	Description	Unit	Particulars
d.	Maximum Head Loss (at 0.6 m3/min)	cm	NA
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 1
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
8.	**Piping** [2]		Referred to Schedule C for valve details
8.1	Inlet Gates or Valves	mm	Gates (300 mm x 300 mm)
8.2	Filter Outlet Pipes and Valves or Siphons	mm mm	Pipes and valves -200 mm dia
8.3	Air Scouring Pipes and Valves	mm	150 mm
8.4	Backwash Pipes and Valves	mm	350 mm

JWIL-RANHILL JV New Delhi

JITF Water Infrastructure Limited New

Project Director
Implementation Unit
Guwahati Water Supply

	Description	Unit	Particulars
8.5	Filter Drain Pipes and Valves	mm	100
8.6	Filter Outlet Header or Conduit	mm	Refer layout
8.7	Air Scouring Main	mm	250
8.8	Backwash Main	mm	500
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	7.2 + 7.2
e.	Length	m	14
f	Side Water Depth	m	3
g	Free Board	m	0.3
h	Effective Volume (Total)	m^3	593
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.

JWIL - RANHILL JV New Delhi

Jal Water Infrastructure Limited New Delhi

Project Director
Implementation Unit
Funded Guwahati Water Supply

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
b.	Length	m	25
c.	Effective Water Depth	m	3
d.	Free Board	m	0.3
2.3	Effective Volume	m3	2375
3.	**Piping** [2]		Referred to Schedule C for valve details
3.1	Inlet Pipes and Valve or Gates	mm	Gates : 800 x 800
3.2	Outlet Pipes and Valves or Gates	mm	Gates provided in partition wall between pump sump and compartments
3.3	Overflow Pipes	mm	300 x 4 Nos
3.4	Drain Pipes and Valves	mm	100
3.5	Gate on Partition Wall of Pump Suction Well	mm	Gates : 800 x 800
4.	**CW Pumping Station**		Refer to Schedule B.3

JWIL RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

Project Direc
Implementatio
JICA Funded Guwahati Wa

	Description	Unit	Particulars
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	6.5
b.	Length	m	14
c.	Effective Water Depth	m	3
d.	Free Board	m	0.3
2.3	Effective Volume (total)	m^3	543
3.	**Piping** [1]		
3.1	Inlet Pipes and Valve or Gates	mm	Gate : 800 x 800
3.2	Outlet Pipes and Valves or Gates	mm	Gates between compartments and pump sump : 800 x 800

JWIL-RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

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

	Description	Unit	Particulars
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	4.6
b.	Length	m	12
c.	Effective Water Depth	m	2
d.	Free Board	m	0.3
2.3	Effective Volume (total)	m^3	220
3.	**Piping** [1]		
3.1	Inlet Pipes and Valve or Gates	mm	Gates : 200 x 200
3.2	Outlet Pipes and Valves or Gates	mm	Gates between compartments and pump sump : 200 x 200
3.3	Overflow Pipes	mm	--

JWIL-RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

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

	Description	Unit	Particulars
4.	**Sludge Transfer Pumps to Thickener**		
4.1	Type of Pumps		Vertical sump pump
4.2	Number of Pumps		2 Nos
a.	Duty	units	1
b.	Standby	units	1
4.3	Size of Suction/Deliver of Pumps	mm	Delivery Pipe : 100 mm
4.4	Pump Head	m	40
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**	--	RCC Thickener /Drum thickener
2.	**RCC Thickener**		Yes
2.1	Loading of Thickener	Kg/day	16996 For all thickeners
2.2	Number of Thickener	nos.	2
2.3	Dimensions of a Thickener		
a.	Diameter	m	24
b.	Effective Side Depth	m	4

JWIL-RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

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

	Description	Unit	Particulars
c.	Depth of Volume	m^3	DDE
d.	Depth of Sludge Deposit	m	1:10 Slope
e.	Volume of Sludge Deposit	m^3	DDE
f.	Total Volume of Thickener	m^3	DDE
h.	Free Board	m	0.3
2.4	Sludge Scraper		
a.	Type of Scraper		Circular rotating
b.	Motor Output	kW	Refer electrical load list
2.5	Piping 1		
a.	Inlet Pipes and Valve	mm	100
b.	Supernatant Outlet Pipes and Valves	mm	80
3.	**Rotating Drum Thickner[2]**		Not applicable
4.	**Sludge Extraction Pumps to Sludge Dewatering Building**		
4.1	Type of Pumps		Progressive cavity type
4.2	Number of Pumps		
a.	Duty	units	1
b.	Standby	units	1
4.3	Size of Suction/Deliver of Pumps	mm	100/80
4.4	Pump Head	m	30
4.5	Motor Output	kW	Refer electrical load list

JITF Water Infrastructure Limited New Delhi

JWIL RANHILL JV New Delhi

Project Director
Project Implementation Unit
JICA Funded Guwahati Water Supply Project

	Description	Unit	Particulars
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.		

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	Yes/No	Yes

JWIL RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

Project ... t (P.I.U)
JICA F... upply Project

	Description	Unit	Particulars
	room		
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
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

JWIL RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

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

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	12 m x 6 m
2.2	Rooms		
a.	Backwash air blower room	Yes/No	Yes
c.	Electrical cum Control room	Yes/No	Included in 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

JWIL-RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

	Description	Unit	Particulars
b.	Electrical cum Control room	Yes/No	Included in 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			

B.3.5 Chemical House

	Description	Unit	Particulars
1.	**Structure (number of floors)**	nos.	Ground + first
2.	**Ground Floor [1]**		
2.1	Total Area	m^2	21 m x 12m
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	21 m x 12m

	Description	Unit	Particulars
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	No
g.	Bathroom	Yes/No	No
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	30 m x 6 m
2.2	Rooms		
a.	Chlorine cylinder storage	m^2	20 m x 6m

JWIL - RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

Project
JICA Fu

	Description	Unit	Particulars
	room		
b.	Chlorinator room	m^2	5 m x 6 m
c.	booster pump room	m^2	5 m 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			

B.3.7 Sludge Thickened Extraction Pump House

	Description	Unit	Particulars
1.	**Structure (number of floors)**	nos.	One
2.	**Floor Area** [1]		
2.1	Total Area	m^2	10 m x 6 m
2.2	Rooms		
a.	Electrical room	Yes/No	Yes
b.	Control room	Yes/No	Yes
c.	Pump room	Yes/No	Yes
d.	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			

JWIL-RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

Project Initiate
JICA Funded

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		22 m x 11m
2.2	Rooms		
a.	Sludge storage tanks, Polymer dosage equipment and Sludge feed pumps, miscellaneous equipment and piping area	Yes/No	Provided in open area
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		22m x 11m
3.2	Rooms		
a.	Dehydrators area	m^2	Provided
b.	Electric room	Yes/No	Included in dehydrator area
c.	Control room	Yes/No	Included in dehydrator area
d.	Duty	Yes/No	No.

JWIL RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

Project ...
JICA Fur

	Description	Unit	Particulars
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			

B.3.9 Maintenance and Store House

	Description	Unit	Particulars
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

JITF Water Infrastructure Limited New Delhi

JWIL RANHILL JV New Delhi

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

	Description	Unit	Particulars
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

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

JWIL – RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

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

	Description	Unit	Particulars
3.5	Discharge Elbow Diameter	mm	400
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	847
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	65 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	%	83
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[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.

JWIL RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

Project Director
Project implement
JICA Funded Guwahati

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/ 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	350
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	805
4.2	Water levels	m	Refer WTP HFD
4.3	Total Head at Design Point	m	29 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

JWIL RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

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

	Description	Unit	Particulars
4.6	Efficiency at Design Point	%	83
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[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

JWIL RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

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

	Description	Unit	Particulars
4.	**Guaranteed Performance**		
4.1	Capacity at Design Point (per pump)	m3/hr	1230
4.2	Discharge Pressure at Design Point	MWC	4
4.3	Efficiency at Design Point	%	DDE
4.4	Rated Speed at 50 Hz	rpm	DDE
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	700
3.3	Wall Thickness	mm	< = 10
3.4	Lining & Coating	mm	

JWIL RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

Project Director

	Description	Unit	Particulars
a.	Lining		
	Materials	--	Epoxy
	Thickness (dry film)	microns	150
b.	Coating		
	Materials	--	Epoxy
	Thickness (dry film)	microns	150
4.0	**Length of Raw Water Piping**	m	Around 4000
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 (to hill top reservoir)

	Description	Unit	Particulars
1.	**Country of Origin**	--	India
2.	**Name of Manufacturer**	--	Jindal Saw/ Equivalent
3.	**Pipes**		
3.1	Pipe Materials	--	DI
3.2	Nominal Size	mm	500
3.3	Wall Thickness	mm	K-9
3.4	Lining & Coating	mm	
a.	Lining		
	Materials	--	Internal Cement mortar lining
	Thickness (dry film)	microns	DDE

JITF Water Infrastructure Limited New Delhi

Project Director
JICA Fu...

	Description	Unit	Particulars
b.	Coating		
	Materials	--	External zinc coating
	Thickness (dry film)	microns	DDE
4.0	**Length of Clear Water Piping**	m	Up to hill top reservoir located inside WTP

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

C.2.4 Raw Water Intake Gates and Screen

JITF Water Infrastructure Limited New Delhi

Project Implementation Unit JICA

	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
b.	Size (width x height)	^{W}mmx^{H} mm	900 x 900
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	1000 x 1000
b.	Structures and Materials for Construction [1]	--	RCC intake structure
c.	Clear opening size	mm	80

JWIL RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

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
3.2	Type of Flow Controller	--	Butterfly valves
3.3	Nominal Diameter	mm	700
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.

JWIL-RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

Project Director
Project Implementation Unit
JICA Funded Guwahati Water Supply Project

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	600 X 600
c.	Structures and Materials for Construction [1]	--	CI
d.	Actuator	--	(manual)
e.	Number of Gates	units	2
4.	**Flash Mixing Tanks (Gate or Valve)**		
a.	Pressure Rating	m or Kg/cm^2	suitable
b.	Type of Valve	--	Not considered since only one flash mixer is provided
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
5.	**Flocculation Tanks** (Gate or Valve)		Gate
a.	Pressure Rating	m or	Suitable

JITF Water Infrastructure Limited New Delhi

JWIL-RANHILL JV New Delhi

Project Director
Proje
JICA

	Description	Unit	Particulars
		Kg/cm^2	
b.	Type of Valve	--	Gates provided
c.	Nominal Size or Diameter	mm	600 x 600
d.	Structures and Materials for Construction [1]	--	CI
e.	Actuator	--	Manual
f.	Number of Gates or Valves	units	Two
6.	**Settling Tanks**		
a.	Pressure Rating	Mp or Kg/cm^2	Not applicable
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		300 mm x 300 mm

JWIL RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

Project Director

	Description	Unit	Particulars
d.	Structures and Materials for Construction [1]	--	CI
e.	Actuator		(motorized) [2]
f.	Number of Gates	units	6 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		200 mm
d.	Structures and Materials for Construction [1]	--	CI
e.	Actuator		(motorized) [2]
f.	Number of Valves	units	12
7.3	Air Scouring Valves		
a.	Pressure Rating	Mp or Kg/cm^2	PN 10
b.	Type of Valve	--	Butterfly
c.	Nominal Diameter		150 mm
d.	Structures and Materials for Construction [1]	--	CI
e.	Actuator		(motorized) [2]
f.	Number of Valves	units	12

JWIL RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

Project Implementation

	Description	Unit	Particulars
7.4	Backwash Valves		
a.	Pressure Rating	Mp or Kg/cm^2	PN 10
b.	Type of Valve	--	Butterfly
c.	Nominal Diameter		350 mm
d.	Structures and Materials for Construction [1]	--	CI
e.	Actuator		(motorized) [2]
f.	Number of Valves	units	12
8.	**Clear Water Reservoir**		
8.1	Inlet Gates or Valves		Gates
a.	Pressure Rating	Mp or Kg/cm^2	suitable
b.	Type of Valve	--	Gates considered
c.	Nominal Diameter		800 mm x 800 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

JWIL-RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

Project Director

b.	Type of Valve	--	Gates considered
c.	Nominal Diameter		800 mm x 800 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		800 mm x 800 mm
c.	Structures and Materials for Construction [1]	--	CI
d.	Actuator		(manual)
e.	Number of Valves/Gates	units	1
9.	**Distribution Reservoir**		
9.1	Inlet Gates or Valves		Gates
a.	Pressure Rating	Mp or Kg/cm^2	Suitable
b.	Type of Valve	--	Gates provided
c.	Nominal Diameter		800 x 800
d.	Structures and Materials for Construction 1	--	CI

JWIL RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

Project Director
Project Implementation Unit (P.I.U)
JICA [illegible] Guwahati Water Supply Project

	Description	Unit	Particulars
e.	Actuator		Manual
f.	Number of Valves	units	2 Gates
9.2	Outlet Gates or Valves		Valves to be provided outside the tank by Client to connect to each compartment
a.	Pressure Rating	Mp or Kg/cm^2	By client
b.	Type of Valve	--	By client
c.	Nominal Diameter		By client
d.	Structures and Materials for Construction 1	--	By client
e.	Actuator		By client
f.	Number of Valves	units	By client

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

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

JWIL-RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

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

	Description	Unit	Particulars
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	1560
	Average	kg/day	1170
	Minimum	kg/day	980
c.	Dosage of Alum Solution		
	Maximum	l/day	15600 (at 10% concentration)
	Average	l/day	11700 (at 10% concentration)
	Minimum	l/day	9800 (at 10% concentration)
d.	Alum Storage		

JWIL-RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

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

	Description	Unit	Particulars
	Storage by weight	tone	35.1
	Storage area required	m^2	30 (Net area)
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	9
	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.	Alum Solution Transfer Pump		
	Type	--	Progressive cavity
	Number of pumps		
	Duty	units	1
	Standby	units	1

JITF Water Infrastructure Limited New Delhi

Project Director
Project Implementation Unit (P.I.U.)
JICA F[illegible] Guwahati Water Supply Projec

	Description	Unit	Particulars
	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

C.3.2 Lime Dosage Equipment

	Description	Unit	Particulars
1.	**Chemical Applications**		
1.1	Chemical Characteristics		
a.	Type of Chemical (powder form)		Powder
b.	CaO Contents	%	-
c.	Purity Contents of Ca(OH)2	%	90%
d.	Concentration of Lime Solution (in weight)	%	5 to 10%

JITF Water Infrastructure Limited New Delhi

Project Director

	Description	Unit	Particulars
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	780
	Average	kg/day	585
	Minimum	kg/day	390
b..	Dosage of Lime Solution (Pre-Lime)		
	Maximum	l/day	7800 (at 10% solution concentration)
	Average	l/day	5850 (at 10% solution concentration)
	Minimum	l/day	3900 (at 10% solution concentration)
c.	Dosage of Lime Solution (Post-Lime)		
	Maximum	l/day	NR

JWIL-RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

	Description	Unit	Particulars
	Average	l/day	NR
	Minimum	l/day	NR
1.4	Lime Storage		
a.	Lime Storage by weight	tone	17.5
b.	Storage area required	M^2	16 (Net area)
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	4
	Dimensions (width x length x depth)	m	DDE
	Inside Lining	--	Chemical proof ceramic lining
b.	Mixer		
	Type	--	Motorized
	Number	units	2
	Motor output	kW	Refer electrical load list
c.	Lime Solution Transfer Pump		
	Type	--	Progressive cavity

JWIL-RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

Project Director
Project Implementation Unit (P
JICA Funded Guwahati Water Supply P

	Description	Unit	Particulars
	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.

C.3.3 Polymer Dosage Equipment

	Description	Unit	Particulars
1.	**Chemical Applications**		(Flocculent poly)
1.1	Chemical Characteristics		

JWIL-RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

	Description	Unit	Particulars
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	39
	Average	kg/day	39
	Minimum	kg/day	20
c.	Dosage of Polymer Solution		
	Maximum	l/day	3900 (At 1% Solution concentration)
	Average	l/day	3900 (At 1% Solution concentration)
	Minimum	l/day	2000 (At 1% Solution concentration)
d.	Polymer Storage		
	Storage by weight	kg	2
	Storage area required	m^2	2
1.3	Unit price of Polymer[2]	Rs/kg	200

JWIL-RANHILL JV New Delhi

JITF Water Infrastructure Limited

Project Director

	Description	Unit	Particulars
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	4000 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.

JWIL-RANHILL JV New Delhi

JITF Water Infrastructure

Project Director
Project Implementation Unit (PIU)
JICA Funded Project

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	191
	Average rate	kg/day	115
	Minimum rate	kg/day	115
d.	Dosage of Chlorine - Pre-Chlorination		
	Maximum rate	kg/day	117
	Average rate	kg/day	78

JITF Water Infrastructure Limited New Delhi

JWIL-RANHILL JV New Delhi

	Description	Unit	Particulars
	Minimum rate	kg/day	78
e.	Dosage of Chlorine - Post-Chlorination		
	Maximum rate	kg/day	74
	Average rate	kg/day	37
	Minimum rate	kg/day	37
1.3	Chlorine Storage		
a.	Storage by weight	Kg	3450 (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

JWIL-RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

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

	Description	Unit	Particulars
	Standby	nos.	Not applicable
c.	Chlorinators (Pre-Chlorination)		
	Type	--	Vacuum type
	Capacity	kg/hr	2 x 5
	Number of unit - Duty	nos.	1
	Standby	nos.	1
	Chlorinators (Post-Chlorination)		
	Type	--	Vacuum type
	Capacity	kg/hr	2 x 4
	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		

JWIL RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

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

	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

JWIL RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

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

[redacted]	Description	[redacted]	[redacted]

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.

JWIL-RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

Project Director
Project Implementation Unit (P.I.U)
JICA [redacted] ity Project

D. Electrical and Instrumentation/Control Equipment

DATA SHEET–: SPECIFIC DATA

MAIN TRANSFORMER

Description	Unit	Particulars
General		
Quantity required		Main Transformer
		2 nos. of 33/0.45kV for WTP 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	1600 KVA
No load voltage Primary	kV	33
Secondary	kV	0.45
Number of phases		3
Rated frequency	Hz	50
Impedance voltage	%	As per IEC/BIS
Vector group		Dyn11
Winding material		Electric Grade Copper
Type of cooling		ONAN

JITF Water Infrastructure Limited New Delhi

JWIL-RANHILL JV New Delhi

Project Director

Description	Unit	Particulars
System Voltage		
Nominal system voltage Primary	kV	33
Secondary	kV	0.43
Highest system voltage - Primary	kV	36
- Secondary	kV	0.45
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 measurement)	^{0}C	55
- Top oil temperature rise (by thermometer)	^{0}C	50
Tap Changing Gear		
Type of tap changer		On Load Tap Changer
Tapping range	%	± 10%

JWIL-RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

Project Im... JICA Funded...

Description	Unit	Particulars
Tapping steps	%	1.25
Bushings		
Rated voltage – Primary	kV	36
– Secondary	kV	0.45
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, (During Detail Eng)sq. mm. aluminum, XLPE, screened, armoured cable
- Secondary		3.6 / 6 / (7.2) kV, 3Cx (During Detail Eng) sq. mm. aluminum, XLPE, screened, armoured, cable
Accessories		OTI, WTI, MOG, Buchholz relay, Pressure relief valve, conservator, pressure relief device on OLTC

JWIL-RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

Project Director
Implementation Unit
JICA Funded Guwahati Water Supply Project

MAIN TRANSFORMER

Description	Unit	Particulars
General		
Quantity required		Auxiliary Transformer
		2 nos. each of 3.3/0.433kV for 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	1000 KVA
No load voltage Primary	kV	3.3
Secondary	kV	0.433
Number of phases		3
Rated frequency	Hz	50
Impedance voltage	%	As per IEC/BIS
Vector group		Dyn11
Winding material		Electric Grade Copper
Type of cooling		ONAN
System Voltage		

JWIL-RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

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

Description	Unit	Particulars
Nominal system voltage Primary	kV	3.3
Secondary	kV	0.415
Highest system voltage - Primary	kV	33
- 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)	0.45
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
- 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

JWIL RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

Project Director
Project Implementation Unit (P.I.U
JICA Funded G... Supply Proje

Description	Unit	Particulars
Bushings		
Rated voltage – Primary	kV	33
– Secondary	kV	0.45
One minute power frequency withstand voltage (dry and wet) – Primary	kV (rms)	10
- Secondary (Line and Neutral)	kV (rms)	0.43
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, (During Detail Eng) sq. mm. aluminum, XLPE, screened, armoured cable
- Secondary		0.6 / 1 (1.2) kV, 3Cx (During Detail Eng) sq. mm. aluminum, XLPE, armoured cables.
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.

JWIL RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

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

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		
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	kV (rms)	70

JWIL RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

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

across open switching devices		
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 Voltage factors for PTs		120% of rated primary current 1.2 Continuous/ 1.5 for 30 sec. For effectively earthed system 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

JWIL-RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

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

Description	Unit	Particulars
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

LIGHTNING ARRESTERS

Description	Unit	Particulars
General		
Application		Outdoor
Type of Arrester		Metal Oxide (Without gaps)
Rated frequency	Hz	50

JWIL_RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

Description	Unit	Particulars
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
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

JWIL-RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

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

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
Nominal creepage distance of each insulator	mm/kV	31

JWIL RANHILL JV New Delhi

JTF Water Infrastructure Limited New Delhi

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

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
Color finish shade		
- Interior		Glossy White
- Exterior		Light Grey Semi Glossy

JWIL RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

Project Director
Project Implementation Unit (P.I.U)
JICA Funded Guwaha[illegible] Sup[illegible]

Description	Unit	Particulars
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
Earthing switch		Required
Current and Voltage Transformers		
Details of ratio, taps, burden, accuracy		As per Single Line Diagram (*)

JWIL – RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

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

Description	Unit	Particulars
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
Operating mechanism		
- Closing and opening		Spring charged
- Control voltage	V	110V DC

JWIL RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

Project Director
Project Implementation Unit
JICA Funded Guwahati Water Supply Project

Description	Unit	Particulars
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

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

JWIL RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

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

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	0.45
Insulation levels		F

JWIL – RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

Description	Unit	Particulars
Rated lightning impulse withstand voltage		
- Across the isolating distance	kV (peak)	As per Spec
- Phase to phase, between phases and across open switching devices	kV (peak)	As per Spec
Rated short duration power frequency withstand voltage		
- Across the isolating distance	kV (rms)	During Detail Eng
- Phase to phase, between phases and across open switching devices	kV (rms)	During Detail Eng
Installation		Indoor
Enclosure		
- Sheet steel thickness	mm	2.5
- Degree of protection		IP – 55
- Color finish shade		Light Grey Semi Glossy
External cable details		1.1 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

JWIL-RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

Project Director
JICA Funded Guwahati Water Supply Project (P...

CAPACITOR AND CONTROL PANEL

Description	Unit	Particulars	
Capacitor Bank			
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	0.45	
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		1.1 kV, 3C x (During Detail Eng) Aluminum, XLPE, armoured	

JWIL – RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

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

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)
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)

JWIL – RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

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

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		

JWIL - RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

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

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)

JWIL RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

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

Description	Unit	Particulars
Auxiliary supply	V	110V DC
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

JWIL RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

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

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

JWIL-RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

Project Director
Project Implementation
JICA Funded Guwahati

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

JWIL-RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

Project Director
Project Implementation Unit (P.I.U
CA Funded Guwahati Water Supply Proje

Sl.No.	Description	Particulars
	ii) Enclosure	Sheet steel (min. 2mm thick enclosure conforming to IP-42
9	Rectifier Transformer	
	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)

JWIL RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

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

Sl.No.	Description	Particulars
		DC-3 (for D.C. contactor)
15	Meter	
	i) Size	96 x 96 mm^2
	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

JWIL RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

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

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

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

JWIL-RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

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
8	Permissible Voltage and frequency variation	
	Voltage	10%

JWIL-RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

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

Sl.No	Description	Particulars
	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

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

JWIL-RANHILL JV New Delhi

JITF Water Infrastructure Limited

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.
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%

JITF Water Infrastructure Limited New Delhi

JWIL RANHILL JV New Delhi

Project Director

Sl.No	Description	Particulars
	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

JITF Water Infrastructure Limited New Delhi

Project Im... ...ctor
JICA Funded...

JWIL RANHILL JV New Delhi

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

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

IL&FS Water Infrastructure Limited
New Delhi

JWIL-RANHILL JV
New Delhi

Spare 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

JWIL - RANHILL JV New Delhi

JIT Water Infrastructure Limited New Delhi

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

Item No.	Description	unit	quantity
	Moisture absorbent	%	100
3	HV and MV Circuit Breakers and Contactors		
	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

JWIL-RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

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

Item No.	Description	unit	quantity
	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
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

JWIL-RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

Project Director
Project Implementation Unit (I
JICA Funded Guwahati Water Supply I

Item No.	Description	unit	quantity
	Timers of each type	sets	2
	Signals and annunciator lights of each type	sets	2
	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

JWIL-RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

Project Director
Project Implementation Unit
JICA Funded Guwahati Water Supply

Item No.	Description	unit	quantity
	Springs, packings, split pins and bolts/nuts of each type	sets	5
	Lubricants with hand pump	litres	200
	Spare parts chests	lot	1
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	set	1

JWIL RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

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

Item No.	Description	unit	quantity
	rating		
	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
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

JWIL-RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

Project Director
Project Implementation Unit
JICA Funded Guwahati Water Supp

Item No.	Description	unit	quantity
	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 fluorescent 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

JWIL-RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

Project Director

Item No.	Description	unit	quantity
	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
	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

JWIL-RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

Project Director
Project Implementation Unit
JICA Funded Guwahati Water Supply Project

Item No.	Description	unit	quantity
	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
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

JWIL - RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

Project : ADB Funded Guwahati Water Supply Pr

Item No.	Description	unit	quantity
	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		
	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

JITF Water Infrastructure Limited New Delhi

JWIL-RANHILL JV New Delhi

Project Director
Project Implementation Unit (P
JICA Funded Guwahati Water Supply P

[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.

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.3 Instrumentation and Control Equipment

D.3.1 Instrumentation Equipment

	Description	Unit	Particulars
1.	**Origin of Country**		
2.	**Manufacturer**		
3.	**Major Parameters and Equipment**		
3.1	Flow Meters		
a.	Raw Water Transmission Flow meter		

JWIL-RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

Project Director
Project Implementation Unit
JICA Funded Guwahati Water Supply

	Description	Unit	Particulars
	Type of flow meter	--	Full Bore Electromagnetic
	Size (nominal diameter)	mm	DDE
b.	Raw water Flow in WTP	A	
	Type of flow meter (optional)		Ultrasonic
	(Pershall Flume)		
	Dimensions [1] - for Phase 1	mm	DDE
	- for Phase 2	mm	DDE
	(Electromagnetic Flow Meter)		
	Size (nominal diameter)	mm	DDE
c.	CW Transmission Flow		
	Type of flow meter (optional)		Ultrasonic
	(Pershall Flume)		
	Dimensions [1] - for Phase 1	mm	DDE
	- for Phase 2	mm	DDE
	(Electromagnetic Flow Meter)		
	Size (nominal diameter)	mm	DDE
d.	Distribution Flow		
	Type of flow meter	--	Full Bore Electromagnetic
	Size (nominal diameter)	mm	DDE

note:

1 The Bidder shall submit key dimensions with calculation of pershall flume for Phase 1 and Phase 2 requirement in a separate sheet.

JITF Water Infrastructure Limited New Delhi

JWIL-RANHILL JV New Delhi

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

D.3.3 SCADA SYSTEM

D.3.3.1 Main Processor

	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	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"

JWIL - RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

Project Director
Project implementation Unit (I
ADB Funded Guwahati Water Supply

	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		DDE
3.8	Software and Hardware		
a.	SCADA System Hardware		Yes
b.	Operating System Platform		Yes
c.	Programmed PLC		Yes
d.	Anti Virus		Yes

note:

1 The Bidder shall submit key dimensions with calculation of pershall flume for Phase 1 and Phase 2 requirement in a separate sheet.

JITF Water Infrastructure Limited New Delhi

JWIL-RANHILL JV New Delhi

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

D.2.2 Engineering Work Station

	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
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 "

JWIL-RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

Project Director
Project Implementation Unit (
ADB Funded Guwahati Water Supply

	Description	Unit	Particulars
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		DDE
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.	SCADA System Hardware		yes
b.	Operating System Platform		yes
c.	Programmed PLC		yes
d.	Anti Virus		yes

note:

[2] The Bidder shall submit key dimensions with calculation of pershall flume for Phase 1 and Phase 2 requirement in a separate sheet.

JITF Water Infrastructure Limited New Delhi

JWIL RANHILL JV New Delhi

Project Director
Project Implementation Unit
JICA Funded Guwahati Water Supply Project

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)
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 "

JITF Water Infrastructure Limited New Delhi

JWIL-RANHILL JV New Delhi

	Description	Unit	Particulars
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		
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:

3 The Bidder shall submit key dimensions with calculation of pershall flume for Phase 1 and Phase 2 requirement in a separate sheet.

JITF Water Infrastructure Limited New Delhi

JWIL RANHILL JV New Delhi

Project Director
Project Implementation Unit (P
KfW Funded Guwahati Water Supply Pro

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
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 "

JWIL RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

Project Director
Project Implementation Un
JICA Funded Guwahati Water Supp

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		
3.8	Software and Hardware		
a.	SCDA System Hardware		yes
b.	Operating System Platform		yes
c.	Programmed PLC		yes
d.	Anti Virus		yes

note:

4 The Bidder shall submit key dimensions with calculation of pershall flume for Phase 1 and Phase 2 requirement in a separate sheet.

JITF Water Infrastructure Limited New Delhi

JWIL RANHILL JV New Delhi

Project Director
...entation Unit (P.I.
Water Supply Proj

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		
b.	Power Supply		NA
c.	Number of Rack		NA
d.	Switch Hub		NA
e.	Network Connection		NA
note: 5 The Bidder shall submit key dimensions with calculation of pershall flume for Phase 1 and Phase 2 requirement in a separate sheet.			

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

JWIL-RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

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

note:

[6] The Bidder shall submit key dimensions with calculation of pershall flume for Phase 1 and Phase 2 requirement in a separate sheet.

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
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

JWIL RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

Project Implementing Agency
JICA Funded Guwahati Water Supply Project

	Description	Unit	Particulars
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.

JWIL RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

Project Implementation Unit
JICA Funded Guwahati Water Supply Project

Schedule VII - Construction Schedule

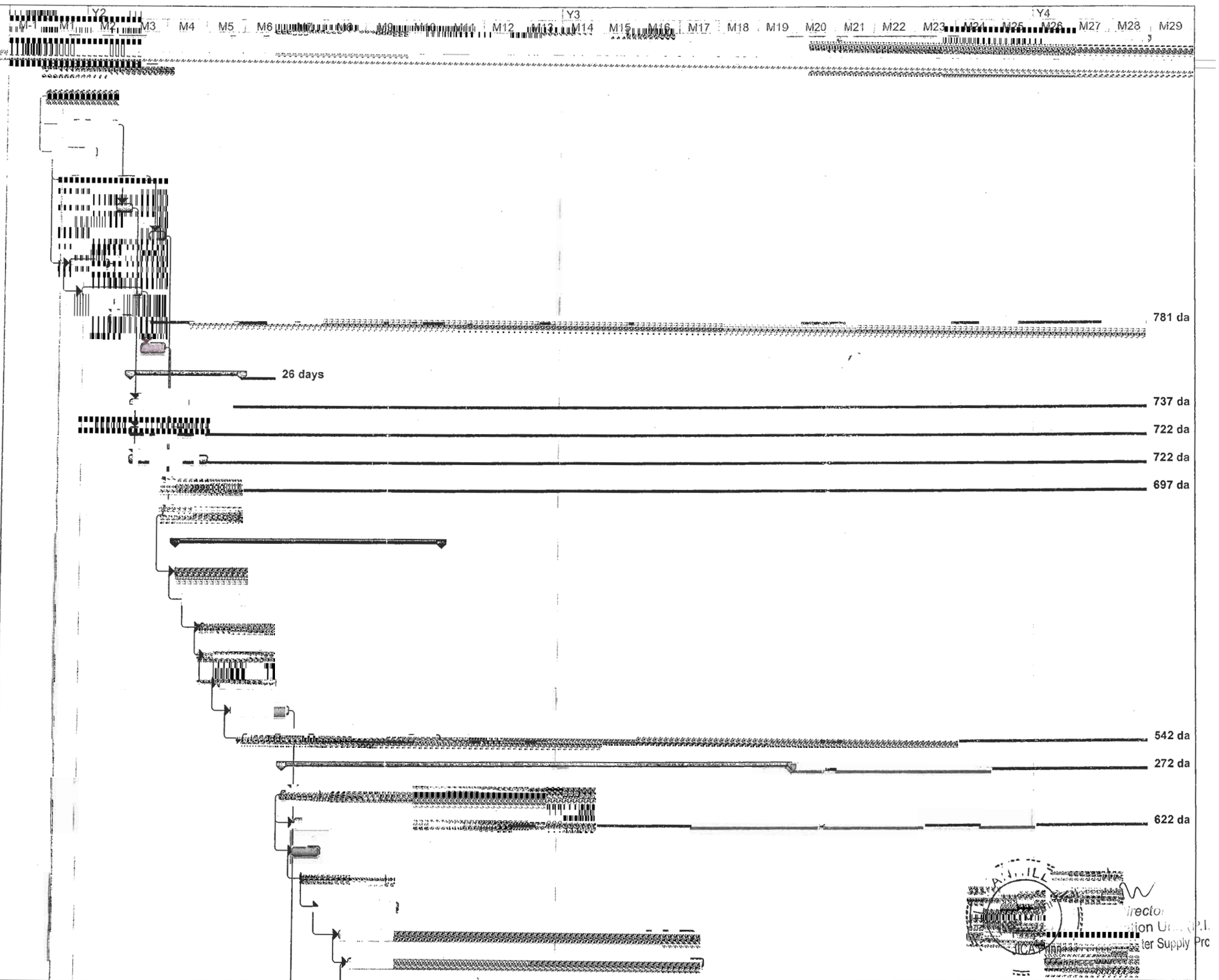
ATTACHED

JWIL-RANHILL JV New Delhi

JTF Water Infrastructure Limited New Delhi

Project Implementation Unit
JICA Funded Guwahati Water Supply

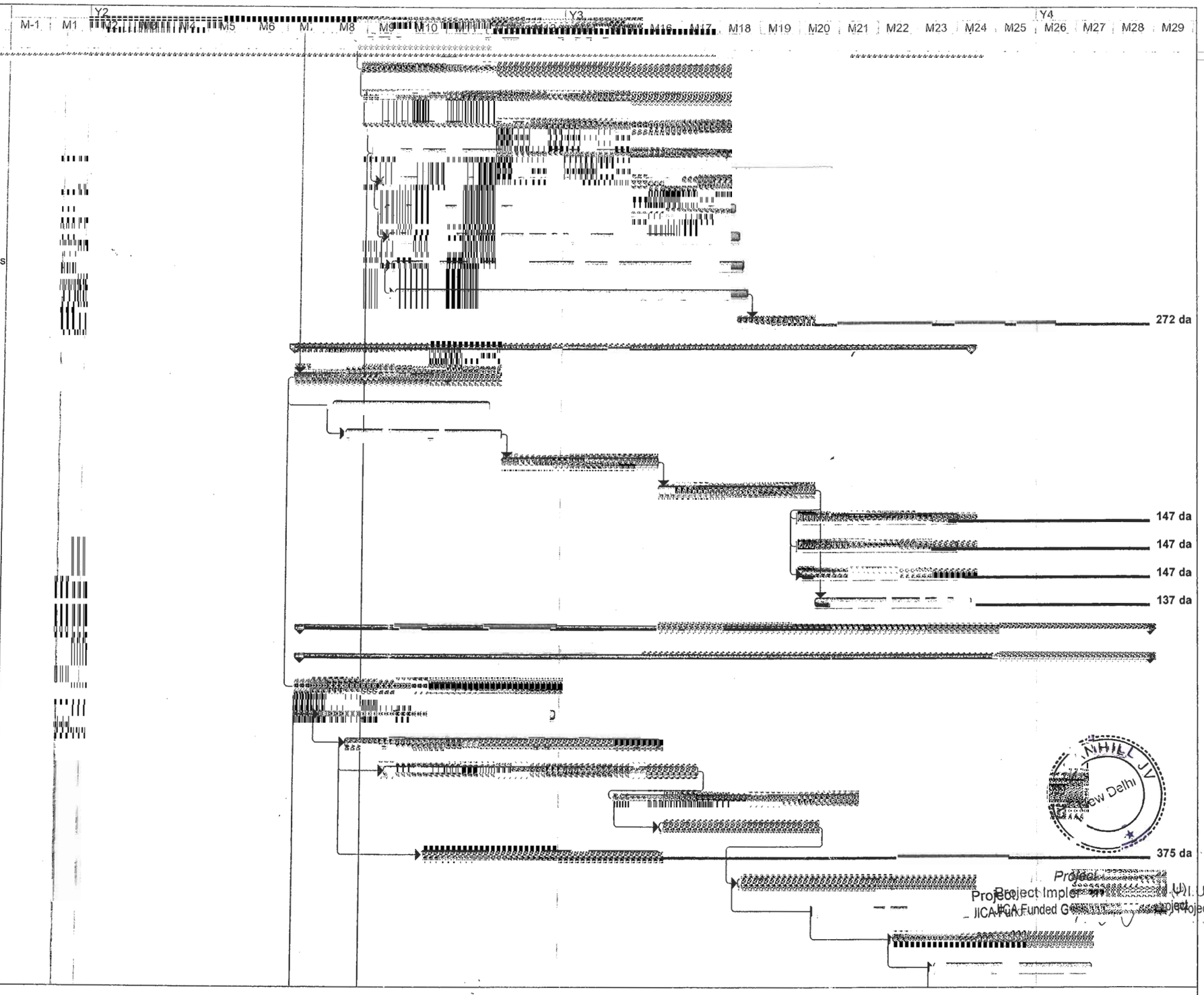
ID	Task Name
1	**37 MLD WTP -N/Gauhati = 28 Month**
2	**Soil testing / Survey**
3	P Route survey-Pipe line
4	Soil Investigation-Pipe line
5	Survey in river for Intake
6	I Soil investigation for River
7	Report for Pipe line
8	Report for Intake
9	Survey in WTP area
10	Soil investigation in WTP area
11	Report for Surveu-wtp
12	Report for Soilinvest-wtp
13	**Engineering**
14	surge analysis report by outside
15	Preparation of scope for Consultant-pipe
16	Preparation of scope for Consultant MEI
17	Preparation of scope for Intake
18	Preparation of scope for Consultant of WTP
19	**Procurement**
20	Sending enquiry of VT Pumps for Intake well/ Reservoir
21	Receiving of Offers
22	Technical Clarifications
23	Technical comparison
24	Finalization of techno-commercial order
25	Releasing of LOI
26	Equipment lead time -Pipe
27	**Construction of Pipe line-4.5Km**
28	Mobilization of Piping contractor
29	Finalization of Storage Yard
30	Finalization of Labour Camp
31	Clearing of right of way
32	Right of way preparation
33	Putting of pipe along the Route
34	Excavation & Shifting of soil



Project: MSProj11
Date: Wed 12/14/11

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

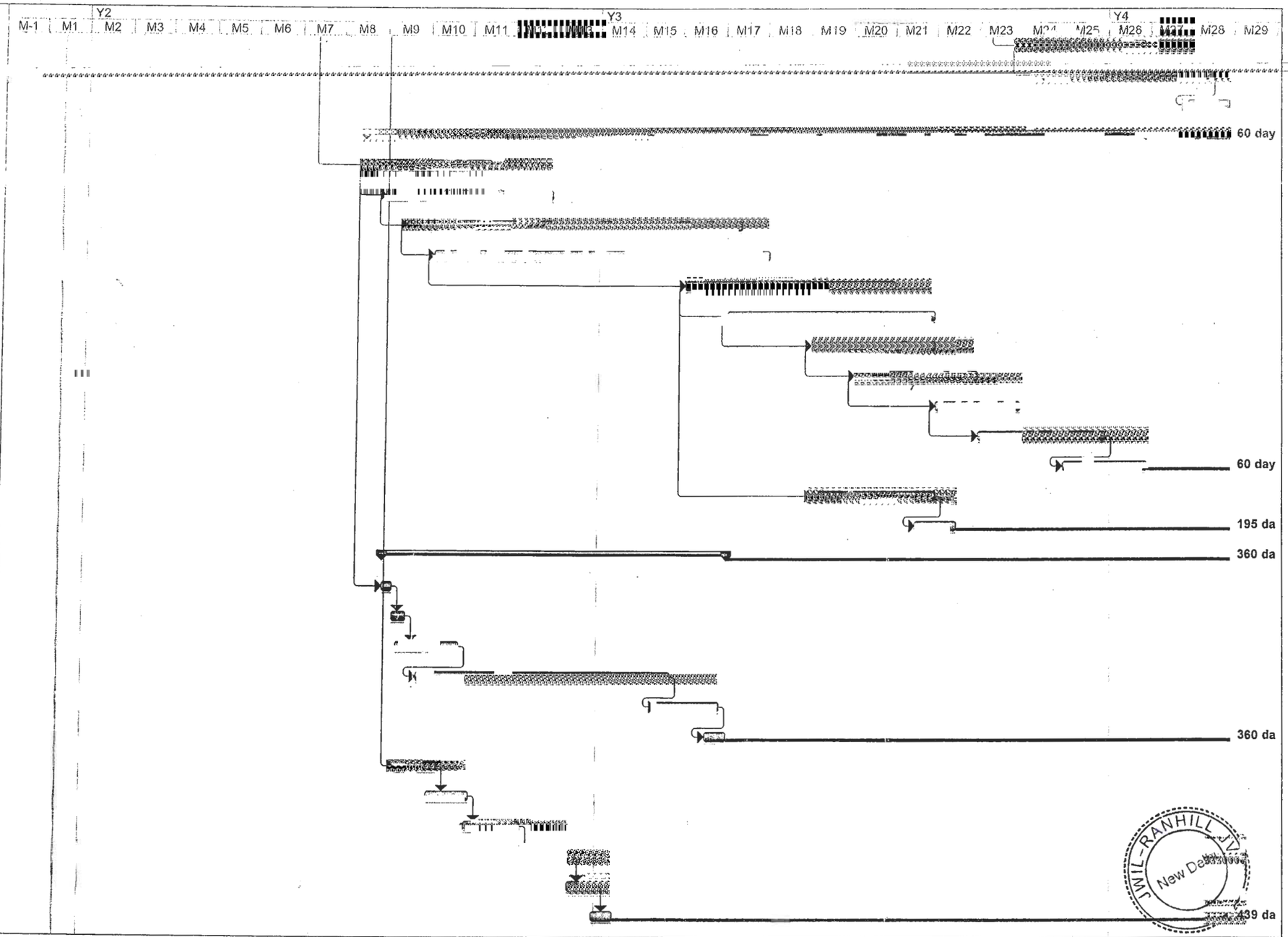
ID	Task Name
35	Locally sand laying bellow proposed pipe line
36	Lowering the pipe
37	Field welding ,applicable ARC Welding
38	Inspection and Radiography test where applicable.
39	Joint coating/ finishing/ Curing etc
40	Installation of Valves and Specials fittings
41	Back filling the Trench
42	Testing and commissioning
43	Dispose off excess soil / Spraining in same location as per the s
44	Construction of thrust blocks and valve chambers
45	Signoff of Govt permission
46	**Construction of Intake Civil work**
47	Excavation/coffer dam
48	PCC
49	RCC Raft
50	RCC Starter
51	RCC wall
52	Installation of Pump
53	Structural for EOT Crane
54	Structural for Trolley arrangement
55	Switch yard construction
56	**Construction WTP**
57	**Process Building- Water/ Sludge**
58	Excavation
59	PCC
60	RCC Raft
61	RCC wall
62	Equipment Errection
63	Screeding
64	Piping
65	Plaster internal
66	Hydro testing
67	External Plaster
68	Painting



Project: MSProj11
Date: Wed 12/14/11

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

ID	Task Name
69	Hand Railing
70	Cabling/Electrical
71	Handing over civil
72	**Filter house/CWR**
73	Excavation
74	PCC
75	RCC Raft
76	RCC Wall
77	Equipment Errection
78	Piping
79	Plaster internal
80	Hydro testing
81	Back filling outside wall
82	External Plaster
83	Painting
84	Cabling/Electrical
85	Handing over civil
86	**OVER Head Water tank**
87	Excavation Floor
88	PCC
89	RCC Raft
90	Rcc Column
91	RCC tank
92	Equipment Errection
93	Piping
94	Plaster internal
95	Hydro testing
96	External Plaster
97	Painting
98	Handing over civil



Project: MSProj11
Date: Wed 12/14/11

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

Electrical load list

ATTACHED

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

JITF Water Infrastructure Limited
New Delhi

JWIL RANHILL JV
New Delhi

GUWAHATI NORTH WSS (37 MLD) ELECTRICAL LOAD DATED 13.12.11

S.No.	Description of Equipment	BKW of pump unit at motor terminal	Rated Motor selected (each)	Total no of units	Running Units	Standby Units	Daily Power consumption (KWH/Day)
RIVER INTAKE							
1	Raw water pump	190.15	225.00	3.00	2.00	1.00	8746.82
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	4.00	2.00	2.00	127.59
2	Thickener feed pump	14.04	18.50	2.00	1.00	1.00	336.85
3	Thickened sludge transfer Pump	4.13	5.50	2.00	1.00	1.00	99.21
4	Centrifuge feed pumps (VFD Operated)	4.29	5.50	4.00	2.00	2.00	137.18
5	Supernatant pump	13.40	15.00	2.00	1.00	1.00	321.54
6	Alum transfer pump	1.55	2.20	2.00	1.00	1.00	24.85
7	Lime transfer pump	1.55	2.20	2.00	1.00	1.00	24.85
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 recycle pump	39.96	45.00	4.00	2.00	2.00	639.32
14	backwash fill pump	20.44	22.00	3.00	2.00	1.00	327.01
15	Drain pump for chlorine building	0.91	1.10	2.00	1.00	1.00	0.09
16	Clear water Pump	80.63	90.00	3.00	2.00	1.00	3708.92
17	Drain pump for clear water Pump house	2.01	2.20	2.00	1.00	1.00	0.20
18	Prechlorination booster pump	2.34	3.70	2.00	1.00	1.00	56.18
19	Post chlorination booster pump	1.71	2.20	2.00	1.00	1.00	41.00
20	Caustic pump for chlorination	3.28	3.70	2.00	1.00	1.00	13.11
21	Sample pumps	1.76	2.20	5.00	5.00	0.00	4.39
22	Travelling bridge for presettling tank	1.54	2.20	2.00	2.00	0.00	12.32
23	Travelling trolley unit for presettling tank	1.54	2.20	2.00	2.00	0.00	12.32
24	Flash Mixer	4.68	5.50	1.00	1.00	0.00	112.20
25	Sludge mixer for clarifier sludge holding tank	2.96	3.70	2.00	2.00	0.00	142.08
26	Thickener Scrapper	1.28	1.50	2.00	2.00	0.00	61.20
27	Sludge mixer for thickener sludge tank	2.96	3.70	2.00	2.00	0.00	142.08
28	Centrifuge	16.65	18.50	3.00	2.00	1.00	333.00
29	Sludge mixer for Backwash waste tank	4.40	5.50	2.00	2.00	0.00	211.20
30	Agitator for Alum preparation tank	0.94	1.10	2.00	1.00	1.00	22.44
31	Agitator for Alum dosing tank	0.31	0.37	2.00	1.00	1.00	7.55
32	Agitator for lime preparation tank	0.94	1.10	2.00	1.00	1.00	22.44
33	Agitator for Lime dosing tank	0.31	0.37	2.00	1.00	1.00	7.55

GUWAHATI NORTH WSS (37 MLD) ELECTRICAL LOAD DATED 13.12.11

S.No.	Description of Equipment	BKW or per unit at motor terminal	KW of Motor selected (each)	Total no of units	Running Units	Standby Units	Daily Power consumption (KWH/ Day)
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	0.64	0.75	2.00	1.00	1.00	6.38
36	Agitator for caustic dosing tank for chlorination	0.64	0.75	1.00	1.00	0.00	2.55
37	Alum Dosing pumps	0.30	0.37	2.00	1.00	1.00	7.10
38	Lime Dosing pumps for PT	1.28	1.50	2.00	1.00	1.00	30.60
39	Lime Dosing pumps for filtered water	1.28	1.50	2.00	1.00	1.00	30.60
40	Poly Dosing pumps	0.30	0.37	4.00	2.00	2.00	14.21
41	Dewatering Poly Dosing pumps	0.30	0.37	6.00	3.00	3.00	14.21
42	Filter blower	19.89	22.00	3.00	2.00	1.00	79.57
43	Blower for chlorine absorbtion system	3.15	3.70	2.00	1.00	1.00	12.58
44	Compressor for clarifier tube cleaning	6.00	7.50	2.00	1.00	1.00	12.00

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

JWIL RANHILL JV New Delhi

Infrastructure Limited New Delhi

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

Transformer sizing calculations

ATTACHED

JWIL RANHILL JV New Delhi

JITF Water Infrastructure Limited New Delhi

Project in
JICA Fu

TRANSFORMER SIZING CALCULATION INTAKE NORTH

A	B	C	D	E	F	G	I	[illegible]	K	L	M	N	O	P	Q=EXH/LXM	R
1	INTAKE WELL PUMPS		3	2	1	190	225	333.35	1500	0.942	0.83	DOL	FIXED SPEED	CONTINOUS	558.92	
2	DESILTING PUMP		2	1	1	11.8	15	22.22	1500	0.9	0.82	DOL	FIXED SPEED	CONTINOUS	18.39	
3	DRAIN PUMPS IN INTAKE		2	1	1	6.69	7.5	11.11	1500	0.81	0.77	DOL	FIXED SPEED	CONTINOUS	12.34	
4	MOTORISED VALVES		4	4	0	0.39	0.555	0.82	1500	0.68	0.65	DOL	FIXED SPEED	CONTINOUS	4.06	
5	MOTORISED GATES		4	1	3	1.05	1.5	2.22	1500	0.72	0.76	DOL	FIXED SPEED	CONTINOUS	2.21	
6	EOT CRANE CT FOR RAW WATER PH		1	1	0	1.05	1.5	2.22	1500	0.72	0.76	DOL	FIXED SPEED	INTERMITTENT	2.21	
7	EOT CRANE LT FOR RWPH		1	1	0	1.54	2.2	3.26	1500	0.72	0.76	DOL	FIXED SPEED	INTERMITTENT	3.24	
8	EOT CRANE LIFTING RWPH		1	1	0	7.44	9.3	13.78	1500	0.885	0.84	DOL	FIXED SPEED	INTERMITTENT	11.51	
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)	=	739.36	KVA												
	DESIGN MARGIN (20%)	=	147.87	KVA												
	TOTAL LOAD	=	887.24	KVA												
	NEAREST STANDARD RATING OF TRANSFORMER SELECTED	=	1000	KVA												

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

JWIL RAMKY JV New Delhi

JITF Water Infrastructure Limited New Delhi

TRANSFORMER SIZING CALCULATION WTP NORTH

A	B	C	D	E	F	G	I	J	K	L	M	N	O	P	Q=EXH/LXM	R
															1230.92	
1	SUBMERSIBLE SLUDGE PUMP FOR PRESETTLING TANK		4	2	2	5.32	7.5	15.26	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	18.68	
2	THICKENER FEED PUMP		2	1	1	14.04	18.5	37.65	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	24.64	
3	Thickened Sludge Transfer pump		2	1	1	4.13	5.5	11.19	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	7.25	
4	CENTRIFUGE FEED PUMPS (VFD OPERATED)		4	2	2	4.29	5.5	11.19	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	15.06	
5	SUPERNATANT PUMP		2	1	1	13.40	15	30.53	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	23.52	
6	Alum Transfer Pump		2	1	1	1.55	2.2	4.48	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	2.72	
7	Lime Transfer Pump		2	1	1	1.55	2.2	4.48	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	2.72	
8	Drain pump for alum mixing area		2	1	1	1.71	2.2	4.48	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	3.00	
9	Drain pump for lime mixing area		2	1	1	1.71	2.2	4.48	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	3.00	
10	Drain pump for dosing pump room		2	1	1	1.71	2.2	4.48	1500	0.84	0.78	DDL	FIXED SPEED	CONTINOUS	3.00	
11	Drain pump for filter house		2	1	1	2.01	2.2	4.48	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	3.53	
12	Drain pump for filter gallery		2	1	1	2.01	2.2	4.48	1500	0.84	0.78	DDL	FIXED SPEED	CONTINOUS	3.53	
13	Backwash recycle Pump		4	2	2	39.96	45	91.58	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	140.27	
14	Backwash fill pump		3	2	1	20.44	22	44.77	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	71.75	
15	Drain pump for chlorine building		2	1	1	0.91	1.1	2.24	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	1.60	
16	Clear water Pump		3	2	1	80.63	90	183.16	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	283.04	
17	Drain pump for clear water Pump house		2	1	1	2.01	2.2	4.48	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	3.53	
18	Prechlorination booster pump		2	1	1	2.34	3.7	7.53	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	4.11	
19	Post chlorination booster pump		2	1	1	1.71	2.2	4.48	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	3.00	
20	Caustic pump for chlorination		2	1	1	3.28	3.7	7.53	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	5.76	
21	Sample Pumps		5	5	0	1.76	2.2	4.48	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	15.45	
22	Travelling bridge for presettling tank		2	2	0	1.54	2.2	4.48	1500	0.84	0.78	DDL	FIXED SPEED	CONTINOUS	5.41	
23	Travelling trolley unit for presettling tank		2	2	0	1.54	2.2	4.48	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	5.41	

Project Director
JICA Supported (P.I.U)
New Project

JITF Water Infrastructure Limited New Delhi

JWR Parsel JV New Delhi

TRANSFORMER SIZING CALCULATION WTP NORTH

A	B	C	D	E	F	G	I	J	K	L	M	N	O	P	Q=EXH/LXM	R
24	Flash Mixer		1	1	0	4.68	5.5	11.19	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	8.21	
25	Sludge mixer for clarifier sludge holding tank		2	2	0	2.96	3.7	7.53	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	10.39	
26	Thickener Scrapper		2	2	0	1.28	1.5	3.05	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	4.49	
27	Sludge mixer for thickener sludge tank		2	2	0	2.96	3.7	7.53	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	10.39	
28	Centrifuge		3	2	1	16.65	18.5	37.65	1500	0.84	0.78	DOL	FIXED SPEED	CONTINDUS	58.45	
29	Sludge mixer for Backwash waste tank		2	2	0	4.40	5.5	11.19	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	15.45	
30	Agitator for Alum preparation tank		2	1	1	0.94	1.1	2.24	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	1.65	
31	Agitator for Alum mixing cum dosing tank		2	1	1	0.31	0.37	0.75	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	0.54	
32	Agitator for lime preparation tank		2	1	1	0.94	1.1	2.24	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	1.65	
33	Agitator for lime mixing cum dosing tank		2	1	1	0.31	0.37	0.75	1500	0.84	0.78	DOL	FIXED SPEED	CONTINDUS	0.54	
34	Agitator for Poly mixing cum dosing tank		2	1	1	0.64	0.75	1.53	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	1.12	
35	Agitator for dewatering Poly mixing cum dosing tank		2	1	1	0.64	0.75	1.53	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	1.12	
36	Agitator for caustic dosing tank for chlorination		1	1	0	0.64	0.75	1.53	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	1.12	
37	Alum Dosing pumps		2	1	1	0.30	0.37	0.75	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	0.53	
38	Lime Dosing pumps for PT		2	1	1	1.28	1.5	3.05	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	2.25	
39	Lime Dosing pumps for filtered water		2	1	1	1.28	1.5	3.05	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	2.25	
40	Poly Dosing pumps		4	2	2	0.30	0.37	0.75	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	1.04	
41	Dewatering Poly Dosing pumps		6	3	3	0.30	0.37	0.75	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	1.56	
42	Filter blower		3	2	1	19.89	22	44.77	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	69.82	
43	Blower for chlorine absorbtion system		2	1	1	3.15	3.7	7.53	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	5.53	
44	Compressor for clarifier tube cleaning		2	1	1	6.00	7.5	15.26	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	10.53	
45	Motorized valves		90	90	0	0.44	0.55	1.12	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	69.51	
46	Motorized gates		36	36	0	0.60	0.75	1.53	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	37.91	

TRANSFORMER SIZING CALCULATION WTP NORTH

A	B	C	D	E	F	G	I	J	K	L	M	N	O	P	Q=EXH/LXM	R
47	Motorized chain hoist for Presettling tank sludge pump		2	2	0	1.76	2.2	4.48	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	6.18	
48	Motorize hoist for thickener feed pump		1	1	0	1.76	2.2	4.48	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	3.09	
49	Motorized hoist for thickened sludge transfer pump		1	1	0	1.76	2.2	4.48	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	3.09	
50	Motorize hoist for centrifuge feed pump		1	1	0	1.76	2.2	4.48	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	3.09	
51	EOT Crane CT for Dewatering building		1	1	0	0.53	0.75	1.53	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	0.93	
52	EOT Crane LT for Dewatering building		1	1	0	1.54	2.2	4.48	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	2.70	
53	EOT Crane Lifting for dewatering building		1	1	0	4.40	5.5	11.19	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	7.72	
54	Motorized hoist for Supernatant pump		1	1	0	1.76	2.2	4.48	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	3.09	
55	Motorized monorail hoist for chemical house ground floor		1	1	0	1.76	2.2	4.48	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	3.09	
56	Motorized monorail hoist for chemical house first floor		1	1	0	1.76	2.2	4.48	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	3.09	
57	Motorized monorail hoist for chlorination building		1	1	0	2.40	3	6.11	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	4.21	
58	Motorized monorail hoist for filter blower		1	1	0	1.76	2.2	4.48	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	3.09	
59	Motorized Hoist for backwash waste pump		1	1	0	2.40	3	6.11	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	4.21	
60	Motorized monorail hoist for maintenence building		1	1	0	2.40	3	6.11	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	4.21	
61	EOT Crane CT for clear water PH		1	1	0	1.05	1.5	3.05	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	1.84	
62	EOT Crane LT for CWPH		1	1	0	1.54	2.2	4.48	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	2.70	
63	EOT Crane Lifting CWPH		1	1	0	7.44	9.3	18.93	1500	0.84	0.78	DOL	FIXED SPEED	CONTINOUS	13.06	
64	Plant Area Lighting		1	1		35.00		0.00	-	1	1	DOL	FIXED SPEED	CONTINOUS	40.25	
65	Ventilation system for chemical house, Chlorination building, MCC room, and		1	1		30.00		0.00	-	1	1	DOL	FIXED SPEED	CONTINOUS	34.50	
66	Misc load for buildings, rooms		1	1		50.00		0.00	-	1	1	DOL	FIXED SPEED	CONTINOUS	57.50	
67	Instrumentation and control system		1	1		20.00		0.00	-	1	1	DOL	FIXED SPEED	CONTINOUS	23.00	
68	HVAC		1	1		35.00		0.00	-	1	1	DOL	FIXED SPEED	CONTINOUS	40.25	

TRANSFORMER SIZING CALCULATION WTP NORTH

A	B	C	D	E	F	G	I	J	K	L	M	N	O	P	Q=EXH/LXM	R
	MAXIMUM DEMAND (KVA)	=	1230.92	KVA												
	DESIGN MARGIN (20%)	=	246.18	KVA												
	TOTAL LOAD	=	1477.11	KVA												
	NEAREST STANDARD RATING OF TRANSFORMER SELECTED	=	1600	KVA												

Price Adjustment Factors

Project Director
Project Implementation Unit
JICA Fu[illegible] 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
	[redacted]						
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	*Distribution Reservoir*						
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	*Mandately Spare Parts and Tools & Tackles*						
II.A-4.1	Mandately Spare Parts		25%				
II.A-4.2	Tools and Tackles		25%				
			25%				
	[redacted]						
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	*Distribution Reservoir*						
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	*Mandately Spare Parts and Tools & Tackles*						
II.B-4.1	Mandately Spare Parts		25%		30%	40%	5%
II.B-4.2	Tools and Tackles		25%		30%	40%	5%
			25%				

	Schedule IV Installation and Other Cost						
IV-1	*Intake Structure and Raw Water Pump Station and Transmisison 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	*Distribution Reservoir*						
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 of Components Specified and Entire System*		25%	35%		40%	
IV-5	*Pre-commissioning Test of Entire System*		25%	35%		40%	
	Schedule V Civil Works						
V-1	*Intake Structure and Raw Water Pump Station*						
V-1.1	Demolishing Existing Structures and Site Embankment		25%	70%		5%	
V-1.2	Civil Structures and Buildings		25%	20%	25%	30%	
V-2	*Water Treatment Plant*						
V-2.1	Demolishing the Existing Structures and Initial Works		25%	70%		5%	
V-2.2	Construction of Civil Structures and Buildings		25%	20%	25%	30%	
V-3	*Distribution Reservoir*						
V-3.1	Construction of Distribution Reservoir		25%	20%	25%	30%	
V-3.2	Any other items not specified in the above but required to complete works		25%		10%	60%	5%

2.2 Schedule of Adjustment Factor for Operation & Maintenance

Item	Description	Unit	Basic Amount	Non-adjustable	Labour portion (L)	Steel (MS)	Other Materials (MA)	
				a	b	c1	c2	
	Schedule 7							
VII	Operation and Maintenance							
VII-1	For Year 1 of O & M							

Project Director
JICA Fe...

	(Estimated Production Capacity as 25.7 MLD)							
VII-1.2	Operation and Maintenance for Water Production			25%	35%		40%	
a.	Personnel cost	l.s.		25%	75%			
b.	Consumable other than electric power and chemicals	l.s.		25%			75%	
c.	Vehicles including purchasing and O & M	l.s.		25%		35%	40%	
d.	Maintenance cost including spare parts other than supplied under Design and Construction Contract, repair and replacement	l.s.		25%			75%	
	Subtotal of Item VII-1.2							
VII-1.3	Operation and Maintenance for sludge handling and disposal			25%	35%		40%	
a.	Personnel cost	l.s.		25%	75%			
b.	Consumable other than electric power and chemicals	l.s.		25%			75%	
c.	Maintenance cost including spare parts other than supplied under Design and Construction Contract, repair and replacement	l.s.		25%			75%	
	Subtotal Item of VII-1.3							
	Subtotal of Item VII-1							
VII-2	**For Year 2 of O & M**							
	(Estimated Production Capacity as 26.8 MLD)							
VII-2.1	Operation and Maintenance for Water Production			25%	35%		40%	
a.	Personnel cost	l.s.			75%			
b.	Consumable other than electric power and chemicals	l.s.					75%	
c.	Vehicles including purchasing and O & M	l.s.				35%	40%	
d.	Maintenance cost including spare parts other than supplied under Design and Construction Contract, repair and replacement	l.s.					75%	
	Subtotal of Item VII-2.1							
VII-2.2	Operation and Maintenance for sludge handling and disposal			25%				
					35%		40%	
a.	Personnel cost	l.s.			75%			
b.	Consumable other than electric power and chemicals	l.s.					75%	
c.	Maintenance cost including spare parts other than supplied under Design and Construction Contract, repair and replacement	l.s.					75%	
	Subtotal Item of VII-2.2							
	Subtotal of Item VII-2							
VII-3	**For Year 3 of O & M**							

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

JWIL-RANHIL ... New Delhi

... Water Infrastructure Limited New Delhi

	(Estimated Production Capacity as 27.9 MLD)			25%	35%		40%	
VII-3.1	Operation and Maintenance for Water Production				75%			
a.	Personnel cost	l.s.					75%	
b.	Consumable other than electric power and chemicals	l.s.				35%	40%	
c.	Vehicles including purchasing and O & M	l.s.					75%	
d.	Maintenance cost including spare parts other than supplied under Design and Construction Contract, repair and replacement	l.s.						
	Subtotal of Item VII-3.1							
VII-3.2	Operation and Maintenance for sludge handling and disposal			25%	35%		40%	
a.	Personnel cost	l.s.			75%			
b.	Consumable other than electric power and chemicals	l.s.					75%	
c.	Maintenance cost including spare parts other than supplied under Design and Construction Contract, repair and replacement	l.s.					75%	
	Subtotal Item of VII-3.2							
	Subtotal of Item VII-3							
VII-4	**For Year 4 of O & M**							
	(Estimated Production Capacity as 30.2 MLD)							
VII-4.1	Operation and Maintenance for Water Production			25%	35%		40%	
a.	Personnel cost	l.s.			75%			
b.	Consumable other than electric power and chemicals	l.s.					75%	
c.	Vehicles including purchasing and O & M	l.s.				35%	40%	
d.	Maintenance cost including spare parts other than supplied under Design and Construction Contract, repair and replacement	l.s.					75%	
	Subtotal of Item VII-4.1							
VII-4.2	Operation and Maintenance for sludge handling and disposal			25%	35%		40%	
a.	Personnel cost	l.s.			75%			
b.	Consumable other than electric power and chemicals	l.s.					75%	
c.	Maintenance cost including spare parts other than supplied under Design and Construction Contract, repair and replacement	l.s.					75%	
	Subtotal Item of VII-4.2							
	Subtotal of Item VII-4							
VII-5	**For Year 5 of O & M**							
	(Estimated Production Capacity as 31.3 MLD)							
VII-5.1	Operation and Maintenance for Water Production			25%	35%		40%	

	a. Personnel cost	l.s.			75%			
	b. Consumable other than electric power and chemicals	l.s.					75%	
	c. Vehicles including purchasing and O & M	l.s.				35%	40%	
	d. Maintenance cost including spare parts other than supplied under Design and Construction Contract, repair and replacement	l.s.					75%	
	Subtotal of Item VII-5.1							
VII-5.2	Operation and Maintenance for sludge handling and disposal			25%				
	a. Personnel cost	l.s.			35%		40%	
	b. Electric power and chemical costs	l.s.			75%			
	c. Consumable other than electric power and chemicals	l.s.					75%	
	d. Maintenance cost including spare parts other than supplied under Design and Construction Contract, repair and replacement	l.s.					75%	
	Subtotal Item of VII-5.2							
	Subtotal of Item VII-5							
Total of Schedule VII								

Note:

Signature of Bidder and Date

Name and Designation SUNIL TREHAN, EXECUTIVE DIRECTOR

Company

JITF Water Infrastructure Limited New Delhi

JITF URBANHILL New Delhi

Project Implementation Unit
JICA Funded Water Supply Project

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.

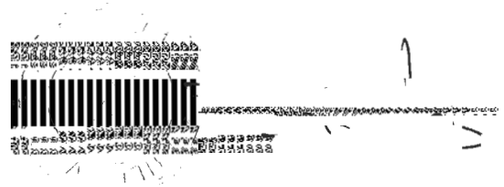
The following conditions shall apply:

(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, P_0, 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

[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.



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 Project

Acknowledgement of Compliance with Guidelines for Procurement under Japanese ODA Loans

Proje
Project Impl
JICA Funded Guwahati Water Supply Project

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

A. I, *Narendran Maniam,* duly authorized by ***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 ***Design, Supply, Installation and Commissioning of Intake Facilities, Transmission Mains, Water Treatment Plant and Reservoir for the North Zone (Contract Package No. C-01), JICA ODA Loan No. ID-P201*** 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 organizations[1].

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.

Authorized SIGNATORY

For and on behalf of the Bidder

Date : 5th December 2011

[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 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

JITF Water Infrastructure Limited New Delhi

Project Director
Project Implementation Unit
JICA

Functional Guarantee for Power and Chemical Consumption

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

Functional Guarantee - Guwahati North WTP

Power Consumption –for rated production Capacity

Description	unit	Raw Water Pumps	Clear Water Pumps
Transmission Flow	mld	38.9	37
Operation Hours	Hrs/day	23	23
Number of Pumps			
Duty operation	nos.	2	2
Standby	nos.	1	1
Pump Discharge	m3/hr	847	805
Pump Head	M	65	29
Motor Output, each (Max.)	kW	225	90

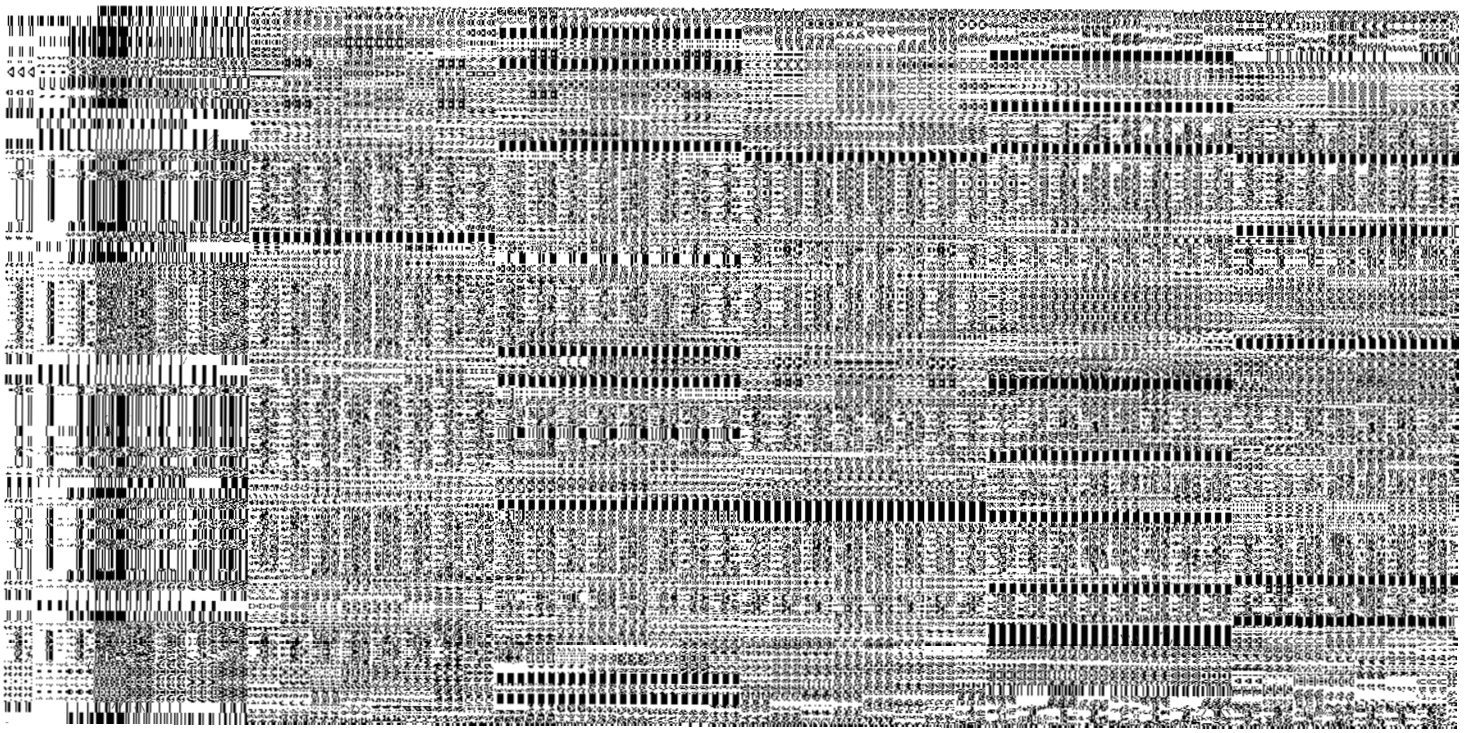
Chemical Consumption –annual average for Rated Production

Description	Water Purification Process Flow	Sludge Handling Capacity	Average Dosage Rate	Purity of Chemicals	Daily Consumption
	mld	Kg/ton	Mg/l	%	Kg/day
Alum	38.9	--	30	100	1170
Lime					
Post-Lime	--	--	N.R	N.R	N.R
Pre-Lime	38.9	--	15	100	585
Total					585
Polymer (Flocculent)	38.9		1	100	39
Dewatering Polymer	--	1 Kg/Ton Dry solids	-	100	8.9
Chlorine					
Pre-Cl_2	38.9	--	2	100	78
Post-Cl_2	37	--	1	100	37
Total					115

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



ASSAM

Contract Agreement for Operations and Maintenance

THIS CONTRACT AGREEMENT is made the 13th 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 Ranhill 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).

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.

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

Signed by: Mr. Prateek Hajela, IAS
Project Director, PIU

for and on behalf of the Employer

in the presence of

Name: _____

Signature _____

Address _____

Signed by: _____

for and on behalf of the Contractor

in the presence of

Name _____

Signature _____

Address _____

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

APPENDICES

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.

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

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:

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 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.

Schedule No. VI: Day Work

100% on completion and approval of works.

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.

Appendix 2 - Price Adjustment

2.1 Price Adjustment Formula

Prices payable to the Contractor, in accordance with the Contract, shall be subject to adjustment during performance of the Contract to reflect changes in the cost of labor and material components, in accordance with the following formula:

$$P1 = P0 \times (a + b\frac{L_1}{L_0} + c_1\frac{MS_1}{MS_0} + c_2\frac{MA_1}{MA_0} + d\frac{E_1}{E_0}) - P_0$$

in which:

P_1 = adjustment amount made every six (6) months, or part thereof, payable to the Contractor

P_0 = Contract Price (base price)

a = fixed element representing profit and overhead in Contract Price (a = __ %)

b = estimated percent of labor portion in Contract Price (b = __ %)

c_1 = estimated percent of material portion (Steel) in Contract Price (c_1 = __ %)

c_2 = estimated percent of material portion (other material) in Contract Price (c_2 = __ %)

d = estimated percent of plant & equipment component in Contract Price (d = __ %)

L_0, L_1 = cost index for labor indexes applicable to the appropriate industry in the country of origin on the base date and the date for adjustment, respectively

MS_0, MS_1 = cost index for the raw materials i.e. steel in the country of origin on the base date and the date for adjustment, respectively

MA_0, MA_1 = cost index for the major raw materials i.e. other than steel in the country of origin on the base date and the date for adjustment, respectively

E_0, E_1 = cost indexes for equipment operation i.e. fuel and lubricants in the country of origin on the base date and the date for adjustment, respectively

The sum of the five coefficients a, b, c_1, c_2 and d shall be one (1) in every application of the formula.

Project
JICA F

Schedule of Adjustment Data

[redacted] rovided Below:

(Bidder shall specify sources of cost indices where these are not specified below)

For costs incurred in India and/or paid in Indian Rupees:		
• Cost Index for Labor	L	The Consumer Price Index for Industrial Workers for the month in which the adjustment date falls, published by Government of India Ministry of Labour & Employment, Labour Bureau for Guwahati. (Base : 2001 = 100)
• Cost Index for Materials, other than steel	MA	The average wholesale price indexes for the following major materials for the month in which the adjustment date falls, as published by the Reserve Bank of India for India (Base year: 1993-94 = 100): • **Concrete Work:** Cement, Stone Aggregate • **Road Work:** Stone Aggregate, Bitumen • **Masonry Work:** Brick • **Plastic Pipes:** PVC (as per bidder's proposal)
• Cost Index for Materials - steel (applicable only for steel supplied for pipe manufacture and structural reinforcing bars)	MS	The average wholesale price index for iron and steel for the month in which the adjustment date falls, as published by the Reserve Bank of India for India (Base: 1993-94 = 100)
• Cost Index for Equipment Operation (fuel and lubricants)	E	The average wholesale price index for fuel, power, light and lubricants for the month in which the adjustment date falls, as published by the Reserve Bank of India for India (Base: 1993-94 = 100)
For costs incurred outside India and/or paid in Foreign Currency:		
• Cost Index for Labor	L	(Bidder to specify source of Index and provide copy of the most recent Cost Index along with the Bid)
• Cost Index for Materials, other than steel	MA	*(Bidder to specify source of Index and provide copy of the most recent Cost Index along with the Bid)*
• Cost Index for Materials - steel (applicable only for steel supplied for pipe manufacture and structural reinforcing bars)	MS	(Bidder to specify source of Index and provide copy of the most recent Cost Index along with the Bid)
• Cost Index for Equipment Operation (fuel and lubricants)	E	*(Bidder to specify source of Index and provide copy of the most recent Cost Index along with the Bid)*

Proje[redacted] (D.I.I)
[redacted] Guwa[redacted]

2.2a Applicable Items/ Adjustment Factors (Work Contract):

Refer to Attachment 5-2

2.2b Schedule of Adjustment Factor (Operation & Maintenance):

Refer to Attachment 5-2

2.3 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:

(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.

Project In... (P.I.U)
JICA Fun... Project

Appendix 3. Insurance Requirements

(A) Insurances to Be Taken Out By the Contractor

In accordance with the provisions of GCC Clause 34, the Contractor shall at its expense take out and maintain in effect, or cause to be taken out and maintained in effect, during the performance of the Contract, the insurances set forth below in the sums and with the deductibles and other conditions specified. The identity of the insurers and the form of the policies shall be subject to the approval of the Employer, such approval not to be unreasonably withheld.

(a) Transit Insurance

Covering loss or damage occurring, while in transit from the supplier's or manufacturer's works or stores until arrival at the Site, to the Facilities (including spare parts therefor) and to the construction equipment to be provided by the Contractor or its Subcontractors.

Amount	Deductible limits	Parties insured	From	To
[in currency(ies)]	**[in currency(ies)]**	**[names]**	**[place]**	**[place]**
Cost of equipment	Nil	Contractor and Employer	Transit Port	Work site

(b) Erection All Risks Insurance

Covering physical loss or damage to the Facilities at the Site, occurring prior to completion of the Facilities, with extended maintenance coverage for the Contractor's liability in respect of any loss or damage occurring during the defect liability period while the Contractor is on the Site for the purpose of performing its obligations during the defect liability period.

Amount	Deductible limits	Parties insured	From	To
[in currency(ies)]	**[in currency(ies)]**	**[names]**	**[place]**	**[place]**
Cost of Equipment	Nil	Contractor, Contractor's Subcontractors and Employer		Work Site

(c) Third Party Liability Insurance

Covering bodily injury or death suffered by third parties (including the Employer's personnel) and loss of or damage to property (including the Employer's property and any parts of the Facilities that have been accepted by the Employer) occurring in connection with the supply and installation of the Facilities.

Amount	Deductible limits	Parties insured	From	To
[in currency(ies)]	**[in currency(ies)]**	**[names]**	**[place]**	**[place]**
Indian Rupees 1 million	Nil	Contractor, Contractor's Subcontractors and Employer		Work site

(d) Automobile Liability Insurance

Covering use of all vehicles used by the Contractor or its Subcontractors (whether or not owned by them) in connection with the supply and installation of the Facilities. Comprehensive insurance in accordance with statutory requirements.

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

(e) Workers' Compensation

In accordance with the statutory requirements applicable in any country where the Facilities or any part thereof is executed.

(f) Employer's Liability

In accordance with the statutory requirements applicable in any country where the Facilities or any part thereof is executed.

(g) Other Insurances

The Contractor is also required to take out and maintain at its own cost the following insurances: Details:

Amount	Deductible limits	Parties insured	From	To
[in currency(ies)]	[in currency(ies)]	[names]	[place]	[place]
None				

The Employer shall be named as co-insured under all insurance policies taken out by the Contractor pursuant to GCC Sub-Clause 34.1, except for the Workers' Compensation and Employer's Liability Insurances, and the Contractor's Subcontractors shall be named as co-insured under all insurance policies taken out by the Contractor pursuant to GCC Sub-Clause 34.1, except for the Cargo, Workers' Compensation and Employer's Liability Insurances. All insurer's rights of subrogation against such co-insured for losses or claims arising out of the performance of the Contract shall be waived under such policies.

(B) Insurances To Be Taken Out By The Employer

The Employer shall at its expense take out and maintain in effect during the performance of the Contract the following insurances.

Details:

Amount	Deductible limits	Parties insured	From	To
[in currency(ies)]	[in currency(ies)]	[names]	[place]	[place]
None				

(C) Insurances To Be Taken Up By The Contractor During O&M Period

The Contractor shall at its expense take out and maintain in effect during the performance of the Operation and Maintenance Contract, without limiting his or the Employer's obligations and responsibilities, the following insurances.

i. The work together with all plant and material for incorporation therein, to the full replacement cost including the Contractor's overhead and profit.

ii. The Contractor's equipment and other assets brought onto site by the Contractor, for a sum sufficient to provide for their replacement at the site.

iii. Insurance against sickness, diseases, body injury or death of any persons which may occur during operation and maintenance period.

iv. The insurance shall be in the joint names of the Contractor and the Employer at the Contractor's cost and shall cover the Employer and the Contractor against all losses or damages from whatsoever cause from the start of the O&M Period until the date of completion of O&M Period in respect to the facilities or any sections or parts thereof as the case may be.

v. Any amounts not insured or not recovered from the insurer shall be borne by the Contractor.

Appendix 4. Time Schedule

S. No.	Description of Milestones	Time for Completion from the date of Receipt of LTC
1	Mobilization to the site and establishment of field office and quality control laboratory	6 Weeks
2	Basic Design and Drawings	6 Weeks
3	Detailed designs and drawings	6 Months
4	Completion of civil works	22 Months
5	Completion of installation of plant and equipment	24 Months
6	Completion of trial run and precommissioning of the treatment plant	26 Months
7	Completion of commissioning, performance guarantee test and taking over by the Employer	28 Months

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

Appendix 5. List of Major Items of Plant and Installation Services and List of Approved Subcontractors

Subcontractors, if any, and Manufacturers / venders shall be approved as per specifications / Employer's requirements during detailed design stage

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

Appendix 6. Scope of Works and Supply by the Employer

Work Contract Period:

The following personnel, facilities, works and supplies will be provided/supplied by the Employer, and the provisions of GC Clauses 10, 21 and 24 shall apply as appropriate.

Not Applicable

O & M Contract Period:

All personnel, facilities, works and supplies will be provided by the Employer in good time so as not to delay the performance of the Contractor, in accordance with the approved Time Schedule and Program of Performance pursuant to GC Sub-Clause 18.2.

Unless otherwise indicated, all personnel, facilities, works and supplies will be provided free of charge to the Contractor.

Personnel: **Not Applicable**

Facilities: **Not Applicable**

Works: **Not Applicable**

Supplies: **Electric Power**
Chemicals for treatment process

Appendix 7. List of Documents for Approval or Review

As per Schedule III of Section IVB

Pursuant to GC Sub-Clause 20.3.1, the Contractor shall prepare, or cause its Subcontractor to prepare, and present to the Project Manager in accordance with the requirements of GC Sub-Clause 18.2 (Program of Performance), the following documents for:

(A) Approval

1. Work Program and Construction Schedule
2. Preparation Works –Temporary Facilities
3. Surveys
4. Definitive Design
5. Detailed Design
6. Shop Drawings/Working Drawings
7. Testing
8. Any other items required in the Contract Documents including technical Specifications

(B) Review

1. Work Program and Construction Schedule
2. Preparation Works –Temporary Facilities
3. Surveys
4. Definitive Design
5. Detailed Design
6. Shop Drawings/Working Drawings
7. Testing
8. Any other items required in the Contract Documents including technical Specifications

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

Appendix 8. Functional Guarantees

1. General

This Appendix sets out:

(a) the functional guarantees referred to in GC Clause 28 (Functional Guarantees);
(b) the preconditions to the validity of the functional guarantees, either in production and/or consumption, set forth below;
(c) the minimum level of the functional guarantees; and
(d) the formula for calculation of liquidated damages for failure to attain the functional guarantees.

2. Preconditions

The Contractor gives the functional guarantees (specified herein) for the facilities, subject to the following preconditions being fully satisfied:

As given in Technical Specifications

3. Functional Guarantees

Subject to compliance with the foregoing preconditions, the Contractor guarantees as follows:

3.1 Production Capacity

As given in Technical Specifications

and/or

3.2 Raw Materials and Utilities Consumption

As given in Technical Specification

4. Failure in Guarantees and Liquidated Damages

4.1 Failure to Attain Guaranteed Production Capacity

If the production capacity of the facilities attained in the guarantee test, pursuant to GC Sub-Clause 25.2, is less than the guaranteed figure specified in para. 3.1 above, but the actual production capacity attained in the guarantee test is not less than the minimum level specified in para. 4.3 below, and the Contractor elects to pay liquidated damages to the Employer in lieu of making changes, modifications and/or additions to the Facilities, pursuant to GC Sub-Clause 28.3, then the Contractor shall pay liquidated damages at the rate of :

Quantity – 2% of Contract Price, for every complete one percent (1%) of the deficiency in the production capacity of the facilities, or at the proportionally reduced rate for any deficiency, or part thereof for less than a complete one percent (1%).

Quantity – 3% of Contract Price, for every complete ten percent (10%) of the deficiency in achieving quality of treated water, or at the proportionally reduced rate for any deficiency, or part thereof for less than a complete ten percent (10%).

4.2 Raw Materials and Utilities Consumption in Excess of Guaranteed Level

If the actual measured figure of specified raw materials and utilities consumed per unit (or their average total cost of consumption) exceed the guaranteed figure specified in para. 3.2 above (or their specified average total cost of consumption), but the actual consumption attained in the guarantee test, pursuant to GC Sub-Clause 25.2, is not more than the maximum level specified in para. 4.3 below, and the Contractor elects to pay liquidated damages to the Employer in lieu of compensation of excess operational cost due to excess consumption of the above materials pursuant to GC Sub-Clause 28.3, then the Contractor shall pay liquidated damages at the rate of :

Power: Liquidated damages shall be the charges for extra power consumed and billed by the local power supply utility in accordance with the following formula.

LDp= Cp1 + Cp2 + Cp3 ..... + Cp15

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

where: LDp is liquidated damage to be paid by the Contractor for extra power consumption
Cpn is the LDp of the respective years calculated as

Cp = P x Q x F

where; P: Excess power cost per 1 m3/day of production by raw water and clear water pumps

Q: Annual production capacity by years as specified in Sub-Section 1

F: Inflation factor calculated from the date of completion (issuance of Operational Acceptance Certificate)

F = 1/(1+r)^n

r: Inflation rate at 8% per annum
n: number of years from the date of Operational Acceptance

Chemicals: Liquidated damages shall be changed for extra chemical cost due to extra consumption of chemicals, including Alum, Polymer and Chlorine, in accordance with the following formula

LDc = Cc1 + Cc2 + Cc3 .....+ Cc15

where: LDc is liquidated damage to be paid by the Contractor for extra chemical consumption

Ccn is LDc of respective years calculated as

Cc = C x Q x F

Where; C: Excess chemical cost per 1 m3/day of production

Q: Annual production capacity by years as specified in Sub-Section 6.1

F: Inflation factor calculated from the date of completion (issuance of Operational Acceptance Certificate)

F = 1/(1+r)^n

r: Inflation rate at 8% per annum
n; number of years from the date of Operational Acceptance

for every complete one percent (1%) of the deficiency in the production capacity of the facilities, or at the proportionally reduced rate for any deficiency, or part thereof, of less than a complete one percent (1%)

[The rate of liquidated damages specified in paras. 4.1 and 4.2 above shall be at least equivalent to the rate specified in Section III, Evaluation and Qualification Criteria for the comparison of functional guarantees provided by the Bidders.]

4.3 Minimum Levels

Notwithstanding the provisions of this paragraph, if as a result of the guarantee test(s), the following minimum levels of performance guarantees (and consumption guarantees) are not attained by the Contractor, the Contractor shall at its own cost make good any deficiencies until the Facilities reach any of such minimum performance levels, pursuant to GC Sub-Clause 28.2:

(a) production capacity of the Facilities attained in the guarantee test: ninety-five percent (95%) of the guaranteed production capacity (the values offered by the Contractor in its bid for functional guarantees represents 100%).

and/or

(b) average total cost of consumption of all the raw materials and utilities of the Facilities: one hundred and five percent (105%) of the guaranteed figures (the

figures offered by the Contractor in its bid for functional guarantees represents 100%).

4.4 Limitation of Liability

Subject to para. 4.3 above, the Contractor's aggregate liability to pay liquidated damages for failure to attain the functional guarantees shall not exceed **Ten percent (10 %)** of the Contract price.

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

FORMS

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

Performance Security – Bank Guarantee

[insert Bank's Name, and Address of Issuing Branch or Office]

Beneficiary: **The Chief Executive Officer,**
JICA ODA Loan Project
Guwahati Metropolitan Development Authority,
3rd Floor, Statfed Building, G.M.C.H Road, Bhangagarh,
Guwahati-781005, Assam, India

Date: _____

PERFORMANCE GUARANTEE No.: _____

We have been informed that **M/s JWIL-Ranhill JV** (hereinafter called "the Contractor") has entered into Contract *[insert reference number of the contract]* dated *[insert date of the contract]* with you, for the execution of Procurement of Turnkey Contract-design, Supply, Installation and Commissioning of Intake Facilities, Transmission Mains, Water Treatment Plant and Reservoir for the North Zone including 5 years Operation & maintenance (Contract Package No. C-01) (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, a performance guarantee is required.

At the request of the Contractor, we *[insert name of Bank]* hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of INR 73,677,183 (Indian Rupees Seventy Three Million Six Hundred Seventy Seven Thousand One Hundred and Eighty Three Rupees only), upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation(s) under the Contract, without your needing to prove or to show grounds for your demand or the sum specified therein.

This guarantee shall be reduced by half upon our receipt of:

(a) a copy of the Operational Acceptance Certificate; or
(b) a registered letter from the Contractor (i) attaching a copy of its notice requesting issuance of the Operational Acceptance Certificate and (ii) stating that the project manager has failed to issue such Certificate within the time required or provide in writing justifiable reasons why such Certificate has not been issued, so that Operational Acceptance is deemed to have occurred.

This guarantee shall expire no later than the earlier of:

(a) twelve months after our receipt of either (a) or (b) above; or
(b) eighteen months after our receipt of:

  (i) a copy of the Completion Certificate;
  (ii) a registered letter from the Contractor, attaching a copy of the notice to the project manager that the Facilities are ready for commissioning, and stating that fourteen days have elapsed from receipt of such notice (or seven days have elapsed if the notice was a repeated notice) and the project manager has failed to issue a Completion Certificate or inform the Contractor in writing of any defects or deficiencies;
  (iii) a registered letter from the Contractor stating that no Completion Certificate has been issued but the Employer is making use of the Facilities; or

(c) the 15 day of September, 2015.

Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed one year, in response to the Employer's written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee."

This guarantee is subject to the Uniform Rules for Demand Guarantees, ICC Publication No. 458, except that subparagraph (ii) of Sub-article 20(a) is hereby excluded.

_____

[signature(s)]

Advance Payment Security – B

[insert Bank's Name, and Address of Issuing Branch or Office]

Beneficiary: **The Chief Executive Officer,**
JICA ODA Loan Project
Guwahati Metropolitan Development Authority,
3rd Floor, Statfed Building, G.M.C.H Road, Bhangagarh,
Guwahati-781005, Assam, India

Date: _____

ADVANCE PAYMENT GUARANTEE No.: _____

We have been informed that **M/s JWIL-Ranhill JV** (hereinafter called "the Contractor") has entered into Contract No. *[insert reference number of the contract]* dated [insert date of the contract] with you, for the execution of Procurement of Turn Key Contract-Design, Supply, Installation and Commissioning of Intake facilities, Transmission Mains, Water Treatment Plant and Reservoir for the North Zone including 5 years Operation and Maintenance (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, an advance payment in the sum of INR **73,677,183** (Indian Rupees Seventy Three Million Six Hundred Seventy Seven Thousand One Hundred and Eighty Three only) is to be made against an advance payment guarantee.

At the request of the Contractor, we *[insert name of Bank]* hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of INR **73,677,183** (Indian Rupees Seventy Three Million Six Hundred Seventy Seven Thousand One Hundred and Eighty Three only) upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation under the Contract because the Contractor used the advance payment for purposes other than toward the execution of the Works.

It is a condition for any claim and payment under this guarantee to be made that the advance payment referred to above must have been received by the Contractor on his account number *[insert account number]* at *[insert name and address of Bank].*

This guarantee shall expire, at the latest, upon our receipt of documentation indicating full repayment by the Contractor of the amount of the advance payment, or on the 15 day of May, 2014, whichever is earlier. Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed six month, in response to the Employer's written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee.

This guarantee is subject to the Uniform Rules for Demand Guarantees, ICC Publication No. 458.

_____
[signature(s) name of bank or financial institution]

Project In
JICA Funde

Performance Security (O & M) – Bank Guarantee

[insert Bank's Name, and Address of Issuing Branch or Office]

Beneficiary: **The Chief Executive Officer,**
JICA ODA Loan Project
Guwahati Metropolitan Development Authority,
3rd Floor, Statfed Building, G.M.C.H Road, Bhangagarh,
Guwahati-781005, Assam, India

Date: _____

PERFORMANCE GUARANTEE No.: _____

We have been informed that **M/s JWIL-Ranhill JV** (hereinafter called "the Contractor") has entered into Contract No. *[reference number of the contract]* dated _____ with you, for the execution of Procurement of Turnkey Contract-design, Supply, Installation and Commissioning of Intake Facilities, Transmission Mains, Water Treatment Plant and Reservoir for the North Zone including 5 years Operation & maintenance (Contract Package No. C-01) (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, a performance guarantee is required.

At the request of the Contractor, we *[name of Bank]* hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of INR.7,216,800 (Indian Purees Seven Million Two Hundred Sixteen Thousand and Eight Hundred only), upon receipt by our office/branch [*Name of Issuing Bank*at Guwahati, Assam, India *where this guarantee is encashable / payable,* of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation(s) under the Contract, without your needing to prove or to show grounds for your demand or the sum specified therein.

This guarantee shall expire after the

a. The issue of Final Contract Certificate
b. Three months later than expiry of the O&M Contract

Consequently, any demand for payment under this guarantee must be received by our office [*Name of Issuing Bank]* at Guwahati, Assam, India on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees, ICC Publication No. 458, except that subparagraph (ii) of Sub-article 20(a) is hereby excluded.

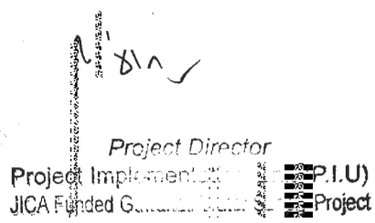
Employer's written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee.

_____

[signature(s)]

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

Forms of Certificates



Form of Initial Completion Certificate

Date: _____

Loan No: _____

Contract No: _____

[Name of Contract]

To: *[Name and address of Contractor]*

Dear Ladies and/or Gentlemen,

Pursuant to GCC Clause 24 (Initial Completion of the Facilities) of the General Conditions of the Contract entered into between yourselves and the Employer dated *[date]*, relating to the *[brief description of the Facilities]*, we hereby notify you that the following part(s) of the Facilities was (were) initially complete on the date specified below, and that, in accordance with the terms of the Contract.

1. Description of the Facilities or part thereof: *[description]*

2. Date of Initial Completion: *[date]*

By this certificate contractor is requested to arrange necessary provisions for commissioning so as to commence the commissioning immediately..

Very truly yours,

_____

Title
(Employer's Representative)

Project Director
Project Implementation Unit
JICA Funded Guwahati Water Supply Project

Form of Completion Certificate

Date: _____

Loan No: _____

Contract No: _____

[Name of Contract]

To: *[Name and address of Contractor]*

Dear Ladies and/or Gentlemen,

Pursuant to GCC Sub-clause 25.2 of the General Conditions of the Contract entered into between yourselves and the Employer dated *[date]*, relating to the *[brief description of the Facilities]*, we hereby notify you that the following part(s) of the Facilities was (were) complete on the date specified below, and that, in accordance with the terms of the Contract, the Employer hereby takes over the said part(s) of the Facilities, together with the responsibility for care and custody and the risk of loss thereof on the date mentioned below.

1. Description of the Facilities or part thereof: *[description]*

2. Date of Completion: *[date]*

However, you are required to complete the outstanding items listed in the attachment hereto as soon as practicable.

This letter does not relieve you of your obligation to complete the execution of the Facilities in accordance with the Contract nor of your obligations during the Defect Liability Period.

Very truly yours,

_____

Title
(Employer's Representative)

Form of Operational Acceptance Certificate

Date: _____

Loan No: _____

Contract No: _____

[Name of Contract]

To: *[Name and address of Contractor]*

Dear Ladies and/or Gentlemen,

Pursuant to GCC Sub-Clause 25.3 (Operational Acceptance) of the General Conditions of the Contract entered into between yourselves and the Employer dated *[date]*, relating to the *[brief description of the Facilities]*, we hereby notify you that the Functional Guarantees of the following part(s) of the Facilities were satisfactorily attained on the date specified below.

1. Description of the Facilities or part thereof: *[description]*

2. Date of Operational Acceptance: *[date]*

This letter does not relieve you of your obligation to complete the execution of the Facilities in accordance with the Contract nor of your obligations during the Defect Liability Period.

Very truly yours,

_____

Title
(Employer's Representative)

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

Form of Work Contract Completion Certificate

Date:

Loan No.:

Contract No.:

[Name of Contract]

To: [Name and address of Contractor]

Dear Ladies and/or Gentlemen,

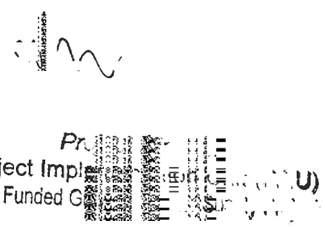
Pursuant to GCC Clause 27 (Defect Liability) of the General Conditions of the Contract entered into between [Name of Contractor] and the Employer dated [date], relating to the Work Contract for [brief description of the Facilities and Title of Contract], we hereby notify you that the defect liability period has been completed without any defects and/or deficiencies or satisfactory completion of works for rectifying defects and/ or deficiencies as notified. .

1. Description of the Facilities or part thereof:
2. Date of Work Contract Completion

By this letter, it is notified that your obligations to the Work Contract have been released.

Very truly yours,

Title
[Employers Representative]



Form of Final Completion Certificate

Date:

Loan No.:

Contract No.:

[Name of Contract]

To: [Name and address of Contractor]

Dear Ladies and/or Gentlemen,

Pursuant to PCC Clause 46 (Final Contract Completion Certificate on Completion of Operation and Maintenance Period) and 47 (Completion of Operation and Maintenance Services) of the Particular Conditions of the Contract entered into between [Name of Contractor] and the Employer dated [date], relating to the Work Contract for [brief description of the Facilities and Title of Contract], we hereby notify you that the service have been completed satisfactorily.

1. Description of the Facilities or part thereof:
2. Date of Work Contract Completion

By this letter, it is notified that all of your obligations to the Contract have been released.

Very truly yours,

Title
[Employers Representative]

Project Director
Project Implementation Unit (P.I.U)
JICA Fu[illegible]