

Rev.00
10th Aug
2016

VOLUME - IA

TECHNICAL CONDITIONS OF
CONTRACT (TCC) FOR
CONSTRUCTION OF ROAD
DRAINAGE, CULVERTS AND
ASSOCIATED CIVIL WORKS FOR
MAIN APPROACH ROAD FOR 50
MW SPV PLANT OF NTPC, AT
MANDSUAR, M.P.

TCC No: HY/PE&SD/E&C-Sub Contract/ Solar/50MW/NTPC/ Main
approach Road-04, Rev.00

BHARAT HEAVY ELECTRICALS LIMITED

PROJECT ENGINEERING & SYSTEMS DIVISION, HYDERABAD



TECHNICAL CONDITIONS OF CONTRACT (TCC)

Contents

Sl. No.	Description	Chapter	No. Of Pages
Volume-IA	Part-I: Contract specific details		
	Content, List of Drawings		2
1	Project Details	Chapter-I	1
2	Scope of Works	Chapter-II	3
3	Facilities in the scope of Contractor/BHEL (Scope Matrix)	Chapter-III	4
4	T&Ps to be deployed by Contractor	Chapter-IV	1
5	T&Ps to be deployed by BHEL on sharing basis	Chapter-V	1
6	Time Schedule	Chapter-VI	2
7	Terms of Payment	Chapter-VII	1
8	Taxes and other Duties	Chapter-VIII	3
Volume-IA	Part-II : Technical Specifications		
10	General	Chapter-I	3
11	Road, Drainage	Chapter-II	2
12	General Civil works	Chapter-III	3
13	General Technical Specification	Chapter - IV	2
14	Quality Assurance and Inspection for civil works	Chapter-V	4
15	List of Drawings	Chapter-VI	1
16	Annexure-II (Standard drawings)		

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-I Project Information

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	:	5x50 MW Solar PV Plant of NTPC at Mandsaur District in Madhya Pradesh. BHEL Scope: 1x 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 11km 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 7 km and after that project site is approachable through cart track (2 km).
7	Nearest Air Port	:	Udaipur
11	Ambient Air Temperature (Average)	:	a) Maximum : 42 ^o C b) Minimum : 16 ^o 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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-II Scope of Works

2.0 SCOPE OF WORK

2.1 This section list major scope of work for construction of Main approach Road, Drains ,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.

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

2.1.2 The Road work shall be consists of

- i) Excavation/Cutting/Filling
- ii) Granular Sub Base Layer
- iii) Water Bound Macadam Layer -1
- iv) Water Bound Macadam Layer – 1
- v) Top Finishing with Bitumen mastic Layer

2.1.3 The Drainage work /culvert work shall be consists of

- i) Excavation
- ii) Concrete work
- iii) Brick works/Masonry work
- iv) Final finishing with plaster etc.,

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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-II Scope of Works

2.1.6 GENERAL

2.1.6.1 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 BHEL. It must not be used directly or indirectly in any way detrimental to the interest of the company.

2.1.6.2 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.

2.1.6.3 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.

2.1.7 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.

2.1.7.1 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.

2.1.7.2 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.

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

2.1.7.4 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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-II Scope of Works

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

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

2.1.8 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.

**FOR FURTHER DETAILED SCOPE OF WORKS REFER RELEVANT
TECHNICAL SPECIFICATIONS PROVIDED IN THE SUBSEQUENT
CHAPTERS IN THE TCC**

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – III: Facilities in the scope of Contractor/BHEL

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 customer(NTPC)
b	Open space for storage (as per availability)	Yes		Location will be finalized after joint survey with customer(NTPC)
c	Construction of bidder's office, canteen and storage building including supply of materials and other services		Yes	
d	Bidder's all office equipments, office / store / canteen consumables		Yes	
e	Canteen facilities for the bidder's staff, supervisors and engineers etc		Yes	
f	Firefighting equipments like buckets, extinguishers etc		Yes	
g	Fencing of storage area, office, canteen etc of the bidder		Yes	
3.1.2	FOR LIVING PURPOSES OF THE BIDDER			
a	Open space for labour colony (as per availability)	Yes		Can be provided as per availability
b	Labour Colony with internal roads, sanitation, complying with statutory requirements		Yes	
3.2.0	ELECTRICITY			
3.2.1	Electricity For construction purposes		Yes	
3.2.2	Electricity for the office, stores, canteen etc. of the bidder		Yes	
3.2.3	Electricity for living accommodation of the bidder's staff, engineers, supervisors etc		Yes	
3.3.0	WATER SUPPLY			
3.3.1	For construction purposes		Yes	
3.3.2	<u>Water supply for bidder's office, stores, canteen etc</u>		Yes	
3.3.3	<u>Water supply for Living Purpose</u>		Yes	

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – III: Facilities in the scope of Contractor/BHEL

S. No.	Description PART I	Scope / to be taken care by		Remarks
		BHEL	Bidder	
3.4.0	LIGHTING			
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	
3.5.0	COMMUNICATION FACILITIES FOR SITE OPERATIONS OF THE BIDDER			
a	Téléphone, fax, internet, intranet, e-mail etc.		Yes	
3.6.0	COMPRESSED AIR wherever required for the work		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 equipments and consumables (T&P, Consumables etc)		Yes	

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – III: Facilities in the scope of Contractor/BHEL

Sl. No	Description PART II 3.9.0 CONSTRUCTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
3.9.1	Engineering works for construction:			
a	Providing the construction drawings for all the works covered under this scope	Yes		
b	Drawings for construction methods	Yes		
c	As-built drawings – where ever deviations observed and executed and also based on the decisions taken at site- example – routing of small bore pipes		YES	In consultation with BHEL
d	Shipping lists etc for reference and planning the activities		Yes	In consultation with BHEL
e	Preparation of construction schedules and other input requirements		Yes	In consultation with BHEL
f	Review of performance and revision of site construction schedules in order to achieve the end dates and other commitments	Yes	Yes	In consultation with BHEL
g	Weekly construction schedules based on S. No. e. hard copy to Construction manager, by email to HO.		Yes	In consultation with BHEL
h	Daily construction / work plan based on S. No. g. hard copy to Construction manager, by email to HO.		Yes	In consultation with BHEL
i	Periodic visit of senior official of the bidder to site to review the progress so that works are completed as per schedule. It is suggested this review by the senior official of the bidder should be done once in every two Weeks.		Yes	

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – III: Facilities in the scope of Contractor/BHEL

Sl. No	Description PART II 3.9.0 CONSTRUCTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
j	Arranging the materials required for Work		Yes	
k	Coordination for inspection & checking and getting clearance from customer		Yes	
l	Preparation of formats for completion of activities		Yes	

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – IV: T&Ps to be deployed by Contractor

F. LIST OF TOOLS AND PLANT:

The following tools and equipment but not limited to, are required for the efficient execution of the civil works. The contractor shall make them available for construction purposes, including all consumables likely to be used at his own cost at the time of mobilization.

S.No.	Description	Minimum Quantity	Remarks
1.	Digital Concrete Mixer 0.25 to 0.40 cum with hopper/Self-loading mobile concrete mixer	2 nos.	
2.	Needle Vibrator (Needle type 40mm)	4 nos.	
3.	Needle Vibrator (Needle type 25mm)	2 nos.	
3.	Surface Vibrator	1 no.	
4.	Concrete Pump		Need based
5.	Dewatering Pump	2 nos.	
6.	Earth Compactor/Vibratory Roller	2 nos.	Need based
7.	Reinforcement steel cutting & Bending machine	2 nos.	
8.	Welding Machine	2 nos.	
9.	Grinding Machine	4 nos.	
10.	Excavator	1 no.	Need based
11.	Theodolite /Total station with staff	1 no.	
12.	Dumpy level with staff	1 no.	
13.	Compression testing machine (for concrete cubes)	1no	
14.	Cube mould (15cm.x15cm.x15cm.)	6 nos.	
15.	Sieve analysis sieve sets for aggregates testing	1 set	
16	Jar/Beaker for Bulk density test of sand	1 no.	
15	Proctor test equipment	1 set	

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter – V: T&Ps to be deployed by BHEL on sharing basis

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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VI: Time Schedule

6.1 TIME SCHEDULE

6.1.1

The entire work of construction of construction of Roads, Pathways, Drains including culverts and any works introduced later stage as detailed elsewhere in the Tender Specification shall be completed within 45 days 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 milestone events.

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

Requisite material, men and machinery (Vibratory Road roller for earth work and bituminous work Excavator, Paver, Total station etc., should be arranged in order to complete the project within stipulated time period.

6.3.2

The contractor should mobilize man power in order to complete the work in 45 days.

6.3.3

The contractor has to augment his resources in such a manner that following major milestones of the project are achieved on specified schedules:

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VI: Time Schedule

TENTATIVE SCHEDULE

S.No.	Activity/Mile stone	Duration in months	
		Start	Finish
1	Site Mobilization and Preparatory Works	Sept'16	Sept'16
2	Road Works	Sept.'16	Oct.'16
3	Drainage Works including culverts	Oct.'16	Oct.'16
15	Completion of facilities		Oct.'16

In order to meet 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.

6.2 CONTRACT PERIOD

For the purpose of contract, the period shall be taken as 45 days. 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 on two-shift basis during erection and during pre-commissioning and commissioning period manpower should be provided round the clock basis 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 and the 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 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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VII: Terms of Payment

7.1

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.

7.2

The following documents are to be submitted along with the Running Account Bills for process of payment

7.2.1 Tax Invoice with details of TIN number of BHEL and contractor.

7.2.2 Measurement books duly filled and signed officials of BHEL and contractor

7.2.3 Provident Fund Remittance challan of previous month.

7.2.4 ESI Remittance challan of previous month.

7.2.5 Invoice submitted along with running bills to indicate the service tax amount charged and bear the Service tax Number.

7.2.6 Bill submitted subsequently to be accompanied with a declaration that service tax liability on the earlier bill has been discharged.

7.2.6.1 By paying money to the Government (along with Tax paid Challan Copy)

7.2.6.2 By utilization of Input Service tax Credit

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-I General

8.0 TAXES, DUTIES, LEVIES

8.1. For All types of works

8.1.1

The contractor shall pay all (save the specific exclusions as enumerated in this contract) taxes, fees, license charges, deposits, duties, tools, royalty, commissions or other charges which may be levied on the input goods & services consumed and output goods & services delivered in course of the Contractor's operations in executing the contract. In case BHEL is forced to pay any of such taxes, BHEL shall have the right to recover the same from contractor's bills or otherwise as deemed fit.

However, provisions regarding Service Tax, Swachh Bharat Cess, Krishi Kalyan Cess and Value Added Tax (VAT) on output services and goods shall be as per following clauses.

8.1.2 Service Tax, Swachh Bharat Cess & Krishi Kalyan Cess on Output Services:

Contractor's price/rates shall be **exclusive** of Service Tax and Swachh Bharat Cess on Services. In case, it becomes mandatory for the contractor under provisions of relevant act/law to collect the Service Tax, Swachh Bharat Cess & Krishi Kalyan Cess from BHEL and pay the same to the concerned tax authorities, such applicable amount will be paid by BHEL at the prevailing Service Tax Rate, presently Service Tax 14%, Swachh Bharat Cess 0.5% and Krishi Kalyan Cess 0.5% on the admitted Service value against submission of documentary evidence of their remittance.

Contractor shall submit to BHEL documentary evidence of Service Tax registration certificate specifying name of services covered under this contract. Contractor shall submit serially numbered Service Tax and Cess Invoice, signed by the Contractor or a person authorized by the Contractor in respect of taxable service provided, and shall contain the following, namely,

- 1.The name, address and the registration number of the contractor,**
- 2.The name and address of the party receiving taxable service,**
- 3.Description and value of taxable service provided and,**
- 4.The Service tax, Swachh Bharat Cess & Krishi Kalyan Cess payable thereon.**

All the above four conditions shall be fulfilled in the invoice before release of service tax, Swachh Bharat Cess and Krishi Kalyan Cess payment.

Wherever, more than one route/option are available for discharge of Service Tax, Swachh Bharat Cess & Krishi Kalyan Cess, liability under a particular service, (e.g. "works contract Service"), contractor shall obtain prior written consent from BHEL before billing the amount towards Service Tax and Cess

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-I General

8.1.3 VAT (Sales Tax /WCT)

As regards Value Added Tax (VAT)/CST on transfer of property in goods involved in Works Contract (previously known as Works Contract Tax) if applicable as per local laws, the price quoted by the contractor shall be **inclusive** of the same and in no case input or output VAT/CST will be reimbursed extra by BHEL.

In any case the Contractor shall register himself with the respective Sales Tax authorities of the State (where the project is located) and submit proof of such registration to BHEL along with the first RA bill. The contractor shall issue the tax Invoices to BHEL as per the Tax laws of respective State and also issue to BHEL the prescribed forms/undertakings/certificate/any other documents prescribed under the respective State VAT laws for enabling BHEL to avail input credit for the output VAT paid by the Contractor or for claiming set-off/deduction for the value of work executed by the Contractor, wherever applicable.

Deduction of tax at source (if applicable) shall be made as per the provisions of law and is to be construed as an advance tax paid by BHEL on behalf of the contractor and no reimbursement thereof will be made by BHEL.

Further, if BHEL, at the instance of customer or otherwise adopts the specific route for discharging output VAT liability itself, benefit of the reduction in liability of the contractor has to be passed on to BHEL.

In case, BHEL is forced to pay any VAT liability on behalf of the contractor, the same will be recovered from contractor's bill or otherwise as deemed fit.

8.2 New Taxes/Levies - For All types of works

In case the Government imposes any new levy/tax on the output service/ goods/work after award of the contract but before the scheduled completion date as per contract, the same shall be reimbursed by BHEL at actual against documentary evidence/proof.

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 the bidder's 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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-I General

No reimbursement/recovery on account of increase/reduction in the rate of taxes, levies, duties etc. on **input** goods/services/work of the Contractor shall be made by BHEL. 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 own assessment of the impact of future variation if any, in rates of taxes/duties/ levies etc. in the price bid.

8.3 GST: For All types of works excepting works covered under sl no 8.2

As and when GST becomes applicable to this contract, the net differential (negative or positive) financial liability of the Contractor to the Authorities (as compared to such liability prior to applicability of GST), if any, shall be to the account of BHEL. For this purpose, all available options under the GST shall be explored, and the decision of BHEL in this regard shall be final and binding on the Contractor.

8.4 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.

In case any portion of work involves execution through building or construction workers, then compliance to the above titled Acts 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:-

- i. 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 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.
- ii. It shall be the sole responsibility of the contractor as employer to ensure compliance of all the statutory obligations under these act and rules including that of payment / deposit of 1% cess on the extant of work involving building or construction workers engaged by the contractor within a period of one month from the receipt of payment.
- iii. 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 workers) engaged by the sub-contractor during the preceding month.
- iv. 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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-I General

1.1

The work covered under this specification is of highly sophisticated nature, requiring the best quality of workmanship for construction, engineering and construction management. The Bidder should ensure timely completion of work. The Bidder must have adequate quantity of tools, construction aids, equipment's etc., in his possession. He must also have on his rolls adequate, trained, qualified and experienced supervisory staff and skilled personnel.

1.2

The work shall be executed under the usual conditions affecting industrial construction and in conjunction with numerous other operations at site. The Bidder and his personnel shall co-operate with the personnel of other agencies, co-ordinate his work with others and proceed in a manner that shall not delay or hinder the progress of work as a whole.

1.3

All the work shall be carried out as per the instructions of BHEL engineer. BHEL engineer's decision regarding the correctness of the work and method of working shall be final and binding on the Bidder.

1.4

The Bidder shall at his cost perform any services, tests etc, although not specified but nevertheless required for the completion of work.

1.5

Contractor shall execute the work as per sequence prescribed by BHEL at site. The sequence of activities, methodology will be decided by the BHEL engineers depending upon the availability of material, drawings, work fronts etc. No claims for extra payment from the Contractor will be entertained on the grounds of deviation from the methods and sequence of construction advised and agreed by BHEL engineer or for any reasons whatsoever.

1.6

All the necessary certificates and licenses required to carry out this work are to be arranged by the Contractor expeditiously at his cost.

1.7

The work to be carried out under the scope of these specifications covers, temporary storing of contractor's own construction material, using the same in the work, carrying out all other activities, viz. survey, excavation, concreting, backfilling, and all the other activities as defined in the scope of work enumerated in chapter-2, Part-I of TCC document, Bill of Quantities /Schedule of Items and elsewhere till handing over of the entire work. The work shall conform to dimensions and tolerances specified in the

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-I General

various drawings, documents etc. That will be provided during the course of construction. If any portion of the work is found to be defective in workmanship or not conforming to drawings or other specifications, 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 at the cost and risk of the contractor.

1.8

The terminal points as decided by BHEL shall be final and binding on the Contractor.

1.9

During the course of execution of this work, certain rework/ modification/ rectification/ repairs/ fabrication/dismantling/reconcreting etc. will be necessary on account of feedback from customer/BHEL on account of design discrepancies and manufacturing defects and site operation/maintenance requirements. Contractor shall carryout such rework/ modification/rectification/fabrication/repairs etc., promptly and expeditiously. Claims of contractor, if any, for such works will be dealt as per relevant clauses of General Conditions of Contract.

1.10

Daily log sheets indicating the details of work carried out, man-hours, consumables used etc, shall be maintained by the Contractor and got signed by BHEL engineer every day.

1.11

All tools and tackles, fixtures, equipment, materials, manpower, supervisors/ engineers, consumables etc. 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 him unless otherwise specified in the relevant clause.

1.12

The contractor shall make adequate security arrangements including employment of security personnel and ensure protection from theft, fire, pilferage, damage and loss of materials/equipments issued to him for the work. Special care will have to be taken to guard against pilferage / theft of cement, steel and/or other materials.

1.13

Contractor shall ensure proper housekeeping and remove all scrap materials periodically from various work area covered in the scope and deposit the same at the place earmarked for this purpose. In case of contractor's failure to do the same, BHEL reserves the right to remove scrap at contractor's cost and risk.

1.14

Access to site for inspection by BHEL and customer engineers shall be made available by the contractor at all times.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-I General

1.15

As Built Drawings: Contractor shall be supplied with two extra copies of the layout & detailed drawings. Contractor to incorporate in one of the copy with Red ink all the changes / deviations / alterations etc carried out at site due to various reasons, with site engineer's endorsement. Marked up drawings shall be submitted to BHEL for approval.

1.16

Site Inspection: The owner / employer or his authorized agents may inspect various stages of work during the currency of the contract awarded to him. The contractor shall make necessary arrangements for such inspection and carry out the rectification pointed out by the owner / employer without any extra cost to the owner / employer. No cost whatsoever such duplication of inspection of work be entertained.

1.17

BHEL will not supply any materials unless otherwise specified.

1.18

Makes of supply of cement, steel and painting materials shall be as per approved material list by NTPC/BHEL.

1.19

The Contractor shall carry the work as per the Field Quality Plan issued by BHEL/NTPC.

1.20

Lab has to be established at site for carrying out testing as per Field Quality Plan, like Cube testing machine, cube mounds etc.

1.21

Weigh batcher with printing facility should be available as per the deployment of parallel gangs.

1.22

Calibration of equipment's should be done by NABL/NPL accredited laboratories.

1.23

Welding procedure to be followed as per Field Quality plan. (Welding procedure and prequalification of welder required to be produced)(If required).

1.24

Indicative Field Quality Plan attached with the NIT.

1.25

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-I General

Contractor should submit the royalty certificates for quantity of Coarse and fine aggregates used at site.

1.26

Field Quality Assurance Formats: It is the responsibility of the contractor to collect and fill up the relevant concrete pour card/FQA Log sheets and present the same to BHEL after carrying out the necessary checks as per the log sheets and obtaining the signature of BHEL / Customer in token of their acceptance. Monthly Running Bill Payment to the contractor will be linked with the submission of these Log sheets.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-II: ROAD, and DRAINAGE

2.0 SCOPE

This section list major scope of work for construction of Roads, Pathways and Drains including culverts for 5 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.

2.1 DETAILED SPECIFICATION

Road: The approach road to the solar power plant shall originate from the main approach road and connect to all inverter rooms and CMCS building.

Approach 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.

Drainage System: The drains shall be trapezoidal or rectangle section lined with concrete slabs/brick masonry/stone slabs. The minimum thickness of these lining shall be 115mm for brick masonry, 75mm thick for concrete slab, 150mm thick for stone masonry and 100mm thick for stone slab.

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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-II: ROAD, and DRAINAGE

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.

All Buildings shall be provided with plinth protection all around, sloped towards side drains. Plinth Protection shall be 150 mm thick PCC (1:3:6) laid over compacted base. Side drains shall be stone masonry/brick masonry/concrete works of minimum 100mm thickness. The side drains shall be connected to area drains by either open drains or combination of open drains and underground pipes.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-III GENERAL CIVIL WORKS

4.1 General Civil works

a) 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.

The external wall for the building shall be 230 mm thick walls and internal wall 230/115 thick as per requirements. The external wall of CMCS facing the transformer area shall be as per IS: 1646 - Code of practice for fire safety of buildings (general): electrical installations.

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

Suitable damp proof course shall be provided the proportion of cement, sand & aggregate shall be 1:2:4 using 6 mm down stone chips with a water proofing admixtures. The thickness of damp-proof course shall be minimum 40 mm.

b) 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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-III GENERAL CIVIL WORKS

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.

The foundation system shall be made which transfer loads safely to the soil for the module mounting structures, depending on soil conditions, geographical condition, regional wind speed, bearing capacity, slope stability etc. All foundation system and foundation depth shall be decided based on the approved geotechnical investigation report. No foundation allowed on back filled soil and the foundation depth to reach upto NGL.

All loads shall be considered in line with IS: 875. Seismic loads for design shall be in accordance with IS: 1893 and relevant Standards.

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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-III GENERAL CIVIL WORKS

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.

c) **Structural Steel:**

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

d) **Grouting:**

Cement mortar (1:2) grout with non-shrink additives shall be used for grouting below the 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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-IV GENERAL TECHNICAL SPECIFICATIONS

5.0 PREAMBLE TO THE SCHEDULE OF QTS. (SOQ) PROVIDED IN PRICE BID SPECIFICATION

- 1) Details of the items in this Schedule shall be read in conjunction with the corresponding NTPC specifications, drawings and other documents and shall have precedence over any contrary statement mentioned anywhere in this document.
- 2) The work shall be carried out as per construction drawings, specifications, the description of the items in this schedule and/or Engineer's instructions., Drawings enclosed with these documents are only indicative giving some idea of the type of work involved. The layout, sizes and details of the building, structures and foundations shown in tender drawings may vary at a large extent during actual construction. Final drawings will be issued progressively during the execution of the work.
- 3) Items of work provided in this schedule but not covered in the specifications shall be executed strictly as per instructions of the Engineer.
- 4) Unless specifically mentioned otherwise in the contract, the bidder shall quote his rates for the finished items and shall provide for the complete cost towards fuel, tools, tackle, equipment, constructional plant, temporary works, labour materials, levies, taxes, transport, layout, repairs, rectification, maintenance till handing over, supervision, shops, establishments, services, temporary roads, revenue expenses, contingencies, overheads, profits and all incidental items not specifically mentioned but reasonably implied and necessary to complete the works according to the contract.
- 5) The rate quoted shall be inclusive of cleaning the site of any vegetations, dressing and leveling etc., required for commencement of site activities. No separate payment will be made towards the same.
- 6) Rates shall be quoted both in figures and in words in clear legible writing. No over writing is allowed. All scoring and cancellation should be counter signed by the bidder. In case of illegibility, the interpretation of the engineer shall be final. All entries shall be in English language.
- 7) Engineers decision shall be final and binding on the contractors regarding clarification of items in this schedule with respect to the other section of the contract.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-IV GENERAL TECHNICAL SPECIFICATIONS

- 8) In case of any discrepancy between item descriptions, relevant drawing and/ or specification clarification shall be sought at tender stage itself. Otherwise it shall be assumed that the bidder has quoted for the more stringent requirement.

HIERARCHY

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

- Statutory Regulations
- NTPC specification
- Items in Schedule of quantities
- IS/IRC/MORTH /BS standards/CPWD Spec.
- BHEL's standard specification (with prior approval of Engineer-in-charge).

NOTE: The above technical specification is not exhaustive. In case for any item of work, technical specification is not available, such items of works will be carried out in conformance to technical specification of CPWD/manufacturer's recommendations/best engineering practice. In case of any dispute between two specifications or non-availability of specifications, customer's specification will prevail. Decision on applicability of any particular specifications will rest with BHEL engineer and his decision in the matter will be final & binding on the contractor. Contractor has to make himself well conversant with the Customer specification.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-V QUALITY ASSURANCE AND INSPECTION FOR CIVIL WORKS

QUALITY ASSURANCE AND INSPECTION FOR CIVIL WORKS

1) Introduction

This part of the specification covers the sampling, testing and quality assurance requirement (including construction tolerances and acceptance criteria) for all civil and structural works covered in this specification.

This part of the technical specification shall be read in conjunction with other parts of the technical specifications, general condition of contract and special condition of contract which covers common QA requirements. Wherever IS code or standards have been referred they shall be the latest revisions. The rate for respective items of work or price shall include the cost for all works, activities, equipment, instrument, personnel, material etc. whatsoever associated to comply with sampling, testing and quality assurance requirement including construction tolerances and acceptance criteria and as specified in subsequent clauses of this part of the technical specifications.

The QA and QC activities in all respects as specified in the technical specifications/ drawings / data sheets /quality plans / contract documents shall be carried out at no extra cost to the owner. The contractor shall prepare detailed construction and erection methodology scheme which shall be compatible to the requirements of the desired progress of work execution, quality measures, prior approvals if any and the same shall be got approved by the Engineer. If required, work methodology may be revised/reviewed at every stage of execution of work at site, to suit the site conditions by the contractor at no extra cost to the owner.

2) QA and QC Manpower

The contractor shall nominate one overall QA coordinator for the contract detailing the name, designation, contact details and address at the time of post bid discussions. All correspondence related to Quality Assurance shall be addressed by the contractors QA coordinator to BHEL. BHEL shall address all correspondence related to Quality issues to the contractors QA coordinator. The contractor's QA coordinator shall be responsible for co-ordination of Quality activities between various divisions of the contractor and their sub-vendors on one hand & with BHEL/NTPC on the other hand.

The contractor shall appoint a dedicated, experienced and competent QA&QC in charge at site, preferably directly reporting to the Project Manager, supported as necessary by experienced personnel, to ensure the effective implementation of the approved QAP. The contractor shall finalize and submit a deployment schedule of QA&QC personnel along with their details to BHEL for approval /acceptance and further shall ensure their availability well before the start of the concern activity.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-V QUALITY ASSURANCE AND INSPECTION FOR CIVIL WORKS

3) **Laboratory and Field Testing**

The field laboratory for QA and QC activities shall be constructed and set-up by the contractor in line with the indicative field QA&QC laboratory set-up enclosed at **Annexure-I**. The Laboratory building shall be constructed and installed with the adequate facilities to meet the requirement of envisaged test set up. Temperature and humidity controls shall be available wherever necessary during testing of samples. The quality plan shall identify the testing equipment's/instrument, which the contractor shall deploy and equip the field quality laboratory for meeting the field quality plan requirements.

The contractor shall furnish a comprehensive list of testing equipment's / instrument required to meet the planned/scheduled tests for the execution of works for BHEL acceptance/ approval. The contractor shall mobilize the requisite laboratory equipment and QA&QC manpower at least 15days prior to the planned test activity as per the schedule of tests. All equipment's and instruments in the field shall be calibrated before the commencement of tests and then at regular intervals, as per the manufacturer's recommendation and as directed by the BHEL. The calibration certificates shall specify the fitness of the equipment's and instruments within the limit of tolerance for use. Contractor shall arrange for calibration of equipment's and instruments by an NABL / NPL accredited agency and the calibration report shall be submitted to BHEL.

The tests which cannot be carried out in the field laboratory shall be done at a laboratory of repute. This includes selected IITs, NCB, CSMRS, reputed government / autonomous laboratories / organizations, NITs and other reputed testing laboratories. The test samples for such test shall be jointly selected and sealed by the engineer and thereafter these shall be sent to the concerned laboratory through the covering letter signed by BHEL engineer. The test report along with the recommendations shall be obtained from the laboratories without delay and submitted to BHEL/NTPC.

Based on the schedule of work agreed with the engineer-in-charge and the approved FQP, the contractor shall prepare a schedule of tests and submit them to the engineer-in-charge and organize to carry out the tests as scheduled /agreed.

4) **Sampling And Testing Of Construction Materials**

The method of sampling for testing of construction materials and work / job samples shall be as per the relevant IS / standards / codes and in line with the requirements of the technical specifications / quality plans. All samples shall be jointly drawn, signed and sealed wherever required, by the contractor and the engineer or his authorized representative. The contractor shall carry out testing in accordance with the relevant IS

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-V QUALITY ASSURANCE AND INSPECTION FOR CIVIL WORKS

/standards / codes and in line with the requirements of the technical specifications /quality plans.

Where no specific testing procedure is mentioned, the tests shall be carried out as per the best prevalent engineering practices and to the directions of the Engineer. All testing shall be done in the presence of the engineer or his authorized representative in a NABL accredited / Govt. Laboratory acceptable to BHEL.NTPC. This includes all IITs, NCB, CSMRS, reputed government / autonomous laboratories / organizations, NITs and other reputed testing laboratories. The test samples for such test shall be jointly selected and sealed by the engineer and thereafter these shall be sent to the concerned laboratory through the covering letter signed by BHEL engineer. The test report along with the recommendations shall be obtained from the laboratories without delay and submitted to NTPC.

5) Purchase And Service

All structural steel shall be procured from main steel producers like SAIL, TISCO, RINL, Essar Steel, Ispat Industries, JSW Steel, Lloyds Steel Industries, Jindal Steel & Power and Sunflag Steel & Iron Co., Bhandara [only for rounds (15-105mm), flats (45-120 mm width & 4.75-28 mm thick), hex rods (15.5-42 mm) and wire rods (5.5-38 mm)]. In case of non-availability of some of the sections with main steel producers the contractor may propose to procure the sections from re-rollers of the main steel producers, the name of such re-rollers will have to be cleared by corporate quality assurance of NTPC for which details such as BIS approval, main steel producer's approval, past experience for production of sections of specified material, details of machines plants testing facilities etc. Confirmation that the process control and manufacturing of steel sections by re-rollers shall be same as that of main steel producers, that billets for re-rolling will be sourced from main steel producers only shall be furnished with regards to re-roller. Even after clearance of re-rollers, induction of billets with identified and correlated Mill test certificates (TC's) in the process of re-rolling, sampling of steel, quality checks thereof and stamping of final product for further identification and correlation with TC's prior to dispatch shall be the responsibility of the contractor and these shall be performed in presence of the authorized representative of the main Contractor.

Reinforcement steel shall be procured from main steel producers like SAIL, TISCO, RINL, Essar Steel, Ispat Industries, JSW Steel, Lloyds Steel Industries, Jindal Steel & Power and Jai Balaji Industries Ltd, Durgapur (for 8-40mm reinforcement steel) and mill test certificates (TC) is to be obtained and submitted to NTPC for co-relatio

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-V QUALITY ASSURANCE AND INSPECTION FOR CIVIL WORKS

6) **Field Quality Plant**

The work at site shall be approved as per the approved FQP, Tentative FQP is attached for reference.

7) **General QA Requirements**

The contractor shall ensure that the works, BOIs and services under the scope of contract whether manufactured or performed within contractor's works or at his sub-contractor's premises or at the NTPC's site or at any other place of work are in accordance with the NTPC/BHEL technical specification, applicable standards /codes, approved drawings / data sheets / quality plans and BOQ. All the works, BOIs and services shall be carried out as per the best prevalent engineering practices and to the directions of the Engineer.

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter-VI LIST OF DRAWINGS

LIST OF DRAWINGS/Documents (For Tender Purpose only)
(Annexure-II)

S. NO.	TITLE	DRAWING No.	REV. NO.
1	Vicinity MAP	5714-004-@-POC-A-001	Rev-C
2	Typical Details of Approach Roads.	5714-004-POC-A-002	Rev-A
3	NTPC Specification		
4	NTPC Vendor List.		
5	Field Quality Plan		