

## Project Details & Brief Scope of work

**For subject work of “CAPITAL OVERHAULING (Including Minor works of Rotary Valve) & REPAIR OF UNDERWATER PARTS OF UNIT#5, AT DEHAR POWER HOUSE (6X165 MW) SLAPPER, HIMACHAL PRADESH”**

### 1. INTRODUCTION: -

**Dehar Power Plant (Hydro Power Project)** is a run of river Project located on river Beas & has six hydro generators of 165 MW each. First four Units were commissioned during 1978-79 and remaining two during 1983-84. The high silt contents particularly quartz particles present in the Beas water cause extensive erosion of underwater parts viz. Runner, Top Cover, Pivot Ring Guide Vanes etc. of Dehar Units. At present Capital mtc. of two nos. Units and Annual mtc. of all the remaining four nos. Units are done every year and various underwater parts and other damaged/deteriorating parts are repaired/replaced during these maintenance activities.

### 2. LOCATION OF SITE: -

**Dehar Power Plant (Hydro Power Project)** is located on the right bank of Sutlej River in Himachal Pradesh at a place 360 Kms North of Delhi, 115 Km from Chandigarh on Chandigarh-Manali Road (National Highway-21) and 22 Km from Bilaspur.

The nearest railway station is Kiratpur Sahib which is about 55 Km away, if material is to be despatched by rail. In case the material is despatched by road, then the same shall be delivered at Slapper Distt. Mandi (H.P.)

### 3. CLIMATIC CONDITIONS: The equipment, during service, can be subjected to extremely severe climate conditions described hereunder: -

Sr. No.	Particulars	Climatic Conditions
1.	Maximum Ambient temperature in shade	50°C
2.	Minimum Ambient temperature in shade	0°C
3.	Maximum relative humidity	90-95%
4.	Average number of thunder storm days per annum	60
5.	Average number of dust storm days per annum	10
6.	Average rainy days per annum	70
7.	Average annual rain fall	125cms.
8.	Number of months during which tropical/monsoon conditions prevail	3
9.	Altitude above M.S.L.	470m
10.	Atmospheric pollution	Heavy

### 4. SCOPE OF WORK: -Scope of Work of specification broadly covers the following: -

- A) **Part A** - Capital Overhauling of UNIT#5 (Including Minor works of Rotary Valve), 165 MW HYDRO MACHINE, AT DEHAR POWER HOUSE.
- B) **Part B** - Repair of Underwater Parts of UNIT#5, 165 MW HYDRO MACHINE, AT DEHAR POWER HOUSE.



**CAPITAL OVERHAULING (Including Minor works of Rotary Valve) & REPAIR OF UNDERWATER PARTS OF UNIT#5, AT DEHAR POWER HOUSE (165 MW) SLAPPER, HIMACHAL PRADESH.**

**IMPORTANT NOTES:-**

1	<b>Tender Shall Comprise of 2 (Two) Parts: Separate Work order will be issued for each part as per percentages (%) of QV mentioned in Rate Schedule.</b>
	<b>Part A-</b> Capital OVERHAULING of UNIT#5 (Including Minor works of Rotary Valve), AT DEHAR POWER HOUSE (165 MW) SLAPPER, Himachal Pradesh.
	<b>Part B-</b> Repair of Underwater Parts of UNIT#5, AT DEHAR POWER HOUSE (165 MW) SLAPPER, Himachal Pradesh.
2	<b>COMPLETION PERIOD:-</b> <b>PART A - 90 days</b> (From date of handing over of Unit#5 to successful heat run/dry out of the Unit) <b>PART B - 140 days</b> (from 3 days after issue of LOA or handing over of UWPs by BBMB (whichever is earlier) to the date of receipt back complete under water parts at DPH after repair in good condition)
3	<b>Defect Liability Period shall be:-</b> <b>(PART-A)-SIX (6) MONTHS</b> from the date of commissioning of the Unit. Subcontract shall provide sub-contractor must offer comprehensive support free of cost to ensure that Unit vibrations, temp etc. levels within rated/design values as per EIC. <b>(PART-B)-SIX (6) MONTHS</b> against bad Quality & Workmanship from the date of commissioning of the repaired components into COH of next due Unit or 24 Months from the date of receipt of these repaired underwater parts at site in good condition, whichever is earlier. <b>NOTE:-</b> If any Deduction on the part of non execution of work during defect liability (For Part-A & B) is done by Customer shall be back to back deducted from vendor along with overheads as applicable. <b>Security Refund:</b> Shall fall due after completion of guarantee period/Defect liability period of respective works as per Part A & B subject to compliance of performance guarantee whichever is later.
4	<b>List of Annexures:</b>
	Annexure I(A)- Part A Scope of Work for Capital OVERHAULING & Minor works of Rotary Valve.
	Annexure I(B)- Part B Scope of Work - Repair of Underwater Parts.
	Annexure II - Tentative list of T&P.
	Annexure III - Tentative list of Manpower.
5	<b>Third party Insurance:</b> The contractor must take and maintain ESI /Workman compensation Policy for the workmen engaged for this work <b>and shall also have to take Third party Insurance</b> (for property and third person) for Rs 50,00,000/- (Fifty Lakhs) in Joint name of BHEL and BBMB for the period of work (up to the end of the Defects Liability Period) and document in this regard for both policy should be submitted to BHEL before commencement of work: Coverage shall be : (i) loss of or damage to the Contractor's T&P; (ii) loss of or damage to the property other than Works including those of third parties and (iii) injury or death of personnel belonging to the Contractor or any other party. Coverage of the Third party insurance shall include any loss or damage to Staff, Supervisors, Engineers and others who are not covered by Workmen Compensation Act. Workman & Third party insurance shall be submitted for the BBMB (Engineer-in-Charge) approval before the date of commencement of the Works. The Contractor shall extend support to BBMB for lodging of claims for its own material with the insurers for claim against Policies taken by BBMB.
6	It shall be in interest of the vendor to visit the site before quoting for the work.

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## RATE SCHEDULE

RATE SCHEDULE						
<b>A</b>	Lumpsum (LS) price for the TOTAL SOW as per (Annexure-A) inclusive of all consumables, input materials and supervision) excluding GST.	Amount to be Quoted: _____				
<b>B</b>	Break up of Price quoted at S. No. A					
S. No.	Job Description	Qty	UoM	% age Allotted of the QV at S. No. A	Completion Period (Days)	Remarks, If any
B.1	Part A- Capital OVERHAULING of UNIT#5 (Including Minor works of Rotary Valve), at DEHAR POWER HOUSE (165 MW) SLAPPER, Himachal Pradesh.	1 Unit	Job	58.63328%	PART A - <b>90 days</b> , from date of handing over of Unit#5 <b>up to</b> successful heat run/ dry out of the Unit.	-
B.2	Part B- Repair of Underwater Parts of UNIT#5, AT DEHAR POWER HOUSE (165 MW) SLAPPER, Himachal Pradesh.	1 Set	Job	41.36672%	PART B- <b>140 days</b> , from 3 days after issue of LOA or handing over of UWPs by BBMB (whichever is earlier) <b>up to</b> the date of receipt back complete under water parts at DPH after repair in good condition.	-
Work shall be divided into TWO PARTS : Separate contract for each PART (A & B) to be issued.						

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<b>ANNEXURE -I(A) Scope of Work for "CAPITAL MAINTENANCE OF UNIT AT DPH, SLAPPER"</b>		
<b>Work shall be divided into TWO PARTS : Separate contract for each PART (A &amp; B) to be issued.</b>		
<b>Part A</b>	Capital OVERHAULING of UNIT#5 (Including Minor works of Rotary Valve), AT DEHAR POWER HOUSE (165 MW) SLAPPER, Himachal Pradesh.	<b>58.63328% of QV</b>
<b>Part B</b>	Repair of Underwater Parts of UNIT#5, AT DEHAR POWER HOUSE (165 MW) SLAPPER, Himachal Pradesh.	<b>41.36672% of QV</b>
<b>A)</b>	<b>DISMANTLING OF MACHINE</b>	<b>Allotted % CV of PART -A</b>
<b>1.0</b>	<b>Common activities</b>	
1.1	Opening and closing of the manholes of draft tube and spiral casing.	4.63
1.2	Installation and removal of platform in the draft tube, I- section, channels, wooden planks, plates and other scaffolding material are to be provided by BBMB. Internal illumination of draft tube and spiral casing will be in the scope of work. Only DC Supply and its Lamps shall be used.	
1.3	Dismantling of slip ring & brush gear assembly drain the oil from the generator & turbine guide bearing reservoirs, removal of RTDs, thermocouple etc.	
1.4	Dismantling of shaft seal assembly, turbine & generator guide bearings & guide pads check and record centring of the machine.	
1.5	Check level and unit axis alignment of machine for recording.	
1.6	Dismantling of oil vapour seal assembly.	
<b>2.0</b>	<b>Rotor Assembly</b>	
2.1	Remove the top & bottom guide ring, end winding plates/winding covers, oil retaining sleeve and top bracket.	5.55
2.2	Disconnect the rotor shaft leads between the spider and shaft.	
2.3	Remove drive bolts and dowels between the spider and thrust block.	
2.4	Removal of coupling nut guard of the turbine and generator shaft couplings.	
2.5	Decouple the turbine & generator shaft and lower the runner to place it on throat ring.	
2.6	Lift the generator rotor and place in the service bay.	
<b>3.0</b>	<b>LOWER MAIN BRACKET &amp; OIL COOLERS &amp; AIR COOLERS</b>	
3.1	Disconnect all pipe work, thermometers and auxiliary wiring from bracket.	3.7
3.2	Remove dowels and holding down bolts.	
3.3	Lift the bracket out of the pit after ensuring the turbine shaft and runner are suitably supported. Decouple the generator shaft from the turbine shaft and removal of over speed device and pit air seal etc.	
3.4	Removal of oil & air coolers.	
<b>4.0</b>	<b>GUIDE APPARATUS, TOP COVER, RUNNER, RUNNER SHAFT, PIVOT RING</b>	
4.1	Dismantle and take out the breaking links, rotating-oil sump, fork ends of guide vane servomotors and regulating ring.	7.42
4.2	Dismantle and take out the guide vane levers, bush housing and top cover.	
4.3	Take out the runner with shaft and place the draft tube cover plate in the turbine pit and take out the guide vanes.	
4.4	Dismantle and take out the pivot ring and hydraulically operated by-pass valve.	

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<b>5.0</b>	<b>Pressure Pumping (PP) SET</b>	
5.1	Dismantle and take out both the motors of both the governor oil pumps.	1.85
5.2	Grease and varnish the GOP motors and mount both the GOP motors and pumps after maintenance. Drain all the oil from the oil receiver & dismantle both the inspection windows of air & oil receiver tank. Clean both the tanker and assembly back. All the gasket/seals shall be provided by BBMB.	
5.3	Checking & servicing of idler valve and checking idling of the pump & safety valves seating as per requirement.	
5.4	Take out turbine oil from PP set. Oil shall be filtered by BBMB & refilled by the Vendor. BHEL shall hand over the filled oil drums to BBMB and the same will be returned after filtration/new oil. The approximated quantity will be registered before handing over and taking over the oil.	
<b>6.0</b>	<b>Dismantling, Servicing &amp; Assembly of Cooling water Pump &amp; strainers</b>	
6.1	Dismantle the complete pumps.	2.78
6.2	Dismantle & takeout strainer.	
6.3	Check up the impeller shafts, bowl bearings, Impellers, suction/discharge case bearing, pump bowls etc. for wear & tear & replacement of damaged parts.	
6.4	Check up the line shaft, top shaft & spider rubber bushes & replacement, if necessary.	
6.5	Check up the motor & pump bearing & replacement, if necessary.	
6.6	Drying up the Pump motor after varnishing.	
6.7	Re-assemble the pumps.	
6.8	Repair of strainer body & its operating mechanism, valve seat & epoxy painting of strainer body. <b>Paint shall be provided by BBMB.</b>	
6.9	Water pressure testing of strainers.	
6.10	Re-assemble the strainers.	
6.11	<b>Servicing of 14" NB NRVs and 14" NB valves.</b>	
6.12	Checking/ flushing/ replacement of 1.5" shaft - gland cooling pipeline to ensure its proper flow of water for cooling of the gland. Connected valves and joints etc. will also be checked/ replaced (valves and pipes will be provided by BBMB). Its painting will also be done (paints in the firm's scope). Its vacuum pump pipe lines will be changed wherever it is found required to do so (pipe line will be provided by BBMB).	
<b>TOTAL DISMANTLING (A)</b>		<b>25.93</b>
<b>B)</b>	<b>ASSEMBLY OF TURBINE</b>	
1	Replacement of top cover, pivot ring, Runner, guide vanes & bush housings.	5.55
2	Repair the shafts sleeve of the turbine shaft, welding electrodes (Mo 309 SS) to be supplied by the vendor.	
3	Test the 24 nos. guide vane Bush Housing at 40 Kg/cm <sup>2</sup> for at least 10 mints. In case of replacement New shaft sleeve will be supplied by BBMB.	
4	Assembly of runner and runner shaft and runner aeration cone.	
5	Cleaning and painting of foundation ring, turbine pit liner, spiral casing and other allied equipment. (Colter based Black Epoxy Paint and Red Oxide Zinc chromate Primer suitable for Epoxy paint to be supplied by BBMB).	
6	Lower the pivot ring on the foundation ring, lowering of top cover and 8 nos. guide vanes & bush housing without runner, place lower main bracket in position with original dowels. Centring of pivot ring and top cover with piano wire w.r.t centre axis of generator shaft to maintain radial clearance as per requirement, re-dowelling of repaired top cover and pivot ring.	

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7	Trial assembly of runner to ensure radial clearance & freeness of runner.	6.49	
8	Assembly of guide vanes and top cover, record clearance of guide vanes with top cover and pivot ring, correction of the same as per requirement.		
9	Final assembly of runner, top cover, bush housing, guide vane apparatus, base plate of shaft gland, servomotor fork ends, breaking links, levers etc. and painting of guide vane apparatus. Paint shall be provided by Subcontractor .		
10	Fit the rotating oil sump on the turbine shaft and turbine guide bearing assembly of outer shell of turbine & generator guide bearing. DPT and UT of inner shell of TGB & all bearing Pads and bearing shell. Hydraulic test of bearing shell. (All nut bolts for the Jali & rotating oil Sump shall be provided by the BBMB)		
11	Lower and fit LMB and rotor in generator pit and couple both turbine and generator shafts.		
12	Levelling and alignment of coupled turbine generator shaft and correction of the same by putting the shims in between the turbine and generator coupling flanges as per requirement.		
13	Centring of the unit, record centring readings at labyrinth of pivot ring/top cover, shaft seal, TGB, UGB, Air gap etc. Keep the machine at best suitable centre position.		
14	Assembly of generator guide bearing pads & turbine shaft seal and turbine bearing. Hydraulic test of the bearing shell.		
15	Calibration and assembly of temperature gauges of TGB, Generator guide bearings. Thrust bearing pads.		
16	Clean the tank, oil strainers and idler valve of PP set and filters of Rexroth valve.		7.42
17	Checking the operation/servicing of all the oil gate valves and attend the leakage, if found.		
18	Polish the white metal surface of inner shell with combination stone and replace the rubber strip of outer shell, if required. (Rubber strip, Grub Screws, TGB Oil flap & turbine Main shaft gland system flaps shall be provided by the BBMB.		
19	Servicing of both the G.V servo motors and replaces the chevron packing (if required). (Chevron packing shall be supplied by BBMB).		
20	Dismantling & replacement work of Valves pertaining to Operation of Guide Vane Servomotors (Including pipeline, drain/check/regulating/globe valves shall be in scope of vendor). However spares such as pipelines & valves shall be provided by BBMB.		
21	Assistance in Oil flushing shall be in scope, whoever Oil Flushing, setting of newly replaced valves & complete commissioning shall be in the scope of BBMB.		
22	Replace the rubber seal of bye pass valve and repair/replace the damaged parts, if required assembly of the same. (Materials shall be provide by BBMB)		
23	Open the air valve and repair/replace the damaged parts, if required & fit it. (Material shall be supplied by BBMB).		
24	Assemble turbine shaft gland system & Carryout the operation of air seal in the presence of BBMB.		
25	Carry out the bedding of guide vanes to match there sealing surfaces.		
26	Carry out the dry stroking of guide vanes in co-ordination with the EMD-BBMB.	2.78	
27	Dismantle and remove the platform from draft tube and close the draft tube door and spiral casing manhole.		
28	Disengage the isolating seal and mechanical lock of rotary valve and then open the 8" bye-pass gate valve for spiral filling.		
<b>TOTAL TURBINE ASSEMBLY (B)</b>		<b>22.24</b>	

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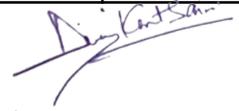
<b>C</b>	<b>ASSEMBLY OF GENERATOR.</b>	
<b>1</b>	<b>Stator</b>	
	Clean the stator windings (suitable/ standard cleaning agent viz CRC 2-26/ Electra Clean/ AC-90 etc. will be provided by the vendor) and air ducts for carbon dust, check condition of slot wedges, repair/replace if required. Check tightness of core studs as per requirement. Check <b>IR, PI, DC Resistance, Capacitance, Tan Delta, Partial discharge of stator winding ELCID test</b> including arrangement of all testing kits & Expert Operator & Level-II Expert as per OEM guide lines or check list. Ensure tightness of MS blocks and replace worn out glass tying cord. Varnishing of stator core & overhang portion. Varnish and thinner (Standard thinner make viz Elantas Beck India Ltd 221 or 205 etc. to be used and shall be provided by the BBMB)	9.28
	Arrangement for carrying out Dry out of stator including rectifier, if required shall be in the scope as per requirement raised by EIC.	
<b>2</b>	<b>Alignment checking of generator shaft</b>	
	Alignment / throw checking of generator shaft (it will be done after removing any additional weight if it is mounted on rotor/spider in past to balance the rotor) and correction of the same by putting the shims between runner disc (without coupling with Turbine shaft). Shim of suitable thickness viz 0.05 / 0.07 / 0.1 / 0.2 mm etc. will be in scope of the firm.	
<b>3</b>	<b>Rotor</b>	
	Remove the carbon dust from field windings by dismantling of all the poles, clean the spider and rotor leads. Check Inter pole connection. Measurement of Impedance including arrangement of impedance testing kit. DC Resistance of field windings. Measure voltage drop of rotor poles as per OEM/BBMB guide lines or check list. Replace the defective pole, if found during testing. Checking and adjustment of stator/Rotor air gap, recording stator form & rotor form; final air gap shall be recorded at top/bottom of each pole. Varnishing of rotor poles as per requirement. Varnish shall be provided by BBMB.	7.42
<b>4</b>	<b>THRUST BEARING/UGB/LGB/BEARING SUMP.</b>	
	Carryout UT & DPT test of Thrust bearing, Top and bottom guide pads. Clean and polish all the thrust/guide bearing pads after blue matching. If any of the guide bearing pads is found damaged, it may be replaced and its clearance be re-set without changing the other pads. The radial clearance between shaft journal and guide pads should be as per requirement. Inspection of runner disc joint if gap found more than desire limit the same shall be reduced up to some extent possible by replacement of joint bolts supplied by BBMB.	6.49
<b>5</b>	<b>Maintenance of slip ring and brush gear ass.</b>	
	Clean the slip rings, brush gear assembly. Check the condition of brush holders and Carbon brushes repair/replace, if any. Carbon brush/holder will be supplied by BBMB.	0.92
<b>6</b>	<b>Maintenance of oil cooler</b>	
	Dismantle and clean the water boxes of coolers clean the cooler tubes with brush and a jet of water. Replace neoprene 'O' ring. Test the coolers for any leakage as per OEM/ BBMB checklist.	0.92
<b>7</b>	<b>Maintenance of air coolers</b>	
	Dismantle and clean the water boxes of coolers. Clean the cooler tube with brush and a jet of water. The outside of the tubes and fins should be cleaned with the help of compressed air and a high pressure jet of water. Replace all the gaskets and Test the coolers for any leakage at the pressure as per BHEL/BBMB check list.	0.92
<b>8</b>	<b>BRAKING AND JACKING SYSTEM</b>	
	Servicing of brake jack system, replacement of cup seal, spring etc. Replace the brake pads, if found worn out. Drain the sludge/moisture trapped in oil turn dish. Check the tightness of brake track holding bolt. (New Brake pads and other spares shall be arranged by BBMB)	1.85

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9	<b>BOX UP OF GENERATOR</b>	
	Assembly of UGB / Slip ring, brush gear assembly. Fix the lock plates of both guide bearings & thrust bearing. Change the polarity of collector rings. Fit the vapour seals and allied piping's. Check tension on brushes as per OEM norms. Fit the top & bottom guide rings, end winding plates and flooring plates. Check that no foreign material is trapped between plates, and flooring plates. Check that no foreign material is trapped between stator core and rotor poles. Final inspection of machine and box up. Mechanical/heat run of the machine for 72 hours or the period till desired IR/PI is achieved.	6.5
10	Painting of all cooling water pipe lines of bearings oil & stator coolers. (Paint in scope of the BBMB).	0.92
11	Painting of the flooring plates, railing etc. (Paint in scope of the Subcontractor).	
12	Maintenance of II KV Bus Duct:- -Cleaning of IIKV Bus duct of complete in all respect near manhole & Replacement of manhole gaskets with verification by BBMB (EMD). Scaffolding wherever required to be made with verification by BBMB (Electrical Mtc. Division) (All spares shall be provided by BBMB)	
13	Spinning, commissioning of all Turbo Generator & Aux system. Manpower assistance during commissioning & correction required in bearing clearance re-adjustments in case of abnormalities observed during bearing run or 72 hrs trial run commissioning test shall be in scope. Final synchronization of the machine and Vibration Testing/Analysis.	3.71
<b>Note:-</b>	<b>Deputation of vibration Expert along with Vibration analysis kit</b> (Bentley Nevada ADRE) & Trim Balancing expert team:- Vendor has to mobilize the Vibration analysis and trim balancing team (Expert Vibration Analyst having vast experience and certification) timely long with Kit (Bentley Nevada ADRE) for Vibration analysis and trim balancing, during final commissioning of the Unit till satisfactory completion of works. The contractor may have to arrange suitable balancing weights for reducing vibration during trim balancing at site.	
<b>TOTAL GENERATOR ASSEMBLY (C)</b>		<b>38.93</b>
<b>D</b>	<b>DISMANTLING &amp; MINOR MAINTENANCE OF ROTARY VALVE.</b>	
1	Complete dismantling of Rotary valve of the unit to service bay to execute the work of replacement of service seal and inspection of service seal, Isolating seal and its operating portion/mechanism.	7.35
2	Removal of existing damaged service seal and its replacement from new one (To be provided by BBMB at Site, transportation in the scope of the BBMB).	
3	Repair/replacement of isolating seal mechanism for its satisfactory operation to the extent possible.	
4	Ensure satisfactory operation of both seal (servicing and isolating). Checking of gaps for avoiding leakage of water after operation.	
5	U-piece of RV is required to be dismantled as per requirement.	
6	Assembly of rotary valve by using new /repaired components, fastener, seal and packing etc. All such fasteners, seals and packing etc. shall be arranged by BBMB.	
<b>TOTAL DISMANTLING &amp; MINOR MAINTENANCE OF ROTARY VALVE (D)</b>		<b>7.35</b>

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<b>E</b>	<b>GENERAL TERMS &amp; CONDITIONS</b>	
1	The contractor shall deploy crane operators (EOT) and riggers to facilitate the timely completion of the work. However, Crane shall be provided free of cost by Customer.	5.55
2	Workshop machines as available at Dehar Power House will be provided as on where basis to contractor, but without any assistance for their operation. Operators to be arranged by bidder, if required.	
3	All kind of other consumables such as Paint remover, Rustolene, Diesel, welding Electrodes, super therm, (E-7018), Mo-309-S.S), and other general purpose consumables such as bonding material, sealing material, cleaning material, DA, Oxygen, Nitrogen and Argon gas, DP test kits, M-seal, Normal, primer, Paint or Synthetic enamel paints etc. required during assembly of machine, S.S. Shims off sizes required during assembly of machine, M.S Flat off sizes for locking various nut and bolts, etc. as per site requirement for the completion & assembly work of the unit shall be in the scope of the bidder.	
4	Any machining work required to run the system shall in be in sub-contractor scope. (Taping, Reaming, Honing or any other in-situ machining activity shall be in scope of vendor)	
5	To provide one full time office boy/attendant for BHEL office in shifts and One Cook and commercial LPG cylinders for BHEL Mess and utensils for tea/coffee at BHEL site office at least for 4-6 persons. Housekeeping of Office and Site work area shall be in Scope. Which is to be provided during entire Job period.	
6	Arranging one personal computer /laptop with latest configuration, Internet connection with 4G/5G Support, 3 in 1 printer, scanner & Copier and its other accessories & Consumables for the complete period up to commissioning. PC shall be installed with latest windows (at least Windows 10).	
<b>TOTAL GENERAL TERMS (E)</b>		<b>5.55</b>
<b>GRAND TOTAL FOR COH (A+B+C+D+E)</b>		<b>100</b>



<b>TERMS &amp; CONDITIONS (Included in Scope of work)</b>	
1	Any other work, which is not specified /covered or the work which can be done at site/got done from local market and is not specified /covered in the above scope of work, but is required to be done to completeness the work, is deemed to be covered in the scope of work.
2	Contractor shall be fully responsible for all the hardware/components, which are dismantled from the unit and shall keep them in safe custody. The contractor at his own risk shall arrange any missing item and BBMB will not be responsible in any way. Contractor will also be responsible for proper upkeep and maintenance of any special tools provided to him, which shall be returned by the contractor in good and working condition. He shall also make any other damage to any equipment or property of BHEL / BBMB due to mishandling or carelessness of any staff of the contractor good at his own cost. The contractor at his own expenses shall keep all the places, surrounding of his working neat & clean and out of danger to any person or assets. At work site, provide and maintain at his own cost all lights, guards, fencing, warning signage, when and where necessary or required by the Engineer-in-Charge. If any component gets damaged, the cost of the same shall be recovered from subcontractor, as per rates decided by Customer plus overheads as applicable.
3	The contractor shall maintain a site order book, which will be available at site so that instructions could be passed by BBMB officer in charge or engineer(s) deputed by him.
4	Any change/modification in scaffolding or shortfall shall be carried out by contractor with his own material.
5	The contractor shall submit Bar/PERT chart and Daily progress report preceding day before noon on next day to the BHEL site engineer.
6	Non-satisfactory results may hinder initiation/finalization of payment process at any stage and in worst case may lead to recovery of payment already made.
7	Firm's representative is required to report at site well before time & conduct a site visit and document diverse factors like unit vibrations, temperatures, oil and water leakage, etc. prior to handing over the unit.
8	Fabrication of any fixture or device for measurement/rectification shall also be in scope.
9	The contractor shall submit along with any tender, or prior to any works commencing the following: -
a	Copies of employer's liability and public liability insurance certificates.
b	Safety assurance plans related to work to be submitted.
10	Any other minor components like Dowell, gaskets and general purpose fasteners etc. shall have to be supplied by sub-contractor as per site requirement.
11	Temporary lighting at site of work. Sub contractor will arrange bulbs, two core cables, bulb holders and step down transformers etc. 24V Distribution transformer & board along with proper cables, plugs and tops. Main switches of 100A/63A, hand lamps, torch and flood lights be arranged by the contractor. All tools and tackles required to complete the Scope of work shall be in scope of the party.
12	Covid or any other Govt. Guideline at the time of execution of work is to be arranged at own cost.
13	All safety articles such as safety belts, safety helmets, electrical/mechanical/normal hand gloves, electrical/mechanical safety shoes, Gum boots, rain coat, protective glass, & welding, cutting glasses etc. shall be arranged by contractor. Sub - contractor will strictly follow and display as per the HSE guidelines of BHEL. <b>Experienced Safety engineer and Graduate engineer shall be in scope as per BHEL policy.</b> At work site, provide and maintain at his own cost all lights, guards, fencing, warning signage, when and where necessary or required by the Engineer-in-Charge. Vendor is required to follow best practises as per <b>BBMB CODE FOR PRACTISE</b> of General Safety Requirements within BBMB Premises.



14	Contractor shall be arrange labour license before start of the job and Compliance other statutory requirements of labour laws as per labour act.
15	Material handling :- Local Site transportation of Material. Material handling from Power House to Customer / BHEL stores or vice versa in in Sub-contractor scope. Making all necessary arrangements of manpower for the same, shall be in scope. (Mobile Crane, Truck/Trailer for material handling from DPH main Store to DPH Power House i.e. upto about 2.5km shall be provided by BBMB)
16	If any work is denied or refused same shall be carried out at Risk and cost of the vendor and cost as per actual for execution to meet urgency shall be recovered with overheads as per NIT.
17	No Idling, Demobilisation/ Re-mobilization charges will be applicable.
18	In case of contradiction between GSCC, Conditions will prevail & be final.
19	Sub-contractor shall have sufficient man power to complete the as per schedule. The contractor shall submit Bar/PERT chart and Daily progress report to the BHEL site engineer. Accommodation is provided, as per availability with customer.
20	Sub contractor has <b>Workers compensation policy</b> : The contractor must take and maintain ESI and Workman compensation Policy for the workmen engaged for this work in accordance with the statutory requirements applicable where the contract or any part thereof is executed. Deduction of any payment done by BBMB on the part of non compliance of statutory requirements by any of the authorities of State/Central Government shall be done back to back as per actual along with Overheads as per EIC.
21	Percentage (%age) Allotted as per detailed breakup of 100% shall be deducted in case of non Execution of the same due to site/Customer requirements.
22	<b>Third party Insurance:</b> The contractor must take and maintain ESI /Workman compensation Policy for the workmen engaged for this work and shall also have to take Third party Insurance (for property and third person) for Rs 50,00,000/- (Fifty Lakhs) in Joint name of BHEL and BBMB for the period of work (up to the end of the Defects Liability Period) and document in this regard for both policy should be submitted to BHEL before commencement of work: Coverage shall be : (i) loss of or damage to the Contractor's T&P; (ii) loss of or damage to the property other than Works including those of third parties and (iii) injury or death of personnel belonging to the Contractor or any other party. Coverage of the Third party insurance shall include any loss or damage to Staff, Supervisors, Engineers and others who are not covered by Workmen Compensation Act. Workman & Third party insurance shall be submitted for the BBMB (Engineer-in-Charge) approval before the date of commencement of the Works. The Contractor shall extend support to BBMB for lodging of claims for its own material with the insurers for claim against Policies taken by BBMB.
23	<b>Contract should provide for submission of supporting documents for deployment of office attendant, laptop/computer, printer, safety officer, digital megger, crane operator as per contract requirement for releasing payment against Miscellaneous Services.</b>
24	Vendor has to obtain necessary "Police Verification" from local PS and "Gate Pass" from Project Security Officer to enter into the project area for his entire manpower including its permanent staff & vehicle. Valid ID proofs to be submitted.
25	Taking of NOC/NDC from the EIC of MMD & EMD of BBMB after completion of works shall be in scope & submission of the same along with Final Bill.

*D. K. Saini*

<b>ANNEXURE -I(B) Scope of Work for "REPAIR OF UNDER WATER PARTS OF 165 MW DEHAR"</b>		Allotted % CV of PART -B
	<b>Scope of Work Detailed Activity</b>	
<b>a</b>	Underwater parts to be repaired as ready for lifting as Site.	
<b>b</b>	Upon receipt of intimation from BHEL/BBMB. Vendor has to deploy his team along with Transporting vehicle and related documents for Lifting of UWP for shifting them to workshop on immediate basis.	
<b>c</b>	Upon Receipt of all components at works <b>Vendor shall immediately</b> record all the dimension prior repair works and prepare Repair works schedule & intimate or plan a Joint inspection of BHEL & BBMB this shall be recorded as " <b>Prior Repair Inspection Report</b> " and submit Schedule for repair of under water parts.	
Following scope of work shall be executed after Joint " <b>Prior Repair Inspection Report</b> "		
<b>1</b>	<b>Repair of Top Cover (without Replacement of labyrinth):</b>	
1.1	Repair of S.S. liner of top cover & its nearby portion and other eroded places by welding with Mo-309 S.S. electrodes, one layer of final welding to be done with <b>hard facing electrode</b> before grinding and polishing.	8
1.2	Repair of 24 No. eroded holes in top cover S.S. liner by welding with Mo-309-S.S Electrodes and machining/grinding/boring.	8
1.3	Repair of <b>existing fixed top labyrinth</b> in position by welding with Mo-309-S.S electrodes & one layer of final welding to be done with hard facing electrode by grinding/ machining & polishing to suit runner	10
1.4	Replacement of existing fixed baffle plate using B.Q. plates by super thermal Electrodes (E-7018).	
1.5	Carry out NDT (MPI,UT,DPT) as per BHEL norms.	
<b>Total for Top Cover</b>		<b>26</b>
<b>2</b>	<b>Repair of pivot ring (without Replacement of labyrinth):</b>	
2.1	Repair of S.S. liner of Pivot ring & its nearby portion and other eroded portion by welding with S.S.Mo-309 electrodes and one layer of final welding to be done with <b>hard facing electrode</b> before machining.	9
2.2	Repair of 24. No. eroded holes in pivot by welding with Mo-309-S.S electrodes and machining.	10
2.3	Repair of <b>existing fixed bottom labyrinth</b> in position by welding with Mo-309-S.S electrodes & one layer of final welding to be done with hard facing electrode before machining by grinding/ machining & polishing to suit runner.	9
2.4	Replacement of existing pivot bronze bushes by new ones ( <b>Supply of Bushes</b> to be arranged by vendor, 1 set as dismantled).	
2.5	Carry out NDT(MPI,UT,DPT) as per BHEL norms.	
<b>Total for Pivot Ring</b>		<b>28</b>
<b>3</b>	<b>Repair of Runner:</b>	
3.1	The repair work will involves welding, grinding/machining to bring the original profile and heat treatment. ( <b>Stress relieving test</b> ). Welding will be done with 309– Mo SS electrodes and one layer of final welding to be done with hard facing electrode before grinding/ machining.	10
3.2	Rectification of cracks by gauging/grinding/NDT/preheating/post and weld repairs.	
3.3	Repair of internal surface of the skirt by weld deposit, grinding and polishing to achieve near original profile.	



3.4	Repair the upper and lower existing labyrinth by weld deposit to bring to drawing dimensions by grinding/machining.	8
3.5	Repair of water path surface crown.	
3.6	Grinding and polishing of water path surfaces.	
3.7	Build- up of skirt and crown to achieve fitting dimensions of the labyrinths.	
3.8	The profile of the skirt and the blades after repair shall be achieved near design dimensions.	10
3.9	Heat treatment after repair/rectification as per BHEL norms.	
3.10	Static balancing of Runner.	
3.11	Weld repair of aeration holes, lifting holes and maintaining the Dia by boring and grinding.	8
3.12	Checking of runner holes available for coupling with runner shaft after heat Treatment of runner. Maintenance of these holes up to the desired Dia by welding/boring etc. providing sleeves in holes if found damaged.(Sleeves shall be provided by BBMB). Machining of new sleeves as per required interference shall be done by as per BHEL norms including arrangement of liquid nitrogen).	
3.13	Carryout NDT (MPI, UT & DPT ) as per BHEL norms	
<b>Total for Runner</b>		<b>36</b>
<b>4</b>	<b>Transportation and Insurance</b>	
	<p>The firm shall be responsible for transportation, handling &amp; insurance of material from destination station up to their works for repair &amp; from their works (after repairing of underwater parts) up to destination station. The material shall be dispatched only by rail/road "freight prepaid". BBMB/BHEL shall have the right to lodge claims for shortage/ damages etc. If any during transit with the firm within the 30 days of receipt of material. The settlement of material shall be vendor's responsibility. In such an event BBMB/BHEL shall obtain an open delivery from the railway/ carrier.</p> <p>Vendor shall be responsible for insurance of these underwater parts from handing over to the repaired U/W parts are received back at DPH store. Vendor/Contractor shall also be responsible to cover life, health, accident, travel or other insurance of personal of firm in accordance with statutory requirements applicable in India. <b>[Top Cover (in single piece) Dia approx. 5.0mtr, height 840 mm, Wt. approx.38 Tons, Pivot Ring (in single piece) Dia 4.8mtr, Height 350 mm, wt. approx. 14 Ton, Runner OD 3730mm,Height approx.1250 mm, wt.21.5Ton]</b></p>	10
Note	<p><b>1. All activities outlined in the aforementioned scope of work must adhere to the standards set by the original equipment manufacturer (OEM). The bidder is required to provide supporting documentation issued by the OEM during or after the completion of each task specified in the scope of work.</b></p> <p><b>2. Inspection may be done by BHEL &amp; BBMB officers at any time during repair period.</b></p> <p><b>3. Balancing and heat treatment of runner may be done in the presence of BHEL &amp; BBMB Representative.</b></p> <p><b>4. Under water parts after repairing will be jointly inspected by BHEL officers and BBMB's representative before dispatch. The dispatch authorization will be issued by BHEL/BBMB.</b></p> <p><b>5. Any other work which is not specified/covered in the above scope of work but is required to be done to complete the work is deemed to be covered in the scope of work.</b></p>	
<b>GRAND TOTAL FOR (1+2+3+4)</b>		<b>100</b>

**CAPITAL OVERHAULING (Including Minor works of Rotary Valve) & REPAIR OF UNDERWATER PARTS OF UNIT#5, AT DEHAR POWER HOUSE (165 MW) SLAPPER, HIMACHAL PRADESH.**

**Tools & Plants (T&P) and Monitoring & Measuring Equipments (MMEs)**

1	Following T&P and consumables falls in the scope of sub-contractor scope and no additional payment over and above quoted rates will be made against supply of same. The list is suggestive/indicative in nature.
2	Contractor shall deploy sufficient T&P like hydraulic jack alongwith pump, Measuring & Testing equipment (i.e. micrometres, slip gauge, dial gauges, telescopic gauges, dial bore gauges for carrying out the scope of work to complete the job within scheduled time. Tentative <b>T&amp;P as detailed below</b> shall be made available at site before start of work as shall be got checked from engineer-in-charge. MMEs to be deployed as per work front availability as decided by BHEL Engineer In charge. Being very short duration shutdown period, <b>In case works/activity gets delayed due the absence of any T&amp;P or MMEs by more than (5 days), than same shall be arranged at the risk and cost of contractor to meet contract timelines/schedules and payment shall be made from contractor's bill/dues with BHEL. Decision made by BHEL Site In charge shall be final &amp; binding to bidder/contractor</b> . Contractor must submit all calibration certificate before the start of work. Test certificate of all lifting tools shall be submitted. Any deduction made by customer due to non availability of tested or calibrated instrument or kit shall be done back to back plus overheads as per rules/norms.
3	Sub-contractor shall ensure use of only calibrated Inspection, Measuring & Testing equipment (i.e. Micrometers, slip gauge, dial gauges, telescopic gauges, dial bore gauges, measuring tape, Vernier callipers etc.) confirming to the national standards. Valid calibration certificates shall accompany these equipment's. Subcontractor shall submit complete list of T&P along with their calibration certificates to BHEL, well before (at least 7 days) start of the job.
4	Consumable like, Champion gasket Sheet (2mm-3mm), Neoprene Rubber sheet (2, 3,4 mm),cotton tape, araldite, permanent markers, white paint, m-seal, Bulbs, all welding electrodes, tarpin oil, DPT kit, waste cloth, hand gloves , MT Oil, Lectra clean Oil, Benzene Oil, CRC 26, acetone, grinding wheels, cutting wheels, Teflon tape, pvc tape roll, Emery papers, Markin cloth, cleaning cloth, safety caution roll, etc. to complete the work shall be in scope.
5	Use of Digital IMET's & Pneumatic or battery operated impact wrench machine (having various range of spanner size) is mandatory in plant to ensure timely completion of work within schedule. Fabrication of any fixture or device for measurement/rectification shall also be in scope.
6	Transportation of testing / measuring equipment's of BHEL if required at site will be transported by sub-contractor from BHEL office or any BHEL site to DPH site & back to respective site/office.
7	Any other minor components like rubber, rubber gaskets and general purpose fasteners etc. shall have to be supplied by sub-contractor as per site requirement. Asbestos cloth and Asbestos powder shall be arranged by contractor.

**List of Tentative MME (Monitoring & Measuring Equipments )**

Sl.No.	Description	Size/Range	Quantity
1	Digital/Analog Multi-meter	As per requirement	As per requirement
2	Digital Megger (Meggar 5 kV)	0-1000-2000-5000V	As per requirement
3	Primary current / Voltage injection kit	5A-240V AC	As per requirement
4	Tong Testers	DC 30/60/300 A	1 each or As per requirement
5	Tong Testers	4-20 mA (DC & AC)	1 each or As per requirement
6	Impedance Measurement Kit	150 A (240V)	As per requirement
7	Tan Delta Test kit With Operator		As per requirement



8	DC Winding Testing Kit With Operator		As per requirement
9	ELCID Test Kit With Operator		
10	Digital micro Ohm meter	As per requirement	As per requirement
11	Precision/standard Thermometer for calibration	As per requirement	1 or As per requirement
12	Digital Handhold Temperature meter,	0-100-200 Degree C	As per requirement
13	Vacuum cleaner	Heavy Duty/ Industrial Use	1 or As per requirement
14	DP/UT /MPI Kit along with Level-II certified.		As per requirement
15	Rectiformer for dry out.		As per requirement

**Tentative List of T&P**

Sl.No.	Description	Size/Range	Quantity
1	SLIDE WRENCH	10"-12"	As per requirement
2	Square Ring Spanner	50x50 mm	1 or As per requirement
3	Ratchet(square drive)	3/4" x 3/4"	4 or As per requirement
4	Double end Open & Ring Spanner of Size	12x13, 14x15, 18x19 21x23, 24x26, 30x32 32x36 & 36x41	2 set or as per Requirement
5	Slogging Spanner	55 mm to 85 mm	1 set each or As per requirement
5	SPANNER RING SLOGGING (size in mm)	12x13, 14x15, 18x19 21x23, 24x26, 30x32 32x36 & 36x41	1 each or As per requirement
6	Heavy Duty Ring Spanner	1-1/2", 2-3/16" 2-1/4", 2-3/4"	1 each or As per requirement
7	Adjustable wrench	10" & 12"	1 each or As per requirement
8	Spanner for nuts of coupling bolt	125 mm	4 nos & As per requirement
9	TORQE WRENCH	540-1380NM (55 - 140 Kg)	As per requirement
10	Pipe wrench	10" and 18" and 24"	1 each or As per requirement
11	COPPER ROD	1/2"/1,1"/2,1.5"/1	As per requirement
12	Box spanner set		2 set or As per requirement
13	Screw Driver	10", 12" & 18"	2 no each or As per requirement
14	Cutting Plier	8"	2 no each or As per requirement
15	Hammer	2lbs, 10lbs, 16lbs	2 no each or As per requirement
16	Calliper inside & outside	0 to 6" & 0 to 12"	1 each or As per requirement
17	Hexa Frame	12"	1 no or As per requirement
18	Mechanical/hydraulic jack	5 Ton & 100 Ton capacity	2 no each or As per requirement
19	Mechanical/hydraulic jack	15, 25 & 50 Ton capacity	4 no each or As per requirement
20	Ratchet Hoist	3 Ton capacity	4 no or As per requirement
21	Ratchet Hoist	5 Ton capacity	1 no or As per requirement
22	Lifting pulley	3/5 Ton capacity	2 No each or As per requirement
23	I-Bolts	8"-36"	As per requirement
24	D-Shackle	2,5,10,15 & 40 MT	4 no each or As per requirement
25	Slings	As per requirement	As per requirement
26	Nylon sling 3mtr & 5mtr	2-10T	As per requirement
27	TAP set	M8, 10,12,14 up to 24,36	As per requirement
28	Welding set ( including Portable set)	As per requirement	2 set or As per requirement



29	Gas cutting set (CutoGen)	As per requirement	1 set or As per requirement
30	Gouging holder set	As per requirement	1 set or As per requirement
31	Pneumatic or battery operated wrench	Up to 2"	1 no or As per requirement
32	Magnetic base drill machine	As per requirement	1 no or As per requirement
33	Boring Machine	As per requirement	1 No
34	Inside micro meter	50 mm to 1000 mm	2 no or As per requirement
35	Stick Micro meter	1 Mtr. To 5 Mtr.	1 no or As per requirement
36	Dial indicator with stand	0 to 5 & 0 to 10mm. LC 0.01mm	2 no & 6 no or As per requirement
37	Puller for bearing	2" to 6"	1 no or As per requirement
38	Outside micro meter	Various size(up to 1000 mm)	1 no or As per requirement
39	PITCH GAUGE	As per requirement	As per requirement
40	Depth Gauge	As per requirement	1 no or As per requirement
41	SLIP GAUGE	As per requirement	1 set or As per requirement
42	TELESCOPIC GAUGE	15 to 60 mm	As per requirement
43	Vernier Calliper	0 to 200mm, 0 to 300mm, 0 to 500 mm	1 no each or As per requirement
44	Pneumatic Angle grinder, AG4, AG5 & AG7	As per requirement	1 each or As per requirement
45	Pneumatic straight grinder	6"	2 no or As per requirement
46	Electric disc grinder	7"	2 no or As per requirement
47	Electric straight grinder	4"	2 no or As per requirement
48	Electric flexible straight grinder	4"	2 no or As per requirement
49	Hot/Air Blower	Heavy Duty	1 no or As per requirement
50	Micro level	As per requirement	As per requirement
51	Rotor level / Master Level	0 to 0.01 mm/meter	1 no or As per requirement
52	Filler gauge set (Reputed make & New )	6" & 12"	2 no each or As per requirement
53	OVEN Welding Rod (PORTABLE)	As per requirement	As per requirement
54	BORE GAUGE	0- 150mm	1 no or As per requirement
55	PLUMB WITH DORI	SMALL/2, 2.5Kg/1	As per requirement
56	CHAIN PULLY BLOCK	2 Ton, 3T, 5Ton	As per requirement
57	SURFACE PLATE	300x300	As per requirement
58	Torch LED/Dry Cell/Battery		2 no or As per requirement
59	Pressure testing Pump Set	WITH HOSE & GAUGE	1 set or As per requirement
60	Pressure Gauge	0-10Kg/sqcm	2 no or As per requirement
61	MS Plate 25-35 mm thick for lifting of Pivot ring & Top Cover etc.	L/S	As per requirement
62	Cabin house of 5 ton capacity (for elongation of the coupling bolts, lifting of TGB inner shell / Outer Shell / Oil Sump etc.)	As per requirement	2 no or As per requirement
63	Nose Plier	As per requirement	2 no or As per requirement
64	Measuring steel Scale	6",12",24"& 48"	1 no each or As per requirement
65	Measuring steel tape	5, 10 & 20 Mtr.	1 no each or As per requirement
66	Acetylene Cylinder	As per requirement	As per requirement
67	Oxygen Cylinder	As per requirement	As per requirement
68	Safety Shoe & Helmets		To all Employees

**CAPITAL OVERHAULING & REPAIR OF UNDERWATER PARTS OF UNIT#5, AT DEHAR POWER HOUSE (165 MW)  
SLAPPER, HIMACHAL PRADESH.**

1	List of Tentative <b>manpower</b> required for the job is mentioned below. Contractor has to depute sufficient skilled manpower to ensure round the clock working in three shifts as per Labour laws to complete the as per schedule.		
2	Dedicated skilled teams <b>Specially for ELECTRICAL &amp; MECHANICAL</b> System in PARALLAL to be deployed for smooth restoration work Having <b>Supervisors, Electrician, Fitters/ Jr. Fitters</b> as per requirement.		
3	Being Planned shutdown job, completion of work on time is essence of contract. In case bidder/contractor fails to deploy skilled manpower during work execution by more than 5 days then, Penalty for less/delayed deployment of manpower shall be done by BHEL. <b>Penalty @ Rs. 1500/person/day</b> for Engineer/Supervisor shall be deducted. If any penalty is deducted by Customer same shall be deducted from RAB bills along with applicable overheads.		
4	The Contractor must commit to deploy certified workers to the extent of 25% of total worker's strength. Valid certificates issued by a recognized University, technical Board, or Ministry of Government of India would only be taken cognizance of.		
5	The following personnel shall be treated as fixed manpower and shall remain deployed at site at all times during the execution of works, irrespective of the nature and quantum of work Project Manager or Site in charge, Engineer, Foreman, Crane Operators, rigger group, Store keeper welder, electrician, Safety Engineer & Supervisors.		
	<b>MANPOWER DESCRIPTION</b>	<b>CATEGORY</b>	<b>NO. OF PERSONS</b>
1	Site In charge/Project Manager	Site-In charge on Role of Vendor Firm	1
2	Engineer/Supervisor (Mechanical)	Experienced /Diploma Having at least 3 Years of Experience of capital Mtc. of Francis Hydro turbine	2
3	Engineer/Supervisor (Electrical)	Experienced /Diploma Having at least 3 Years of Experience of capital Mtc. of Francis Hydro turbine	2
4	Ex BBMB/ Engineer (MMD)	Experienced (at least 5 Yrs.)	1
5	Ex BBMB F/M (Turbine & Generator)	Experienced (at least 5 Yrs.)	2
6	Safety Engineer/Supervisor	Diploma / Graduate	1
7	Crane Operator	Certified skilled operator	2
8	Fitter (Hydro Turbine/ Mechanical)	Skilled	4
9	Fitter (Hydro Generator)	Skilled	2
10	Welder	Skilled (Certified)	2
11	Gas cutter	Semi Skilled	1
12	Electrician	Skilled	1
13	Electrician (Generator)	Skilled	2
14	Grinder man	Skilled	1
15	Skilled labour	Semi-Skilled (6 Gen works +6 Turbine works)	12
16	Store Keeper	Semi-Skilled	2
17	Helper	Un-skilled	26
18	Dedicated skilled team for Rotary valve works as per Scope of work	Including Fitter, Jr Fitter, Helpers	10
	<b>Total</b>		<b>74</b>

