MePGCL

Generating Clean And Green Energy

MEGHALAYA POWER GENERATION CORPORATION LIMITED MEGHALAYA

(INDIA)

UNDERWATER SEALING OF THE STEEL LINED HP TUNNELS AT THE SURGE SHAFT OF STAGE-I, POWER STATION.

RIBHOI DISTRICT, MEGHALAYA

VOLUME- 2

BIDDING DOCUMENT

Technical Specifications & Schedule of Requirements
And
Project Schedule/Work Schedule

CONTENTS

A - TECHNICAL DATA/PARAMETERS OF UMIAM DAM, INTAKE & HEAD RACE TUNNEL, SURGE SHAFT, High Pressure Tunnel etc., SCHEDULE OF REQUIREMENTS AND SCOPE OF WORK

1. Concrete Dam

a)	Length and width at top level	:	Length-195m
		:	Top width-7.3m
b)	Height from deepest foundation level	:	73.2m
c)	Size of crest gates	:	2 x 12.2m x 12.2m
d)	Max. Water level	:	981.70m (3220.00Ft)
e)	Minimum draw-down level	:	960.36 m(3150.00 Ft)
f)	F.R.L/M.W.L	:	3217.50 Ft/3220.00 FT
g)	Live storage	:	141.8 x 10^6 m³
h)	Dead Storage	:	39.4 x 10^6 m³
i)	Quantity of concrete	:	2.5 lakhs m³
j)	Overflow action - elevation above MSL	:	269.5 m
k)	Area of the reservoir at MWL	:	2510 acres (1015.8 hectares)

2. i) Intake

a)	Diameter of shaft	:	3.05 m
b)	Height of shaft	:	28.50 m
c)	Size of Intake Gate	:	3.85m x 3.21m
d)	Capacity of hoist	:	27 tonnes

ii) Tunnel

a)	Length of tunnel	:	2078.74 m (2.08 Km)
b)	Size of tunnel and shape of the section	:	3.05 m dia. Horse-shoe-shaped
c)	Average Lining thickness	:	250 mm

iii) Surge Shaft

a)	Height of shaft	:	48.30 m
b)	Diameter of shaft	:	4.90 m
c)	Bottom level of shaft	:	934.90 m
d)	Top level of shaft	:	983.20 m
e)	Gallery length and size	:	100.60 m long, 3.66 m dia.
f)	Level at the junction of gallery and shaft	:	1951.80 m
g)	Upper expansion chamber- size	:	32.9 m x 16.50 m at top and 24 x 7.60m at bottom
h)	Level at the junction of expansion chamber and shaft	:	983.20 m
i)	Top level of the expansion chamber	:	990.90 m

iv) High Pressure Tunnel

a)	Length	:	88.7 m
b)	Diameter and shape	:	1.98 m circular
c)	Liner thickness	:	10 mm
d)	Quantity of boring in tunnel	:	0.32 lakhs m³
e)	Quantity of concrete in tunnel lining	:	0.17 lakhs m³

3. Butterfly Valves

a)	Number	:	2 (two)
b)	Supplier	:	M/s Listorej, Yugoslavia
c)	Method of Operation	:	both manual and electrical operations from the valve house in addition, operation for

			applying the valve in the Control Room of Power House.
	d) Special Features –	:	Automatic tripping in the event of 25 % over velocity in the Penstock.

4. Penstock

	a) Length ,diameter, and numbers	:	Two lines- 1.98m dia and 530 m long. Each line bifurcating into 1.37 m dia near Power House.
	b) No. of support and spacing	:	60Nos @ 7.3m apart
	c) No. of anchors	:	6 (six)
	d) No. of turbines fed by each Penstock	:	2 (two)

5. Power House

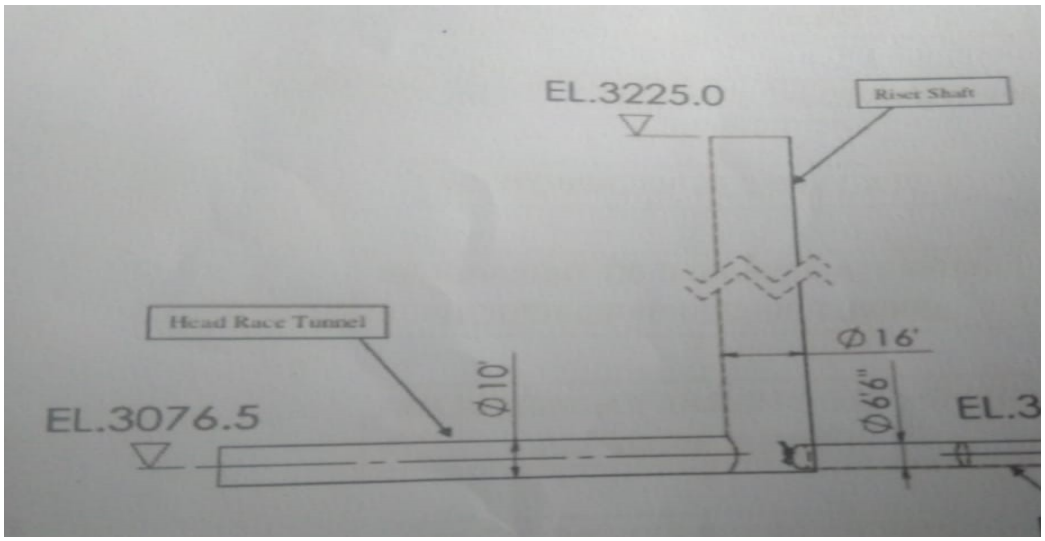
a)	Size of the building	:	41.8m x 21.3 m including Control Room
b)	Installation	:	4 x 9000 k.Watts
c)	Supplier of the Hydro- Electric Generator	:	M/s Toshiba, Japan
d)	Capacity of the E.O.T crane	:	Main hoist – 40 tonnes Auxillary Hoist- 7 tonnes
e)	Level of the generator floor	:	811.86 m
f)	Level of the distributor C.L	:	810.16 m

6. Tail Race Channel

a)	Length	:	365.85 m
b)	Maximum T.W.L	:	810.77 m
c)	Minimum T.W.L	:	809.40 m

General Parameters of Surge Shaft:

a)	Diameter of Riser Shaft	:	16'
b)	Riser Shaft Top Level	:	EL 3225.00 feet
c)	Diameter of Pressure Tunnel	:	6'6"
d)	C/L of Pressure Tunnel	:	EL 3074.82 feet
e)	Diameter of Head Race Tunnel	:	10'
f)	C/L of Head Race Tunnel	:	EL 3076.5 feet



B - SCHEDULE OF REQUIREMENTS AND SCOPE OF WORK:

1 Underwater sealing of the mouths of the Steel lined High Pressure Tunnel (2 nos) under high water pressure at the bottom of the Surge shaft, one after another (tentatively one month for each HP Tunnel) for a period of 2 (two) months strictly as per the "Work Schedule" in order to facilitate the execution of the allotted works for replacement of the Penstock Bypass Valves, inlet and outlet pipes etc., in both the Penstocks Valve Houses, as the Dam level shall be 3190 ft – 3180 ft above sea level during the lean season between the middle of February up to middle of May in the year. The said work situation/environment cannot be better as the Dam intake Gate was taken out since it became mal-functioned.

2 In addition to the Clauses in the Special Condition of Contract, the specific requirement of the Sealing work is that it should be reliably safe and secured for the mentioned works to be carried out in both the pen stock Valve Houses, utilising the best quality of Sealing items and accessories, in such a way so as to avoid possible caving in of the Dummy Seal and to reduce the flow/leakage of water from the Dummy gate to the penstock as minimally as possible so that the work personnel can easily access to the inside of the Penstock and work safely.

3 The tentative Sequential Processes for the above Sealing works are as follows and the bidder may also suggest any better option.

C- SEQUENTIAL PROCESSES FOR SEALING PRESSURE TUNNEL

1) DESIGNING OF DUMMY GATE:

After issuing of LOA and signing of Contract Agreement the Contractor shall design the Dummy Gate, stiffeners, bracket for anchoring the Dummy gate, desired holes etc., by taking the Maximum head of water in that period as well as other parameters and submit the same within 3 (three) weeks along with the design drawings/documents and details of the Sealing items with technical data for necessary approval by the competent authorities of MePGCL Civil wing.

2) FABRICATION OF DUMMY GATE

After obtaining of necessary approval of the Designs of the Dummy Gate etc., from the office of the Chief Engineer (C), HP&HC, MePGCL, the Contractor shall arrange for fabrication and transportation to the work site all the sealing items i.e, the Dummy gate etc., within a period of 2 (two) months from the date of intimation of the approval of the designs.

3) SITE PREPARATION WORKS etc., FOR SEALING OF PENSTOCK MOUTHS AT THE SURGE SHAFT (Sealing of only one penstock will be done at a time. After completion of work in one penstock the same procedure for sealing shall be adopted for the works in other penstock) are briefly as below such as:

LOWERING AND LIFTING ARRANGEMENT IN THE TOP RISER SHAFT:

a) Mobilization of Hoisting arrangement to the top of Riser Shaft

b) Anchoring preparation for locking of Hoisting arrangement

c) Assembly &Anchoring of Hoisting arrangement

d) Mobilization of Dummy gate to floor level of Riser Shaft.

ARRANGEMENT IN THE BOTTOM OF RISER SHAFT:

a) Arrangement of lights in the bottom of Riser Shaft.

b) Arrangement for holding/pushing the dummy gate towards the pressure tunnel.

c) Finalization of location for anchoring of Dummy gate

d) This process includes the diving team to work in the bottom area of the Riser Shaft. Works like fixing of the brackets for mounting all the lights & fixing of the brackets of the jacks in the bottom of riser shaft.

LOWERING OF DUMMY GATE:

a) Placing of Dummy gate in lowering position.

b) Latching of dummy gate to the hoisting arrangement.

c) Lowering of dummy gate.

d) This process includes the lowering of dummy gate in the centre of the riser shaft with the required speed to reach the dummy gate safely to the bottom of the shaft. During the lowering of the Dummy gate, divers will go along with dummy gate to ensure the proper lowering of the gate.

ALIGNMENT OF DUMMY GATE WITH MOUTH OF PRESSURE TUNNEL

a) Alignment of dummy gate in-front of the Pressure Tunnel

b) Pushing of dummy gate towards the pressure Tunnel with help of jacks

c) Alignment and marking of location for drilling on the wall of the surge shaft.

d) This process is one of the most important task over the all as its related to the alignment of the dummy gate in the centre of the pressure shaft. For the alignment of the dummy gate in the riser shaft filled with water in all 3 direction, the divers will carry the operation by holding the gate in each direction to fix that axis. Restricting the movement of the dummy gate in the deep water without pushing pressure we need to fix the big jack with the gate. This is also included in a list of time taking process as diver is unable to do work more than 30 mins in

water, so the another team of diver will come in action for continuing the process. After restricting that movement of dummy gate in each direction, now divers are ready to anchor the dummy gate.

ANCHORING OF DUMMY GATE OVER THE PRESSURE TUNNEL

a) Drilling on the surface of surge shaft area after marking the location of bracket of Dummy Gate

b) Insertion of anchor rod long with instant hardening grout

c) Balanced tightening of anchor rod for balance sealing of dummy gate.

d) After the alignment and locking of the gate on the sealing location of the pressure tunnel, marking will be done for drilling over the mouth of the pressure tunnel. Drilling in the bottom of the risk.

e) Dewatering of the Penstock No. 1/Penstock No. 2 (one at a time).

f) Coarse/Fine Sealing of the Gate with mouth of HPT.

Note: After the above works are completed the allotted work for replacement of the Penstock By-pass Valve etc., shall be attended for approximately 5 (five) days.

g) After the replacement of Penstock By-pass Valve is completed filling of Penstock No. 1/Penstock No. 2 (one at a time).

CLEARING/CLEANING OF RISER SHAFT BOTTOM AREA AND SEALING OF ANCHORING HOLES/GROVES AND FILLING OF PENSTOCK:

a) Removal of dummy gate from its anchored position and all items and accessories that was utilized for the sealing works along with the tools and tackles including metallic wastes items without leaving anything inside the Surge Shaft.

b) Sealing of the anchoring holes/groves and damages caused during anchoring works with the best underwater instant hardening sealing materials/compounds.

In addition to the above, any other works required for successful execution and completion of the work as intended but has not been mentioned in the Scope of Work shall also form part of the Scope of Work.

D. **Planned Work/Project Schedule for Sealing of Penstock mouth at the Surge Shaft for Umiam Stage-I Power Station (For Penstock No. 1)**

Sr. no.	Day	Details of Activities	Total Shutdown for both the penstocks (No of days)	Day time Total Shutdown for 12 hours for both the penstocks (No of days)	Total shutdown for Penstock No.1 only (U1 & U2) (No of days) .	Total	Remarks
1	D1-D2	- Alignment of winch machine - Site visual - Fixing of Light bracket assembly inside the water - Cutting of few rung ladders	-	2		2	X
2	D3-D4	- Drilling for mounting of chain pulley blocks and its associated works (for alignment of gate).	-	2	-	2	X
3	D5-D9	- Lowering of gate and placing in position. - Marking of holes for drilling. - Lifting of Gate.	5	-	-	5	
4	D10-D13	- Complete drilling of holes for gate fixing.	-	4	-	4	X
5	D14-D17	- Lowering/fixing of gates with anchor bolts. - Removal of all extra materials and equipments.	4	-	-	4	
6	D18-D20	- Dewatering of Penstock No 1. - Coarse/Fine sealing of gate with mouth.	-	3	3	3	XX
7	D21-D25	Work for replacement of Bypass Valve for Penstock-1 along with OPU system & servomotors for main valve.	-	-	5	5	XXX
8	D26-D28	- Filling of penstock - Removal of sealing gate from its anchored position.	-	3	-	3	X
TOTAL PERIOD of WORK						28	

Note below :

1 (X) U1, U2, U3, U4 will be available after Shutdown

2 (XX) U3, U4 will be available after Shutdown

3 (XXX) U3, U4 will be available after each day shutdown, however U1 & U2 will remain under continuous shutdown

4 The number of days given have been considered on the minimum possible and may increase in case of unforseen problems or difficulties.

5 During this Shutdown the following works may be taken up simultaneously :

(a) At Stage I Power Station - Repairing/Replacement of PRV and DT Steel liner .

(b) Renovation of Open channel at Umsumer.

(c) Reverse Engineering of Stage III Power Station under RMU Works

(d) Any other works

Total Shutdown for all the 4 units.

E. **Tentative Proposed Work/Project Shut down sample dates for Umiam Stage 1 Power Station for Sealing of Penstock mouth at the Surge Shaft (for Penstock No 1) in order to facilitate Replacement/Repairing of By-Pass Valve etc at Penstock Valve House.**

Sl No	Nature of Work	Sample Date	Time (hours)	Duration	Shutdown	Remarks
1	- Alignment of winch machine - Site visual - Fixing of Light bracket assembly inside the water - Cutting of few rung ladders	5.3.2023	06:00 - 18:00	12 hours	Total Shutdown	X
		6.3.2023	06:00 - 18:00	12 hours	Total Shutdown	
2	- Drilling for mounting of chain pulley blocks and its associated works (for alignment of gate).	7.3.2023	06:00 - 18:00	12 hours	Total Shutdown	X
		8.3.2023	06:00 - 18:00	12 hours	Total Shutdown	
3	- Lowering of gate and placing in position. - Marking of holes for drilling. - Lifting of Gate.	9.3.2023	06:00 - 24:00	18 hours	Total Shutdown	
		10.3.2023	00:00 - 24:00	24 hours	Total Shutdown	
		11.3.2023	00:00 - 24:00	24 hours	Total Shutdown	
		12.3.2023	00:00 - 24:00	24 hours	Total Shutdown	
		13.3.2023	00:00 - 18:00	18 hours	Total Shutdown	
4	- Complete drilling of holes for gate fixing.	14.3.2023	06:00 - 18:00	12 hours	Total Shutdown	X
		15.3.2023	06:00 - 18:00	12 hours	Total Shutdown	
		16.3.2023	06:00 - 18:00	12 hours	Total Shutdown	
		17.3.2023	06:00 - 18:00	12 hours	Total Shutdown	
5	- Lowering/fixing of gates with anchor bolts. - Removal of all extra materials and equipments.	18.3.2023	06:00 - 24:00	18 hours	Total Shutdown	
		19.3.2023	00:00 - 24:00	24 hours	Total Shutdown	
		20.3.2023	00:00 - 24:00	24 hours	Total Shutdown	
		21.3.2023	00:00 - 18:00	18 hours	Total Shutdown	
6	- Dewatering of Penstock No 1. - Coarse/Fine sealing of gate with mouth.	22.3.2023	06:00 - 18:00	12 hours	Total Shutdown	XX
			18:00 - 24:00	06 hours	U1 & U2	
		23.3.2023	00:00 - 06:00	06 hours	U1 & U2	
			06:00 - 18:00	12 hours	Total Shutdown	
			18:00 - 24:00	06 hours	U1 & U2	
		24.3.2023	00:00 - 06:00	06 hours	U1 & U2	
			06:00 - 18:00	12 hours	Total Shutdown	
7	Work for replacement of Bypass Valve for Penstock-1 along with OPU system & servomotors for main valve.	25.3.2023	00:00 - 24:00	24 hours	U1 & U2	XXX
		26.3.2023	00:00 - 24:00	24 hours	U1 & U2	
		27.3.2023	00:00 - 24:00	24 hours	U1 & U2	
		28.3.2023	00:00 - 24:00	24 hours	U1 & U2	
		29.3.2023	00:00 - 24:00	24 hours	U1 & U2	
8	- Filling of penstock - Removal of sealing gate from its anchored position.	30.3.2023	06:00 - 18:00	12 hours	Total Shutdown	XXX
		31.3.2023	06:00 - 18:00	12 hours	Total Shutdown	
		01.4.2023	06:00 - 18:00	12 hours	Total Shutdown	

Note below :

1 (X) U1, U2, U3, U4 will be available after Shutdown
2 (XX) U3, U4 will be available after Shutdown
3 (XXX) U3, U4 will be available after each day shutdown, however U1 & U2 will remain under continuous shutdown
4 The number of days given have been considered on the minimum possible and may increase in case of unforseen problems or difficulties.
5 During this Shutdown the following works may be taken up simultaneously :
(a) At Stage I Power Station - Repairing/Replacement of PRV and DT Steel liner .
(b) Renovation of Open channel at Umsumer.
(c) Reverse Engineering of Stage III Power Station under RMU Works
(d) Any other works

[redacted] Total Shutdown for all the 4 units.

F. **Planned Work/Project Schedule for Sealing of Penstock mouth at the Surge Shaft for Umiam Stage-I power station (For Penstock No. 2)**

Sr. no.	Day	Details of Activities	Total Shutdown for both the penstocks (No of days)	Day time Total Shutdown for 12 hours for both the penstocks (No of days)	Total shutdown for Penstock No.1 only (U3 & U4) (No of days) .	Total	Remarks
1	D1	- Alignment of winch machine - Site visual - Fixing of Light bracket assembly inside the water - Cutting of few rung ladders	-	1		1	X
2	D2-D3	- Drilling for mounting of chain pulley blocks and its associated works (for alignment of gate).	-	2	-	2	X
3	D4-D8	- Lowering of gate and placing in position. - Marking of holes for drilling. - Lifting of Gate.	5	-	-	5	
4	D9-D12	- Complete drilling of holes for gate fixing.	-	4	-	4	X
5	D13-D16	- Lowering/fixing of gates with anchor bolts. - Removal of all extra materials and equipments.	4	-	-	4	
6	D17-D19	- Dewatering of Penstock No 2. - Coarse/Fine sealing of gate with mouth.	-	3	3	3	XX
7	D20-D24	Work for replacement of Bypass Valve for Penstock-1 along with OPU system & servomotors for main valve.	-	-	5	5	XXX
8	D25-D27	- Filling of penstock - Removal of sealing gate from its anchored position.	-	3	-	3	X
TOTAL PERIOD of WORK						27	

Note below :

(X) U1, U2, U3, U4 will be available after

1 Shutdown

2 (XX) U1, U2 will be available after Shutdown

3 (XXX) U1, U2 will be available after reach day shutdown, however U3 & U4 will remain under coninuous shutdown.

4 The number of days given have been considered on the minimum possible and may

increase in case of unforseen problems or difficulties.

5 During this Shutdown the following works may be taken up simultaneously :

(a) At Stage I Power Station - Repairing/Replacement of PRV and DT Steel liner .

(b) Renovation of Open channel at Umsumer.

(c) Reverse Engineering of Stage III Power Station under RMU Works

(d) Any other works

[redacted] Total Shutdown for all the 4 units.

G. **Tentative Proposed Work/project Shut down sample dates for Umiam Stage 1 Power Station for Sealing of Penstock mouth at the Surge Shaft (for Penstock No 2) in order to facilitate Replacement/Repairing of By-Pass Valve etc at Penstock Valve House**

Sl No	Nature of Work	Sample Date	Time (hours)	Duration	Shutdown	Remarks
1	- Alignment of winch machine - Site visual - Fixing of Light bracket assembly inside the water - Cutting of few rung ladders	2.4.2023	06:00 - 18:00	12 hours	Total Shutdown	X
2	- Drilling for mounting of chain pulley blocks and its associated works (for alignment of gate).	03.4.2023	06:00 - 18:00	12 hours	Total Shutdown	X
		04.4.2023	06:00 - 18:00	12 hours	Total Shutdown	
3	- Lowering of gate and placing in position. - Marking of holes for drilling. - Lifting of Gate.	05.4.2023	06:00 - 24:00	18 hours	Total Shutdown	
		06.4.2023	00:00 - 24:00	24 hours	Total Shutdown	
		07.4.2023	00:00 - 24:00	24 hours	Total Shutdown	
		08.4.2023	00:00 - 24:00	24 hours	Total Shutdown	
		09.4.2023	00:00 - 18:00	18 hours	Total Shutdown	
4	- Complete drilling of holes for gate fixing.	10.4.2023	06:00 - 18:00	12 hours	Total Shutdown	X
		11.4.2023	06:00 - 18:00	12 hours	Total Shutdown	
		12.4.2023	06:00 - 18:00	12 hours	Total Shutdown	
		13.4.2023	06:00 - 18:00	12 hours	Total Shutdown	
5	- Lowering/fixing of gates with anchor bolts. - Removal of all extra materials and equipments.	14.4.2023	06:00 - 24:00	18 hours	Total Shutdown	
		15.4.2023	00:00 - 24:00	24 hours	Total Shutdown	
		16.4.2023	00:00 - 24:00	24 hours	Total Shutdown	
		17.4.2023	00:00 - 18:00	18 hours	Total Shutdown	
6	- Dewatering of Penstock No 2. - Coarse/Fine sealing of gate with mouth.	18.4.2023	06:00 - 18:00	12 hours	Total Shutdown	XX
			18:00 - 24:00	06 hours	U3 & U4	
		19.4.2023	00:00 - 06:00	06 hours	U3 & U4	
			06:00 - 18:00	12 hours	Total Shutdown	
			18:00 - 24:00	06 hours	U3 & U4	
		20.4.2023	00:00 - 06:00	06 hours	U3 & U4	
			06:00 - 18:00	12 hours	Total Shutdown	
7	Work for replacement of Bypass Valve for Penstock-1	21.4.2023	00:00 - 24:00	24 hours	U3 & U4	XXX
		22.04.2023	00:00 - 24:00	24 hours	U3 & U4	

Sl No	Nature of Work	Sample Date	Time (hours)	Duration	Shutdown	Remarks
	along with OPU system & servomotors for main valve.	23.4.2023	00:00 - 24:00	24 hours	U3 & U4	
		24.4.2023	00:00 - 24:00	24 hours	U3 & U4	
		25.4.2023	00:00 - 24:00	24 hours	U3 & U4	
8	- Filling of penstock - Removal of sealing gate from its anchored position.	26.4.2023	06:00 - 18:00	12 hours	Total Shutdown	XXX
		27.4.2023	06:00 - 18:00	12 hours	Total Shutdown	
		28.4.2023	06:00 - 18:00	12 hours	Total Shutdown	

Note below :

(X) U1, U2, U3, U4 will be available after

1 Shutdown

2 (XX) U1, U2 will be available after Shutdown

(XXX) U1, U2 will be available after reach day shutdown, however U3 & U4 will remain under coninuous

3 shutdown.

4 The number of days given have been considered on the minimum possible and may increase in case of unforseen problems or difficulties.

5 During this Shutdown the following works may be taken up simultaneously :

(a) At Stage I Power Station - Repairing/Replacement of PRV and DT Steel liner .

(b) Renovation of Open channel at Umsumer.

(c) Reverse Engineering of Stage III Power Station under RMU Works

(d) Any other works

[redacted] Total Shutdown for all the 4 units.