

TECHNICAL SPECIFICATION FOR CIVIL WORKS OF NTPC SINGRAULI-STPS-Stage-II UNIT-6
ESP R&M PROJECT.

IMPORTANT INSTRUCTION TO BIDDERS:-

- 1. ALL REFERENCE DOCUMENT IN CONTRACT AGREEMENT NO. CS-1100-104A-2-FC-NOA-6013 CS-1100-104A-2-SC-NOA-6014 dated 14.11.2013 WILL BE APPLICABLE TO CONTRACT WHERE THEY ARE RELEVANT**

2.0.1 SCOPE OF WORK

Mentioned below is the brief scope of work for the foundation works of ESP foundation for Stage-II of NTPC-Singrauli project-Stage-II, Unit#6. The scope mentioned below is only for bidder to assess the broad scope of work and is by no means limited to the following. The bidder shall have to execute the works required for successful completion and execution of the project and asked by customer and agreed by BHEL.

- A) Civil Dismantling work includes architectural works, structural works and associated electrical works.
 - 1) Dismantling of existing facilities at the location of the new fields of ESP Foundations for Stage-II-Unit#6.
 - 2) Dismantling of existing foundations for ESP, cable tray support, duct support etc. as well as structural dismantling or electrical dismantling required for the accessibility of civil works.
 - 3) Dismantling of existing Grade Slab for casting of foundations of new fields of ESP for stage-II Unit#6.
 - 4) Foundation works for ESP foundation for new fields of ESP at inlet and outlet side including pile foundation, pile caps casting, ESP column supporting pedestals, required excavation, backfilling etc.
 - 5) Casting of grade slab below the new ESP fields for Stage-II-Unit-6.
 - 6) Supply and laying of Earthing mat under the extended fields of ESP Stage-II-Unit-6.
 - 7) Rerouting of existing ash slurry trenches if required.

1. The entire work will be executed as per following specifications
 - I. Customer's specification for all relevant clauses of this specification shall be applicable to this contract. for bidder's convenience most relevant part from this specification is reproduced and put along with tender for ready reference. Soft copy of customer's technical specification will be made available on demand.
 - II. Latest CPWD specification (applicable for works where customer's specification is not available)
 - III. Instructions from ministry of environment issued from time to time.
 - IV. state govt., local bodies bye laws
 - V. BHEL specification
 - VI. Written instruction of BHEL engineer in charge
- 3 MATEIAL WILL BE PURCHASED/ SERVICES TAKEN FROM APPROVED CUSTOMER'S VENDOR LIST ONLY WHERE SPECIFIED, OTHERWISE AS APPROVED BY BHEL.
- 4 Bidder will provide all help to BHEL for taking Approval from statutory and local authorities
- 5 The quantities of the various items mentioned in the schedule are approximate and may vary up to any extent or be deleted altogether. The overall variation in contract value on execution shall be dealt as per GCC.

- 6 Contractor should setup field laboratory at site for conducting test as per approved field quality plan for civil work. If any test is required to conduct in approved laboratory outside the plant, the contractor shall bear entire cost of testing.
- 7 **Dismantling of Floor/existing foundation is required to be carried out at various levels & at various Depths. The Dismantling may be carried out manually or by mechanical means depending upon its requirement.**
- 8 **The Dismantling is carried out only in accordance with Running Civil Work with prior approval of RMSG BHEL Engineer in charge.**
- 9 **\Measurements and payments will be made as per units and rates in awarded price schedule .Methods of measurement shall be as per CPWD schedule and items beyond CPWD schedule shall be as per relevant standards.**
- 10 Bidder will prepare detailed working drawings and bar bending schedules for all reinforced concrete work and getting them approved by the BHEL Engineer.
- 11 Bidder will make appropriate fabrication drawing as per agreed schedule before starting fabrication work for any structural GA drawing.
- 12 Bidder will take delivery from BHEL stores for fabrication and erection of structural steel reinforcement steel work including all interfacing works and miscellaneous works. Supply of steel will be made by BHEL. The nature of work shall include columns , beams, splicing of steel works as needed, bracings, sheeting runners , sag rods, ties struts, walkways, galleries, stairs, ladders, hand railing , floor gratings, chequered plate work, M.S pipes, equipment supporting platform, RCC works and all other structures required for the successful completion of the project.
- 13 The scope of work will also include such other related works although they may not be specifically mentioned in the above paragraph and all such incidental items not specified but reasonably imply and necessary for completion of the job as a whole all as desired and as directed by the engineer.

ALSO INCLUDED IN THE SCOPE OF BIDDER

Unless otherwise specified, the work to be provided by the contractor for the items e "Schedule of items" shall include but not be limited to the following.

- 1) Furnishing all labour, materials, supervision, construction plans, equipment, supplies, transport, to and from 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 handling over the works, except 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) Furnishing samples of all materials required by the engineers for testing/inspection and approval for use in the works. The samples may be retained by the engineer for final incorporation in the works.
- 3) Furnishing test reports for the products used or intended to be used, if called for the specifications or if so desired by the engineer.

- 4) 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.
- 5) Arranging manufacturer's supervision for items of work done as per manufacturer's specifications when so specified.
- 6) Providing all incidental items not shown or specified but reasonably implied or necessary for the successful completion of the work in accordance with contract.
- 7) 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.

Unless otherwise specified, the work to be provided by the contractor for the items e "Schedule of items" shall include but not be limited to the following.

- 8) Furnishing all labour, materials, supervision, construction plans, equipment, supplies, transport, to and from 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 handling over the works, except 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.
- 9) 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.
- 10) 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.

2.0.2 GENERAL

- 1) 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.

Further this is to be noted that the drawings and the documents furnished along with this specification are the sole property of B.H.E.L. It must not be used directly or indirectly in any way detrimental to the interest of the company.

- 2) The scope of work will also include such other related works although they may not be specifically mentioned in the above paragraph and all such incidental items not specified but reasonably imply and necessary for completion of the job as a whole all as desired and as directed by the engineer.
- 3) The detail scope of work covered above is not a comprehensive list of items of work involved. The detail scope of work may vary considerably depending on the actual construction requirements.

2.0.3 WORKS BY OTHERS

No work under the specification will be provided by any agency other than the contractor unless specifically mentioned elsewhere in the contract.

2.0.4 HIERARCHY

In case of any conflict/deviations amongst various documents, the order of precedence shall be as follows

- 1) Statutory Regulations
- 2) Customer (NTPC) specification
- 3) Items in Schedule of quantities
- 4) IS/BS standards
- 5) BHEL's standard specification (with prior approval of Engineer-in-charge).
- 6) Latest CPWD Specification

2.0.5 Field Quality Assurance:

The contractor shall be responsible for day-to-day quality checks of concrete and other building materials during the progress of work. All quality records and log sheets shall be maintained as per the requirement of BHEL/BHEL'S customer and as per field quality plan approved by **BHEL**. For this, contractor shall either establish their own field quality lab.

2.0.6 Reconciliation of steel issued by BHEL (free of cost):

2.0.6.1 MATERIAL

- 1) Steel like (structural, reinforcement bars and 40mm dia. MS round earthing rod/ GI flats) as specified in relevant BOQ shall be issued at free of cost by BHEL for use in the work covered in this contract from BHEL stores/store yard. The contractor shall collect these materials from BHEL stores/store yard at specified places at his own cost and store the same at the work site or in his stores as per standard norms. Materials issued will be used only for construction of permanent works.
- 2) BHEL reserves the right to recover from the contractor any loss arising out of damage/ theft or any other causes or during verification/stacking or at any time under the custody of the contractor.
- 3) 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 for storing and stacking of cement **procured by the contractor**. Design & drawing required for storage of cement shall be prepared by the vendor and shall be approved by BHEL's site in-charge before taking up for the construction work.
- 4) 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 section(s) which delays the completion of work, such cases shall be recorded separately during the joint review meeting at site and the shall be considered for time extension of contract.
- 5) No material shall be issued to the contractor except as those indicated and mentioned above i.e structural steel and reinforcement as specified in relevant BOQ. 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.
- 6) The contractor shall solely be responsible for the safety & security of material after it is handed over and issued to contractor by the BHEL.

- 7) 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.

Materials shall be issued by BHEL based on the weighment basis/linear measurements & sectional weight and payment shall also be done in similar way.

- 1) All materials issued by BHEL shall be stacked, stored above ground level **by use of concrete or wooden sleepers. No materials shall remain on ground at any time.** All concrete or wooden sleepers required for stacking the materials shall be arranged by contractor (successful bidder of this package) at his own cost within the quoted rates. All other equipments like winches, D-Shackles, slings of various sizes, max puller, pulley blocks, jacks, trucks, trailers etc. Required for such handling of steel from BHEL stores/storage yard etc. Shall be arranged by contractor within quoted/accepted rates.
- 2) The contractor shall take delivery of the materials from the designated place within the project premises at his own cost and store the same at his stores as per standard norms. Open land for such purposes shall be provided by BHEL on free of cost basis. Temporary barbed wire fencing of the open storage yard is to be done by the contractor and is included under the scope of his work. Contractor shall also remove grass, bushes, trees etc wherever required off the land provided to him and shall make proper continuous up keeping of the open yard /land by removing grass, bushes trees etc and same is included under the scope of his work & No extra payment shall be made to the contractor in this regard. The bidder shall make complete arrangement of necessary security personnel's to safeguard all such materials in his custody. Materials issued will be used only for construction of permanent works. The contractor shall take care of material issued by BHEL and shall protect the same from theft, damage and weathering. Excessive rusting of steel in custody of agency/contractor must be avoided. **In case, due to any cause attributable to the contractor, such rusting of steel occur rendering the same unusable, then such quantity of steel shall be recovered from the interim payment at the penal rate specified in the tender.**

2.0.6 ISSUE OF BHEL MATERIALS

Issue of steel: -The steel shall be issued to the contractor on the following basis:

(A)	Structural Steel, MS Flats , MS Plates/ Chequered Plates etc	Weighment Basis (unit – MT) / Linear Measurement (section wt. As per relevant IS code)
(B)	Reinforcement Steel	Weighment basis (unit – MT)/ linear and earthing rod (MS round). Measurement (section wt. As per relevant IS code)

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All the steel (structural, reinforcement, earthing ms rod, MS/GI flats) issued by the BHEL shall be properly accounted for. The total quantity of steel required for the work will be calculated from the approved bar bending schedule, fabrication drawings, approved laps, chairs and lugs. The measurement for payment as well as for accounting shall be based on linear measurements and the sectional weight as indicated in the following IS specifications.

Sl.no	IS code (s)	Description
1	IS: 808-1964	beams, channels and angles
2	IS: 1730-1961	plates, sheets and strips
3	IS:1732- 1971/IS-1786	Rounds including deformed high yield strength bars/TMT rebar.

In case any such sectional weights are not available in the above documents, the manufacturer recommendation shall be binding. The steel issued to the contractor shall be mainly in standard length and sections as received from the supplier.

However, the contractor shall be bound to accept the steel in length as available in the project stores no claims for extra payment because of issue of non-standard length will be entertained. In case MS flats as required in the fabrication of structures are not available, the contractor shall cut such width out of the available MS plates to make flats at no extra cost till such material is available and procured by BHEL.

The contractor shall satisfy himself of the quality and quantity of the materials at the time of taking delivery from BHEL stores/storage yard. No claims whatsoever will be entertained by BHEL because of quality or quantity after the contractor takes the materials from BHEL stores/storage yard.

Bidders to ensure that no lamination materials are taken over by them from BHEL stores. Fabrication wastage, if any due to above, shall not be compensated by BHEL.

Bidder to note that all fasteners like MS/HT/HSFG bolts/Nuts, Lock Nuts, Washers etc shall be supplied by the bidder as per relevant items of BOQ.

Bidder to note that cement and steel required for their enabling job like store/site office etc shall be arranged at his own cost.

2.0.7 RETURN OF MATERIALS:

Return of steel:-

All surplus steel and all wastage materials will be taken back on weight basis.

However linear measurements shall also be acceptable for unused/ full size materials.

Surplus, unused and un-tampered steel shall be sorted section-wise and returned separately for a place directed by BHEL/engineer within the project area, return of such materials will not be entitled to any handling and incidental charges.

All wastage / scrap (including melting scrap, wastage, and unusable scrap) shall be returned item wise to the stores and a receipt obtained for material accounting purposes. Return of such material will not be entitled to any additional cost due handling and transportation and incidental charge.

All scrap for reinforcement (cut pieces) shall be returned separately.

All scrap for structural steel including melting scrap shall be returned separately.

2.0.8 STEEL CONSUMPTION AND WASTAGE:-

Structural steel, reinforcement and earthing rod 40 mm MS round steel, GI flats consumption and wastage.

- 1) The theoretical consumption of various sections and/or diameter of reinforcement and earthing MS round/GI flats, rails shall be based on approved construction drawing and bar bending schedule. Weight shall be calculated considering/based on linear measurements and the sectional weights as per Indian standards. No extra cost shall be payable to the contractor for any deviation in weights for the different procedures adopted for issue and calculation of the **theoretical consumption including rolling tolerances**. However if rolling margins exceeds the limit stipulated in IS codes, the same shall be considered for reconciliation purpose.
- I) Actual consumption = Issue – Surplus (unused).
- II) Surplus = Un-tampered and unused qty. of steel returned by the contractor to BHEL store along-with relevant documents.
- III) Wastage = Actual consumption – Theoretical consumption.

❖ Wastage of reinforcement steel

Allowable wastage: - plus five percentage (+5%) of the theoretical consumption shall be considered as allowable wastage for both reinforcement steel as well as earthing rod/flats. Wastage is further classified as cut pieces/serviceable scrap (pieces of reinforcement steel/GI strip/40mm dia. MS earth rod of lengths 3 m and above. Both serviceable & unserviceable shall be accounted separately.

Sl. No.	Reinforcement steel & earthing rod 40 mm MS round	Basis of issue & Penal recovery
R-1	Theoretical consumption (without considering wastage and scrap or loss)	Free
R-2	Wastage limited to plus five percent (+5%) of aforesaid theoretical Consumption (R-1) towards allowable Wastage (cut pieces plus scrap to be Returned to BHEL).	Free
R-3	Wastage beyond five percent (+5%) of the theoretical consumption above (R-1). (Cut pieces plus scrap to be returned to BHEL).	Penal Rate

❖ **Wastage of structural steel:**

Allowable wastage: - plus five percentage (+5%) of the theoretical consumption shall be considered as allowable wastage for both structural steel as well as MS plates. Wastage as further classified as cut pieces/serviceable scrap (pieces of rolled section lengths 3 m and above, MS plate 1.0 m² and above with minimum width 200 mm) and scrap/unserviceable (less than above) measured as per actual weighment basis. Invisible wastage (loss of materials due to gas cutting, straightening of edges etc) shall be limited to 0.5% (zero point five percent) of theoretical consumption and shall be considered for reconciliation purposes only. But this invisible wastage shall be considered to be included in allowable wastage (i.e. Five percent).

Sl. No.	Structural Steel & MS plats , Rolled section, plates & SS liner etc	Basis of issue & Penal recovery
S-1	Theoretical consumption (without considering wastage and scrap or loss)	Free
S-2	Wastage limited to plus five percent (+5%) of aforesaid theoretical Consumption (S-1) towards allowable Wastage (cut pieces plus scrap to be Returned to BHEL).	Free
S-3	Wastage beyond five percent (+5%) of the theoretical consumption above (S-1). (Cut pieces plus scrap to be returned to BHEL).	Penal Rate

2.0.9 RECONCILIATION OF BHEL ISSUED MATERIALS: -

- 1) The contractor shall submit a reconciliation statement of steel issued to them with each RA bill. BHEL engineer's certification will be final on this matter.
- 2) At the time of submission of bill(s), the contractor shall properly account for the material issued to him as specified herein to the satisfaction of BHEL certifying that the balance materials are available with contractor's custody at site.
- 3) At the time of submission of bills by the contractor, if it is noticed by BHEL that the wastage is high and calls recovery at the penal rate, then BHEL will proceed for recovery for the excess wastage as per penal recovery rates as specified.
- 4) The approved drawings/bar bending schedules are to be considered for the purpose of reconciliation of materials.

2.0.10 RECOVERY OF MATERIAL:-

- If wastage exceeds the specified limit, the recovery of excess wastage shall be made from r/a bill at the penal rate.

Penal Rate of Materials

Sl.No	Description	UOM	Penal Rate (in Rs)
A	Reinforcement steel.	MT	60, 000/-
B	Structural steel		
1	Chqd. Plates/MS plates	MT	65, 000/-
2	Flats/ Beams/ Channel/ Angles etc. (rolled sections).	MT	65, 000/-

2.0.11 PROCUREMENT OF MATERIALS BY SUCCESSFUL CONTRACTORS AND TESTING:

Material required for the entire job (other than issued by BHEL as explained above) like cement, sand, aggregates, windows, doors, ventilators, rolling shutter, sanitary fixtures, painting & finishing material, stop-log gates, travelling screen, electrical fittings and wiring material and all other material required for the completion of entire scope, bolts & nuts, HSFG/HT bolts have to be arranged by the contractor, except those specifically indicated as BHEL scope of supply. BHEL reserves the right to reject any material not found satisfactory. Contractor shall produce manufacturer's test certificate (**MTC**) for cement for every batch of manufacturing along with each consignment brought to the site. Cement shall be procured from fresh stock only. Apart from the above, it shall be the responsibility of contractor to get the testing of cement, or any other materials procured from outside laboratory approved by **BHEL/OPAL** to ascertain the quality if insisted by **BHEL/BHEL's customer**.

A: TOOL & PLANTS

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	9.	Air Compressor	As per requirement to meet time schedule.
	10.	Jack Hammer	As per requirement to meet time schedule.
	11.	Wagon drill machine	As per requirement to meet time schedule.
	12.	Piling Hydraulic Rigs	As per requirement to meet time schedule.
	13.	Self priming Dewatering pump of various capacity (Diesel/Electric) From 3 HP to 25 HP	As per requirement to meet time schedule.
	14.	Curing / dewatering pump – 1.5 / 2 HP	As per requirement to meet time schedule.
	15.	Hydraulic Excavator /Poclain	As per requirement to meet time schedule.
	16.	JCB	As per requirement to meet time schedule.
	17.	- Ply Shuttering board with adequate supporting structure – (Old steel shuttering plates will not be allowed). - Steel shuttering (fare face)	Lot (As per requirement)
	18.	Pipe Scaffolding, 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)	As per requirement to meet time schedule.
	19.	Dumper	As per requirement to meet time schedule.
	20.	Reinforcement bending machine	As per requirement to meet time schedule.
	21.	Reinforcement cutting machine	As per requirement to meet time schedule.
	22.	MS scaffolding pipe with matching Couplers	6000RM
	23.	Power driven earth rammer	As per requirement to meet time schedule.
	24.	Total Station	As per requirement to meet time schedule.
	25.	Auto level & staff	As per requirement to meet time schedule.
	26.	Concrete Cube Moulds	As per requirement to meet time schedule.
	27.	Tippers	As per requirement to meet time schedule.
	28.	Road roller/Vibro roller	As per requirement to meet time schedule.
	29.	Water Tanker	As per requirement to meet time schedule.
	30.	POLES, CABLES,	As per requirement to meet time schedule.

SN	DESCRIPTION	
	HALOGENS,BULBS ETC FOR AREA ILLUMINATION	
31.	COMPUTER(window Xp) with printing & CD writing facility	As per requirement to meet time schedule.
32.	COMMUNICATION FACILITIES – LANDLINE, WLL, MOBILE, FAX ETC.	As per requirement to meet time schedule.
(c) CIVIL WORKS - FIELD QUALITY LAB EQUIPMENTS – (a) Automatic compression testing machine(2000KN) – 1no (b) Cube moulds(150mm size) –36 nos (c) Slump cone with tamping rod – 02no (d) Sieves of different sizes for fine & coarse aggregate testing – 1 set (e) Core cutter test apparatus – 02sets (f) Oven (capacity 120ltr, range – 250c) – 1no (g) Moisture container(steel/aluminum) – 02nos (h) Rapid moisture meter – 02nos (i) Vicat apparatus with plungers for cement testing – 1set (j) Cube moulds (70mm size) – 06nos (k) Physical balance – 02no. (l) Automatic vibration m/c – 01 no. (m) Jars – 4 nos.		

NOTE:

1. This above list is only indicative and neither exhaustive nor limiting. Quantities indicated above are only the minimum required. Contractor shall deploy all necessary T&P to meet the time schedules & as prescribed by **BHEL engineer** and required for completion of work.

2. BHEL WILL NOT PROVIDE ANY T & P's FOR THIS WORK.

2.0.13 PROCUREMENT OF MATERIALS BY SUCCESSFUL CONTRACTORS AND TESTING:

Material required for the entire job like machine, scaffolding, electrical fittings and wiring material and all other material required for the completion of entire scope, have to be arranged by the contractor, except those specifically indicated as BHEL scope of supply. BHEL reserves the right to reject any material not found satisfactory.

A-: TOOLS AND PLANTS

S.NO	DESCRIPTION																												
1	(a) T &Ps FOR STRUCTURAL WORKS																												
	<table> <tr> <th>SL</th><th>Major T&P items</th><th>Qty</th></tr> <tr> <td>19.</td><td>Hydra (8 / 10 T Cap.)</td><td>As per requirement</td></tr> <tr> <td>20.</td><td>Radial drill machine</td><td>As per requirement</td></tr> <tr> <td>21.</td><td>Hand cutting set</td><td>As per requirement</td></tr> </table>	SL	Major T&P items	Qty	19.	Hydra (8 / 10 T Cap.)	As per requirement	20.	Radial drill machine	As per requirement	21.	Hand cutting set	As per requirement																
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