1000 mm	± 2 mm
300–1000 mm	± 0.8 mm	1000–2000 mm	+ 3 mm

HPP
ENERGY (INDIA) PVT. LTD.

Format	A2	Scale	
Drawn	N.K.	23.07.07	
Checked	ALEKH	23.07.07	
Approved			
Comp. Ref.			

Material	Qty.	Weight
Project	BELSAR (2x500 KW)	
Client	BIHAR STATE HYRO POWER CORPORATION	

Title
CABLE TRENCH DETAILS
(SECTION)

Drg. No.	Rev.	Sheet
HPP/BHPC/ELE/120/004	0	1 3

150

1740201

DO NOT SCALE

ASK IF IN DOUBT

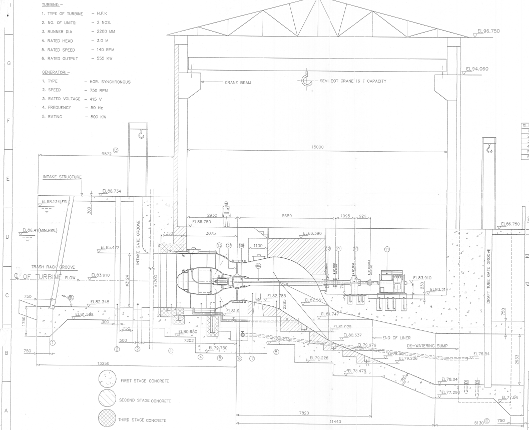
SPECIFICATIONS:-

TURBINE:-

1. TYPE OF TURBINE - H.F.K
2. NO. OF UNITS: - 2 NOS.
3. RUNNER DIA - 2200 MM
4. RATED HEAD - 3.0 M
5. RATED SPEED - 140 RPM
6. RATED OUTPUT - 555 KW

GENERATOR:-

1. TYPE - HOR. SYNCHRONOUS
2. SPEED - 750 RPM
3. RATED VOLTAGE - 415 V
4. FREQUENCY - 50 Hz
5. RATING - 500 KW


EL96.750
EL94.060
CRANE BEAM
SEMI EOT CRANE 16 T CAPACITY
9572 ©
15000
INTAKE STRUCTURE
EL88.734
EL88.134(FSL)
300
EL86.41(MIN.HWL)
EL85.472
INTAKE GATE GROOVE
TRASH RACK GROOVE
℄ OF TURBINE FLOW
EL83.910
EL86.750
2930
5659
1095
925
3075
1350
EL86.390
1100
Ø3124
Ø4200
750
EL82.348
EL81.598
1750
300
750
500
EL80.650
7202
EL79.750
EL82.785
EL82.581
EL81.9
2285
EL81.747
EL81.025
EL80.537
EL80.275
END OF LINER
DE-WATERING SUMP
EL79.976
EL79.226
EL79.504
EL79.226
EL78.476
EL76.54
2933
EL78.04
EL77.290
EL77.04
EL83.910
230
EL83.21
EL86.750
300
DRAFT TUBE GATE GROOVE
750
EL85.391(MAX TWL)
EL83.80(MIN TWL)
13250
7820
11440
5130 ©
750
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑪ ⑫ ⑬ ⑭
FIRST STAGE CONCRETE
SECOND STAGE CONCRETE
THIRD STAGE CONCRETE

This drawing must not be used for manufacturing purposes copied nor communicated in anyway to third parties without written permission from M/s. BOVING FOURESS LIMITED.

REVISIONS

Zone	Rev.	Description	Ppd	Chd	Appd
	A	REVISED AS PER CUSTOMER LETTER NO NPL/AGNOOR/RN/01 DT 23&30.04.2001			
	B	REVISED AND REDRAWN			
	C	REVISED AS PER CUSTOMER REQUIREMENTS			
	D	REVISED AS PER CUSTOMER DAWINGS DRG NO.AHEC/C-2051008			
	E	REVISED AS PER IOM FROM CONTRACTS DEPT. DATED 26.12.2002			
	F	REVISED AND REDRAWN			

LOAD DETAILS FOR GEAR BOX FOUNDATIONS.

STATIC LOAD 4000 kgf
DYNAMIC LOAD 500 kgf /BOLT
NO.OF BOLTS-12Nos (WILL BE CONFIRMED SHORTLY)

LOAD DETAILS FOR GENERATOR FOUNDATIONS.

NO.OF BOLTS-10Nos (WILL BE CONFIRMED SHORTLY)

SL.NO	DESCRIPTION	LOAD (kgf/BOLT)	DIRECTION
1	DOWNWARD STATIC LOAD.	1300	DOWN
2	DYN. VERT.LOAD DUE TO S.C TORQUE.	±5200	VERTICAL
3	DYN. HORIZ.LOAD DUE TO S.C TORQUE.	±3100	HORI.
4	MAX. DOWNWARD VERTICAL LOAD	6500	DOWN
5	MAX. DOWNWARD VERTICAL LOAD	3900	UPWARD
6	MAX. HORIZONTAL LOAD	±3100	HORI.

SL NO		LOAD DETAILS	DIRECTION OF LOAD	LOAD IN TONS	REMARKS
1	W1	ANCHOR FRAME	TOWARDS GENARATOR	46	TO BE TAKEN BY ANCHOR FRAME
2	W2	INLET CASING	VERTICALLY DOWNWARDS	25(WET)	ON TURBINE
3	W3	RUNNER CHAMBER	VERTICALLY DOWNWARDS	7(WET)	ON TURBINE
4	W4	SUCTION CONE	VERTICALLY DOWNWARDS	11(WET)	ON TURBINE
5	W5	DRAFT TUBE BEND	TOWARDS GENARATOR	44	BY EMBEDED ANCHOR BAR & TURNBUCKLE
6	W6	DRAFT TUBE BEND	VERTICALLY UPWARDS	25	BY EMBEDED ANCHOR BAR & TURNBUCKLE
7	W7	DRAFT TUBE DEAD WEIGHT	VERTICALLY DOWNWARDS	80(WET)	ON TURBINE

BOVING FOURESS LTD.
DESIGN OFFICE
Date 14/8/03
HOSKOTE

1F

RECD. FROM BFL VIDE
LETTER NO. 174/215 DATED 14.08.03

QTY.	SL NO.	DESCRIPTION	MAT'L	SPEC'N	REF/DRG

AGNOOR PROJECT
174 CODE
2 No.OF SETS
USED ON ASSY.
DRG.No. -

BOVING FOURESS turbines

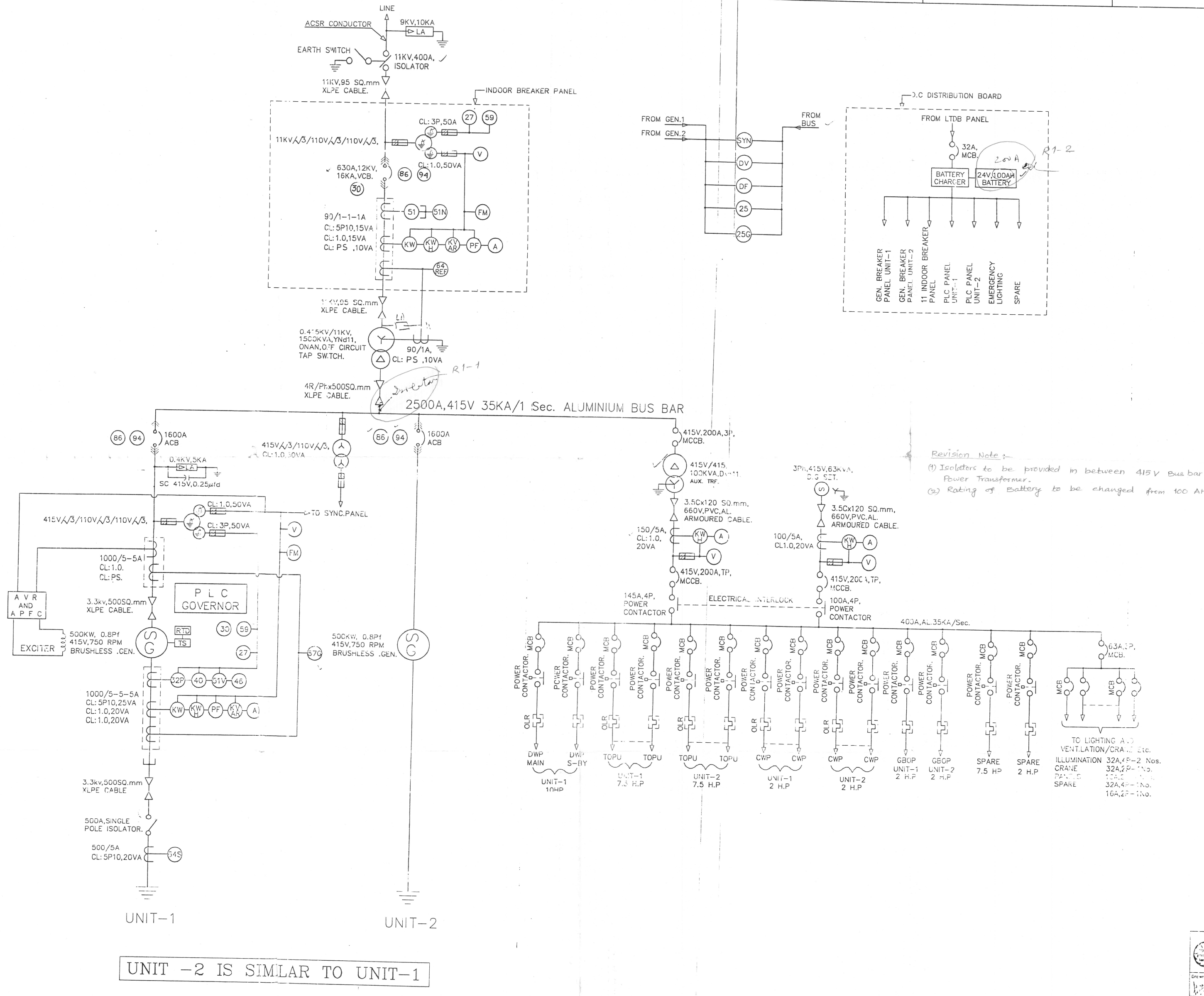
BOVING FOURESS LIMITED
BANGALORE

TITLE STATION ARRANGEMENT ELEVATION

DRAWN		14/8/03	SCALE	PROJECTION	MASS
CHECKED			1:50	1 ANGLE	- KG.
APPROVED			ALL DIMENSIONS IN MILLIMETRES		
DRAWING NO.	1740201			SHEET 1 OF 2	
REVISION	A B C D E F				

1745101

Rev. No.	REVISIONS Description	SIGN.	DATE
A	1. CUSTOMER COM[illegible] INCORPORTATED.		12/11/02


LINE
ACSR CONDUCTOR
9KV,10KA
LA
EARTH SWITCH
11KV,400A, ISOLATOR
11KV,95 SQ.mm XLPE CABLE.
INDOOR BREAKER PANEL
11KV/√3/110V/√3/110V/√3.
CL: 3P,50A
27
59
V
CL: 1.0,50VA
630A,12KV, 16KA,VCB.
86
94
30
90/1-1-1A
CL: 5P10,15VA
CL: 1.0,15VA
CL: PS ,10VA
51
51N
FM
KW
KWH
KVAR
PF
A
64 REF
11KV,95 SQ.mm XLPE CABLE.
LA
0.415KV/11KV, 1500KVA,YNd11, ONAN,OFF CIRCUIT TAP SWITCH.
90/1A, CL: PS ,10VA
R1-1
Isolator
4R/Ph.x500SQ.mm XLPE CABLE.
2500A,415V 35KA/1 Sec. ALUMINIUM BUS BAR
1600A ACB
0.4KV,5KA LA
SC 415V,0.25μfd
415V/√3/110V/√3, CL: 1.0,50VA
TO SYNC.PANEL
415V/√3/110V/√3/110V/√3.
CL: 1.0,50VA
CL: 3P,50A
1000/5-5A CL: 1.0. CL: PS.
AVR AND APFC
EXCITER
PLC GOVERNOR
3.3kv,500SQ.mm XLPE CABLE.
500KW, 0.8Pf 415V,750 RPM BRUSHLESS GEN.
RTD
TS
30
59
27
57G
32P
40
51V
46
1000/5-5-5A CL: 5P10,25VA CL: 1.0,20VA CL: 1.0,20VA
3.3kv,500SQ.mm XLPE CABLE
500A,SINGLE POLE ISOLATOR.
500/5A CL: 5P10,20VA
64S
UNIT-1
500KW, 0.8Pf 415V,750 RPM BRUSHLESS GEN.
UNIT-2
FROM GEN.1
FROM GEN.2
FROM BUS
SYN
DV
DF
25
25G
D.C DISTRIBUTION BOARD
FROM LTDB PANEL
32A, MCB.
BATTERY CHARGER
24V,100AH BATTERY
200 A
R1-2
GEN. BREAKER PANEL UNIT-1
GEN. BREAKER PANEL UNIT-2
11 INDOOR BREAKER PANEL
PLC PANEL UNIT-1
PLC PANEL UNIT-2
EMERGENCY LIGHTING
SPARE
415V,200A,3P, MCCB.
415V/415, 100KVA,Dyn11 AUX. TRF.
3.5Cx120 SQ.mm, 660V,PVC,AL. ARMOURED CABLE.
150/5A, CL: 1.0, 20VA
415V,200A,TP, MCCB.
145A,4P, POWER CONTACTOR
ELECTRICAL INTERLOCK
3Ph,415V,63KVA, D.G SET.
3.5Cx120 SQ.mm, 660V,PVC,AL. ARMOURED CABLE.
100/5A, CL1.0,20VA
415V,200A,TP, MCCB.
100A,4P, POWER CONTACTOR
400A,AL.35KA/Sec.
MCB
POWER CONTACTOR.
OLR
DWP MAIN
DWP S-BY
UNIT-1 10HP
TOPU
TOPU
UNIT-1 7.5 H.P
TOPU
TOPU
UNIT-2 7.5 H.P
CWP
CWP
UNIT-1 2 H.P
CWP
CWP
UNIT-2 2 H.P
GBOP UNIT-1 2 H.P
GBOP UNIT-2 2 H.P
SPARE 7.5 HP
SPARE 2 H.P
63A,3P, MCB.
TO LIGHTING AND VENTILATION/CRANE Etc.
ILLUMINATION 32A,4P-2 Nos.
CRANE 32A,2P-1No.
PANELS 16A,2P-1No.
SPARE 32A,4P-1No.
16A,2P-1No.

UNIT -2 IS SIMILAR TO UNIT-1

Revision Note :-

(1) Isolators to be provided in between 415V Bus bar & Power Transformer.

(2) Rating of Battery to be changed from 100 AH to 200 AH.

LEGENDS

- CHECK SYNCHRONISING RELAY
- GUARD RELAY
- UNDER VOLTAGE RELAY
- ANNUNCIATOR
- REVERSE POWER RELAY
- FIELD FAILURE RELAY
- NEGATIVE SEQUENCE RELAY
- I D M T O/C RELAY
- I D M T E/F RELAY
- OVER VOLTAGE RELAY
- RESTRICTED E/F RELAY
- STATOR E/F RELAY
- MASTER TRIP RELAY
- GENERATOR DIFFERENTIAL RELAY
- TRIP CIRCUIT SUPERVISING RELAY
- AMMETER
- [illegible] VOLTAGE REGULATOR
- [illegible] POWER FACTOR CONTROLLER
- FREQUENCY METER
- GENERATOR
- KILO WATT METER
- KILO WATT HOUR METER
- KILO VOLT AMPERE REACTIVE METER
- LIGHTNING ARRESTOR
- POWER FACTOR METER
- SURGE CAPACITOR
- VOLT METER
- DOUBLE FREQUENCY METER
- DOUBLE VOLTMETER
- SYNCHROSCOPE
- TURBINE OIL PUMPING UNIT
- COOLING WATER PUMP
- GEAR BOX OIL PUMP UNIT
- DEWATERING PUMP

NOTE:-

1. LT CABLE FOR AUXILIARIES
   - DWP - [illegible] SQ.mm COPPER CABLE
   - CWP - 2.5 SQ.mm COPPER CABLE
   - GBOPU - 2.5 SQ.mm COPPER CABLES
2. CONTROL CABLES
   - 1.5 SQ.mm COPPER FLEXIBLE FOR AC & DC CIRCUIT

BHPC
Approved
21/2/02

CHECKED AND
RECOMMENDED FOR
APPROVAL

Head
AHEC, IIT
Roorkee
Date : 31/1/2003

BOVING FOURESS LIMITED
BANGALORE

SCALE NTS

TITLE:-
SINGLE LINE DIAGRAM
(2 x [illegible]KW,SYN..GEN.)

SHEET 1 OF 1

NO.OF SETS

Drawn | Chkd. | Appd. | Date 21/11/02

DRG.No. 1745101

PROJECT AGNOOR

REVISIONS. A

The layout drawing is recommended for approval subject to following provisions for which detailed engineering shall be required before execution: -

1. The bore well shall be constructed according to the spring level, type and length of water bearing strata available so as to give sand free continuous rated discharge till full life of the project.
2. Th[illegible]e well strainer assembly shall be designed for sand free continuous rated discharge without effecting the pumping depression till full life of the project
3. The bore well shall be gravel packed slotted pipe assembly well fully developed to provide rated sand free discharge at nominal depression till full life of project. Distance between the two bore wells shall be good –enough to protect each other from depression zone of the running well.
4. The pump set shall be good enough for continuous rated discharge at rated head from bore well-depressed level in continuous running.
5. The pump running electrical controls shall be provided with powerhouse control and operation switch at local control.
6. Suitable foundation and shed for pump discharge head, local control switch and overhead tank shall be provided.
7. Suitable permanent arrangement shall be provided over both wells for taking out and dropping pump assembly in emergency for maintenance.
8. The pipeline and valves provided in the system shall be as per ISS leak free and suitable for discharge and head at different points. Strength of the civil structure shall not be disturbed in laying the system.

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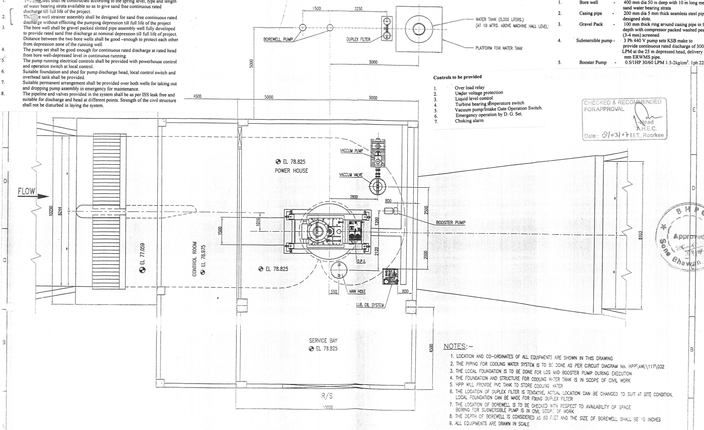
Main Parameters to be provided in both bore wells

1.	Bore well -	400 mm dia 50 m deep with 10 m long medium sand water bearing strata
2.	Casing pipe -	200 mm dia 5 mm thick seamless steel pipe with designed slots.
3.	Gravel Pack -	100 mm thick ring around casing pipe in full bore depth with compressor packed washed pea gravel. (3-4 mm) screened
4.	Submersible pump -	3 Ph 440 V pump sets KSB make to provide continuous rated discharge of 300/400 LPM at the 25 m depressed head, delivery 50/64 mm ERWMS pipe.
5.	Booster Pump -	0.5/1HP 30/60 LPM 1.5-2kg/cm^2. 1ph 220 V

Controls to be provided

1. Over load relay
2. Under voltage protection
3. Liquid level control
4. Turbine bearing temperature switch
5. Vacuum pump/Intake Gate Operation Switch.
6. Emergency operation by D. G. Set.
7. Choking alarm

CHECKED & RECOMMENDED FOR APPROVAL
Head
A.H.E.C.
I.I.T., Roorkee
Date : 9/03/07



NOTES:-

1. LOCATION AND CO-ORDINATES OF ALL EQUIPMENTS ARE SHOWN IN THIS DRAWING
2. THE PIPING FOR COOLING WATER SYSTEM IS TO BE DONE AS PER CIRCUIT DIAGRAM No. HPP\AWL\117\032
3. THE LOCAL FOUNDATION IS TO BE DONE FOR LOS AND BOOSTER PUMP DURING EXECUTION
4. THE FOUNDATION AND STRUCTURE FOR COOLING WATER TANK IS IN SCOPE OF CIVIL WORK
5. HPP WILL PROVIDE PVC TANK TO STORE COOLING WATER
6. THE LOCATION OF DUPLEX FILTER IS TENTATIVE, ACTUAL LOCATION CAN BE CHANGED TO SUIT AT SITE CONDITION, LOCAL FOUNDATION CAN BE MADE FOR FIXING DUPLEX FILTER
7. THE LOCATION OF BOREWELL IS TO BE CHECKED WITH RESPECT TO AVAILABILITY OF SPACE BORING FOR SUBMERSIBLE PUMP IS IN CIVIL SCOPE OF WORK
8. THE DEPTH OF BOREWELL IS CONSIDERED AS 60 FEET AND THE SIZE OF BOREWELL SHALL BE 10 INCHES
9. ALL EQUIPMENTS ARE DRAWN IN SCALE

Rev.	Modification	Date	Sign

TOLERANCES UNLESS OTHERWISE STATED

MACHINING		FABRICATION	
01-100 mm	± 0.15 mm	01-300 mm	± 1 mm
100-300 mm	± 0.4 mm	300-1000 mm	± 2 mm
300-1000 mm	± 0.8 mm	1000-2000 mm	± 3 mm

HPP
ENERGY (INDIA) PVT. LTD.

Format	A2	
Scale		
Drawn	SAJI	16.01.07
Checked		
Approved		
Comp. Ref.		

Material: | Qty.: | Weight:

Project: ARWAL SHP (1x500 K.W)

Client:

Title: EQUIPMENT LAYOUT PLAN

Drg. No. HPP/AWL/117/034

Rev. 0 | Sheet 1/1