BALANCE CIVIL WORKS OF CHP MPH-1 TG Deck-2 & SG-2

BALANCE CIVIL AND ARCHITECTURAL WORKS OF CHP, MPH FOR UNIT-1, SG FOR UNIT-2 AND TG DECK FOR UNIT-2 AT 2X660 MW NTPC TALCHER TPS

BHARAT HEAVY ELECTRICALS LIMITED

Sl. No.	Description	Details
1	**Project Title**	2x660 MW Talcher Thermal Power Station
2	**Customer**	National Thermal Power Corporation Limited (NTPC Limited)
3	**Location**	The proposed site is at a distance of about 4 km from Talcher town and about 25 km from district headquarters Angul in Odisha state, India.
4	**Nearest Railway Station**	Talcher is on Talcher-Cuttack section of North Eastern Railway (renamed East Coast Railway) at about 2 Km. However, a small railway station named 'Talcher Thermal' is located near project boundary.
5	**Nearest Airport**	Bhubaneshwar (Approx. 150Km by road)
6	**Access by Road/Major Cities**	The area is accessible by NH-23 (renamed NH-149) at about 1 km.
7	**Temperature**	Mean of daily minimum temperature = 15.1°C Mean of daily maximum temperature = 39.8°C
8	**Seismic Zone**	The project site lies in zone III as defined in IS: 1893.
9	**Wind Speed**	Design wind speed is 50 m/sec as per IS: 875 Part III

<table>
<tr><td>1.0</td><td>INSTRUCTIONS TO BIDDERS</td></tr>
<tr><td>1.1</td><td>The Bidder shall visit project site and acquire full knowledge and information about conditions prevailing at site and in & around the plant premises, together with site conditions, transportation routes, various distances, all the statutory, obligatory, mandatory requirements of various authorities and all information that may be necessary for preparing the bid and entering into the Contract. All costs for and associated with site visits shall be borne by the bidder.</td></tr>
<tr><td>1.2</td><td>Other contractors would be working in this area and their structures are to be protected. The material brought and stacked for construction should not make hindrance to other contractors.</td></tr>
<tr><td>1.3</td><td>The information given herein is for general guidance and shall not be contractually binding on BHEL/Owner. All relevant site data /information as may be necessary shall have to be obtained /collected by the Bidder.</td></tr>
<tr><td>1.4</td><td>The contractor, in the event of this work awarded to him, shall establish an office at site and keep posted an authorized, responsible officer with valid Power of Attorney for the purpose of the contract. Any order or instructions of the `Engineer' or his duly authorized representative, communicated to the contractor's representative at site office will be deemed to have been communicated to the contractor at his legal address.</td></tr>
<tr><td>1.5</td><td>No claim will be entertained by BHEL on ground of lack of knowledge and the contractor's rates shall be deemed to have taken this into account.</td></tr>
<tr><td>1.6</td><td>Bidders may fix up their site visit in consultation with below mentioned contact person:
<table>
<tr><td>Name:</td><td>Sh. Rajib Nath</td><td>Sh. Rohit Agrawal</td></tr>
<tr><td>Designation:</td><td>AGM</td><td>Sr. Manager</td></tr>
<tr><td>Location:</td><td>BHEL Site Office: 2x660 MW Talcher TPS</td><td>PSWR HQ, Nagpur</td></tr>
<tr><td>Email:</td><td>rajibnath@bhel.in</td><td>rohitagr@bhel.in</td></tr>
<tr><td>Ph. No.</td><td>+91-6370737678</td><td>+91-9974066147</td></tr>
</table></td></tr>
</table>

2.0	**Scope of Works:**
2.1	The Balance scope of work comprises of construction of Civil, Structural and Architectural works 'as is where is basis' in conformity with the approved mechanical/ electrical layout including supply of all materials for buildings, equipment and facilities for the project listed below **except Cement, Ready Mix Concrete (RMC), Structural Steel, Reinforcement Steel (TMT), Foundation Bolts, Deck Sheet and Earthing Rod that shall be issued by BHEL free of cost** as per Schedule of Items. **Before commencement of any major foundations, the bidders have to check with mechanical/electrical drawings jointly with concerned BHEL Engineers.** **BHEL at its discretion, may decide to execute the scope of production of Ready-Mix Concrete (RMC) at Batching Plant as per site requirement, BOQ cum Rate Schedule and instruction of Site-in-Charge.**
2.2	**The brief scope of work is as follows:** Civil and architectural works of all buildings/structures & associated works for the following areas.
2.2.1	**Part-I - Balance scope of work for Coal Handling Plant (CHP) area:** 1. Area Leveling & Grading works of CHP, AHP, LHP, GHP & other areas of FGD 2. Track Hopper under-ground structure 3. Machinery Hatch -1 & 2 4. Crusher House 5. Transfer Point-1, 2 & 3 6. Conveyor Gallery-1A/B, 2A/B, 3A/B & 6 7. MCC-1, 2 & 3 8. Dust Suppression Pump House -1 & 2 with water tank 9. Compressor House 10. Stacker Reclaimer 11. Retaining wall with drain 12. Stockyard 13. Coal shed 14. Workshop building 15. Pent house 16. Dozer shed 17. Pipe rack cum cable rack 18. Cable rack 19. Dust extraction system

	20. Road & drain 21. Lighting mast 22. Street light 23. Dismantling work of existing structure, if any for construction of foundation/structure 24. Any other structures in Coal Handling Plant as per system requirement
2.2.2	**Part-II - Balance Scope of Work for Main Power House of Unit-1 (MPH-1):** 1. Main Power House Area excluding TG Raft and Deck (Unit # 1) 2. Transformer Yard (Unit # 1) 3. DG Foundation (Unit # 1) 4. CS Tank and Pump House 5. Rail Road (Unit # 1) 6. ACW / CW Pipe Laying (within Transformer Yard) 7. Oil Separator Pit 8. Bus Duct Foundation 9. Pipe & Cable Rack 10. Compressor House 11. Bunker Floors (Feeder, Tripper and Roof) including Lift Machine Room 12. Fire protection system 13. Below Ground Earthing System, Test Pits, etc. 14. Any Other Miscellaneous Foundations / Structure/ System, etc. within Power House area and Transformer Yard.
2.2.3	**Part-III - Balance Scope of Work for Boiler Area of Unit-2 (SG-2):** 1. Integrated Boiler - Bunker Foundation and its auxiliaries. 2. Mill Foundation 3. ESP Foundation 4. ID Duct Foundation 5. Fans Foundation 6. MRS Foundation 7. FGD RCPH & OB Foundation 8. Absorber Foundation 9. FGD Duct Foundation 10. ESP and FGD Control Room

	11. Bottom Ash Hopper and other related civil works within Boiler Area 12. CEP VFD Room 13. Pipe & Cable Rack 14. Process Water Tank Foundation 15. VGTU in boiler area 16. FAE tower 17. Compressor House 18. Bunker MCC 19. Fire Water Booster Pump House 20. TPs & Trestles foundations up to GL with in the area of SG 21. Lift Pit Foundation 22. Any Other Miscellaneous Foundations / Structure/ System, etc. within Boiler area.
2.2.4	**Part-IV - Balance Scope of Work for TG Deck of Unit-2 (TG Deck-2):** 1. TG Deck Unit-2 including TG Column 2. Retaining Wall and Auxiliary Pedestal 3. Condenser Wall 4. Any Other Miscellaneous Foundations / Structure/ System, etc.
2.2.5	**Civil, Structural and Architectural works related to following services:** 1. Storm Water drain system under this contract of scope of work 2. Crane movement road, main road approach roads, drains culverts 3. ERC/IRC 4. Sanitary and plumbing system in the buildings (for the buildings within the scope of this contract only) 5. RCC Electrical/Instrumentation cable trenches and pipe trenches 6. Pipe way Bridges 7. Pipe way Sleepers 8. Crossings (Culverts, bridges, sleeves as per applicable) of underground services below approach road for all services in the corridor including drains, fire water lines, cooling water lines, waste sewers. 9. Hard stand required for erection of heavy equipment. 10. Strengthening of existing roads for crane movement if required. 11. All approach roads from existing main roads as per detailed engineering requirement for maintenance and operation.

	12. Maintenance and erection approach roads/ by strengthening of roads. 13. Any temporary activities required to complete the work. 14. Structural platforms, monorail beams, walkways, crossovers, handrails etc. for miscellaneous equipment, piping etc. 15. Micro grading & disposal of surplus and unserviceable material beyond project complex's compound wall. Contractor to assess the lead by physically visiting the Plant site. 16. The sub-grade for roads & pavements and soil improvement/ preparation below foundation level of drains, culverts, pipe way bridges, manholes, etc. shall be carried out as per Geo- Technical recommendation. 17. Excavation for rock (Soft/Hard) may require blasting which require approval of statutory authority of local bodies. Supervision by authorized person shall be ensured as required. 18. Sprinkling of water in roads/ passage/ construction areas on regular basis in order to suppress dust. BHEL at its discretion, may arrange for sprinkling of water for common areas where multiple agencies are involved as well as agency/ies who are not performing the sprinkling of water in their areas, the cost incurred towards it shall be recovered from the agencies proportionately with respect to awarded contract value. **E&C of Piping as per BOQ Cum Rate Schedule:** Collection of materials from BHEL/client's stores/storage yard; transportation to site, erection, testing & commissioning, trial operation and handing over of piping, including valves, fittings, supports etc. & wrapping & coating as per standards, final painting (including supply of paint), Laying of pipes and associated Civil Works, road works, construction of drains along the reservoir boundary etc. and other ancillary works associated with the completion of reservoir as per directions of the Engineer. Laying of pipe consists of following: (Pipe Size - 3700NB/ 3200NB/ 2300NB/ 800NB/ 250NB/ 200NB/ 150NB/ 100 NB/ 25NB) a. Pipe up to and including 150 NB shall be Carbon Steel, ERW IS:1239 (Heavy Duty) b. Pipe 200 NB & above shall be Carbon Steel and Welded as per IS-3589 fabricated from Carbon Steel plates as per IS:2062 Gr-B c. ERW G.I. Pipe as Per IS:1239 Heavy Class (Pipe Size-250NB/200 NB/150 NB/ 100 NB/ 80 NB) d. ERW, MS black pipe as Per IS:1239 Heavy Class (Pipe Size-250NB/200 NB/150 NB/ 100 NB/ 80 NB) Design Pressure for CW Piping: 5 Kg/ Sq.cm Design Pressure for ACW Piping: 7. 5 Kg/ Sq.cm

	Application of wrapping & coating, final painting including supply portion is the scope of vendors. Accepted rate is inclusive of supply and application of Final painting, wrapping & coating with 4mm tape as per IS standards. Note: i. The weights given above are tentative. It may change after detailed engineering is done. Rate quoted by the Contractor shall not change due to variation in weight. ii. Rate Schedule Identified for Piping is Indicative only and based on envisaged material specification. Payment shall be made on the basis of material specification of actual material received and erected at site. iii. BHEL's decision with regard to classification of a particular rate category shall be final & binding on the Contractor. iv. Electrical & C&I items of handling system is excluded from the scope of work. v. Weight of valves, fittings, supports etc. are including in weight of piping (for all C.S.) of respective scheme / systems of piping. The site welding of site weld joints and NDT/pre-post heat treatment requirements Non-IBR, CS, piping's/system shall be as per BHEL drawings/documents and site requirement. vi. There will be no payment for consumables like welding electrode /filler wire, gases etc. vii. In case of Piping category, payment rates will be derived on actual type of material received/used at site.
2.2.6	**EXCAVATION IN HARD ROCK (Clause 2.2.5.17 is further elaborated):**
2.2.6.1	Excavation in rock shall be carried out by mechanical means and if blasting is required for founding of some of the structures under this package, control blasting only shall be carried out.
2.2.6.2	Controlled blasting shall be done by a specialized agency duly approved by Engineer. All controlled blasting shall be done by using time delay detonators (i.e. excel type).
2.2.6.2.1	Contractor shall engage an agency expert in blasting such as, NIRM (National Institute of Rock Mechanics), CMPDIL, Central Institute of Mining and Fuel Research Dhanbad, Dept. of Mining of Govt. Institutions etc. to design detailed blasting scheme and get the same approved from Engineer before carrying out the blasting operation. All blasting shall be done as per the approved blasting scheme & initial blasting operations shall be done under the supervision & guidance of the representative of the blasting expert.
2.2.6.2.2	All the statutory laws, (Explosives Act etc.) rules, regulations, Indian Standards, etc. pertaining to the acquisition, transport, storage, handling and use of explosives, etc. shall be strictly followed.
2.2.6.2.3	The Contractor shall obtain Licenses from Competent Authorities for undertaking blasting work as well as for procuring, transporting to site and storing the explosives as

	per explosives act. The Contractor shall be responsible for the safe transport, use, custody and proper accounting of the explosive Materials.
2.2.6.2.4	The Contractor shall be responsible and liable for any accident and injury / damage which may occur to any person or property of the project or public on account of any operations connected with the storage, transportation, handling or use of explosive and blasting operations.
2.2.6.2.5	For controlled rock blasting specialized agency, equipped with sensors to assess the impact of the blast on the adjoining existing structures, shall be employed.
2.3	BHEL at its discretion may include other area works limited to 15% of awarded contract value, which are not mentioned in above scope of works. Contractor shall execute such works as desired and as directed by BHEL Engineer. The item rates & contract conditions shall remain unchanged for such works.
2.4	The work under this contract shall be carried out as per BOQ Cum Rate Schedule and in compliance of tender conditions including technical specifications and approved drawings/ documents.
2.5	**GENERAL**
2.5.1	Providing all incidental items not shown or specified but reasonably implied or necessary for the successful completion of the work in accordance with contract.
2.5.2	The drawings enclosed with this tender are intended to give the tenderer a general idea of the type and extent of work involved. The drawings are as such only indicative and not to be considered as the exact construction drawings.
2.5.3	Further this is to be noted that the drawings and the documents furnished along with this specification are the sole property of BHEL. It must not be used directly or indirectly in any way detrimental to the interest of the company.
2.5.4	Furnishing all labor, materials, supervision, construction plans, equipment, supplies, transport, to and fro the site, fuel, electricity, compressed air, water, transit and storage insurance and all other incidental items and temporary works not shown on specified but reasonably implied or necessary for the proper completion, maintenance and handing over the works in accordance with the stipulations laid down in the contract documents and additional stipulations as may be provide by the engineer during the course of works.
2.5.5	Manpower hired/deployed by contractor for this project shall be monitored through online project monitoring system. All Personnel entering in to NTPC site premises for carrying out any work shall be tracked. Tracking devices shall be provided by BHEL on chargeable basis to contractor. BHEL will provide tags free of cost at first instance. In case of damage or missing of issued worker tag, Rs. 1000/- per tag will be charged for issuing new worker tag.
2.5.6	VOID

2.5.7	All the works areas shall be adequately flood lighted to the satisfaction of the Engineer-in-Charge when the work is in progress during the night shifts.
2.5.8	Drawings showing enough details for the construction as per the specification shall be furnished to the contractor in a phased manner as far as possible.
2.5.9	All necessary arrangement for safety like Hard Barricading around deep structures of Under Ground Track Hopper, Tunnel & TP's with scaffolding pipes and providing of safety net on the slope of excavated area is in bidder's scope.
2.5.10	The Customer may depute their representative for checking and supervision of important stages of work. The contractor shall be required to provide all facilities for inspection of works at no extra cost to BHEL. Any defect in quality of work or deviations from drawings / specifications pointed out during such inspection shall be made good by the contractor in the same way as if pointed out by the BHEL Engineer, without any cost implication to BHEL.
2.5.11	Giving all notices, paying all fees, taxes etc., in accordance with the general conditions of contract, that is required for all works including temporary works.
2.5.11.1	**Royalty & other fees:** Royalty challan and statutory documents shall be submitted along with RA Bills for processing of Bills. In the event of non-availability of royalty/statutory documents along with RA Bill, BHEL site at its discretion may opt to withhold relevant amount from the running RA Bills and process the bill further to maintain proper cash flow and continuity of work. The Contractor shall pay and indemnify the Employer against any default in payment of Royalties or Seignorage Fee or Cess or other charges by the Contractor or the agency from which the Contractor purchases soil/earth, sand, stone/aggregates, metals, minerals or minor minerals. In the event of there being a statutory increase in the rates of royalty charges/fresh levy of royalty on materials, the same shall be reimbursed to the Contractor upon submission of original challan by him of having made the payments at revised rates. In the event of there being a decrease in such rates, the same shall be recovered from the Contractor. The base date for calculating the increase or decrease shall be the rate as on seven (7) days prior to the date of Techno-commercial (Envelope-I) bid opening. The total reimbursement (positive or negative) as specified above, to be paid or recovered, shall however be calculated on the quantity of materials actually accepted for payment), whichever is less, and on the basis of documentary evidence of Govt. Notification. However, the Contractor will settle claims, if any, on account of over charge by the State Authorities.
2.5.12	Carrying out topographic survey of the entire and establish levels and coordinates at suitable intervals from existing grid levels and coordinates furnished by the owner established bench marks, setting out the locations and levels of proposed structures, constructions and marking of reference pillars and other identification works etc., The contractor shall provide the owner/BHEL such a assistance, instruments, machines,

	labour and materials as are normally required for examining, measuring and testing any work and the quality, weight or quantity of any material used.
2.5.13	Arranging for joint checking (with BHEL / BHEL's Customer / Consultant) of all site construction activities Preparation of joint protocols for each & every activity and maintaining quality records for audit/inspection as per approved FQP by BHEL.
2.5.14	Medical/First aid center/medicine purchased for emergency/Doctor purpose along with ambulance services with fuel and operator (round the clock) shall be arranged by BHEL for handling medical emergencies. Cost against these facilities shall be distributed / shared among the vendors working in Project site proportionately based on contract value.
2.5.15	The complete works shall be carried out as per BOQ cum Rate schedule. If any work covered in the scope of contract cannot be executed using items available in BOQ, additional / extra items shall be made and rates for such items shall be worked out as per GCC clause 2.15.7. However, contractor shall be bound to execute all the works under the scope of the contract and decision whether an extra item is applicable or not, shall be taken by BHEL Engineer which will be binding on the contractor.
2.5.16	Any activity which is necessarily required for satisfactory execution of any item of BOQ in line with technical specifications shall be deemed to be included in BOQ item even if it is not described in the item description and no extra payment shall be made against such activity.
2.5.17	1. In certain cases, Crushed Stone Sand/M-Sand may be added to Natural sand in order to achieve the required grading with prior approval of the Customer/Consultant and subsequent design mix report from reputed institute like IITs/NITs/Any Other Government Institutes. Crushed Stone Sand/M-sand alone may be used only with the prior approval of the BHEL Engineer/Customer/Consultant for filling and Concreting works. 2. The bidder shall quote his price considering only River Sand usage. If crushed stone sand/M-sand (arranged by contractor) is used in place of river sand, suitable rebate/compensation (rate shall be mutually decided based on market rate with applicable BHEL overhead) of M-Sand consumed shall be applicable for all items/ works where M-Sand is used in place of River sand. In case, BHEL at its discretion and subject to availability, may issue the crushed stone sand/M-sand free of cost for usage in place of river sand, suitable rebate (rate shall be mutually decided based on market rate with applicable BHEL overhead) of crushed stone sand/M-Sand consumed shall be applicable for all items/ works where M-Sand is used in place of River sand. Measurement for the rebate/compensation shall be calculated based on quantity of M-Sand consumed in the particular item, not on the quantity of the particular item.
2.6	**Tentative Technical Staff Requirement:**

2.6.1	• **Project Manager –** 01 Head with 15 Years' experience in Industrial Foundation, Building & Power Plant Civil & Architectural Works etc. • **Asst. Project Managers –** 01 Heads with 12 Years' experience in Industrial Foundation, Building & Power Plant Civil & Architectural Works • Experienced Civil Engineers – 03 heads • Experienced Foreman / Supervisors – 06 heads • Planning & Billing Engineers – 01 head • Stores, Gate Pass – 01 head • Accounts & Administration – 01 head • Quality Control Engineer – 02 head • Safety Engineer – As per HSE Plan • Surveyor – 1 head capable to handle total station • Operator, Licensed Electrician, Mechanic - As per requirement • Experienced Carpenters & Helpers – lot for similar nature of work • Experienced Bar Benders & Helpers – lot for similar nature of work • Security Guards (Round the Clock) – As per requirement. **Note: Above manpower requirement is tentative only. Contractor shall augment manpower to meet the project schedule/ milestones. Deployment of manpower shall be progressive to meet the project schedule.**
2.6.2	Deputation of above man-power shall be jointly decided at site in line with construction Schedule.
2.6.3	Engineer/ supervisor for other functions like store & purchase, material management, planning, finance, administration etc. are to be provided as per site requirement and not considered in above list.
2.6.4	BHEL reserves the right to reject or approve the list of personnel proposed by the contractor. The persons whose bio-data have been approved by BHEL will have to be posted at site and deviation in this regard will not be permitted unless specific & reasonable justification is made.
2.6.5	In addition to above, a well experienced qualified engineer to be designated, as 'Project Co-coordinator', shall be deployed by the contractor. Such engineer shall have adequate exposure on the job and shall remain fully involved in all planning activities, guidance etc. to contractor's own team during the complete execution period of contract.
2.7	**Supervisors / Engineer and Computer for exclusive use of BHEL:**
2.7.1	The successful bidder(s) will have to provide two supervisors (Diploma in Civil Engineering) acceptable to BHEL Site with sufficient computer knowledge (knowledge of MS office) to whom works will be assigned in consultation and acceptance of BHEL

	for original contract period. In case, the contractor fails to provide supervisors from 3rd month from LOI date till completion of site works or as decided by BHEL, deduction of Rs. 25,000/- per supervisor per month.
2.7.2	VOID
2.7.3	The bidder will have to provide **Three (03) No. of Laptops** (X-86 Architecture Based, 64-Bit Supported, Microprocessor with minimum 8 cores, On-board Graphics feature compatible with supplied OS, Minimum 8 GB RAM 2666 MHZ SDRAM upgradeable to 16 GB, 512 GB SSD M.2 Hard Drive or higher, 13" - 14" (both included) high definition anti-glare LED back lit Screen, OEM USB Optical Travel Mouse, Integrated High definition audio with integrated speakers and volume control (Hardware/Software). Single audio jack (single pin) for connecting ear phones and mic, Built-In HD Webcam with Built-In Microphone, integrated 100/1000 Mbps port, Integrated Wi-Fi 6, supporting industry standard IEEE 802.11ax + Bluetooth 5.0 or higher, Minimum 2xUSB 3.1 Ports, 1xType C, Stereo headphone/ microphone combo jack,1 x HDMI Port. 1 x RJ – 45, Minimum 3-cell battery capable of providing 6 hours or more backup in standard business environment, ACPI Compliant, OEM AC Adaptor suitable for 230V supply, Should come pre-installed with Windows 11 Professional Edition or latest version with 64bit latest service pack, OEM carry bag to be supplied with OS Certification from Microsoft and required software like MS Office 2010 Professional, AutoCAD 2011, ADOBE PDF CREATOR (version 8.0) **each with one laser jet printer compatible for A4 and A3 size printing with power backup at places, as per instruction of BHEL**.
2.7.4	These laptops/ printers shall remain contractor's property/ownership for all legal/technical purposes. However, contractor will be allowed to take out the same after completion of the site works. The computer/printer shall remain at BHEL offices during the contract period/ extended period (if any).
2.7.5	This facility has to be provided as directed by BHEL till completion of site works or as decided by BHEL. If contractor fails to provide computer/ printer as per requirement, for a continuous period of fifteen days or more, BHEL shall have the right to purchase it on behalf of contractor and recover the expenses incurred from the dues payable to contractor. Recoveries shall be actual expenses incurred plus 5% overheads.
2.8	**Field Quality Assurance:**
2.8.1	The contractor shall be responsible for day-to-day quality checks for civil, structural and architectural works including concrete and other building materials in line with approved Field Quality Plan (FQP) and Manufacturing Quality Plan (MQP) during the progress of work. All quality records and log sheets shall be maintained as per the requirement of BHEL/CUSTOMER and as per FQP/MQP approved by BHEL/CUSTOMER.
2.8.2	**Setting Up of Laboratory Works:** The contractor shall set up laboratory in the close vicinity of the work site as per required field QA & QC laboratory set up and as the directions of engineer-in-charge. The laboratory shall be equipped with latest testing equipment in sufficient number to carry out all the tests as required under a contract. The contractor should ensure that the equipment is available well in advance of starting

	of the work to avoid stoppage of work on this account. All the tests shall be carried out by the contractor in the presence of the Engineer's representative and a joint record of all observations and results thereof shall be maintained, and available with the Engineer. **Bidder shall tie up only with BHEL / Customer approved third party Lab for advance testing which are not feasible at site laboratory set-up.** The laboratory set-up should consist of one AC lab (Approx. size 4.5mtr x 6mtr) for temperature and humidity control as required during testing of cement and other materials and one non-AC lab (Approx. Size 4.5m x 4.5m) in the field to carry out all relevant tests. Laboratory equipment as per requirement and as per NTPC specification to be arranged by the contractor within quoted rate for conducting day to day tests. The contractor may tie up with approved/registered inspection agencies for setting up test lab at site as described above.
2.8.3	Minimum Testing Facilities to be arranged by contractor at site are as under: 1. Soil Works: 1a. Facilities for HDD 1b. Field Compaction Test (Core Cutter / Sand Replacement Method). 1c. Atterberg Limit Test of Soil. 1d. Grain Size Distribution Test. 2. Road Works: 2a. Facilities for mechanical strength of aggregates. 2a(i). Impact and Abrasion Value. 2a(ii). Crushing Value. 2a(iii). Water Absorption 3. Concreting Works: 3a. Facilities for sieve Analysis for both fine and coarse aggregates. 3b. Facilities for workability test of concrete by Slump cone / BV. 3c. Facilities for Cube Strength.
2.8.4	Mix design for all concreting shall be carried out from NCCBM / IITs / NITs / other reputed laboratories approved by CUSTOMER/BHEL. Contractor has to ensure adding of high grade PCE based admixture to minimize the cement content in line with ASTMC 494 as advised by BHEL time to time without any additional cost.
2.8.5	In case of change of brand of cement in a particular design mix, contractor has to re-design the concrete mix with new brand of cement before actual usage at site, cost incurred will be borne by contractor.
2.8.6	The following specifications of PCE-type high performance super plasticizer shall be used for concrete works as per BOQ item.
2.8.6.1	High performance super plasticizer PCE-based water reducing admixture of Type-G/F as per ASTMC-494 of approved make FOSROC/SIKA/BASF or Equivalent having minimum water reduction capability of 30%.

	The performance compliance of the Super-plasticizer should be ensured based on the following tests: a) Marsh cone test for optimum dosage of admixture with specific brand of cement. b) Slump retention test of concrete. c) Water reduction capability test by doing trial mix. d) Rheological properties of fresh concrete on trial mix.
2.8.7	In case ambient temperature is greater than 32 Degree Celsius, Placement temperature should be controlled with necessary temperature correction of concrete by introducing Chiller Plant along with Batching Plant.
2.9	**HEIRARCHY:**
2.9.1	In case of any conflict/deviations amongst various documents, the order of precedence shall be as follows: 1. Items Description in BOQ Cum Rate Schedule 2. Technical Conditions of Contract (TCC) 3. Technical Specifications for Customer (Section-C) 4. IS Standard 5. BHEL's Standard Specification (Section-D)

Sl. No	Description PART I	Scope		Remarks
		BHEL	Bidder	
3.1	**Establishment:**			
3.1.1	**For Construction Purpose:**			
a	Open space for office (as per availability)	Yes		Location will be finalized after joint survey with owner
b	Open space for storage (as per availability)	Yes		Location will be finalized after joint survey with owner
c	Construction of bidder's office, canteen and storage building including supply of materials and other services		Yes	
d	Bidder's all office equipment, office / store / canteen consumables		Yes	
e	Canteen facilities for the bidder's staff, supervisors and engineers etc.		Yes	
f	Firefighting equipment like buckets, extinguishers etc.		Yes	
g	Fencing of storage area, office, canteen etc. of the bidder		Yes	
3.1.2	**For living purpose of the bidder:**			
a	Open space for labour colony (as per availability)	Yes		As per availability outside project area within 5Km, Necessary levelling/dressing of land shall be done by the contractor.
b	Labour Colony with internal roads, sanitation, complying with statutory requirements		Yes	Construction Plan shall be approved by BHEL
3.2	**Electricity:**			
3.2.1	**Electricity for construction purposes 3 Phase 415/440 V**			

Sl. No	Description PART I	Scope		Remarks
		BHEL	Bidder	
a	Single point source	Yes		Free of cost at one point near the site at a distance of approx. 500 meter. Further distribution and Metering is in scope of bidder.
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.2.2	**Electricity for office, stores, canteen etc. of the bidder.(Chargeable)**			
a	Single point source	Yes		Single point as above for construction purpose, no separate point shall be given.
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.2.3	**Electricity for living accommodation of the bidder's staff, engineers, supervisors etc .(Chargeable)**			
a	Single point source		Yes	Single point as above for construction purpose, no separate point shall be given.
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	

Sl. No	Description PART I	Scope		Remarks
		BHEL	Bidder	
3.3	**Water Supply:**			
3.3.1	**For construction purposes: (free)**			
a	Making the water available at single point	Yes		Free of cost at one point near the plant boundary. Further distribution and Metering is in scope of bidder.
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.3.2	**Water supply for bidder's office, stores, canteen etc. (Chargeable)**			
a	Making the water available at single point		Yes	Single point as above for construction purpose, no separate point shall be given
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	Contractor has to make his own arrangements for distribution.
3.3.3	**Water supply for Living Purpose(Chargeable)**			
a	Making the water available at single point		Yes	Single point as above for construction purpose, no separate point shall be given
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	Contractor has to make his own arrangements for distribution.
3.4	**Lighting**			

Sl. No	Description PART I	Scope		Remarks
		BHEL	Bidder	
a	For construction work (supply of all the necessary materials) 1. At office/storage area 2. At the preassembly area 3. At the construction site /area		Yes	
b	For construction work (execution of the lighting work/ arrangements) 1. At office/storage area 2. At the preassembly area 3 At the construction site /area		Yes	
c	Providing the necessary consumables like bulbs, switches, etc during the course of project work		Yes	
d	Lighting for the living purposes of the bidder at the colony / quarters		Yes	
3.5	**Communication facilities for site operations of the bidder**			
a	Téléphone, fax, internet, intranet, e-mail etc		Yes	
3.6	**Compressed air wherever required for the work**		Yes	
3.7	**Demobilization of all the above facilities**		Yes	
3.8	**Transportation**			
a	For site personnel of the bidder		Yes	
b	For bidder's equipments and consumables (T&P, Consumables etc)		Yes	

Sl. No	Description PART II	Scope / to be taken care by		Remarks
		BHEL	Bidder	
3.9	**Erection Facilities**			
3.9.1	Engineering works for construction:			

Sl. No	Description PART II	Scope / to be taken care by		Remarks
		BHEL	Bidder	
3.9	**Erection Facilities**			
a	Providing the erection/constructions drawings for all the equipments covered under this scope	Yes		
b	Drawings for construction methods		Yes	In consultation with BHEL
c	As-built drawings where ever deviations observed and executed and also based on the decisions taken at site.		Yes	Changes are to be marked in drawing & handover to BHEL on completion of work.
d	Shipping lists etc. for reference and planning the activities			Not Applicable
e	Preparation of site erection schedules and other input requirements	Yes	Yes	In consultation with BHEL
f	Review of performance and revision of site erection schedules in order to achieve the end dates and other commitments	Yes	Yes	In consultation with BHEL
g	Weekly erection schedules based on Sl No. e		Yes	In consultation with BHEL
h	Daily erection / work plan based on Sl No. g		Yes	In consultation with BHEL
i	Periodic visit of the senior official of the bidder to site to review the progress so that works is completed as per schedule. It is suggested this review by the senior official of the bidder should be done once in every two months.		Yes	
j	Preparation of preassembly bay		Yes	
k	Laying of racks for gantry crane if provided by BHEL or brought by the contractor /bidder himself		Yes	

3.10	**Land/Open Space:**
3.10.1	Availability of land within plant boundary is very limited and the contractor has to plan and use the existing land considering the use of land by other Civil /mechanical/ electrical contractors and the storage of plant machineries and materials. The existing land shall be shared by all erection agencies. BHEL shall provide free of charge limited open space for office, storage shed and laydown area as and where made available by Customer. It is the responsibility of the contractor to construct sheds, fabrication yard, establish batching plant, provide all utilities and dismantle and clear the site after completion of work or as and when required, as a part of his scope of work.
3.11	**Labour and Staff Colony:** **Following are in the Bidder's scope of work for labour & staff colony:**
3.11.1	Labour colony is to be developed by bidder for all the labourers required to be deployed for the works. All labour colony set-up is to be developed as per attached drawing and in compliance of statutory requirements. Contractor shall construct/arrange Labour Hutment as per minimum specifications mentioned in the attached drawing. Ownership of the labour hutment shall be of the contractor and contractor shall keep BHEL indemnified from any statutory obligations / legal compliances w.r.t. labour hutment establishment during as well as after the completion of contract. Contractor as per work requirement shall assess labour colony requirement, and labour hutments more than the quantity as per BOQ Cum Rate Schedule, if required shall be constructed by contractor as per requirement without any cost implication to BHEL.
3.11.2	VOID
3.11.3	VOID
3.11.4	Development of Bidder's temporary staff colony and labour colony **(workers accommodation)** having adequate no. of rest rooms along with toilets & fencing etc. (**Workers accommodations Drawing enclosed for ready reference**).
3.11.5	All Civil and Structural work associated with drinking and service water for Bidder's labour and other personnel at the work site/colony/offices including pump houses, pipes, overhead tank, tube wells etc.
3.11.6	Providing and maintaining facilities for safety, welfare, drinking water and sanitation, hygiene, biennial health check-up etc. for construction workers at their workplaces as well as at labour & staff colonies.
3.11.7	Development and maintenance of above facilities for construction workers deployed by the Contractor shall solely rest with the Contractor.

3.12	**Installation of necessary amenities- and temporary infrastructure for construction activities at Project site locations.** Following are the minimum amenities to be provided by the bidder within the quoted price including removal/disposal of the same in environment friendly manner after its intended use/completion of scope of work: i. Labour rest sheds near work spot. (Minimum 02 Nos. Rest shed shall be constructed by contractor as per approved drawings within 03 months from the date of start of work). ii. Canteen facility creation. iii. Drinking water facility. iv. Labour Bio toilets near work spot in sufficient nos. with regular cleaning & maintenance arrangement. v. Labour colony should have all hygienic condition, dining hall, toilets, proper sewerage system, good drinking water arrangements.
3.13	**Construction Power:**
3.13.1	Construction power (three phase, 415 V/ 440 V) will be provided free of cost at one point near the site at a distance of approx. 500M. Further distribution shall be arranged by the contractor at his own cost and services. Contractor shall be responsible for fulfilment of all requirements including statutory requirements in this regard. Contractor shall deploy and install required energy meter, cables, fuses, distribution boards, switchboards, bus bars, earthing arrangements, protection devices and any other installation as specified by statutory authority/act. Contractor shall also obtain approvals of appropriate authority and pay necessary fees, levies etc towards the clearance of such installations, prior to use. Sufficient power factor compensation equipments like capacitor shall be provided by contractor for reactive loads like welding machines etc. In case of any fine/penalty on account of low power factor, same shall be shared by contractor proportionately according to power consumption.
3.13.2	Contractor shall make necessary arrangements for onward distribution of construction power taking due care of surrounding construction activities like movement of cranes & vehicles, civil work, fabrication/construction/assembly/ erection etc. and safety of personnel. It may become necessary to relocate some of the installations to facilitate work by other agencies or by him.
3.13.3	It shall be the responsibility of the Contractor to provide, maintain the complete installation on the load side of the supply with due regard to the safety requirements at site. All cabling and installations shall comply in all respects with the appropriate statutory requirements. The installation and maintenance of this shall be done by licensed and experienced electrician.
3.13.4	While reasonable efforts will be made to ensure continuous electric power supply, interruptions cannot be ruled out and no claim from the Contractor shall

	be entertained on this account such as idle labor, extension of time etc. The Contractor shall adjust his working shift accordingly and deploy additional manpower, if necessary, so as to achieve the target.
3.13.5	Contractor to note that till construction power is made available by BHEL (approx. within 3 months from start of work); contractor shall make his own arrangement like DG set etc. The contractor shall also take the approval/ permission of statutory authorities for his DG set installation. The Contractor has to make his own arrangement for the same as required to carry out the job under the scope of balance work within the quoted rate. Nothing extra shall be paid on this account of DG set up and running for construction and office maintenance etc.
3.13.6	Contractor shall be well equipped with back-up power supply arrangement like DG set and diesel operated welding machine etc. to tackle situations arising due to failure of supplied power, so as to ensure continuity and completion of critical processes like Operation of Batching Plant, Concreting, etc. that are underway at the time of power failure or important activities planned in immediate future.
3.13.7	BHEL is not responsible for any loss or damage to the Contractor's equipment as a result of variations in voltage or frequency or interruptions in power supply.
3.13.8	Contractor is advised to maintain the calibrated energy measuring instruments and use their system as efficiently as possible to maintain the HT side input energy meter reading and LT side outgoing energy meter reading to sub-contractors as equal.
3.13.9	The bidder will have to Procure & install General mobile illumination system during construction right from start of his work. This system will include temporary pole lighting, portable lighting towers with DG back-up, within the quoted price. The illumination should be such that minimum illumination requirement as specified by Indian standards for general illumination is maintained.
3.13.10	Contractor to arrange energy meter for office.
3.13.11	**General:** If any other voltage level (other than normally available) is required, the same shall be arranged by the contractor from power supply as above. Contractor will have to provide at his own cost necessary calibrated energy meters (tamper proof, suitably housed in a weather proof box with lock & key arrangement) at point of power supply along with calibration certificate from authorized/ accredited agency for working out the power consumption. In case of recalibration required for any reason the necessary charges including

	replacement by calibrated meters is to be borne by the contractor. Supply of electricity shall be governed by Indian Electricity Act and Installation Rules and other Rules and Regulation as applicable. The contractor shall ensure usage of electricity in an efficient manner and the same may be audited by BHEL time to time. In case of any major deviation from normally accepted norms is observed, BHEL will reserve the right to impose penalty as deemed fit for such cases. Contractor to arrange calibrated energy meter (tamper proof, suitably housed in a weather proof box with lock & key arrangement) for office and this construction power at office is chargeable as per applicable tariff rates.
3.14	**Construction water:**
3.14.1	Construction water will be provided free of cost at one point within the plant boundary. Bidder has to make arrangement of further distribution of water at his own cost. No extra payment shall be made under this account. The agency should also construct a sump of suitable size for storage of construction water as per their site requirement for use in batching plant and construction purposes.

4.0 Tools and Plants:

Nos. of T&Ps to be deployed at site shall be decided w.r.t. monthly plan and review format (F-14) based on site requirement. Below given Nos are tentative for planning purposes by the bidder.

Sl. No.	Description of T&P	Quantity
1	Concrete Transit Mixer	06 Nos.
2	Batching Plant (30 Cum/Hr) with Sufficient Capacity of Silos.	01 No. As per Requirement
3	Concrete Mixer	As per Requirement
4	Concrete Pump of Suitable Capacity with Sufficient lift in order to pour concrete at roof of Transfer Points	As per Requirement
5	Hydraulic Excavator /Poclain	As per Requirement
6	JCB	03 Nos.
7	Dumper	As per requirement
8	Concrete Boom placer min. 35m long	03 Nos.
9	Vibrators (electrical/diesel)	As per requirement
10	Self-priming Dewatering pump of various capacity (Diesel/Electric) From 2 HP to 7.5 HP	As per requirement
11	Curing / dewatering pump – 1.5 / 2 HP	As per requirement
12	De-watering pump (diesel operated) – 20 HP & 30 HP	05 Nos. each
13	Hydraulic Excavator /Poclain with rock breaker arrangement.	03 Nos.
14	Pneumatic rock breaker with jack hammer	02 Nos.
15	Ply Shuttering board with adequate supporting structure – (Old steel shuttering plates will not be allowed).	As per requirement
16	Farana crane (Required Capacity) *Note- Hydra is not allowed at project site	As per requirement
17	Trailer (20MT Capacity)	As per requirement
18	Tractor mounted grader/ loader	As per requirement

19	Scaffolding Pipes, Clamps / Swivel Couplers (One/Two Way), Props, Jacks, Screw Heads, MS Pipes, Wooden Battens, Planks, Bullies, H Frames, Tie Rods with Nuts, Adjustable Achro Span (Considering Individual Areas)	Scaffolding Pipes with clamps– Min. 1500 Nos. for execution purpose for safety related other than Scaffolding Pipes – As per requirement.
20	Reinforcement bending machine	As per requirement.
21	Reinforcement cutting machine	As per requirement.
22	Plate compactor	As per requirement.
23	Earth Compactor- 3MT Capacity	As per requirement.
24	Total Station	05 Nos.
25	Auto level & staff	05 Nos.
26	Road roller/Vibro roller	03 Nos.
27	Water Tanker with sprinkler attachment	03 Nos.
28	All equipments for area Lightning like LED/Halogen bulbs and Portable light Towers etc.	As per requirement
29	Computer with printing/photocopy & CD writing facility	As per Requirement
30	Man lift crane of Minimum 20m reach	As per requirement
31	DG Set of 125 KVA Capacity	As per Requirement

4.1	**Measuring and Monitoring Equipment (MMEs):** To be finalized as per site requirement.
4.2	T&Ps shown in the above-mentioned list is suggestive requirement. However, mobilization schedule as mutually agreed at site for major T&Ps, have to be adhered to. Numbers/time of requirement will be reviewed from time to time at site and contractor will provide required T&Ps/equipment to ensure completion of entire work within schedule/target date of completion without any additional financial implication to BHEL. Contractor will give advance intimation & certification regarding capacity etc. prior to dispatch of heavy equipment. Also, on completion of the respective activity, demobilization of T&Ps in total or in part can be done with the due approval of Engineer-In-Charge. Retaining of the T&Ps during the contract period will be mutually agreed in line with construction requirement.
4.3	The contractor shall arrange crane operator, diesel, petrol and other consumables including electrical / water / air connections required for the tools and plants,

	equipment etc. Preventive and routine maintenance of T & P are also to be arranged by the contractor at his cost without any delay. Required number of experienced mechanics and helpers for routine maintenance of the above T&Ps shall be provided by the contractor within his quoted rate.
4.4	Heavy equipment will be tracked with real-time position location for fleet management. Deployment vs planned reports shall be generated. Equipment condition monitoring data like service meter reading, operation maps, loading, fuel levels, operating information, idle time etc. shall be captured. This data shall be captured through integrated online project monitoring system. All T&Ps and Equipment deployed by contractor will also be covered/ monitored through this system. Accordingly, minimum 5 signals per equipment should be made available to provide the input to integrated online project monitoring system. Necessary software/ hardware for aforesaid system shall be provided by BHEL.
4.5	All manpower hired/deployed by Contractor for this project shall be monitored through Integrated Online Project Monitoring system by BLE beacons & LoRa backhaul. Every personnel entering in to NTPC site premises for carry out any work shall be tracked. [Separate tagging for visitors]. Geo-fencing /BLE beacon-based zoning of the erection area shall be done to track workforce deployment and safety purposes. Work force monitoring Dash board (planned vs actual deployment) shall be made available. BLE beacons & LoRa backhaul shall be provided by BHEL on chargeable basis to contractor. BHEL will provide Tags free of cost for maximum 300 workers, additional tags as required shall be provided by BHEL on chargeable basis @ Rs. 1000/- per tag. In case of damage or missing of issued worker tag, Rs. 1000/- per tag will be charged for issuing new worker tag.
4.6	Medical/First aid center/medicine purchased for emergency/Doctor purpose along with ambulance services with fuel and operator (round the clock) shall be arranged by BHEL for handling medical emergencies. Cost against these facilities shall be distributed / shared among the vendors working in Talcher Project site proportionately based on contract value.
4.7	Other terms and conditions regarding T&Ps to be deployed by Contractor, shall be as per clause No. 4.2 of SCC.

5. LIST OF T&P TO BE PROVIDED BY BHEL FREE OF HIRE CHARGES ON SHARING BASIS:

BHEL shall not provide any T&Ps for this scope of work.

All T&Ps required for handling of items / materials to be arranged by bidder.

6	**Time Schedule and Mobilization:**	
6.1	**Initial Mobilization and Time Schedule:** After issue of LOA (though Fax/courier/email) the contractor shall report to the Construction Manager/Site In-Charge of BHEL at site within seven (07) days from date of LOA and submit detailed mobilization plan to start work within 15 days from date of LOA; unless instructed by BHEL to differ start of work in writing. The contractor has to subsequently augment his resources in such a manner that the entire works are completed within the contract period of **Nineteen (19) Months** from the date of start of work in a manner required by BHEL to match with the project schedule. Date of Start of work shall be considered as 15 days after date of LOA or as instructed by BHEL in writing.	
6.2	**Schedule of Completion:** The entire work under the scope of this contract shall be carried out in such a manner that the following listed major milestones are achieved as per completion schedule given against each activity & released for erection by other agency.	
	Activity	**Schedule completion from date of start of work**
	Part-I: Balance Scope of Work for CHP	
6.2.1	Connecting Conveyor (BCN-2A/B) including Trestles from TP-1 to Crusher House	4th Months
6.2.2	Transfer Point-1 (TP-1) & Conveyor (1A/B) foundations	6th Months
6.2.3	Connecting Conveyor (BCN-3A/B & 6 A/B) including Trestles from Crusher House to TP-2	6th Months
6.2.4	Connecting Conveyor (4 A/B) including Trestles from TP 2 to TP-3	8th Months
6.2.5	Tunnel 1 A/B & PH	10th Months
6.2.6	Transfer Point-2 (TP-2) Slabs	10th Months
6.2.7	Transfer Point-3 (TP-3) Slabs	10th Months
6.2.8	Workshop Building	10th Months
6.2.9	Crusher House Slabs	12th Months
6.2.10	Coal Settling Pond	12th Months
6.2.11	MCC-II	12th Months
6.2.12	Dozer Shed	14th Months
6.2.13	Track Hopper with Machinery Hatch-1 & 2	14th Months
6.2.14	MCC-III	15th Months
6.2.15	Dust Suppression Pump House-1 with Water Tank	15th Months
6.2.16	MCC-I	16th Months

6.2.17	Stacker Reclaimer	16th Months
6.2.18	Roads and Drains	16th Months
6.2.19	Retaining Wall with drain	17th Months
6.2.20	Any other structures as per system requirement	18th Months
	Part-II: Main Power House of Unit-1 (MPH-1) - Balance Scope of Work	
6.2.21	CW/ACW Pipe Laying within Transformer Yard	2nd Months
6.2.22	Operating Floor including stairs, roof deck sheeting, side cladding, etc. in order to handing over for TG Erection.	9th Months
6.2.23	Bunker Bay – Feeder Floor, Tripper Floor and Roof Slab with Parapet	10th Months
6.2.24	Readiness of ST Foundation	12th Months
6.2.25	Pipe cum Cable Rack	12th Months
6.2.26	Power House AB Bay – Roof Slab including Parapet Wall and Oil canal	14th Months
6.2.27	Power House BC Bay – RCC Floor Slabs of all Floors above Ground Level	15th Months
6.2.28	Power House AB Bay – RCC Floor Slabs of all Floors above Ground Level	15th Months
6.2.29	Power House Ground Floor - Equipment Foundations, AC Plant, Inert Gas, etc. including Paving/ Grade Slab, Cable/ Pipe Trench and Drains	17th Months
6.2.30	Power House – Architectural works of Various Rooms/ Different Floors	18th Months
6.2.31	➢ Transformer Foundations (GT, UT, UAT, etc.) with Rail Track and Fire Wall ➢ Bus Duct Foundation, Oil Pit and Cable Trench/Duct ➢ DG Foundation	18th Months
6.2.32	Any other structures as per system requirement	19th Months
	Part-III: Boiler Area of Unit-2 (SG-2) - Balance Scope of Work	
	Foundation up to Ground Level /Bolt Lift:	
6.2.33	Mill & ESP, Duct support from Boiler to ESP	04th Months
6.2.34	PA Fan, FD Fan, ID fan, Absorber, Duct supporting structure up to chimney, SCR including FPS system.	06th Months
6.2.35	ESP/FGD Control Room, MRS Silo,	07th Months
6.2.36	**Completion of above ground:**	
6.2.37	ESP	3rd Months
6.2.38	Pipe & Cable rack in SG island	Progressively from 4th to 8th Months
6.2.39	MRS Silo, Bucket elevator	Progressively from 7th to 10th Months

6.2.40	PA Fan, FD Fan, ID Fan.	08th Months
6.2.41	Duct supporting structure up to chimney, Bottom ash hopper, SCR including FPS system.	12th Months
6.2.42	ESP/FGD Control Room	15th Months
6.2.43	Any other structures as per system requirement	17th Months
	Part-IV: TG Deck of Unit-2 - Balance Scope of Work	
6.2.44	TG Deck Unit-2 including TG Column	04th Months
6.2.45	Retaining Wall and Auxiliary Pedestal	07th Months
6.2.46	Condenser Wall	07th Months
6.2.47	Any Other Miscellaneous Foundations / Structure/ System, etc.	08th Months
6.3	The above schedule is only tentative. The above schedule shall be advanced, if there are requirements to advance the project schedule and the civil works in the scope of the contractor is to be advanced to meet the project requirement. No extra payment whatsoever shall be paid on this account.	
6.4	In order to meet the above schedule in general, and any other intermediate targets set, to meet customer/ project schedule requirements, Contractor shall arrange & augment all necessary resources from time to time on the instructions of BHEL Engineer.	
6.5	**Intermediate milestones:**	
6.5.1	Two Major Intermediate Milestones are identified as M1 and M2 above.	
Milestones	**Activity**	**Schedule of completion from start of work**
M1	Operating Floor including stairs, roof deck sheeting, side cladding, etc. in order to handing over for TG Erection.	9th Months
M2	Track Hopper with Machinery Hatch-1 & 2	14th Months
6.6	**Provision of Penalty in case of slippage of Intermediate Milestones:** In case of slippage of Two Major Intermediate Milestones, mentioned as M1 & M2 above, delay Analysis shall be carried out on achievement of each of these two Intermediate Milestones in reference to F-14.	
6.6.1	In case of slippage of these identified Intermediate Milestones, Delay Analysis shall be carried out on achievement of each of these two Intermediate Milestones.	
6.6.2	In case delay in achieving M1 Milestone is solely attributable to the contractor, 0.5% per week of executable contract value*, limited to maximum 2% of executable contract value, will be withheld.	

6.6.3	In case delay in achieving M2 Milestone is solely attributable to the contractor, 0.5% per week of executable contract value*****, limited to maximum 3% of executable contract value, will be withheld.
6.6.4	Amount already withheld, if any against slippage of M1 milestone, shall be released only if there is no delay attributable to contractor in achievement of M2 Milestone.
6.6.5	Amount required to be withheld on account of slippage of identified intermediate milestone(s) shall be withheld out of respective milestone payment (corresponding RA Bill) and balance amount (if any) shall be withheld @10% of RA Bill amount from subsequent RA bills.
6.6.6	Final deduction towards LD (if applicable), on account of delay attributable to contractor shall be based on final delay analysis on completion/ closure of contract. Withheld amount, if any due to slippage of identified intermediate milestone(s) shall be adjusted against LD or released as the case may be.
6.6.7	In case of termination of contract due to any reason attributable to contractor before completion of work, the amount already withheld against slippage of intermediate milestones shall not be released and be converted into recovery.
6.7	Common activities shall be completed in Phase wise manner/ Instruction of Engineer within the Contractual time.
6.8	Above milestone dates has to be completed in parallel.
6.9	Bidders are requested to submit Resource deployment plan Area wise with detail program in line with above schedule in the form of Bar Chart/ MS project planer along with their offer.
*****	Executable Contract Value - Value of work for which inputs/ fronts were made available to contractor and were scheduled for execution till the date of achievement of that milestone.
6.10	**COMPLETION OF WORK AND COMMENCEMENT OF GUARANTEE PERIOD**
6.10.1	The works shall be completed to the entire satisfaction of the Engineer and in accordance with the completion schedule as specified in the Contract, and all unused stores and materials, tools, plant, equipment, temporary buildings, site office, labor hutments and other things shall be removed and the site and work cleared of rubbish and all waste materials and delivered up clean and tidy to the satisfaction of the Engineer at the Contractor's expenses.
6.10.2	BHEL shall have power to take over from the Contractor from time to time such sections of the work as have been completed to the satisfaction of the Engineer. Such work however shall not be treated as have been completed until the remaining / pending works are executed to the satisfaction of Engineer.

6.10.3	The Engineer shall certify to the contractor the date on which the work is completed and the date thereof for commencement of Guarantee Period. Guarantee Period shall be as given in GCC.

7.0	**Terms of Payment:**
7.1	**Progressive Payment/ Final Payment:** The payments for works under the scope of this contract shall be as per clause no 2.6; 2.22; 2.23 of General Conditions of Contract and Volume-IB, Chapter-X of SCC.
7.1.1	**<u>Documents required for RA Bill:</u>** • GST Complied Invoice of the work done as per approved BBU. • WAM -6 for RA Bill. • Jointly signed Measurement sheet. • Power of Attorney before submission of Bill. • Validity of Bank Guarantees as applicable under the contract. • HR/IR compliance documents: i. Wages payment sheet as per applicable minimum wages. ii. Proof of PF contribution submission. iii. Proof of ESI/ WC contribution submission iv. Proof of Bonus payment as per Bonus Act if applicable. v. Proof of EL payment if applicable. vi. Any other statutory document if applicable.
7.1.2	**<u>Documents required for Final Bill:</u>** The final bill is drawn as soon as the entire work is completed. From the final amount due, all amounts already claimed up to the previous running account bill will be deducted. It should be ensured that in the final bill the following additional particulars have been provided: • Final Bill in WAM-7 Format. • 'No claim' certificate from the contractor. • Clearance certificates where ever applicable viz. Clearance Certificates from Customer, various Statutory Authorities like Labour department, PF Authorities, Commercial Tax Department etc. • Final Material re-conciliation statement duly approved by BHEL. • Indemnity Bond as per prescribed format. • Deviation statement showing the difference between the actuals and as per the contract. • Final Delay Analysis.
7.2	**SECURED RECOVERABLE ADVANCES:**

	Interest Free Secured Mobilization Advance as per GCC Clause No. 2.13.1 will be payable under exceptional circumstances on certification of BHEL Construction Manager at Site. Interest Free Mobilization Advance shall be disbursed in specifically mentioned stages of major resource mobilization as specified hereunder: 1. For Mobilization of Batching Plant, Excavator & Dumper, Transit Mixers, Boom Placer/Concrete Pump- 2.0% 2. For Mobilization of other required T&Ps and resources at site to start the work - 1.5% 3. For Installation and Erection of Site Infrastructure by contractor i.e. site office, stores etc. - 1.5% Note: 1. BHEL Site-CM shall be the deciding authority for assessing the admissibility of advance payment to contractor. 2. In case contractor do not fulfil the agreed conditions of payment of 1st mobilization advance, BHEL Construction Manager will have the authority to not allow the 2nd mobilization advance to contractor.

8.0	**TAXES & DUTIES**
8.1	The contractor shall pay all (save the specific exclusions as enumerated in this clause) taxes, fees, license, charges, deposits, duties, tools, royalty, commissions, other charges, etc. which may be levied on the input goods & services consumed and output goods & services delivered in course of his operations in executing the contract. In case BHEL is forced to pay any of such taxes/duties, BHEL shall have the right to recover the same from his bills or otherwise as deemed fit. However, provisions regarding **GST** on output supply (goods/service) and TDS/TCS as per Income Tax Act shall be as per following clauses.
8.2	**GST (Goods and Services Tax)**
8.2.1	GST as applicable on output supply (goods/services) are excluded from contractor's scope; therefore, contractor's price/rates shall be **exclusive** of GST. Reimbursement of GST is subject to compliance of following terms and conditions. BHEL shall have the right to deny payment of GST and to recover any loss to BHEL on account of tax, interest, penalty etc. for non-compliance of any of the following condition.
8.2.2	The admissibility of GST, taxes and duties referred in this chapter or elsewhere in the contract shall be limited to direct transactions between BHEL & its Contractor. BHEL shall not consider GST on any transaction other than the direct transaction between BHEL & its Contractor.
8.2.3	Contractor shall obtain prior written consent of BHEL before billing the amount towards such taxes. Where the GST laws permit more than one option or methodology for discharging the liability of tax/levy/duty, BHEL shall have the right to adopt the appropriate one considering the amount of tax liability on BHEL/Client as well as procedural simplicity with regard to assessment of the liability. The option chosen by BHEL shall be binding on the Contractor for discharging the obligation of BHEL in respect of the tax liability to the Contractor.
8.2.4	Contractor has to submit GST registration certificate of the concerned state. Contractor also needs to ensure that the submitted GST registration certificate should be in active status during the entire contract period.
8.2.5	Contractor/Vendor has to issue Invoice/Debit Note/Credit Note indicating HSN/SAC code, Description, Value, Rate, applicable tax and other particulars in compliance with the provisions of relevant GST Act and Rules made thereunder.
8.2.6	Vendor has to submit GST compliant invoice within the due date of invoice as per GST Law. In case of delay, BHEL reserves the right of denial of GST payment if there occurs any hardship to BHEL in claiming the input thereof. In case of goods, vendor has to provide scan copy of invoice & GR/LR/RR to BHEL before movement of goods starts to enable BHEL to meet its GST related compliances. Special care should be taken in case of month end transactions.

8.2.7	Vendor has to ensure that invoice in respect of such services which have been provided/completed on or before end of the month should not bear the date later than last working day of the month in which services are performed.
8.2.8	Subject to other provisions of the contract, GST amount claimed in the invoice shall be released on fulfilment of all the following conditions by the Contractor: - a. Supply of goods and/or services have been received by BHEL. b. Original Tax Invoice has been submitted to BHEL. c. Contractor/ Vendor has submitted all the documents required for processing of bill as per contract/ purchase order/ work order. d. In cases where e-invoicing provision is applicable, vendor/contractor is required to submit invoice in compliance with e-invoicing provisions of GST Act and Rules made thereunder. e. Contractor has filed all the relevant GST return (e.g. GSTR-1, GSTR-3B, etc.) pertaining to the invoice submitted and submit the proof of such return along with immediate subsequent invoice. In case of final invoice/ bill, contractor has to submit proof of such return within fifteen days from the due date of relevant return. f. Respective invoice has appeared in BHEL's GSTR - 2A for the month corresponding to the month of invoice and in GSTR-2B of the month in which such invoices has been reported by the contractor along with status of ITC availability as "YES" in GSTR-2B. Alternatively, BG of appropriate value may be furnished which shall be valid at least one month beyond the due date of confirmation of relevant payment of GST on GSTN portal or sufficient security is available to adjust the financial impact in case of any default by the contractor. g. Contractor has to submit an undertaking confirming the payment of all due GST in respect of invoices pertaining to BHEL.
8.2.9	Any financial loss arises to BHEL on account of failure or delay in submission of any document as per contract/purchase order/work order at the time of submission of Tax invoice to BHEL, shall be deducted from contractor's bill or otherwise as deemed fit.
8.2.10	TDS as applicable under GST law shall be deducted from contractor's bill.
8.2.11	Contractor shall comply with the provisions of e-way bill wherever applicable. Further wherever provisions of GST Act permits, all the e-way bills , road permits etc. required for transportation of goods needs to be arranged by the contractor.
8.2.12	Contractor shall be solely responsible for discharging his GST liability according to the provisions of GST Law and BHEL will not entertain any claim of GST/interest/penalty or

	any other liability on account of failure of contractor in complying the provisions of GST Law or discharging the GST liability in a manner laid down thereunder.
8.2.13	In case declaration of any invoice is delayed by the vendor in his GST return or any invoice is subsequently amended/altered/deleted on GSTN portal which results in any adverse financial implication on BHEL, the financial impact thereof including interest/penalty shall be recovered from the Contactor's due payment.
8.2.14	Any denial of input credit to BHEL or arising of any tax liability on BHEL due to non-compliance of GST Law by the Contractor in any manner, will be recovered along with liability on account of interest and penalty (if any) from the payments due to the Contactor.
8.2.15	In the event of any ambiguity in GST law with respect to availability of input credit of GST charged on the invoice raised by the contractor or with respect to any other matter having impact on BHEL, BHEL's decision shall be final and binding on the contractor.
8.2.16	**Variation in Taxes & Duties:** Any upward variation in GST shall be considered for reimbursement provided supply of goods and services are made within schedule date stipulated in the contract or approved extended schedule for the reason solely attributable to BHEL. However downward variation shall be subject to adjustment as per actual GST applicability. In case the Government imposes any new levy/tax on the output service/goods after price bid opening, the same shall be reimbursed by BHEL at actual. The reimbursement under this clause is restricted to the direct transaction between BHEL and its contactor only and within the contractual delivery period only. In case any new tax/levy/duty etc. becomes applicable after the date of Bidder's offer but before opening of the price Bid, the Bidder/Contractor must convey its impact on his price duly substantiated by documentary evidence in support of the same before opening of price bid. Claim for any such impact after opening the price bid will not be considered by BHEL for reimbursement of tax or reassessment of offer.
8.3	**Income Tax:** **TDS/TCS** as applicable under Income Tax Act, 1961 or rules made thereunder shall be deducted/collected from contractor's bill.

8.4 BOCW Act & Cess Act

8.4.1 BOCW Cess is not to be borne by contractor. Refer Annexure-I for BOCW Act & Cess Act.

Annexure-I:
Bidder may please note that the sub-contractor/bidder of BHEL engaging building or construction worker in connection with building or other construction work, are required to follow the procedures enumerated below:

1.	It shall be the sole responsibility of the contractor as employer to ensure compliance of all the statutory obligations under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder.
2.	It shall be sole responsibility of the contractor engaging Building Workers in connection with the building or other construction works in the capacity of employer to apply and obtain registration certificate specifying the scope of work under the relevant provisions of the Building and Other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 from the appropriate Authorities.
3.	It shall be responsibility of the contractor to furnish a copy of such Registration Certificate within a period of one month from the date of commencement of Work.
4.	It is responsibility of the contractor to register under the Building and other Construction Workers' Welfare Cess Act, 1996 and deposit the required Cess for the purposes of the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 at such rate as the Central Government may, by notification in the Official Gazette, from time to time specify. However, before registering and deposit of Cess under the Building and other Construction Workers' Welfare Cess Act, 1996, the contractor will seek written prior approval from the Construction Manager.
5.	It shall be sole responsibility of the contractor as employer to get registered every Building Worker, who is between the age of 18 to 60 years of age and who has been engaged in any building or other construction work for not less than ninety days during the preceding twelve months as Beneficiary under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996.
6.	It shall be sole responsibility of the contractor as employer to maintain all the registers, records, notices and submit returns under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder.
7.	It shall be sole responsibility of the contractor as employer to provide notice of poisoning or occupation notifiable diseases, to report of accident and dangerous occurrences to the concerned authorities under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the rules made thereunder and to make payment of all statutory payments & compensation under the Employees' Compensation Act, 1923.

8.	It shall be the responsibility of the sub-contractor as employer to make payment/deposit of applicable cess amount on the extent of work involving building or construction workers engaged by the sub-contractor within a period of one month from the receipt of payment. It shall also be responsibility of the Contractor to furnish BHEL on monthly basis, Receipts/ Challans towards Deposit of the Cess under the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder along with following statistics: i) Number of Building Workers employed during preceding one month. ii) Number of Building workers registered as Beneficiary during preceding one month. iii) Disbursement of Wages made to the Building Workers for preceding wage month. iv) Remittance of Contribution of Beneficiaries made during the preceding month.
9.	**BHEL shall reimburse the contractor the Cess amount deposited for the purposes of the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 under the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder.** However, BHEL shall not reimburse the Fee paid towards the registration of establishment, fees paid towards registration of Beneficiaries and Contribution of Beneficiaries remitted.
10.	It shall be responsibility of the Building Worker engaged by the Contractor and registered as a beneficiary under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 to contribute to the Fund at such rate per mensem as may be specified by the State government by notification in the Official Gazette. Where such beneficiary authorizes the contractor being his employer to deduct his contribution from his monthly wages and to remit the same, the contractor shall remit such contribution to the Building and other construction Workers' Welfare Board in such manner as may be directed by the Board , within the fifteen days from such deduction.
11.	**Bidders may please note that though the quoted price is exclusive of BOCW (which will be reimbursed by BHEL as per sub-clause 9 above) , however, If at any point of time during the contract period, non-compliance of the provisions of the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder is observed, BHEL reserves the right to deduct the applicable cess (1%) on the contract value and penalty (if any, imposed by Cess Authorities) from the payables on account of non-compliance.**
12.	The contractor shall declare to undertake any liability or claim arising out of employment of building workers and shall indemnify BHEL from all consequences / liabilities / penalties in case of non-compliance of the provisions of the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder.

9.0	**MATERIAL**
9.1	Material to be issued by BHEL (Free of Cost) as per BOQ cum Rate Schedule: 1. Ready Mix Concrete (RMC)* 2. Cement 3. Reinforcement Steel and MS Round Bar (Earthing Rod) 4. Metal Deck Sheet ***BHEL at its discretion, may decide to execute the scope of production of Ready-Mix Concrete (RMC) at Batching Plant as per site requirement, BOQ cum Rate Schedule and instruction of Site-in-Charge.**
9.2	All other materials required for proper completion of job shall be provided by the contractor and is deemed to be inclusive in the quoted price. Bidder's scope also includes following:
9.2.1	Furnishing samples of all materials required by the BHEL Engineer for testing/inspection and approval for use in the works. The samples may be retained by the Engineer for final incorporation in the works.
9.2.2	Furnishing test reports for the products used or intended to be used, if called for the specifications or if so desired by the engineer.
9.2.3	Arranging manufacturer's supervision for items of work done as per manufacturer's specifications when so specified.
9.2.4	Contractor shall set up suitable storage facilities for Cement, sand, deck plate, bolts, aggregate, reinforcement steel, structural steel, handrail, grating, foundation bolts, shuttering item, inserts, water proofing material, admixture other BOI's etc. and all are stored properly as per IS recommendation/technical specifications/ manufacturer recommendation. Wastage due to lapse of storing will be because of contractor.
9.3	**HANDLING OF MATERIAL ISSUED BY BHEL:** **Refer Chapter-VI "Material Handling, Storage & Preservation" of SCC**
9.3.1	Cement and Reinforcement Steel (wherever specified as free issue by BHEL) required for the tender scope shall be procured by BHEL and issued to contractor free of cost (As FOC Item). However, unloading, handling / storage of Cement and Reinforcement steel procured by BHEL for this tender scope at site, Contractor's Stores, issuance of materials from BHEL Stores and further transportation from Stores to work area (including loading and unloading) will be in the scope of contractor. No Extra payment shall be made for this work.

9.3.2	The contractor shall take care of material issued by BHEL and shall protect the same from damage and weathering. Contractor shall construct waterproof cement store (capacity minimum 300 MT/ 6000 Bags) for storing and stacking of cement issued by BHEL free of cost.
9.3.3	The theoretical weight of each bag of cement for issued purposes will be considered as 50kg, the contractor shall be accountable for the cement issued to the contractor on this notional weight only. No claim whatsoever will be entertained because of difference between theoretical and actual weight of the bags of cement.
9.3.4	The empty cement bags duly accounted for against issue shall be the contractor's property and the same shall be disposed as per statutory regulation prevailing in the project.
9.3.5	The contractor shall satisfy himself of the quality and quantity of supplied cement at the time of taking delivery from BHEL stores. No claims whatsoever will be entertained by BHEL because of quality or quantity after the materials are taken by the contractor from BHEL stores.
9.3.6	Contractor will be responsible for sampling and testing of cement as per Indian Standard / Specification / approved quality plan in the testing laboratory established by the contractor.
9.3.7	Contractor will be responsible for unloading the cement as soon as the arrival of cement in the weather proof cement storage sheds/ Silo's having dense impervious bituminous or concrete floors which shall be kept swept clean at all times. The storage arrangements shall be fully completed and approved by the owner before any cement is delivered to site. The construction of cement storage sheds as per the requirement of BHEL, unloading of cement bags, stacking properly in the storage sheds, removal of the sheds after the completion of the work are in the scope of bidder. Though the cement is unloaded directly at the contractor storage shed, it will be deemed to be considered that the cement was issued from BHEL stores. Necessary documents are to be submitted by the contractor to the BHEL stores for having received cement.
9.3.8	The contractor shall in no case be entitled for any compensation on account of any delay in supply or non-supply thereof for all or any such materials. However, in case of non-availability of any specific material / section(s) which delays the completion of work, such cases shall be recorded separately in monthly planning format (F14) and shall be considered for time extension of contract.
9.3.9	Contractor will have to make his own arrangement at his own cost for procurement of any other materials except as mentioned above, as required for the works and of such quality as acceptable to BHEL.
9.3.10	Contractor shall also carryout in complete association with BHEL, the material management functions and execution like day-to-day update of materials, issued to contractor, accounting for surplus/scrap material returned etc. These functions shall

	also be carried out through computerized system utilizing suitable software. Contractor shall engage experienced software personnel to associate on dedicated basis for efficient discharge of the same in time.
9.3.11	The contractor shall solely be responsible for the safety & security of material after it is handed over and issued to contractor by the BHEL.
9.3.12	BHEL reserves the right to recover from the contractor any loss of material issued by BHEL arising out of damage/ theft or any other causes during verification/stacking or at any time under the custody of the contractor.
9.3.13	BHEL issued materials, shall not be under any circumstances whatsoever, and shall be taken out of the project site unless otherwise permitted by BHEL for outside job.
9.3.14	"BHEL/BHEL's agency for providing RMC" shall carry out design mix as per IS 456/10262 latest revision and specification, using the OPC and/or OPC with Fly Ash and/or PPC (as the case may be) and get the design mix proportions approved by BHEL's Customer/Consultant. The design mix proportion shall be used for concreting at this project.
9.3.15	Before commencement of work, Contractor has to satisfy/ensure the above design mix proportion through conducting trial mix. Contractor shall not be absolved from the responsibility of quality of concrete works as per relevant specification, standard and to ensure satisfactory performance as per terms and conditions of contract. Any issue raised regarding design mix after successful completion of trial mix shall not be entertained and contractor shall not be entitled for any cost or damages.
9.4	**Issue of Ready Mix Concrete and Cement:**
9.4.1	Ready Mix Concrete (Design Mix/Nominal Mix) of required grade shall be issued by BHEL at Batching Plant of BHEL's RMC / Other Agency as per relevant BOQ Items. Transportation of Concrete through Transit Mixer from the Batching Plant to Pouring Point & Concrete Pouring through Concrete Pump/ Suitable Boom Placer or other means as per site requirement shall be in the scope of contractor.
9.4.2	Cement as received from the manufacturer/ stockiest will be issued free of cost to the contractor. The theoretical weight of each bag of cement for issued purposes will be considered as 50 kg, the contractor shall be accountable for the cement issued to the contractor on this notional weight only. No claim whatsoever will be entertained because of difference between theoretical and actual weight of the bags of cement.
9.4.3	In case cement is issued through bulkers being supplied from manufacturer/stockiest; the same shall be emptied in cement silos of batching plant and necessary assistance shall be provided by contractor.

9.4.4	In case BHEL supplies cement through Bulker, Bidder has to store cement in Silos of Suitable capacities as decided by Engineer in charge. Silos Capacities shall be finalized mutually.
9.4.5	The empty cement bags duly accounted for against issue shall be the contractor's property and the same shall be disposed as per statutory regulation prevailing in the project.
9.4.6	No cement will be issued on free basis for bought out item like Hume pipe, Interlocking Paver block, Fly ash brick etc. However, cement for mortar for fixing of these items if required will be issued on free basis.
9.4.7	One month shall be the limit for the maximum quantity of BHEL issued cement that would be with the contractor at any point of time when work is in progress (excluding what has already been incorporated in the works).
9.5	**Issue of Reinforcement Steel and MS Round Bar (Earthing Rod):** **Refer Chapter-VI "Material Handling, Storage & Preservation" of SCC**
9.6	**Return of Cement, Reinforcement Steel and MS Round Bar (Earthing Rod):** **Refer Chapter-VI "Material Handling, Storage & Preservation" of SCC**
9.7	**Return of Ready Mix Concrete:** Under no circumstances, Ready Mix Concrete will be taken back. Contractor has to plan accordingly for proper use of Ready Mix Concrete.
9.8	**Consumption and Wastage of Cement, Reinforcement Steel and MS Round Bar (Earthing Rod):** **Refer Chapter-VI "Material Handling, Storage & Preservation" of SCC**
9.9	**Consumption and Wastage of Ready Mix Concrete:**
9.9.1	**Ready Mix Concrete (RMC) Consumption:** The theoretical consumption of various grade of based on approved construction drawing shall be considered. Quantity shall be calculated considering the volume of concrete as per approved drawing. No extra cost shall be payable to you for any deviation in quantity of Ready Mix Concrete received from the Batching Plant and actual use at site. Requirement of RMC shall be provided at least one week in advance. Weekly concreate plan shall be provided to BHEL on regular basis
9.9.2	**Ready Mix Concrete (RMC) Wastage:** a) **Allowable wastage:** One and half percent (+1.5%) of theoretical consumption of cement unless specified otherwise in the technical specification.

b) For RMC issued by BHEL to the contractor free of cost, and which is not accounted for by the contractor to BHEL, then recovery for such material shall be affected at penal rates.

Sl. No.	RMC consumption	Basis of issue & penal recovery
1	Theoretical consumption (without considering any wastage or loss).	Free
2	Actual consumption being Limited to one and half percent (+1.5%) of aforesaid theoretical consumption towards allowable wastage.	Free
3	Actual consumption beyond one and half percent (+1.5%) of Sl. No. (1) above.	Penal Rate

9.10 **Recovery of Materials (Penal Rates):**

If wastage exceeds the specified limit, the recovery of excess wastage shall be made from monthly RA Bills as per following penal rates (excluding GST):

9.10.1

Sl. No.	Materials	Penal Rate (Rs.)
1	Cement (PPC)	5,000/- per MT
2	Cement (OPC)	7,000/- per MT
3	Reinforcement Steel / Earthing Rod	65,000/- per MT
4	RMC – M7.5 (1 part cement, 4 part sand, 8 parts of aggregate by volume)	4,500/- per Cum
5	RMC – M10 (1 part cement, 3 part sand, 6 parts of aggregate by volume)	5,000/- per Cum
6	RMC – M15 ((1 part cement, 2 part sand, 4 parts of aggregate by volume)	5,500/- per Cum
7	RMC – M20	6,000/- per Cum
8	RMC – M25	6,500/- per Cum
9	RMC – M30	7,000/- per Cum
10	RMC – M35	7,500/- per Cum

9.10.2	**Penal Rate will be 1.05 times the actual cost to BHEL or Rate mentioned in Table 9.10.1 above, whichever is higher, shall be imposed.**

This Chapter consists of Part A & Part B of Volume II "Price bid":

CONTENTS	
Description	**Remarks**
PART A: Instructions to the Bidders	Instructions
PART B: % weightage for amount of individual items of Schedule of quantity	Refer Latest Chapter-XI of Vol-IA TCC (BILL OF QUANTITIES AND % WEIGHTAGE OF INDIVIDUAL ITEMS)
PART C: Total Lump Sum Price for entire scope of Work	This part is implanted in the E- Procurement portal entitled as "Part-C of Vol-II Price Bid".

Part A:	**Instructions to the Bidders**
1.	**Bidders shall quote Total Price (Except for BOQ ST No. A) for the entire scope of work in Rupees in VOL II PRICE BID at BHEL E-procurement Portal.** Any other entry elsewhere in the offer of the bidder shall be treated as Null and Void. The total value shall be automatically calculated on E-portal
2.	Bidder shall quote the total price in "Price Bid".
3.	BHEL has fixed the % weightages as in "Part-B" for the amount of individual items of BOQ Cum Rate Schedule w.r.t. the total price of Price Bid Vol-II.
4.	Based on the pre-fixed % weightages, amount of individual items shall be derived by BHEL. This amount shall not be rounded off.
5.	Based on the quantities of individual item and the amount arrived in Sl. No. 4 above, item rate of individual items shall be derived by BHEL. This item rate shall be rounded off up to two decimal places and shall be used to calculate the total amount of an item.
6.	For the convenience of bidders, BHEL has issued an excel sheet with all requisite formulae as detailed above. ***However, this excel sheet shall not form part of contract document. Further, this sheet should not be uploaded at the e-Portal.***
7.	Bidders to note that this is an '**Item rate contract'**. Payment shall be made for the actual quantities of work executed at the Unit rate arrived at as per serial no. 5 above.

PART B:	% weightage for amount of individual items of BOQ CUM RATE SCHEDULE w.r.t. the total price (as quoted by the bidder in "Part C of Vol-II-Price Bid")- attached separately.

11. Following technical Specifications and Drawings shall be integral part of this tender:

SL. NO.	Document	Uploaded as
1.	(Section – C) Detailed Technical Specification-	**Technical Specifications (Part-1)**
2.	Section-D (General Specification of BHEL)	
3.	Workers Accommodation Floor plan and Elevations & Plot Plan	
4.	Approved BOI Vendor List	
5.	NTPC Talcher Geo Tech data	**Technical Specifications (Part-2 & Part-3)**
6.	NTPC Circular for Minimum Wages	

ANNEXURE – A LIST OF EQUIPMENTS FOR CIVIL SITE LABORATORY CONCRETE TESTING EQUIPMENT			
SL NO.	**NAME OF TEST**	**NAME OF EQUIPMENT**	**SIZE OF EQIPMENT**
1	Concrete Compressive test	Digital Compressive Testing Machine with 2000 KN capacity.	2000KN capacity
2	Concrete Cube casting	Concrete testing Mould	Minimum 125 sets desired considering major concerting activity.
3	Workability of concrete	Slump cone	Standard, at least 04 Nos.
4	Course aggregate Sieve analysis (Concrete & Road Works)	Sieve set	450mm dia GI Frames Size: 125 mm, 90 mm, 75 mm, 63 mm, 53 mm, 40 mm, 20 mm, 16 mm, 12.5 mm, 10 mm, 4.75 mm, Pan and cover
5	Fine aggregate sieve analysis	Sieve set	Minimum 200 mm dia Brass sieves; Size 4.75 mm, 2.36 mm, 1.18 mm 600 micron, 300 micron, 150 micron, 75 micron, 75 micron, Pan and cover
	Soil Testing Equipment (Levelling & Grading)		
1	Compaction of filling test	Core cutter apparatus	Rammer, 6 Nos. of standard core cutter mould, dolly
2	Proctor density test	Standard proctor Compaction apparatus	Standard
3	Moisture Content	Rapid moisture meter	Standard, at least 02 Nos.
	Process Control Accessories		

1	Electronic balance	1 Nos.	600gx0.01g, 10g and 10 kg
2	Physical balance	5 kg capacity	Weights up to 5 kg
3	Thermometer	Temperature range 0° C to 150° C. 2 Nos.	Digital
4	Measuring jars	2 Nos. set of each size	100ml, 200ml, 500ml & 1000 ml
5	Spatula	2 Nos. each size	100mm & 200 mm with long blade wooden handle
6	Venire calipers	2 Nos. each	12" and 6" Sizes
7	Digital pH meter	01 Nos.	.01 mm least count
8	Digital micrometer	01 Nos.	0.01 mm least count
9	GI tray	02 Nos. each	600x450x50mm, 450x300x40mm, 300x250x40mm
10	Rebound hammer test	01 Nos.	Digital Rebound hammer
11	Screw Gauge	02 Nos.	0.1 mm-10mm, Least count 0.05

12.1	The intent of specification is to provide services according to the most modern and proven techniques and codes. The omission of specific reference to any method, equipment or material necessary for proper and efficient execution of this work shall not relieve the Contractor of the responsibility of providing such facilities to complete the work without any extra compensation.
12.2	The terminal points decided by BHEL shall be final and binding on the Contractor for deciding the scope of work and effecting payment for the work done.
12.3	The work shall be executed under the usual conditions affecting major power plant construction and in conjunction with numerous other operations at site. The Contractor and his personnel shall cooperate with personnel of BHEL, BHEL'S Customer, Customer's consultants and other Contractors, coordinating his work with others and proceed in a manner that shall not delay or hinder the progress of work of the project as a whole.
12.4	The work covered under this specification is of highly sophisticated nature, requiring the best quality workmanship, supervision, engineering and construction management. The Contractor should ensure proper planning and successful & timely completion of the work to meet the overall project schedule. The Contractor must deploy adequate quantity of tools & plants, modern / latest construction aids etc. He must also deploy adequately trained, qualified and experienced supervisory staff and skilled personnel.
12.5	Contractor shall erect and commission all the equipment and auxiliaries as per the sequence & methodology prescribed by BHEL depending upon the technical requirements. Availability of materials and fronts will decide this. BHEL Engineer's decision regarding correctness of the work and method of working shall be final and binding on the Contractor. No claims for extra payment from the Contractor will be entertained on the ground of deviation from the methods / sequence adopted in erection of similar sets elsewhere.
12.6	All necessary certificates and licenses, permits & clearances required to carry out this work from the respective statutory/ local authorities are to be arranged by the Contractor at his cost in time to ensure smooth progress of work.
12.7	The boiler shall be erected as per relevant provisions of latest Indian Boiler Regulations (IBR) and amendments/addendums thereof, if any.
12.8	The work shall conform to dimensions and tolerances specified in the various drawings / documents that will be provided during various stages of erection. If any portion of work is found to be defective in workmanship, not conforming to drawings or other stipulations due to Contractor's fault, the Contractor shall dismantle and re-do the work duly replacing the defective materials at his cost, failing which the work will be got done by BHEL and recoveries will be effected

	from the Contractor's bills towards expenditure incurred including cost of materials and departmental overheads of BHEL.
12.9	The Contractor shall perform any services, tests etc., which may not be specified but nevertheless, required for the completion of work within quoted rates.
12.10	All necessary certificates and licenses required for carrying out this work are to be arranged by the Contractor expeditiously.
12.11	The Contractor shall execute the work in the most substantial and workman like manner. The stores shall be handled with care and diligence.
12.12	BHEL reserves right to recover from the Contractor any loss which arises out of undue delay / discrepancy / shortage / damage or any other causes due to Contractor's lapse during any stage of work. Any loss to BHEL due to Contractor's lapse shall have to be made good by the Contractor.
12.13	All cranes, transport equipment, handling equipment, tools, tackles, fixtures, equipment, manpower, supervisors/engineers, consumables etc. except otherwise specified as BHEL scope of free issue, required for this scope of work shall be provided by the Contractor. All expenditure including taxes and incidentals in this connection will have to be borne by Contractor unless otherwise specified in the relevant clauses. The Contractor's quoted rates should be inclusive of all such contingencies.
12.14	During the course of erection, testing and commissioning certain rework / modification / rectification / repair / fabrication etc. may become necessary on account of feedback / revision of drawing etc. This will also include modifications / re-works suggested by BHEL / customer / other inspection group. Contractor shall carry out such rework / modification / rectification / fabrication / repair etc. promptly and expeditiously. Daily log sheets signed by BHEL engineer and indicating the details of work carried out, man-hours etc. shall be maintained by the Contractor for such reworks. Claim of Contractor if any, for such works will be governed by relevant clauses of 'General Conditions of Contract'.
12.15	All works such as cleaning, leveling, aligning, trial assembly, dismantling of certain equipment / components for checking and cleaning, surface preparation, fabrication of structures, tubes and pipes as per general engineering practice and as per BHEL Engineer's instructions at site, cutting, gouging, weld depositing, grinding, straightening, chamfering, filing, chipping, drilling, reaming, scrapping, lapping, fitting up etc. as may be applicable in such erection works and which are treated incidental to the erection works and necessary to complete the work

	satisfactorily, shall be carried out by the Contractor as part of the work within the quoted rates.
12.16	The Contractor shall make all fixtures, temporary supports, steel structures required for jigs & fixtures, anchors for load and guide pulleys required for the work. Contractor shall arrange necessary steel for such usage. Only the steel for making temporary structure for drum lifting will be provided by BHEL in random sizes materials available at site.
12.17	The Contractor shall take delivery of the components, equipments, chemicals, and lubricants etc. from the BHEL stores/ storage area after getting the approval of BHEL Engineer on standard indent forms of BHEL. Complete and detailed account of the materials and equipment after usage shall be submitted to the BHEL and reconciled periodically.
12.18	The distance between storage area and erection site is approx. 3 to 5 KM. Contractor shall plan and transport equipment, components from storage to erection site and erect them in such a manner and sequence that material accumulation at site does not lead to congestion at site of work. Materials shall be stacked neatly, preserved and stored in the Contractor's shed and at work areas in an orderly manner. In case it is necessary to shift and re-stack the materials kept at work areas/ site to enable other agencies to carry out their work or for any other reason, same shall be done by Contractor most expeditiously as incidental to work.
12.19	Plant materials should not be used for any temporary supports / scaffolding/ preparing pre-assembly bed etc.
12.20	The details of equipment to be erected under this contract are generally as per the schedule given in relevant appendices. These details are approximate and meant only to give a general idea to the tenderer about the magnitude of the work involved. Actual quantum and type of equipment will be based on the relevant erection documents which will be furnished to the Contractor in due course of erection and the weight and quantity as per the relevant engineering documents will only be admissible for the billing purpose.
12.21	Hangers & suspensions, supports etc. for tubes, piping, & ducts etc. will be supplied in running / random lengths / sizes which shall be cut to suitable sizes and adjusted as required.
12.22	Spring suspension / constant load hangers may have to be pre-assembled for required load and erection carried out as per instructions of BHEL. Adjustments, removal of temporary arrests/locks, cutting of excess thread length of hanger tie-rod etc. have to be carried out as and when required. Load setting of spring hangers, as per BHEL's documents/instructions, during various stages of

	erection & testing and after floating of piping/ducting during cold and hot condition will have to be done as part of work. This exercise may have to be repeated till satisfactory results are achieved.
12.23	Layout of field routed/ small bore piping shall be done as per site requirement. Necessary sketch for routing these lines should be got approved from BHEL by the Contractor. There is a possibility of slight change in routing the above pipe lines even after completion of erection.
12.24	Welding of necessary instrumentation tapping points, thermos-well, thermocouple pad, metal temp pad and clamps, root valve, condensing vessel, flow metering & measurement devices, and control valves to be provided on boiler & its auxiliaries and piping are covered within the scope of this specification. The installation of all the above items will be Contractor's responsibility even if:
12.24.1	Items are not specifically indicated under the respective product groups as given in the technical specifications.
12.24.2	Items are supplied by an agency other than BHEL.
12.25	Pre-heating, NDE, and Post weld heat treatment for above shall be done as per the specifications as part of work.
12.26	Certain instrumentation like pressure switches, air sets, filters, regulators, pressure gauges, junction boxes, power cylinders, dial thermometers, flow meters, valve actuators, flow indicators, centrifugal/speed switches of motors, accumulators etc. are received in assembled condition as integral part of equipment. Contractor shall dismount such instruments for calibration and hand over the same to BHEL. C&I erection agency will do storage / re-erection calibration etc.
12.27	Fixing and seal welding of thermos-wells & plugs before Hydro test/ steam blowing of equipment or other piping system is within the scope of work. Contractor shall also remove the seal welded plugs by process of grinding and fix and seal weld thermo wells after hydro test/steam blowing of lines as part of work.
12.28	Actuators/drives of valves, dampers, gates, powered vanes etc. may have to be serviced, lubricated, before erection, during pre-commissioning & commissioning, including carrying out minor adjustments required as incidental to the work.
12.29	All electrical motors have to be tested for IR & PI values prior to the trial run. Where required, dry out may have to be carried out by using external heating

	source. Contractor shall make all arrangements in this regard and complete the work as instructed. BHEL will provide the motorized insulation testers.
12.30	In installation of various equipments it may become necessary to install these on temporary supports/ hanger due to various reasons including non-availability of suspension materials. Contractor shall install such temporary suspensions/hangers and later on shift the relevant equipments to their respective permanent hangers/ suspensions/ supports as incidental to work. Requisite materials for such temporary arrangements will be provided by BHEL on free -returnable basis which shall be returned to BHEL after the use.
12.31	The work shall be carried out strictly in accordance to the "Field Quality Plan" approved by BHEL/client. Contractor, jointly with BHEL, shall prepare all necessary records of measurements/readings/ protocols etc.
12.32	All works such as cleaning, leveling, aligning, trial assembly, dismantling of certain equipments / components for checking and cleaning, surface preparation, fabrication of sheets, tubes and pipes as per the general engineering practice and as per BHEL engineers instructions at site, cutting, weld disposing, grinding, straightening, chamfering, filing, chipping, drilling, reaming, scraping, lapping, fitting up etc. as may be applicable in such erection works and which are treated incidental to the erection work and necessary to complete the work satisfactorily shall be carried out by the Contractor as part of the work.
12.33	Interconnection/ hookup, if any, with the existing system shall form part of work. Such interconnections, hookups may require shut down of running plant and the relevant work have to be completed within such planned shutdowns. This may call for working with enhanced resources and on extended hours. Contractor's offer shall cover all such contingencies.
12.34	Contractor shall regulate flow of material to and from site in such a manner and sequence that material accumulation at site does not lead to congestion at site. In case it is necessary to shift and restack the materials kept at work areas / site to enable other agencies to carry out their work or further any other reason, it shall be done by the Contractor most expeditiously. No claim for extra payment for such work will be entertained.
12.35	It may so happen that certain components like manhole doors, hanger etc. may be supplied in loose items. They need to be assembled as per relevant drawings or as per advice of BHEL engineer prior to erection. This forms the part of the scope of work.
12.36	The Contractor shall have total responsibility for all equipment and materials in his custody at Contractor's stores, loose, semi-assembled, assembled or erected by him at site. He shall effectively protect the finished works from action of

	weather and from damages or defacement and shall also cover the finished parts immediately on completion of work as per BHEL engineer's instructions. The machine surfaces/finished surfaces should be greased and covered.
12.37	BHEL is operating web based computerized site operation management system (SOMS) that includes, inter-alia, issue of materials, daily progress reporting, Contractor's running monthly billing and material reconciliation through a computerized data management system. Contractor shall install necessary hardware to hook-up with the BHEL's system and use the same for his scope of work.
12.38	In the event the computerized SOMS is inoperative for any reasons, the Contractor shall take delivery of materials from the storage area/sheds of BHEL/customer after getting the approval of the engineer/customer on standard indent forms to be specified by BHEL/customer. All these records however shall be updated in the SOMS as and when the SOMS is reactivated/ normalized.
12.39	Gases like argon, oxygen, acetylene etc. that are required for erection related activities shall be arranged by the Contractor at his cost. For T-91 material site weld joints argon as per grade-3 of IS-5760: 1998 with oxygen and water vapor restricted to max 6 ppm each and with argon purity level of minimum 99.99% shall be arranged and used by the Contractor. The supply should accompany test certificate for the batch indicating individual element 'ppm' level and overall purity level.
12.40	Nitrogen gas, if required, for preservation of boiler and nitrogen capping during chemical cleaning process, will be provided by BHEL free of charge. Contractor shall arrange necessary connector, nipple, regulator, header and piping for usage of such gas from cylinders.
12.41	All lubricants and chemicals required for testing, preservation, chemical cleaning / acid cleaning, oil flushing, and the lubricants for trial runs of the equipment and trial operation of the unit will be supplied by BHEL free of charges.
	WELDING, RADIOGRAPHY AND OTHER NON-DESTRUCTIVE TESTING, POST WELD HEAT TREATMENT:
	WELDING
12.42	Installation of equipment involves good quality welding, NDE checks, post weld heat treatment etc. Contractor's personnel engaged should have adequate qualification on the above works.

12.43	The method of welding (viz.) arc, TIG or other method will be indicated in the detailed drawing/documents. BHEL Engineer will have the option of changing the method of welding as per site requirement.
12.44	Welding of high-pressure joints shall be done by IBR certified high-pressure welders who have been permitted by CIB of state concerned for deployment at the site of work.
12.45	Welding of all attachments to pressure parts, piping shall be done only by the qualified and approved welders.
12.46	Before any welder is engaged on work, he shall be tested and qualified by BHEL/ customer, though they may possess the IBR/other certificate. BHEL reserves the right to reject any welder without assigning any reason. All the expenditure in testing/qualification of the Contractor's welder shall be borne by Contractor.
12.47	Unsatisfactory and continuous poor performance may result in discontinuation of concerned welder.
12.48	The welded surface shall be cleaned of slag and painted with primer paint to prevent rusting, corrosion. For this consumable like paint /primer etc. will be in the Contractor's scope.
12.49	HP joint fit-up, should be protected, where required, by use of tapes/protective paint as may be prescribed by BHEL. The Contractor shall arrange consumables like protective paints/tapes etc.
12.50	The Contractor shall maintain welding records in the form as prescribed by BHEL containing all necessary details, and submit the same to the BHEL Engineer as required. Interpretation of the BHEL Engineer regarding acceptability of the welds shall be final.
12.51	In the case of P-91 pipe welding, Contractor shall deploy welders having experience in welding of P-91 material. The welders engaged by Contractor if not qualified for P-91 welding will be trained by BHEL at BHEL welding research institute (WRI) Trichy and allowed to work only after passing the required test arranged by BHEL. All the expenditure towards such qualification including cost of training, traveling expenses, stay etc., shall be borne by the Contractor.
12.52	Joint fit up will be a stage of inspection. Where required, joints shall be offered for visual inspection after root run. Subsequent welding should be made only after the approval of root run.
	SOCKET WELDING:
12.53	In execution of this work, considerable number of socket weld joints is involved. The exact quantity of such socket welds or probable variation in the quantum cannot be furnished. The tenderer shall take notice of this while quoting as no extra claim on this account will be entertained. The socket welding on HP parts/ HP piping shall be done

	by the IBR qualified welders. Contractor has to adhere to the procedures/specification as indicated in the drawing for socket welding.
12.54	Welding electrodes have to be stored in enclosures having temperature and humidity control arrangements. This enclosure shall meet BHEL specifications.
12.55	Welding electrodes, prior to their use, call for baking for specified period and will have to be held at specified temperature for specified period. Also, during execution, the welding electrodes have to be carried in portable ovens.
	HEAT TREATMENT:
12.56	For the purpose of temperature recording of stress relieving process, thermocouples have to be attached to the weld joint. The number of temperatures measuring points and locations shall be as per the standards of BHEL. Thermocouples have to be attached using capacitor discharge type portable thermocouple attachment unit. Contractor shall arrange sufficient number of thermocouple attachment units.
12.57	Contractor should provide temperature indicator / temperature recorder for measuring temperature during pre-heating for welding or for controlling temperature of metal for hot correction etc. The temperature recorders should be preferably of solid-state type.
12.58	Heat treatment may be required to be carried out at any time (day or night) to ensure the continuity of the process. The Contractor shall make all necessary arrangements including labourer required for the same as per directions of BHEL.
12.59	In certain cases, only, the pre-heating of weld joints may be called for.
12.60	For weld joints of heavy structural sections, if heat treatment is required, the same shall be carried out as part of the work.
12.61	Checking effectiveness of stress relieving by hardness tests (by digital hardness tester or other approved test methods as per BHEL Engineer's instruction) including necessary testing equipment is within the scope of the work / specification.
12.62	Preheating, inter-pass heating, post weld heating and stress relieving after welding are part of erection work and shall be performed by the Contractor in accordance with BHEL engineer's instructions. Where the electric resistance heating method is adopted Contractor shall make all arrangement including heating equipment with automatic recording devices, all heating elements, thermocouples and attachment units, graph sheets, thermal chalks, & insulating materials like mineral wool, asbestos cloth, ceramic beads, asbestos ropes etc., required for all heating and stress relieving works.
12.63	BHEL will provide the induction heating equipment set for SA 335 P-91 materials piping only. The set will comprise of following: a) Main panel b) Capacitor panel c) Interconnection power & control cables between above panels

	d) 185 sqmm special connecting cable from capacitor panel output – 5m length. Contractor shall provide the input electrical power connection including arrangements such as DB, cables etc. thermocouple pads, thermocouples and compensating cables, induction heating annealing cables (from the capacitor panel to joint and for wrapping around the weld joint) (spec: single core 240 sq mm, 1200a, 3khz), ceramic wool and other consumables etc. as may be required. Quantum of annealing cable requirement will depend on many parameters e.g. weld joint size, heat input, type of connection i.e. series or parallel etc. Likely supplier: Mansfield Cable Co. Noida (UP).
12.64	All the recorded graphs for heat treatment shall be handed over to BHEL/ IBR authorities and due clearances obtained.
12.65	During welding & post weld heat treatment of main stream piping (P-91 material), the induction heating process shall continue un-interrupted. Therefore, contactor shall arrange back-up DG set to take care of power interruptions during the process.
12.66	Results of these processes shall be verified/ validated as per requirements of BHEL/client.
	NON-DESTRUCTIVE EXAMINATION:
12.67	Contractor shall provide all resources and make all arrangements for the radiographic examination of welds for this work. for reasons of safety, invariably the radiography work will be carried out after the normal working hours and close of other site activities only. in this regard, the Contractor has to adhere to the safety rules / regulations laid by bark authorities from time to time.
12.68	Radiography inspection of welds shall be performed in accordance with requirements and recommendation of BHEL Engineer. The minimum quantum of radiographic inspection shall be as per provision of IBR/BHEL's erection documents. They may, however be increased depending upon the performance of the individual welder at the discretion of BHEL Engineer/Boiler inspecting authority. Bidder shall also arrange the UT equipment with recording facility at his own cost. Usage of UT equipment shall be as per direction of BHEL engineer. Records of UT shall be produced as per site requirement.
12.69	All X-Ray / Gamma Ray films of weld joints shall be preserved properly and be handed over to BHEL/ IBR authorities and requisite clearances shall be obtained by the Contractor.
12.70	The field welded joints shall be subject to Dye-penetrant/MPT/RT/ other non-destructive examination as specified in the respective engineering documents/ as instructed by BHEL.
12.71	Wherever required, surface preparation, like smooth grinding of welded area, prior to Radiography shall be done. It may also become necessary to adopt inter-layer

	radiography/MPT/UT depending upon the site/ technical requirement necessitating interruptions in continuity of the work and making necessary arrangements for carrying out the above work. The Contractor shall take all this into account in his offer. The required NDT method/procedure will be decided by BHEL engineer at site.
12.72	Tenderer shall note that 100% radiography shall be taken on all high-pressure welding till such time the welders' performance is found by BHEL Engineers to be satisfactory. Subsequently, subject to consistency in welder's performance, the percentage of radiography will be based on BHEL's standard practice/code requirement. the defects shall be rectified immediately and to the satisfaction of BHEL engineer. The decision of BHEL engineer regarding acceptance / rejecting the joints will be final and binding on the Contractor.
12.73	100% radiograph of certain sizes in piping have to be taken as per BHEL standards/ drawings.
12.74	For carrying out ultrasonic testing of welding joints of large size tubes and pipes, it will be necessary to prepare surface by grinding and buffing a smooth finish and contour as necessary. The Contractor's scope of work includes such preparation as incidental to work.
12.75	After stress relieving 5% of UT for all critical lines and 2% of UT for other alloy steel lines to be taken to ensure soundness of joints particularly stress relieving cracks. No separate payment will be made.
12.76	Contractor may have to undertake radiography with cobalt-60 isotope camera in certain cases. However, for any reason if use of Cobalt-60 is not possible then these joints shall be checked by radiography after completion of welding up to suitable part of thickness with IR–192 other suitable source subsequently after completing the joint UT to be done. For this Contractor has to deploy level–II operator certified by BARC.
12.77	In the case of P-91 piping wherever radiography is not possible, alternatively ultrasonic test has to be carried out apart from other NDE checks.
12.78	For piping of thickness less than 25 mm no radiography plugs will be provided radiography shots to be taken by double wall technique or any other method to be adopted in consultation with BHEL engineer at site.
12.79	No separate payment for any NDE activities (including radiography) will be made.
	PAINTING:
12.80	All exposed metal parts of the equipment including piping, structures, railings etc. wherever applicable, after installation unless otherwise surface protected, shall be first painted with at least one coat of suitable primer which matches the shop primer paint used, ***after thoroughly cleaning all such parts of all dirt, rust, scales, greases, oils and other foreign materials by wire brushing,*** and the same being inspected and

	approved by BHEL engineer for painting. Afterwards, the above parts shall be finished with two coats of alloyed resin machinery enamel paints.
12.81	Touch-up painting on damaged areas - a) For coatings damaged up to metal surface: Surface preparation shall be carried out by manual cleaning minimum 6 inches adjoining area with existing coating shall be roughened by wire brushing, emery paper rubbing etc., for best adhesion of patch primer. Primer coat of touch-up primer to be applied by brush immediately after the surface preparation. Over this primer coat, finish coat and final finish coat shall be applied as covered above by brush within maximum seven (7) days of application of touch up primer.
12.82	Painting of welded areas / painting of areas exposed after removal of temporary supports / touch-up painting on damaged areas of employer's structures, where inter-connection, welding / modification etc. has been carried out by the bidder. a) Clean the surface to remove flux spatters and loose rust, loose coatings in the adjoining areas of weld seams by wire brush and emery paper. b) Painting procedure to be followed as mentioned above for touch-up painting on damaged areas.
12.83	The scope of work includes painting of color bands, lettering, marking and signs for direction of flow/rotation, names etc. of approved colors as per the standard color codes and specifications specified in tender specification or as advised by BHEL/customer engineer at site for the equipments/ components covered in these specifications. Applicable paints and primer shall be supplied by Agency.
12.84	All exposed metal parts of the equipment including piping, structures, hand railing, grating etc. shall be thoroughly cleaned off dust, rust, scales and other foreign materials by manual or mechanized wire brushing, scrapping, sand blasting etc. and the same being inspected and approved by BHEL/customer engineer before application of primer. Afterwards, the above parts shall be finish painted with specified number of coats as per specification.
12.85	In certain isolated instances where it is not possible to clean the equipments as explained above, cleaning by grinding might have to be resorted to. No damage to the equipment/components should be caused.
12.86	Surface to be painted should be free of oil and grease. It should be removed by using suitable cleaning agents including permitted solvents. Surface cleaned by chemical agent, if required, shall be treated further as prescribed in use of such cleaning agents. The Contractor at his own cost shall provide all the consumables and application implements.

12.87	During the preparation of surface, if the shop coat is damage by chemical cleaning or by mechanical means, Contractor shall repair the same free of cost to BHEL. Agency will make available the necessary primer and paints.
12.88	Specified drying time shall be permitted from one to another coat.
12.89	This work requires working at higher altitudes from ground level to as high as 90 m and more. The work spread is also substantial involving substantial run of structures and piping. Contractor shall take sufficient precautions to avoid any accident and hazard in all respects. The ropes, ladders, scaffolding materials, clamps etc. and climber used should be of standard quality for safe and smooth execution of work.
12.90	Contractor shall carry out the work in such a way that other erected equipment, structure, civil foundations and other property are not damaged. For damages in any of such cases due to lapses by Contractor, BHEL shall have the right to recover the cost of such damages from the Contractor.
12.91	Contractor shall take due care to cover/protect the equipment which are already painted while carrying out the painting of other adjacent equipment. If so happens, it shall be cleaned and repainted by the Contractor without any extra charges.
12.92	In general, painting of structural parts and color bands, lettering, marking of direction of flow/rotation etc. will be carried out by brush painting. However, areas/equipment inaccessible for manual painting have to be painted by spray painting. The decision of BHEL engineer, in this regard, shall be final and binding on the Contractor. For the purpose of spray painting, air at one point will be made available by BHEL free. Laying of air hose pipe and any other line required shall be done by Contractor at his cost. The Contractor shall provide spray equipment set.
12.93	The Contractor shall provide all the necessary scaffolding materials, temporary structures and necessary safety devices etc. during execution of the work.
12.94	Final painting work shall be started after obtaining clearance from BHEL engineers and as per his instructions.
	PRIMER AND PAINTS FOR FINAL PAINTING:
12.95	All primer and paints (including Black Bituminous paint) required for final painting shall be supplied by agency.