VOLUME - IA

TECHNICAL CONDITIONS OF CONTRACT (TCC) FOR REPAIR AND RESTORATION OF DAMAGED ROADS, DRAINS, FENCE DUE TO FLOODS AND CONSTUCTION OF CULVERTS AND OTHER CIVILWORKS AT SOLAR POWER PLANT OF 1X50MW NTPC, MANDSAUR, MP.

TCC No: HY/PE&SD/Projects/Solar/NTPC-Mandsaur/ Repair of Roads, Rev.00

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Contents

1.0 Project Details

NTPC LTD. is establishing a 250 MW Grid connected Solar PV Plant on EPC basis at Gujarkhedi, Near Runija village in Mandsaur District in Madhya Pradesh. The Plant is divided into 5 blocks, each of 50 MW. BHEL has been awarded **1 block of 50 MW**.

1	Customer	:	NTPC LTD.
2	Project Information	:	5 x 50 MW Solar PV Plant of NTPC at Mandsaur District in Madhya Pradesh. BHEL Scope: 1 x 50 MW SPV Block
3	Location	:	Near Runija (V), Mandsaur District in Madhya Pradesh
4	Address Detail	:	Gujarkhedi, Near Runija Village, Mandsaur District in Madhya Pradesh
5	Nearest Railway Station	:	Suwasra, Madhya Pradesh, Which is about 11 km from Runija village
6	Road Approach	:	The project site is located at a distance of 9 km from the Runija Village. Road is available up to BHEL, P4 Block CMCS building.
7	Nearest Air Port	:	Udaipur
11	Ambient Air Temperature (Average)	:	a) Maximum : 42^0 C b) Minimum : 16^0 C
12	Average Relative Humidity	:	17-78 %
13	Climatic Condition	:	Tropical Climate

Bidder is advised to visit the project site and appraise himself about the local conditions and infrastructure available in the area for fulfilling their commitments under the contract. BHEL will not admit any claims whatsoever on account of Contractor's non-familiarization of local conditions.

SCOPE OF WORK

1.0 This section list major scope of work for Repair and restoration of Damaged roads, drains, fence due to floods and construction of new Culverts and other associated civil works for 1 x 50 MW of Solar PV Plant of NTPC at Mandsaur District, Madhya Pradesh to be carried out by contractor, but not limited to following for safe, speedy completion of this package.

The work to be performed under the scope of this tender mainly consists of but not limited to complete Civil work.

1.1 The New/repair of Road work consisting of
i) Excavation/Cutting/Filling
ii) Granular Sub Base Layers
iii) Water Bound Macadam Layers
iv) Top Finishing with Bitumen mastic Layer etc.

1.2 The New/repair of Drainage work /culvert work consisting of
i) Excavation
ii) Concrete work
iii) Brick works/Masonry work
iv) Final finishing with plaster etc.

1.3 The New/repair of Chain Link Fencing works with associated civil works

1.4 The New/repair of Slope protection with stone pitching.

1.5 Total or partial dismantling of existing roads, culverts, drain, pitching, retaining wall etc. including making holes and other provisions to connecting to new construction etc. all as required to complete the work.

1.6 Any other foundation /Structure /work which may be introduced a later date.

2. GENERAL

2.1 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 extent of work may vary based on site condition.

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.

2.2 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.

2.3 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.

2.4 ALSO INCLUDED IN THE SCOPE

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

2.4.1 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 provided by the engineer during the course of works.

2.4.2 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.

2.4.3 Furnishing test reports for the products used or intended to be used, if called for the specifications or if so desired by the engineer.

2.4.4 Giving all notices, paying all fees, taxes etc., in accordance with the general conditions of contract, that are required for all works including temporary works.

2.4.5 Arranging manufacturer's supervision for items of work done as per manufacturer's specifications when so specified.

2.4.6 Providing all incidental items not shown or specified but reasonably implied or necessary for the successful completion of the work in accordance with contract.

2.5 WORK BY OTHERS

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

3. DETAILED SPECIFICATION

3.1 Road:

Road shall be 3.0 meter wide with 1 meter wide shoulder on both side. Red moorum/brick, minimum 100 mm thick shall be provide for shoulder. The crown of the road shall be minimum 250 mm above FGL. The final finished roads shall have camber of 1 in 50.

The minimum road section shall be as follows:

1) Topping : Wearing course of premix carpet 20 mm thick
2) WBM, Compacted 75 mm thick Grade III.
3) WBM, compacted 100 mm thick Grade II.
4) Granular Sub-base, compacted 250mm thick granular sub-base (Grade-I)
5) Sub-grade under road and its shoulders shall be compacted to achieve 95% or more of standard proctor's MDD. CBR value of the sub grade level should be minimum 4%. If actual CBR is less that 4% in a particular stretch then the same material shall modified with increase in GSB thickness.

The methodology of road construction with material specification shall be in line with IRC/MORTH and shall be submitted for BHEL/NTPC approval before start of work.

3.2 Drainage System:

The drains shall be trapezoidal section lined with brick masonry. The minimum thickness of these lining shall be 115mm.

Size of the drain as per the drawings shall also be provided on either side of road for quick disposal of water from road and solar blocks.

The road on the culvert portions of the drains shall be concrete road.

Bidder shall also ensure that drainage from his plot does not encroach/flood in to the adjacent property and adjacent solar plots. Bidder shall try to maintain existing natural drain and shall remodel the natural drains in case of any disturbance made. The same shall be as per the technical/design requirements without affecting the drainage pattern. The bidder plot drainage scheme shall include to drain out the drainage of the allotted plot and shall include contributing catchment area consisting of adjoining plots and nearby catchment area.
Bidder its plot shall terminate its plot drains into the existing natural water body passing through its plot. The 'additional drains scheme shall also be followed for the drainage system. Suitable strengthening of natural drain shall be done at the terminal point to avoid any erosion of soil/strata. The strengthening shall be done sing stone pitching or RCC works.

3.3 Chain Link Fencing:

The chain link fencing shall compromise of G.I. chain link fencing with mesh size 75x75 mm and of minimum 4 mm diameter and diameter of bare galvanized wire shall not be less than 2.5 mm as per IS 278. The chain link fencing material requirement shall

confirm to IS: 2721 the chain link fence fabric shall have zinc coating of type "heavy as given IS 4826.

The G.I. chain link wire mesh will be stretched and attached by clips to 3 strands of High Tensile Spring Steel (HTSS) wire of 4 mm dia interwoven in chain link wire mesh and kept under tension which in turn are attached to the fence post with security nuts and bolts. On every fourth post a clamping strip will be threaded through the links of chain link and bolted to the fence post with the help of security nuts and bolts. All nuts, fasteners, bolts, clamping strips, clamps, clips, etc. shall be galvanised. Above the chain link fence three rows of galvanized reinforced twisted barbed tape with double edged profile, twisted around minimum 2.5mm galvanized bare wire shall be provided in the Half Y steel post at a maximum spacing of 175 mm c/c.

Reinforced barbed tape will be attached to angle iron posts vertical height 400 mm. The type of section for fence shall be as mentioned in the fencing drawing and details of scope of work of fencing in plot layouts.

All fence posts shall be 75X75X6 MS angles spaced at 2.5 m c/c distance.

All corner fence posts will have two stay posts in orthogonal directions and every tenth post will have a stay post in the direction of the fence. All stay posts shall be 75X75X6 MS angles. Concrete foundations for the angle iron posts and stays shall be provided as per the drawing. Toe wall shall be provided between the fence posts all along the run of the fence with foundation as per the drawing. Toe walls shall be made of brick masonry or stone masonry, both of minimum 75 kg/cm2 compressive strength.

All MS angles conforming to IS 2062 used in posts and gates shall be finished by cleaning of steel surfaces as per IS: 1477 (Part-II) and applying zinc chrome or zinc phosphate primer, followed by two coats of synthetic enamel paint. For finishing coat suitable colour pigment shall be added. All paints including primer shall be of reputed brand /manufacturer and as approved by the Engineer-In-charge. The method of application shall be as per the recommendations of the manufacturer.

Suitable foundation/fencing arrangement shall be made in the fencing scheme to ensure intact fencing/safety in the water body/drains entry and exit points in the plot area. The same may be provided with a grid of MS angles of 50X50X6 sizes with foundation.

3.4 Construction of Pipe Culverts:

The Pipe culverts shall be Providing and laying non-pressure NP2 class (light duty 900 mm dia.) R.C.C. pipes with collars jointed with stiff mixture of cement mortar in the proportion of 1:2 (1 cement : 2 fine sand) including testing of joints etc.

R.C.C retaining walls shall be provided on both sides of road as per drawing provided.

R.C.C pipes shall be back filled to the desired height (based on the requirement of road top level.) Number of pipes per culvert is based on the site condition/ as per the construction drawing.

3.5 Stone pitching:

Back filling of soil and stabilization of slopes with stone pitching shall be done as per the drawing provided adjacent to road works.

3.6 Dismantling of Roads & Pipe Culverts:

Dismantling of existing roads for the construction of new pipe culverts shall be done as per the drawing provided. Dismantling shall be done manually/mechanical means.

Demolishing R.C.C. work manually/ by mechanical means shall be done for construction/inclusion of new pipes in the existing pipe culverts. Care shall be taken during the demolishing, adjacent concrete shall not damage.

Demolishing stone rubble masonry manually/ by mechanical means for construction of new pipe culverts as per drawing provide.

4. General Civil works

4.1 Masonry work:

All brick works shall be using at least class designation 7.5 of approved quality as per IS: 1077, IS: 2212 and IS: 3495. All concrete blocks shall be of minimum compressive strength of 7.5 N/mm2 and shall be of Grade-A as per IS: 2185. All stone masonry work shall be Random Rubble (RR) masonry work with stone of good quality and durability. All stone masonry work for drains and fencing work shall be RR masonry with stone good quality and durability. The stone masonry work shall be in line with IS: 1597, IS: 1122 and IS: 1126.

The cement mortar for all kind of masonry work shall be in the ratio 1 cement and 6 sand by weight.

Bricks/blocks required for masonry work shall be thoroughly soaked in clean water tank for approximately two hours. Brick shall be laid in English bond style. Green masonry work shall be protected from rain. All masonry work shall be kept moist on all the faces for a period of seven days.

Use of fly ash brick for masonry shall be subjected to approval of NTPC/BHEL.

4.2 Reinforced Concrete Structure, Allied Works and Foundation:

All RCC works shall be design mix as per IS: 456-2000. For structural concrete items, Ordinary Portland cement (43/53 Grade) conforming to IS: 8112 and Fly ash based Portland pozzolana cement conforming to IS: 1489 (Part-1) shall be used for superstructure. Type of cement for sub-structures shall be decided based on the final Soil Investigation report.

Coarse aggregate for concrete shall be crushed stones chemically inert, hard, strong, durable against weathering of limited porosity and free from deleterious materials. It shall be properly graded. It shall meet the requirements of IS: 383.

Sand shall be hard, durable, clean and free from adherent coatings of organic matter and clay balls or pellets. Sand, when used as fine aggregate in concrete shall conform to IS: 383. For plaster, it shall conform to IS: 1542 and for masonry work to IS: 2116

Reinforcement steel shall be of high strength deformed TMT steel bars of grade minimum Fe-500 and shall conform to IS: 1786. Ductile detailing in accordance with IS: 13920 shall be adopted for superstructure and substructure of all RCC buildings / structures

The following minimum grades of concrete for design mix and nominal mix shall be adopted for the type of structures noted against each unless not specified elsewhere.
M 25 - All RCC structural elements above and below ground level, precast concrete, MMS foundation, cable trench, oil pit, Grade Slab, Paving, culverts & road.
M-20 (Equivalent nominal Mix of 1:1.5:3)* - Fencing work
M-15 (Equivalent Nominal Mix of 1:2:4)*- Base slab of drains.
M-10 (Equivalent Nominal Mix of 1:3:6)*- Plain Concrete Cement.

The bidder shall carry out the design mix of M-25 and M-20 grade concrete on priority. The design mix shall be approved from NTPC/BHEL before start of work.

* The use of nominal mix for M-20 grade may be accepted only in exceptional cases subject to approval of NTPC/BHEL. The same shall be adopted subject to approval from NTPC/BHEL for specific work.

In case Geotechnical investigations requires any special kind of cement or higher grade of concrete, the same shall be provided.

IS: 2502 Code of Practice for Bending and Fixing of Bars for concrete reinforcement must be complied for reinforcements. IS: 5525 and SP: 34 shall be followed for reinforcement detailing.

A minimum 75 mm thick PCC shall be provided below RCC wherever RCC is laid over the ground. Proper and sufficient formwork/shuttering shall be provided for the required period as per IS: 456.

4.3 Structural Steel:

All structural steel shall design shall carried out as per IS 800. Structural steel shall conform IS 2062, Pipe shall be as per medium/high grade of IS 1161, Chequered plates shall conformed to 3502 and Hollow steel sections for structural use shall conform to IS: 4923.

4.4 Grouting:

Cement mortar (1:2) grout with non-shrink additives shall be used for grouting below base plate of column. The grout shall be high strength grout having a minimum characteristic compressive strength of min 30 N/mm2 at 28 days. The grout shall be chloride - free, cement based, free flowing, non-metallic grout.

S. No.	Description PART I	Scope / to be taken care by		*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 BHEL
b	Open space for storage (as per availability)	Yes		Location will be finalized after joint survey with BHEL
c	Construction of bidder's office		Yes	
3.2.0	**ELECTRICITY**			
3.2.1	Electricity For work/operation purpose		Yes	
3.3.0	**WATER SUPPLY**			
3.3.1	Drinking water for labor		Yes	
3.3.2	Water supply for bidder's office,		Yes	
3.7.0	**Demobilization of all the above facilities**		Yes	
3.8.0	**TRANSPORTATION**			
a	For site personnel of the bidder		Yes	
b	For bidder's equipment and consumables (T&P, Consumables etc.)		Yes	

F. LIST OF TOOLS AND PLANT:

All the Tools and Plants required for the efficient execution of the civil works are in the scope of contractor. The contractor shall make them available for operation/work purposes, including all consumables likely to be used at his own cost at the time of mobilization.

BHEL will not provide any tool, plants or any testing facility/apparatus for the work. It will be contractor's responsibility to arrange all required tools, plants and other testing apparatus, etc. at their own cost. The prices quoted & finalized are inclusive of the charges towards providing such T&P. No extra payment will be entertained on account of this.

However, subject to availability, BHEL may provide few T&P to the contractor for expediting and in larger interest of the project. In case any such facility is provided to the contractor, BHEL will make necessary recovery in the running account/final bills towards the hire charges. A departmental charge @ 5% will also be affected such cases. The decision of BHEL on the hire charges will be final and binding on contractor.

6.1 TIME SCHEDULE

6.1.1
The entire work of restoration and repair of damaged roads, fence, construction of culvers and other civil works as detailed elsewhere in the Tender Specification shall be completed within 4 (Four) months from the date of commencement of work at site.

6.1.2
During the total period of contract, the contractor has to carry out the activities in a phased manner as required by BHEL and the program of activity completion schedule.

6.1.3
The work shall be commenced on the mutually agreed date between the bidder and BHEL engineer and shall be deemed as completed in all respect only when the unit is in operation. The decision of BHEL in this regard shall be final and binding on the contractor. The scope of work under this contract is deemed to be completed only when so certified by the site Engineer.

6.2 COMMENCEMENT OF CONTRACT PERIOD

The date of commencement of contract period shall be the mutually agreed date between the bidder and BHEL engineer to start the work. In case of discrepancy the decision of BHEL engineer will be final.

6.3 MOBILISATION

6.3.1
The activities for mobilization of manpower, arrangement of required tools and machinery shall be started as per directions of Construction manager of BHEL.
6.3.2
The contractor should mobilize man power in order to complete the work as per activity completion schedule for Grass and shrubs cutting activity.
6.3.3
Requisite Material, men and machinery should be arranged in order to complete the project within stipulated time period.

6.2 CONTRACT PERIOD

For the purpose of contract, the period shall be taken as 4 (Four) months. Completion of the work shall be as per BHEL Bar Charts revised from time to time. In order to expedite the work, the contractor has to deploy manpower as per site requirement without any extra cost to BHEL.

6.3 PROTECTION OF WORK

The contractor shall have total responsibility for protecting his works till it is taken over by the Employer. No claim will be entertained by the Employer or the representative of the Employer for any damage or loss to the Contractor's works. Contractor shall be responsible for complete restoration of the damaged works to original conditions to comply with the specification and drawings. Should any such damage to the Contractor's Works occur because of other party not being under his supervision or control, the Contractor shall make his claim directly with the party concerned.

If any damage to BHEL's plant occurs by contractor's personal such as PV modules, cables, module washing system etc., contractor shall be responsible to restore such damaged works within stipulated time as directed by BHEL Engineer. In case contractor fails to restore the damage within agreed time, BHEL shall get that work repaired and debit the cost (Estimated cost + 10% extra) from running bills of contractor.

If disagreement or conflict or dispute develops between the Contractor and the other party or parties concerned regarding the responsibility for damage to the Contractor's Works the same shall be rectified. The Contractor shall not cause any delay in the repair of such damaged Works because of any delay in the resolution of such disputes. The Contractor shall proceed to repair the Work immediately and no cause thereof will be assigned pending resolution of such disputes.

6.1
The progressive payment for the work on accepted price of contract value will be released on the basis of running account bills & other bills as per the provisions of relevant clauses of GCC and SCC.

6.2 **Penalty:** Please refer the GCC clause.

6. 3 New Taxes/Levies

In case the Government imposes any new levy/tax on the output service/ goods/work after award of the contract, the same shall be reimbursed by BHEL at actual.

In case any new tax/levy/duty etc. becomes applicable after the date of Bidder's offer, 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.
No reimbursement/recovery on account of increase/reduction in the rate of taxes, levies, duties etc. on input goods/services/work shall be made. Such impact shall be taken care of by the Price Variation/Adjustment Clause (PVC) if any. In case PVC is not applicable for the contract, Bidder has to make his own assessment of the impact of future variation if any, in rates of taxes/duties/ levies etc. in his price bid.

6.4 BUILDING & OTHER CONSTRUCTION WORKERS (REGULATION OF EMPLOYMENT AND CONDITIONS OF SERVICE) ACT, 1996 (BOCW Act) AND RULES OF 1998 READ WITH BUILDING & OTHER CONSTRUCTION WORKERS CESS Act, 1996 & CESS RULES, 1998 and
INTER-STATE MIGRANT WORKMEN ACT, 1979 (IN CASE BIDDER ENGAGE MANPOWER FROM OTHER STATE)

In case any portion of work involves execution through building or construction workers and/or inter-state migrant workmen, then compliance to the above titled Acts as applicable shall be ensured by the contractor and contractor shall obtain license and deposit the cess under the Act. In the circumstances it may be ensured as under:-
It shall be the sole responsibility of the contractor in the capacity of employer to forthwith (within a period of 15 days from the award of work) apply for a license to the Competent Authority under the BOCW Act and/or ISMW Act as applicable and obtain proper certificate thereof by specifying the scope of its work. It shall also be responsibility of the contractor to furnish a copy of such certificate of license / permission to BHEL within a period of one month from the date of award of contract.
It shall be the sole responsibility of the contractor as employer to ensure compliance of all the statutory obligations under these acts and rules including that of payment / deposit of cess as per the applicability under above referred Acts within a period of one month from the receipt of payment.

It shall be the responsibility of the sub-contractor to furnish the receipts / challans towards deposit of the cess together with the number, name and other details of beneficiaries (building/Inter-state Migrant workmen) engaged by the sub-contractor during the preceding month.

It shall be the absolute responsibility of the sub-contractor to make payment of all statutory payments & compensations to its workers including that is provided under the Workmen's Compensation Act, 1923.