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VOLUME - IA

TECHNICAL CONDITIONS OF
CONTRACT (TCC) FOR
CONSTRUCTION OF CONTROL
ROOM BUILDING (PESS),
STORES BLDG, CIVIL WORKS
FOR SWITCHYARD & SECURITY
ROOM, SUPPLY AND E & C OF
ILLUMINATION PESS BUILDING,
ERECTION OF FDA SYSTEM AT
SOLAR POWER PLANT OF
1X65MW NLC, NEYVELI,
TAMILNADU.

TCC No: HY/PE&SD/E&C-Sub Contract/ Solar/65MW/NLC/ PESS,
Rev 00

BHARAT HEAVY ELECTRICALS LIMITED

PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD



Project Engineering & Systems Division

TCC No: HY/PE&SD/E&C-Sub Contract/ Solar/65MW/NLC/ PESS, Rev.00

Technical Conditions of Contract –Volume I A (Part I: Contract Specific Details) Page

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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TECHNICAL CONDITIONS OF CONTRACT (TCC)(Part-I)

Chapter-I Project Information

1.0 Project Details

NLC is setting up 2 blocks of Grid Interactive Solar PV Plant of each 65 MW on EPC basis at Neyveli in Tamilnadu. The Plant is divided into 2 blocks, each of 65 MW. BHEL has been awarded with 1 block of 65 MW.

1	Customer	:	Neyveli Lignite Corporation Ltd. (NLC)
2	Project Information	:	1x65 MW Solar PV Plant of NLC at Neyveli in Tamilnadu.
3	Location	:	Neyveli, Cuddalore District in Tamilnadu
4	Address Detail	:	Neyveli, Cuddalore District in Tamilnadu
5	Nearest Railway Station	:	Neyveli Railway Station
6	Site Details	:	The project site consists of 325 Acres i.e. 200 Acres in between NLC Block-2 to Block-7 and 125 Acres adjacent to Neyveli New Thermal Power Project.
7	Nearest Air Port	:	Tiruchirapalli
11	Ambient Air Temperature (Average)	:	a) Outdoor : 50 ⁰ C b) Indoor : 45 ⁰ C
12	Average Relative Humidity	:	100 % Maximum
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) (Part-I)

Chapter-II Scope of Works

2.0 SCOPE OF WORK

This section list major scope of work for construction of Power Export Sub-Station (PESS), Stores Bldg, Civil Works for Switchyard & Security Room, Supply and E & C of Illumination for PESS, E & C of FDA System for 1 x 65 MW of Solar PV Plant of NLC at Neyveli, Tamilnadu to be carried out by contractor, but not limited to following for safe, speedy completion of this package.

2.1 The work to be performed under the scope of this tender mainly consists of but not limited to complete Civil , Structural and Architectural work.

For operation and maintenance of SPV Plant two nos. of Control Room Building (PESS) with Inverter Rooms, Parking sheds etc, shall consist of the following:

1. Control room building (PESS Building)- 2 nos
2. Foundations for PEB inverter rooms (PCSS rooms)- 11 nos
3. Parking sheds to PESS - 2 nos
4. Metering yard
5. Security rooms
6. Cable trenches, transformer foundations in rooms
7. Fence & gate for inverter room, metering yard
8. Earth pit civil works (Excavation & Hole for Earth Pit, Top wall and Fixing of Earthing pipe)
9. Supply and E & C Illumination works for PESS Building.
10. E & C of FDA System for the items supplied by BHEL.

The PESS shall be RCC framed structure with bricks/concrete blocks masonry walls. The PESS shall have entry lobby and portico with roof for vehicle stoppage.

TECHNICAL CONDITIONS OF CONTRACT (TCC) (Part-I)

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) (Part-I)

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) (Part-I)

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(NLC)
b	Open space for storage (as per availability)	Yes		Location will be finalized after joint survey with customer(NLC)
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		Refer below note Point 1
3.2.2	Electricity for the office, stores, canteen etc. of the bidder			Not applicable
3.2.3	Electricity for living accommodation of the bidder's staff, engineers, supervisors etc			Not applicable
3.3.0	WATER SUPPLY			
3.3.1	For construction purposes	Yes		Refer below note Point 2
3.3.2	<u>Water supply for bidder's office, stores, canteen etc</u>			Not applicable
3.3.3	<u>Water supply for Living Purpose</u>			Not applicable

TECHNICAL CONDITIONS OF CONTRACT (TCC) (Part-I)

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) (Part-I)
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 (Concreting B/W, etc.) 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	
j	Arranging the materials required for Work		Yes	

TECHNICAL CONDITIONS OF CONTRACT (TCC) (Part-I)

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	
k	Coordination for inspection & checking and getting clearance from customer		Yes	
l	Preparation of formats for completion of activities		Yes	

Note:

1. 3-Phase power supply will be made available by customer free of charge at one point near the plant are of each site. Contractor has to make required lines, power conversion, control and distribution network for meeting construction loads.

2. Water required for the construction purposes will be made available by customer free of charge at one point near the plant are of each site. Contractor has to make required arrangements to meet their requirement.

TECHNICAL CONDITIONS OF CONTRACT (TCC) (Part-I)

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(AZAX with printer)	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	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 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 coarse & fine aggregates	1 set	
16	Jar/Beaker for Bulk density test of sand	1 no.	
15	Proctor test equipments	1 set	

TECHNICAL CONDITIONS OF CONTRACT (TCC) (Part-I)

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.

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.

TECHNICAL CONDITIONS OF CONTRACT (TCC) (Part-I)

Chapter-VI: Time Schedule

6.1 TIME SCHEDULE

6.1.1

The entire work of construction of Central Monitoring and Control Station (PESS), Store & Security Room, switchyard civil works and associated 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 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

The activities for Excavation, Concreting, Architectural, structural & other civil construction works, etc. 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 in 4 months for Central Monitoring and Control Station (PESS).

6.3.3

Requisite Material, men and machinery should be arranged in order to complete the project within stipulated time period.

6.3.4

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) (Part-I)

Chapter-VI: Time Schedule

TENTATIVE SCHEDULE

S.No.	Activity/Mile stone	Duration in months	
		Start	Finish
1	Site Mobilization and Preparatory Works	Oct'16	Oct'16
2	PESS Room Construction:	Oct'16	Jan'17
3	Store shed, Security room foundation.	Oct'16	Dec'16
4	Switchyard civil works	Oct'16	Jan'17
15	Completion of facilities		Jan'17

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 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 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) (Part-I)

Chapter-VII: Payment Terms

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) (Part-I)

Chapter-VIII Taxes, Duties, Levies

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

8.1.3 VAT (Sales Tax /WCT)

TECHNICAL CONDITIONS OF CONTRACT (TCC) (Part-I)

Chapter-VIII Taxes, Duties, Levies

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.

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

TECHNICAL CONDITIONS OF CONTRACT (TCC) (Part-I)

Chapter-VIII Taxes, Duties, Levies

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.

TECHNICAL CONDITIONS OF CONTRACT (TCC) (Part-II)

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 and elsewhere till handing over of the entire work. The work shall conform to dimensions and tolerances specified in the 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

TECHNICAL CONDITIONS OF CONTRACT (TCC) (Part-II)

Chapter-I General

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.

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

TECHNICAL CONDITIONS OF CONTRACT (TCC) (Part-II)

Chapter-I General

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 NLC/BHEL.

1.19

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

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

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) (Part-II)

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2.0 SCOPE

The work will involve all civil, structural and architectural works connected such as jungle clearance, earth work, concrete work, steel work, embedment, plastering and painting, etc.

2.1 DETAILED SPECIFICATION

The PESS building shall be made of RCC framed structure with bricks/concrete blocks masonry walls. The thickness of outer masonry walls shall be minimum 230mm in case of bricks and minimum 200mm thick in case of concrete blocks. The following detailed specification shall also be followed for RCC works:

Floor Finishes

Switchgear/Inverter rooms:	Cement concrete flooring with ironite hardener.
SCADA room:	Heavy duty vitrified ceramic tiles
Battery room:	Acid/Alkali resistance tile flooring and dado (2100 mm)
Lobby:	Heavy duty vitrified ceramic tiles and skirting
Toilet:	Heavy duty anti-skid ceramic Tiles and dado 2100 mm
Steps:	Kota stone/Granite- 20 mm thick
Store room:	Cement concrete flooring with ironite hardener.

Flooring for air conditioned areas shall be provided with vitrified ceramic tiles of size 600X 600 mm of min 9 mm thickness, laid with 3 mm ground joints as per approved pattern. Cement concrete flooring shall conform to IS 2571.

The floor finish for toilet shall be vitrified ceramic anti-skid tiles and Dado glaze ceramic tiles up to 2.1m shall be used. The normal size of Ceramic tiles shall be 300 mm X 300 mm X 9 mm and shall comply IS: 15622.

Finish floor level of all building shall be minimum 450 mm above from Finish graded level.

False Ceiling

The SCADA room shall be provided with false ceiling of 15 mm thick mineral fiber board, in tile form of size 600mm x 600mm, along with galvanized light gauge rolled form supporting system in double web construction pre painted with steel capping, of approved shade and color, to give grid of maximum size of 1200x600 mm as per manufacturers details including supporting grid system, expansion fasteners for

TECHNICAL CONDITIONS OF CONTRACT (TCC) (Part-II)

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suspension arrangement from RCC, providing openings for AC ducts(if required), return air grills(if required), light fixtures, etc., all complete.

Roof Finishes

Roof of the Building shall consist of Cast-in-situ RCC slab treated with a water proofing system. The roof of the building shall be water proof with Polymeric membrane type waterproofing as per DSR 2013, Items no.22.16. The roof shall be designed for minimum superimposed load to 150kg/m².

For efficient disposal of rainwater, the run off gradient for the roof shall not be less than 1:100 and the roof shall be provided with RCC water gutter, wherever required. Gutter shall be made water tight using suitable watertight treatment. This gradient can be provided either in structure or subsequently by screed concrete 1:2:4 (using 12.5 mm coarse aggregate) and/or cement mortar (1:4). However, minimum 25 mm thick cement mortar (1:4) shall be provided on top to achieve smooth surface. The roof of all building shall be projecting out by at least 750 mm all around the building for its external walls protection from rain water and parapet wall above roof beam. Height of parapet wall shall be minimum 300 mm above top of roof level. Structural steel hand railings of minimum 700mm height shall also be provided over the parapet wall. The bidder shall also provide structurally adequate rain water harvesting system in order to ensure rain water harvesting.

View point.

RCC terrace of PESS building shall also work as view point. View point shall be used for security purposes and viewing gallery. Suitable staircase with hand railings and foundation shall be provided for access to roof of the RCC PESS building.

Windows, Doors, Ventilators and Rolling Shutters

Doors, windows and ventilators of air-conditioned areas, entrance lobby of all buildings, and all windows and ventilators of PESS building shall have, powder coated (minimum thickness of powder coating 50 micron) aluminum framework with glazing. Window shall be provided with suitable aluminum grill.

All doors of toilet areas shall be of steel framed solid core flush shutter as per IS 2202. Minimum size of door provided shall be 2.1 m high and 1.2 m wide. However for toilets minimum width shall be 0.75 m and office areas minimum width shall be 1.20 m.

Doors and windows on external walls of the buildings (other than areas provided, with insulated metal claddings) shall be provided with RCC sunshade over the openings with 300 mm projection on both side of the openings. Projection of sunshade from the wall shall be minimum 450 mm over window openings and 750 mm over door openings except for main entrance door to the control room where the projection shall be 1500mm.

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Rolling shutter (Mechanical gear operated). Rolling shutters shall be fabricated from 18 gauge steel and machine rolled with 75 mm rolling centers with effective bridge depth of 12 mm lath sections, interlocked with each other and ends locked with malleable cast iron clips to IS: 2108 and shall be designed to withstand a wind load without excessive deflection. Metal rolling shutters and rolling grills as IS: 6248

Glazing

All accessible ventilators and windows of all buildings shall be provided with min. 4mm thick float glass, tinted for preventing solar radiations, unless otherwise specified.

For single glazed aluminum partitions and doors, toughened float glass of 10 mm thickness shall be used. All glazing work shall conform to IS: 1083 and IS: 3548.

The glass to use should be from reputed brand / manufacturer and as approved by NLC. The glass should be free from distortion and thermal stress.

Paintings of wall and ceilings

Internal wall surfaces:

SCADA room / All other rooms in plant buildings- Acrylic Emulsion- Oil bound distemper.

External faces of walls: - Exterior emulsion paint

Walls of battery room - Chlorinated rubber paint, an exposed walls above Dado – 2100 mm high Dado of Acid / Alkali resistant tiling.

All Ceiling - Oil bound distemper (office rooms without false ceiling), Acid resistant resin based Epoxy coating (Battery rooms), and Whitewashing (all other areas)

The paint shall be anti-fungal quality of reputed brand suitable for masonry. All painting on masonry or concrete surface shall preferably be applied by roller. If applied by brush then same shall be finished off with roller. For painting on concrete, masonry and plastered surface, IS: 2395 shall be followed. Minimum 2 finishing coats of paint shall be applied over a coat of primer.

For painting on steel work and ferrous metals, BS: 5493 and IS: 1477 shall be followed. The type of surface preparation, thickness and type of primer, intermediate and finishing paint shall be according to the painting system adopted.

Ceiling of all rooms except Battery room shall be white washed. The ceiling of Battery room (if provided) shall be acid/alkali resistant paint.

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A standard colour scheme for the different buildings/structures shall be prepared by the Contractor and the approval of the Owner shall be obtained, before commencement of work.

Plumbing and sanitary

PESS room shall have attached toilet for both Gender. Each toilet shall have the following minimum fittings.

- (a) Wall mounted WC (Western type) 390 mm high with toilet paper roll holder and all fittings
- (b) Wall mounted Urinal (430 x 260 x 350 mm size) with all fittings for male toilet only.
- (c) Wash basin (550 x 400 mm) above platform with all fittings.
- (d) Bathroom mirror (600 x 450 x 6 mm thick) hard board backing
- (e) CP brass towel rail (600 x 20 mm) with C.P. brass brackets
- (f) Soap holder and liquid soap dispenser

All fittings, fastener, grating shall be brass with chromium plated as per relevant IS code. Necessary plumbing lines shall be provided for PESS room building and Security room near main gate.

The bidder shall design & provide packaged sewerage treatment plant for PESS and Security room assuming that a total of 15 people shall use the facility.

Doors Frames:

Door frames shall be of T-iron frame of mild steel Tee-sections as per DSR-2013 item no 10.13. All doors shall be provided necessary fittings like hinges, handles, mortise locks, tower bolts, stopper, hydraulic door closer, etc. of CP brass complete. Black powder coated aluminum doors shall be with extruded built up standard tubular sections, appropriate Z sections and other sections of approved make conforming to IS: 733 and IS: 1285, fixed to Pre-Engineered structure including necessary filling up of gaps at junctions with required PVC/neoprene felt etc. including hinges / pivots and double action hydraulic floor spring of approved brand and manufacture IS: 6315 marked, lock, handle and all necessary fittings as detailed in tender drawing or submitted by bidder in shop drawing and approved by NLC. The door entrance shall include Mild Steel single leaf door. The structural steel shall conform to IS: 7452 and IS: 2062. The holdfasts shall be made from steel flats (50 mm and 5 mm thick). The fixtures, fastenings and door latch are to be made with same materials.

Windows Frame:

Aluminum black powder coated section, frame shall be of 92x31 mm, minimum 16G thick as per approved design. Tinted glass and aluminum grill shall be provided.

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Ventilators:

Aluminum black powder coated frame of minimum size 62x25 mm and 16G thick as per approved design. Ventilators/duct shall be provided with bird guard. Size of opening at wall for ducts shall be as per PCU manufacture and min 18 gauge GI sheet. Ducts shall be supported with suitable means, as approved during detail engineering. All accessible ventilators and windows of all buildings shall be provided with min. 4mm thick float glass, tinted for preventing solar radiations. Suitable sunshades made out of approved colour sheet will be provided to all external windows and door. The minimum projection for the sunshades will be 450 mm and 300mm wider than the width of the opening.

Rolling shutter:

Rolling shutter (Hand operated) shall be fabricated from 18 gauge steel and machine rolled with 75 mm rolling centres with effective bridge depth of 12mm lath sections, interlocked with each other and ends locked with malleable cast iron clips to IS:2108 and shall be designed to withstand a wind load without excessive deflection. Metal rolling shutters and rolling grills as IS: 6248.

Plinth Protection:

750 wide plinth protection minimum 75 mm thick of cement concrete 1:3:6 (cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size) over 75 mm bed of dry brick ballast 40 mm nominal size well rammed and consolidated and grouted with fine sand including finishing the top smooth, shall be provided around the Pre-Engineered Building.

Floor Finish:

Flooring, including preparation of surface, cleaning etc. shall be of cement concrete flooring as per IS: 2571 with ironite hardener. The inverter room floor shall be at least 450 mm above the ground level.

ILLUMINATION SYSTEM

LED Fixtures:

All light fittings inside PESS shall be indoor type and pre-wired comprising of Lamp(s) with lamp holder(s), Electronic powering unit(s) and metal reflector(s). The lamp fitting shall be covered by Glass or Perspex material. The Lamp Fixture shall be fitted on roof.

LIGHTING Cable

Cable shall be 1100 V grade, PVC insulated, copper conductor, armoured and overall PVC sheathed type of size 2.5 Sqmm. & above. For power socket connection aluminium conductor cable of min. 6 Sqmm size shall be used.

Lighting panels etc. shall be earthed by two separate and distinct connections with earthing system.

TECHNICAL CONDITIONS OF CONTRACT (TCC) (Part-II)

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RECEPTACLE

Receptacles boxes shall be fabricated out of MS sheet of 2mm thickness and hot dipped galvanised or of die-cast aluminium alloy of thickness not less than 2.5 mm. The boxes shall be provided with two nos. earthing terminals, gasket to achieve IP55 degree of protection, terminal blocks for loop-in loop-out for cable of specified sizes, mounting brackets suitable for surface mounting on wall/column/structure, gland plate etc. The ON-OFF switch shall be rotary type heavy duty, double break, AC23 category, suitable for AC supply. Plug and Socket shall be shrouded Die-cast aluminium. Socket shall be provided with lid safety cover. Robust mechanical interlock shall be provided such that the switch can be put ON only when the plug is fully engaged and plug can be withdrawn only when the switch is in OFF position. Also cover can be opened only when the switch is in OFF position. Wiring shall be carried out with 1100 V grade PVC insulated stranded aluminium/copper wire of adequate size. The Terminal blocks shall be of 1100 V grade. The Terminal blocks shall be of 1100 V grade made up of unbreakable polyimide 6.6 grade with adequate current rating and size. The welding receptacles shall be provided with inbuilt ELCB rated for suitable mA sensitivity.

GALVANISING

Galvanising of steel components and accessories shall conform to IS:2629 , IS4759 & IS:2633. Additionally galvanising shall be uniform, clean smooth, continuous and free from acid spots.

The amount of zinc deposit over threaded portion of bolts, nuts, screws and washers shall be as per IS:1367. The removal of extra zinc on threaded portion of components shall be carefully done to ensure that the threads shall have the required zinc coating on them as specified.

Ventilation:

Exhaust fans shall be mounted on wall openings provided with louvers and insect proof screen. These shall be industrial type.

MAKE OF COMPONENTS:

Make of components shall be as per customer approved vendor list as provided below

S. no.	Item	Approved Vendors
1	LED lamp fixtures for indoor	BAJAJ CGL Havells Philips Wipro
2	LT power cables	Asian Cables CCI Cords Finolex Fort Gloster GEMSCAB Havells Incab

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		KEC KEI Nicco PARAMOUNT CABLE Polycab RADIANT CABLES RAVIN CABLES RPG Torrent Cables UNIVERSAL CCI(Cable Corporation of India) GUPTA POWER
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Tentative list of Illumination Items :

40 MW Site

Sl	Item Description	UOM	Qty
1	40W LED batton type fixture (Bajaj Catalog no. BICDP 40W LED or Equivalent)	Nos	36
2	Industrial 10W LED bulkhead type fixture (IP65) (Bajaj Catalog no. BIBWP 10W LED or Equivalent)	Nos	1
3	Surface mounted 18W LED Fixture (Bajaj catalogue No. BGSLO Sleek Surface 18 WH RD)	Nos	6
4	Recessed mounted 36W LED Fixture (2x2 Bajaj Catalogue no BARSQ 36W NW)	Nos	9
5	SSB-1 Surface mounted swbd with 1 nos 5A piano type switches (modular type). Switch board shall have provision for terminating 3nos. 3CX2.5sqmm Cu. PVC Armoured cable.	Nos	14
6	SSB-2 Surface mounted swbd with 2 nos 5A piano type switches (modular type). Switch board shall have provision for terminating 4nos. 3CX2.5sqmm Cu. PVC Armoured cable.	Nos	7
7	SSB-2+R Surface mounted swbd with 2 nos 5A piano type switches and 1 no. electronic fan regulator. (modular type). Switch board shall have provision for terminating 4nos. 3CX2.5sqmm Cu. PVC Armoured cable.	Nos	1
8	Domestic type surface mounted 5/15A receptacle with switch (Modular Type)	Nos	15
9	63A TPN Welding Socket with Plug and interlocked Switch	Nos	1

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10	6 Way TPN Indoor type Lighting Panel (Surface mounted) with 32A, 4pole RCBO at the incomer & 6 Nos 20A SPN MCB at the outgoing .	Nos	2
11	3 Way 1Ph Indoor type UPS Power distribution board (Surface mounted) with 32A DP RCBO at the incomer & 6 Nos 20A SPN MCB at the outgoing .	Nos	1
12	Ceiling Fan 1200mm blade	Nos	1
13	Industrial grade Exhaust Fan 1ph, 0.2 kW	Nos	7
14	Industrial grade Exhaust Fan with DOL starter (415V, 3 PHASE, 0.75kW, 10000CMH)	Nos	3
15	Data connector Box (Surface Mounted)	Nos	1
16	1.5 Ton Split AC (5-Star) with stabiliser & MCB Box	Nos	1
17	2 Ton Split AC (5-Star) with stabiliser & MCB Box	Nos	3
18	200x150x100mm rectangular JB with 4nos. Terminal block suitable for 4sqmm wire. JB shall have 4nos. Cable entry suitable for 3Cx2.5sq mm PVC armoured cu. cable with Cable Gland.	Nos	53
19	200x150x100mm rectangular JB with 4nos. Terminal block suitable for 6sqmm wire. JB shall have 4nos. Cable entry suitable for 3Cx6sq mm PVC armoured Al. cable with Cable Gland.	Nos	20
20	3Cx2.5sqmm Cu. PVC Armoured Cable	Mtr	1400
21	3Cx6 sqmm Al.. PVC Armoured Cable	Mtr	500
22	Flexible Wires 2.5sqmm Cu for JB to fixture & 6 sqmm Al. for JB to sockets, GI stripped flexible conduit, Cable clamps, GI Clamp & Galvanised steel chain for fixture mounting, ISA/ISMC/GI FLAT and any other accessories for installation of above items - 1 LOT	LOT	1
23	E&C of the above items(S. no. 1 to 22)	Lot	
25 MW Site			
1	40W LED batton type fixture (Bajaj Catalog no. BICDP 40W LED or Equivalent)	Nos	30
2	Industrial 10W LED bulkhead type fixture (IP65) (Bajaj Catalog no. BIBWP 10W LED or Equivalent)	Nos	1
3	Surface mounted 18W LED Fixture (Bajaj catalogue No. BGSLO Sleek Surface 18 WH RD)	Nos	6

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4	Recessed mounted 36W LED Fixture (2x2 Bajaj Catalogue no BARSQ 36W NW)	Nos	9
5	SSB-1 Surface mounted swbd with 1 nos 5A piano type switches (modular type). Switch board shall have provision for terminating 3nos. 3CX2.5sqmm Cu. PVC Armoured cable.	Nos	14
6	SSB-2 Surface mounted swbd with 2 nos 5A piano type switches (modular type). Switch board shall have provision for terminating 4nos. 3CX2.5sqmm Cu. PVC Armoured cable.	Nos	7
7	SSB-2+R Surface mounted swbd with 2 nos 5A piano type switches and 1 no. electronic fan regulator. (modular type). Switch board shall have provision for terminating 4nos. 3CX2.5sqmm Cu. PVC Armoured cable.	Nos	1
8	Domestic type surface mounted 5/15A receptacle with switch (Modular Type)	Nos	15
9	63A TPN Welding Socket with Plug and interlocked Switch	Nos	1
10	6 Way TPN Indoor type Lighting Panel (Surface mounted) with 32A, 4pole RCBO at the incomer & 6 Nos 20A SPN MCB at the outgoing .	Nos	2
11	3 Way 1Ph Indoor type UPS Power distribution board (Surface mounted) with 32A DP RCBO at the incomer & 6 Nos 20A SPN MCB at the outgoing .	Nos	1
12	Ceiling Fan 1200mm blade	Nos	1
13	Industrial grade Exhaust Fan 1ph, 0.2 kW	Nos	7
14	Industrial grade Exhaust Fan with DOL starter (415V, 3 PHASE, 0.75kW, 10000CMH)	Nos	2
15	Data connector Box (Surface Mounted)	Nos	1
16	1.5 Ton Split AC (5-Star) with stabiliser & MCB Box	Nos	1
17	2 Ton Split AC (5-Star) with stabiliser & MCB Box	Nos	3
18	200x150x100mm rectangular JB with 4nos. Terminal block suitable for 4sqmm wire. JB shall have 4nos. Cable entry suitable for 3Cx2.5sq mm PVC armoured cu. cable with Cable Gland.	Nos	53
19	200x150x100mm rectangular JB with 4nos. Terminal block suitable for 6sqmm wire. JB shall have 4nos. Cable entry suitable for 3Cx6sq mm PVC armoured Al. cable with Cable Gland.	Nos	20

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20	3Cx2.5sqmm Cu. PVC Armoured Cable	Mtr	1300
21	3Cx6 sqmm Al.. PVC Armoured Cable	Mtr	450
22	Flexible Wires 2.5sqmm Cu for JB to fixture & 6 sqmm Al. for JB to sockets, GI stripped flexible conduit, Cable clamps, GI Clamp & Galvanised steel chain for fixture mounting, ISA/ISMC/GI FLAT and any other accessories for installation of above items - 1 LOT	LOT	1
23	E&C Price of the above items(S. no. 1 to 22)	Lot	
Mandatory Spares for 40 MW & 25 MW			
1	40W LED batton type fixture (Bajaj Catalog no. BICDP 40W LED or Equivalent)	Nos	7
2	Industrial 10W LED bulkhead type fixture (IP65) (Bajaj Catalog no. BIBWP 10W LED or Equivalent)	Nos	1
3	Surface mounted 18W LED Fixture (Bajaj catalogue No. BGSLO Sleek Surface 18 WH RD)	Nos	2
4	Receesed mounted 36W LED Fixture (2x2 Bajaj Catalogue no BARSQ 36W NW)	Nos	2

TECHNICAL CONDITIONS OF CONTRACT (TCC) (Part-II)

Chapter-II: PESS Building, Store & Security Room, Illumination, FDA(E & C)

Fire Detection and Alarm system: Complete erection and commissioning of FDA as per Table-FDA is in the scope of vendor. Free issue items to vendor by BHEL is also mentioned in the Table – FDA, except erection hardware which is in the scope of vendor.

Table - FDA

Sl. No.	Items	Quantity	Unit	
1	Local Fire alarm Panel	1	No.	Free Issue by BHEL
2	Multi sensor detector	22	No.	Free Issue by BHEL
3	Hooter cum Strobe	4	No.	Free Issue by BHEL
4	Interface Modules	4	No.	Free Issue by BHEL
5	MCP	4	No.	Free Issue by BHEL
6	Isolator Modules	5	No.	Free Issue by BHEL
7	Loop Cable (2C x 1.5 sqmm)	100	mts.	Free Issue by BHEL
8	Power cable (3C x 2.5 sqmm)	50	mts.	Free Issue by BHEL
9	Supply of Erection Items (saddle, clamps, screws, nut, bolt etc.) In Rupees	1	Lot	
10	E&C of above items	1	Lot	

TECHNICAL CONDITIONS OF CONTRACT (TCC) (Part-II)

Chapter-III SWITCHYARD CIVIL WORKS

3.0 SCOPE

The work will involve all civil, structural and architectural works connected such as jungle clearance, earth work, concrete work, steel work, embedment, plastering and painting, etc.

This part includes the technical requirements for 33KV Switchyard/metering yard works (as indicated in SLD drawing) including execution of all associated civil works. The specifications are intended for general description of work, quality and workmanship. The specifications are not however exhaustive to cover minute details and work shall be executed according to relevant latest Indian standards/IRC or IRS Specifications. This specification covers construction of all civil, structural and architectural works. The materials specification for the switchyard items shall be same as the material specification mentioned for PESS building unless otherwise quoted specifically in this clause.

Minimum Thickness of Members & Galvanization

All steel work used in construction of switchyard structure such as Towers & Beams, Lightening mast and equipment supporting structures including nuts, bolts and washers shall be galvanized.

Minimum section thickness shall not be less than 4 mm. Weight of zinc coating shall be at least 0610 kg/sqm. and foundation bolts shall have heavier zinc coating of at least 080kg/sqm.

TECHNICAL CONDITIONS OF CONTRACT (TCC) (Part-II)

Chapter-IV GENERAL CIVIL WORKS

4.1 General Civil works

a) Water Supply:

GI pipes of Medium quality conforming to IS 1239 (Part I-1990) shall be used for all water supply and plumbing works. The Syntax or equivalent make PVC storage water storage tank conforming to IS: 12701 shall be provided over the roof of the PESS with adequate capacity for 10 No person and 24 hr requirement, complete with all fitting including float valve, stop cock etc. The capacity of the tank shall be minimum 500 liters. The over roof water tanks shall have suitable provision for avoiding heating of water from direct sunlight during day timings

b) Plastering:

All external surfaces shall have 18 mm cement plaster in two coats, under layer 12 mm thick cement plaster 1:5 and finished with a top layer 6 mm thick cement plaster 1:6 (DSR 2013-13.11). White cement primer shall be used as per manufacturer's recommendation. At least one coat of plaster shall be applied to interior walls by hand or mechanically, to a total thickness of 12 mm using 1:6, 1 cement and 6sand. Plastering shall comply to IS: 1542, IS: 1661, IS: 1630. Oil bound washable distemper on smooth surface applied with minimum 2 mm thick Plaster of Paris putty for control room. Plaster of Paris (Gypsum Anhydrous) conforming to IS: 2547 shall be used for plaster of Paris punning.

c) 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 PESS facing the transformer area shall be

TECHNICAL CONDITIONS OF CONTRACT (TCC) (Part-II)

Chapter-IV GENERAL CIVIL WORKS

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 NLC/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.

d) 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 NLC/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 NLC/BHEL. The same shall be adopted subject to approval from NLC/BHEL for specific work.

TECHNICAL CONDITIONS OF CONTRACT (TCC) (Part-II)

Chapter-IV GENERAL CIVIL WORKS

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.

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.

e) 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.

f) 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.

g) Transformer yard civil works:

Transformer and equipment's foundations shall be founded on piles/isolated spread footings depending on the final geotechnical investigation report. Transformer foundations shall have its own pit which would cover the area of the transformer and cooler banks, so as to collect any spillage of oil or oil drainage in case of emergency. The oil pit shall be filled with granite stones of 40 mm size uniformly graded. The individual oil pits shall be connected to an oil collection pit which shall be sized to accommodate oil

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Chapter-IV GENERAL CIVIL WORKS

volume of the transformer connected to it, without backflow. The oil pit shall be connected to oily water drainage system. Dimensions of the discharge pipe shall consider rainfall intensity also. The water shall be discharged into the nearest drain by gravity flow or pumping. The area around the transformer and equipment's shall be covered with gravel and galvanized chain link fence of height min 1.8 m with fence posts and gates shall be provided. All fence posts shall be 50X50X6 MS angles spaced at 2.5m c/c distance and all other specification mentioned at clause no. 5 for Fencing and gate shall be followed. M.S. angle posts shall conform to IS: 2062. The portion of the fence covering towards rail track shall be made of removable type for movement of transformer during erection /removal. In addition a small gate, 1.2 m wide shall be provided for man entry. The transformer yard fencing work shall conform to CEIG requirements. Transformer track rails shall conform to IS: 3443. The requirement of fire barrier wall between transformers shall be as per Electricity Rules and IS:1646 recommendations.

h) Pipe/Cable Racks & Trenches

Trenches shall be constructed in reinforced cement concrete of M-20/ approved grade of wall thickness min 150 mm. The top of trenches shall be kept at least 100 mm above the gravel level so that rain water does not enter the trench. Trench walls shall not foul with the foundations.

Outdoor Cable Trenches: RCC cable trenches shall be constructed with pre-cast RCC removable covers with lifting arrangement, edge protected with suitable galvanized angle iron designed to withstand self-weight of top slab + concentrated load of 150 kg at center of span on each panel.

Indoor Cable Trenches: RCC indoor cable trenches shall be provided with 50X50X6 mm angles grouted on the top edge of the trench wall for holding minimum 7 mm thick mild steel checkered plate covers (600 mm in length except at ends & bends) with lifting arrangement. Angle or channels shall also be grouted at distances of 600 mm across the indoor cable trenches to support the checkered plates.

Trench Drainage: The trench bed shall have a slope of approx. 1/500 along the run & 1/250 perpendicular to the run. In case straight length exceeds 30 m, suitable expansion joint shall be provided at appropriate distances. The expansion joint shall run through vertical wall and base of trench. All expansion joints shall be provided with approved quality PVC water stops.

Suitable drainage at lowest point of the trench shall be provided

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

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i) Electrification of Building.

Electrification of all building shall be carried out as per IS 732-1989, IS: 4648-1968 and other relevant standards.

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Chapter-V GENERAL TECHNICAL SPECIFICATIONS

PREAMBLE TO THE SCHEDULE OF QTS. (SOQ)

- 1) Details of the items in this Schedule shall be read in conjunction with the corresponding NLC 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.
- 8) Incase 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.

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Chapter-V GENERAL TECHNICAL SPECIFICATIONS

HIERARCHY

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

- Statutory Regulations
- NLC specification
- Items in Schedule of quantities
- IS/BS standards
- 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.

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Chapter-VI 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/NLC 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.

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Chapter-V GENERAL TECHNICAL SPECIFICATIONS

3) Laboratory and Field Testing

Field Quality Plans (FQP) shall detail out all the site tests / checks to be carried out during receipt, storage, erection of the equipment's. The Contractor /sub Contractor shall also furnish copies of the erection & commissioning manuals, reference documents and inspection procedure through soft as well as hard copy. FQP will be mutually discussed and finalized preferably in the format mentioned. In these Field Quality Plans, NLC shall identify customer hold points (CHP), i.e. test/checks which shall be carried out in presence of NLC/ Project Manager or his authorized representative and beyond which the work will not proceed without consent of NLC in writing. After FQP finalization and approval, the same shall be submitted in compiled form.

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

/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.NLC. 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 NLC.

5) Purchase And Service

Bidder to furnish documentary evidence to show that similar or higher capacity component/equipment /system has been supplied by the vendor or their associate/collaborator. The documentary evidence shall be in the form of Material Receipt Certificate/ Site Inspection Report/ Installation or erection report etc. from the end user, site/purchaser premises for having received the material.

(b) For structural steel :

1. It should conform to relevant Indian / International Standards.

TECHNICAL CONDITIONS OF CONTRACT (TCC) (Part-II)

Chapter-V GENERAL TECHNICAL SPECIFICATIONS

2. It should be of reputed make of supplier to similar construction / infrastructure projects.
3. The Bidder should furnish documentary evidence to prove (1) and (2) above.

(c) For Cement and reinforcement steel:

1. It should conform to Indian / International Standard
2. It should be of reputed makes supplied to similar construction/ infrastructure projects
3. The Bidder should furnish documentary evidence to prove (1) and (2) above

6) Field Quality Plan

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 NLC's site or at any other place of work are in accordance with the NLC/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.

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Chapter-VII LIST OF DRAWINGS

LIST OF DRAWINGS (Annexure-II)

S. NO.	TITLE	DRAWING No.	REV. NO.
1			
2			
3			
4			
5			
6			
7			
8			