INTAKE WELL
Qty. : 1 No.

PRE-SETTLING TANK
QTY : 6 NOS
SUBMERSIBLE PUMP : 12 nos.

CASCADE AERATOR
QTY : 1 NO

FROM ALUM TANK

FROM POLY TANK

FROM LIME TANK

FLASH MIXER
QTY : 2 NOS

FLOCCULATOR
QTY : 2 NOS

TROLLY WITH SLUDGE FROM CENTRIFUGE

DRY SLUDGE YARD
QTY. : 1 NO.

SUPERNATENT PIT
Qty. : 1 No.

MECH. SLUDGE THICKENER
QTY. : 1 NO.

SLUDGE SUMP PIT (CLARI.)
Qty. : 1 No.

TUBE SETTLERS
QTY : 2 NOS

BACKWASH SUMP PIT
Qty. : 1 No.

CLEAR WATER TANK

CHLORINE SUPPLY

FROM LIME TANK

TO HILL TOP RESERVOIR

B/W OHT
Qty. : 1 No.

OHT FOR CHEMICAL HOUSE

AIR BLOWERS

LEGEND

	BUTTERFLY VALVE	PS	PRESSURE SWITCH
	GATE VALVE (MANUAL)	U	LEVEL INDICATOR
	GATE VALVE	LT	LEVEL TRANSMITTER
	GLOBE VALVE (SDV)	LAH	LEVEL ALARM - HIGH
	BALL VALVE (SV)	LAL	LEVEL ALARM - LOW
	NON RETURN VALVE (NRV)	LAHL	LEVEL ALARM - LOW LOW
	AIR RELEASE VALVE (ARV)	LS	LEVEL SWITCH
	FLUSHING HOSE PIPE CONNECTION	FIT	FLOW INDICATOR TRANSMITTER
	ULTRASONIC TYPE	FR	FLOW RECORDER
	PUMP	FQI	FLOW TOTALISER
	STRAINER	FHT	FLOW INDICATING TRANSMITTER
	FLOW DIRECTION IN CHANNEL	TUT	TURBIDITY INDICATING TRANSMITTER
	FLOW DIRECTION IN PIPE	CL	RESIDUAL CHLORINE
	SUBMERSIBLE PUMP	ROF	RATE OF FLOW (FILTER)
	FLOW METER	LOH	LOSS OF HEAD (FILTER)
	SLUDGE PUMP (SU)	TS	TORQUE SWITCH
	ELECTRIC MOTOR	TAH	TORQUE ALARM HIGH
	DISMANTLING JOINT (DJ)	TAHH	TORQUE ALARM HIGH HIGH
	ROTAMETER (RT)	PGCO	PRESSURE GAUGE WITH SEAL (WITH 3-WAY COCK)
	ROTARY SCREW PUMP	PG	PRESSURE GAUGE WITHOUT SEAL (WITH 3-WAY COCK)
OL	OVER LOAD	LSL	LEVEL SWITCH LOW
AM	AUTO / MANUAL	LSH	LEVEL SWITCH HIGH
RFB	RETURN FEED BACK	I	INTERLOCK
S/ST	START / STOP	HA	HIGH ALARM
	PLC	LL	LOW LEVEL
	LEVEL INSTRUMENT WITH LOCK	HH	HIGH LEVEL
	PRESSURE SWITCH WITH LOCK	TDV	TELESCOPIC SLUICE VALVE
	SHAPED DISPLAY SHAPED CONTROL	CG	COMPOUND GAUGE
	INSTRUMENTS LOCALLY MOUNTED	PT	PRESSURE TRANSMITTER
	WATER SEPERATOR	RCA	RESIDUAL CHLORINE ANALYSER
		LE	LEVEL ELEMENT

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REV.	DATE	DESCRIPTION	DRN. BY	CHKD. BY	APPR. BY

JITF AQUASOURCE — JITF WATER INFRASTRUCTURE LTD.

CLIENT: GUWAHATI METROPOLITAN DEVELOPMENT AUTHORITY

PROJECT: 191 MLD GUWAHATI WATER SUPPLY PROJECT (GWSP) SOUTH CENTRAL ZONE

TITLE: P&ID FOR WTP.

DRAWING NO.: JWIL/2011/GWSP/SOUTH WTP/A* SHEET NO. : 1/2

REVISION	SCALE	DATE	DRN. BY	DES. BY	CKD. BY	APPD. BY
00	NTS/A4/A1	24.11.2011	S. SOLANKI	SURESH	H.C.RAVA	P.JAIN

SERVICE WATER

CHLORINE BOOSTER PUMPS (PRE-CHL)

2 Nos. (1W + 1S)

FROM OHT

PRE-CHLORINATOR

CHLORINE INJECTION FOR PRE-CHLORINATION

ROTA METER

TO PRE-CHLORINE

TO VENT

VACUUM REGULATOR

CHLORINE LEAK DETECT SENSOR

CHLORINE LEAK DETECT SENSOR

CHLORINE LEAK DETECT SENSOR

COPPER TUBE (TYP.)

TONER

TONER

COPPER TUBE (TYP.)

TO PST OUTLET

CHLORINE BOOSTER PUMPS (POST-CHL)

2 Nos. (1W + 1S)

POST-CHLORINATOR

CHLORINE INJECTION FOR POST-CHLORINATION

ROTA METER

TO POST-CHLORINE

TO VENT

VACUUM REGULATOR

COPPER TUBE (TYP.)

TO FILTER OUTLET CHANNEL

LIME-PREPARATION TANKS

Qty. : 2 nos.

RCC TANK

SCREW PUMP

LIME-DOSING TANKS

Qty. : 2 nos.

FRP TANK

SCREW PUMP

TO PST INLET

TO FILTRATE CHANNEL

ALUM-PREPARATION TANKS

Qty. : 2 nos.

RCC TANK

SCREW PUMP

ALUM-DOSING TANKS

Qty. : 2 nos.

FRP TANK

METERING PUMP

TO FLASH MIXER-1

TO FLASH MIXER-2

TO FLASH MIXER-3

POLY PREPARATION CUM DOSING TANKS

Qty. : 2 nos.

FRP TANK

METERING PUMP

TO FLOCCULATOR-1

TO FLOCCULATOR-2

TO FLOCCULATOR-3

DEWATERING PE DOSING SYSTEM

Qty. : 2 nos.

FRP TANK

METERING PUMP

TO MECH. THICKENER ① & ②

TO MECH. THICKENER ③ & ④

TO MECH. THICKENER ⑤ & ⑥

TO MECH. THICKENER ⑦ & ⑧

TO MECH. THICKENER ⑨ (STANDBY)

TO MECH. THICKENER ⑩ (STANDBY)

LEGEND

	DIAPHRAGM VALVE (DV)	PS	PRESSURE SWITCH
	BUTTERFLY VALVE (BFV)	LI	LEVEL INDICATOR
	GATE VALVE (NAMUR)	LT	LEVEL TRANSMITTER
	GATE VALVE (GV)	LSH	LEVEL ALARM - HIGH
	GLOBE VALVE (GLV)	LSL	LEVEL ALARM - LOW
	BALL VALVE (BV)	LSLL	LEVEL ALARM - LOW LOW
	NON RETURN VALVE (NRV)	LS	LEVEL SWITCH
	AIR RELEASE VALVE (ARV)	FIT	FLOW INDICATOR TRANSMITTER
	FLUSHING HOSE PIPE CONNECTION	FR	FLOW RECORDER
	ULTRASONIC TYPE	FQ	FLOW TOTALISER
	PUMP	PHIT	pH INDICATING TRANSMETTER
	DRAIN	TUIT	TURBIDITY INDICATING TRANSMETTER
	FLOW DIRECTION IN CHANNEL	CL	RESIDUAL CHLORINE
	FLOW DIRECTION IN PIPE	ROF	RATE OF FLOW (FILTER)
	SUBMERSIBLE PUMP	LOH	LOSS OF HEAD (FILTER)
	FLOW METER	TS	TORQUE SWITCH
	SLUICE GATE (SG)	TAH	TORQUE ALARM HIGH
M	ELECTRIC MOTOR	TAHH	TORQUE ALARM HIGH HIGH
	DISMANTLING JOINT (DJ)	PG(S)	PRESSURE GAUGE WITH SEAL (WITH 3-WAY COCK)
	ROTAMETER (RT)	PG	PRESSURE GAUGE WITHOUT SEAL (WITH 3-WAY COCK)
	ROTARY SCREW PUMP	LSL	LEVEL SWITCH LOW
OL	OVER LOAD	LSH	LEVEL SWITCH HIGH
A/M	AUTO / MANUAL	I	INTERLOCK
RFB	RETURN FEED BACK	HA	HIGH ALARM
S/ST	START / STOP	LL	LOW LEVEL
	PLC	HH	HIGH LEVEL
	LEVEL INSTRUMENT INTER LOCK	TSV	TELESCOPIC BLEED VALVE
	PRESSURE SWITCH INTER LOCK	CG	COMPOUND GAUGE
	SHARED DISPLAY/ SHARED CONTROL	PT	PRESSURE TRANSMITTER
	INSTRUMENT LOCALLY MOUNTED	RCA	RESIDUAL CHLORINE ANALYZER
	RATE SETTER	LE	LEVEL ELEMENT

Project Director
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REV.	DATE	DESCRIPTION	DRN. BY	CHKD. BY	APPD. BY

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CLIENT: GUWAHATI METROPOLITAN DEVELOPMENT AUTHORITY

PROJECT: 191 MLD GUWAHATI WATER SUPPLY PROJECT (GWSP) SOUTH CENTRAL ZONE

TITLE: P&ID FOR WTP

DRAWING NO.: JWIL/2011/GWSP/SOUTH WTP/A* — SHEET NO.: 2/2

REVISION	SCALE	DATE	DRN. BY	DSN. BY	CHD. BY	APPVD. BY
00	SAS 2000 A1 NTS	24.1.2011	S. SOLANKI	SURESH	M.Z.KHAN	P.JAIN

A.2 General Layout Plan

- WTP
- Intake

Project Director
Project Implementation Unit (P.I.U)
JICA Funded Guwahati Water Supply Project

ATTACHED

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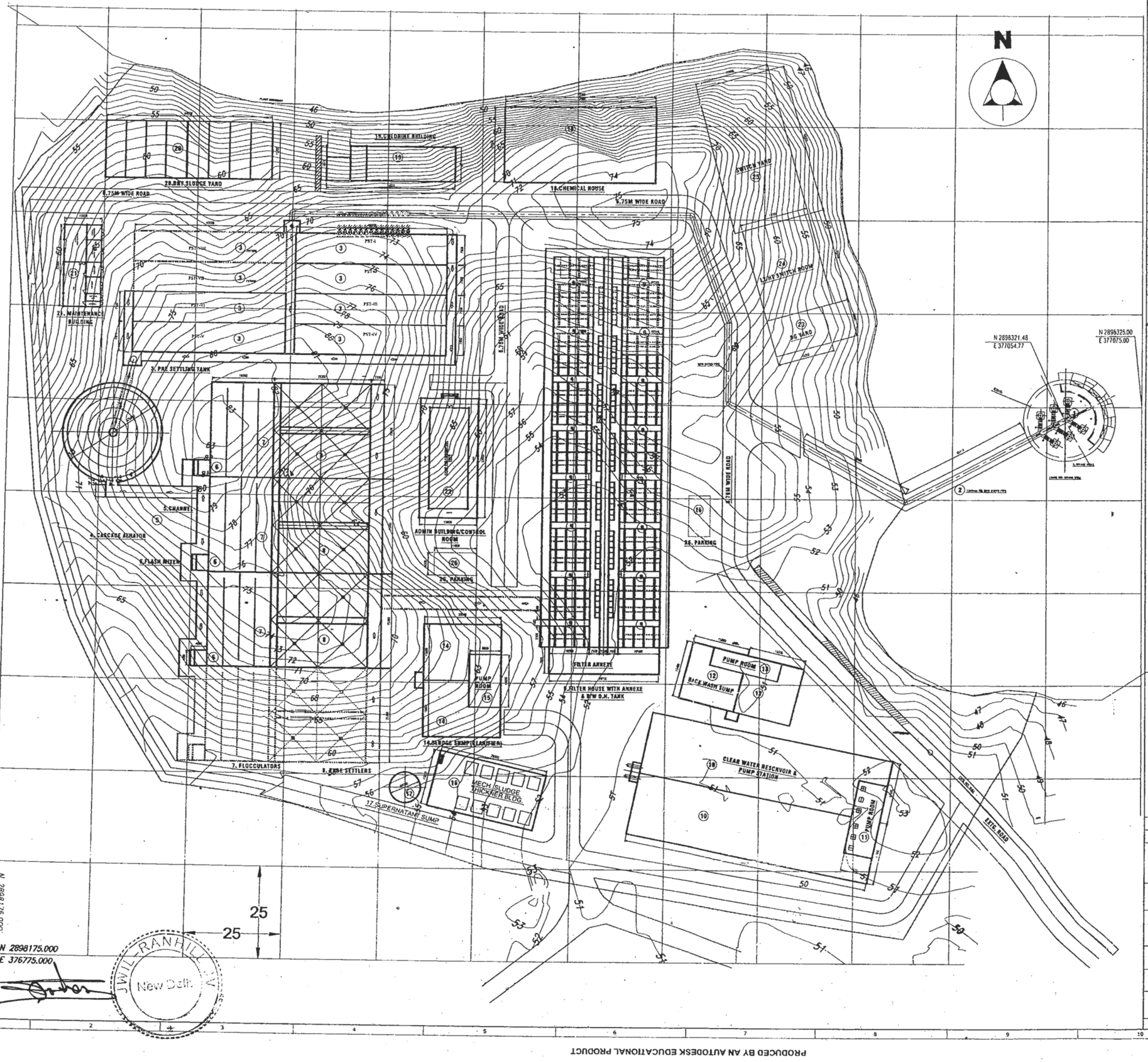

LIST OF UNITS

UNIT No.	DESCRIPTION	QTY/NOS.	SIZE
1	INTAKE WELL	01.	18000 DIA
2	APPROACH BRIDGE	01	
3	PRE SETTLING TANK	06	9000 x 7300 x 4500 LD
4	CASCADE AERATOR	01	25600 DIA (INCLUDING COLLECTING CHANNEL)
5	CHANNEL	01	3000 WIDE
6	FLASH MIXER	03	4000 x 4000 x 3000 LD
7	FLOCCULATORS	03	16000 x 25300 x 3590 LD
8	TUBE SETTLERS	03	25300 x 25300 x 3050 LD
9	FILTER BEDS	12	12200 x 10500 (5600 x 2 + 1500 + 700 x 2)
10	CLEAR WATER RESERVOIR	02	64600 x 18600 x 5100 LD
11	CWR PUMP ROOM	01	
12	BACK WASH SUMP	01	15000 x 15400 x 3000 LD
13	BACK WASH SUMP PUMP ROOM	01	
14	SLUDGE SUMP (CLARIFIER)	02	15000 x 29600 x 2500 LD
15	PUMP ROOM	08	8000 x 14000
16	MECH. SLUDGE THICKNER BLDG.	01	28000 x 15000 (DOUBLE STOREY)
17	SUPERNATANT SUMP	01	8000 DIA
18	CHEMICAL HOUSE	01	20000 x 40000 (DOUBLE STOREY)
19	CHLORINE BUILDING	01	34000 x 8200
20	DRY SLUDGE YARD	01	44000 x 15000 x 1800 LD
21	MAINTENANCE BUILDING	01	22000 x 10000
22	ADMIN BUILDING/CONTROL ROOM	01	32000 x 15000 (DOUBLE STOREY)
23	DG SHED	01	15000 x 10000
24	LT/HT SWITCH ROOM	01	18000 x 25000
25	SWITCH YARD	01	20000 x 40000
26	PARKING	02	11000 X 6000
27			
28			
29			
30			

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GENERAL NOTES

1. ALL DIMENSIONS ARE IN MM & ALL LEVELS ARE IN METERS.
2. THIS IS A TENTATIVE DWG. FOR TENDER PURPOSE ONLY AND SUBJECT TO MODIFICATIONS DURING DETAILED ENGG.
3. PLEASE DO NOT SCALE THIS DWG. IF IN DOUBT PLEASE ASK.
4. FGL SHALL BE AT > 54.00 m IN THE PLANT AREA

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PROJECT: 191 MLD GUWAHATI WATER SUPPLY PROJECT (GWSP) SOUTH CENTRAL ZONE

TITLE: LAYOUT PLAN

DRAWING NO.: JWIL/2011/GWSP/SOUTH/ WTP/A1 — SHEET NO.: 1 / 1

REVISION	SCALE	DATE	DRN. BY	DES'R. BY	CKD. BY	APPVD. BY
00	841 x 594 A1 1 : 500	11.11.2011	SUMI.	SURESH	K.C. AWA	P.J.

A.3 Cross Section of Raw Water Intake

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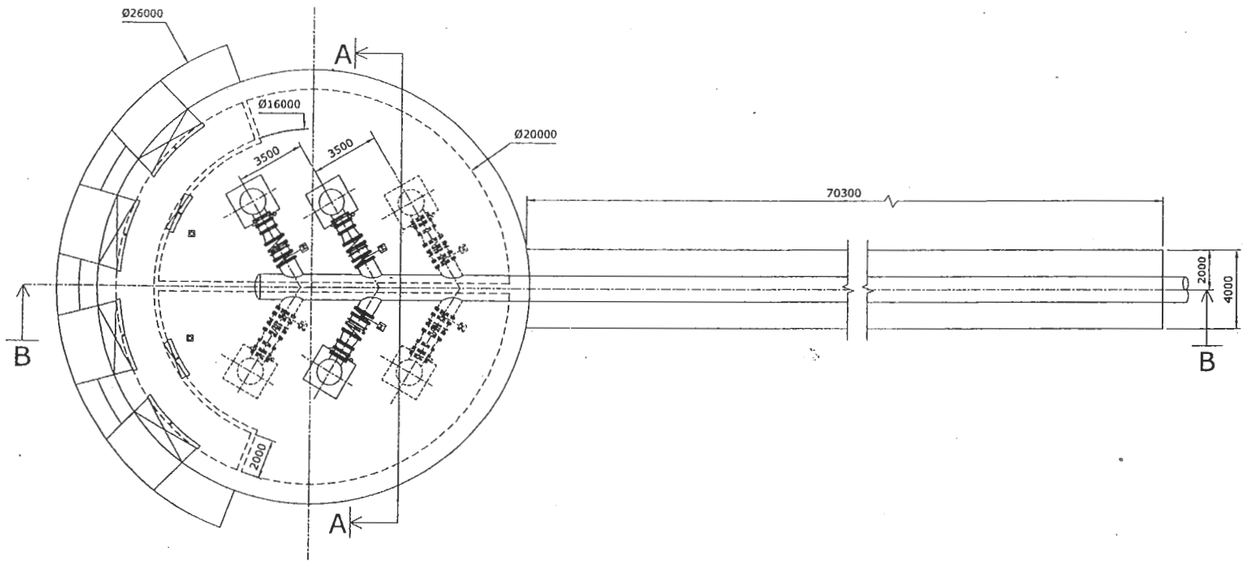
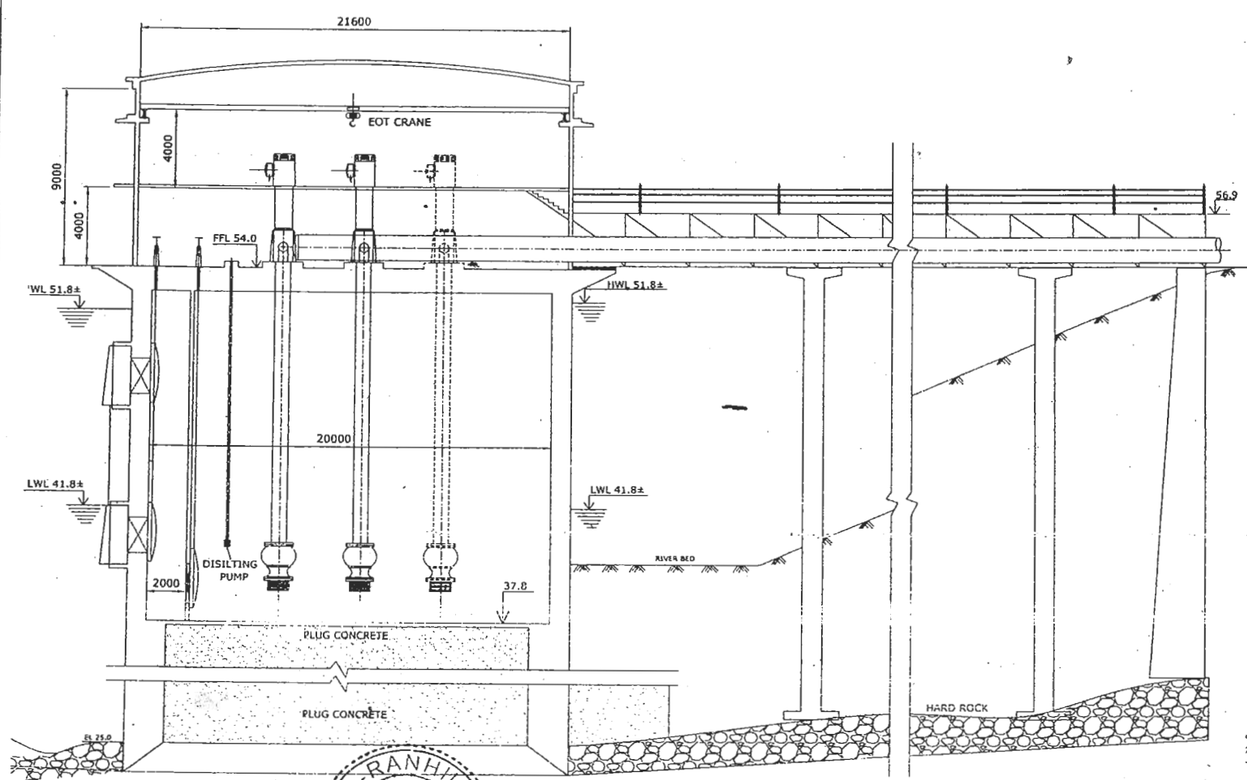
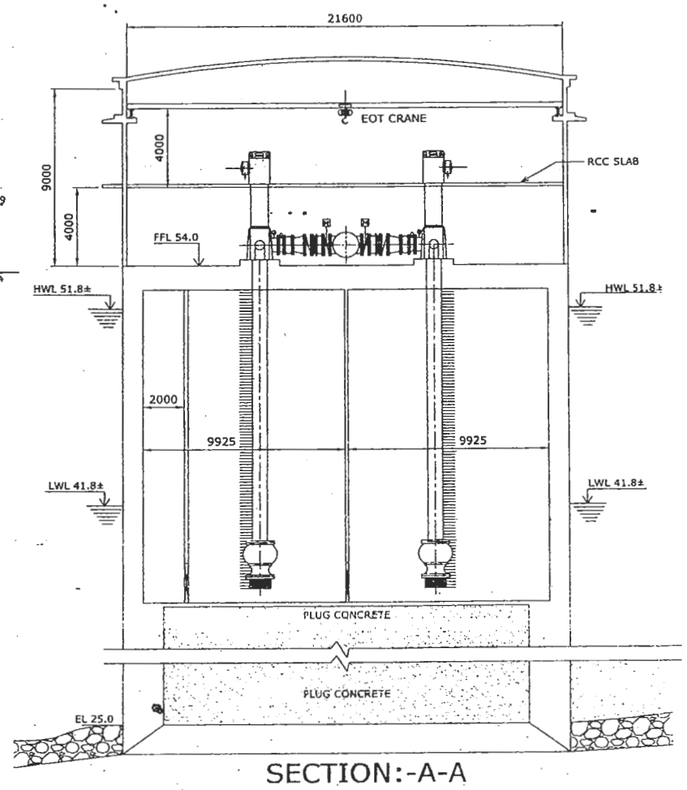


PLAN VIEW



SECTION:-B-B



SECTION:-A-A

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Project Implementation Unit (P.I.U)
JICA Funded Guwahati Water Supply Project
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ONLY FOR TENDER PURPOSE

REV.	DATE	DESCRIPTION	DRN	CHD.	APPD.

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CLIENT: GUWAHATI METROPOLITAN DEVELOPMENT AUTHORITY(GMDA)

PROJECT: 191 MLD GUWAHATI WATER SUPPLY PROJECT(GWSP) SOUTH CENTRAL ZONE

TITLE: SOUTH INTAKE WELL PLAN & SECTIONS

DRG. NO.: JWIL/2011/GMDA/GWSP/SOUTH INTAKE/A3 | SH. NO. 1 OF 2

REVISION	SCALE	DATE	GEN. BY	DRAN. BY	REVWD. BY	APPD. BY
00	420X297 A3 1:300	11.11.2011	HJ	HJ	SK/HR	PJ

A.4 Hydraulic Profile of Water Treatment Plant

ATTACHED

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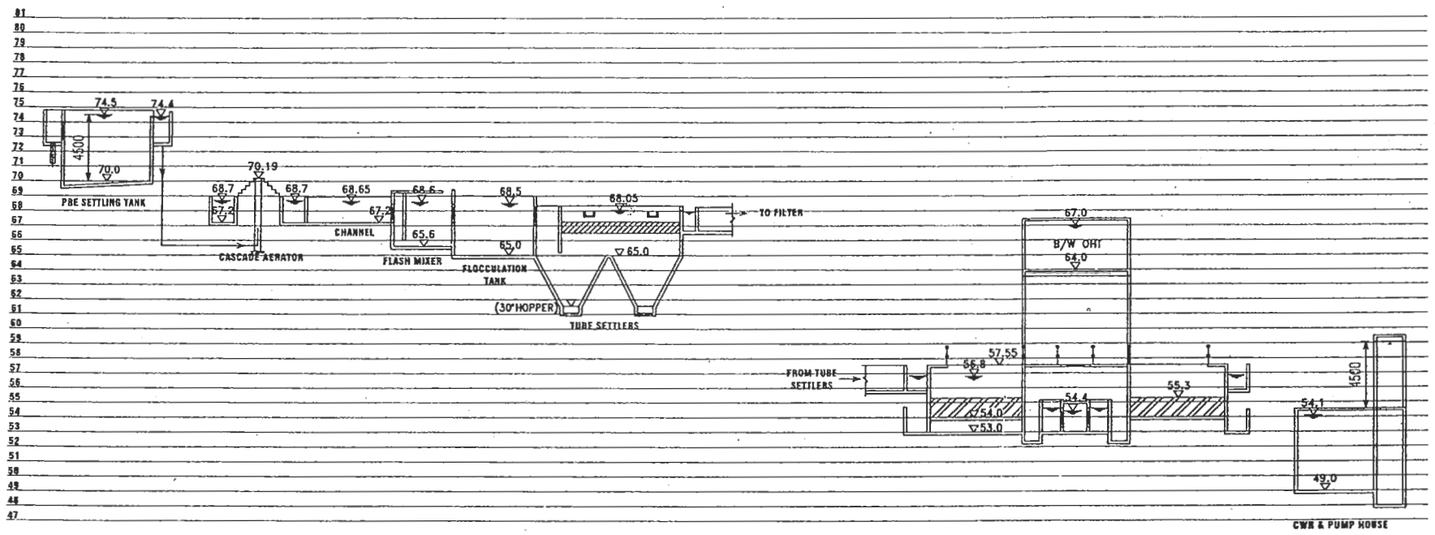

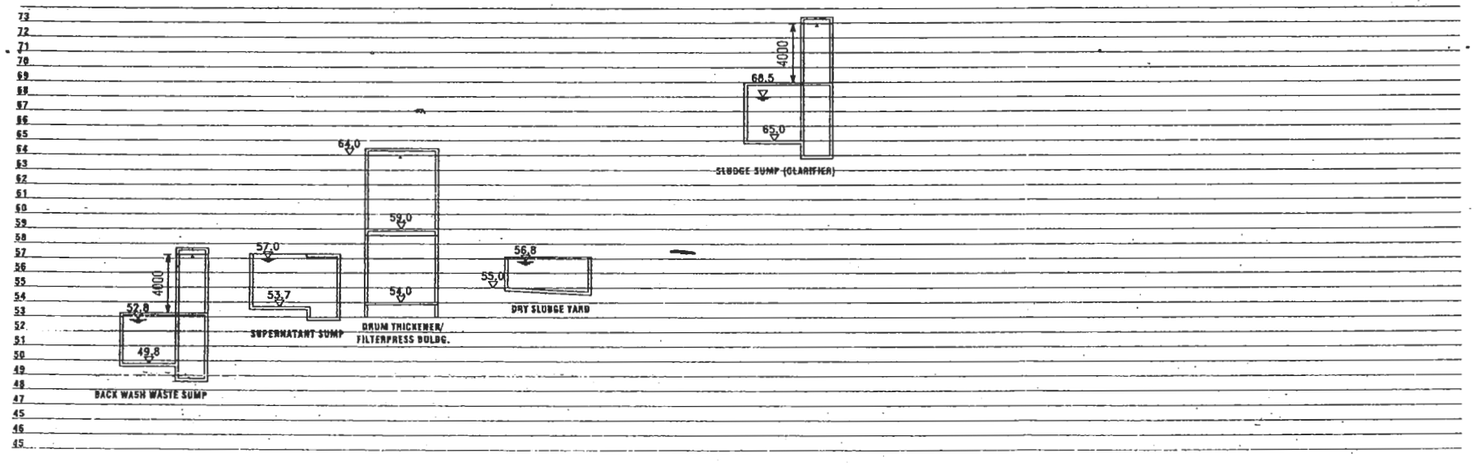

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Project Implementation Unit (P.I.U)
JICA Funded Guwahati Water Supply Project

GENERAL NOTES

1. ALL DIMENSIONS ARE IN MM & ALL LEVELS ARE IN METERS.
2. THIS IS A TENTATIVE DWG. FOR TENDER PURPOSE ONLY AND SUBJECT TO MODIFICATIONS DURING DETAILED ENGG.
3. PLEASE DO NOT SCALE THIS DWG. IF IN DOUBT PLEASE ASK.
4. FGL SHALL BE AT >54.00 m IN THE PLANT AREA

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REV.	DATE	DISCRIPTION	DRN. BY	CHKD. BY	APPD. BY

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CLIENT: GUWAHATI METROPOLITAN DEVELOPMENT AUTHORITY

PROJECT: 191 MLD GUWAHATI WATER SUPPLY PROJECT (GWSP) SOUTH CENTRAL ZONE

TITLE: HYDRAULIC FLOW DIAGRAM

DRAWING NO.: JWIL/2011/GWSP/SOUTH WTP/A2 — SHEET NO.: 1 / 1

REVISION	SCALE	DATE	DRN. BY	DSGN. BY	CKD. BY	APPVD. BY
00	841 x 594 A1 1 : 200	19.11.2011	SUNIL	SURESH	H.C. RANA	P.J.

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B. Details of Raw Water Intake Structure, Transmission Main, Water Treatment Plant and Clear water reservoir

B.1 Raw Water Intake Structure/Pumping Station and Transmission Main

B.1.1 Raw Water Intake Structure and Pumping Station

	Description	unit	Particulars
1.	**Number of Intake Well and Shapes**		
1.1	Number of Wells	nos.	One
1.2	Shapes [1]		Circular
2.	**Structure of Intake Well and Construction Method** [2]	--	RCC
3.	**Dimensions of Well**		
3.1	Foundation Well		
a.	Inner Dimensions	m	Refer layout attached
b.	Wall Thickness	mm	DDE
3.2	Pump Suction Well		
a.	Inner Dimensions	m	Refer layout attached
b.	Wall Thickness	mm	DDE
3.3	Intake gates		Details referred to Schedule C
a.	Number of Gates		Details referred to Schedule C
b.	Number of Screens		Details referred to Schedule C
c.	Size of gate (width x height)	mm x mm	Details referred to Schedule C
3.4	Levels		

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	Description	Unit	Particulars
a.	Top Level of Well (motor floor level)	m msl	Refer Intake section drawing attached
b.	Bottom level of Well	m msl	Refer Intake section drawing attached
c.	Level of Foundation	m msl	Refer Intake section drawing attached
d.	Top Intake Gate (center)	m msl	Refer Intake section drawing attached
e.	Bottom Intake Gate (center)	m msl	Refer Intake section drawing attached
4.	**Pump Station**		
4.1	Inner Dimensions		
4.2	Area		
a.	Lower Floor for Piping/Valve	m^2	Refer Intake section drawing attached
b.	Upper Floor (total Area)	m^2	Refer Intake section drawing attached
c.	Pump motor and Electric panels	m^2	Refer Intake section drawing attached
d	Control room	m^2	Refer Intake section drawing attached
e	Duty room	m^2	Refer Intake section drawing attached
f	Store room	m^2	Refer WTP drawing
g	Any other areas or rooms proposed	m^2	Not applicable
4.2	Head room	m	Refer Intake section drawing attached
5.	**Access Bridge**		
5.1	Construction Materials and Structure[2]	--	Refer Intake section drawing attached
5.2	Width (clear roadway/total)	m	Refer Intake section drawing attached
5.3	Length	m	Refer Intake section drawing attached

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	Description	unit	Particulars
5.1	Number of piers	m	Refer Intake section drawing attached
6.	**Any other items** not listed above but incidental to complete the works		-

note: [1] Submit general plan showing inner dimensions and wall thickness for foundation well and pump suction well in separate sheet (A3 size)

[2] Brief description in separate sheet (s)

B.1.2 Raw Water Transmission Main

Project Director
Project Implementation Unit (P.I.U)
Integrated Guwahati Water Supply Project
JICA Module C

	Description	unit	Particulars
1.	**Pipe Materials**	--	Details referred to Schedule C
2.	**Economical diameter**		1300 mm
2.1	Length	m	Around 270 meters
2.2	Combined efficiency of pumping unit	%	84
2.3	C- value		130
2.4	Losses other than frictional losses in % of frictional loss	%	Considered
2.5	Pumping unit cost	Rs./KW	4.5 (As per tender Part 1)
2.6	Economical diameter	mm	1300 mm
3.	**Flow meter and Control valve**		For details refer to Schedule C and D
4.	**Auxiliary Valves and Crossing Works**	--	
4.1	Washouts (Blow-off)	pls.	Included
4.2	Air valves	pls.	Included

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	Description	unit	Particulars
5.	Surge Protection [1]	mm	DDE

note:

[1] Submit surge analysis in separate sheet (s)never-the-less the protection shall be required or not. If the protection is found as required, the brief description of method and major equipment or structures to be proposed in separate sheet(s)

B.2 Water Treatment Plant

B.2.1 Pre-Settling tank

	Description	unit	Particulars
1.	**Detention Time**	min	60
2	**Tanks**		
2.1	Number of Tanks	nos	6
2.2	Internal Dimensions of each		
a.	Width	m	7.9
b.	Length	m	40
c.	Side Water Depth	m	4.5
d.	Depth of Sediment deposit	m	Slope considered
e.	Free Board	m	0.3
3.	**De-silting**		
3.1	Method	--	De-silting shall be done in 2 methods. 1. Through extraction pumps, the silt + sludge will be pumped out

A.5 Single line Diagram of Raw Water Pump Intake and Water Treatment Plant

ATTACHED

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Project Implementation Unit (P.I.U)
JICA Funded Guwahati Water Supply Project

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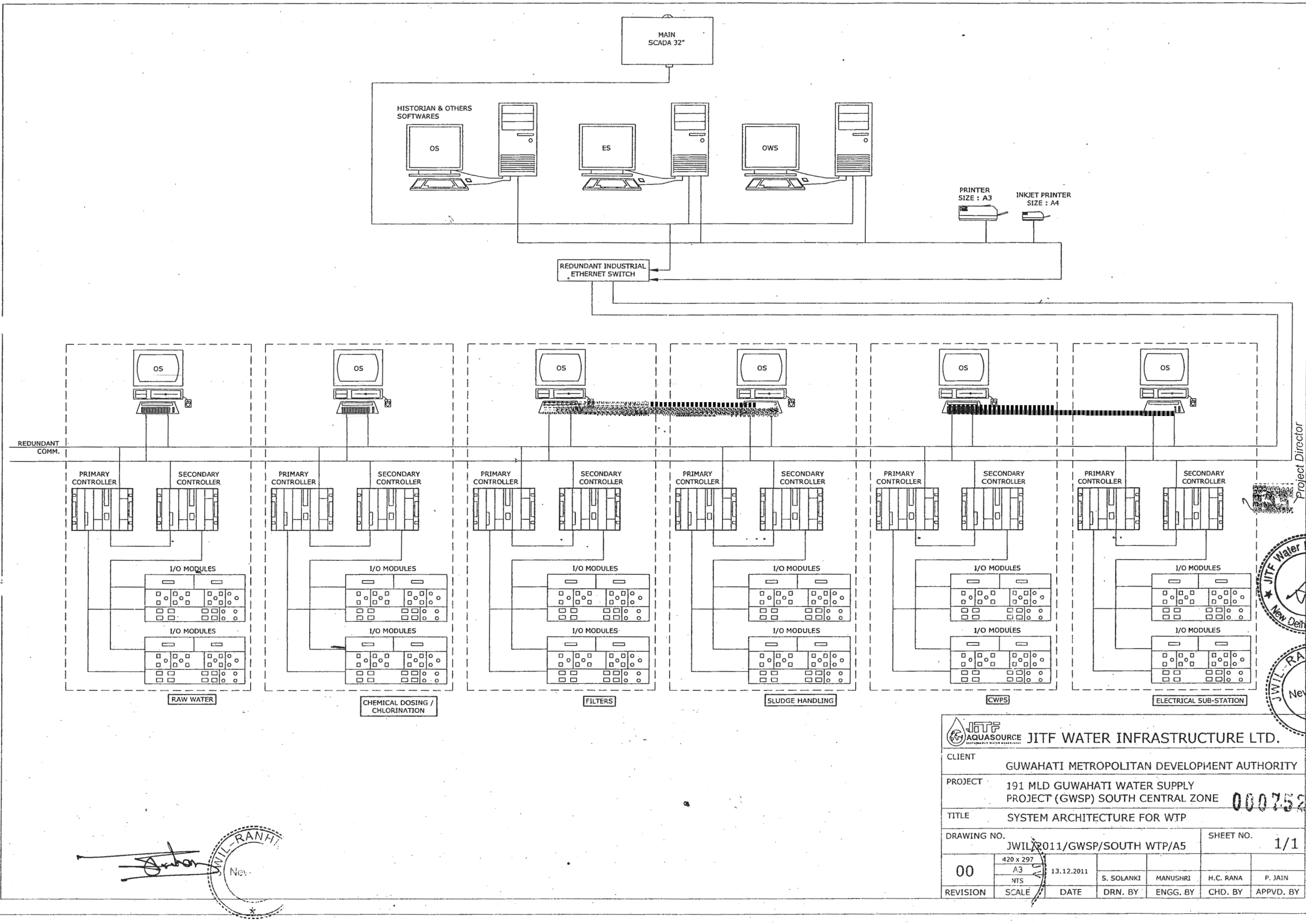

JITF AQUASOURCE JITF WATER INFRASTRUCTURE LTD.

CLIENT	GUWAHATI METROPOLITAN DEVELOPMENT AUTHORITY
PROJECT	191 MLD GUWAHATI WATER SUPPLY PROJECT (GWSP) SOUTH CENTRAL ZONE
TITLE	SYSTEM ARCHITECTURE FOR WTP
DRAWING NO.	JWIL/2011/GWSP/SOUTH WTP/A5
SHEET NO.	1/1

REVISION	SCALE	DATE	DRN. BY	ENGG. BY	CHD. BY	APPVD. BY
00	420 x 297 A3 NTS	13.12.2011	S. SOLANKI	MANUSHRI	H.C. RANA	P. JAIN

Project Director
Project Implementation Unit (P.I.U)
ADB Funded Guwahati Water Supply Project

JITF Water Infrastructure Ltd. New Delhi

JWIL-RANHI New Delhi

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A.6 Architecture of SCADA System

ATTACHED

Project Director
Project Implementation Unit (P.I.U)
JICA Funded Guwahati Water Supply Project

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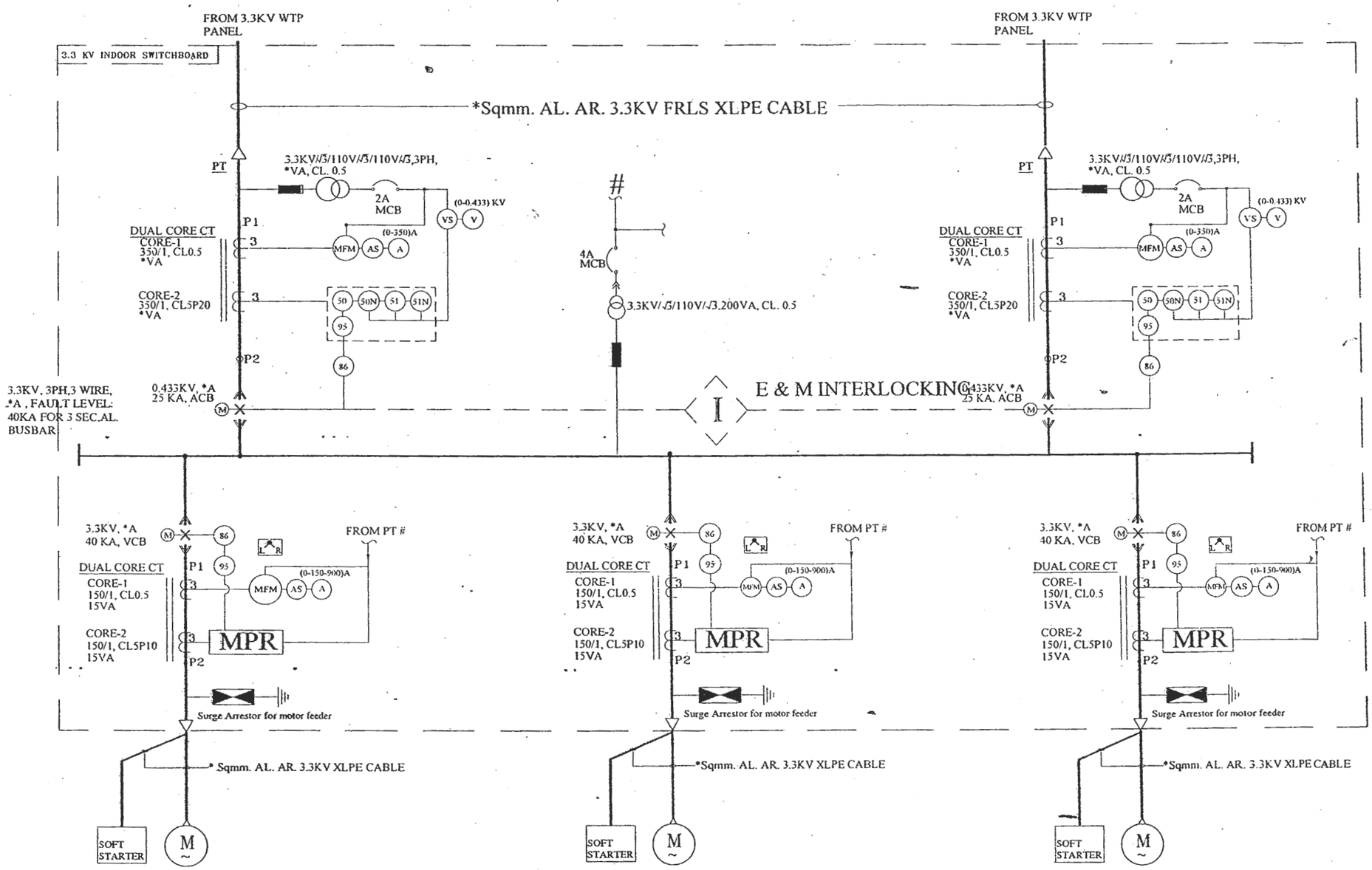


LEGEND

DEV. NO.	DESCRIPTION
A	AMMETER
AS	AMMETER SELECTOR SWITCH
V	VOLTMETER
VS	VOLTAGE SELECTOR SWITCH
MFM	MULTIFUNCTION METER (A,V,KWH,PF,WA, KVAR,) WITH RS-485 COMMUNICATION
DC	DC FAIL RELAY WA, KVAR
2	TIME DELAY RELAY
27	U/V RELAY WITH 2 TIMERS
27LV	RE-ACCELERATION AUTHORISATION
37	UNDER CURRENT RELAY
46	SINGLE PHASING RELAY
47	PHASE REVERSAL/INCORRECT PHASE SEQUENCE PROTECTION
48	STALL PROTECTION
49	OVERLOAD PROTECTION
49X	AUX. CONTACTS FOR BCLZ, WTI, OTI TRIP
50N	INST. O/C RELAY
50GF	INST. E/F RELAY
50S	CIRCUIT BREAKER FAILURE PROTECTION
51	LOCKED ROTOR
51N	IDMT O/C RELAY
51G	IDMT E/F RELAY
51LR	STANDBY E/F RELAY
59	LOCKED ROTOR
63X	AUX. CONTACTS FOR BCLZ, WTI, OTI ALARM
66	O/V RELAY
66R	FREQUENT START PROTECTION
86	RESTRICTED E/F RELAY
86T/GU	MASTER TRIP RELAY
87G	OVER/UNDER FREQUENCY
87M	DIFF. PROTECTION RELAY FOR GENERATOR
95	DIFF. PROTECTION RELAY FOR MOTOR
97	TRIP CKT. SUPERVISION RELAY
98	PT FUSE FAILURE RELAY
	MOTORISED DRAWOUT VCB
	CURRENT TRANSFORMER
	DG SET
	SINGLE CORE FIXED TYPE PT
	POWER TRANSFORMER
M	MOTOR
	3PH. CAPACITOR BANK
	SURGE ARRESTOR

INTERLOCK LOGIC FOR VCB INCOMER

CONDITION	INCOMER 1	INCOMER 2	INCOMER 3
CONDITION 1	CLOSE	OPEN	OPEN
CONDITION 2	OPEN	CLOSE	OPEN
CONDITION 3	OPEN	OPEN	CLOSE

JWIL-RANHILL JV New Delhi

Project Director JITF Water Infrastructure Project Implementation Unit (P.I.U) JICA Funded Guwahati Water Supply Project New Delhi

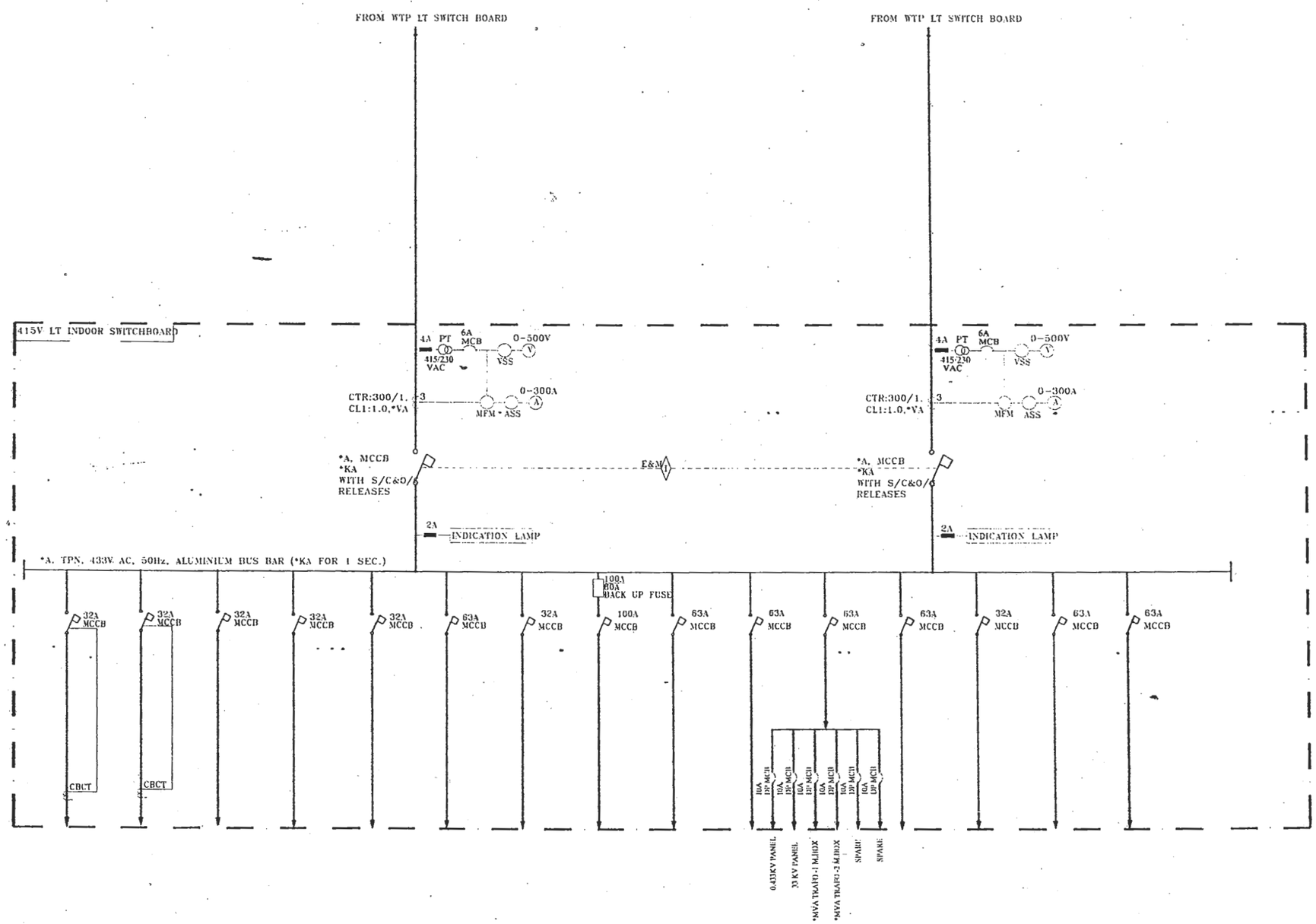
05747

REV.	DATE	DISCRIPTION	DRN. BY	CHKD. BY	APPD. BY

JITF AQUASOURCE — JITF WATER INFRASTRUCTURE LTD.

CLIENT NAME	GUWHATI METROPOLITAN DEVELOPMENT AUTHORITY
PROJECT	191 MLD WATER SUPPLY SYSTEM AT GUWHATI SOUTH
TITLE	SLD FOR INTAKE
DRAWING NO.	JWIL/2010-11/GUWHATI SOUTH/INTAKE/D.01
SHEET NO.	1 OF 2

REVISION	SCALE	DATE	DRN. BY	CHKD. BY	ENGG. BY	APPVD. BY
00	NTS *A3	13.12.2011	M.JAWED	AK.SINGH	NADEEM	P.JAIN



LEGEND	
50	INST. O/C RELAY
50N	INST. E/F RELAY
51	IDMT O/C RELAY
51N	IDMT E/F RELAY
94	TRIPPING RELAY
95	TRIP CKT. SUPERVISION RELAY
27	U/V RELAY
Z	TIME DELAY RELAY
MPR	COMPOSITE MOTOR PROTECTION RELAY
MFM	MULTIFUNCTION METER (Hz,V,A,KWH) WITH RS-485 COMMUNICATION PORT
M	MOTOR
	DRAWOUT TYPE INDOOR VCB
	DRAWOUT TYPE ACB
	MPCB WITH SHORT CIRCUIT PROTECTION ONLY
	MCCB WITH SHORT CIRCUIT PROTECTION
	CURRENT TRANSFORMER
	POTENTIAL TRANSFORMER
	CONTROL TRANSFORMER
	EOCR (ELECTRONIC OVER CURRENT RELAY)
	THERMAL OVER LOAD RELAY WITH INHERENT PROTECTION AGAINST SINGLE PHASING
	CONTROL FUSE
	CONTACTOR
STP RST	EMERGENCY STOP, RESET PUSH BUTTON
	INDICATION LAMP CLUSTER LED TYPE
	POWER TRANSFORMER
	415V,50Hz D.G.SET.

NOTES:-

1. PMCC WILL BE SINGLE/DOUBLE FRONT, FIXED METAL ENCLOSED, FREE STANDING, FLOOR MOUNTING, WITH BOTTOM CABLE ENTRY COMPARTMENTALIZED, DUST AND VERMIN PROOF, DEGREE OF PROTECTION NOT LESS THAN IP.54. WITH EXTENDABLE BUS ON EITHER SIDE. ALL ACB FEEDERS IN THE MCC SHALL BE DRAWOUT TYPE & INTERCHANGEABLE.
2. FRAMES WILL BE MADE OUT OF 14 SWG (2MM) CRCA EXCEPT THAT THE DOORS AND COVERS WILL BE MADE OF MINIMUM (1.6MM) 16SWG - CRCA. THE GLAND PLATE WILL BE OF 3MM THICK. EACH VERTICAL PANEL WILL HAVE INTEGRAL BASE FRAME SUITABLE FOR ERECTION TACK WELDING. METAL SHEET SEGREGATION BETWEEN ADJACENT PANELS WILL BE PROVIDED.
3. BUS-BAR WILL BE OF HIGH CONDUCTIVITY ALUMINIUM SUPPORTED ON INSULATOR MADE OF NON-HYGROSCOPIC, NON-INFLAMMABLE MATERIAL. THE RATING WILL BE FOR FULL LOAD CURRENT OF TRANSFORMER SECONDARY.
4. SPACE HEATER WILL BE PROVIDED FOR MOTORS RATED 75 kW AND ABOVE.
5. EOCR FOR OVER CURRENT PROTECTION SHALL BE PROVIDED FOR MOTOR RATED 7.5kW ~ 15kW.
6. EOCR FOR O/C & E/F, UNBALANCED PROTECTION SHALL BE PROVIDED FOR MOTOR RATED 15kW ~ 110kW.
7. COMPOSITE MOTOR PROTECTION RELAY FOR OVERLOAD, O/C, E/F PHASE UNBALANCED & LOCKED ROTOR PROTECTION SHALL BE PROVED FOR MOTOR RATED 110kW AND ABOVE.
8. ALL INDICATING INSTRUMENTS SHALL BE OF DIGITAL TYPE. INDICATING LAMPS WILL BE OF CLUSTER LED TYPE WITH MINIMUM 8 MM DIA.
9. THE PMCC WIRING SHALL BE CARRIED OUT BY 2.5sqmm. FR PVC INSULATED COPPER CONDUCTOR FOR CT CIRCUITS & 1.5sqmm. FOR CONTROL CIRCUITRY.
10. EACH VERTICAL SECTION SHALL BE PROVIDE WITH THERMOSTAT CONTROLLED SPACE HEATER & 6A 3-PIN PLUG SOCKET.
11. ENGRAVED NAME PLATES (IN TWO PARTS) OF 3-PLY (BLACK-WHITE-BLACK) LAMICOID SHEETS OR ANODISED ALUMINIUM WILL BE PROVIDED. NAME PLATE FOR EACH FEEDERS WILL HAVE FEEDER NUMBER & A SECOND REMOVABLE PLATE WITH MOTOR TAG NUMBER, MOTOR NAME, RATING & CABLE SIZE.
12. ALL STARTER FEEDERS WILL MEET THE REQUIREMENT OF TYPE 2 CO-ORDINATION.
13. ALL COMPONENTS OF THE PMCC SHALL BE SUITABLE FOR 50kA FAULT [illegible] FOR 1sec.
14. FINAL COLOUR SHADE SHALL BE SIEMENS GREY RAL-7032.
15. THE LOADS SPECIFIED IN THIS DRG. IS ACC. TO THE SUBMITTED ELECTRICAL LOAD LIST - INTAKE (JWIL/2009-10/NRDA/INTAKE/D.01a REV.1
16. ALL SWITCHGEAR COMPONENTS SHALL BE AS PER APPROVED VENDOR LIST.
17. COMPONENT DETAILS SHALL BE FINALISED IN MANUFACTURER DWG.

REV.	DATE	DISCRIPTION	DRN. BY	CHKD. BY	APPD. BY

JITF AQUASOURCE

JITF WATER INFRASTRUCTURE LTD.

CLIENT NAME	GUWHATI METROPOLITAN DEVELOPMENT AUTHORITY
PROJECT	191 MLD WATER SUPPLY SYSTEM AT GUWHATI SOUTH
TITLE	SLD FOR INTAKE
DRAWING NO.	JWIL/2010-11/GUWHATI SOUTH/INTAKE/D.01
SHEET NO.	2 OF 2

REVISION	SCALE	DATE	DRN. BY	CHKD. BY	ENGG. BY	APPVD. BY
00	NTS / A2	13.12.2011	M.JAWED	AK.SINGH	NADEEM	P.JAIN

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Project Director Implementation Unit Guwahati Water Supply

JWIL-RANHILL New Delhi

JITF Water Infrastructure New Delhi

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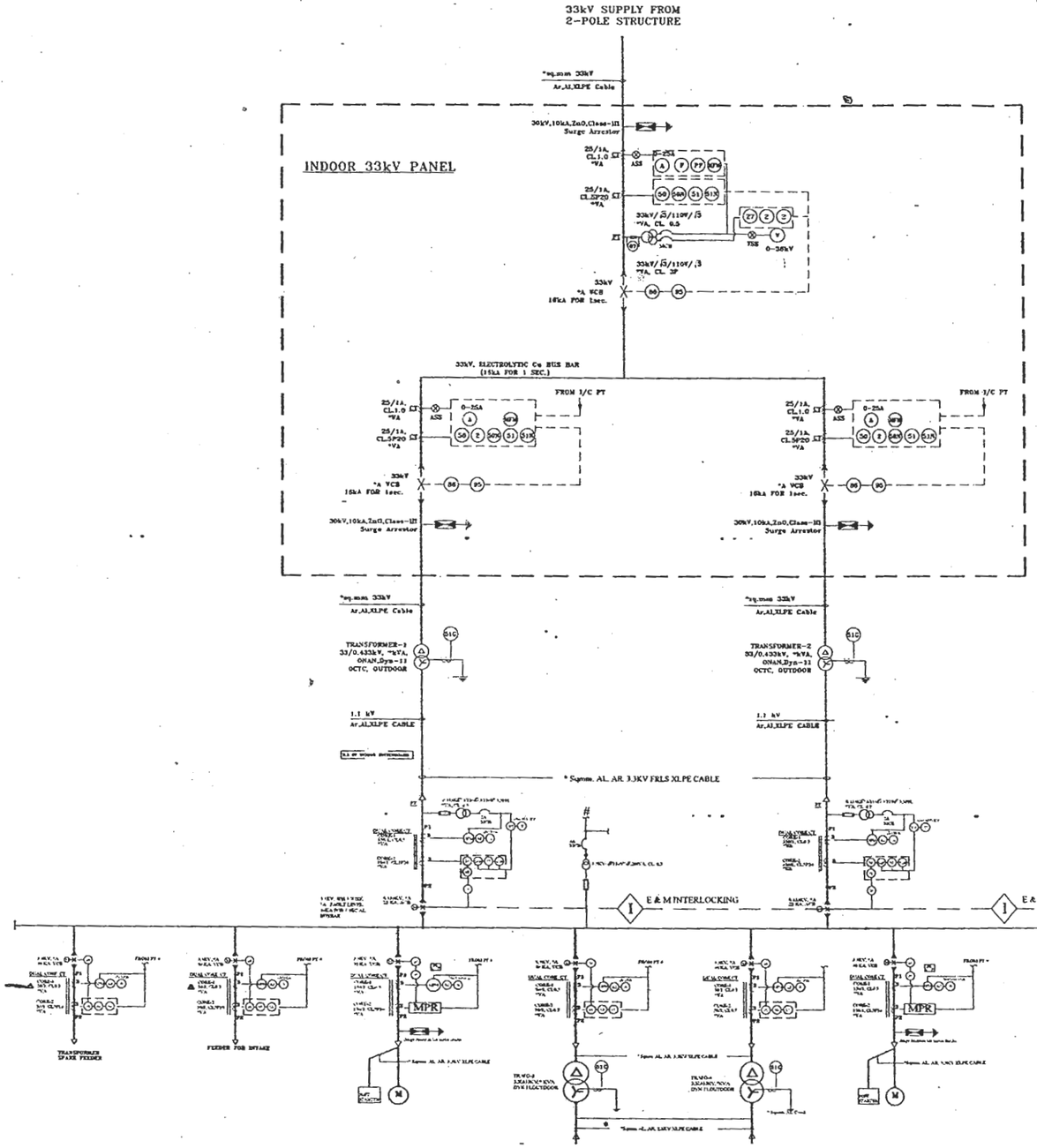

LEGEND	
50	INST. O/C RELAY
50N	INST. E/F RELAY
51	IDMT O/C RELAY
51N	IDMT E/F RELAY
86	TRIPPING RELAY
95	TRIP CKT. SUPERVISION RELAY
27	U/V RELAY
2	TIME DELAY RELAY
98	PT FUSE FAILURE RELAY
MPR	COMPOSITE MOTOR PROTECTION RELAY
MFM	MULTIFUNCTION METER(Hz,V,A,kWH,kVar,kVA,PF..)WITH RS-485 COMMUNICATION PORT
M	MOTOR
	DRAWOUT TYPE INDOOR VCB
	DRAWOUT TYPE ACB
	MPCB WITH SHORT CIRCUIT PROTECTION ONLY
	MCCB WITH SHORT CIRCUIT PROTECTION
	CURRENT TRANSFORMER
	POTENTIAL TRANSFORMER
	CONTROL TRANSFORMER
	EOCR (ELECTRONIC OVER CURRENT RELAY)
	THERMAL OVER LOAD RELAY WITH INHERENT PROTECTION AGAINST SINGLE PHASING
	CONTROL FUSE
	CONTACTOR
	EMERGENCY STOP, RESET PUSH BUTTON
	INDICATION LAMP CLUSTER LED TYPE
	POWER TRANSFORMER
	415V,50Hz D.G.SET
	CABLE GLAND
	SURGE ARRESTER

COMPRISE IN NUMERICAL PROTECTION RELAY (MULTI-FUNCTIONAL)

NOTES:-

1. PMCC WILL BE SINGLE/DOUBLE FRONT, FIXED METAL ENCLOSED, FREE STANDING, FLOOR MOUNTING, WITH BOTTOM CABLE ENTRY COMPARTMENTALIZED, DUST AND VERMIN PROOF. DEGREE OF PROTECTION NOT LESS THAN IP.54. WITH EXTENDABLE BUS ON EITHER SIDE. ALL ACB FEEDERS IN THE MCC SHALL BE DRAWOUT TYPE & INTERCHANGEABLE.
2. FRAMES WILL BE MADE OUT OF 14 SWG (2MM) CRCA EXCEPT THAT THE DOORS AND COVERS WILL BE MADE OF MINIMUM (16SWG) 16SWG - CRCA. THE GLAND PLATE WILL BE OF 3MM THICK. EACH VERTICAL PANEL WILL HAVE INTEGRAL BASE FRAME SUITABLE FOR ERECTION TACK WELDING. METAL SHEET SEGREGATION BETWEEN ADJACENT PANELS WILL BE PROVIDED.
3. BUS BAR WILL BE OF HIGH CONDUCTIVITY ALUMINIUM SUPPORTED ON INSULATOR MADE OF NON-HYGROSCOPIC, NON-INFLAMMABLE MATERIAL. THE RATING WILL BE FOR FULL LOAD CURRENT OF TRANSFORMER SECONDARY.
4. SPACE HEATER WILL BE PROVIDED FOR MOTORS RATED 75 kW AND ABOVE.
5. EOCR FOR OVER CURRENT PROTECTION WITH DIGITAL DISPLAY SHALL BE PROVIDED FOR MOTOR RATED 7.5kW ~ 15kW.
6. EOCR FOR O/C & E/F, UNBALANCED PROTECTION WITH DIGITAL DISPLAY SHALL BE PROVIDED FOR MOTOR RATED 15kW ~ 110kW.
7. COMPOSITE MOTOR PROTECTION RELAY FOR OVERLOAD, O/C, E/F PHASE UNBALANCED & LOCKED ROTOR PROTECTION WITH DIGITAL DISPLAY SHALL BE PROVIDED FOR MOTOR RATED 110kW AND ABOVE.
8. ALL INDICATING INSTRUMENTS SHALL BE OF DIGITAL TYPE. INDICATING LAMPS WILL BE OF CLUSTER LED TYPE WITH MINIMUM 8 NOS DIA.
9. THE PMCC WIRING SHALL BE CARRIED OUT BY 2.5sqmm. FR PVC INSULATED COPPER CONDUCTOR FOR CT CIRCUITS & 1.5sqmm. FOR CONTROL CIRCUITS.
10. EACH VERTICAL SECTION SHALL BE PROVIDE WITH THERMOSTAT CONTROLLED SPACE HEATER & 6A 3-PIN PLUG SOCKET.
11. ENGRAVED NAME PLATES (IN TWO PARTS) OF 3-PLY (BLACK-WHITE-BLACK) LAMICOID SHEETS OR ANODISED ALUMINIUM WILL BE PROVIDED. NAME PLATE FOR EACH FEEDERS WILL HAVE FEEDER NUMBER & A SECOND REMOVABLE PLATE WITH MOTOR TAG NUMBER, MOTOR NAME, RATING & CABLE SIZE.
12. ALL STARTER FEEDERS WILL MEET THE REQUIREMENT OF TYPE 2 CO-ORDINATION.
13. ALL COMPONENTS OF THE PMCC SHALL BE SUITABLE FOR *kA FAULT LEVEL FOR 1sec.
14. FINAL COLOUR SHADE SHALL BE SEIMENS GREY RAL-7032.
15. THE LOADS SPECIFIED IN THIS DRG. IS ACC. TO THE SUBMITTED ELECTRICAL
16. ALL SWITCHGEAR COMPONENTS SHALL BE AS PER APPROVED VENDOR LIST.
17. COMPONENT DETAILS (LAMP/SWITCH ETC) SHALL BE FINALISED IN MANUFACTURING DRAWING.

REV.	DATE	DISCRIPTION	DRN. BY	CHKD. BY	APPD. BY

JITF WATER INFRASTRUCTURE LTD.

CLIENT NAME	GUWHATI METROPOLITEN DEVELOPMENT AUTHORITY
PROJECT	191 MLD WATER SUPPLY SYSTEM AT GUWHATI SOUTH
TITLE	SLD FOR WTP,CWPS
DRAWING NO.	JWIL/2010-11/GUWHATI SOUTH/WTP/D.02
SHEET NO.	1 OF 2

REVISION	SCALE	DATE	DRN. BY	CHKD. BY	ENGG. BY	APPVD. BY
00	NTS A2	13.12.2011	M.JAWED	AK.SINGH	NADEEM	P.JAIN

Project Director
Project Implementation Unit (P.I.U)
Water Supply Project

JITF Water Infras

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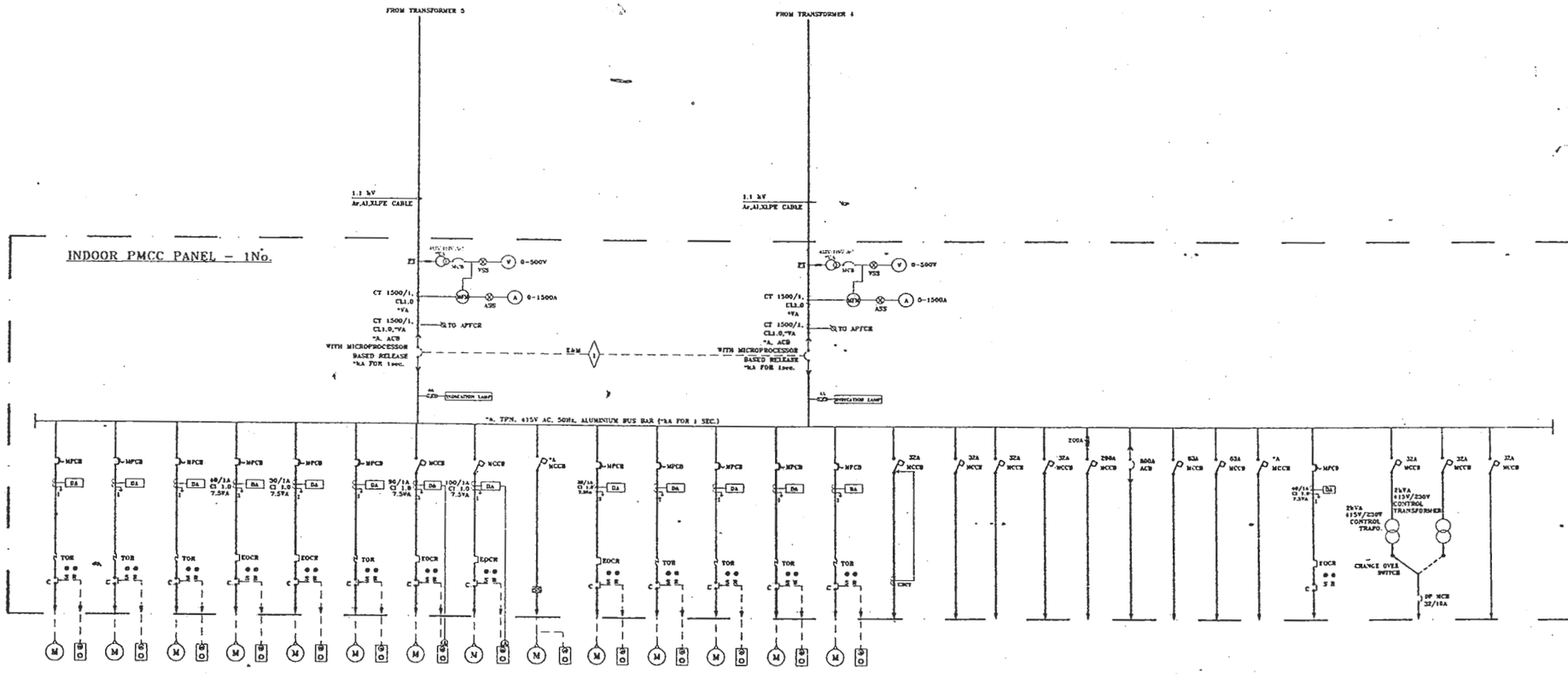
INDOOR PMCC PANEL – 1No.



LEGEND		
50	INST. O/C RELAY	COMPRISE IN NUMERICAL PROTECTION RELAY (MULTI-FUNCTIONAL)
50N	INST. E/F RELAY	
51	IDMT O/C RELAY	
51N	IDMT E/F RELAY	
94	TRIPPING RELAY	
95	TRIP CKT. SUPERVISION RELAY	
27	U/V RELAY	
T	TIME DELAY RELAY	
98	PT FUSE FAILURE RELAY	
MPR	COMPOSITE MOTOR PROTECTION RELAY	
MFM	MULTIFUNCTION METER(Hz,V,A,kW,kVAr,kVA,PF..)WITH RS-485 COMMUNICATION PORT	
M	MOTOR	
	DRAWOUT TYPE INDOOR VCB	
	DRAWOUT TYPE ACB	
	MPCB WITH SHORT CIRCUIT PROTECTION ONLY	
	MCCB WITH SHORT CIRCUIT PROTECTION	
	CURRENT TRANSFORMER	
	POTENTIAL TRANSFORMER	
	CONTROL TRANSFORMER	
	EOCR (ELECTRONIC OVER CURRENT RELAY)	
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	CONTROL FUSE	
	CONTACTOR	
	EMERGENCY STOP, RESET PUSH BUTTON	
	INDICATION LAMP CLUSTER LED TYPE	
	POWER TRANSFORMER	
	415V,50Hz D.G.SET	
	CABLE GLAND	
	SURGE ARRESTER	

NOTES:-

1. PMCC WILL BE SINGLE/DOUBLE FRONT, FIXED METAL ENCLOSED, FREE STANDING FLOOR MOUNTING, WITH BOTTOM CABLE ENTRY COMPARTMENTALIZED, DUST AND VERMIN PROOF, DEGREE OF PROTECTION NOT LESS THAN IP:54, WITH EXTENDABLE BUS ON EITHER SIDE. ALL ACB FEEDERS IN THE MCC SHALL BE DRAWOUT TYPE & INTERCHANGEABLE.
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17. COMPONENT DETAILS (LAMP/SWITCH ETC) SHALL BE FINALISED IN MANUFACTURER DRAWING.

REV.	DATE	DISCRIPTION	DRN. BY	CHKD. BY	APPD. BY

JITF AQUASOURCE

JITF WATER INFRASTRUCTURE LTD.

CLIENT NAME	GUWHATI METROPOLITEN DEVELOPMENT AUTHORITY
PROJECT	191 MLD WATER SUPPLY SYSTEM AT GUWHATI SOUTH
TITLE	SLD FOR WTP,CWPS
DRAWING NO.	JWIL/2010-11/GUWHATI SOUTH/WTP/D.02
SHEET NO.	2 OF 2

REVISION	SCALE	DATE	DRN. BY	CHKD. BY	ENGG. BY	APPVD. BY
00	NTS A2	13.12.2011	M.JAWED	AK.SINGH	NADEEM	P.JAIN

JWIL-RANHILL-IV New Delhi

JWIL-RANHILL-V New Delhi

JWIL-RANHILL-III New Delhi

Project Director Project Implementation Unit (P.I.U) JICA Funded Guwahati Water Supply Project

JWIL Water Infrastructure New Delhi

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C.3.4 Chlorine Dosage Equipment

	Description	Unit	Particulars
1.	**Chemical Applications**		
1.1	Chemical Characteristics		
a.	Type of Chemical (liquid chlorine with one tone cylinder)		liquid chlorine with one tone cylinder
1.2	Chlorine Dosage		
a.	Pre-Chlorination Dosage		
	Maximum rate	mg/l	3
	Average rate	mg/l	2
	Minimum rate	mg/l	2
b.	Post-Chlorination Dosage		
	Maximum rate	mg/l	2
	Average rate	mg/l	1
	Minimum rate	mg/l	1
b.	Chlorine Requirement for Pre- and Post-Chlorination		
	Maximum rate	kg/day	1000
	Average rate	kg/day	610
	Minimum rate	kg/day	610
d.	Dosage of Chlorine - Pre-Chlorination		
	Maximum rate	kg/day	610
	Average rate	kg/day	410

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	Description	Unit	Particulars
	Storage area required	m^2	5
1.3	Unit price of Polymer[2]	Rs/kg	200
2.	**Dosage Equipment**		
2.1	Country of Origin		India
2.2	Manufacturer		JITF Approved vendor
2.3	Major Equipment		
a.	Polymer Solution Preparation		
	Type and major equipment [1]		Dosing tank
	Number of unit	Nos.	2
	Capacity	L	9000 liters
b.	Polymer Dosage [2] (by gravity)		Dosing pump considered
	Dosage chamber - Capacity	litter	Dosing pump considered
	Flow meter - Number	units	Dosing pump considered
	Type	--	Dosing pump considered
	Nominal diameter	mm	Dosing pump considered
	Flow controller - Number	unit	Dosing pump considered
	Type	--	Dosing pump considered
	Nominal diameter	mm	Dosing pump considered

note:

[1] The Bidder shall submit price quotation from manufacturer or supplier with his name, address and past supply record.

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C.3.3 Polymer Dosage Equipment

	Description	Unit	Parti[illegible]
1.	**Chemical Applications**		
1.1	Chemical Characteristics		
a.	Type of Chemical (anionic or nonionic)		Anionic/Cationic (Depends on jar test)
b.	Form of Polymer (liquid or powder)		Solid
c.	Concentration of Solution	%	1% solution to be prepared
1.2	Polymer Dosage		
a.	Dosage Rate		
	Maximum	mg/l	1 (Depends on particular raw water quality)
	Average	mg/l	1
	Minimum	mg/l	0.5
b.	Polymer Requirement		
	Maximum	kg/day	202
	Average	kg/day	202
	Minimum	kg/day	101
c.	Dosage of Polymer Solution		
	Maximum	l/day	20200 (At 1% Solution concentration)
	Average	l/day	20200 (At 1% Solution concentration)
	Minimum	l/day	10100 (At 1% Solution concentration)
d.	Polymer Storage		
	Storage by weight	kg	6.1

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	Description	Unit	Particulars
	Number	units	2
	Motor output	kW	Refer electrical load list
c.	Lime Solution Transfer Pump		
	Type	--	Progressive cavity
	Number of pumps	units	
	Duty		1
	Standby	units	1
	Capacity	l/hr	5000
	Pump suction/delivery	mm	50
d.	Lime Solution Dosage [1] (by gravity)		
	Dosage chamber - Capacity	liter	Dosing Pump considered
	Flow meter - Number	units	Dosing Pump considered
	Type	--	Dosing Pump considered
	Nominal diameter	mm	Dosing Pump considered
	Flow Controller - Number	unit	Dosing Pump considered
	Type	--	Dosing Pump considered
	Nominal diameter	mm	Dosing Pump considered

note:

1 The Bidder shall submit proposed dosage system diagram with major equipment and specifications.

2 The Bidder shall submit price quotation from manufacturer or supplier with his name, address and past supply record.

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	Description	Unit	Particulars
	Average	l/day	30200 (at 10% solution concentration)
	Minimum	l/day	20200 (at 10% solution concentration)
c.	Dosage of Lime Solution (Post-Lime)		
	Maximum	l/day	N.R
	Average	l/day	N.R
	Minimum	l/day	N.R
1.4	Lime Storage		
a.	Lime Storage by weight	tone	91
b.	Storage area required	M^2	74
1.5	Unit price of Lime[2]	Rs/kg	5.5
2.	**Dosage Equipment**		
2.1	Country of Origin		India
2.2	Manufacturer		JITF approved vendor
2.3	Major Equipment		
a.	Lime Dilution/Mixing Tank		
	Number of tank	nos.	2
	Storage Capacity	m^3	18
	Dimensions (width x length x depth)	m	DDE
	Inside Lining	--	Chemical proof ceramic lining
b.	Mixer		
	Type	--	Motorized

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	Description	Unit	Particulars
	form)		
b.	CaO Contents	%	-
c.	Purity Contents of Ca(OH)2	%	90%
d.	Concentration of Lime Solution (in weight)	%	5 to 10%
1.2	Lime Dosage[1]		
a.	Dosage Rate (Pre-Lime)		
	Maximum	mg/l	20 (Depends on particular raw water quality)
	Average	mg/l	15
	Minimum	mg/l	10
b.	Dosage Rate (Post-Lime)		
	Maximum	mg/l	NR
	Average	mg/l	NR
	Minimum	mg/l	NR
1.3	Lime Requirement (weight as solid form)		
a.	For Pre- and Post-Lime		
	Maximum	kg/day	4030
	Average	kg/day	3020
	Minimum	kg/day	2020
b..	Dosage of Lime Solution (Pre-Lime)		
	Maximum	l/day	40300 (at 10% solution concentration)

	Description	Unit	Particulars
c.	Alum Solution Transfer Pump		
	Type	--	Progressive cavity
	Number of pumps		
	Duty	units	1
	Standby	units	1
	Capacity	l/hr	5000
	Pump suction/delivery	mm	50
d.	Alum Solution Dosage [1] (by gravity)		By Dosing Pump considered
	Dosage chamber - Capacity	litter	By Dosing Pump considered
	Flow meter - Number	Units	By Dosing Pump considered
	Type	--	By Dosing Pump considered
	Nominal diameter	mm	By Dosing Pump considered

note:

1 The Bidder may be allowed to propose direct dosage from the solution tank using metering pump system. He shall submit proposed dosage system diagram with major equipment and specifications.

2 The Bidder shall submit price quotation form manufacturer or supplier with his name, address and part supply record

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Project Implementation Unit (P.I.U)
JICA Funded Guwahati Water Supply Pro

C.3.2 Lime Dosage Equipment

	Description	Unit	Particulars
1.	**Chemical Applications**		
1.1	Chemical Characteristics		
	Type of Chemical (powder		Powder

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	Description	Unit	Particulars
	Minimum	kg/day	5030
c.	Dosage of Alum Solution		
	Maximum	l/day	80500 (at 10% concentration)
	Average	l/day	60400 (at 10% concentration)
	Minimum	l/day	50300 (at 10% concentration)
d.	Alum Storage		
	Storage by weight	tone	181
	Storage area required	m^2	150
1.3	Unit Price of Alum[2]	Rs/kg	10
2.	**Dosage Equipment**		
2.1	Country of Origin		India
2.2	Manufacturer		JITF water approved vendor
2.3	Major Equipment		
a.	Alum Dilution/Mixing Tank		
	Number of tank	nos.	2
	Storage Capacity	m^3	36
	Dimensions (width x length x depth)	m	DDE
	Inside Lining	--	Chemical proof ceramic lining
b.	Mixer		
	Type	--	Vertical mounted
	Number	units	2
	Motor output	kW	Refer electrical load list

C.3 Chemical Dosage Equipment

C.3.1 Alum

	Description	Unit	Particulars
1.	**Chemical Applications**		
1.1	Chemical Characteristics		
a.	Type of Chemical (solid or liquid)		Solid
b.	Stock Solution (alum stone by weight)	%	Lumps
c.	Chemical Strength (Al2O3 by weight)	%	10% to 20% solution to be prepared
d.	Alum Solution as AL2O3 by weigh	%	Al2(SO4)3 14-18 H2O
e.	Specific Gravity	kg/l	1.1
f.	Concentration of Alum Solution	%	10% to 20% solution to be prepared
1.2.	Alum Dosage		
a.	Dosage Rate		
	Maximum	mg/l	40 (Depends on particular raw water quality)
	Average	mg/l	30
	Minimum	mg/l	25
b.	Alum Requirement (weight as solid form)		
	Maximum	kg/day	8050
	Average	kg/day	6040

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Project Implementation Unit (P.I.U)
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[redacted]	Description	Unit	Particular [redacted]
e.	Number of Valves/Gates	units	1
9.	**Distribution Reservoir**		(Not in bidder's scope)
9.1	Inlet Gates or Valves		(Not in bidder's scope)
a.	Pressure Rating	Mp or Kg/cm^2	(Not in bidder's scope)
b.	Type of Valve	--	(Not in bidder's scope)
c.	Nominal Diameter		(Not in bidder's scope)
d.	Structures and Materials for Construction 1	--	(Not in bidder's scope)
e.	Actuator		(Not in bidder's scope)
f.	Number of Valves	units	(Not in bidder's scope)
9.2	Outlet Gates or Valves		(Not in bidder's scope)
a.	Pressure Rating	Mp or Kg/cm^2	(Not in bidder's scope)
b.	Type of Valve	--	(Not in bidder's scope)
c.	Nominal Diameter		(Not in bidder's scope)
d.	Structures and Materials for Construction 1	--	(Not in bidder's scope)
e.	Actuator		(Not in bidder's scope)
f.	Number of Valves	units	(Not in bidder's scope)

note:

1 The Bidder shall submit major materials for construction in accordance with manufacturer's specification in separate sheet(s).

2 The Bidder shall submit details of actuator (motorized) in accordance with manufacturer's specifications including gears, torque, limit switch, others incidental

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	Description	Unit	Circular
		Kg/cm^2	
b.	Type of Valve	--	Gates considered
c.	Nominal Diameter		1600 mm x 1600 mm
d.	Structures and Materials for Construction [1]	--	CI
e.	Actuator		(manual)
f.	Number of Valves/Gates	units	2
8.2	Outlet Gates or Valves		Gates
a.	Pressure Rating	Mp or Kg/cm^2	N.A
b.	Type of Valve	--	Gates considered
c.	Nominal Diameter		1600 mm x 1600 mm
d.	Structures and Materials for Construction [1]	--	CI
e.	Actuator		(manual)
f.	Number of Valves/Gates	units	2
8.3	Gates on Partition Wall		Gates considered
a.	Pressure Rating	Mp or Kg/cm^2	N.A
b.	Nominal Diameter		1600 mm x 1600 mm
c.	Structures and Materials for Construction [1]	--	CI
d.	Actuator		(manual)

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	Description	Unit	Particulars
e.	Actuator		(motorized) [2]
f.	Number of Valves	units	24
7.3	Air Scouring Valves		
a.	Pressure Rating	Mp or Kg/cm^2	PN 10
b.	Type of Valve	--	Butterfly
c.	Nominal Diameter		250 mm
d.	Structures and Materials for Construction [1]	--	CI
e.	Actuator		(motorized) [2]
f.	Number of Valves	units	24
7.4	Backwash Valves		
a.	Pressure Rating	Mp or Kg/cm^2	PN 10
b.	Type of Valve	--	Butterfly
c.	Nominal Diameter		600 mm
d.	Structures and Materials for Construction [1]	--	CI
e.	Actuator		(motorized) [2]
f.	Number of Valves	units	24
8.	**Clear Water Reservoir**		
8.1	Inlet Gates or Valves		Gates
a.	Pressure Rating	Mp or	N.A

	Description	Unit	Particu'
b.	Type of Valve	--	Not applicable
c.	Nominal Diameter		Not applicable
d.	Structures and Materials for Construction [1]	--	Not applicable
e.	Actuator		Not applicable
f.	Number of Valves	units	(Valves provided for Sludge line)
7.	**Filter**		
7.1	Inlet Gates or Valves		Gates
a.	Pressure Rating	Mp or Kg/cm^2	Suitable
b.	Type of Valve	--	Gates considered
c.	Nominal Diameter		500 mm x 500 mm
d.	Structures and Materials for Construction [1]	--	CI
e.	Actuator		(motorized) [2]
f.	Number of Gates	units	12 Nos
7.2	Outlet Valve or Siphon		Valve
a.	Pressure Rating	Mp or Kg/cm^2	PN 10
b.	Type of Valve	--	Butterfly valve
c.	Nominal Diameter		350 mm
d.	Structures and Materials for Construction [1]	--	CI

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	Description	Unit	Particulai
d.	Actuator	--	(manual)
e.	Number of Gates	units	6
4.	**Flash Mixing Tanks (Gate or Valve)**		
a.	Pressure Rating	m or Kg/cm^2	N.A
b.	Type of Valve	--	Gate considered
c.	Nominal Size or Diameter	mm	1000 mm x 1000 mm
d.	Structures and Materials for Construction [1]	--	CI
e.	Actuator	--	(manual)
f.	Number of Gates or Valves	units	3
5.	**Flocculation Tanks** (Gate or Valve)		Not applicable
a.	Pressure Rating	m or Kg/cm^2	Not applicable
b.	Type of Valve	--	Not applicable
c.	Nominal Size or Diameter	mm	Not applicable
d.	Structures and Materials for Construction [1]	--	Not applicable
e.	Actuator	--	Not applicable
f.	Number of Gates or Valves	units	Not applicable
6.	**Settling Tanks**		
a.	Pressure Rating	Mp or Kg/cm^2	Not applicable

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	Description	Unit	Particulars
3.2	Type of Flow Controller	--	Butterfly valves
3.3	Nominal Diameter	mm	1300
3.4	Structures and Materials for Construction [1]	--	CI
3.5	Actuator [2]	--	Motorized
4.	**Raw Water Flow in WTP**		
4.1	Pressure Rating		WTP input flow shall be controlled by Motorized control valve of PN 10 OF Raw water transmission flow controller

note:

1 The Bidder shall submit major materials for construction in accordance with manufacturer's specification in separate sheet(s).

2 The Bidder shall submit details of actuator (motorized) in accordance with manufacturer's specifications including gears, torque, limit switch, others incidental

3 The bidder shall submit range of flow control within allowable cavitations recommended by the manufacturer in a separate calculation sheet of cavitations at the worth condition of flow control.

C.2.6 Other Main Gates and Valves

	Description	Unit	Particulars
1.	**Country of Origin**	--	India
2.	**Name of Manufacturer**	--	Jash/Mecgale/Indoasiatic/Equivalent
3.	**Pre-Settling Tanks (Gates)**		
a.	Pressure Rating	m	Suitable
b.	Nominal Size (width x height)	^{W}mm x ^{H}mm	700 X 700
c.	Structures and Materials for Construction [1]	--	CI

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	Description	Unit	Particulars
b.	Size (width x height)	^{W}mmx^{H} mm	1500 x 1500
c.	Structures and Materials for Construction [1]	--	RCC intake structure
d.	Actuator [2]		Motorized
2.	Screens		
2.1	Country of Origin	--	India
2.2	Name of Manufacturer	--	Jash/Mecgale/Indoasiatic/Equivalent
2.3	Screens		
a.	Total Size (width x height)	^{W}mmx^{H} mm	1500 x 1500
b.	Structures and Materials for Construction [1]	--	RCC intake structure
c.	Clear opening size	mm	80

C.2.5 Flow Controller

	Description	Unit	Particulars
1.	**Country of Origin**	--	India
2.	**Name of Manufacturer**	--	R&D Multiples/IVC/Jupiter/ S&M/Equivalent
3.	**Raw Water Transmission Flow Controller**		
3.1	Pressure Rating		PN 10

C.2.3 Plant Drain Pipe

	Description	Unit	Particulars
1.	**Country of Origin**	--	Not applicable (Back wash waste recirculation considered)
2.	**Name of Manufacturer**	--	Not applicable
3.	**Pipes**		Not applicable
3.1	Pipe Materials	--	Not applicable
3.2	Nominal Size	mm	Not applicable
3.3	Wall Thickness	mm	Not applicable
3.4	Lining & Coating	mm	Not applicable
a.	Lining		Not applicable
	Materials	--	Not applicable
	Thickness (dry film)	microns	Not applicable
b.	Coating		Not applicable
	Materials	--	Not applicable
	Thickness (dry film)	microns	Not applicable

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C.2.4 Raw Water Intake Gates and Screen

	Description	Unit	Particulars
1.	**Gates**		
1.1	Country of Origin	--	India
1.2	Name of Manufacturer	--	Jash/Mecgale/Indoasiatic/Equivalent
1.3	Gates		
a.	Pressure Rating	m	Suitable as per design

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	Description	Unit	Particulars
	Materials	--	Epoxy
	Thickness (dry film)	microns	150 microns
4.0	**Length of Raw Water Piping**	m	Around 270

note:

1 The Bidder shall determine optimum size of the transmission main in accordance with total cost (present value) including initial cost and operational cost in accordance with specified conditions (production tendency specified and 30 years operation).

C.2.2 Clear Water Transmission Main

	Description	Unit	Particulars
1.	**Country of Origin**	--	India
2.	**Name of Manufacturer**	--	Jindal Saw/ Equivalent
3.	**Pipes**		
3.1	Pipe Materials	--	MS
3.2	Nominal Size	mm	1500
3.3	Wall Thickness	mm	16
3.4	Lining & Coating	mm	
a.	Lining		
	Materials	--	Epoxy
	Thickness (dry film)	microns	150 microns
b.	Coating		
	Materials	--	Epoxy
	Thickness (dry film)	microns	150 microns
4.0	**Length of Clear Water Piping**	m	2m beyond the boundary of the WTP

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	Description	Unit	Particulars
	Point		
4.3	Efficiency at Design Point	%	DDE
4.4	Rated Speed at 50 Hz	rpm	1370
4.5	Motor Output at Design Point	kW	Refer electrical load list
4.6	Auxiliary Equipment	--	Suction air filter, PRV
4.7	Performance Curve of Blower[1]	--	DDE
note: [1] The Bidder shall indicate accommodated major axially equipment with types and numbers for start-up and safety operation.			

C.2 Pipes and Gates/Valves

C.2.1 Raw Water Transmission Main

	Description	Unit	Particulars
1.	**Country of Origin**	--	India
2.	**Name of Manufacturer**	--	Jindal Saw/Equivalent
3.	**Pipes**		
3.1	Pipe Materials	--	MS
3.2	Nominal Size	mm	1300
3.3	Wall Thickness	mm	< = 10
3.4	Lining & Coating	mm	
a.	Lining		
	Materials	--	Epoxy
	Thickness (dry film)	microns	150 microns
b.	Coating		

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	Description	Unit	Particulars
	requirement	m^3/hr	
4.10	Type of Shaft Seal	--	Gland packed
4.11	Performance Curve of Pump[1]	--	DDE

note:

The Bidder shall indicate pump's performance curve (head, power, efficiency and NPSH versus flow) covering complete range of operation in a separate sheet.

C.1.3 Air Blowers (for Filter Washing)

	Description	Unit	Particulars
1.	**Country of Origin**	--	India
2.	**Name of Manufacturer**	--	Everest/Kay/Swam/Beta/Equivalent
3.	**Air Blowers**		
3.1	Type of Air Blowers	--	Twin lobe
3.2	Number of Air Blowers		
a.	Duty	units	2
b.	standby	units	1
3.3	Suction Connection Diameter	mm	DDE
3.4	Delivery Connection Diameter	mm	250
3.5	Electrical Service Requirements	v/ph/hz	Refer electrical data sheet
4.	**Guaranteed Performance**		
4.1	Capacity at Design Point (per pump)	m3/hr	3120
4.2	Discharge Pressure at Design	MWC	4

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	Description	Unit	Particulars
			Equivalent
3.	**Pumps**		
3.1	Type of Pumps	--	Vertical turbine
3.2	Model Number of Manufacturer	--	DDE
3.3	Number of Pumps		
a.	Duty	units	2
b.	Standby	units	1
3.4	Column Pipe Diameter	mm	DDE
3.5	Discharge Elbow Diameter	mm	DDE
3.6	Electrical Service Requirements	v/ph/hz	Refer electrical data sheets
4.	**Guaranteed Performance**		
4.1	Capacity at Design Point (per pump)	m^3/hr	4153
4.2	Water levels	m	Refer WTP HFD
4.3	Total Head at Design Point	m	143 m
4.4	Hours per Day of Pump Operation	hrs	23, after 23 hours stand by pump shall be operated
4.5	Shut-off Pump Head	m	DDE
4.6	Efficiency at Design Point	%	82
4.7	Rated Speed at 50 Hz	rpm	DDE
4.8	Motor Output at Design Point	kW	Refer electrical load list
4.9	Line shaft bearing Lubrication		Gland packed

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	[illegible]	Unit	[illegible]
4.2	Static Head at Design Point	m	Refer intake elevation diagram
a.	Intake water level	m msl	Refer intake elevation diagram
b.	Receiving Water Level at WTP	m msl	Refer WTP HFD
4.3	Total Head at Design Point	m	40 m
4.4	Hours per Day of Pump Operation	hrs	23, after 23 hours stand by pump shall be operated
4.5	Shut-off Pump Head	m	DDE
4.6	Efficiency at Design Point	%	84
4.7	Rated Speed at 50 Hz	rpm	DDE
4.8	Motor Output at Design Point	kW	Refer electrical load list
4.9	Line shaft bearing Lubrication requirement	m^3/hr	Gland packed
4.10	Type of Shaft Seal	--	Gland packed
4.11	Performance Curve of Pump	[illegible]	DDE

note:

The Bidder shall indicate pump's performance curve (head, power, efficiency and NPSH versus flow) covering complete range of operation in a separate sheet.

C.1.2 Clear Water Transmission Pumps

	Description	Unit	Particulars
1.	**Country of Origin**	--	India
2.	**Name of Manufacturer**	--	Sintech/Jyoti/KBL/Flowmore/M&P/CNP/

C. Major Mechanical Equipment

C.1 Major Pumps

C.1.1 Raw Water Pumps

	Description	Unit	Particulars
1.	**Country of Origin**	--	India
2.	**Name of Manufacturer**	--	Sintech/Jyoti/KBL/Flowmore/M&P/CNP/ Equivalent
3.	**Pumps**		
3.1	Type of Pumps	--	Vertical turbine
3.2	Model Number of Manufacturer	--	DDE
3.3	Number of Pumps		
a.	Duty	units	2
b.	Standby	units	1
3.4	Column Pipe Diameter	mm	DDE
3.5	Discharge Elbow Diameter	mm	700
3.6	Electrical Service Requirements	v/ph/hz	Refer electrical data sheets
4.	**Guaranteed Performance**		
4.1	Capacity at Design Point (per pump)	m^3/hr	4371

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B.3.9 Maintenance and Store House

	Description	Unit	Pa[redacted]
1.	**Structure (number of floors)**	nos.	Ground
2.	**Floor Area** [1]		
2.1	Total Area		22m x 10m
2.2	Areas or Rooms		
a.	Main (mechanical) workshop	Yes/No	Yes
b.	Painting shop	Yes/No	Yes
c.	Electronics shop	Yes/No	Yes
d.	Storage : Dry good/spare parts		Yes
	Chemicals	Yes/No	No.
	Flammables	Yes/No	Yes
e.	Electrical Shop	Yes/No	Yes
f.	Washroom	Yes/No	Yes
g.	Additional, if any	Yes/No	No

note:

[1] The Bidder shall propose a total floor area. Additional areas or rooms may be proposed as he deems incidental for proper functioning of the building

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	Description	Unit	Particulars
a.	Sludge storage tanks, Polymer dosage equipment and Sludge feed pumps, miscellaneous equipment and piping area	Yes/No	Yes
b.	Truck loading area	Yes/No	Yes
c.	Stairway	Yes/No	Yes
d.	Additional, if any	Yes/No	No.
3	**First Floor**[1]		
3.1	Total Area		28m x 15m
3.2	Rooms		
a.	Dehydrators area	m^2	28m x 15m
b.	Electric room	Yes/No	Considered inside de-hydrator area
c.	Control room	Yes/No	Considered inside de-hydrator area
d.	Duty	Yes/No	No.
e.	Washroom	Yes/No	No.
f.	Stairway	Yes/No	No.
g.	Additional, if any	Yes/No	No.

note:

[1] The Bidder shall propose a total area of each floor. Additional areas or rooms may be proposed as he deems incidental for proper functioning of the building

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B.3.7 Sludge Thickened Extraction Pump House

	Description	Unit	Particulars
1.	Structure (number of floors)	nos.	Not applicable
2.	Floor Area [1]		Not applicable
2.1	Total Area	m^2	Not applicable
2.2	Rooms		Not applicable
a.	Electrical room	Yes/No	Not applicable
b.	Control room	Yes/No	Not applicable
c.	Pump room	Yes/No	Not applicable
d.	Additional, if any	Yes/No	Not applicable

note:

[1] The Bidder shall propose a total floor area. Additional areas or rooms may be proposed as he deems incidental for proper functioning of the building

B.3.8 Sludge Dewatering Building

	Description	Unit	Particulars
1.	Structure (number of floors)	nos.	Ground + first Ground floor open in all sides to vehicle movement
2.	Ground Floor [1]		
2.1	Ground Floor		
2.1	Total Area		28 m x 15m
2.2	Rooms		

	Description	Unit	Particulars
g.	Bathroom	Yes/No	Yes
h.	Stairway	Yes/No	Yes
i.	Additional, if any	Yes/No	No.

note:

[1] The Bidder shall propose a total area of each floor. Additional areas or rooms may be proposed as he deems incidental for proper functioning of the building

B.3.6 Chlorine Building

	Description	Unit	Particulars
1.	**Structure (number of floors)**	nos.	Ground
2.	**Floor Area** [1]		
2.1	Total Area	m^2	34m x 9.2m
2.2	Rooms		
a.	Chlorine cylinder storage room	m^2	24m x 9.2m
b.	Chlorinator room	m^2	9.2m x 4m
c.	booster pump room	m^2	6m x 6m
d.	Chlorine gas neutralization room	m^2	6m x 6m
e.	Additional, if any	m^2	No.

note:

[1] The Bidder shall propose a total floor area. Additional areas or rooms may be proposed as he deems incidental for proper functioning of the building

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B.3.5 Chemical House

	Description	Unit	Particular
1.	**Structure (number of floors)**	nos.	Ground + first
2.	**Ground Floor** [1]		
2.1	Total Area	m^2	40 m x 15m
2.2	Rooms		
a.	Alum storage, mixing tank and Alum solution transfer pump area	Yes/No	Yes
b.	Lime storage, mixing tank and Lime solution transfer pump area	Yes/No	Yes
c.	Stairway	Yes/No	Yes
d.	Additional, if any	Yes/No	Poly storage area
3	**First Floor** [1]		
3.1	Total Area	m^2	40 m x 15m
3.2	Rooms		
a.	Alum Tank, storage (daily) and dosage equipment area	Yes/No	Yes
b.	Lime Tank, storage (daily and dosage equipment area	Yes/No	Yes
c.	Polymer storage and dosage area	Yes/No	Yes
d.	Electrical room	Yes/No	Yes
e.	Control room	Yes/No	Yes
f.	Duty room	Yes/No	Yes

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	Description	Unit	Particulars
c.	Electrical cum Control room	Yes/No	Considered inside filter house
d.	Bath room	Yes/No	No
e.	Additional, if any	Yes/No	No

note:

[1] The Bidder shall propose a total floor area. Additional areas or rooms may be proposed as he deems incidental for proper functioning of the building

B.3.4 Clear Water Pumping Station

	Description	Unit	Particulars
1.	**Structure (number of floors)**	nos.	Single floor
2.	**Floor Area** [1]		
2.1	Total Area	m^2	18 m x 7.5 m
2.2	Rooms		
a.	Pumps room	Yes/No	Yes
b.	Electrical cum Control room	Yes/No	Considered inside Pump house
c.	Store room	Yes/No	No.
d.	Bath room	Yes/No	No.
e.	Additional, if any	Yes/No	No.

note:

[1] The Bidder shall propose a total floor area. Additional areas or rooms may be proposed as he deems incidental for proper functioning of the building

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	Description	Unit	Particulars
b.	Laboratory	Yes/No	Yes
c.	Conference/Training room	Yes/No	Yes
d.	Store room	Yes/No	Yes
e.	Bath room	Yes/No	Yes
f.	Pantry	Yes/No	Yes
g.	Additional, if any	Yes/No	No

note:

[1] The Bidder shall propose a total area of each floor. Additional areas or rooms may be proposed as he deems incidental for proper functioning of the building

B.3.2 Electric/Control Room of Settling Tanks

		Unit	Particulars
1.	**Structure (number of floors)**	nos.	Included in Admin building

B.3.3 Filter House

	Description	Unit	Particulars
1.	**Structure (number of floors)**	nos.	Ground floor
2.	**Floor Area** [1]		
2.1	Total Area	m^2	29 m x 7 m
2.2	Rooms		
a.	Backwash air blower room	Yes/No	Yes

B.3 Major Buildings in Water Treatment Plant

B.3.1 Administration Building

	Description	Unit	Particulars
1.	**Structure (number of floors)**	nos.	Ground + first
2.	**Floor Area** [1]		
3.	**Ground floor**		
3.1	Total Area		32 m x 15m
3.2	Rooms		
a.	Entrance hall and reception	Yes/No	Yes
b.	Manager's office	Yes/No	Yes
c.	Offices (for multiple staff)	Yes/No	Yes
d.	Meeting/Break room	Yes/No	Yes
e.	Duty room (operators)	Yes/No	Yes
f.	Bathroom	Yes/No	Yes
g.	Store room	Yes/No	Yes
h.	Mechanical and Electrical room	Yes/No	Yes
i.	Stairways and corridors	Yes/No	Yes
j.	Additional, if any	Yes/No	No
4.	**First Floor**		
4.1	Rooms		
a.	Control room	Yes/No	Yes

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	Description	Unit	Particulars
b.	Standby	units	Not applicable
4.3	Size of Suction/Deliver of Pumps	mm	Not applicable
4.4	Pump Head	m	Not applicable
4.5	Motor Output	kW	Not applicable

note:

1 The Bidder shall propose pipe materials and types of valves and gates applied.

2 The Bidder shall submit literature of general description of equipment with performance specification and overall dimension.

Rotary Drum thickener cum belt filter press details:

The drum thickener belt-type filter press mono-block machine is a comprehensive sludge thickening and dewatering equipment combined with sludge-dose mixing machine, drum thickener and belt-type filter press machine. The sludge with the moisture rate lower than 99.5% can be treated directly. Compared with other types of water extractor, the cost-effectiveness is more advantageous. The sludge thickening basin is superseded so that the construction investment is reduced.

- Features:
  - Two corrective measures: bilateral differential and infinite tension-corrective.
  - Synchronization of two belts, easy to operate, low energy consumption.
  - Excellent sealing of the drum with no sludge leaking.
  - The S-shape arrangement of the 8 rollers in pressing system allows good Pressing effect moisture content of the cake lower than 78%.
  - The two drivers make sure that the belts won't slip.
  - The structure of the whole machine is compact, thus saving the floor
  - space and reducing the construction investment

	Description	Unit	Particulars
2.1	Loading of Thickener	Kg/day	Not applicable
2.2	Number of Thickener	nos.	Not applicable
2.3	Dimensions of a Thickener		Not applicable
a.	Diameter	m	Not applicable
b.	Effective Side Depth	m	Not applicable
c.	Depth of Volume	m^3	Not applicable
d.	Depth of Sludge Deposit	m	Not applicable
e.	Volume of Sludge Deposit	m^3	Not applicable
f.	Total Volume of Thickener	m^3	Not applicable
h.	Free Board	m	Not applicable
2.4	Sludge Scraper		Not applicable
a.	Type of Scraper		Not applicable
b.	Motor Output	kW	Not applicable
2.5	Piping 1		Not applicable
a.	Inlet Pipes and Valve	mm	Not applicable
b.	Supernatant Outlet Pipes and Valves	mm	Not applicable
3.	**Rotating Drum Thickner[2]**		Details provided below
4.	**Sludge Extraction Pumps to Sludge Dewatering Building**		
4.1	Type of Pumps		Not applicable
4.2	Number of Pumps		Not applicable
a.	Duty	units	Not applicable

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	Description	Unit	Particulars
3.	**Piping** [1]		
3.1	Inlet Pipes and Valve or Gates	mm	Gates : 400 x 400
3.2	Outlet Pipes and Valves or Gates	mm	Gates between compartments and pump sump : 400 x 400
3.3	Overflow Pipes	mm	--
4.	**Sludge Transfer Pumps to Drum Thickener**		
4.1	Type of Pumps		Vertical sump pump
4.2	Number of Pumps		3 Nos
a.	Duty	units	2
b.	Standby	units	1
4.3	Size of Suction/Deliver of Pumps	mm	Delivery Pipe : 150 mm
4.4	Pump Head	m	30
4.5	Motor Output	kW	Refer electrical load list attached
note: [1] The Bidder shall propose pipe materials and types of valves and gates applied.			

B.2.10 Sludge Thickener

	Description	Unit	Particulars
1.	**Type of Structure**	--	Rotating Drum Thickener cum belt filter press considered
2.	**RCC Thickener**		Not applicable

	Description	Unit	Particulars
d.	Free Board	m	0.3
2.3	Effective Volume (total)	m^3	1386
3.	**Piping** [1]		
3.1	Inlet Pipes and Valve or Gates	mm	Gate : 1200 x 1200
3.2	Outlet Pipes and Valves or Gates	mm	Gates between compartments and pump sump : 1200 x 1200
3.3	Overflow Pipes	mm	--
4.	**Disposal of Waste water**		Recycle to Pre-settling Tank

note:

[1] The Bidder shall propose pipe materials and types of valves and gates applied.

B.2.9 Sludge Buffer (SB) Tank

	Description	Unit	Particulars
1.	**Type of Structure**	--	RCC
2.	**SB Tank**		
2.1	Number of Compartments	nos.	2
2.2	Dimensions of Compartment		
a.	Width	m	15
b.	Length	m	20
c.	Effective Water Depth	m	3.3
d.	Free Board	m	0.3
2.3	Effective Volume (total)	m^3	1970

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	Description	Unit	Particulars
	Gates		between pump sump and compartments
3.3	Overflow Pipes	mm	700 x 4 Nos
3.4	Drain Pipes and Valves	mm	200
3.5	Gate on Partition Wall of Pump Suction Well	mm	Gates : 1600 x 1600
4.	**CW Pumping Station**		Refer to Schedule B.3
5.	**Transmission Main**		Refer to Schedule C
6.	**Flow meter and Control Valve**		Refer to Schedule C and D
7	**Surge Protection** [3]		DDE

note:

[1] The Bidder shall propose type of structure for foundation, support of slab (such as beam or flat slab structure)

[2] The Bidder shall propose pipe materials and types of valves and gates applied.

B.2.8 Waste Backwash Water (WBW) Holding Tank

	Description	Unit	Particulars
1.	**Type of Structure**	--	RCC tank
2.	**WBW Holding Tank**		
2.1	Number of Compartments	nos.	2
2.2	Dimensions of Compartment		
a.	Width	m	15.4
b.	Length	m	15
c.	Effective Water Depth	m	3

	Description	Unit	Particulars
g	Free Board	m	0.3
h	Effective Volume (Total)	m^3	1486
10.2	Backwash pump		Refer to Schedule C

note:

1 Backwash method shall be air plus water. The method specified in the specifications is one of prevailing methods.

2 The Bidder shall propose pipe materials and types of valves and gates applied.

B.2.7 Clear Water (CW) Reservoir and Pumping Station

	Description	Unit	Particulars
1.	**Type of Structure** [1]	--	RCC tank
2.	**CW Reservoir**		
2.1	Number of Reservoirs or Compartments	nos.	2 compartment
2.2	Dimensions (Reservoir or Compartment)		
a.	Width	m	16.2
b.	Length	m	64.6
c.	Effective Water Depth	m	5.1
d.	Free Board	m	0.3
2.3	Effective Volume	m3	10625
3.	**Piping** [2]		Referred to Schedule C for valve details
3.1	Inlet Pipes and Valve or Gates	mm	Gates : 1600 x 1600
3.2	Outlet Pipes and Valves or	mm	Gates provided in partition wall

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	Description	Unit	Particulars
8.	Piping [2]		Referred to Schedule C for valve details
8.1	Inlet Gates or Valves	mm	Gates (500 mm x 500 mm)
8.2	Filter Outlet Pipes and Valves or Siphons	mm mm	Pipes and valves -350 mm dia
8.3	Air Scouring Pipes and Valves	mm	250 mm
8.4	Backwash Pipes and Valves	mm	600 mm
8.5	Filter Drain Pipes and Valves	mm	200
8.6	Filter Outlet Header or Conduit	mm	Refer layout
8.7	Air Scouring Main	mm	350
8.8	Backwash Main	mm	800
8.9	Filter Drain Header	mm	Not applicable
9.	**Air Blower**		Refer to Schedule C
10.	**Backwash Water (BW) Storage Tank / Backwash pump**	--	Back wash water OHT
10.1	Backwash storage tank		
a.	Structure	--	Over head tank
b.	Number of Tanks or Compartments	units	One tank with 2 compartment
c.	Water Level (HWL)	m	Refer HFD
d.	Width	m	7
e.	Length	m	72
f	Side Water Depth	m	3

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	Description	Unit	Particulars
	m3/min)	cm	
6.3	Nozzle Type		N.A
a.	Total Area of Plunk Pipe to Filter Bed Area	%	N.A
b.	Installation Spacing of Nozzle	mm	N.A
c.	Net Clearance under False Slab to Base Slab	cm	N.A
d.	Maximum Head Loss (at 0.6 m3/min)	cm	N.A
7	**Filter Washing**		
7.1	Method of Filter Washing 1	--	From OHT
7.2	Washing Rate		
a.	Air Scouring	m^3/min/m2	0.9 to [redacted]
b.	Backwashing with Air Scouring	m^3/min/m2	0.25 to 0.6 (water flow rate)
c.	Backwashing with Water (Maximum rate)	m^3/min/m2	Back washing with air scouring considered
7.3	Washing Trough		
a.	Number of Trough per Cell	nos.	DDE
b.	Materials of Construction	--	RCC
c.	Dimensions		
	Internal width	mm	DDE
	Internal depth	mm	DDE

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	Description	Unit	Particulars
e.	Depth of filter media (sand & gravel)	m	Refer HFD
f.	Height of under drain	m	Refer HFD
g.	Free Board	m	Refer HFD
4.3	Width of Wash drain Gutter including side walls	m	1.5
5.	**Filter Media**		
5.1	Filter Sand		
a.	Effective Size	mm	0.8 to 1
b.	Uniformity Co-efficient	--	< 1.6
c.	Thickness of media layer	mm	900
5.2.	Supporting Gravel (optional)		
a.	Number of Layers	nos.	3
b.	Range of Size (diameter)	mm	First layer: 2.5mm to 6mm, Second layer : 6mm to 12mm, Third layer: 12mm to 37mm
c.	Thickness of each Layer	mm	First layer 100 mm, second layer 150 mm, Third layer 150 mm
6.	**Under drain System**		
6.1	Type		Header Lateral Type
6.2	Partition Block Type Under drain		Header Lateral Type
a.	Materials of Block	--	N.A
b.	Installation Height	mm	N.A
c.	Maximum Head Loss (at 0.6		N.A

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	Description	Unit	Particulars
e.	Applied head for sludge extraction	m	Static head of clarifier
f.	Maximum Sludge Extraction Flow	l/sec	Depends on TSS

note:

1. Up flow velocity is calculated as treatment flow divided by net tank area (horizontal).
2. Either by Mechanical (with Scraper) or Hopper type
3. Maximum sludge scraping volume will be determined based on estimated sludge concentration during scraping.
4. Sludge extraction is made water level deference between tank and sludge discharge chamber by gravity.

B.2.6 Rapid Sand Filter

	Description	Unit	Particulars
1.	**Type of Filtration Control**	--	Declining rate filter with restrictor valve at outlet
2.	**Filtration Rate**	$m^3/hr/m^2$	6 m3/m2/hr
3.	**Number of Filters**	units	12
4.	**Filter**		
4.1	Number of Cell per Filter	nos	Twin bed filters
4.2	Dimensions of a Cell		
a.	Width	m	5.5
b.	Length	m	10.5
c.	Side Water Depth	m	Refer HFD
d.	Water depth above sand Layer	m	Refer HFD

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	Description	Unit	Particulars
a.	Mechanical Sludge Scraping Type	nos.	Not applicable
b.	Hopper Type	nos.	4 Nos per clarifier
7.3	Sludge Scraper		
a.	Type of Scraper	--	Not applicable
b.	Width and Height of Scraping Blade	cm	Not applicable
c.	Scraping Speed	m/hr	Not applicable
d.	Number of Scraper per Tank	units	Not applicable
e.	Maximum Scraping Capacity 3	m^3/day	Not applicable
7.4	Sludge Extraction Cycle per tank (at Maximum turbidity)	times/day	continuous
7.5	Sludge Extraction Operation (per Cycle at Max. turbidity)	nos	continuous
a.	Sludge Concentration	%	Around 2%. Sludge consistency depends on raw water TSS
b.	Sludge Extraction Times per Cycle	times	10 minutes for every 1 hour
c.	Time for a Sludge Extraction	min	10 minutes for every 1 hour
d.	Time for Sludge Extraction per Cycle	min	10 minutes for every 1 hour
7.6	Sludge Extraction Piping		
a.	Size of Sludge Extraction Pipes	mm	200
b.	Number of Sludge Extraction Valves	units	2 Numbers per clarifier
c.	Type of Sludge Extraction Valves	--	Referred to Schedule C
d.	Size of Sludge Extraction Header	mm	200

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	Description	Unit	Particulars
a.	Width	m	24.75 per clarifier
b.	Length	m	25.3 per clarifier
c.	Installation Height	m	0.75 m media height
d.	Spacing between Plates or Tube size	mm	As per Media Manufacturer
e.	Thickness of Plates or Tube	mm	As per Media Manufacturer
f.	Installation Angle	deg.	As per Media Manufacturer
g.	Effective area of Module	m^2	11 m2 per m3 of module
h.	Number of Modules		
	along tank width	nos.	As per Media Manufacturer
	along tank length	nos.	As per Media Manufacturer
i	Weight of plate/tube per unit plan area	kg/sq.m	As per Media Manufacturer
j	Thickness	mm	As per Media Manufacturer
k	Height of module, after installation	m	0.75
5.2.	Surface Loading	$m^3/hr/m^2$	< 1 (media surface loading)
5.3	Up flow Velocity 1	$m^3/hr/m^2$	< 6
6.	**Clarified Water Collector**		
6.1	Method/Type of Collector	m	Launders/weirs
6.2	Total Length of Collector	m	DDE
6.3	Weir Loading	$m^3/day/m$	< 200 m3/m2/day
7	**Sludge Extraction (per tank)**		
7.1	Method of Sludge Extraction [2]	--	Through sludge hopper
	Number of Sludge Hopper		4 Nos per clarifier

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B.2.5 Tube Settling Tanks

	Description	Unit	Particulars
1.	**Type (Plate or Tube settler)**	--	Tube
2.	**Detention Time**	sec	DDE
3.	**Number of Tanks**	units	3
4.	**Settling Tank**		
4.1	Number of Compartments per tank	nos	1
4.2	Dimensions of Compartment		
a.	Width	m	25.3
b.	Length	m	25.3
c.	Side Water Depth	m	3.05
d	Water depth above module	m	0.8
e	Total height of module including support	m	0.75
f	Height below module	m	1.5
g	Length of Inlet Stilling Zone	m	25.3
h	Free Board	m	0.3
4.3	Effective Volume of Compartment		1952.2
5.	**Inclining Plate or Tube Installation (per a compartment)**		
5.1	Dimensions of a Tube Module		

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	Description	Unit	Particulars
	1st compartment	--	Not applicable
	2nd compartment	--	Not applicable
	3rd compartment	--	Not applicable
	Total	--	Not applicable
5.2	Hydraulic Mixing		
a.	Number of baffle wall		
	1st compartment	nos	DDE
	2nd compartment	nos	DDE
	3rd compartment	nos	DDE
b.	Head Loss		
	1st compartment	cm	DDE
	2nd compartment	cm	DDE
	3rd compartment	cm	DDE
b.	Energy Dissipation (GT-value)		
	1st compartment	--	DDE
	2nd compartment	--	DDE
	3rd compartment	--	DDE
	Total	--	DDE
note: [1]	Submit analysis of mixing intensity and energy dissipation in separate sheet		

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	Description	Unit	Particulars
3.	**Number of Tanks**	units	3
4.	**Flocculation Tank**		
4.1	Nos. of compartments per tank	nos	1 (baffling arrangement provided)
4.2	Dimensions of compartment		
a.	Width	m	16
b.	Length	m	25.3
c.	Side Water Depth	m	3.5
d.	Free Board	M	0.3
4.3	Effective Volume of compartment	M3	1416.8
5.	**Mixing Intensity**[1]		
5.1	Mechanical Mixing		Not applicable
a.	Type Flocculator	--	Not applicable
b.	Motor Output		Not applicable
	1st compartment	kW	Not applicable
	2nd compartment	kW	Not applicable
	3rd compartment	kW	Not applicable
c.	Mixing Intensity (G-value)		Not applicable
	1st compartment	sec^{-1}	Not applicable
	2nd compartment	sec^{-1}	Not applicable
	3rd compartment	sec^{-1}	Not applicable
d.	Energy Dissipation (GT-value)		Not applicable

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	Description	Unit	Particulars
2.	**Detention Time**	sec	60
3.	**Number of Tanks**	units	3
4.	**Mixing Tank**		
4.1	Width	m	4
4.2.	Length	m	4
4.3	Side Water Depth	m	3
4.4	Free Board	m	0.3
5.	**Mixing Intensity**[1]		
5.1	Mechanical Mixing		
a.	Type Flash Mixer	--	Agitator type
b.	Motor Output	kW	Refer electrical load list
c.	Mixing Intensity (G-value)	sec^{-1}	500
5.2	Hydraulic Mixing		Not applicable
a.	Type of Mixing	--	Not applicable
b.	Head Loss	m	Not applicable
c.	Mixing Intensity (G-value)	sec^{-1}	Not applicable

note: [1] Submit analysis of mixing intensity in separate sheet

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B.2.4 Flocculation Tanks

	Description	Unit	Particulars
1.	**Mixing Method (Mechanical or Hydraulic)**	--	Hydraulic type
	Detention Time	Min	30

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	Description	unit	Particulars
			2. Drain valves provided at bottom most point of tank will opened in periodic intervals to remove silt + sludge
3.2.	Estimated De-silting Cycle per tank	days	Depends on particular raw water quality

B.2.2 Cascade Aerator

	Description	Unit	Particulars
1.	Aerator		
1.1	Number	units	1
1.2	Number of steps (falls)		
a.	Number	nos	6
b.	Total height of fall	m	0.25
1.3	Shape	--	
1.4.	Dimensions		
a.	Diameter or Width x Length	m	24 dia
b.	Height of a step	cm	0.25

B.2.3 Flash Mixing Tanks

	Description	Unit	Particulars
1.	**Mixing Method (Mechanical or Hydraulic)**	--	Mechanical type

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Sl.No	Description	Particulars
4.	Armor	Galvanized single round steel wire armour for twin and multicore cables. Non-magnetic hard drawn aluminium single round wire conforming to H4 grade for single core cables.
5.	Overall Sheath	Extruded FRLS PVC compound conforming to type ST2 of IS: 5831
6.	Highest System Fault Current	As per drawing
7.	Short circuit rating	
	i) Incoming cable to MCC	
	ii) Cable from 400V MCC to Motors	
8.	Permissible Voltage and frequency variation	
	Voltage	10%
	Frequency	5%
	Voltage & frequency	10%
	Permissible conductor temperature corresponding to maximum current	90 deg C
	Maximum permissible conductor temperature foe emergency overloading	130 deg C
	Conductor temperature allowed for short circuit duty	250 deg C

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Sl.No	Description	Particulars
8	Permissible Voltage and frequency variation	
	Voltage	10%
	Frequency	5%
	Voltage & frequency	10%
	Permissible conductor temperature corresponding to maximum current	90 deg C
	Maximum permissible conductor temperature foe emergency overloading	130 deg C
	Conductor temperature allowed for short circuit duty	250 deg C
9.	Highest System Fault Current	As per drawing

LT power cables

Sl.No	Description	Particulars
1.	Conductor	Stranded and compacted plain aluminium of grade H2 and class 2/stranded, high conductivity annealed plain copper as per Annexure, generally conforming to IS: 8130
2.	Insulation	Extruded HR PVC compound conforming to type C of IS: 5831 or XLPE
3.	Inner Sheath	Extruded PVC compound conforming to type ST2 of IS: 5831for multicore cable. Single core cables shall have no inner sheath.

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Sl.No.	Description	Particulars
	Insulation level	1.5 KV for 1 min.

HT Cables

Sl.No	Description	Particulars
1.	Conductor	Stranded and compacted aluminium conductor of grade H2 and class 2 for all sizes, generally conforming to IS: 8130
2.	Conductor Screen	Extruded semi-conducting compound
3.	Insulation	Extruded cross linked polyethylene (XLPE)
4.	Insulation Screen	Extruded semi-conducting compound with a layer of non-magnetic metallic tape. For single core the metallic part of screening. The semi-conducting tape shall be easily strippable
5.	Core Identification	By coloured strips applied on (For three core cables) cores or by numerals
6.	Inner Sheath	Extruded PVC compound conforming to type ST2 of IS: 5831 for three core cables. Single core cables shall have no inner sheath. Filler material shall also be of type ST2 PVC
7.	Armour	Galvanized single round steel wire armour for twin and multicore cables. Non-magnetic hard drawn aluminium single round wire conforming to H4 grade for single core cables.
8.	Overall Sheath	Extruded FRLS PVC compound conforming to type ST2 of IS: 5831

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Sl.No.	Description	Particulars
	ii) Accuracy	± 1%
16	Changeover switch	
	i) Type	3 position 4 pole, load break with minimum 2 NO + 2 NC auxiliary contacts
	ii) Key interlock furnished?	Yes
17	Terminal Connection	
	i) A.C. Input	AYWY cable of adequate size
	ii) D.C. Output	
	a) To Battery	1/C copper cables of adequate size
	b) To Load	1/C AYWY cables of adequate size
18	DCDB	
19	General	
	Type	Metal clad, Fixed
	Service	Indoor
20	System	
	Voltage	110 V
	Phase	2 wire
	Rated current at 50 Deg.C ambient within cubicle	
	MCBs	10 A to 50 A
21	Short circuit rating	
	Short time for 1 sec.	10 KA

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Sl.No.	Description	Particulars
	i) Type	Dry type, cast resin, double wound, taps ±2x2.5% on primary
	ii) Class of insulation	Class-F
	iii) Type of cooling	Naturally air-cooled
10	Maximum temperature rise above 50ºC ambient	
	i) Rectifier Transformer	Restricted to class-B
	ii) SCR	Limited to 35ºC rise above ambient temperature 50ºC
11	Controlled Rectifier (SCR)	
	i) Type	Silicon
	ii) Surge protection provided?	Yes
	iii) Fast acting HRC fuse provided	Yes
12	Diode	
	Peak Inverse Voltage	1200V
13	Filter Choke	
	Insulation Class	Class-F
14	Contactor	
	i) Type	Air break heavy duty
	ii) Utilization category	AC-3 (for A.C. contactor)
		DC-3 (for D.C. contactor)
15	Meter	
	i) Size	96 x 96 mm^2

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Sl.No.	Description	Particulars
5	A.C. Input	
	i) Supply	433V, 3phase, 50Hz, 4wire
	ii) Voltage variation	±10%
	iii) Frequency variation	±5%
	iv) Combined volt and frequency variation	10% (absolute sum)
	v) Short-circuit level	10 kA(rms) symmetrical
	vi) System earthing	Solidly earthed
6	D.C. Output	
	i) Trickle charging mode	(Continuous D.C. load+ trickle charging battery) plus 25% margin. Output voltage adjustable between 120-130 Volt
	ii) Boost charging mode	Restoring fully discharged battery to full charging condition in 10-hours with 25% margin over maximum charging rate.
7	Performance Parameters	
	i) Output Voltage Regulation (load variation from 1 to 100%)	Within ±1% of the set value
	ii) Ripple content in 220V charger D-C output	±1%
8	Charger Panel	
	i) Type	Free standing floor mounting
	ii) Enclosure	Sheet steel (min. 2mm thick enclosure conforming to IP-42
9	Rectifier Transformer	

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BATTERY: Ni Cd

Sl.No.	Description	Particulars
A)	BATTERY	
1	Application	Intake Raw Water Pump House
2	Ambient temperature	
	i) Maximum	50ºC
	ii) Minimum	5°C
3	Type	Ni Cd
4	Battery voltage	110 V
5	Proposed Method of working	
	i) Trickle charging (normal)	2.25 Volt per cell
	ii) Equalizing Charge (occasional)	Bidder to furnish
	iii) Boost charging (max.). (after complete discharge)	2.75 Volt per cell
6	Terminal Connection	1/C, copper cables of adequate size
B)	BATTERY CHARGER	
1	Charger	Trickle-cum-boost/Trickle
2	Type	Solid-state (thyristor based), full wave, fully controlled (6 pulse), three phase bridge for continuous application
3	Enclosure	Sheet steel enclosure, IP-42
4	Ambient Temperature	50ºC

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Description	Unit	Particulars
Details of protective relays		As per Single Line Diagram
Moulded Case Circuit Breakers		
Type		Moulded Case (microprocessor based)
Rated current when installed within cubicle under design ambient temperature of 50^{0}C	A	As required (During Detail Eng)
Rated short-time withstand current	kA (rms)	25 kA
Miniature Circuit Breakers		
Type		Miniature
Rated current when installed within cubicle under design ambient temperature of 50^{0}C	A	(During Detail Eng)
Rated short-time withstand current	kA (rms)	10
Motor Starters and Contactors		
Type		Variable Frequency Drive/ Star-Delta / Direct-on line
Rated current	A	(During Detail Eng)
Rated voltage of coil	V	230V AC / 110V DC
Utilization category		AC-3

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Description	Unit	Particulars
Type		Air
Rated current inside the cubicle under design ambient temperature at 50°C	A	(During Detail Eng)
Rated operating sequence		O–3 Min–CO-3 Min-CO
Rated short-time withstand current and time	kA(rms)/sec	25(During Detail Eng)
Min. no. of auxiliary contacts		6 NO + 6 NC after internal use by manufacturer
Type of operating mechanism		
- Normal		Spring charging for closing and tripping
- Emergency		Manual and Spring charged for closing and tripping
Auxiliary control voltage		
- Closing coil / Tripping coil	V	110V DC
- Spring charging motor	V	110V DC
- Space heater and lighting	V	230V AC
Earthing switch		Required
Current and Voltage Transformers		
Details of ratio, taps, burden, accuracy		As per Single Line Diagram (During Detail Eng)
Protective Relays		
Type		Numerical (Microprocessor based)
Auxiliary supply	V	110V DC

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LV INDOOR SWITCHBOARD

Description	Unit	Particulars
General		
Rated voltage, no. of phases and rated frequency	V / - / Hz	415V, 3, 50Hz
System neutral earthing		Effectively Earthed
Rated short duration power frequency withstand voltage		
- Power circuit	kV (rms)	3.5
- Control circuit	kV (rms)	1.5
Rated normal current of bus bars under design ambient temperature of 50°C and material of bulbar	A / -	(During Detail Eng), Copper
Rated short-time withstand current and time	kA(rms)/sec	25 kA for 1 sec
Constructional Requirements		
Thickness of sheet steel in mm Cold rolled (Frame/Enclosure/Covers)	mm	Frame – 2.5 Doors/Covers – 2.0
Degree of protection of enclosure		IP-5X, Form-4 enclosure
Color finish shade		
- Interior		Glossy White
- Exterior		Light Grey
Cable connection		Bottom entry and exit
Circuit Breakers		

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Description	Unit	Particulars
Rated output	kVAR	(During Detail Eng)
Rated voltage	V	415
Rated frequency and no. of phases	Hz / -	50, 3 Phase
Capacitor bank connection		Delta
Type of mounting and location		Floor mounted and Indoor
Design ambient temperature	°C	50
Type of switching		Automatic
Control supply		110V DC
No. of steps for control	Nos.	Minimum 8
Degree of protection of enclosure		IP-4X
Color finish shade		Light Grey Semi Glossy
Type of APFC relay		Microprocessor based automatic power-factor correction relay (maximum setting 0:99 lag)

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Application		Power factor improvement	
Type of insulation		Polypropylene (APP) / Mixed Dielectric (MD)	
Rated output	kVAR	(During Detail Eng) (RWPS for Phase 1)	(During Detail Eng) (CWPS for Phase 1)
Rated voltage	kV	3.6	
Rated frequency and no. of phases	Hz / -	50, 3 Phase	
Capacitor bank connection		Delta	
Type of mounting and location		Floor mounted and Indoor	
Design ambient temperature	°C	50	
Type of switching		Manual	
Color finish shade		Light Grey Semi Glossy	
External cable details		3.6 / 6 kV, 3C x (During Detail Eng) Aluminum, XLPE, armoured	

LV CAPACITOR AND CONTROL PANEL

Description	Unit	Particulars
Capacitor Bank		—
Application		Power factor improvement
Arrangement		Automatic Power Factor Correction (APFC)
Type of insulation		Polypropylene (APP) / Mixed Dielectric (MD)

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NEUTRAL EARTHING RESISROR

Description	Unit	Particulars
Application and criteria for sizing		For earthing of main transformer neutral and to limit the earth fault current on secondary side to 1000 A
Quantity	Nos.	Bidder to indicate
Material of resistor		Wire wound – Stainless steel
Installation		Outdoor, Insulator mounted
Enclosure		
- Sheet steel thickness	mm	2
- Degree of protection		IP 34
- Color finish shade		Light Grey Semi Glossy
Type of cooling		Natural air cooled
Rated voltage	kV	3.6
Rated current	A	1000
Ohmic value	Ohm	(During Detail Eng)
Rated time	sec	10

MV CAPACITOR AND CONTROL PANEL

Description	Unit	Particulars
Capacitor Bank		

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Description	Unit	Particulars
Rated lightning impulse withstand voltage		
- Across the isolating distance	kV (peak)	46
- Phase to phase, between phases and across open switching devices	kV (peak)	40
Rated short duration power frequency withstand voltage		
- Across the isolating distance	kV (rms)	12
- Phase to phase, between phases and across open switching devices	kV (rms)	10
Installation		Indoor
Enclosure		
- Sheet steel thickness	mm	2.5
- Degree of protection		IP – 55
- Color finish shade		Light Grey Semi Glossy
External cable details		3.6 / 6 kV, 3C x (During Detail Eng) Aluminum, XLPE, armoured
Type of cooling		Air cooled
Bypass arrangement	Required	By Vacuum contactor
Control supply	V	110V DC / 230 V AC as required for the control

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Description	Unit	Particulars
Design ambient temperature	°C	50
Limits of temperature rise of winding		
- Determination by resistance method	°C	70
- Determination by ETD method	°C	80
Location		Indoor
Degree of Protection		IP55
Cooling designation		IC411
External cable details		0.4 / 1 kV, 3C x (During Detail Eng) Aluminum, XLPE, armoured
Space heater for motor		Required for rating 30kW and above

SOFT STARTER

Description	Unit	Particulars
Type, Application and criteria for sizing		Automatic soft starter for (During Detail Eng) kW motor (RWPS for 1st Stage) and (During Detail Eng)kW motor (CWPS for 1st Stage) (Starting current to be limited to 2.5 to 3 times the rated current of the motor)
Connection		On phase/neutral side of stator winding
Quantity	Nos.	Bidder to indicate
Rated voltage	kV	3.6
Insulation levels		F

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Description	Unit	Particulars
- Determination by ETD method	°C	80
Location		Indoor
Degree of Protection		IP55
Cooling designation		IC411
Terminal box		Two terminal boxes (on opposite sides)
External cable details		3.6 / 6 kV, 3C x (During Detail Eng) Aluminum, XLPE, armoured
Space heater for motor		Required

LV MOTOR

Description	Unit	Particulars
Type		Squirrel cage Induction motor.(TEFC).
Rating	kW	(During Detail Eng)
Rated voltage	kV	0.415
Type of mounting		Vertical / Horizontal (As required)
Duty type		Continuous (S1)
Method of starting		Direct on line- for motors upto 22kW Star-Delta (Close transition type) – For motors above 22kW upto 75kW Soft Starter – For motors above 75kW
Type of system earthing		Effectively earthed
Class of insulation		F

Description	Unit	Particulars
		3.3/0.433 kV control transformer (*) on each bus section

MV MOTOR

Description	Unit	Particulars	
Type		Squirrel cage Induction motor (TETV or CACA)	
Rating	kW	(800) – for RWPS	(2300) - for CWPS
Rated voltage	kV	3.3	
Synchronous speed	Rpm	1000	1500
Type of mounting		Vertical	Vertical
Duty type		Continuous (S1)	
Method of starting		By soft starter (Line or Neutral side)	
Type of system earthing		Earthed through resistance to limit the earth fault current to 1000 A.	
Class of insulation		F	
Design ambient temperature	°C	50	
Efficiency class		Energy efficient Eff1 or Eff2 (Certification required)	
Limits of temperature rise of winding			
- Determination by resistance method	°C	70	

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Description	Unit	Particulars
Insulation levels		
Rated lightning impulse withstand voltage		
- Across the isolating distance	kV (peak)	70
- Phase to phase, between phases and across open switching devices	kV (peak)	60
Rated short duration power frequency withstand voltage		
- Across the isolating distance	kV(rms)	23
- Phase to phase, between phases and across open switching devices	kV(rms)	20
Operating mechanism		
- Closing and opening		Spring charged
- Control voltage	V	110V DC
Earthing switch		Required
MV Fuses		
Application		Indoor
Type		HRC
Rated current	A	(During Detail Eng)
Rated voltage	kV	3.6
Rated breaking capacity	kA (rms)	16
Motor Contactors		
Type		Vacuum
Rated current	A	(During Detail Eng)
Rated voltage of coil	V	230 V AC, 1 phase, drawn from

Description	Unit	Particulars
Min. no. of auxiliary contacts		6 NO + 6 NC after internal use by manufacturer
Type of operating mechanism		
- Normal		Spring charging for closing and tripping
- Emergency		Manual and Spring charged for closing and tripping
Auxiliary control voltage		
- Closing coil / Tripping coil	V	110V DC
- Spring charging motor	V	110V DC
- Space heater and lighting	V	230V AC
Earthing switch		Required
Current and Voltage Transformers		
Details of ratio, taps, burden, accuracy		(During Detail Eng)
Protective Relays		
Type		Numerical (Microprocessor based)
Auxiliary supply	V	110V DC
Details of protective relays		(During Detail Eng)
Switch-Disconnector		
Rated current under design ambient temperature of 50°C	A	(During Detail Eng)
Rated making current	kA (peak)	100
Rated peak withstand capacity	kA (peak)	100
Rated short-time withstand current and time	kA (rms) / sec	40 kA for 1 sec

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Description	Unit	Particulars
- Rated lightning impulse withstand voltage	kV (peak)	40
Rated normal current of bus bars under design ambient temperature of 50°C and material of bulbar	A / -	(During Detail Eng), Copper
Rated short-time withstand current and time	kA (rms) / sec	40 kA for 1 sec
Dynamic rating	kA (peak)	100
Constructional Requirements		
Minimum thickness of sheet steel in mm Cold rolled (Frame/Enclosure/Covers)	mm	Frame – 2.5 Doors/Covers – 2.0
Degree of protection of enclosure		IP– 4X
Color finish shade		
- Interior		Glossy White
- Exterior		Light Grey Semi Glossy
Cable connection		Bottom entry and exit
Circuit Breakers		
Type		Vacuum
Rated current inside the cubicle under design ambient temperature at 50°C	A	(During Detail Eng)
Rated operating sequence		O–3 Min–CO-3 Min-CO
Rated short time breaking current	kA (rms)	16
Rated short time making current	kA (peak)	40
Rated short-time withstand current and time	kA (rms) / sec	40 kA for 1 sec
Rated peak withstand current	kA (peak)	100

Description	Unit	Particulars
Operating mechanism		
- Closing and opening		Spring charged
- Control voltage	V	110V DC
Earthing switch		Required
HV Fuses		
Application		Indoor
Type		HRC
Rated current	A	(During Detail Eng)
Rated voltage	kV	36
Rated breaking capacity	kA (rms)	16

MV SWITCHBOARD

Description	Unit	Particulars
General		
Type		Metal enclosed, compartmentalized, draw-out type
Rated voltage, no. of phases and rated frequency	kV / - / Hz	3.6 kV, 3 Phase, 50Hz
System neutral earthing		Earthed through resistance to limit the earth fault current to 1000 A.
Rated Insulation Levels		
- Rated short duration power frequency withstand voltage	kV (rms)	10

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Description	Unit	Particulars
Earthing switch		Required
Current and Voltage Transformers		
Details of ratio, taps, burden, accuracy		As per Single Line Diagram (*)
Protective Relays		
Type		Numerical (Microprocessor based)
Auxiliary supply	V	110V DC
Details of protective relays		As per Single Line Diagram
Switch-Disconnector		
Rated current under design ambient temperature of 50°C	A	(During detail Eng)
Rated making current	kA (peak)	40
Rated peak withstand capacity	kA (peak)	40
Rated short-time withstand current and time	kA (rms) / sec	16 kA for 1 sec
Insulation levels		
Rated lightning impulse withstand voltage		
- Across the isolating distance	kV (peak)	70
- Phase to phase, between phases and across open switching devices	kV (peak)	60
Rated short duration power frequency withstand voltage		
- Across the isolating distance	kV(rms)	23
- Phase to phase, between phases and across open switching devices	kV(rms)	20

Description	Unit	Particulars
Color finish shade		
- Interior		Glossy White
- Exterior		Light Grey Semi Glossy
Cable connection		Bottom entry and exit
Circuit Breakers		
Type		Vacuum/ SF6
Rated current inside the cubicle under design ambient temperature at 50°C	A	(DDE) – (Breakers shall be rated for final ratings of motors in CWPS)
Rated operating sequence		O–3 Min–CO-3 Min-CO
Rated short time breaking current	kA (rms)	16
Rated short time making current	kA (peak)	40
Rated short-time withstand current and time	kA (rms) / sec	16 kA for 1 sec
Rated peak withstand current	kA (peak)	40
Min. no. of auxiliary contacts		6 NO + 6 NC after internal use by manufacturer
Type of operating mechanism		
- Normal		Spring charging for closing and tripping
- Emergency		Manual and Spring charged for closing and tripping
Auxiliary control voltage		
- Closing coil / Tripping coil	V	110V DC
- Spring charging motor	V	110V DC
- Space heater and lighting	V	230V AC

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Description	Unit	Particulars
Nominal creepage distance of each insulator	mm/kV	31

HV SWITCHBOARD

Description	Unit	Particulars
General		
Type		Metal enclosed, compartmentalized, draw-out type
Rated voltage, no. of phases and rated frequency	kV / - / Hz	36 kV, 3 Phase, 50Hz
System neutral earthing		Effectively Earthed
Rated Insulation Levels		
- Rated short duration power frequency withstand voltage	kV (rms)	70
- Rated lightning impulse withstand voltage	kV (peak)	170
Rated normal current of bus bars under design ambient temperature of 50^0C and material of bulbar	A / -	(During Detail Eng), Copper - suitable for 100% load including future loads
Rated short-time withstand current and time	kA (rms) / sec	16 kA for 1 sec
Dynamic rating	kA (peak)	40
Constructional Requirements		
Minimum thickness of sheet steel in mm Cold rolled (Frame/Enclosure/Covers)	mm	Frame – 2.5 Doors/Covers – 2.0
Degree of protection of enclosure		IP-4X

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Description	Unit	Particulars
Withstand test of voltages- a. One minute power frequency withstand voltage b. - Impulse withstand voltage	kV (rms) kV (peak)	As per IEC-60099-4 and 60099-5 As per IEC-60099-4 and 60099-5

INSULATOR AND HARDWARES

Description	Unit	Particulars
String Insulators		
Type of insulators		Porcelain, ball and socket type
Highest system voltage	kV	36
No. of units per stack	Nos.	3 nos. of 12kV
Mechanical characteristics		
- Electromechanical or mechanical failing load	kN	70
- Nominal creepage distance	mm/kV	31
Post Insulators		
Type of insulators		Porcelain, Pedestal post
No. of units per stack	Nos.	2 nos. of 24 kV or Solid stack
One minute power frequency withstand voltage of stack	kV (rms)	70
Rated lightning impulse withstand voltage of stack	kV (peak)	170

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LIGHTNING ARRESTERS

Description	Unit	Particulars
General		
Application		Outdoor
Type of Arrester		Metal Oxide (Without gaps)
Rated frequency	Hz	50
Type of system neutral earthing		Non-effectively earthed system for 33kV system
Rated Values		
Rated voltage	kV	30
Nominal discharge current	kA (peak)	10
Max. residual voltage at nominal discharge current	kV (peak)	72 (*)
Pressure relief class		20 (B)
Continuous operating voltage	kV (rms)	Approx. 24 (*)
Long duration current impulse		
- Line discharge class		3
- High current impulse	kA	100 (4/10 μsec)
Arrester housing		
- Material of housing		Porcelain
- Creepage	mm/kV	31
- Primary terminal		Suitable for 'Panther' ACSR(*) conductor for 33kV system

Description	Unit	Particulars
Voltage factors for PTs		1.2 Continuous/ 1.9 for 30 sec. For non-effectively earthed system
Parameters e.g. no. of cores, output, accuracy class, current and voltage ratios etc.		(During Detail Eng)
Rated Values		
Rated voltage	kV	36
Rated frequency	Hz	50
Rated short time withstand current and time	kA (rms) / sec	16 kA for 1 sec
Rated peak withstand current	kA (peak)	40
Rated insulation levels		
Rated lightning impulse withstand voltage	kV (peak)	170
One minute power frequency withstand voltage	kV (rms)	70
Phase spacing	mm	1500 (preferable)
Support Insulators		
Nominal creepage distance	mm/kV	31
Ratio of Creepage distance/ Arcing distance		≤ 4.0
Clamps and Connectors		Suitable for 'Panther' ACSR(*) conductor for 33kV system

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Rated lightning impulse withstand voltage		
- Across the isolating distance	kV (peak)	195
- Phase to phase, between phases and across open switching devices	kV (peak)	170
One minute power frequency withstand voltage		
- Across the isolating distance	kV (rms)	80
- Phase to phase, between phases and across open switching devices	kV (rms)	70
Operating Mechanism		
Operating devices		Manual
Phase spacing	mm	1500 (preferable)
Support Insulators		
Number and type of insulators		Pedestal post
Nominal creepage distance	mm/kV	31

CURRENT AND VOLTAGE TRANSFORMERS

Description	Unit	Particulars
General		
Application		CT-Outdoor Oil Filled PT- Outdoor Electro-magnetic Type Oil Filled
Class of Insulation		A or better
Rated extended primary current of CTs		120% of rated primary current 1.2 Continuous/ 1.5 for 30 sec. For effectively earthed system

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Description	Unit	Particulars
Accessories		OTI, WTI, MOG, Buchholz relay, conservator

Notes:

i) The Transformer shall be capable of withstanding without damage 1.4 times the rated voltage at its termination for five (5) seconds.

ii) The specified MVA rating shall be available at the lowest HV winding tap (-5%) also.

DISCONNECTORS

Description	Unit	Particulars
General		
Application		Outdoor
Type of disconnector		Double break with center pole rotating/ Center break
Type of mounting		Horizontal/ Vertical – for 33kV system
Execution of poles		Group operated three phases
Rated Values		
Rated voltage	kV	36
Rated normal current	A	(During Detail Eng)
Rated frequency	Hz	50
Rated short time withstand current and time	kA (rms) / sec	16 kA for 1 sec
Rated peak withstand current	kA (peak)	40
Rated insulation levels		

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Description	Unit	Particulars
- Top oil temperature rise (by thermometer)	^{0}C	50
Tap Changing Gear		
Type of tap changer		Off Circuit tap Changer
Tapping range	%	± 10%
Tapping steps	%	2.5
Bushings		
Rated voltage – Primary	kV	3.6
– Secondary	kV	1.2
One minute power frequency withstand voltage (dry and wet) – Primary	kV (rms)	10
- Secondary (Line and Neutral)	kV (rms)	3.5
Rated lightning impulse withstand voltage	kV (peak)	40
Nominal creepage distance	mm/kV	31
Terminal Connections		
Primary line end		Cable box
Secondary line end		Cable box
Secondary neutral end		Bushing outside cable box
Type of wheels		Bi-direction, Flanged – Rail mounted (Gauge-1676mm)
Cable sizes:		
- Primary		3.6 / 6 / (7.2) kV, (300) sq. mm. aluminum, XLPE, screened, armoured cable
- Secondary		0.6 / 1 (1.2) kV, 3Cx (300) sq. mm. aluminum, XLPE, armoured cables.

Description	Unit	Particulars
Impedance voltage	%	As per IEC/BIS
Vector group		Dyn11
Winding material		Electric Grade Copper
Type of cooling		ONAN
System Voltage		
Nominal system voltage Primary	kV	3.3
Secondary	kV	0.415
Highest system voltage - Primary	kV	3.6
- Secondary	kV	1.2
Transformer Secondary Neutral Earthing		Effectively earthed
Insulation Withstand		
Rated lightning impulse withstand voltage	kV (peak)	40
Rated short duration induced or separate source AC withstand voltage - Primary	kV (rms)	10
- Secondary	kV (rms)	3.5
Temperature Rise		
Reference design ambient	^{0}C	50
Temperature rise over design ambient temperature of 50^{0}C		
- Average winding temperature rise (by resistance measurement)	^{0}C	55

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Description	Unit	Particulars
		XLPE, screened, armoured, cable
Accessories		OTI, WTI, MOG, Buchholz relay, Pressure relief valve, conservator, pressure relief device on OLTC

AUXILARY TRANSFORMER

Description	Unit	Particulars
General		
Quantity required		Auxiliary Transformer
		2 nos. each of 3.3/0.433kV for CWPS and RWPS
Installation (Indoor / Outdoor)		Outdoor
Ratings		
Rated power		Auxiliary Transformer
(*) Contractor shall submit their design calculation for rating of each equipment for Employer Representative's approval. The capacities indicated are minimum to be provided.	kVA	2.5 MVA
No load voltage Primary	kV	3.3
Secondary	kV	0.433
Number of phases		3
Rated frequency	Hz	50

Description	Unit	Particulars
measurement)		
- Top oil temperature rise (by thermometer)	^{0}C	50
Tap Changing Gear		
Type of tap changer		On Load Tap Changer
Tapping range	%	± 10%
Tapping steps	%	1.25
Bushings		
Rated voltage – Primary	kV	36
– Secondary	kV	3.6
One minute power frequency withstand voltage (dry and wet) – Primary	kV (rms)	70
- Secondary (Line and Neutral)	kV (rms)	10
Rated lightning impulse withstand voltage	kV (peak)	170
Nominal creepage distance	mm/kV	31
Terminal Connections		
Primary line end		Cable box
Secondary line end		Cable box
Secondary neutral end		Bushing outside cable box
Type of wheels		Bi-direction, Flanged – Rail mounted (Gauge-1676mm)
Cable sizes:		
- Primary		18 / 30 (36) kV, (500)sq. mm. aluminum, XLPE, screened, armoured cable
- Secondary		3.6 / 6 / (7.2) kV, 3Cx (500) sq. mm. aluminum,

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Description	Unit	Particulars
Rated frequency	Hz	50
Impedance voltage	%	As per IEC/BIS
Vector group		Dyn11
Winding material		Electric Grade Copper
Type of cooling		ONAN
System Voltage		
Nominal system voltage Primary	kV	33
Secondary	kV	3.3
Highest system voltage - Primary	kV	36
- Secondary	kV	3.6
Transformer Secondary Neutral Earthing		Earthed through resistance to limit the earth fault current to 1000 A
Insulation Withstand		
Rated lightning impulse withstand voltage	kV (peak)	170
Rated short duration induced or separate source AC withstand voltage - Primary	kV (rms)	70
- Secondary	kV (rms)	10
Temperature Rise		
Reference design ambient	^{0}C	50
Temperature rise over design ambient temperature of 50 ^{0}C		
- Average winding temperature rise (by resistance	^{0}C	55

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	Description	Unit	Particulars
note:			
1	The Bidder shall submit price quotation from manufacturer or supplier with his name, address and past supply record.		

Note : The data provided above is for tendering purpose only. During detail engineering stage the data may change upon design and selection of vendors.

D. Electrical and Instrumentation/Control Equipment

DATA SHEET–: SPECIFIC DATA

MAIN TRANSFORMER

Description	Unit	Particulars
General		
Quantity required		Main Transformer
		2 nos. of 33/3.45kV for RWPS plus CWPS
Installation (Indoor / Outdoor)		Outdoor
Ratings		
Rated power		Main Transformer
(*) Contractor shall submit their design calculation for rating of each equipment for Employer Representative's approval. The capacities indicated are minimum to be provided.	kVA	10 MVA
No load voltage Primary	kV	33
Secondary	kV	3.45
Number of phases		3

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	Description	Unit	Particulars
a.	System Capacity (for 1 tone chlorine)	hrs	Suitable
b.	Reaction Reagent		NaOH
c.	Regent Storage Tank		
	Capacity	m^3	1
	Number	nos.	1
	Structure	--	FRP/PP
	Internal lining	--	FRP/PP
d.	Absorption Tower	--	
	Materials		FRP
	Diameter	mm	suitable
e.	Blower	--	
	Type		Centrifugal
	Materials of construction	--	MS-FRP
	Capacity	l/hr	Suitable
	Number of unit	nos.	1
f.	Regent Circulation Pumps		
	Type		PP type pumps
	Materials of construction	--	PP
	Capacity	l/hr	20000
	Number of unit	nos.	1

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	Description	Unit	Particulars
	Standby	nos.	Not applicable
c.	Chlorinators (Pre-Chlorination)		
	Type	--	Vacuum type
	Capacity	kg/hr	2 x 26
	Number of unit - Duty	nos.	1
	Standby	nos.	1
	Chlorinators (Post-Chlorination)		
	Type	--	Vacuum type
	Capacity	kg/hr	2 x 16
	Number of unit - Duty	nos.	1
	Standby	nos.	1
d.	Booster Pumps		
	Type	--	Horizontal centrifugal
	Capacity	l/hr	DDE
	Number of unit - Duty	nos.	1
	Standby	nos.	1
3	**Chlorine Gas Neutralization System**		
3.1	Country of Origin		India
3.2	Manufacturer		Perfect Chloro/Penwalt/IEC Fabchem/ Industrial devices/Equivalent
3.2	Major Equipment		

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	Description	Unit	Particulars
	Minimum rate	kg/day	410
e.	Dosage of Chlorine - Post-Chlorination		
	Maximum rate	kg/day	390
	Average rate	kg/day	200
	Minimum rate	kg/day	200
1.3	Chlorine Storage		
a.	Storage by weight	Kg	18300 (for 1 month)
b.	Storage area required	m^2	Stored in tonners
1.4	Unit price of Liquid Chlorine[1]	Rs/kg	11
2.	**Dosage Equipment**		
2.1	Country of Origin		India
2.2	Manufacturer		Perfect Chloro/Penwalt/IEC Fabchem/ Industrial devices/Equivalent
2.3	Major Equipment		
a.	Weighing Scale		
	Type	--	Lifting type
	Capacity		Suitable to lift 900 Kgs tonner
	Number of unit	nos.	1
b.	Evaporators (for future)		Not applicable
	Type	--	Not applicable
	Capacity	kg/hr	Not applicable
	Number of unit - Duty	nos.	Not applicable

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LT Control cables

Sl.No	Description	Particulars
1.	Conductor	Stranded and compacted plain aluminium of grade H2 and class 2/stranded, high conductivity annealed plain copper as per Annexure, generally conforming to IS:8130.
2.	Insulation	Extruded HR PVC compound conforming to type C of IS:5831 or XLPE.
3.	Inner Sheath	Extruded PVC compound conforming to type ST2 of IS:5831 for multicore cable. Single core cables shall have no inner sheath.
4.	Armor	Galvanized single round steel wire armour for twin and multicore cables. Non-magnetic hard drawn aluminium single round wire conforming to H4 grade for single core cables.
5.	Overall Sheath	Extruded FRLS PVC compound conforming to type ST2 of IS: 5831
6.	General requirement	1100 V grade, 850 C/ 900 C rating, heavy duty, HR PVC/XLPE power cable conforming to following requirement and in line with IS-1554, IS-5831, IS-8130 & IS-3975

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SPARES PARTS

Mandatory Spare Parts

The Contractor shall furnish the following mandatory spare parts:

Item No.	Description	unit	quantity
Power Substation			
1	33kV Outdoor Substation Equipment		
	Post insulators	no.	1
	String insulators	no.	1
	Clamps / connectors	no.	1
	33kV disconnector support insulator column	no.	1
	33kV disconnector spring	set	1
	33kV lightning arrester	set	1
2	Power Transformers		
	Bushing of each type with conductor and terminal	no.	1
	Complete set of gaskets for one bank of transformer	no.	1
	Bursting plates with gaskets	sets	6
	Dial type thermometers with gaskets	set	1
	Oil level gauge with gaskets	set	1
	Moisture absorbent	%	100
3	HV and MV Circuit Breakers and Contactors		

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Item No.	Description	unit	quantity
	Closing coils of each type	nos.	3
	Tripping coils of each type	nos.	3
	Spring charging motors of each type	nos.	3
	Bushing of each type	no.	1
	Indicating lamp covers: red and green	set	1
	Contacts, coils, relay, valves and other small components(*)	set	1
4	HV and MV Switchboards		
	Complete assembly of switch of each type	set	1
	Complete assembly of auxiliary relay of each type	set	1
	Complete assembly of timer of each type	set	1
	Complete assembly of meter of each type	set	1
	Indicating lamps of each type on the switchgear	%	100
	Fuses of each type and rating used	%	100
	Interior illumination florescent lamp of each switchgear	%	100
5	LV Switchboards		
	Complete assembly of MCCB or ACB of each type and rating	set	1
	Complete assembly of meter of each type	set	1
	Complete assembly of control switch of each type	set	1
	Complete assembly of timer of each type	set	1

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Item No.	Description	unit	quantity
	Complete assembly of instrument transformer of each type and rating	set	1
	Complete assembly of contactor of each type and rating	set	1
	Complete assembly of power capacitor of each type and rating	set	1
	Complete assembly of auxiliary relay of each type and rating	%	100
	Indicating lamps of each type	%	100
	Fuses of each type and rating used	%	100
	Interior illumination florescent lamp of each switchgear	%	100
6	Standby Diesel Generating Set (Generator)		
	Speed relays	set	1
	AVR	set	1
	Tacho-generator	set	1
	Semi-conductor rectifiers for the exciter	set	1
	MCCB of each type and rating	set	1
	Electromagnetic switches with thermal relays of each type	sets	2
	Changeover switches and control switches of each type	set	1
	Auxiliary relays of each type	sets	5
	Timers of each type	sets	2
	Signals and annunciator lights of each type	sets	2

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Item No.	Description	unit	quantity
	Light bulbs of each type	%	200
	Fuses of each type	%	200
	Space heater with thermostat of each type	sets	2
7	Standby Diesel Generating Set (Diesel Engine)		
	Governor	set	1
	Piston rings and oil rings	sets	6
	Intake valves and springs with cock	sets	2
	Exhaust valves and springs with cock	sets	4
	Starting valves and springs	sets	6
	Fuel injection valves	sets	6
	Nozzles and springs for fuel valves	sets	3
	Plungers, liners, valve seats and springs for fuel injection pumps	sets	3
	Solenoid control valves of each type	set	1
	Stop valves of each type	set	1
	Valve-belts of each type	set	1
	Meters of piping material of each size	nos.	5
	Ball tap	set	1
	Springs, packings, split pins and bolts/nuts of each type	sets	5
	Lubricants with hand pump	litres	200
	Spare parts chests	lot	1

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Item No.	Description	unit	quantity
Intake Pump Station			
1	MV Motor Control Panels / Soft Starters		
	Complete assembly of MCCB of each type and rating	set	1
	Complete assembly of meter of each type	set	1
	Complete assembly of control switch of each type	set	1
	Complete assembly of timer of each type	set	1
	Complete assembly of instrument transformer of each type and rating	set	1
	Complete assembly of contactor of each type and rating	set	1
	Complete assembly of power capacitor of each type and rating	set	1
	Complete assembly of auxiliary relay of each type and rating	%	100
	Indicating lamps of each type	%	100
	Fuses of each type and rating used	%	100
	Interior illumination florescent lamp of each switchgear	%	100
2	LV Distribution Boards		
	Complete assembly of MCCB or ACB of each type and rating	set	1
	Complete assembly of meter of each type	set	1
	Complete assembly of control switch of each type	set	1
	Complete assembly of timer of each type	set	1

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Item No.	Description	unit	quantity
	Complete assembly of instrument transformer of each type and rating	set	1
	Complete assembly of contactor of each type and rating	set	1
	Complete assembly of power capacitor of each type and rating	set	1
	Complete assembly of auxiliary relay of each type and rating	%	100
	Indicating lamps of each type	%	100
	Fuses of each type and rating used	%	100
	Interior illumination florescent lamp of each switchgear	%	100
3	LV Panels		
	Complete assembly of MCCB of each type and rating	set	1
	Complete assembly of meter of each type	set	1
	Complete assembly of control switch of each type	set	1
	Complete assembly of timer of each type	set	1
	Complete assembly of instrument transformer of each type and rating	set	1
	Complete assembly of contactor of each type and rating	set	1
	Complete assembly of power capacitor of each type and rating	set	1
	Complete assembly of auxiliary relay of each type and rating	%	100
	Indicating lamps of each type	%	100

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Item No.	Description	unit	quantity
	Fuses of each type and rating used	%	100
	Interior illumination florescent lamp of each switchgear	%	100
4	Local Control Panels		
	Control switch of each type	set	1
	Push button switch of each type	sets	2
	Indicating lamps of each type	%	100
	Fuses of each type and rating	%	100
	Space heater with thermostat of each type	set	1
	Auxiliary switch of each type, if any	sets	2
5	DC Batteries / Battery Chargers		
	Diluted potassium for NI-CD type and/or Diluted sulfuric acid for lead-acid type	%	30
	Cells in seal of each type(*)	sets	2
	Diodes of each type(*)	set	1
	Silicon controlled rectifier of each type(*)	set	1
	Indicating lamps and fuses of each type	%	200
Water Treatment Plant			
1	MV Motor Control Panels / Soft Starters		
	Complete assembly of MCCB of each type and rating	set	1
	Complete assembly of meter of each type	set	1
	Complete assembly of control switch of each type	set	1

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Item No.	Description	unit	quantity
	Complete assembly of timer of each type	set	1
	Complete assembly of instrument transformer of each type and rating	set	1
	Complete assembly of contactor of each type and rating	set	1
	Complete assembly of power capacitor of each type and rating	set	1
	Complete assembly of auxiliary relay of each type and rating	%	100
	Indicating lamps of each type	%	100
	Fuses of each type and rating used	%	100
	Interior illumination florescent lamp of each switchgear	%	100
2	LV Distribution Boards		
	Complete assembly of MCCB or ACB of each type and rating	set	1
	Complete assembly of meter of each type	set	1
	Complete assembly of control switch of each type	set	1
	Complete assembly of timer of each type	set	1
	Complete assembly of instrument transformer of each type and rating	set	1
	Complete assembly of contactor of each type and rating	set	1
	Complete assembly of power capacitor of each type and rating	set	1
	Complete assembly of auxiliary relay of each type and	%	100

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Item No.	Description	unit	quantity
	rating		
	Indicating lamps of each type	%	100
	Fuses of each type and rating used	%	100
	Interior illumination florescent lamp of each switchgear	%	100
3	LV Panels		
	Complete assembly of MCCB of each type and rating	set	1
	Complete assembly of meter of each type	set	1
	Complete assembly of control switch of each type	set	1
	Complete assembly of timer of each type	set	1
	Complete assembly of instrument transformer of each type and rating	set	1
	Complete assembly of contactor of each type and rating	set	1
	Complete assembly of power capacitor of each type and rating	set	1
	Complete assembly of auxiliary relay of each type and rating	%	100
	Indicating lamps of each type	%	100
	Fuses of each type and rating used	%	100
	Interior illumination florescent lamp of each switchgear	%	100
	Interior illumination florescent lamp of each switchgear	%	100
4	Local Control Panels		

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Item No.	Description	unit	quantity
	Control switch of each type	set	1
	Push button switch of each type	sets	2
	Indicating lamps of each type	%	100
	Fuses of each type and rating	%	100
	Space heater with thermostat of each type	set	1
	Auxiliary switch of each type, if any	sets	2
5	DC Batteries / Battery Chargers		
	Diluted potassium for NI-CD type and/or Diluted sulfuric acid for lead-acid type	%	30
	Cells in seal of each type(*)	sets	2
	Diodes of each type(*)	set	1
	Silicon controlled rectifier of each type(*)	set	1
	Indicating lamps and fuses of each type	%	200

[1] Quantity shown on the above table shall be per total number for each item of equipment

supplied except items with asterisk mark.

(*) Quantity of spare parts shall be as per each part of equipment.

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Recommended Spare Parts

The Contractor shall furnish details of the recommended spares for the following equipment / systems:

i. Motors
ii. MV and LV Capacitors
iii. Substation Equipment
iv. Power Transformers
v. Current and Voltage Transformers
vi. Switchboards
vii. Other panels
viii. Lighting Systems
ix. 110v DC system
x. Batteries and Battery Chargers
xi. Cabling Systems
xii. Earthing and Lightning Protection Systems

D.2 Instrumentation and Control Equipment

D.2.1 Instrumentation Equipment

	Description	Unit	Particulars
1.	**Origin of Country**		DDE
2.	**Manufacturer**		As per approved make
3.	**Major Parameters and Equipment**		
3.1	Flow Meters		
a.	Raw Water Transmission Flow meter		
	Type of flow meter	--	Full Bore Electromagnetic
	Size	mm	DDE
b.	Raw water Flow in WTP	A	
	Type of flow meter		Full Bore Electromagnetic

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	Description	Unit	Details
	Size	mm	DDE
c.	CW Transmission Flow		Full Bore Electromagnetic
	Type of flow meter		
	Size	mm	DDE
note:			

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D.2.2 SCADA SYSTEM

D.2.2.1 Main Processor

	Description	Unit	Particular
1.	**Origin of Country**		DDE
2.	**Manufacturer**		As per approved make
3.	**Major Parameters and Equipment**		
3.1	Installation Location	--	Main buliding
3.2	Main Computer		
a.	Type of CPU and Capacity		
b.	RAM		3 or 4 GB
c.	Graphic Capacity		
d.	Number of Priority Interruption Level		DDE
3.3	Hard Disk Driver		
a.	Storage Capacity		320 GB
b.	Access Time		DDE
c.	Interface		DDE
3.4	Recordable CD/DVD ROM		
a.	Size		DDE
b.	Read/Write Capability		yes
c.	Access Time		DDE
3.5	LCD		
a.	Screen Size		32"

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	Description	Unit	Particulars
b.	Resolution		1366x768
c.	Number of Default Color		DDE
3.6	Key Board and Mouse		
a.	Number of Standard Keys		QWERTY
b.	Number of Function Keys		12
c.	Access Time		
3.7	Printer		DDE
a.	Type of Printer		A3
b.	DPI		2400x600
c.	Printing Speed		20 page/minute
d.	Graphic Capability		Yes
3.8	Software and Hardware		
a.	SCDA System Hardware		Yes
b.	Operating System Platform		Yes
c.	Programmed PLC		Yes
d.	Anti Virus		Yes
note:			

D.2.2 Engineering Work Station

	Description	Unit	Particulars
1.	**Origin of Country**		DDE
2.	**Manufacturer**		As per approved make

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	Description	Unit	Particulars
3.	**Major Parameters and Equipment**		
3.1	Installation Location	--	Main Building
3.2	Back-up Computer		
a.	Type of CPU and Capacity		C2D @ 2.20 (6600) / Core i3 @ 2.13 (330M)
b.	RAM		3 or 4 GB
c.	Graphic Capacity		DDE
d.	Number of Priority Interruption Level		DDE
3.3	Hard Disk Driver		
a.	Storage Capacity		80 GB
b.	Access Time		DDE
c.	Interface		DDE
3.4	Recordable CD/DVD ROM		
a.	Size		DDE
b.	Read/Write Capability		Yes
c.	Access Time		DDE
3.5	LCD	—	
a.	Screen Size		19 "
b.	Resolution		DDE
c.	Number of Default Color		DDE
3.6	Key Board and Mouse		
a.	Number of Standard Keys		QWERTY

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	Description	Unit	Particulars
b.	Number of Function Keys		12
c.	Access Time		
3.7	Printer		
a.	Type of Printer		A4
b.	DPI		240x288 dpi
c.	Printing Speed		1200 lines/ min
d.	Graphic Capability		
3.8	Software and Hardware		
a.	SCDA System Hardware		yes
b.	Operating System Platform		yes
c.	Programmed PLC		yes
d.	Anti Virus		yes
note:			

D.2.3 Operator Work Station for Master Control Station (MSC)

	Description	Unit	Particulars
1.	**Origin of Country**		DDE
2.	**Manufacturer**		As per approved make
3.	**Major Parameters and Equipment**		
3.1	Installation Location	--	Main Building
3.2	Back-up Computer		
a.	Type of CPU and Capacity		C2D @ 2.20 (6600) / Core i3 @ 2.13 (330M)

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	Description	Guaranteed	Particulars
b.	RAM		3 or 4 GB
c.	Graphic Capacity		DDE
d.	Number of Priority Interruption Level		DDE
3.3	Hard Disk Driver		
a.	Storage Capacity		80 GB
b.	Access Time		DDE
c.	Interface		DDE
3.4	Recordable CD/DVD ROM		
a.	Size		DDE
b.	Read/Write Capability		Yes
c.	Access Time		DDE
3.5	LCD		
a.	Screen Size		19"
b.	Resolution		DDE
c.	Number of Default Color		DDE
3.6	Key Board and Mouse		
a.	Number of Standard Keys		QWERTY
b.	Number of Function Keys		12
c.	Access Time		
3.7	Printer		
a.	Type of Printer		A4

	Description	Unit	Particulars
b.	DPI		240x288 dpi
c.	Printing Speed		1200 lines/ min
d.	Graphic Capability		
3.8	Software and Hardware		
a.	SCDA System Hardware		yes
b.	Operating System Platform		yes
c.	Programmed PLC		yes
d.	Anti Virus		yes
			DDE
note:			

D.2.4 Operator Work Station for PLC

	Description	Unit	Particulars
1.	**Origin of Country**		DDE
2.	**Manufacturer**		As per approved make
3.	**Major Parameters and Equipment**		
3.1	Installation Location	--	Main Building
3.2	Back-up Computer		
a.	Type of CPU and Capacity		C2D @ 2.20 (6600) / Core i3 @ 2.13 (330M)
b.	RAM		3 or 4 GB
c.	Graphic Capacity		DDE

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	Description	Unit	Particulars
d.	Number of Priority Interruption Level		DDE
3.3	Hard Disk Driver		
a.	Storage Capacity		80 GB
b.	Access Time		DDE
c.	Interface		DDE
3.4	Recordable CD/DVD ROM		
a.	Size		DDE
b.	Read/Write Capability		DDE
c.	Access Time		
3.5	LCD		
a.	Screen Size		19"
b.	Resolution		DDE
c.	Number of Default Color		DDE
3.6	Key Board and Mouse		
a.	Number of Standard Keys		QWERTY
b.	Number of Function Keys		12
c.	Access Time		
3.7	Printer		
a.	Type of Printer		A4
b.	DPI		240x288 dpi
c.	Printing Speed		1200 lines/ min
d.	Graphic Capability		

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	Description	Unit	Particulars
3.8	Software and Hardware		
a.	SCDA System Hardware		yes
b.	Operating System Platform		yes
c.	Programmed PLC		yes
d.	Anti Virus		yes
note:			

D.2.5 PLC Redundant Panel

	Description	Unit	Particulars
1.	**Origin of Country**		NA
2.	**Manufacturer**		NA
3.	**Major Parameters and Equipment**		
3.1	Installation Location	--	NA
3.2	PLC Panels		NA
a.	Memory		NA
b.	Power Supply		NA
c.	Number of Rack		NA
d.	Switch Hub		NA
e.	Network Connection		NA
note:			

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D.2.6 Network Peripheral

	Description	Unit	Particulars
1.	**Origin of Country**		DDE
2.	**Manufacturer**		As per approved make
3.	**Major Parameters and Equipment**		
3.1	Wire Cable Network	--	DDE
3.2	Managed Switch Hub		Yes
3.3.	Unmanaged Switch Hub		NA
note:			

D.2.7 PLC Panels

	Description	Unit	Particulars
1.	**Origin of Country**		DDE
2.	**Manufacturer**		As per approved make
3.	**Major Parameters and Equipment**		
3.1	CIP Panels Installed at 1	--	
3.2	Main Component		
a.	CPU		DDE
b.	Memory		DDE
c.	Discrete Input		16/24/32 Channel
d.	Sub-based Digital Input		16/24/32 Channel
e.	Cable Digital Input		DDE
f.	Discrete Output		16/24/32 Channel
g.	Sub-based Output		16/24/32 Channel

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	Description	Unit	Particulars
3.8	Software and Hardware		
a.	SCDA System Hardware		yes
b.	Operating System Platform		yes
c.	Programmed PLC		yes
d.	Anti Virus		yes
note:			

D.2.5 PLC Redundant Panel

	Description	Unit	Particulars
1.	**Origin of Country**		NA
2.	**Manufacturer**		NA
3.	**Major Parameters and Equipment**		
3.1	Installation Location	--	NA
3.2	PLC Panels		NA
a.	Memory		NA
b.	Power Supply		NA
c.	Number of Rack		NA
d.	Switch Hub		NA
e.	Network Connection		NA
note:			

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	Description	Unit	Parameter
h.	Cable Digital Output		DDE
i.	Analog Input		8/12/16 Channel
j.	Sub-based Analog Input		8/12/16 Channel
k.	Cable Analog Input		DDE
l.	Power Supply Module		24 VDC
m.	Number of Rack		DDE
n.	Switch Hub		DDE
o.	Network Connection		Redundant

note:

1 The Bidder shall propose CIP locations and main component with specifications and quantities to fulfill the functions specified.

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TECHNICAL PROPOSAL
SCHEDULE – VII : CONSTRUCTION SCHEDULE

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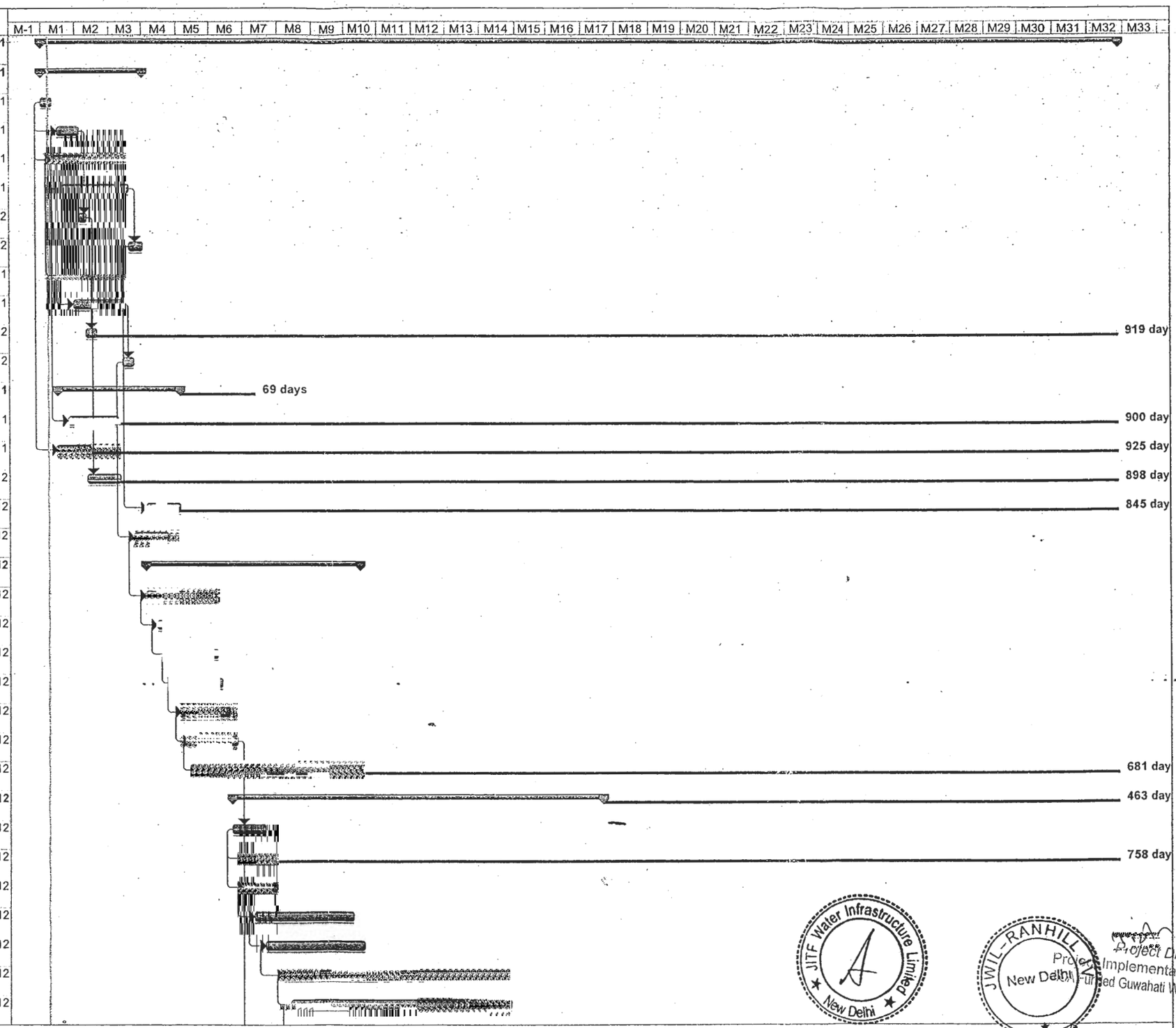
ID	Task Name	Start
1	**191 MLD WTP -S/Gauhati = 32 Month**	**Thu 12/1/11**
2	**Soil testing / Survey**	**Thu 12/1/11**
3	P Route survey-Pipe line	Thu 12/1/11
4	Soil Investigation-Pipe line	Fri 12/16/11
5	Survey in river for Intake	Sun 12/11/11
6	I Soil investigation for River	Wed 12/21/11
7	Report for Pipe line	Thu 1/5/12
8	Report for Intake	Sun 2/19/12
9	Survey in WTP area	Wed 12/21/11
10	Soil investigation in WTP area	Sat 12/31/11
11	Report for Surveu-wtp	Wed 1/11/12
12	Report for Soilinvest-wtp	Mon 2/13/12
13	**Engineering**	**Fri 12/16/11**
14	surge analysis report by outside	Mon 12/26/11
15	Preparation of scope for Consultant-pipe	Fri 12/16/11
16	Preparation of scope for Consultant MEI	Thu 1/12/12
17	Preparation of scope for Intake	Mon 3/5/12
18	Preparation of scope for Consultant of WTP	Thu 2/23/12
19	**Procurement**	**Sun 3/4/12**
20	Sending enquiry of VT Pumps for Intake well/ Reservoir	Sun 3/4/12
21	Receiving of Offers	Wed 3/14/12
22	[illegible]	Sat 3/24/12
23	Technical comparison	Wed 3/28/12
24	Finalization of techno-commercial order	Wed 4/4/12
25	Releasing of LOI	Wed 4/11/12
26	Equipment lead time -Pipe	Wed 4/18/12
27	**Construction of Pipe line-270 M**	**Mon 5/21/12**
28	Mobilization of Piping contractor	Mon 5/21/12
29	Finalization of Storage Yard	Thu 5/31/12
30	Finalization of Labour Camp	Thu 5/31/12
31	Clearing of right of way	Sun 6/10/12
32	Right of way preparation	Wed 6/20/12
33	Putting of pipe along the Route	Thu 7/5/12
34	Excavation & Shifting of soil	Thu 7/12/12



Project: MSProj11
Date: Wed 12/7/11

Critical | Split | Slack | Project Summary | External Tasks
Critical Split | Progress | Slippage | Rolled Up Critical | External Milestone
Task | Milestone | Summary | Rolled Up Critical | Deadline

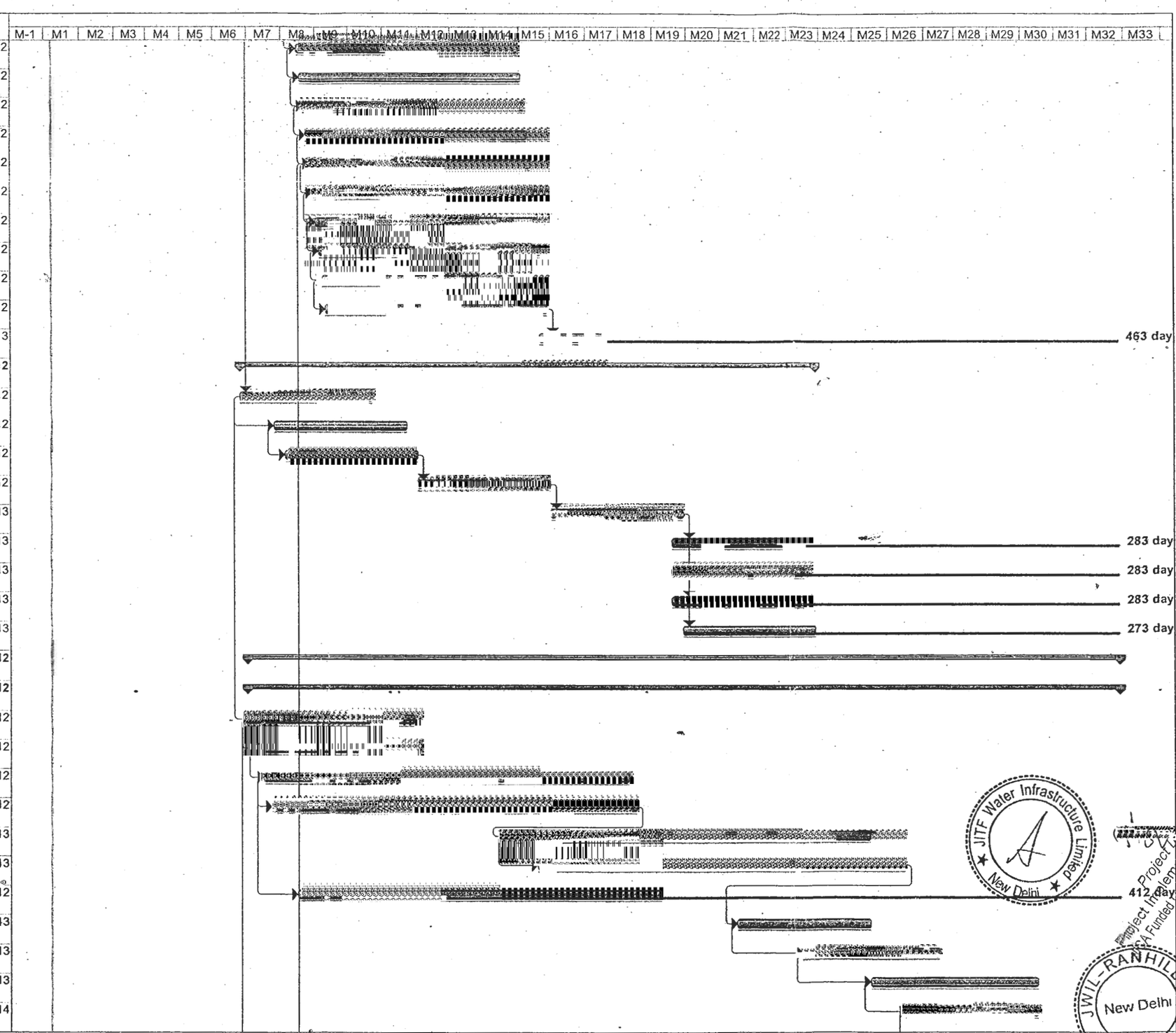
JITF Water Infrastructure Limited New Delhi

JWIL-RANHILL Project Implementation Unit New Delhi

Project Director
Implementation U
-ed Guwahati Water Su

000902

ID	Task Name	Start
35	Locally sand laying bellow proposed pipe line	Sun 7/15/12
36	Lowering the pipe	Wed 7/18/12
37	Field welding ,applicable ARC Welding	Sat 7/21/12
38	Inspection and Radiography test where applicable.	Tue 7/24/12
39	Joint coating/ finishing/ Curing etc	Fri 7/27/12
40	Installation of Valves and Specials fittings	Mon 7/30/12
41	Back filling the Trench	Thu 8/2/12
42	Testing and commissioning	Sun 8/5/12
43	Dispose off excess soil / Spraining in same location as per the s	Wed 8/8/12
44	Construction of thrust blocks and valve chambers	Sat 8/11/12
45	Signoff of Govt permission	Wed 2/20/13
46	**Construction of Intake Civil work**	**Sat 5/26/12**
47	Excavation/coffer dam	Sat 5/26/12
48	PCC	Mon 6/25/12
49	RCC Raft	Thu 7/5/12
50	RCC Starter	Fri 11/2/12
51	RCC wall	Sat 3/2/13
52	Installation of Pump	Thu 6/20/13
53	Structural for EOT Crane	Thu 6/20/13
54	Structural for Trolley arrangement	Thu 6/20/13
55	Switch yard construction	Sun 6/30/13
56	**Construction WTP**	**Sat 6/2/12**
57	**Process Building- Water/ Sludge**	**Sat 6/2/12**
58	Excavation	Sat 6/2/12
59	PCC	Sat 6/9/12
60	RCC Raft	Sat 6/16/12
61	RCC wall	Sat 6/23/12
62	Equipment Erection	Sat 1/19/13
63	Screeding	Mon 2/18/13
64	Piping	Mon 7/16/12
65	Plaster internal	Sat 8/17/13
66	Hydro testing	Wed 10/16/13
67	External Plaster	Sun 12/15/13
68	Painting	Tue 1/14/14



Project: MSProj11
Date: Wed 12/7/11

Critical		Split		Slack		Project Summary		External Tasks	
Critical Split		Progress		Slippage		Rolled Up Critical		External Milestone	
Task		Milestone		Summary		Rolled Up Critical		Deadline	

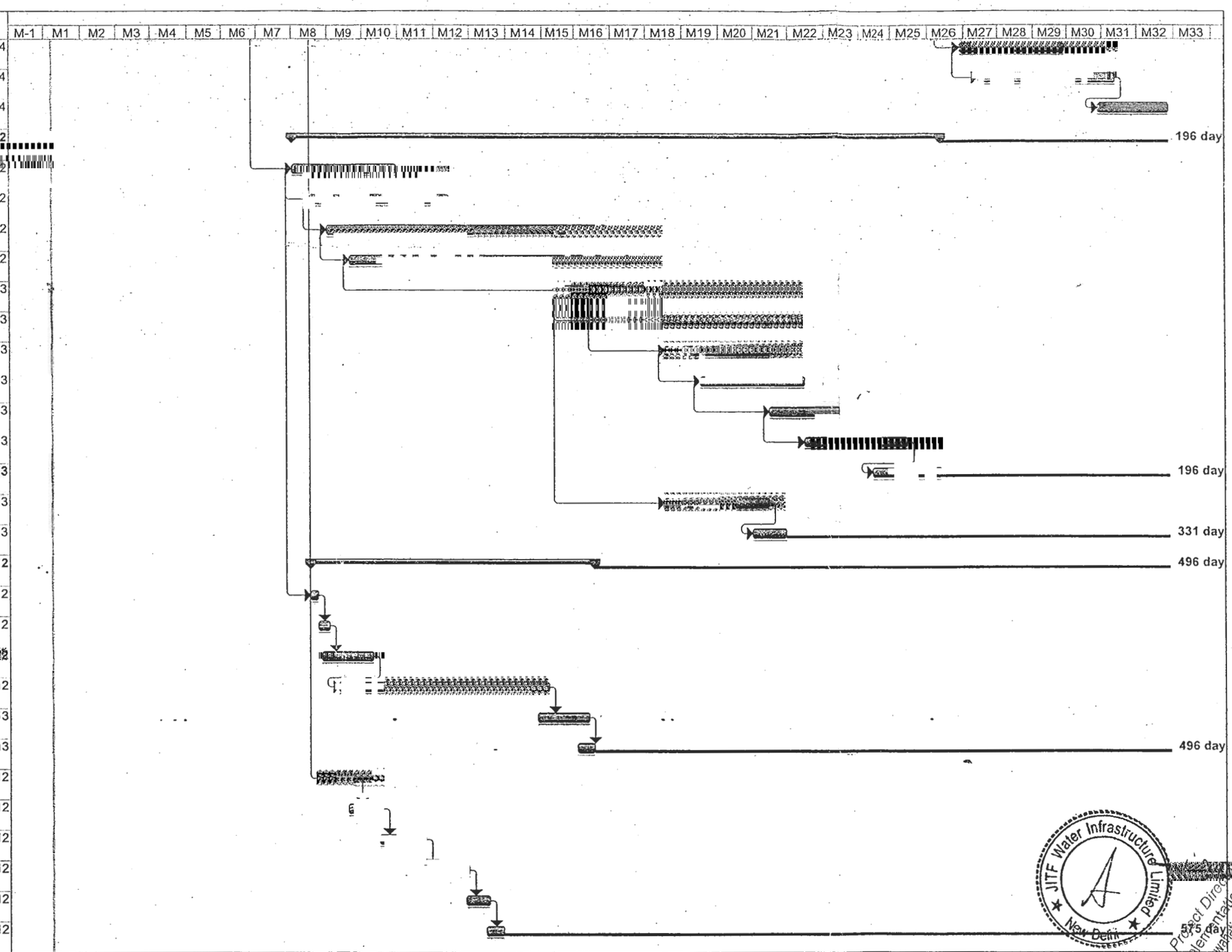
JITF Water Infrastructure Limited New Delhi

Project Implementation ADB Funded Guwahati

JWIL-RANHILL JV New Delhi

000903

ID	Task Name	Start
69	Hand Railing	Wed 1/29/14
70	Cabling/Electrical	Thu 2/13/14
71	Handing over civil	Thu 5/29/14
72	**Filter house/CWR**	**Mon 7/2/12**
73	Excavation	Mon 7/2/12
74	PCC	Tue 7/17/12
75	RCC Raft	Wed 8/1/12
76	RCC Wall	Tue 8/21/12
77	Equipment Errection	Sun 2/17/13
78	Piping	Tue 3/19/13
79	Plaster internal	Sat 5/18/13
80	Hydro testing	Mon 6/17/13
81	Back filling outside wall	Fri 8/16/13
82	External Plaster	Sun 9/15/13
83	Painting	Thu 11/14/13
84	Cabling/Electrical	Sat 5/18/13
85	Handing over civil	Thu 8/1/13
86	**OVER Head Water tank**	**Tue 7/17/12**
87	Excavation Floor	Tue 7/17/12
88	PCC	Tue 7/24/12
89	RCC Raft	Fri 8/17/12
90	Rcc Column	Sat 8/11/12
91	RCC tank	Mon 1/28/13
92	Equipment Errection	Mon 3/4/13
93	Piping	Fri 7/27/12
94	Plaster internal	Sun 8/19/12
95	Hydro testing	Sat 9/15/12
96	External Plaster	Mon 10/22/12
97	Painting	Wed 11/28/12
98	Handing over civil	Sat 12/15/12



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Project Director
Project Implementation Unit
JICA Funded Guwahati Water S

Project: MSProj11
Date: Wed 12/7/11

Critical	Split	Slack	Project Summary	External Tasks
Critical Split	Progress	Slippage	Rolled Up Critical	External Milestone
Task	Milestone	Summary	Rolled Up Critical	Deadline

000904

ELECTRICAL LOAD LIST

Project Director
Project Implementation Unit (P.I.U)
JICA Funded Guwahati Water Supply Project

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000933

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GUWAHATI SOUTH WSS (191 MLD) ELECTRICAL LOAD DATED 13.12.11

RIVER INTAKE							
1	Intake well pumps	596.67	700.00	3.00	2.00	1.00	27446.89
2	Desilting pump	11.18	15.00	2.00	1.00	1.00	1.12
3	Drain pumps in intake	6.69	7.50	2.00	1.00	1.00	0.67
WTP							
1	Submersible sludge pump for presettling tank	5.32	7.50	12.00	6.00	6.00	382.77
2	Drum Thickener feed pump	25.22	30.00	4.00	2.00	2.00	807.09
3	Supernatant pump	51.34	55.00	2.00	1.00	1.00	821.36
4	Alum transfer Pump	1.55	2.20	2.00	1.00	1.00	37.28
5	Lime transfer Pump	1.55	2.20	2.00	1.00	1.00	37.28
6	Lime Dosing Pump (Pre treatment)	1.28	1.50	2.00	1.00	1.00	30.79
7	Lime Dosing Pump (Post treatment)	0.94	1.50	2.00	1.00	1.00	22.58
8	Drain pump for alum mixing area	1.71	2.20	2.00	1.00	1.00	0.17
9	Drain pump for lime mixing area	1.71	2.20	2.00	1.00	1.00	0.17
10	Drain pump for dosing pump room	1.71	2.20	2.00	1.00	1.00	0.17
11	Drain pump for filter house	2.01	2.20	2.00	1.00	1.00	0.20
12	Drain pump for filter gallery	2.01	2.20	2.00	1.00	1.00	0.20
13	backwash fill pump	51.80	55.00	3.00	2.00	1.00	1243.25
14	backwash recycle pump	101.62	110.00	4.00	2.00	2.00	2438.79
15	Drain pump for chlorine building	1.71	2.20	2.00	1.00	1.00	0.17
16	Clear water Pump	2076.15	2300.00	3.00	2.00	1.00	95502.70
17	Drain pump for clear water Pump house	2.01	2.20	2.00	1.00	1.00	0.20
18	Prechlorination booster pump	7.54	7.50	2.00	1.00	1.00	180.95
19	Post chlorination booster pump	3.50	3.70	2.00	1.00	1.00	83.90
20	Caustic pump for chlorination	3.34	3.70	2.00	1.00	1.00	13.37
21	Sample pumps	1.76	2.20	8.00	5.00	3.00	4.39
22	Travelling bridge for presettling tank	1.87	2.20	6.00	6.00	0.00	44.88
23	Travelling trolley unit for presettling tank	1.87	2.20	6.00	6.00	0.00	44.88
24	Flash Mixer	4.68	5.50	3.00	3.00	0.00	336.60
25	Sludge mixer for clarifier sludge holding tank	6.38	7.50	4.00	4.00	0.00	612.00
26	Drum thickener cum belt filter press (Thickener)	0.68	0.75	10.00	8.00	2.00	66.40
27	Drum thickener cum belt filter press (Mixer)	0.33	0.37	10.00	8.00	2.00	42.62
28	Drum thickener cum belt filter press (Filter press)	1.35	1.50	10.00	8.00	2.00	172.80
29	Sludge mixer for Backwash waste tank	6.00	7.50	2.00	2.00	0.00	288.00
30	Agitator for Alum preparation tank	1.28	1.50	2.00	1.00	1.00	30.60
31	Agitator for Alum dosing tank	0.31	0.37	2.00	1.00	1.00	7.55
32	Agitator for lime mixing tank	1.28	1.50	2.00	1.00	1.00	30.60
33	Agitator for lime dosing tank	0.31	0.37	2.00	1.00	1.00	7.55
34	Agitator for Poly mixing cum dosing tank	0.64	0.75	2.00	1.00	1.00	15.30
35	Agitator for dewatering Poly mixing cum dosing tank	0.94	1.10	2.00	1.00	1.00	22.44
36	Agitator for caustic dosing tank for chlorination	0.31	0.37	1.00	1.00	0.00	1.26
37	Alum dosing pump	0.26	0.37	6.00	3.00	3.00	18.65
38	Poly Dosing pumps	0.30	0.37	6.00	3.00	3.00	21.31
39	Dewatering Poly Dosing pumps	0.30	0.37	6.00	4.00	2.00	18.94
40	Filter blower	45.86	55.00	3.00	2.00	1.00	183.44
41	Blower for chlorine absorbtion system	3.15	3.70	2.00	1.00	1.00	12.58
42	Compressor for clarifier tube cleaning	6.00	7.50	2.00	1.00	1.00	12.00

Project Director
Project Implementation Unit (P.I.U)
JICA Funded Guwahati Water Supply Project

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Note: The electrical load provided above will subject to vary during detail engineering upon selection of actual vendor and equipment model

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TRANSFORMER SIZING CALCULATIONS

JWIL-RANHILL JV New Delhi

er Infrastructure Limited New Delhi

Project Director
Project Implementation Unit (P.I.U)
JICA Funded Guwahati Water Supply Project

JWIL RANHILL New Del

TRANSFORMER SIZING CALCULATION INTAKE SOUTH

A	B	C	D	E	F	G	I	J	K	L	M	N	O	P	Q=MXN/LXM	R
1	INTAKE WELL PUMPS		3	2	1	596.67	700	1091.68	1500	0.95	0.9	DOL	FIXED SPEED	CONTINOUS	1605.08	
2	DESILTING PUMP		2	1	1	11.82	15	26.75	1500	0.89	0.84	DOL	FIXED SPEED	CONTINOUS	18.18	
3	DRAIN PUMPS IN INTAKE		2	1	1	6.69	7.5	15.26	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	11.74	
4	MOTORISED VALVES		4	4	0	0.39	0.55	1.66	1500	0.68	0.65	DOL	FIXED SPEED	CONTINOUS	4.06	
5	MOTORISED GATES		7	5	2	1.05	1.5	3.66	1500	0.72	0.76	DOL	FIXED SPEED	CONTINOUS	11.03	
6	EOT CRANE CT FOR RAW WATER PH		1	1	0	1.54	2.2	5.36	1500	0.72	0.76	DOL	FIXED SPEED	INTERMITTENT	3.24	
7	EOT CRANE LT FOR RWPH		1	1	0	1.54	2.2	5.36	1500	0.72	0.76	DOL	FIXED SPEED	INTERMITTENT	3.24	
8	EOT CRANE LIFTING RWPH		1	1	0	14.4	18	31.20	1500	0.905	0.85	DOL	FIXED SPEED	INTERMITTENT	21.53	
9	LIGHTING		1	1	0	20	-	-	-	1	1	SFU	FIXED SPEED	CONTINOUS	23.00	
10	MISC LOADS		1	1	0	50	-	-	-	1	1	SFU	FIXED SPEED	INTERMITTENT	57.50	
11	VENTILATION SYSTEM		1	1	0	20	-	-	-	1	1	SFU	FIXED SPEED	CONTINOUS	23.00	
12	Instrument & Control System		1	1	0	20	-	-	-	1	1	SFU	FIXED SPEED	CONTINOUS	23.00	

MAXIMUM DEMAND (KVA)	=	**1804.59 KVA**
DESIGN MARGIN (20%)	=	**360.92 KVA**
TOTAL LOAD	=	**2165.51 KVA**
NEAREST STANDARD RATING OF TRANSFORMER SELECTED	=	**2500 KVA**

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Project Director
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JICA Funded Guwahati Water Supply Project

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TRANSFORMER SIZING CALCULATION WTP SOUTH

A	B	C	D	E	F	G	H=GX1.15	I	J	K	L	M	N	O	P	Q=EXH/LXM	R
1	Submersible sludge pump for presettling tank		12	6	6	5.32	6.12	7.5	15.26	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	56.03	
2	Drum Thickener feed pump		4	2	2	25.22	29.00	30.0	52.96	1500	0.91	0.83	DOL	FIXED SPEED	CONTINOUS	76.80	
3	Supernatant pump		2	1	1	51.34	59.04	55.0	93.48	1500	0.923	0.85	DOL	FIXED SPEED	CONTINOUS	75.25	
4	Alum transfer Pump		2	1	1	1.55	1.78	2.2	5.36	1500	0.72	0.76	DOL	FIXED SPEED	CONTINOUS	3.26	
5	Lime transfer Pump		2	1	1	1.55	1.78	2.2	5.36	1500	0.72	0.76	DOL	FIXED SPEED	CONTINOUS	3.26	
6	Lime Dosing Pump (Pre treatment)		2	1	1	1.28	1.47	1.5	4.08	1500	0.7	0.7	DOL	FIXED SPEED	CONTINOUS	3.00	
7	Lime Dosing Pump (Post treatment)		2	1	1	0.94	1.08	1.5	4.08	1500	0.7	0.7	DOL	FIXED SPEED	CONTINOUS	2.21	
8	Drain pump for alum mixing area		2	1	1	1.71	1.97	2.2	5.99	1500	0.7	0.7	DOL	FIXED SPEED	CONTINOUS	4.01	
9	Drain pump for lime mixing area		2	1	1	1.71	1.97	2.2	5.36	1500	0.72	0.76	DOL	FIXED SPEED	CONTINOUS	3.59	
10	Drain pump for dosing pump room		2	1	1	1.71	1.97	2.2	5.36	1500	0.72	0.76	DOL	FIXED SPEED	CONTINOUS	3.59	
11	Drain pump for filter house		2	1	1	2.01	2.31	2.2	3.74	1500	0.923	0.85	DOL	FIXED SPEED	CONTINOUS	2.95	
12	Drain pump for filter gallery		2	1	1	2.01	2.31	2.2	3.83	1500	0.933	0.82	DOL	FIXED SPEED	CONTINOUS	3.02	
13	backwash fill pump		3	2	1	51.80	59.57	55.0	149.67	1500	0.7	0.7	DOL	FIXED SPEED	CONTINOUS	243.14	
14	backwash recycle pump		4	2	1	101.62	116.86	110.0	181.08	1500	0.9	0.9	DOL	FIXED SPEED	CONTINOUS	288.55	
15	Drain pump for chlorine building		2	1	1	1.71	1.97	2.2	5.36	1500	0.72	0.76	DOL	FIXED SPEED	CONTINOUS	3.59	
16	Clear water Pump		3	2	1	2076.15	2387.57	2300.0	4102.26	1500	0.89	0.84	DOL	FIXED SPEED	CONTINOUS	6387.30	
17	Drain pump for clear water Pump house		2	1	1	2.01	2.31	2.2	4.48	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	3.53	
18	Prechlorination booster pump		2	1	1	7.54	8.67	7.5	16.03	1500	0.81	0.77	DOL	FIXED SPEED	CONTINOUS	13.90	
19	Post chlorination booster pump		2	1	0	3.50	4.03	3.7	7.91	1500	0.81	0.77	DOL	FIXED SPEED	CONTINOUS	6.45	
20	Caustic pump for chlorination		2	1	0	3.34	3.84	3.7	8.43	1500	0.78	0.75	DOL	FIXED SPEED	CONTINOUS	6.57	
21	Sample pumps		8	5	0	1.76	2.02	2.2	5.01	1500	0.78	0.75	DOL	FIXED SPEED	CONTINOUS	17.30	
22	Travelling bridge for presettling tank		6	6	0	1.87	2.15	2.2	5.01	1500	0.78	0.75	DOL	FIXED SPEED	CONTINOUS	22.06	
23	Travelling trolley unit for presettling tank		6	6	0	1.87	2.15	2.2	4.48	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	19.69	

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TRANSFORMER SIZING CALCULATION WTP SOUTH

A	B	C	D	E	F	G	H=GX1.15	I	J	K	L	M	N	O	P	Q=EXH/LXM	R
24	Flash Mixer		3	3	2	4.68	5.38	5.5	16.12	1500	0.7	0.65	DOL	FIXED SPEED	CONTINOUS	35.49	
25	Sludge mixer for clarifier sludge holding tank		4	4	2	6.38	7.34	7.5	23.31	1500	0.66	0.65	DOL	FIXED SPEED	CONTINOUS	68.41	
26	Drum thickener cum belt filter press (Thickener)		10	8	2	0.68	0.78	0.8	1.83	1500	0.72	0.76	DOL	FIXED SPEED	CONTINOUS	11.43	
27	Drum thickener cum belt filter press (Mixer)		10	8	0	0.33	0.38	0.4	0.75	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	4.63	
28	Drum thickener cum belt filter press (Filter press)		10	8	1	1.35	1.55	1.5	3.66	1500	0.72	0.76	DOL	FIXED SPEED	CONTINOUS	22.70	
29	Sludge mixer for Backwash waste tank		2	2	1	6.00	6.90	7.5	21.98	1500	0.7	0.65	DOL	FIXED SPEED	CONTINOUS	30.33	
30	Agitator for Alum preparation tank		2	1	1	1.28	1.47	1.5	3.66	1500	0.72	0.76	DOL	FIXED SPEED	CONTINOUS	2.69	
31	Agitator for Alum dosing tank		2	1	1	0.31	0.36	0.4	1.08	1500	0.7	0.65	DOL	FIXED SPEED	CONTINOUS	0.78	
32	Agitator for lime mixing tank		2	1	1	1.28	1.47	1.5	4.08	1500	0.7	0.7	DOL	FIXED SPEED	CONTINOUS	3.00	
33	Agitator for lime dosing tank		2	1	1	0.31	0.36	0.4	1.01	1500	0.7	0.7	DOL	FIXED SPEED	CONTINOUS	0.73	
34	Agitator for Poly mixing cum dosing tank		2	1	0	0.64	0.74	0.8	21.98	1500	0.7	0.065	DOL	FIXED SPEED	CONTINOUS	16.18	
35	Agitator for dewatering Poly mixing cum dosing tank		2	1	3	0.94	1.08	1.1	3.42	1500	0.66	0.65	DOL	FIXED SPEED	CONTINOUS	2.52	
36	Agitator for caustic dosing tank for chlorination		1	1	3	0.31	0.36	0.4	1.15	1500	0.66	0.65	DOL	FIXED SPEED	CONTINOUS	0.83	
37	Alum dosing pump		6	3	3	0.26	0.30	0.4	1.15	1500	0.66	0.65	DOL	FIXED SPEED	CONTINOUS	2.09	
38	Poly Dosing pumps		6	3	2	0.30	0.35	0.4	1.15	1500	0.66	0.65	DOL	FIXED SPEED	CONTINOUS	2.41	
39	Dewatering Poly Dosing pumps		6	4	1	0.30	0.35	0.4	1.15	1500	0.66	0.65	DOL	FIXED SPEED	CONTINOUS	3.22	
40	Filter blower		3	2	1	45.86	52.74	55.0	93.48	1500	0.923	0.85	DOL	FIXED SPEED	CONTINOUS	134.44	
41	Blower for chlorine absorbtion system		2	1	1	3.15	3.62	3.7	8.43	1500	0.78	0.75	DOL	FIXED SPEED	CONTINOUS	6.19	
42	Compressor for clarifier tube cleaning		2	1	1	6.00	6.90	7.5	15.26	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	10.53	
43	Motorized valves		143	143	0	0.44	0.51	0.6	1.66	1500	0.68	0.65	DOL	FIXED SPEED	CONTINOUS	163.71	
44	Motorized gates		46	46	0	0.60	0.69	0.8	2.26	1500	0.68	0.65	DOL	FIXED SPEED	CONTINOUS	71.81	
45	Motorized hoist for Presettling tank sludge pump		6	6	0	1.76	2.02	2.2	5.36	1500	0.72	0.76	DOL	FIXED SPEED	CONTINOUS	22.19	
46	EOT Crane CT for Dewatering building		1	1	0	1.05	1.21	1.5	3.66	1500	0.72	0.76	DOL	FIXED SPEED	CONTINOUS	2.21	
47	EOT Crane LT for Dewatering building		1	1	0	1.54	1.77	2.2	5.36	1500	0.72	0.76	DOL	FIXED SPEED	CONTINOUS	3.24	

JWIL-RANHILL JV New Delhi

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TRANSFORMER SIZING CALCULATION WTP SOUTH

A	B	C	D	E	F	G	H=GX1.15	I	J	K	L	M	N	O	P	Q=EXH/LXM	R
48	EOT Crane Lifting for dewatering building		1	1	0	7.44	8.56	9.3	16.68	1500	0.885	0.84	DOL	FIXED SPEED	CONTINOUS	11.51	
49	Motorized hoist for Drum thickener feed pump		1	1	0	2.40	2.76	3.7	7.91	1500	0.81	0.77	DOL	FIXED SPEED	CONTINOUS	4.43	
50	Motorized hoist for supernatant pump		1	1	0	2.40	2.76	3.7	7.91	1500	0.81	0.77	DOL	FIXED SPEED	CONTINOUS	4.43	
51	Motorized hoist for chemical house ground floor		1	1	0	1.76	2.02	2.2	5.36	1500	0.72	0.76	DOL	FIXED SPEED	CONTINOUS	3.70	
52	Motorized hoist for chemical house first floor		1	1	0	1.76	2.02	2.2	5.36	1500	0.72	0.76	DOL	FIXED SPEED	CONTINOUS	3.70	
53	Motorized hoist for chlorination building		1	1	0	2.40	2.76	3.7	7.91	1500	0.81	0.77	DOL	FIXED SPEED	CONTINOUS	4.43	
54	Motorized hoist for filter blower		1	1	0	2.40	2.76	3.7	7.74	1500	0.85	0.75	DOL	FIXED SPEED	CONTINOUS	4.33	
55	Motorized hoist for backwash waste pump		1	1	0	2.40	2.76	3.7	7.91	1500	0.81	0.77	DOL	FIXED SPEED	CONTINOUS	4.43	
56	Motorized hoist for maintenence building		1	1	0	2.40	2.76	3.7	7.91	1500	0.81	0.77	DOL	FIXED SPEED	CONTINOUS	4.43	
57	EOT Crane CT for clear water PH		2	2	0	1.05	1.21	1.5	3.42	1500	0.78	0.75	DOL	FIXED SPEED	CONTINOUS	4.13	
58	EOT Crane LT for CWPH		2	2	0	1.54	1.77	2.2	5.01	1500	0.78	0.75	DOL	FIXED SPEED	CONTINOUS	6.05	
59	EOT Crane Lifting CWPH		1	1	0	24.00	27.60	30.0	52.00	1500	0.905	0.85	DOL	FIXED SPEED	CONTINOUS	35.88	
60	Plant Area Lighting		1	1		35.00	40.25				1	1	DOL	FIXED SPEED	CONTINOUS	40.25	
61	Ventilation system for chemical house, Chlorination building, MCC		1	1		30.00	34.50				1	1	DOL	FIXED SPEED	CONTINOUS	34.50	
62	Misc load for buildings, rooms		1	1		50.00	57.50				1	1	DOL	FIXED SPEED	CONTINOUS	57.50	
63	Instrumentation and control system		1	1		20.00	23.00				1	1	DOL	FIXED SPEED	CONTINOUS	23.00	
64	HVAC		1	1		35.00	40.25				1	1	DOL	FIXED SPEED	CONTINOUS	40.25	

MAXIMUM DEMAND (KVA)	=	**8157.74**	**KVA**
DESIGN MARGIN (20%)	=	**1631.55**	**KVA**
TOTAL LOAD	=	**9789.29**	**KVA**
NEAREST STANDARD RATING OF TRANSFORMER SELECTED	=	**10000**	**KVA**

JITF Water Infrastructure Limited New Delhi

JWIL-RANHILL JV New Delhi

Project Director
Project Implementation Unit (P.I.U)
JICA Funded Guwahati Water S...

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JWIL-RANHILL JV New Delhi

Price Adjustment Factors

Project Director
Project Implementation Unit (PIU)
JICA Funded Guwahati Water Supply Project

2.1 Applicable Items/ Adjustment Factors:

Item No.	Item/Description	Basic Amount	Non-adjustable[1]	Labour portion (L)	Steel (MS)	Other Materials (MA)	Equipment operation (E)
			a	b	c1	c2	d
	[illegible]						
II.A-1	*Intake Structure and Raw Water Pump Station and Transmission Main:*						
II-A-1.1	Mechanical Works		25%				
II.A-1.2	Electrical Works		25%				
II.A-1.3	Instrumentation and Control Works		25%				
II.A-2	*Water Treatment Plant*						
II.A-2.1	Mechanical Works		25%				
II.A-2.2	Electrical Works		25%				
II.A-2.3	Instrumentation and Control Works		25%				
II.A-3	*Clear Water Reservoir and Clear Water Pump Station*						
II.A-3.1	Mechanical Works		25%				
II.A-3.2	Electrical Works		25%				
II.A-3.3	Instrumentation and Control Works		25%				
II.A-4	*Mandatory Spare Parts and Tools & Tackles*						
II.A-4.1	Mandatory Spare Parts		25%				
II.A-4.2	Tools and Tackles		25%				
			25%				
II.B-1	*Intake Structure and Raw Water Pump Station and Transmission Main:*						
II-B-1.1	Mechanical Works		25%	5%	35%	30%	5%
II.B-1.2	Electrical Works		25%	20%	10%	40%	5%
II.B-1.3	Instrumentation and Control Works		25%	20%	10%	40%	5%
II.B-2	*Water Treatment Plant*						
II.B-2.1	Mechanical Works		25%	5%	35%	30%	5%
II.B-2.2	Electrical Works		25%	20%	10%	40%	5%
II.B-2.3	Instrumentation and Control Works		25%	20%	10%	40%	5%
II.B-3	*Clear Water Reservoir and Clear Water Pump Station*						
II.B-3.1	Mechanical Works		25%	5%	35%	30%	5%
II.B-3.2	Electrical Works		25%	20%	10%	40%	5%
II.B-3.3	Instrumentation and Control Works		25%	20%	10%	40%	5%
II.B-4	*Mandatory Spare Parts and Tools & Tackles*						
II.B-4.1	Mandatory Spare Parts		25%		30%	40%	5%
II.B-4.2	Tools and Tackles		25%		30%	40%	5%
			25%				
	[illegible]						

Project Director
Project Implementation Unit (P.I.U)
JICA Funded Guwahati Water Supply Project

IV-	*Intake Structure and Raw Water Pump Station and Transmission Main*						
IV-1.1	Mechanical Works		25%	60%	5%	5%	5%
IV-1.2	Electrical Works		25%	60%	5%	5%	5%
IV-1.3	Instrumentation nd Control Works		25%	60%	5%	5%	5%
IV-2	*Water Treatment Plant*						
IV-2.1	Mechanical Works		25%	60%	5%	5%	5%
IV-2.2	Electrical Works		25%	60%	5%	5%	5%
IV-2.3	Instrumentation and Control Works		25%	60%	5%	5%	5%
IV-3	*Clear Water Reservoir and Clear Water Pump Station*						
IV-3.1	Mechanical Works		25%	60%	5%	5%	5%
IV-3.2	Electrical Works		25%	60%	5%	5%	5%
IV-3.3	Instrumentation and Control Works		25%	60%	5%	5%	5%
IV-4	*Trial Run and Pre-commissioning of Components and Entire System*		25%	35%		40%	
IV-	*Pre-commissioning Test of Entire System*		25%	35%		40%	
	Intake Structure and Raw Water Pump Station						
V-1.1	Initial Site Development works		100%				
V-1.2	Construction of Civil Structures and Buildings		25%	20%	25%	30%	
V-2	*Water Treatment Plant*						
V-2.1	Initial Site Development works		100%				
V-2.2	Construction of Civil Structures and Buildings		25%	20%	25%	30%	
V-3	*Clear Water Reservoir and Clear Water Pump Station*						
V-3.1	Construction of Civil Structures and Buildings		25%	20%	25%	30%	
V-	*Interception and Diversion of Drain*						
V-4.1	Construction of civil structures and Laying of sewer line		25%	20%	25%	30%	
	Any other items not specified in the above but required to complete works		25%		10%	60%	5%

Schedule of Adjustment Factor for Operation & Maintenance

Item	Description	Unit	Basic Amount	Non-adjustable	Labour portion (L)	Steel (MS)	Other Materials (MA)	Equipment operation (E)
				a	b	c1	c2	d
	Schedule 7							
VII	Operation and Maintenance							
VII-1	For Year 1 of O & M							
	(Estimated Production Capacity for year 1)							

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JICA Funded Guwahati Water Supply Project

VII-1.1	Preparation Work: Deployment of personnel and equipment including spare parts			100%				
VII-1.2	Operation and Maintenance for Water Production			25%	35%	25%	10%	5%
VII-1.3	Operation and Maintenance for sludge handling and disposal			25%	35%	25%	10%	5%
VII-1.4	Other items and sub items not specified in the above but required to fulfill O&M operation requirement			25%	35%	25%	10%	5%
VII-2	For Year 2 of O & M							
	(Estimated Production Capacity for year 2)			25%	35%	25%	10%	5%
VII-2.1	Operation and Maintenance for Water Production			25%	35%	25%	10%	5%
VII-2.2	Operation and Maintenance for sludge handling and disposal			25%	35%	25%	10%	5%
VII-2.3	Other items and sub items not specified in the above but required to fulfill O & M operational requirement			25%	35%	25%	10%	5%
VII-3	For Year 3 of O & M							
	(Estimated Production Capacity for year 3)							
VII-3.1	Operation and Maintenance for Water Production			25%	35%	25%	10%	5%
VII-3.2	Operation and Maintenance for sludge handling and disposal			25%	35%	25%	10%	5%
VII-3.3	Other items and sub items not specified in the above but required to fulfill O & M operational requirement			25%	35%	25%	10%	5%
VII-4	For Year 4 of O & M							
	(Estimated Production Capacity for year 4)							
VII-4.1	Operation and Maintenance for Water Production			25%	35%	25%	10%	5%
VII-4.2	Operation and Maintenance for sludge handling and disposal			25%	35%	25%	10%	5%
VII-4.3	Other items and sub items not specified in the above but required to fulfill O & M operational requirement			25%	35%	25%	10%	5%
VII-5	For Year 5 of O & M							
	(Estimated Production Capacity for year 5)							
VII-5.1	Operation and Maintenance for Water Production			25%	35%	25%	10%	5%
VII-5.2	Operation and Maintenance for sludge handling and disposal			25%	35%	25%	10%	5%
VII-5.3	Other items and sub items not specified in the above but required to fulfill O & M operational requirement			25%	35%	25%	10%	5%

Note:

Signature of Bidder and Date

Name and Designation SUNIL TREHAN, EXECUTIVE DIRECTOR

Company

JITF Water Infrastructure Limited New Delhi

JWIL-RANHILL JV New Delhi

Conditions Applicable To Price Adjustment

The Bidder shall indicate the source of labour and materials indexes and the base date indexes in its bid.

The base date shall be the date twenty-eight (28) days prior to the Bid closing date.

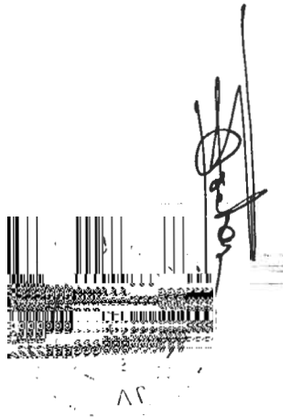
The following conditions shall apply:

Project Director
Project Implementation Unit (P...
Guwahati Water Supp... Project

(a) No price increase will be allowed beyond the original delivery date unless covered by an extension of time awarded by the Employer under the terms of the Contract. No price increase will be allowed for periods of delay for which the Contractor is responsible. The Employer will, however, be entitled to any price decrease occurring during such periods of delay.

(b) If the currency in which the Contract Price, P0, is expressed is different from the currency of the country of origin of the labor and/or materials indexes, a correction factor will be applied to avoid incorrect adjustments of the Contract Price. The correction factor shall correspond to the ratio of exchange rates between the two currencies on the base date and the date for adjustment as defined above.
(c) No price adjustment shall be payable on the portion of the Contract Price paid to the Contractor as an advance payment.

[1] Weight of non-adjustable portion (a) is fixed by the Employer. Weight of other adjustment factors are to be set by the Bidder. The item-wise breakdown of weight shall be submitted to the Employer by the successful Bidder.



Project Director
Project Implementation Unit
JICA Funded Guwahati Water Supply Project

Other Documents Forms Part of the Employer's Requirement (Separate Volume)

- **Standard Specifications**
- **Quality Assurance / Quality Control Manual**
- **Health & Safety Manual**
- **Environmental Management Plan**
- **Survey Data**

Project Director
Project Implementation Unit (P.I.U)
JICA Funded Guwahati Water Supply Project

Acknowledgement of Compliance with Guidelines for Procurement under Japanese ODA Loans

Project Director
Project Implementation Unit (P.I.U)
JICA Funded Guwahati Water Supply Project

Form FIN – 4: Acknowledgment of Compliance with Guidelines for Procurement under Japanese ODA Loans

A. I, *Sunil Trehan, Executive Director,* duly authorized by JITF Water Infrastructure Limited and Ranhill Utilities Sdn. Bhd (hereinafter referred to as "Bidder") hereby certify on behalf of the Bidder and myself that information provided in the bid submitted by the Bidder for Loan No.: *JICA Loan No. ID P-201,* Invitation for Bid No.: GMDA/JICA/25/2011/22, **[Procurement of Turnkey Contract- Design, Supply, Installation and Commissioning of Intake Facilities, Transmission Mains, Water Treatment Plant and Clear Water Pumping Station for the South Central Zone (Contract C-03)]** is true, correct and accurate to the best of my knowledge and belief. I further certify that on behalf of the Bidder that;

(i) the bid has been prepared and submitted in compliance with the terms and conditions set forth in Guidelines for Procurement under Japanese ODA Loans (hereinafter referred to as "Guidelines"); and

(ii) the Bidder has not taken any action which is or constitutes a corrupt, fraudulent, collusive or coercive practice and is not subject to any conflict of interest as stipulated in the relevant section of the Guidelines.

B. I certify that neither the Bidder nor any subcontractor, or expert nominated by the Bidder in the bid has been sanctioned by any development assistance organizations1.

C. I further certify on behalf of the Bidder that, if selected to undertake services in connection with the Project, we shall carry out such services in continuing compliance with the terms and conditions of the Guidelines.

Name SUNIL TREHAN

In the capacity of EXECUTIVE DIRECTOR, JITF Water Infrastructure Limited-Lead Partner

Signed

Duly authorized to sign the bid for and on behalf of JITF WATER INFRASTRUCTURE LIMITED

Dated on 12th day of December, 2011.

Project Director
Project Implementation Unit (P.I.U)
JICA Funded Guwahati Water Supply Project

1 If the Bidder or any subcontractor or expert nominated by the Bidder has once been or once constituted a corrupt, fraudulent, or coercive practice and has been sanctioned by any development assistance organizations in the past five years, it shall modify the Clause B) accordingly and shall provide the following information;
(a) The name of the organization which sanctioned the Bidder or subcontractor or JVA partner, or expert nominated by the Bidder.
(b) The period of the sanction.
However, the Borrower shall not disqualify such a Bidder only because of this matter.

JWIL-RANHILL JV New Delhi

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Functional Guarantee for Power and Chemical Consumption

Project Director
Project Implementation Unit (P.I.U)
JICA Funded Guwahati Water Supply Project

Functional Guarantee

Power Consumption –for rated production Capacity

Description	unit	Raw Water Pumps	Clear Water Pumps
Transmission Flow	mld	201	191
Operation Hours	Hrs/day	23	23
Number of Pumps			
Duty operation	nos.	2	2
Standby	nos.	1	1
Pump Discharge	m3/hr	4371	4152
Pump Head	M	40	143
Motor Output (Maximum)	kW	686	2387

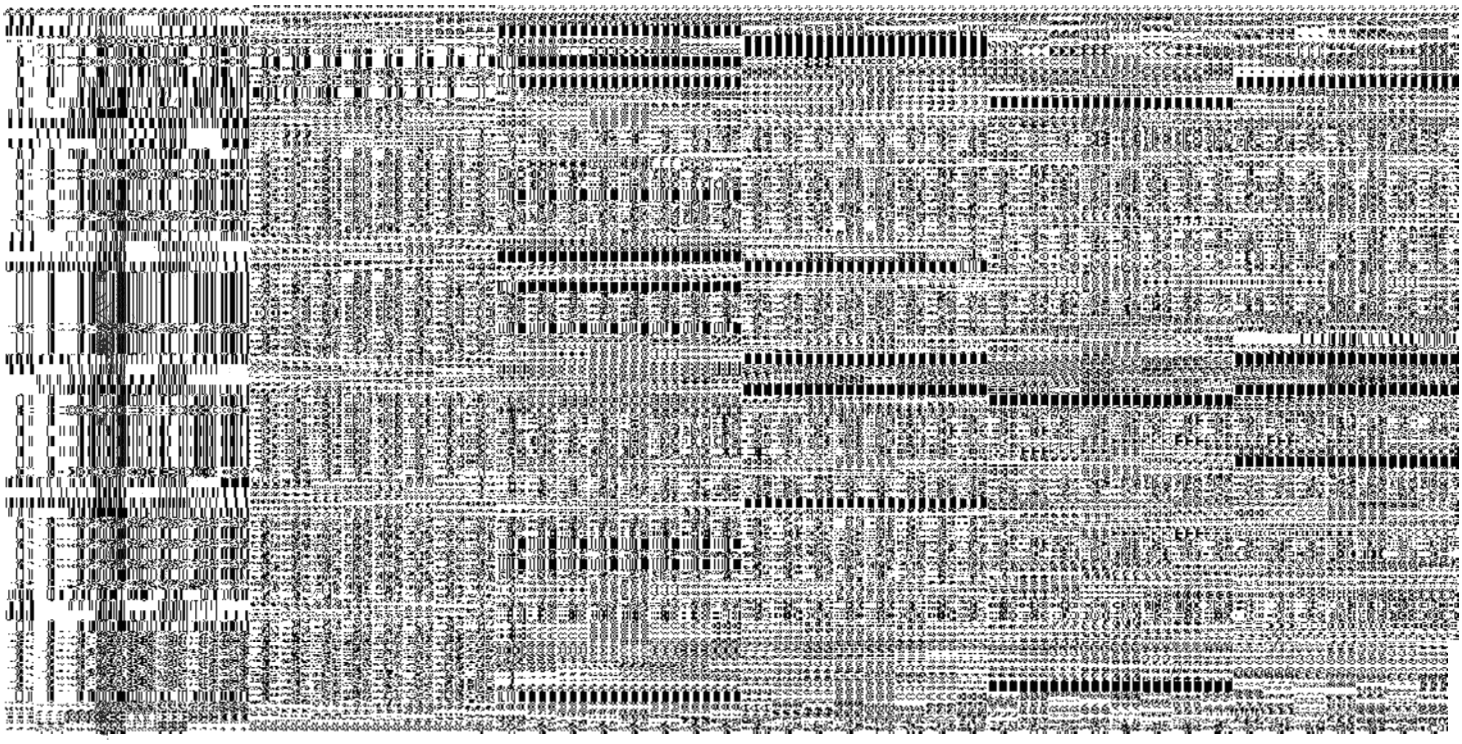
Chemical Consumption –annual average for Rated Production

Description	Water Purification Process Flow	Sludge Handling Capacity	Average Dosage Rate	Purity of Chemicals	Daily Consumption
	mld	Kg/ton	Mg/l	%	Kg/day
Alum	201	--	30	100	6040
Lime					
Post-Lime	--	--	N.R	N.R	
Pre-Lime	201	--	15	100	
Total					3020
Polymer (Flocculent)	201		1	100	202
Dewatering Polymer	--	1 Kg/Ton Dry solids	-	100	45.7
Chlorine					
Pre-Cl_2	201	--	2	100	
Post-Cl_2	191	--	1	100	
Total					1610

Project Director
Project Implementation Unit (P.I.U)
JICA Funded Guwahati Water Supply Project

Contract Agreement for Operation and Maintenance

Project Director
Project Implementation Unit (P.I.U)
JICA Funded Guwahati Water Supply Project



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Contract Agreement for Operations and Maintenance

THIS CONTRACT AGREEMENT is made the 05 day of March, 2012

BETWEEN

(1) Guwahati Metropolitan Development Authority, a corporation incorporated under the laws of India and having its principal place of business at Statefed Building, GMCH Road, Bhangagrah, Guwahati-781005, Assam India (hereinafter called "the Employer"), and (2) JWIL-Ranhill JV (Consortium of JITF Water Infrastructure Limited, India and Rabhill Utilities Sdn Bhd., Malaysia), a corporation incorporated under the laws of India and having its principal place of business at 28 Shivaji Marg, New Delhi-110015, India (hereinafter called "the Contractor").

WHEREAS the Employer desires that the permanent Plant, Equipment and all other facilities incorporated into the Works should be properly operated and maintained for the purposes for which they are intended by the Contractor after completion of construction, and has accepted a Bid by the Contractor for the operation and maintenance of such plant and equipment for a period of 60 (sixty) months after completion and acceptance of the Works.

The Employer and the Contractor agree as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to.

2.1. The following documents of main Contract Agreement (for works) shall be deemed to form and be read and construed as part of this Agreement:

(a) The Contract Agreement and the Appendixes thereto
(b) The Letter of Acceptance
(c) Addendum to Bidding Documents
(d) Particular Conditions (PC)
(e) General Conditions (GC)
(f) Technical Specifications
(g) Drawings
(h) Bid (accepted Price Bid)
(i) The Contractor's Proposal (Technical Bid)
(j) Schedules
(k) Procedures (as listed)
(l) Standard Specification
(m) Quality Assurance / Quality Control Manual
(n) Health and Safety Manual
(o) Acknowledgment of Compliance with Guidelines for Procurement under Japanese ODA Loan

2.2. Order of Precedence (Reference GCC Clause 2) – In the event of any ambiguity or conflict between the Contract Documents listed above, the order of precedence shall be the order in which the Contract Documents are listed in Article 2.1 (Contract Documents) above.

3. In consideration of the payments to be made by the Employer, or his legal successors or assignees, to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to operate and maintain the Works at its rated capacity, including maintaining the Plant and equipment in good operating condition, normal wear and tear excepted, and remedying any defects therein in conformity in all respects with the provisions of the Contract.

4. The Employer, or his legal successors or assignees, hereby covenants to pay the Contractor, in consideration of the operation and maintenance of the Works and the remedying of defects therein, the O&M Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

5. The Price Adjustment Appendix attached shall be deemed to form an integral part of the O&M contract.

6. Penalties for failure to achieve the process Guarantees for O&M shall be as per 'Operation and Maintenance' subsection of main Contract agreement (for works).

Project Director
Project Implementation Unit (P.I.U)
JICA Funded Guwahati Water Supply Project

In Witness whereof the parties hereto have caused this Agreement to be executed the day and year first before written in accordance with their respective laws.

Signed by: **Mr. Prateek Hajela, IAS,** **Project Director, JICA Assisted GWSP**	Signed by:
for and on behalf of the Employer	for and on behalf of the Contractor
in the presence of	in the presence of
Name: _____	Name _____
Signature _____	Signature _____
Address: _____	Address _____

APPENDICES

Project Director
Project Implementation Unit (P.I.U)
JICA Funded Guwahati Water Supply Project

Appendix 1. Terms and Procedures of Payment

In accordance with the provisions of GCC Clause 12 (Terms of Payment), the Employer shall pay the Contractor in the following manner and at the following times, on the basis of the Price Breakdown given in the section on Price Schedules. Payments will be made in the currencies quoted by the Bidder unless otherwise agreed between the parties. Applications for payment in respect of part deliveries may be made by the Contractor as work proceeds.

(A) Terms of Payment

Advance payment:

a) **Ten percent (10%)** of the total contract price less operation and maintenance cost as an advance payment against an irrevocable advance payment security for the equivalent amount made out in favor of the Employer.

b) The advance shall be recovered in 18 nos. equal monthly installment, with first installment commencing from the 7th month from the Effective Date. In case no interim payment is made in a particular month after 7th month, the recovery from the interim payment made in any particular month shall be equivalent to commutative recovery due but not made in proceeding month.

100% of the advance payment shall stand recovered by the end of 24th month after the scheduled date of start or 85% progressive payment of contract amount, whichever is earlier. In case of default to repay the advance payment awaited by the end of 24th month, the mobilization advance would stand recovered in full by encashment of BGs.

Schedule No. I: Preparatory Work

Ninety percent (90%) of the total accepted price of the item upon completion and cleanup, removal of debris and Contractor's equipment and materials, final grading and restoration of the Site(s) and commissioning for its intended use.

Ten percent (10%) of the total accepted price of the item upon issue of the Completion Certificate.

Schedule No. IIA: Plant and Equipment Supplied from Abroad

In respect of Plant and Equipment supplied from abroad, the following payments shall be made:

1. **Supply and delivery of pumps and motors at the intake pumping station and clear water pumping station**

   Eighty Five percent (85%) of total accepted price for the item upon supply, delivery to the site, proper storage and acceptance of the relevant item.

   Ten percent (10%) of the total accepted price of the item upon successful completion of installation and in-situ pump testing, trial runs and precommissioningof the relevant item viz. after issuing Initial Completion Certificate.

   Five percent (5%) of the total accepted price of the item upon successful completion of the commissioning, functional guarantee tests and upon issue of the Completion Certificate and Operational Acceptance Certificate, including rectifying any defects observed during this period.

2. **Supply and delivery to site of other mechanical and electrical equipment, instrumentation, etc.**

   Eighty Five percent (85%) of total accepted price for the item upon supply, delivery to the site, proper storage and acceptance of the relevant item.

   Ten percent (10%) of the total accepted price of the item upon successful completion of installation and in-situ testing, trial runs and precommissioning of the relevant item viz. after issuing Initial Completion Certificate.

   Five percent (5%) of the total accepted price of the item upon successful completion of the commissioning, functional guarantee tests and upon issue of the Completion Certificate and Operational Acceptance Certificate, including rectifying any defects observed during this period.

3. **Supply and delivery to the Site of mandatory spare parts, tools and tackles, etc**.

   100% - Progressive payment, commensurate with the approved delivery schedule, for supply, delivery to the site, proper storage and acceptance by the Employer.

Schedule No. IIB: Plant and Equipment Supplied from within the Employer's Country

In respect of Plant and Equipment supplied from within the Employer's country, the following payments shall be made:

Project Director
Project Implementation Unit (P.I.U)
JICA Funded Guwahati Water Supply Project

1. **Supply and delivery of pumps and motors at the intake pumping station and clear water pumping station**

   Eighty Five percent (85%) of total accepted price for the item upon supply, delivery to the site, proper storage and acceptance of the relevant item.

   Ten percent (10%) of the total accepted price of the item upon successful completion of installation and in-situ pump testing, trial runs and precommissioning of the relevant item viz. after issuing Initial Completion Certificate.

   Five percent (5%) of the total accepted price of the item upon successful completion of the commissioning, functional guarantee tests and upon issue of the Completion Certificate and Operational Acceptance Certificate, including rectifying any defects observed during this period.

2. **Supply and delivery to site of other mechanical and electrical equipment, instrumentation, etc.**

   Eighty Five percent (85%) of total accepted price for the item upon supply, delivery to the site, proper storage and acceptance of the relevant item.

   Ten percent (10%) of the total accepted price of the item upon successful completion of installation and in-situ pump testing, trial runs and precommissioning of the relevant item viz. after issuing Initial Completion Certificate.

   Five percent (5%) of the total accepted price of the item upon successful completion of the commissioning, functional guarantee tests and upon issue of the Completion Certificate and Operational Acceptance Certificate, including rectifying any defects observed during this period.

3. **Supply and delivery to the Site of mandatory spare parts, tools and tackles, etc**.

   100% - Progressive payment, commensurate with the approved delivery schedule, for supply, delivery to the site, proper storage and acceptance by the Employer.

Schedule No. III- Design Drawings and Documentation

In respect of design services for both the foreign currency and the local currency portions, the following payments shall be made:

1. **Detailed designs and construction documents**

   Eighty percent (80%) of the total accepted price of the item upon substantial completion, submission and approval by the Project Manager of the designs, drawings and construction documents for all major items of work

   Twenty (20%) of the total accepted price of the item upon submission and approval by the Project Manager of the final designs and construction documents for all remaining and miscellaneous construction details and working drawings.

2. **Other documents**

   100% of the total accepted price of the item upon completion, submission and approval by the Project Manager of all other documents as required under the Contract.

Schedule No. IV:. Installation and other Services

In respect of installation services for the foreign and local currency portions, the following payments shall be made:

1. **Installation of pumps and motors at intake pumping station and clear water pumping station**

   Eighty Five percent (85%) of the total accepted price of the item upon installation of the pumps and motors for the relevant item.

   Ten percent (10%) of the total accepted price of the item upon successful completion of the in-situ pump testing, trial runs and precommissioning, along with cleanup, removal of construction debris and Contractor's equipment and materials, restoration of the Site(s) and correction of any defects viz. after issuing Initial Completion Certificate.

   Five percent (5%) of the total accepted price of the item upon successful completion of the commissioning, functional guarantee tests and upon issue of the Completion Certificate and Operational Acceptance Certificate, including rectifying any defects observed during this period.

2. **Installation of other mechanical and electrical equipment and instrumentation, etc.**

   Eighty Five percent (85%) of the total accepted price of the item upon the installation of the mechanical and electrical equipment at their respective locations for the relevant item.

   Ten percent (10%) of the total accepted price of the item upon successful completion of the in-situ pump testing, trial runs and precommissioning, along with cleanup, removal of construction debris and

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Contractor's equipment and materials, restoration of the Site(s) and correction of any defects viz. after issuing Initial Completion Certificate.

Five percent (5%) of the total accepted price of the item upon successful completion of the commissioning, functional guarantee tests and upon issue of the Completion Certificate and Operational Acceptance Certificate, including rectifying any defects observed during this period.

3. Tests on Completion and Trial Run

Ninety Five percent (95%) of the total accepted price of the item upon successful completion of the tests on completion and trial run for the relevant item.

Five percent (5%) of the total accepted price of the item upon issue of the Completion Certificate, including rectifying any defects observed during this period.

4. Commissioning of the Plant

Ninety Five percent (95%) of the total accepted price of the item upon successful completion of the commissioning, including rectifying any defects observed during this period, and concurrent training of Employer's personnel for the relevant item.

Five percent (5%) of the total accepted price of the item upon issue of the Completion Certificate, including rectifying any defects observed during this period.

Schedule No. V: Civil Works

In respect of Civil works, following payments shall be made:

1. General civil works (excavation, backfilling, site grading, fencing, road works, drainage structures, power system works, buildings other than water retaining structures, etc.)

Ninety Five percent (95%) of the total accepted price of the item upon the progress achieved for the relevant item.

Five percent (5%) of the total accepted price of the item upon completion of cleanup, removal of debris and Contractor's equipment and materials, final grading and restoration of the Site(s), commissioning and upon issue of the Completion Certificate.

2. Construction of water retaining structures (e.g., filter trough, clarifier, reservoirs, etc.)

Ninety percent (90%) of the total accepted price of the item upon the progress achieved up to completion of the civil works, but prior to hydraulic testing for the relevant item.

Five percent (5%) of the total accepted price of the item upon successful completion of hydraulic testing of the water retaining structures and correction of any defects for the relevant item.

Five percent (5%) of the total accepted price of the item upon commissioning and upon issue of the Completion Certificate.

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Schedule No. VI: Day Work

Each Provisional Sum shall only be used, in whole or in part, in accordance with the Project Manager's instructions, and the Contract Price shall be adjusted accordingly. The total sum paid to the Contractor shall include only such amounts, for the work, supplies or services to which the Provisional Sum relates, as the Project Manager shall have instructed. The Provisional Sum may be used for executing works due to change of facilities / change order as may be instructed by the Project Manager. The value of such work shall be determined as per the provision of the contract. The Contractor shall, when required by the Engineer, produce quotations, invoices, vouchers and accounts or receipts in substantiation.

The terms of payment of provisional sum shall be as per the terms of payment of corresponding schedule/s depending on the nature of work viz. supply, installation, civil work etc.

Schedule No. VII: Operation and Maintenance Services

100% - On completion of each month's operations and maintenance.

(B) Payment Terms and Procedures

The procedures to be followed in applying for certification and making payments shall be as follows:

1. All payments shall be made within 60days after receiving invoices of appropriate elements in the price Schedules, after due check by accounts & audit by the Accounts Section of Project Manager's Office, and corrections as deemed fit for justified reasons.
2. All payments shall be treated as advances till settlement of Final Accounts & Billing and in the event of any over payments or wrong payments are noticed the same shall be adjusted or recovered forthwith, from the Contractor, from any amount due to him.
3. The mobilisation advance shall not carry any interest.

4. An interest of 4% (Four percent) per annum is payable by the employer if the disbursement of payment is delayed beyond its due date.

The payments will be as certified by the Project Manager and as per disbursement procedure of JICA ODA Loan.

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