Tender Document for the work of

Construction of control room (CMCS) and other civil works for

15 MWp Solar PV Power Plant Project at

NTPC MGR Singrauli site, Near Jayanth coal mine, Singrauli district, M.P.

Tender RFQ No: HCS10002

Due date and time for tender document submission: 18-04-2014, before 1:00 PM

(A) Part-I of this tender document contains:

1. Technical-cum-commercial bid **(to be filled-up by tenderer)**
2. Notice Inviting Tenders
3. Instructions to Tenderer
4. General conditions of contract
5. Special conditions of contract
6. List of Indian standards
7. Approach road drawing
8. Level crossing drawing
9. Field quality plan

(B) Part-II of this tender document contains:

1. Bill of Quantities (BoQ) for total scope of work **(to be filled-up by tenderer)**

(C) Documents to be submitted by the tenderer:

1) Offer shall be submitted in two parts: Part-I and Part-II as below:
2) **Part-I** shall be submitted with following documents:
   a) Filled-up technical-cum-commercial bid with enclosures:
      i. List of machineries, accessories, tools and fixtures planned for works
      ii. List of manpower, stage-wise and activity-wise.
      iii. Bank solvency certificate, works completion certificate.
      iv. Turnover and balance sheet statements
      v. EMD
   b) All documents listed under (A) as above duly signed by the contractor with seal.
3) **Part-II** is price bid, which shall contain filled-up Bill of Quantities as per (B) above.
4) Part-I and Part-II shall be submitted in separate sealed covers.
   Each cover shall have the **RFQ No, Tender due date** and the title **"Techno commercial Bid" / "Price bid"** titled on the cover and both covers should be put in a single overall envelope.
5) All pages of the tender document shall be signed (with seal) by the contractor.
6) The overall envelope cover shall also be super scribed with the **Description of work, RFQ no, Name & address of the tenderer** and last date of submission.
7) The tender to be dropped in **tender box marked as "CE,SC&PV,DEFENCE – Friday" at reception area** of BHEL and addressed to:
   AGM (SC&PV-Engineering)
   5th floor, New Engineering Building,
   BHEL, Electronics Division, Mysore road, Bangalore 560 026.
8) Tender shall be dropped into the above box before **1.00 PM of 18-04-2014.**

Department / Section**:** SC&PV /PV System Engineering
Ref Tender RFQ No: **HCS 10002** **Date of tender: 30-03-2014**

PART-I TECHNICAL-CUM-COMMERCIAL BID

A. Project particulars

1	Description of the work	Construction of control room (CMCS), security room and other civil works viz: approach road, pathways, drains and railway level crossing for 15MWp solar PV power plant project at NTPC MGR Singruali site, near Jayanth coal mine, Singrauli dist., MP.
2	Approx. estimated cost	Rs 583 Lakhs (Rupees five hundred and eighty three lakhs only) inclusive of all taxes, for the total scope of work
3	Stipulated period	4 months from the date of work order for all the activities put together
4	Penalty for delayed completion of work	At 0.5% per week of work order value subject to ceiling of 10% of work order value
5	Price variation clause, PVC	PVC is not applicable.
6	Payment terms	1. Payment against running account bills duly certified by BHEL engineer. 2. No advance payments

B. Bidder details (to be filled by the bidders)

1	Name of contractor	
2	Qualification	
3	Staff strength (Nos) - Technical (List to be enclosed)	Enclosed / Not enclosed
	- General (List to be enclosed)	Enclosed / Not enclosed
4	Plant and machinery (List to be enclosed)	Enclosed / Not enclosed
5	Office address of contractor	
6	Office telephone	
12	e-mail	
13	Residential address of contractor	
14	Residential telephone	
15	Whether having registration or having executed with Government agencies such as CPWD / state PWD / MES / Railways / other public sector undertakings / reputed private sector organizations.	
	Validity of registration	
16	BHEL reserves right to conduct reverse auction. Indicate acceptance. **Note:** Bidders are advised to quote their best prices as no further price bids will be accepted in case BHEL decides to open price bids instead of reverse auction.	Accepted / Not accepted

C. Pre-qualification requirements (to be filled-up with details furnished by the bidders)

Bidders, for qualification in the tender-evaluation process, should meet the following pre-qualification requirements:

1	Scope of work as per the Bill of Quantities of this tender	Understood / Not understood
2	Acceptance for execution of scope of work in totality	Yes / No
3	Financial turnover during last 3 years (audited balance sheets and profit-loss statement to be enclosed): **Note:** Average annual financial turnover for the last 3 years, ending 31-Mar-2013, shall be Rs 175 Lakhs minimum.	Enclosed / Not enclosed
4	**Experience certificate for successful completion of civil works during last 7 years from the date of this tender notice:** **Note:** Bidder should have executed civil works such as buildings, boundary walls, other infrastructural works. Copies of completion certificate shall be enclosed **<u>for any one of the three options as below</u>**: (a) Three such completed works each of value not less than 40% of estimated cost, i.e. Rs 234 Lakhs (OR) (b) Two such completed works each of value not less than 50% of estimated cost, i.e. Rs 292 Lakhs (OR) (c) One such completed work with value not less than 80% of estimated cost, i.e. Rs 467 Lakhs	 Enclosed / Not enclosed Enclosed / Not enclosed Enclosed / Not enclosed
5	Latest banker's solvency certificate from Nationalized/scheduled bank issued not earlier than 12 months from the final date of tender submission for value not less than Rs.146 lakhs.	Enclosed / Not enclosed
6	EMD particulars Note: If bidder is eligible for EMD exemption under MSME, provide the MSE certificate.	(a) Cash / Cheque: (OR) (b) Demand draft:
7	Acceptance to the drawings	Yes / No
8	Acceptance to the designs	Yes / No
9	BHEL payment terms	Acceptable / Not acceptable
10	Service tax, VAT/COT (sales tax) details to be provided	Enclosed / Not enclosed
10	Undertaking to provide Workmen compensation insurance upon award of work	Acceptable / Not acceptable

NOTICE INVITING TENDER

1	Tender RFQ No / Date	**HCS 10002 dated 30-Mar-2014**
2	Description of work	Construction of control room (CMCS), security room and other civil works viz: approach road, pathways, drains and railway level crossing for 15MWp solar PV power plant project at NTPC MGR Singruali site, near Jayanth coal mine, Singrauli dist., MP.
3	Stipulated period	4 months from the date of work order for all the activities put together
4	Penalty for delayed completion of work	At 0.5% per week of work order value subject to ceiling of 10% of work order value
5	Price variation clause, PVC	PVC is not applicable.
6	Estimated cost	Rs 583 Lakhs (Rupees five hundred and eighty three lakhs only) inclusive of all taxes, for the total scope of work
7	Earnest money deposit	Rs. 2.00 Lakhs DD in favour of **BHEL, Bangalore.**
8	Security deposit (SD)	50% of SD shall be submitted before start of work; Balance will be recovered from running bills at a rate of 10%. (SD= 4 Lakhs +5% of the amount exceeding Rs. 50 Lakhs); 50% of SD will be released after completion of all the works and remaining 50% after 6 months from the date of completion of all the works.
9	Last date and time for submission of duly filled-in tender document	Before **1.00 PM on 18-04-2014**
10	Place of submission of tender document	Tender documented shall be dropped into the tender box marked as **"CE, SC&PV, Defence – Friday"** kept at reception area of BHEL- Electronics Division.
11	Address to be super scribed on the tender envelop	AGM (SCPV-Engg) 5th floor, NEB building, BHEL-Electronics Division, Mysore Road, Bangalore. 560 026.
12	Date and time of technical bid opening	**At 1.30 PM on 18-04-2014**

NOTE:
The Tenderer shall return the duly filled-in Tender document after affixing signature on all pages.

CONTRACTOR (Signature with seal) EMPLOYER (Signature)

INSTRUCTIONS TO TENDERER

1. Sealed Tenders for the above noted work are hereby invited from Contractors experienced in works of similar kind and magnitude.
2. Tenders should be addressed to the AGM (SCPV-Engg.), 5th Floor N.E.B., Electronics Division, Bharat Heavy Electricals Limited, Mysore road, Bangalore – 560 026, super scribing the Name of Work and Name and Address of the Tenderer.

2.1 The local address of the Contractors, the name of the person to whom all the correspondence are to be addressed should be indicated, with telephone number (both office and residence) and telex numbers.

3. All entries in tender documents should be in one ink. Eraser and over writing are not permitted. All cancellation and insertion should be duly signed by tenderer concerned with proper indication of the name designation and address of the person signing.
4. Tenderers shall fill in all the required particular in the blank space provided for this purpose in the tender documents and also sign in each and every page of the tender document including the drawings attached there to before submitting tender.
5. Unit rate should be quoted in figures as well as in words in Indian Currency only i.e. Rupees and Paise with reference to each item and for the items shown in the attached schedule. These rates shall be for the finished work at site. The rate shall include all taxes and duties payable an account of Octroi, Sales Tax, tax on work contract, service tax etc., and also expenses towards all statutory formalities (see clauses 8, 39 and Annexure 'C'). Amount of each item and total on each sheet as also the grand total amount of the whole contract shall be filled by the tenderers.
6. If there is a discrepancy between words and figures the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error in which case the amount in figure shall prevail subject to the following points:-
   (a) If there is discrepancy between the unit price and total price, the unit price shall prevail and the total price corrected accordingly, unless in the opinion of the purchaser there is an obvious misplacement of the decimal point in the unit price, in which case the total price as quoted shall govern and unit price corrected accordingly.
   (b) If there is an error in the total corresponding to the addition or subtraction of sub totals, the sub totals shall prevail and the total shall be corrected.

(c) If there is a discrepancy in an offer same shall be conveyed to the bidder with target date up to which the bidder has to send his acceptance on the above lines and if the bidder does not agree to the decision of the purchaser, the bid is liable to be ignored.

7. In quoting rates, the tenderer are advised to take into account all factors including any fluctuations in market rates. No claim for enhanced rates will be entertained on this account after acceptance of the tender or during the currency of the contract.

8. The rate to be quoted by the tenderer shall be firm and shall cover and include all statutory levies such as "Octroi, sales tax, excise duty, service tax etc., arising from Act passed by Parliament or State Legislature and rules framed there –under. The rates shall further be deemed to include statutory levies arising from such Acts, Central or State, which may come into force, subsequent to submission of tenders. The tenderer shall note that no claim for enhancement rates, on the ground that existing statutory levies have been increased, or that new statutory levies have come into effect after tender, or on any other ground, will be entertained on any account.

9 (a) The rate quoted in the tender shall remain valid for a period of ' THREE MONTHS' from the date of opening tender.

(b) Tenderer shall not increase their quoted rates, once the tenderer has submitted his quotation and during execution of contract in case his tender is accepted.

10 Quantities shown in the schedule are only approximate and are liable to variation without entitling the Contractors to any compensation, provided the total value of the contract does not vary by more than 20% (Twenty percent)

11 Before tendering, the tenderer are advised to inspect the site of work and its environments and be well acquainted with the actual working and other prevailing conditions, position of material and labour. They should be well versed with BHEL General Conditions of Contract instruction to the tenderers, drawing and specification and all other documents which form part of the agreement to be entered into subsequent award of work. The tenderer should be specially note that it is tenderers responsibility to provide any items which is not specifically mentioned in the specifications and drawing, but which is necessary to complete the work.

12. Details and quantities of each item of work shown in the bill of quantities attached here to only approximate. They are given as a guide for the purpose of tendering only and are liable for variation and alteration at the discretion of the competent authority. The work under each item as

executed shall be measured and price at the corresponding rates to be quoted by the Contractor in the bill of quantities attached hereto.

13. Should a tenderer find discrepancies or omission in the drawing attached to the tender documents or should be in doubt as to their meaning he should at once address to the authority inviting the tender for clarifications.

    Every endeavor is made to avoid any error which can materially effect the basis of the tender but successful tenderer shall take upon himself to provide for the risk of any error which may be subsequently discovered and shall make no subsequent claim on account thereof.

14. In the event of the tender being submitted by a firm the tender must be signed separately and legibly by each partner or member of the firm or in their absence, by the person holding the power of Attorney on behalf of firm concerned. In the later case, a copy of the power of Attorney duly attested by the Gazetted Officer must accompany the tender.

15. If in any case, the date of Tender Opening falls on holiday, the Tender will be opened on the next working day.

16. Unless the contractor whose tender is accepted signs contract agreement within fifteen days (15 days) of the date of the order directing him to do so, the amount of Earnest Money already deposited by him may be forfeited and acceptance of the tender withdrawn.

17. If after opening of tenders a tenderer revokes his tender or increase his earlier quoted rates or after acceptance of his tender does not commence the work in accordance with the instruction of Engineer –in-charge, the Earnest Money Deposited by him will be forfeited and acceptance of his tender withdrawn.

18. BHARATH HEAVY ELECTRICALS LIMITED reserve the right to reject any or all the tenders received or accept any tender or part thereof without assigning reason thereof. In the case of acceptance of a part of tender, the time for completion may also be reduced to the extent considered approximately by the accepting authority.

19. Conditional and Unsigned tenders, tender containing absurd rates and amounts, tenderer which are incomplete or otherwise considered defective, tenders which are not in accordance with the tender conditions laid down by the accepting officer and tenders not submitted in the prescribed forms are liable to be rejected.

20. The tenders should be accomplished by a list of Contracts already held by the Contractor at the time of submitting the tender and giving the following particulars:

    a) Name of the work, value and address.

b) The balance work remaining to be done on the same.

21. Tenders submitted by the post should be sent by "Registered Post with acknowledgement due". These should be posted with due consideration of any delay in postal delivery.
Tenders received after the due date of opening tenders are liable to be rejected.

22. The Contractors responsibility under this contract shall commence from date of receipt of the order or acceptance of tender.

23. If tenderer expires after the submission of the tender or acceptance of his tender, the BHEL, may at their discretion cancel such tender.
If a partner of a firm expires after the submission the tender, after the acceptance of tender, BHEL, may cancel such tenders at their discretion unless the firm retains its character/s.

24. BHARAT HEAVY ELECTRICALS LIMITED will not be bound by any power of Attorney granted by the tenderer or changes in the composition firm made subsequent to execution of contract. They may however recognize such power of Attorney and changes after obtaining proper legal advice, the cost of which will be chargeable to the Contractor concerned.

25. If the tenderer deliberately gives wrong information on his tender, the BHEL reserves the right to reject such tender at any stage.

26. Words imparting the singular number shall also be deemed to include the plural number and vice-versa where the context so require.

27. The General and Special Conditions are complementary to each other and where they are in conflict, the special condition shall prevail.

28. The expenses for completing the stamping agreement shall be paid by the contractor.

29. Unless or otherwise stated above tendered work includes supply, erection, testing & commissioning of equipment and survey works as per site requirement as agreed in the contract.

30. After completing of the job, the contractor has to furnish actual drawings of work done in consultation with Engineer-in-charge.

31. Any covering letter and comments of the Contractor should be submitted in duplicate along with the offer.

32. Cement for carrying out Civil Works will be supplied by Contractor.

33. The Contractor shall provide all the materials needed for trial run, testing including chemicals, consumables etc. **Contractor has to mobilize the field quality control laboratory at site and has to maintain the documents as per the (FQP) field quality plan as approved by BHEL/NTPC.** In quoting their rates, the Contractors are advised to take into account the cost of

the above materials.

34. Should a tenderer or a contractor on the list of approved contractors has a relative or in the case of firm or Company of Contractors any of its share holders relative is employed in a Gazetted Capacity in the Electronics Division of Bharat Heavy Electricals Limited, Banalore-26, the authority inviting tenders shall be informed of this fact at the time of submission of the tender, failing which tender may be disqualified or if such fact subsequently come to light, the relevant provisions of the General Conditions of Contract will apply.

35. These 'INSTRUCTIONS TO TENDERERS' & GENERAL CONDITIONS OF CONTRACT OF BHEL' shall be deemed to form an integral part of the Contract agreement for the work to be entered into. In cases of variation between the two in any matter, the conditions in the 'THE INSTRUCTIONS TO TENDERERS' shall prevail. Extracts of some of the important clauses of BHEL G.C.C are enclosed (Annexure containing extracts of clauses 20, 38 and 58 of BHEL G.C.C).

36. All operations to be carried out by the Contractor during the execution of the contract such as drilling, welding etc., shall be done with proper equipments to be brought by the tenderer. Suitable power point will be provided and tapping from the power point equipment shall be done using proper size of cables equipments and after getting approval of connections from our Engineer-in-charge.

37. The Contractor shall comply with the all statutory provisions concerning works contracts while executing the works at the site.

38. The Contractor shall do all the formalities covering the required registration under labour laws and other statutory rules and also do the needful to satisfy compliance to filing of returns and other documentations to the appropriate authorities as required under Acts/Laws of government.

38.1. If any action is brought in by authorities on BHEL for the work done by the Contractor for his labourers regarding deficiencies in complying with stipulations/rules etc., the Contractor shall defend the case on behalf of BHEL and / or reimburse BHEL the expenses so incurred.

38.2. The Contractor shall apply and obtain license under Contract labour(R&A) Act 1970 and comply the relevant provisions of this Act in respect of the labour employed by him for executing this contract. The contractor shall furnish necessary returns to the authority through the Principal Employer.

39. Contractor shall insure all his labourers and material. Any claim by his Employees for damages shall be settled by the Contractor even if action is against BHEL or to reimburse the legal expenses incurred by BHEL.

40. Any action brought in by anybody on BHEL regarding patent, right etc., used by Contractor in

execution of work shall be defended by the Contractor and / or reimburse BHEL the cost of the same.

41. Contractor shall produce necessary records, documents, explanation whenever he is called upon to do by any Government Agencies like ESI, PF, and VIGILANCE etc.

GENERAL CONDITIONS OF CONTRACTS

It is hereby agreed by me/us that the BHEL General Conditions of Contract including subsequent amendments/ additions/deletions to clauses if any, and conditions pertaining the settlement of disputes by Arbitration form an integral part of the tender documents and that the tender submitted by me/ us is subject to the aforesaid BHEL General Conditions of Contract which has been read and accepted by me/us.

CLAUSE 20 OF GENERAL CONDITIONS OF CONTRACT LABOUR

The Contractor shall employ labour in sufficient numbers either directly or through sub-contractors to maintain the required date of progress and of quality to ensure workmanship of the degree specified in the contract and to the satisfaction of the Engineer-in-charge. The contractor shall not employ in connection with the works any person who has not completed his eighteen years of age.

The contractor shall furnish to the Engineer-in-charge at the intervals specified by him, A distribution return of the number and description by trades of the work people employed on the works. The Contractor shall also submit on the 4th and 19th or every month to the Engineer-in-charge a true statement showing in respect of the second half of the preceding month and the first half of the current month (I) the accidents that occurred during the said fortnight showing the circumstances under which they happened and the extent of damage and injury caused by them and (ii) the number of female workers who have been allowed maternity benefits as provided in the maternity benefit Act, 1961 or Rules made there under and the amount paid to them.

The contractor shall pay to labour employed by him either directly or through sub-contractors wages not less than fair wages as defined in the contractors Labour Regulations.

The Contractor shall in respect of labour employed by him either directly or through sub-Contractors comply with or causes to be complied with contractors labour Regulations in regard to all matters provided therein.

The Contractors shall comply with the provisions of the payment of wages Act, 1936,Minimum Wages Act, 1948, Workmen's Compensation Act 1923, Industrial Disputes Act, 1947, Maternity Benefit Act 1961 or any modifications there of or any other law relating there to and rules made there under from time to time.

The Contractors shall do the needful to satisfy the provisions of statutory laws governing labour welfare. All documentation and registrations applicable for complying with these provisions shall be the responsibility of the contractor and if required he shall produce the records if called to do so.

The Contractor shall be liable to comply with statutory requirements in respect of remittances as per rules and regulations in respect of all labour employed by him for the execution of the contract.

The Engineer-in –charge shall on a report having been made by an Inspecting Officer as defined in the Contractors Labour Regulations have the power to deduct from the moneys due to the Contractor any sum required or estimated to be required for making good the loss suffered by a worker or workers by reason of non fulfillment of the conditions of the contract for the benefit of workers, non - payment of wages or of deductions made from him or their wages which are not justified by the terms of the contract of non observance of the said contractor's Labour Regulations.

The Contractors shall indemnify the BHEL against any payment to be made under and for observance of the Regulation aforesaid without prejudice to his right to claim indemnity from this sub-contractors.

In the event of the contractor committing a default or breach of any of the provisions of the aforesaid contractors Labour Regulations, as amended from time to time or furnishing any information or submitting or filling any form/Register/Slip under the provisions of these Regulations which is materially incorrect then on the report of the Inspecting Officers as defined in the Contractors Labour Regulations, the contractor shall without prejudice to any other liability pay to the BHEL a sum not exceeding Rs.50/- as liquidated damages for every default breach or furnishing, making, submitting, filling materially incorrect statement as may be fixed by the Engineer-in-chare and in the event of the contractor's default continuing in this respect, the liquidated damages may be enhanced to Rs.50/-per day for each day of default subject to maximum percent of the estimated cost of works put to tender . The contractor shall defend the case by himself any action brought in by such Government Agencies for non-compliance of any Labour Regulations and / or reimburse the expense incurred by BHEL in this regard.

The Engineer–in-charge shall deduct such amount from bills or security deposit of the contractor and credit the same to the welfare fund constituted under Regulations. The decisions of the Engineer-in-charge in this respect shall be final and binding.

MODEL RULES FOR LABOUR WELFARE

The Contractor shall at his own expense comply with or cause to be complied with model Rules for Labour Welfare as appended to these conditions or rules framed by Government from time to time for the protection of health and for making sanitary arrangements for workers employed directly or indirectly on the works, In case the Contractors fails to make arrangements as aforesaid the engineer-in-charge shall be entitled do so and recover the cost thereof from the contractor.

SAFETY CODE

RESPONSIBILITIES OF THE CONTRACTOR IN RESPECT OF SAFETY OF MEN, EQUIPMENT, MATERIAL AND ENVIRONMENT

1. Before commencing the work, contractor submit a "SAFETY PLAN" to the authorised BHEL Official. The 'SAFETY PLAN' shall indicate in detail the measure that would be taken by the contractor to ensure safety of men, equipment, material and environment during execution of the work. The plan shall take care to satisfy all requirements specified hereunder. The contractor shall submit Safety Plan along with his offer. During negotiations before placing of work order and during

execution of the contract BHEL shall have right to review and suggest modification in the Safety Plan. Contractor shall abide by BHEL decision in this respect.

2. The contractor shall take all necessary safety precautions and arrange for appropriate appliances as per direction of BHEL or its authorised officials to prevent loss of human lives, injuries to personnel engaged, and damage to property and environment.

3. The contractor shall provide to its work force and ensure the use of the following personal protective equipment as found necessary and as directed by the authorized BHEL officials:
   (i) Safety Helmets conforming to IS-2925: 1984.
   (ii) Safety Belts conforming to IS-3521: 1983.
   (iii) Safety Shoes conforming to IS-1989: 1978.
   (iv) Eye and Face protection devices conforming to IS-8520: 1977 and IS-8940: 1978.
   (v) Hand and body protection devices conforming to:
   IS-2573: 1975
   IS-6994: 1973
   IS-8807: 1978
   IS-8519: 1977

All tools, tackles, lifting appliances, material handling equipment scaffolds, cradles, safety nets, ladders, equipment etc. used by the contractor shall be of safe design and construction. These shall be tested and certificate of fitness obtained before putting them to use and from time to time as instructed by authorised BHEL official who shall have the right to ban the use of any item. All electrical equipment's, connections and wiring for constructions power, its distribution and use shall conform to the requirement of the Indian Electricity Act and Rules. Only electricians licensed by the appropriate statutory authority shall be employed by the contractor to carry out all types of electrical works. All electrical appliances including portable electric tools used by the contractor shall have safe plugging system to source of power and be appropriately earthed. The contractor shall not use any hand lamp energized by electric power with supply voltage of more than 24 volts. For work in confined space lighting shall be arranged with power sources of not more than 24 volts.

The Contractor shall adopt all fire safety measures as laid down in the "Code for fire Safety at Construction Sites" issued by the Safety Department of the Construction Management (HQ) of BHEL and as per directions of the authorised BHEL official. A copy of the above referred "Code of Fire Safety at the Construction Sites" shall be made available by BHEL to the contractor for reference, on demand by the contractor, during tendering stage itself.

Where it becomes necessary to provide and/or store petroleum Products, explosives, chemicals and liquid or gaseous fuel or any other substance that may cause fire or explosion, the contractor shall be responsible for carrying out such provisions and/or storage in accordance with the rules and regulations laid down in the relevant government acts, such as Petroleum Act, Explosives Act, Petroleum and Carbides of Calcium Manual of the Chief Controller of Explosives, Govt. of India. etc., Prior approval to the authorised BHEL official at the site shall also be taken by the contractor in all such matters.

The contractor shall arrange at his cost (wherever not specified) appropriate illumination at all work spots for safe working when natural daylight may not be adequate for clear visibility.

The contractor shall be held responsible for any violation of statutory regulations local, state or central and BHEL instructions, that may endanger safety of men, equipment, material and environment in his scope of work or another contractor's or agency's. Cost of damages if any, to life and

property arising out of such violation of statutory regulations and BHEL instructions shall be borne by the contractor.

In case of a fatal or disabling injury accident to any person at construction sites due to the lapses by the contractor, the victim and/or his/her dependents shall be compensated by the contractor as per statutory requirements. However, if considered necessary, BHEL shall have the right to impose appropriate financial penalty on the contractor and recover the same from payments due to the contractor for suitably compensating the victim and/or his/her dependents. Before imposing any such penalty, appropriate enquiry shall be held by BHEL giving opportunity to the contractor to present his case.

In case of any damage to property by the contractor, BHEL shall have the right to recover cost of such damages from payments from payments due to the contractor after holding an appropriate enquiry.

In case of any delay in the completion of a job due to mishaps attributable to lapses buy the contractor, BHEL shall have to recover cost of such delay from payments due to the contractor, after notifying suitably and giving him opportunity to present his case.

If the contractor fails to improve the standards of safety in its operation to the satisfaction of BHEL after being given a reasonable opportunity to do so; and/or if the contractor fails to take appropriate safety precautions or to provide necessary safety devices and equipment or to carry out instructions regarding safety issued by the authorised BHEL official, BHEL shall have the right to take corrective steps at the risk and cost of the contractor after giving a notice of not less than seven days indicating the steps that would be taken by BHEL.

The contractor shall submit report of all accidents, fires and property damage, dangerous occurrence to the authorised BHEL official immediately after such occurrence, but in any case not later than twelve hours of the occurrence. Such reports shall be furnished in the manner prescribed by BHEL. In addition, the contractor to the authorised BHEL official shall also submit periodic reports on safety from time to time as prescribed.

Before commencing the work, the contractor shall appoint/nominate a responsible officer to supervise implementation of all safety measures and liaison with his counterpart of BHEL.

If safety record of the contractor in execution of the awarded job is to the satisfaction of Safety Department of BHEL, issue of an appropriate certificate to recognize the safety performance of the contractor may be considered by BHEL after completion the job.

CLAUSE 38 OF BHEL GENERAL CONDITIONS OF CONTRACT

INSURANCE OF WORKS AGAINST DAMAGE AND LOSS DUE TO FIRE, STRIKE, TEMPEST, FLOODS, EARTHQUAKE, RIOT AND AGAINST DAMAGE BY AIRCRAFT

The Contractor shall, within one month after the date of acceptance of the contract, insure the work against loss and damage by fire, tempest, floods, earthquake, riots, strike & against damage by air-craft with an insurance office approved by the Accepting officer from the date of acceptance of work or actual commencement of work whichever is earlier. Such insurance shall be effected in the name of BHEL and shall be for the full value of the contract sum. The contractor shall lodge with the BHEL the policies and receipts of the premiums for such insurance and shall maintain such policies in force until the entire completion of the work as certified by the Senior Engineer.

If the contractor fails to comply with the terms of this condition the Accepting Officer may insure the work and may deduct. The amount of premium from any money that may become payable to the contractor or may at his discretion refuse payment of any advance to the contractor until the contractor shall have complied with the terms of this condition.

Such insurance whether effected by the Accepting Officer or the Contractor shall not be a limit or bar to the liability and obligation of the contractor to complete the entire work in all respects as certified by the Senior Engineer.

In case of such a loss or damage as aforesaid, the money payable under any such insurance shall be received and may be retained by the BHEL until the work is finally completed and shall then be credited to the contractor in the final statement of accounts in the event of the contract not having been previously cancelled under these conditions after taking into account the delay in completion, settlement to his workers for damages, damage to BHEL property etc.

CLAUSE 58 OF GENERAL CONDITIONS OF CONTRACT

ARBITRATION:

Except where otherwise provided for in the contract all questions and disputes relating to the meaning of the specifications, designs, drawings and instructions herein before mentioned as to the quality of workmanship or materials used on the work or as to any other question, claim, right, matter or thing whatsoever in any way arising out of or relating to the contract, designs, drawings, specifications, estimates, instructions, orders or these conditions or otherwise concerning the works, or the execution or failure to execute the same whether arising during the progress of the work or after the completion or abandonment thereof shall be referred to the sole arbitration of the Executive Director/General Manager of BHEL and if the Executive Director/General Manager is unable or unwilling to act to the sole Arbitration of some other person appointed by the Executive Director / General manager willing to act as such Arbitrator. There will be no objection if the arbitrator so appointed is an employer of BHEL or an employer of any other unit of BHEL and that he had to deal with the matters to which the contract relates and that in the course of its duties as such he had expressed views on all or any of the matters in dispute or difference. The Arbitrator to whom the matter is originally referred being transferred or vacating his office or being unable to act for any reason, such Executive Director / General Manager as aforesaid at the time of such transfer vacation of office or inability to act, shall appoint another person to act as arbitrator in accordance with the terms of the contract. Such person shall be entitled to proceed with the reference from the stage at which it was left by his predecessor. It is also a term of this contract that no person other than a person appointed by such Executive Director/General Manager or an employee appointed as arbitrator as aforesaid should act as arbitrator and the arbitrator shall give reasons for the award.

Subject as aforesaid the provision of the Arbitration Act, 1940 or any statutory modification or re-enactment thereof and the rules made there under and for the time being in force shall apply to the arbitration proceeding under this clause.

It is a term of a contract that the party invoking arbitration shall specify the depute or disputes to be referred to arbitration under this clause together with the amount or amounts claimed in respect of each such dispute.

The arbitrator(s) may from time to time with consent of the parties extend the time, for making the publishing the award.

The work under the contract shall, if reasonably possible, continue during the arbitration proceeding and no payment due or payable to the contractor shall be withheld on account of such proceedings.

The arbitrator shall be deemed to have entered on the reference on the date he issued notice to both the parties fixing the date of the hearing.

The arbitrator shall give a separate speaking award in respect of each dispute or difference referred to him.

The venue of arbitration shall be such place as may be fixed by the arbitrator in his sole discretion.

The award of the arbitrator shall be final, conclusive and binding on all parties to this contract.

SPECIAL CONDITONS OF CONTRACT

1. GENERAL

The special conditions of contract and other contract documents are complimentary to each other and shall be read in conjunction with each other. In case of any conflict of meanings between the special conditions of contract and the BHEL General Conditions of Contract the provisions of the special conditions of contract shall override the corresponding provisions of the BHEL General Conditions of Contract.

2. SCOPE OF WORK

The scope of work includes for the full, final and entire completion of all Civil Engineering works as detailed in specifications and drawings, which forms part of this Contract. The scope of work also includes cleaning/removing all debris beyond 200mtrs. or as stipulated in the item schedule from building location and leveling the areas as per direction of the Engineer-in-charge.

The scope of work under this contract shall cover supply of all materials, labour, tools, plants etc., unless otherwise specified in the specifications, descriptions of items or in foregoing clauses.

3. SITE CONDITIONS

Before tendering the Contractor shall get himself/themselves acquainted with site conditions such as the nature of soil likely to be encountered during the course of the work etc,. The rates quoted by the contractor shall be deemed to have been quoted after getting acquainted with the prevailing site conditions. Initial jungle clearance, stripping of top soil etc., shall also be included in the quoted rates. No claims on the pretext of ignorance of site conditions shall be entertained.

4. SITE FACILITES:

4.1. LAND:

The Employer will allot land as available free of cost to the contractor for his office stores. He must maintain the areas allotted to him in a neat and clean conditions as required by the Employer. The contractor shall provide adequate storage and office facilities with approval from the Engineer. The rate quoted by the contractor shall be deemed to include for these and no separate payment will be made towards these.

On completion of work, the site shall be cleaned by the contractor of all materials, temporary debris, rubbish plants and equipment's, belonging to the contractor at no extra cost. The site and surroundings shall be handed over in a neat and clean conditions. In case of any failure by the contractor, the employer will get inside cleared at risk and cost of the Contractor.

4.2. POWER AND WATER SUPPLY

Power and water required at site for execution of the works shall be arranged by the contractor at his expense and risk. BHEL is not responsible for any failure of water/electricity supply and the contractor will have to make his own arrangements for the same, without claiming any extra rate.

4.3. MACHINERY

The Contractor shall at his own expense, supply all tools, plant and equipment (hereinafter referred to as T & P) required for execution of contract, as specified in the tender documents.

5.0

a) The whole of the works shall be executed in perfect conformity with the specifications and drawings. If contractor perform any works in a manner contrary to the specifications and drawings and without reference to the Engineer he shall bear all the costs arising or ensuring there from.

b) All technical documents regarding the construction of works are given in the metric system and work should be carried out according to metric system.

c) In case the contractor desires to obtain additional copies of drawings, the same shall be supplied by the Employer on payment of charges as fixed by the Engineer-in-charge.

d) The works shall be carried out as per detailed specifications enclosed with the tender. For items for which there is no mention in the drawings, detailed specification relevant IS specification (latest edition) shall be followed.

e) The contractor shall submit to the Employer for their approval complete drawings, of all temporary works and staging which he may require for carrying out the works shown in the drawings. He shall at the same time if so required by the Employer submit his calculations relating to strength and anticipated deflection in respect of any aforesaid temporary works. He shall also submit for the approval of Employer drawings showing the methods he proposes to adopt for the erection of the various parts of the temporary works. Any modification to the drawings that may be required by the Employer shall be made by the contractor at his own cost. However, not with standing the approval of modification required for temporary works, the contractor shall be fully responsible for their efficiency, security and maintenance and for all obligations and risks in regard to such works, specified or implied in this contract and be shall reinstate the same at his own cost, should any mishap or accident occur causing damage or injury there from, subject however, to such clauses of the General conditions as may be applicable in such cases.

6.0 BENCH MARKS AND REFERENCE POINTS

The contractor shall construct and maintain proper benchmarks and reference points of the inter section of all main walls, no separate payment shall be made for this survey works and rates quoted deemed to include this cost.

7.0 SAFETY PRECAUTIONS

The contractor shall at times observe the safety code enclosed and make necessary action as required in the tender. In default thereof, the employer may get this done departmentally or through other agencies and recover the cost from the contractor.

The Contractors shall also abide by all the security regulations promulgated from time to time by employer.

8.0 RATES

The rates to be quoted are intended to provide for works duly and properly completed in accorded with the general and special conditions of contract and specifications and drawings together with such alteration and or conditions as may be required / ordered without prejudice to the generality thereof shall include for detail of construction which are obviously and fairly intended and which may not have been specifically referred in these documents and working drawings and but are essential for execution and satisfactory completion of work including those of minor nature and shall be deemed to include and cover internal the followings.

a) Arrangements for obtaining the clearance wherever required from statuary bodies, regarding license for construction permanent electricity, water supply, and sanitary connections including payment of necessary fees, inspection charges and obtaining financial certificates for using these services. The various items rates quoted in the schedule shall be deemed include the above services and no separate payments shall be made towards these.

b) The cost of all superintendence and labour materials, tools, plants, equipments, mobilizing and demobilizing equipment fuel lubricants, fixture, transport charges, temporary and permanent works and quarrying charges, testing, screening, washing, handling of materials, stacking and removal charges, of any rejected materials and water and power arrangements and satisfactory maintenance of the same satisfactory completion of the work intended.

c) All fees, duties, royalties, rent and compensation to owner for surface damage or taxes And impositions payable to local authorities, in respect of land an structure, for all materials supplied for the work or any other duties/expenses for which the contractor may become liable or may be put to under any provision of the law for the purpose of in connection with the execution of the contract including revise payable on the transactions.

d) Watching and lighting arrangements as required for satisfactory performances.

e) Settings out of works profiles etc., and of construction repair and up-keep of all center lines, bench marks and levels and page there of including provisions of masonry/concrete pillars showing the center line of structure/gridlines and levels and maintenance and protection of the some including providing fencing etc., through out the period of contract.

f) Maintenance and removal of temporary works and buildings.

g) Supply of complete, Moulds, cost of testing of materials etc.

h) Working in all conditions including in/under water liquid, conditions etc., and shall also include boiling or pumping out water from the foundations, basements or any other sources of whatsoever de slushing and allied operation at any stage of work including all suspension period and delays whatsoever. Cost of curing including pumping and curing water whatever necessary.

i) In the interest of completion of work within the stipulated time, certain works are to be carried out during the monsoon period also. No separate payment will be made to the contractor for such works and it will be deemed to be included in the contract rates.

j) Diversion and draining works, protection works, temporary facilities, bridges, gangway.

k) Work at all depth in foundation below the ground level and in superstructure upto all height above ground level including all lifts and dissents involved at any other place of work and disposed/barrow areas.

l) Unless otherwise specified in the specification schedule cost of all loads.

m) Provision of centering, scaffolding, strutting props etc.,

n) All materials and labour required for fencing is an protection against risk of accidents and for providing necessary/planking strutting with hand rails, gum boots, helmets, safety belts etc., during the progress of work.

o) All prevention on compensation for trespass of barrier arrangements for the safety of the public or employees during the provision of works.

p) Works in all shapes inclined or curved and all sizes as shown or as are required.

q) Cleaning the site after the completion of work of all debris, left out construction materials, machine equipment's, temporary offices, stores, work shop etc., including microdressing the area in neat and clean shape.

r) Such other incidental charges or contingencies as may have been provided for in the specifications.

09 LABOUR COLONIES: -

No labour camp will under any circumstances be permitted within the project premises.

10 ESCALATION: -

The rates to be quoted by the tenderer shall be firm and shall cover and include all statutory levies, arising from, acts passed by parliament or by state legislature, the rates shall further be deemed to include statutory levies arising from such Acts, Central or State, which may come in to force subsequent to submission of tenders. The tenderer shall note that no claim for enhancement of rates, on the ground that existing statutory levies have been increased, or that new statutory levies have come in to effect after tender, or on any other ground, will be entertained on any account.

11. LEAD, LIFT, DEWATERING ETC.,

a) Unless otherwise specified in the tender schedule, the rates for all items will be deemed to include all leads, lifts and descents involved in the work.

b) No separate payment will be made for dewatering (including seepage, surface drainage and monsoon water) desludging and allied operations at any stage of the work, and the cost of such operations will be deemed to be included in the contract rates

c) No separate payment will be made for curing including pumping of curing water where necessary.

12. EXTRA ITEMS

No extra items of work shall be carried out by the contractor other than those authorised to do so in writing by the Engineer. For any such items of work executed as per instructions of Engineer-in-charge/Civil Engineer. The rates will be fixed on the basis indicated under clause 50 of BHEL GCC.

The schedule of rates to be followed in this case will be CPWD schedule of rates.

13. Quantity

The probable quantities of the several items of work are furnished in the schedule of quantities. It must be clearly understood that neither the probable quantities nor the value of individual items nor the aggregate value of the entire work shall be binding on the Employer/Engineer does not in any way assure the contractor or Guarantee that the said probable quantities are correct or that the work will correspond to these. The Employer/Engineer reserve the right to omit, vary or add to the item/work described in the schedule, of quantities and no claim for compensation will be entertaining on this account.

14. Variation/Deviation in quantities

The contractor shall not make any alteration in addition to or omission from the work as described in the tender document except in pursuance of the written instructions of the Engineer-in-charge. No such deviation from the work described in the tender documents shall be valid unless the same has been specifically confirmed and accepted by the accepting officer in writing and incorporated in the contract. The quantities indicated in BOQ are tentative and there may be difference (+/-) as per the site conditions/ client requirement.

The rates quoted are firm for deviation subject to minimum of (-) 20% and maximum (+) 20% of the total value of work awarded. Deviation beyond the above limits is subject to the standard terms and conditions of BHEL.

15. **Materials supply by Employer:**

Unless otherwise specified, BHEL will not supply any materials.

16. SUPPLY OF CEMENT AND STEEL IS TO BE MADE BY CONTRACTOR

17. SUPPLY BY CONTRACTOR

i) The work is for a completed job including labour and supply of all materials except those otherwise specified in the bid document.

ii) All materials supplied by the contractor according to the contract conditions shall be subject to inspection and passing by the Engineer or his representatives from time to time, the contractor providing all facilities for such instruction free of cost. BHEL officers connected with the contract shall have the power at any time to inspect and examine any stores or materials intended to be used in or on the work, whether on the site

or at any factory or workshop or other place where such stores or materials are being fabricated or manufactured or at any place the same are lying and the contractor shall give necessary facilities for such inspection and examination.

The Engineer-in-charge shall be entitled to have tests made of any stores or materials supplied by the contractor shall provide at his own expense all facilities which the Engineer-in-charge may require for this purpose. If at the discretion of the Engineer-in-charge an independent expert is employed to make any such tests his charges shall be born by the contractor only if the tests disclosed that the said stores or materials are not in accordance with the provision of the contract.

Should the Senior Engineer/Civil Engineer/Civil consider as any time during the construction or reconstruction on prior to the expiry of the Maintenance Period that the stores or materials provided by the contractor are unsound or of quality inferior to that contracted for, or otherwise not in accordance with the contract (in respect where the decision of the Senior Engineer/Civil shall be final and conclusive) the contractor shall on demand, in writing from the Sr.Engineer-civil specifying the stores an demand or materials complained of, not with-standing that the same may have been inadvertently passed, certified that and paid forth with remove the stores or materials so specified and provide other and suitable stores or materials at his own expense, to the entire satisfaction of the Sr.Engineer/Civil Engineer/Civil and in the event of his failing to do so within a period to be specified by the Senior Engineer/C,E/C, in his demand aforesaid, the Sr.Engineer/Civil Engineer/Civil may replace within the other stores or materials complained of at the risk and expense in all respect of the contractor. The liability of the contractor under this conditions, shall not extended beyond the maintenance period aforesaid except as regards stores or materials which the Sr.Engineer/Civil Engineer/Civil shall have previously given notice to the contractor to replace (Maintenance, period for any work under this organization will be six months from the date of actual completion of the particular work and handing over to BHEL).

18. INTERRUPTION TO THE WORKS: -

In quoting the rates/prices the Contractor should take in to account the fact that due to the design or other stipulations at site, or the necessity to follow a particular sequence of overall construction operation, or non-supply of particular drawings, or the connected work or other reasons, interruptions are likely to be encountered in a work of this nature and magnitude. No claims for such interruptions will be entertained on any account.

EXTENSION OF TIME OR PENALTY/LIQUIDATED DAMAGES

Extension of time or penalty/liquidated damages as the case may be will be determined as stipulated in clause 7,9 and 41 of BHEL General Conditions of Contract.

19. COMPLETION OF WORK AND MEASUREMENT

a) All work shall be carried out according to authorised dimensions and measurement will be restricted to those authorised dimension even though the Contractor may for convenience of this work exceed the authorised dimensions.

b) All work shall be measured in accordance with the applicable standard method of measurements prescribed by the Indian Standard Institution (1200 latest edition) unless otherwise specified.

c) The Contractor shall admit for technical inspection, works which are likely to be embedded or covered by other works and have the necessary measurement books and certificates to this effect duly signed by the Engineer before the works are covered.

d) On completion of the work, the Contractor must submit to the Engineer the following documents for passing of works.

i) A copy of the working drawing showing thereon all addition and alterations in the process of execution. If required site joint inspection levels to be submitted by contractor.
ii) A certificate for embedded and covered up works as in sub-para (C) above

e) The authorised Contractors representative and a representative of the Employer shall jointly sign a certificate of handling over any completed work and date of signature of that certificate will be that the date from which the maintenance period of that unit will reckoned.

f) Not withstanding the above insurance cover has to be taken by the contractor for the full value of work as also for the duration of the contract period., 50% of the Security Deposit shall be released only on the total completion of the building and handed over to BHEL to their satisfaction. Remaining 50% of Security Deposit shall be released subject to the stipulation in our GCC after 6 months from the date of completion of the building.

20. MAINTENANCE OF WORK

The contractor will be responsible for the maintenance of works during the period of construction until the various items are taken over, and for a further period of six months, from the date of taking over.

If the contractor fails to maintain the building satisfactorily, it will be got done by other agency and cost towards such maintenance together with departmental charges will be recovered from his bills/dues.

21. SECURITY DEPOSIT

Upon acceptance of the tender, the successful tenderer shall within the time specified in the letter of intent deposit with the Bharat Heavy Electricals Ltd.,

Successful tenderer is to be remitted Security Deposit. The rate of Security Deposit will be as below:

Upto Rs.10 lakhs	10%
Above Rs. 10 lakhs upto Rs.50lakhs	1 lakhs + 7.5% of the amount exceeding Rs. 10 lakhs
Above Rs.50 lakhs	Rs. 4 lakhs + 5% of the amount exceeding

Rs. 50 lakhs

The contractor should submit the Security Deposit before the start of the work.

i) Cash (as permissible under the income Tax Act).

ii) Pay order, demand draft in favour of BHEL.

iii) Local cheques of scheduled banks, subject to realization.

iv) Securities available from Post Offices such as National Saving Certificates, kisan Vikas Patras etc.,(Certificate should be held in the name of contractor furnishing the security and duly pledged in favour of BHEL and discharged on the back)

v) Bank Guarantee from scheduled Banks/Public financial Institutions as defined in the companies Act subject to a maximum of 50% of the total security deposit value. The balance 50% has to be remitted either by cash or in the other form of security. The Bank Guarantee format should have the approval of BHEL.

vi) Fixed Deposit Receipt issued by scheduled Banks/Public Financial Institutions as defined in the Companies Act. The FDR should be in the name of the contractor, A/C BHEL, duly discharged on the back.

vii) Security Deposit can also be recovered at the rate of 10% from the running bills. However in such cases at least 50% of the Security Deposit should be collected before start of the work and balance 50% may be recovered from the running bills.

viii) The Security Deposit shall not carry any interest.

NOTE: Accepting of Security Deposit against Sl.No. (iv) and (vi) above will be subject to hypothecation or endorsement on the documents in favour on BHEL. However, BHEL will not be liable or responsible in any manner for the collection of interest or renewal of the documents or in any other matter connected therewith.

For extra items of work and deviated quantities, security deposit will be recovered at 10% of the value of deviated amount. The security deposit will be released as stipulated under clause 16(IV) of GCC.

22. RUNNING ACCOUNT PAYMENTS

During execution of work, monthly payments of all works in place will be made on the basic measurements recorded in measurement sheet/book in respect of items executed but no claim on the account will be entertained, if for any reason payments are not so made.

ADVANCE

No advance amounts will be paid by BHEL to the contractor.

23. STATUTORY DEDUCTION TOWARD INCOME TAX WILL BE MADE as per rules.

24. In respect of all labour directly or indirectly employed on the work by the Contractor, the Contractor shall comply with the provisions of the contract labour (Regulation and Abolition) Act 1970 or any amendment thereof and all legislations and rules of the State and or Central Government or other Authority, framed from time to time governing the protection of health, sanitary arrangements, wages, welfare and safety for labour employed on building and construction works. The rules and other statutory obligations with regard to fair wages, welfare and safety measures, maintenance of the register etc., will be deemed to be part of the contract.

25. The Contractor is required to take an insurance for all workers employed on works towards payment for workmen compensation. The insurance has to be taken out with in 15 days of the award of work and has to be produced at the time of signing agreement. Half (1/2%) shall be deducted for every bill if the contractor fails to produce a proof of having taken such an insurance to cover his workmen**.**

However the contractor shall be fully responsible for all the consequences arising out of such default. This may also be read with clause 20 of BHEL GCC.

26.0 **TIME OF COMPLETION**

The date of commencement of work shall be counted from the date of handing over the site to the contractor. The contractor shall plan the work in such a manner that all roofs are laid before the start of the rainy season and the work is not hampered due to rain. It may be clearly understood that time is the essence of the contract and the entire work should be completed within the time imposed in the tender document letter of intent.

27.0 The Contractor has to pay the Works Contract Tax (Under Sec.19A of the KST Act 1957) of their own on Monthly basis.

28.0 The managements of BHEL shall be at liberty to terminate the contract by issuing a month's notice to the contractor without assigning any reason what so ever. As regards unsatisfactory performance or non compliance with any of the terms & conditions of the contract by the contractor. The management of BHEL shall have the right to terminate the contractor forthwith without notice & rearrange the balance work through other agencies at the risk & cost of the contractor & under such circumstances, the Earnest Money Deposit/Security Deposit paid by the contractor shall stand forfeited.

LIST OF INDIAN STANDARD

Following is the list of various Indian Standards,
Relevant to the Civil Engg., work

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1. EARTH WORK

IS 1200-1974, Method Part I Earthwork, Measurement of Building, and Civil Engineering works, and chapter No.2 of CPWD/specification 1977.

2. MORTAR (PLASTERING)

1) IS 2394-1965. Code of practice for application of lime plaster finish.
2) IS 1661-1972. Code of practice for application of cement lime plaster finish.
3) IS 2402-1963. Code of practice for external rendered finishes.

3. CONCRETE WORK & RCC WORK

1) IS 456-1964. Code of practice for plain and reinforced concrete.
2) IS 432(part 1) –1966. Mild steel and medium tensile steel bars.
3) IS 1786- TMT steel bars for concrete reinforcement.

4. BRICK WORK

1) IS 2212-1962-Code of practice for brick work.

5. STONE WORK

1) IS 1597-code of practice for construction of stone masonry.

6. MARBLE WORK

1) IS 1124-1974 Methods of test for water absorption of natural building works.

7. STEEL WORK

1) IS 800-1962-Code of practice for use of structural steel in general building construction.
2) IS 1308-1975-Steels doors, windows and ventilators
3) IS 1081-1960-Code of practice for fixing glazing of metal (steel & aluminium doors, windows & ventilators)
4) IS 1161-1968-Steel tubes for structural purposes.
5) IS 4351-1967-Steel doorframes.
6) IS-6245-5245-1971-Metal rolling shutters and rolling grills.

8. FLOORING

1) IS 2114-1962-Code of practice for laying in situ tarrazo floor finish.
2) IS 2571-1971-Code of practice for in situ cement concrete flooring.
3) IS 5313-1969-code of practice of lying of flexible P.V.C. sheet & tiles flooring.

9. ROOFING

1) IS 3007(pt-I)-1964-code of practice of laying of corrugated cement sheets.

10. FINISHING

1) IS 133-1975-Enamel, Interior (a) under coating (b) Finishing colour as required.
2) IS 348-1966-French Polish.
3) IS 427-1965-Distemper, dry colour as required.
4) IS 425-1969-Distemper, oil emulsion as required.
5) IS 5410-1969-Cement paint, Colour as required.
6) IS 5011 (pt.1)-1969-Plastic emulsion paint for interior use.
7) IS 6278-1971 code of practice for white washing & colour washing.

11. DEMOLITION AND DISMANTILING.

1) IS 1200 (pt XVIIO-1974-Method of measurements of demolition and dismantling.

12. SAFETY CODE

1) IS 5915-1970-Safety code for construction including use of hot bituminous materials.
2) IS 4130-1970-Safety code for demolition of building.
3) IS 3754-1966-Safety code for excavation works.
4) IS 3606(Pt-I)-1966-Safety code for Scaffolds.

FORM OF TENDER

Having examined the invitation to bid, Instructions to Bidder, General conditions of contract, special conditions, specifications tender schedule, contract drawings and other documents for the above work, we the undersigned, offer to construct, erect complete and maintain the whole of the said in conformity with the said bid documents on the terms and conditions and under the provisions set out or called for in the contract documents at the rates listed in the schedule of unit prices or else wherein the contract documents.

We undertake if our bid is accepted, to commence the works within 7 days from the date of issue of award and to complete and delivery the whole of the works comprised in the contract as per the time schedule agreed to the contract document.

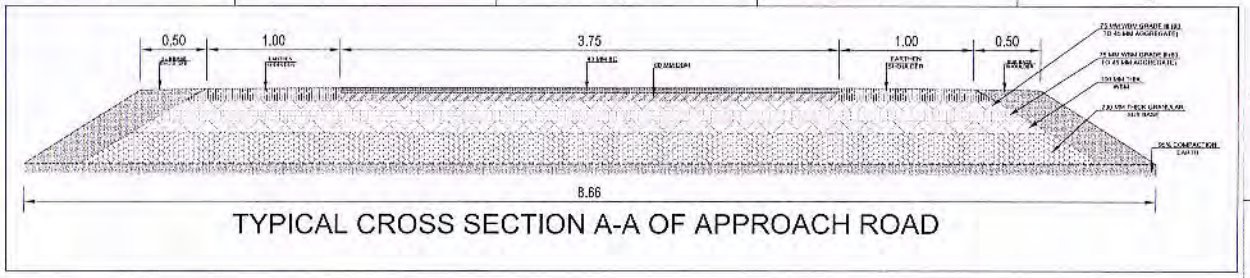
We agree to abide by this bid for the period of three months from the date fixed for receiving the same and it shall remain binding upon us and may be accepted at any time before expiry of the period.

Until and unless a formal agreement is prepared and executed this bid, together with your award thereof shall constitute a binding contract between us.

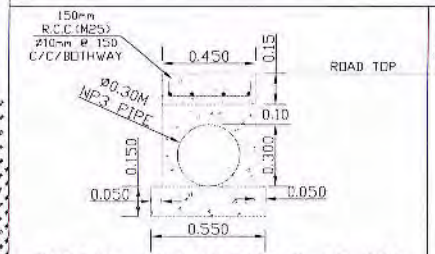
CONTRACTOR (Signature with seal) EMPLOYER (Signature)

DWG NO. 5709-004-PVC-C-102

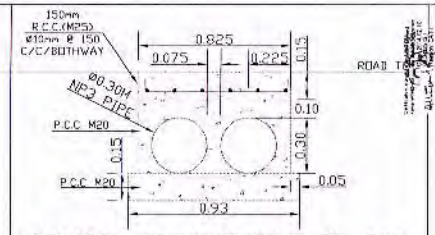
PLAN & SPOT LEVELS OF THE LEVEL CROSSING AREA



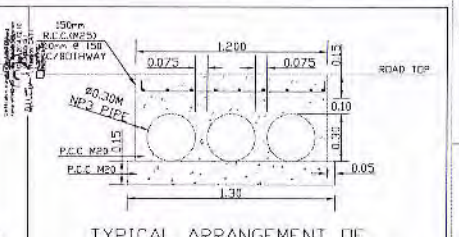
TYPICAL CROSS SECTION A-A OF APPROACH ROAD



TYPICAL ARRANGEMENT OF 300 DIA NP3 FOR DRAIN No.4 & 5



TYPICAL ARRANGEMENT OF 300 DIA NP3 FOR DRAIN No.1 & 2



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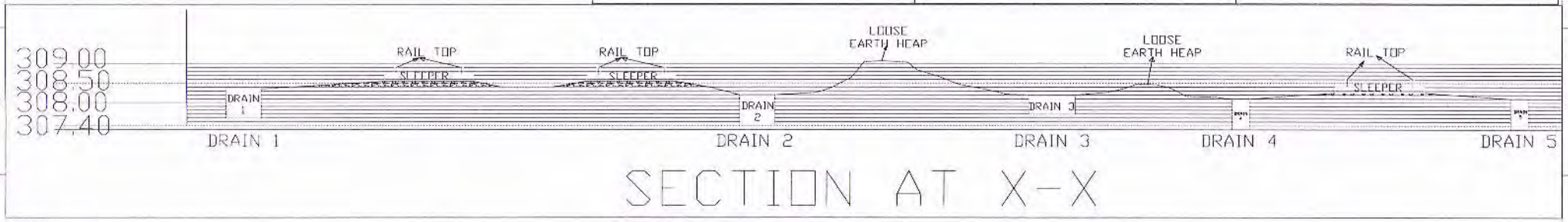


SECTION AT X-X

NOTE:
1. ALL DIMENSIONS ARE IN METERS OR AS MENTIONED.
2. LEVEL OF THE APPROACH ROAD SHALL MATCH WITH THE EXISTING ROAD AND RAIL LINE.
3. SUB BASE,BASE COURSE AND CARPETING SHALL BE AS IRC 37-2001.
4. COMPACTION OF SUB BASE TO AS PER IS 2720 (PART-8).
5. MATERIAL USED FOR SUB GRADE CONSTRUCTION SHOULD HAVE THE DRY DENSITY OF NOT LESS THAN 1.75 GM/CC.
6. DEPTH OF PAVEMENT IS CONSIDERED AS PER IRS 37-2001.
7. PROPOSED APPROACH ROAD IS MARKED FROM A-F.
8. F.R.L OF ROAD NEAR TRACK 1 & 2 IS 308.90 & TRACK 3 IS 308.780.
9. CONSTRUCTION OF LEVEL CROSSING WILL BE CARRIED OUT UNDER SUPERVISION OF RAILWAY CONSULTANT.
10. SAFETY NORMS LIKE AREA LIGHTNING,SIGNALING,RAIL MOVEMENT SHUT DOWN ETC. WILL BE ENSURED AT SITE. LOADING/UNLAODING OF COAL WILL NOT BE DISTURBED. THE SAME WILL BE PLANNED AT SITE IN COORDINATION WITH NTPC.
11. CAUTION SIGN BOARDS AT BOTH SIDES BEFORE SPEED BREAKERS FOR ROAD VEHICLES AND BEFORE LEVEL CROSSING FOR LOCO DRIVER WILL BE PROVIDED.

LEGENDS:	
	40mm BC.
	60mm DBM.
	250mm WBM (2 LAYERS OF 75mm + 1 LAYER OF 100mm).
	230mm GRANULAR SUB-BASE.
	COMPACTED SOIL WITH AT LEAST 95% COMPACTION.

TYPICAL DETAILS OF SPEED BREAKER

PROJECT	15 MWp SOLAR PHOTO VOLTAIC PLANT AT NTPC SINGRAULI
CUSTOMER	NTPC-SINGRAULI
CONTRACTOR	Refex ENERGY M/S REFEX ENERGY LTD.

REV.	DATE	ALTERED / CHECKED / APPROVED	REV.	DATE	ALTERED REFEX / CHECKED LNK / APPROVED SLR

	NAME	SIGN	DATE
DRAWN	REFEX		
CHECKED	LNK		
APPROVED	SLR		

BHARAT HEAVY ELECTRICALS LIMITED
ELECTRONICS DIVISION, BANGALORE

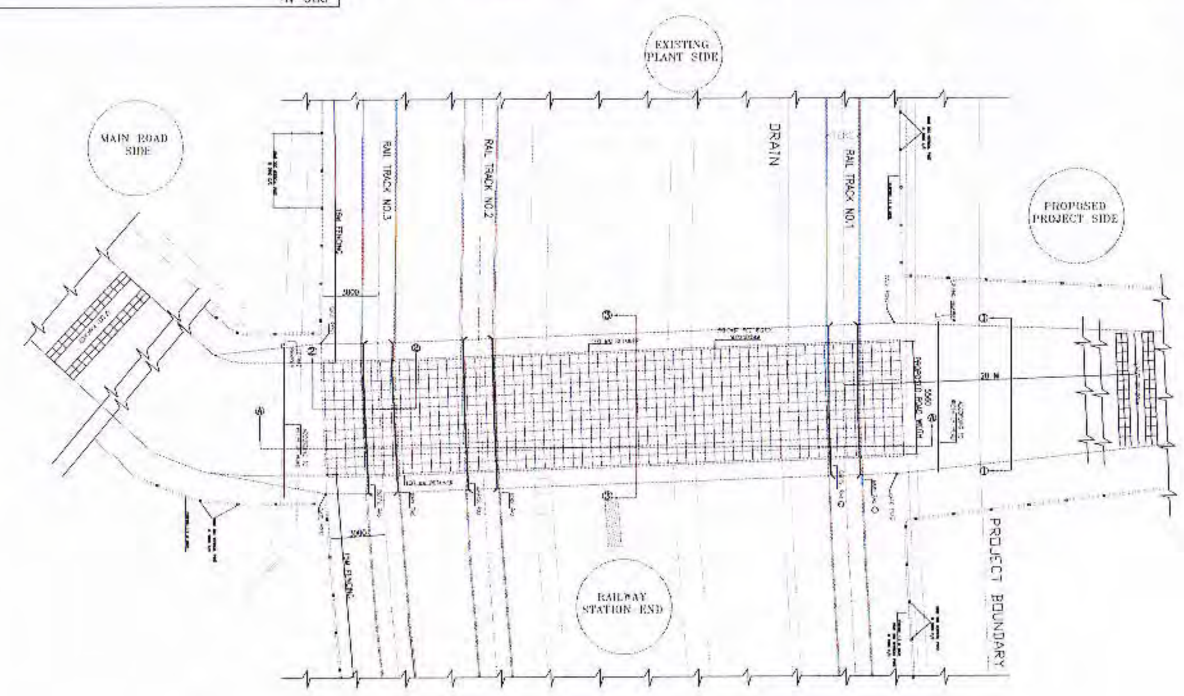
DEPT.	CODE
SC&PV	439

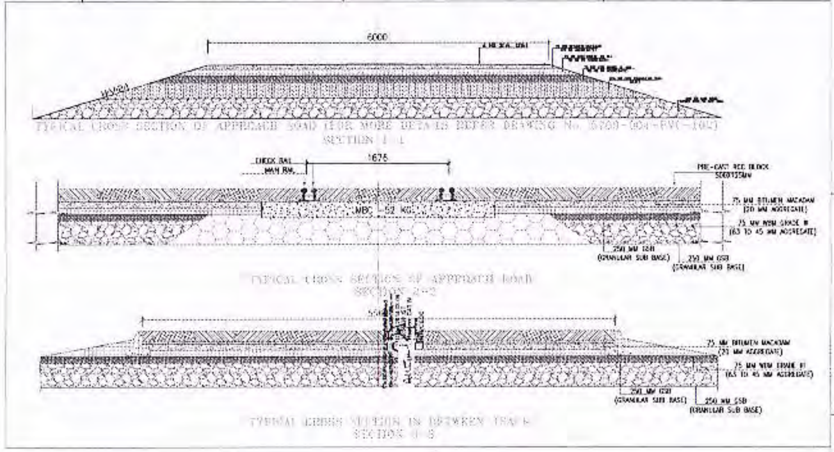
TITLE: APPROACH ROAD DETAILS.

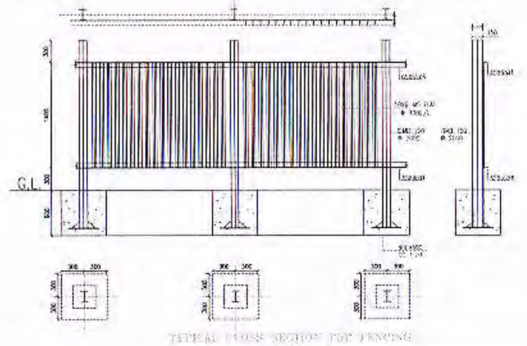
No. OF SHEETS	1
SHEET No.	1

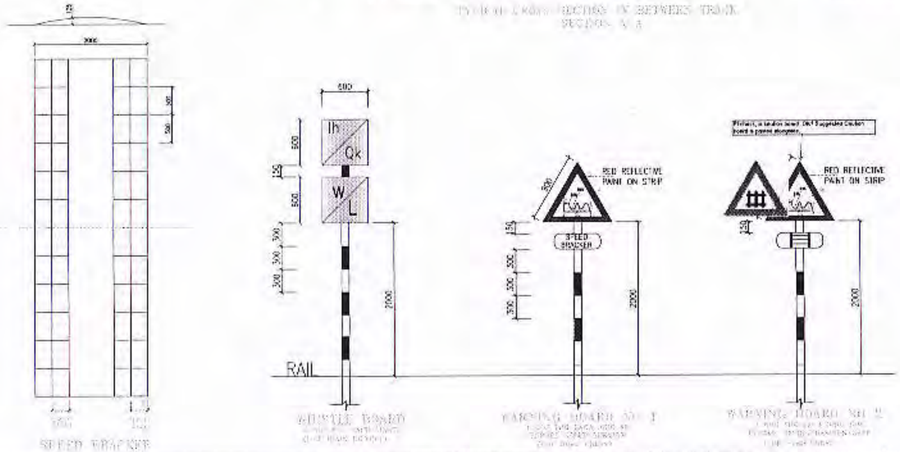
NTPC DRG.NO.	5709-004-PVC-C-102	BHEL DRG. No.	BH-NT-SI-DG-102	REV.	03

RET. DRG. No. | SIGN & DATE | INVENTORY No.









DETAILS OF PRECAST CONCRETE UNITS

S.NO	TYPE	SIZE	REINFORCEMENT/ REMARK	SKETCH
1	A	500X500X125	12 NO 8# 500MM LONG & 5 NOS RING 6/8MM	
2	B	250X250X125	7 NO 8# 500MM LONG & 5 NOS RING 6/8MM	
3	C	150X500X125	5 NO 8# 500MM LONG & 5 NOS RING 6/8MM	
4	D	150X500X125 TO 200X500X125	5 NO 8# 500MM LONG & 5 NOS RING 6/8MM	
5	E	300X100X500	5 NO 8# 500MM LONG & 10 NOS VER. 8MM	

NOTE:
1. ALL DIMENSIONS ARE IN MM OR AS MENTIONED
2. EXISTING TRACK STRUCTURE 52KG RAIL /PSC SLEEPERS.
3. PROPOSED CHECK RAIL SHALL BE 52 KG(7.5M LONG) WITH STANDARD FITTING.
4. PROPOSED ROAD WIDTH 5.560M + 100MM RETAINER ON BOTH SIDE(THIS CAN BE SUITABLY MODIFIED.
5. PROVIDE SAND /MOORUM/SUITABLE GRANULAR MATERIAL CUSHION 25 TO 30MM. WELL RAMMED AND COMPACTED BELOW CONCRETE BLOCK.
6. CONCRETE GRADE M-30 FOR PRECAST BLOCK. BLOCK THICKNESS OF CC BLOCKS CAN BE REDUCED UPTO 100MM TO SUITSITE CONDITION.
7. SPEED BRACKER PROVIDED AS PER SUITABLE LOCATION.
8. LIFTING BARRIER/LEAF TYPE GATE CAN BE PROVDED FROM SAFETY POINT OF VIEW ON BOTH END OF ROAD WAY.
9. SAFETY SIGN BOARDS ON RAILWAY TRACKS SHALL BE PROVIDED ON BOTH ENDS FOR EACH TRACK SEPARETLY.(WL BOARD 3X2=6Nos.)
10. SAFETY SIGN BOARDS ON RAILWAY TRACKS SHALL BE PROVIDED ON BOTH ENDS FOR EACH TRACK SEPARETLY.(WL BOARD 2X2=4Nos.)
11. FENCING SHALL BE EXTENDED AS PER SITE REQUIREMENT.
12. REINFORCEMENT AS PROPOSED FOR PRECAST CONCRETE CAN BE SUITABLY BY IF REQUIRED.
13. FOR APPROACH ROAD DETAILS REFER DRAWING No. 5709-004-PVC-102(LATEST).

PROJECT	15 MWp SOLAR PHOTO VOLTAIC PLANT AT NTPC SINGRAULI
CUSTOMER	NTPC SINGRAULI
CONTRACTOR	Refex ENERGY M/S REFEX ENERGY LTD

BHARAT HEAVY ELECTRICALS LIMITED
ELECTRONICS DIVISION, BANGALORE

TITLE: LEVEL CROSSING DRAWING

No. OF SHEETS: 1
SHEET No.: 1

CONTRACTORS CONSULTANT

BHEL DRG.NO: BT-NT-SI-DG-085
NTPC DRG.NO: 5709-004-PVC-C-085
DATE: 28.2.14
REV 02

REV	DATE	ALTERED	REV	DATE	ALTERED REFEX
		CHECKED			CHECKED LNK
		APPROVED			APPROVED SLR

	NAME	SIGN	DATE
DRAWN	REFEX		
CHECKED	LNK		
APPROVED	SLR		

DEPT SC & PV
CODE 439

BILL OF QUANTITIES FOR CMCS, SECURITY ROOM, ROAD,PATHWAYS, DRAINS AND LEVEL CROSSING WORKS AT, 15MW SPV POWER PLANT AT NTPC-SINGRAULI,MGR,NEAR JAYANTH COAL MINE,SINGRAULI DIST.(M.P.)

Activitity - 1

Control room (CMCS) and security room construction works.

(1A) Civil Works Items:

S.NO.	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
1	Earth work in excavation over areas (Exceeding 30 cm in depth, 1.50 mtrs in width as well as 10 sqm on plan) including disposal of excavated earth, lead upto 50 mtrs and lift upto 1.5 mtr, disposed earth to be levelled and neatly dressed in all type of soil as per the directions of Engineer In charge.	Cum	570		
2	Earth work in excavation by mechanical means (Hydraulic excavator) / manual means over areas (exceeding 30 cm in depth, 1.5m in width as well as 10 sqm on plan) including disposal of excavated earth, lead upto 50 m and lift upto 1.5 m, disposed earth to be levelled and neatly dressed in Ordinary rock	Cum	40		
3	...do--- earth work in hard rock	Cum	20		
4	Filling available excavated earth (excluding rock) in trenches plinth, sides of foundations etc., in layers not exceeding 20 cm in depth consolidating each deposited layer by ramming and watering, lead upto 50 mtrs and lift upto 1.50m as per the directions of Engineer In charge	Cum	330		
5	Diluting and injecting chemical emulsion for POST-CONSTRUCTIONAL anti-termite treatement With Chlorpyriphos/Lindane E.C. 20% with 1% concentration for Control room building & Security room as per IS 6313 - part II by approved agency including the cost of chemical, precautionary measures etc.complete complete as specified by Designer.	Sqm	620		
6	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work at all levels below foundation and for flooring concrete (1:4:8) including curing etc, all complete as per the directions of Engineer-in-charge.	Cum	110		
7	Embedment of fence post Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to all levels 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) and for plinth protection etc, complete all as per the directions of Engineer In charge.	Cum	25		
8	Providing and laying in position machine batched and machine mixed design mix M-25 grade cement concrete for reinforced cement concrete work, using cement content as per approved design mix, including pumping of concrete to site of laying but excluding the cost of centering, shuttering, finishing and reinforcement, including admixtures in recommended proportions as per IS: 9103 to accelerate, retard setting of concrete, improve workability without impairing strength and durability including curing and testing etc, as per direction of Engineer-in-charge All works upto plinth level.				
8a	M 25 grade RCC footings,septic tank,cable trench, soak pit etc,	Cum	150		
8b	M 25 grade RCC Columns	Cum	50		
9	Providing and laying in position machine batched and machine mixed design mix M-25 grade cement concrete for reinforced cement concrete work, using cement content as per approved design mix, including pumping of concrete to site of laying but excluding the cost of centering, shuttering, finishing and reinforcement, including admixtures in recommended proportions as per IS: 9103 to accelerate, retard setting of concrete, improve workability without impairing strength and durability including curing and testing etc, as per direction of Engineer-in-charge All works above plinth level upto floor V level.				
9a	M 25 grade RCC Columns	Cum	20		
9b	M 25 grade RCC Beams , Lintel plinth beam, cantilevers etc	Cum	120		
9c	M 25 grade RCC Roof Slab, chajja and facia fins	Cum	130		
9d	M 25 grade RCC Stair Case	Cum	10		
10	Centering and shuttering including strutting, propping etc., and removal of form for at all heights and levels for				

10a	Footing, foundations, septic tank, soak pit, bases of columns etc for mass concrete	sqm	230		
10b	Columns, pillars, piers, abutments, posts and struts	sqm	432		
10c	Lintels, Beams, plinth beams, girders, bressumers and cantilevers	sqm	700		
10d	Roofs, Suspended floors, landings, balconies & access platform	sqm	620		
10e	Staircases	sqm	30		
11	Providing and laying in position reinforcementfor RCC work including straightening, cutting, bending, placing in position and binding for bars with 16 gauge G I wires welding of reinforcement where required, providing cover to reinforcement all complete in THERMO MECHANICALLY TREATED BARS	Kg	56000		
12	Providing and constructing 230 mm thick brickwork with bricks of class designation 7.5 at all levels in CM (1:4) including providing necessary staging, scaffolding curing removing the staging and scaffolding, complete work as per direction of Engineer-in-charge	Cum	200		
13	Providing Half brick masonry 115 thick brickwork in CM (1:4) with bricks of class designation 7.5 at all levels including , providing scaffolding curing, removing scaffolding etc., complete work as per direction of Engineer-in-charge.	Sqm	390		
14	Random rubble masonry with hard stone in foundation and plinth including levelling up with cement concrete 1:6:12 (1 cement : 6 coarse sand : 12 graded stone aggregate 20mm nominal size) upto plinth level with Cement Mortar 1:6 (1 cement : 6 coarse sand) complete work as per direction of Engineer-in-charge.	Cum	30		
15	Preparing the surface with Cleaning & hacking . Providing surface with 12mm Internal Plastering with CM(1:6),for masonry walls & ceilings & applied by hand or mechanically, providing & removing scaffolding	Sqm	1770		
16	Providing surfaces of External walls such other members with plaster of cement mortar 18 mm thickness to get a plain and even surface, with 12mm thick cement plaster of CM(1:5) & finished with a top layer 6mm thick cement plaster(1:6) with water proofing compound with white cement primer all; labour, materials & providing and removing scaffolding complete at all heights and levels as per direction of Engineer-in-charge	Sqm	960		
17	Providing surfaces of walls outside periphery of chajja etc., with plaster of CM (1:4) 15 mm average thickness to get a plain and even surface finished with a coat of neat floating cement at all levels including providing and removing scaffolding (outside) as per direction of Engineer-in-charge	sqm	150		
18	Providing and applying plaster of paris putty of two coats over plastered surface 2mm thickness to prepare the surface even and smooth complete as per direction of Engineer-in-charge. Plaster of Paris confirming to IS:2547 shall be used for punning	sqm	1770		
19	Distempering with oil bound washable distemper of approved brand and manufacture to give an even shade , new work (two or more coats) over and including priming coat with cement primer as per direction of Engineer-in-charge	sqm	1150		
20	Painting of Battery room ceiling with Acid resistant paint(two or more coats)	Sqm	35		
21	Finishing exterior walls with multi surface paint with two or more coats applied on walls @ 1.25ltr/10Sqm including special coat of primer applied at 0.75 ltr/10sqm	sqm	970		
22	Providing surfaces and ceiling, portico etc., with 6 mm cement plaster 1:3 (1 cement: 3 fine sand) finished with a floating coat of neat cement and thick coat of Lime wash to get a plain and even surface, on top of walls when dry for bearing of R.C.C. slabs finished smooth at all levels including providing scaffolding, curing, etc., complete as per direction of Engineer-in-charge.	sqm	620		
23	Vitrified tile Flooring of 600mmX600mm of min 9mm thickness,confirming to IS:15622 Laid on 20mm thick mortar(1:4) with 3mm ground joints as per approved pattern painted neatly with 3X4mm epoxy grout or equivalent, as directed by the engineer at all levels. (SCADA, LOBBY, OFFICE). Skirting of 100mm also included	Sqm	190		
24	Providing & laying anti acid / Alkali type (300mmX300mm) Heavy Duty(Grade V) dust pressed ceramic tiles on 10mm cement mortar (1:4) as per IS 13755 in Battery Room. Skirting of 100mm also included	Sqm	38		

25	Providing and laying rectified Glazed Ceramic floor tiles 300x300 mm or more (thickness to be specified by the manufacturer) of 1st quality conforming to IS : 15622 of approved make i, laid on 20 mm thick Cement Mortar 1:4 (1 Cement : 4 Coarse sand) including pointing the joints with white cement and matching pigments etc., complete.(In toilet & pantry)	Sqm	42		
26	Providing and fixing Ist quality ceramic glazed wall tiles conforming to IS : 15622 (thickness to be specified by the manufacturer) of approved make as approved by Engineer-in-Charge, in skirting, risers of steps and dados over 12 mm thick bed of cement Mortar 1:3 (1 cement : 3 coarse sand) and jointing with grey cement slurry @ 3.3kg per sqm including pointing in white cement mixed with pigment of matching shade complete.	Sqm	85		
27	Providing & laying Kota stone slabs 20 mm thick in risers of steps, skirting, laid on 12 mm (average) thick cement mortar 1:3 (1 cement 3 coarse sand) and jointed with grey cement slurry mixed with pigment to match the shade of the slabs, including rubbing and polishing complete	Sqm	40		
28	Providing and Fixing 15 mm thick densified tegular edged eco friendly light weight calcium silicate false ceiling tiles of approved texture spintone/cosmos / Hexa or equivalent of size 595 x 595 mm in true horizontal level suspended on inter locking metal grid of hot dipped galvanised steel sections (galvanising @ 120 grams per sqm including both side) consisting of main 'T' runner suitably spaced at joints to get required length and of size 24x38mm made from 0.33 mm thick (minimum) sheet, spaced 1200mm centre to centre, and cross "T" of size 24x28mm made out of 0.33mm (Minimum) sheet, 1200mm long spaced between main'T' at 600mm centre to centre to form a grid of 1200x600mm and secondary cross 'T' of length 600mm and size 24 x28mm made of 0.33mm thick (Minimum) sheet to be inter locked at middle of the 1200x 600mm panel to from grid of size 600x600mm, resting on periphery walls /partitions on a Perimeter wall angle pre-coated steel of size(24x24X3000 mm made of 0.40 mm thick (minimum) sheet with the help of rawl plugs at 450mm centre to centre with 25mm long dry wall screws @ 230mm interval and laying 15mm thick densified edges calicum silicate ceiling tiles of approved texture (Spintone / Cosmos/hexa) in the grid including, cutting/ making opening for services like diffusers, grills,light fittings, fixtures, smoke detectors etc., whereever required, Main 'T' runners to be suspended from ceiling using G.I. slotted cleats of size 25x35x1.6mm fixed to ceiling with 12.5 mm dia and 50mm long dash fasteners, 4mm G.I. adjustable rods with galvanised steel level clips of size 85 x 30 x 0.8 mm, spaced at 1200mm centre to centre along main 'T' , bottom exposed with 24mm of all T-sections shall be pre-painted with polyster baked paint, for all heights, as per specifications, drawings and as directed by engineer-in-charge.	Sqm	151.75		
29	62 mm thick cement concrete flooring with concrete hardener topping, under layer 50 mm thick cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20mm nominal size) and top layer 12mm thick cement hardener consisting of mix 1:2 (1 cement hardener mix : 2 graded stone aggregate, 6mm nominal size) by volume, hardening compound mixed @ 2 litre per 50kg of cement or as per manufactures specifications. This includes cost of cement slurry, but excluding the cost of nosing of steps etc. complete	Sqm	430		
30	Providing and laying pressed clay tiles (as per approved pattern 20 mm nominal thickness of approved size) on roofs jointed with cement mortar 1:4 (1 cement : 4 coarse sand) mixed with 2% integral water proofing compound laid over a bed of 20 mm thick cement mortar 1:4 (1 cement : 4 coarse sand) and finished neat complete	Sqm	650		
31	Providing and fixing **Granite slab** table rubbed, edges rounded and polished of size 75x50 cm deep and 1.8 cm thick fixed in urinal partitions by cutting a chase of appropriate width with chase cutter and embedding the stone in the chase with epoxy grout or with cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 6 mm nominal size) as per direction of Engineer-in-charge and finished smooth.	Sqm	4		

32	Providing and fixing 18mm thick gang saw cut mirror polished premoulded and prepolished) machine cut **Granite Slabs** for kitchen platforms, vanity counters, window sills , facias and similar locations of required size of approved shade, colour and texture laid over 20mm thick base cement mortar 1:4 (1 cement : 4 coarse sand) with joints treated with white cement, mixed with matching pigment, epoxy touch ups, including rubbing, curing, moulding and polishing to edges to give high gloss finish etc. complete at all levels	Sqm	3		
33	Providing and fixing anodised aluminimum work for doors, windows, ventilators and partitions with extruded built up standard tubular and other sections of approved made conforming to IS : 733 and IS : 1285 anodised transparent or dyed to required shade according to IS : 1868 (minimum anodic coating of grade AC 15), fixed with rawl plugs and screns or with fixing clips, or with expansion hold fasteners including necessary filling up of gaps at junctions at top, bottom and sides with requried PVC / neorprine felt etc., Aluminium sections shall be smooth, rust free straight mitred and jointed mechnically whereever required including cleat angle, alumimimum snap beading for glazing, panelling, CP brass / stainless steel screws, all complete as per architectural drawings and the directions of Engineer-in-charge (Glazing and panelling to be paid for separtely) for shutters of doors, windows and ventilators including providing and fixing hinges / pivots and making provision for fixing of fittings wherever required including the cost of PVC / Neoprene gasket required				
33a	For Fixed portion	Kg	400		
33b	Aluminium Doors(Internal), windows/ sliding including cost of all accessories	Kg	662.5		
34	Providing and fixing pressed steel door frames conforming to IS: 4351 manufactured from commercial mild steel sheet of 1.60 mm thickness including hinges, jamb, lock jamb, bead and if required angle threshold of mild steel angle of section 50x25mm, or base ties of 1.60 mm pressed mild steel welded or rigidly fixed together by mechanical means, including M.S. pressed butt hinges, 2.5mm thick with mortar guards, lock strike-plate and shock absorbers as specified and applying a coat of approved steel primer after pre-treatment of the surface as directed by Engineer-in-charge: Fixing with adjustable lugs with split tail end to each jamb	Rm	72		
35	35 mm thick factory made Solid panel PVC Door shutter made out of single piece extruded soild PVC profiles, 5 mm (± 0.2mm) thick, having styles & rails (except lock rail) of size 95 mmx 35 mm x 5 mm, out of which 75 mm shall be flat and 20 mm shall be tapered (on both side), having one side thickness of 15 mm integrally extruded on the hinge side of the profile for better screw holding power, including reinforcing with MS tube of size 40 mm X 20 mm x 1 mm, joints of styles & rails to be mitered cut & joint with the help of PVC solvent cement, self driven self tapping screws & M.S. rectangular pipes bracket of size 190 mm X 100 mm of cross section size 35 mm x 17 mm x 1 mm at each corner. Single piece extruded 5mm thick solid PVC Lock rail of size 115 mm x 35 mm x 35 mm, out of which 95 mm to be flat and 20 mm to be tapered at both ends, having 15 mm solid core in middle of rail section integrally extruded, fixing the styles & rails with the help of solvent and self driven self tapping screws of 125 mm x 11 mm, including providing 5 mm Single piece solid PVC extruded sheet inserted in the door as panel, all complete as per manufacturer's specification and direction of Engineer-in-charge.	Sqm	12		
36	Providing and fixing glazing in aluminium door, window, ventilator shutters and partitions etc. with EPDM rubber / neoprene gasket etc. complete as per the architectural drawings and the directions of engineer-in-charge :				
36a	With tinted glass panes of 4.00 mm thickness	Sqm	65		
36b	With tinted glass panes of 8.00 mm thick for partition and Aluminium Doors.	Sqm	10		
37	Providing and fixing aluminium die cast body tubular type universal hydraulic door closer (having brand logo with ISI, IS : 3564, embossed on the body, door weight upto 35 kg and door width upto 700 mm) with necessary accessories and screws etc. complete.	Each	5		

38	Providing and fixing aluminium I S I marked anodised (anodic coating not less than grade AC 10 as per IS : 1868) ISI marked tower bolts of size 250 X 10 mm size with nuts & screws.	Each	20		
39	Providing and fixing aluminium ISI marked anodised (anodic coating not less than grade AC 10 as per IS : 1868) aluminium handles of 125 mm size with nuts & screws etc., all complete.	Each	24		
40	Providing and fixing aluminium I S I marked anodised (anodic coating not less than grade AC 10 as per IS : 1868) aluminium hanging floor door stopper of single rubber stopper with screws for fixing stopper.	Each	10		
41	Providing and fixing bright finished brass 100 mm mortice latch and lock ISI marked with six levers and a pair of anodized (anodic coating not less than grade AC 10 as per IS : 1868) aluminium lever handles with necessary screws etc complete (best make of approved quality)	Each	8		
42	Providing and fixing vertical venitian blinds of approved colour and brand cost is inclusive of supply of materials, fixing, labour charges, transportation all leads, lifts, taxes etc., complete at all heights and levels as directed by the Engineer-in-charge..	Sqm	11		
43	Providing structural steel work in built up sections, framed work, window grill, ventilator Grills,Acess Ladders , hand rails, Channels for cable trench etc, & Door Frames. including cutting, hoisting, fixing in position at all levels and applying a priming coat of approved steel primer etc., complete.	Kg	5500		
44	Supplying and fixing rolling shutters: 80x1.25mm M.S. laths with 1.25 mm thick top cover, made of required size M.S. laths, interlocked together through their entire length and jointed together at the end by end locks, mounted on specially designed pipe shaft with brackets, side guides and arrangements for inside and outside locking with push and pull operation complete, including the cost of providing and fixing necessary 27.5 cm long wire springs manufactured from high tensile steel wire of adequate strength conforming to IS: 4454 – part 1 and M.S. top cover of required thickness for rolling shutters.complete as per the directions of the engineer-in-charge.	sqm	26		
45	Providing lime concrete terracing on roof average thickness 10 cms laid to fall with 25 mm nominal size brick aggregate and 50 % of lime mortar 1 : 2 (1 lime putty : 2 Surki) rammed with wooden ramper and finished with gur and belgiri treatment including necessary tamping etc., complete at all heights and levels as directed by the Engineer-in-charge.	Sqm	650		
46	Providing and laying pressed split clay tiles (as per aproved pattern) 20 mm nominal thickness on roofs jointed with cement mortar 1:4 (1 cement : 4 coarse sand) mixed with 2 % integral water proofing compound laid over a bed of 20 mm thick cement mortar (1 : 4) (1 cement : 4 Coarse Sand) and finished neat complete at all heights and levels as directed by the Engineer-in-charge.	Sqm	650		
47	Providing and fixing on wall face un platicised rigid PVC rain water pipe 110 mm dia conforming to IS 13592 type A including jointing with seal ring conforming to IS 5382 leaving 10 mm gap for the themal expansion including all fittings like bends, tees, clamps, screws, cleats etc., complete at all heights and levels as directed by the Engineer-in-charge	RM	80		
48	Pointing on stone work with cement mortar 1:3 (1 cement : 3 fine sand) for flush pointing all complete including curing etc, as directed by the Engineer-in-charge.	Sqm	50		
49	Providing and fixing GI pipes complete with GI fittings and clamps, including cutting, painting with anti corrosive bitumastic paint, and making good the walls (internal works) 20 mm dia nominal bore	RM	35		
50	Providing and fixing GI pipes complete with GI fittings including trenching refilling, sealing the joints, etc., 25 mm nominal bore	RM	15		
51	Providing and fixing brass stop cock of approved design, quality and make 15 mm NB	Each	2		
52	Providing and fixing brass ball valve with C I wheel of approved quality (screwed end) for 25 mm dia nominal bore with reducer if necessary at all heights & levels	Each	8		
53	Providing and fixing PVC Nahani Traps of ISI Make of 100 x 100 mm at all heights and levels size and all complete as directed by the Engineer-in-charge..	Each	17		

54	Providing and fixing PTMT towel rail complete with brackets fixed to wooden cleats with CP brass screws with concealed fitting arrangement of approved quality and colour. 600mm long towel rail with total length of 645mm, width 78mm and effective height of 88mm, weighing not less than 190gms	Each	3		
55	Providing and fixing PVC, soil waste and vent pipes conforming to IS 4985 of SWR quality 4 Kg & 6 Kg / Sq cm, pressure. The rate shall incude cost of all fittings like plain elbow, plain tee, plain Y, 4 way tee and all required necessary specials etc., complete. jointing with rubber ring and solvent joints providing MS brackets grouted in the wall and fasteners cutting and making good the walls and floors (pipes running expose in sanitary ducts) supreme or prince quality pipes.				
55a	75 mm dia	RM	20		
55b	110 mm dia	RM	40		
56	Providing and fixing Stainless Steel A ISI 304 (18/8) kitchen sink as per IS 13983 with C.I. brackets and stainless steel plug 40 mm including painting of fittings and brackets, cutting and making good the walls wherever required, 510x1040 mm bowl depth 200mm	Nos	1		
57	Providing and fixing CP brass long body bib cock of approved quality conforming to IS complete with necessary accessories for 15 mm nominal bore tap / cock at all heights and floors as per the directions of Engr In Charge	Each	5		
58	Providing and fixing wash basin with C.I. brackets, 15 mm C.P. brass pillar taps,32 mm C.P. brass waste of standard pattern, including painting of fittings and brackets, cutting and making good the walls wherever require :White Vitreous China Flat back wash basin size 550x400 mm with single 15 mm C.P. brass pillar tap.	Each	4		
59	Providing and fixing 600x450 mm beveled edge mirror of superior glass (of approved quality) complete with 6 mm thick hard board ground fixed to wooden cleats with C.P. brass screws and washers complete	Each	4		
60	Providing and fixing white water closet Squatting type pan (Indian Type) orissa pattern of size 580 x 440 mm with 100 mm sand cast iron ' P or S ' trap 10 litre low level white PVC flushing cistern with manually controlled device (handle lever) conforming to IS : 7231 parry ware / hindware / seabird / orient (coral) with all fittings and fixtures complete including cutting and making good the walls and floors where ever required etc., complete.	Each	2		
61	Providing and fixing white vitreous china pedasal type water closet (european type) with seat & lid, 10 litre low level flushing cistern with fittings and CI / MS brackets, 40 mm flush bend, over flow arrangement with specials of standard make and mosquito proof coupling of approved municipal design complete including painting of fittings and brackets, cutting and making good the walls and floors where ever required WC pan with ISI marked coloured solid plastic and lid with coloured vitreous china flushing cistern and CP flush bend (low level cistern)	Each	3		
62	Providing and fixing white vitreous china flat back half stall urinal of 430*260*350mm parryware/Hindware/seabird/orient (coral) with fittings size C.P. Brass , spreaders with unions and clamps (all in C.P.Brass) with waste fitting as per I.S.2556, C. I. trap with outlet grating and other coupling in C.P. brass including painting of fittings and brackets, cutting and making good the walls and floorswherever required: all CP fittings are jaquar or yes yes brand. flush pipe: Single half stall urinal with 5 litre P.V.C. automatic flushing cistern.	Each	3		
63	Providing and fixing constructing road gully chamber 50 x 45 x 60 cm with bricks of class designation 75 in cement mortar 1:4 (1 cement : 4 fine sand) including 500 x 450 mm pre cast RCC horizontal grating with frame complete as per standard design with FPS bricks.	Each	6		
64	Providing and fixing approved brands of PVC Sintex water tanks including,lifting, positioning and cost of all labours, materials, fittijngs etc. complete.(3 Tanks, 2No 6000 Lts & 1 no 500 Lts)	Ltr	12500		
65	Providing and fixing approved quality soap holder fix on wall with rawl plugs all materials labours etc., all complete as directed by the Engineer-in-charge.	Each	3		
(ACTIVITY 1A) TOTAL AMOUNT OF CIVIL WORKS INCLUSIVE OF TAXES (Rs)					

Control room (CMCS) and security room construction works.
(1B) Electrical Works Items:

S.NO.	DESCRIPTION	UNIT	QTY	Rate	AMOUNT
1	Philips make TCS 398 2x36 D6 EBT LIGHT FITTING	Nos	4		
2	Philips make TMS021 1x36 IC LIGHT FITTING	Nos	4		
3	Ceiling fans	Nos	13		
4	Exhaust fans	Nos	8		
5	15A switch controlled by a 15A universal shuttered socket with box	Nos	18		
6	5A switch controlled by a 5A universal shuttered socket with box	Nos	2		
7	3.5Cx25Sq.mm AL cable	RM	100		
8	3.5Cx25Sq.mm AL cable termination	Nos	8		
9	point wiring for lighting / exhaust fan	Nos	122		
10	point wire for ceiling fans	Nos	13		
11	3/4' PVC pipe	RM	300		
12	1'' PVC pipe	RM	600		
13	8 SWG GI EARTH WIRE	RM	20		
14	25 x 6 mm GI Earth Flat Strip for Internal earth grid	RM	30		
15	25 x 6 mm GI Earth Flat	RM	265		
16	Earth station	Nos.	6		
17	2 pair 0.5 mm ATC telephone cable without pipe/casing	RM	100		
18	RJ 45 Socket (krone make) with box	Nos	15		
19	RJ 11 Socket with box	Nos	11		
20	Telephone tag block	Nos.	2		
21	20 pair 0.5 mm ATC telephone cable without pipe/casing	RM	80		
22	Ethernet cable UTP CAT-6 without pipe/casing	RM	200		
23	1.5'' PVC casing N caping	RM	100		
24	1'' PVC casing N caping	RM	100		
25	3x4.0sqmm cables	RM	120		
26	2x2.5sqmm cables	RM	200		
27	4 WAY double door	Nos	1		
28	40A, TP&N MCB (MAIN I/C)	Nos	1		
29	25A,DP RCBO (PHASE I/C)	Nos	3		
30	10/16A, SP&N MCB (O/G)	Nos	12		
31	2+6WAY SP&N DB	Nos	2		
32	25A,DP RCBO (I/C)	Nos	2		
33	10/16A, SP&N MCB (O/G)	Nos	8		
34	8 WAY TP&N DB	Nos	1		
35	63A, TP&N MCB (MAIN I/C)	Nos	1		
36	40A, SP&N MCB (PHASE I/C)	Nos	3		
37	25A,DP RCBO (OG I/C)	Nos	12		
38	Modular base and cover plate for 1 module	Nos	20		
39	Modular base and cover plate for 2 module	Nos	13		
40	Modular base and cover plate for 3 module	Nos	6		
41	Modular base and cover plate for 6 module	Nos	13		
42	SP Switch 6A one way modular switch,ISI mark	Nos	60		
43	SP Switch 6A two way modular switch,ISI mark	Nos	2		
44	Steped type modular regulator type (2 module)	Nos	13		
(ACTIVITY 1B) TOTAL AMOUNT OF ELECTRICAL WORKS INCLUSIVE OF TAXES (Rs)					
(ACTIVITY -1A & 1B) TOTAL AMOUNT INCLUSIVE OF ALL TAXES (Rs)					

Activitity - 2

Bituminous Road,Pathways and drains and Level crossing works.

S.NO.	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
1	Preparation & consolidation of OGL/sub grade with power road roller of 8 to 10MT capacity after dressing to camber & consolidating with road roller including making good the undulations etc. & re rolling the OGL & disposal of surplus earh lead up to 50m complete all as per direction of Engineer-in -charge.	Sqm	20000		
2	Construction of granular sub-base by providing close graded Material conforming to specifications, mixing in a mechanical mix plant at OMC, carriage of mixed material by tippers to work site, for all leads & lifts, spreading in uniform layers of specified thickness with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per specifications and directions of Engineer-in-Charge.With material conforming to Grade-III (size range 26.5 mm to 0.075 mm) having CBR Value-20.	Cum	2650		
3	Brick work with clay flyash F.P.S. (non modular) brick of class designation 7.5 in pathways and superstructure above plinth level up to floor five level in :Cement mortar 1:4 (1 cement : 4 coarse sand) with curing complete as per direction of Engineer-in-charge.	Cum	1725		
4	Supply and stacking of good earth from approved borrow area for filling as sub grade complete all as per direction of Engineer-in -charge.	Cum	1860		
5	Filling of suitable approved borrow area soil in layers not exceeding 20 cm in depth consolidating each deposited layer by watering and compacting up to required density (Min. 97% of MDD) with power road roller of 8 to 10MT capacity complete all as per direction of Engineer-in -charge including testing.	Cum	1860		
6	Supply and stacking of 90mm to 45mm size stone aggregates for WBM as per specification complete all testing as per direction of Engineer-in -charge.	Cum	180		
7	Supply and stacking of 63mm to 45mm size stone aggregates for WBM as per specification complete all testing as per direction of Engineer-in -charge.	Cum	255		
8	Supply and stacking of 53mm to 22.4mm size stone aggregates for WBM as per specification complete all testing as per direction of Engineer-in -charge.	Cum	245		
9	Supply and stacking of stone screening material nominal size 13.2mm as per specification complete all as per direction of Engineer-in -charge. (Type - A) for WBM.	Cum	42		
10	Supply and stacking of stone screening material nominal size 11.2mm as per specification complete all as per direction of Engineer-in -charge. (Type - B) for WBM.	Cum	120		
11	Supply and stacking of binding material mooram for WBM as per specification complete all as per direction of Engineer-in -charge.	Cum	62		
12	Laying, spreading & compacting stone aggregates of specified sizes to WBM specification including spreading uniform thickness 150mm in two layers,hand picking,rolling with 3 wheeled road/vibratory roller 8 to 10Tonnes in stages to proper grade & camber,applying & brooming requisite type of screening/binding material to fill up interstices of coarse aggregate watering and compacting to required density as directed by Engineer-in-charge.	Cum	540		
13	Providing and laying bituminous macadam using crushed stone aggregates of specified grading premixed with bituminous binder, transported to site by tippers, laid over a previously prepared surface with paver finisher equiped with electronic sensor to the required grade, level and alignment and rolling with smooth wheeled, vibratory and tandem rollers as per specifications to achieve the desired compaction and density, complete as per specificatons and directions of Engineer-in-Charge.50 to 100 mm average compacted thickness with bitumen of grade VG-30 @3.50% (percentage by weight of total mix) prepared in Drum Type Hot Mix Plant of 60-90 TPH capacity.	Cum	100		

14	Providing and laying Bituminous concrete using crushed stone aggregates of specified grading, premixed with bituminous binder and filler, transporting the hot mix to work site by tippers, laying with paver finisher equiped with electronic sensor to the required grade, level and alignment and rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction and density as per specification, complete and as per directions of Engineer-in-Charge. 40/50 mm compacted thickness with bitumen of grade VG-30 @5.5% (percentage by weight of total mix) and lime filler @ 3% (percentage by weight of Aggregate) prepared in drum Type Hot Mix Plant of 60-90 TPH capacity.	Cum	70		
15	Earth work in excavation by mechanical means (Hydraulic excavator) / manual means over areas (exceeding 30cm in depth. 1.5m in width as well as 10 sqm on plan) including disposal of excavated earth, lead upto 50m and lift upto 1.5m, disposed earth to be levelled and neatly dressed in all kinds of soil	Cum	6150		
16	Earth work in excavation by mechanical means (Hydraulic excavator) / manual means over areas (exceeding 30 cm in depth, 1.5m in width as well as 10 sqm on plan) including disposal of excavated earth, lead upto 50 m and lift upto 1.5 m, disposed earth to be levelled and neatly dressed in Ordinary rock	Cum	2500		
17	...do--- earth work in hard rock	Cum	500		
18	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level 1:3:6 with curing complete as per direction of Engineer-in-charge.	Cum	450		
19	Providing and laying in position specified grade of reinforced cement concrete excluding the cost of centering, shuttering, finishing and reinforcement - All work up to plinth level for foundation 1:1.5:3 (M25 grade as per IS:456) (1 cement : 1.5 coarse sand : 3 graded stone aggregate 20 mm nominal size with curing complete as per direction of Engineer-in-charge.	Cum	850		
20	Centering and shuttering including strutting, propping etc. and removal of form for wall,Columns, Pillars, Piers, Abutments, Posts and Struts.	Sqm	5000		
21	Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundations etc. in layers not exceeding 20cm in depth, consolidating each deposited layer by ramming and watering, lead up to 50 m and lift upto 1.5 m.	Cum	1050		
22	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level 1:2:4 in coping (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) with curing complete as per direction of Engineer-in-charge.	Cum	100		
23	Providing and fixing of Structural steel for check rails,fencing of level crossing, baricading, grills etc, (as per approved drawing) riveted, bolted or welded in built up sections, trusses and framed work, including cutting, hoisting, fixing in position with primer coat and colour paint of approved brand all complete as per direction of Engineer-in-charge	Kg	24000.0		
24	Random rubble masonry with hard stone in foundation & above plinth in wall including levelling up with cement concrete 1:6:12 (1 cement : 6 coarse sand : 12 graded stone aggregate 20 mm nominal size) at plinth level with cement mortar 1:6 (1 cement : 6 coarse sand) all including curing complete as per the directions of Engineer In charge.	Cum	1500		
25	Pointing on stone work with cement mortor 1:3 (1 cement : 3 fine sand) with flush pointing including material,labour,curing all complete as per direction of Engineer-in -charge.	sqm	4800		
26	Reinforcement for RCC work including straightening, cutting,bending,placing in position & binding all complete with TMT bars of various dia (Fe-415 grade) for various works drain walls,footings,columns,beams,pillasters,pre cast slabs etc at all levels up to floor level five complete all as per direction of Engineer-in -charge.	Kg	66000		
27	Providing and fixing G.I. pipe hand rail of approved size by welding etc. to steel ladder railing, balcony railing, staircase railing and similar works, including applying a priming coat of approved steel primer.	Kg	5000		

28	Providing and laying Reinforced cement concrete 1:1:2 (M30 grade concrete as per IS 456) in pre cast blocks for level crossing as per approved drawing (any thickness), including attached pilasters, buttresses, plinth and string courses, fillets, columns, pillars, piers, abutments, posts and struts etc. up to floor five level excluding cost of centering, shuttering, finishing and reinforcement :	Cum	75		
29	75 mm thick moorum filling below pre cast concrete blocks for level crossing including supplying of required materials and consolidation etc. complete with all as per direction of Engineer-in -charge.	Sqm	600		
30	Centering and shuttering including strutting, propping etc. and removal of form work for Foundations, footings, bases for columns.	Sqm	220		
(ACTIVITY -2) TOTAL AMOUNT INCLUSIVE OF ALL TAXES (RS)					

(BOTH ACTIVITIES 1&2) GRAND TOTAL AMOUNT (Including all taxes)	
TOTAL AMOUNT OF WORK INCLUDING TAXES (Rs) in figures: (Activities 1&2)	
TOTAL AMOUNT OF WORK INCLUDING TAXES (Rs) in words: (Activities 1&2)	

NOTE: Rate quoted is inclusive of testing of all materials as per the NTPC/BHEL approved field quality plan (FQP) and establishing the field laboratory at site.

CONTRACTOR
(With Seal)

EMPLOYER

BHEL	BHEL	FIELD QUALITY PLAN								
		ITEM : FQP FOR CIVIL SCOPE OF WORKS		QP NO. :		1	PROJECT:	15 MW SOLAR PV PROJECT AT SINGRAULI		
		SUB-SYSTEM : CIVIL WORKS		REV. NO .: 1			PACKAGE:			
				DATE : 22.1.2014			DOCUMENT NO.	5709-004-QVE-Q-161		
				PAGE :		Page 1 of 13	MAIN CONTRACTOR			

Sl. No	Activity and operation	Characteristics / instruments		Class of check	Type of Check	Quantum Of check	Reference Document	Acceptance Norms	Format of Record		Remarks
1	2	3		4	5	6	7	8	9	D*	10
1	**GENERAL REQUIREMENTS**										
A	Availability of QA& QC manpower and laboratory		-	A	Physical	Once prior to start of work and thereof monthly	Tech Specs and Const. Drawings		SR	√	
B	Sampling for testing of buliding materials, concrete mix design etc.		As agreed / required	A	Physical	As specified in FQP for various materials	Tech Specs and Const. Drawings		SR/TR	√	Test report along with the recommendations from specialist agency to be submitted to NTPC.
C	Submission of schedule of tests to be done monthly / quaterly		-	A	Physical	Once prior to start of work and thereof monthly	Tech Specs and Const. Drawings		SR	√	
D	Stacking and storage of construction materials and components at site		As per IS:4082	A	Physical	Random	Tech Specs and Const. Drawings and IS: 4082		SR	√	
E	All bought out items to be procured from the approved vendor and on approval of Quality plans by NTPC as per inspection Category		-	A	Verification of TC and/or Testing	100%	NTPC Tech. Spec. /BOQ		SR/LB	√	The TC submitted should bear proper identification or correlation with the batch of material supplied and same shall be brought out in the challan/ consignment note .
F	Submission of list of Bought out items and their vendors for each of the bought out item identified for approval within the period agreed in LoA.		-	A	Physical	One time	NTPC Tech. Spec. /BOQ		SR/LB		To be submitted to CQA for approval with a copy to site .
2	**EXCAVATION AND FILLING IN FOUNDATION WORKS**										
	Excavations-										
2.1		Nature, type of soil/rock before and during excavations	As agreed / required	C	Visual	Random in eah shift	Tech Specs and Const. Drawings		SR		
2.2		Initial ground level before start of excavations	As agreed / required	C	Measurement	100%	Tech Specs and Const. Drawings		SR	√	
2.3		Final shape and Dimensions of excavations.	As agreed / required	C	Measurement	100%	Tech Specs and Const. Drawings		SR		
2.4		Final excavation lelvels	As agreed / required	B	Measuement	100%	Tech Specs and Const. Drawings		SR	√	
2.5		Side slope of final excavation	As agreed / required	B	Measurement	Random in eah shift	Tech Specs and Const. Drawings		SR		
	Fill/ Backfill -										
2.6	**Standard proctor Test**	Optimum moisture content and max. dry density before fill	As per IS: 2720, Proctor needle apparatus,etc.	B	Physical	One for each type and source of fill materials	IS 2720 (Pt.VII), Tech Specs and Const. Drawings		SR/TR	√	
2.70	**Moisture content**	Moisture content of fill before compaction	As per IS: 2720, balance, oven, rapid moisture meter, etc.	B	Physical	Onefor each type and source of fill materials	IS 2720 (Pt.II), Tech Specs and Const. Drawings		SR/TR	√	APPLICABLE IN CASE OF BORROWED EARTH
2.8	**Degree Of Compaction Of Fill / Backfill**										
i		Dry density by core cutter method ---- OR---- Dry density in place by sand displacement method	As per IS: 2720/compaction test (core cutter), balance, rapid moisture meter etc.	A	Physical	i) For foundation fill/ backfill one for every 10 foundations for each compacted layer.	IS 2720 (Pt. XXIX), Tech Specs and Const. Drawings OR IS 2720 (Pt. XXVIII), Tech Specs and Const. Drawings		SR/TR	√	
						ii) For area filling, one every 1000 SQM area for each compacted layer.			SR/TR	√	
ii		Relative density (Density Index)	As per IS: 2720, balance oven, rapid moisture meter etc.	B	Physical	----do----- (i) & (ii) above	IS 2720 (Pt. XIV), Tech Specs and Const. Drawings		SR/TR	√	

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				DATE : 22.1.2014			DOCUMENT NO.	5709-004-QVE-Q-161			
				PAGE :		Page 2 of 13	MAIN CONTRACTOR				
Sl. No	Activity and operation	Characteristics / instruments		Class of check	Type of Check	Quantum Of check	Reference Document	Acceptance Norms	Format of Record		Remarks
1	2	3		4	5	6	7	8	9	D*	10
3.0	**MATERIALS**										
	Expert openion regarding suitability of construction materials shall be taken from Specialist Institute (Identified during pre award)										
3.1	**CEMENT**										
		Retesting of cement	as per IS:4031	A	Testing	At Random	As per relevant IS Codes		TR	√	Each consignment of cement shall be duly correlated with manufactureres TC,in case the cement is supplied by the contractor one sample from each lot shall be tested for setting time and compressive strength . Acceptance norms shall be as per relevant IS. If cement is stored more than 60 days in godown of contractor same shall be retested for comp. Strength & setting time.
3.2	**Coarse Aggregate**	Moisture content	as per IS:2386	B	Physical	Once for each stack of 100 Cu.M. or part there of	IS : 456 IS : 383/Tech Spec		SR/LB	√	during monsoon when this has to be done every day before start of concreting
ii		Specific gravity, water absorption	IS:2386	A	Physical	Once for each source & for every change of source	IS: 2386 Part-III, IS:456, IS:383/Tech Spec		SR/LB/ TR	√	
iii		Sieve analysis, flakiness index, elongation index,	IS:2386	B	Physical	One per 100 cum., or part thereof	IS: 2386 Part-I, IS:383/Tech Spec		SR/LB	√	
iv		Deleterious materials (coal & lignite, clay lumps, material finer than 75 micron sieve, soft fragment, shale)	IS:2386	A	Physical	Once per source/ on every change of source	IS: 2386 Part-II, IS:383/Tech Spec		SR/LB/ TR	√	
v		Soundness	IS:2386	A	Physical	-do-	IS: 2386 Part-V, IS:383		SR/LB/ TR	√	
vi		Crushing value abrasion value and impact value	IS:2386	A	Physical	-do-	IS:383, IS-2386 Part IV/Tech Spec		SR/LB/ TR	√	
3.3	**Fine Aggregate**										
i		Moisture content, water absorption	balance , oven, rapid moisture meter etc	B	Physical	To be done every day before start of work	IS: 2386 Part-III IS:383		SR/LB/TR	√	
ii		Deleterious materials (coal & lignite, clay lumps, material finer than 75 micron sieve, soft fragment, shale)	IS:2386	A	Physical	Once per source& for on every change of source	IS: 2386 Part-II, IS:383		SR/LB/TR	√	
iii		All other tests similar to coarse aggregates as mentioned above.					IS-2386, IS-383		SR/LB/TR	√	except test for flankiness index,elongation index, abrasion value, impact value
3.4	**Water**										
i		Complete tests as per IS:456	Buret, conical flask, pipette etc	B	Testing	One for each source.	IS:3025 part 22 and 23 (for test procedure), IS:456(for acceptance		SR/LB/TR	√	
3.5	**CONCRETE**										
i		Crushing strength (works Tests cubes)	IS:516	A	Physical	One set of 6 cubes per 50 CuM or part thereof for each grade of concrete per shift whichever is earlier.	IS:516, IS:456, NTPC Tech. Spec.		SR/LB/ TR	√	Min. of 6 cubes for each mix, 3 specimen shall be tested at 7 days remaining 3 shall be for 28 days comp. Strength.
ii		Workability - slump test	IS:1199	B	Physical	At the time of concrete pouring at site every two hrs	IS:456/NTPC Tech. Spec.		SR/LB/TR	√	
3.5.1	**Admixtures for Concrete**	Type of admixture	As per IS:9103	B	EIC Approved source and review of MTC/ test reports	For each lot received at site	Designed mix and IS:9103		TR	√	Admixture of appd. Brand and tested quality shall be used (each lot of admixture will included with brochure in which the type of admixture and its properties shall be clearly indicated)

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				DATE : 22.1.2014			DOCUMENT NO.	5709-004-QVE-Q-161			
				PAGE :		Page 3 of 13	MAIN CONTRACTOR				
Sl. No	Activity and operation	Characteristics / instruments		Class of check	Type of Check	Quantum Of check	Reference Document	Acceptance Norms	Format of Record		Remarks
1	2	3		4	5	6	7	8	9	D*	10
3.6	Concrete conveying, placing& compaction										
i		mixing of concrete shall be done in a approved mixer such as to produce a homogenous mix				To be calibrated at the time of starting and subsequently once in three months, and shall conform to IS:4925	Review of calibration chart/ Certificate, IS 4926			√	
ii		Arrangement for transportation & placement of concrete.	As required	C	Visual	100%	Before clearance for concreting		Inspection Report	√	
iii		Handling and Transportation of concrete	As required	C	Physical	100%	As per construction/erection methodology (to be approved one week prior to start of work)		SR		
iv		Placement of concrete	Visual	B	Physical	100%	As per construction/erection methodology and tech.specs / No segregation		SR	√	
v		Compacting	As required	C	Physical	At Random	IS:456		SR	√	
vi		Curing	As required	C	Physical	At Random	Period of curing as per IS 456 (use gunny bags / curing compound)		SR	√	
3.7	TEST/CHECK ON RCC STRUCTURE IN HARDENDED CONDITIONS										
i		Dimensional check on finished structures & Dimensional tolerances	As required	B	Measurement	Approved Drawing	As per IS:456/ tech. Specification.		SR/LB	√	
ii		Water Tightness Test of liquid retaining structure/ tanks	As required	B	Test	100%	IS:3370/ Tech. Specification		SR/LB	√	
3.8	REINFORCEMENT STEEL										
i		Physical and Chemical Properties for each lot as per relevant IS codes	As required/ agreed	A	EIC Approved source and review of MTC/ test reports	Each batch of delivery	IS : 1786, IS:432, IS:1566, Tech Specs and Const. Drawings		MTC	√	Applicable if steel is procured by Contractor
ii		Freedom from cracks surface flaws, Lamination.	As agreed / required	C	Visual	Random in each shift	IS: 1852, IS:432, IS:1786, Tech Specs and Const. Drawings		SR		To be checked at site. Steel collected from source should be free from excessive rust. To be stored as per Technical Specs.
3.9	PLACEMENT OF REINFORCEMENT STEEL										
i		Bar bending schedule with necessary lap, Spacers & Chairs	As agreed / required	B	Visual & Measurement	Random in each shift	Approved Drawings, Tech Specs and Const. Drawings, IS:2502		SR	√	
ii		Bending of bars, cutting tolerance	As agreed / required	C	Visual & Measurement	Random in each shift	Approved Drawings, Tech Specs and Const. Drawings, IS:2502		SR	√	
iii		Acceptance - Cover, spacing of bars, spacers and chairs after the reinforcement cage is put inside the formwork	As agreed / required	B	Visual & Measurement	Random in each shift	Approved Drawings, Tech Specs and Const. Drawings		SR	√	
3.10	STAGING AND FORMS										
i		Materials and accessories	As agreed / required	C	Visual	Once before start of work	As per relevant IS, Tech Specs and Const. Drawings		SR		
ii		Soundness of staging, shuttering and scaffolding including application of mould oil / release agent	As agreed / required	C	Visual	Once before start of work	As per manufacturer's spec.and as per 3696,4014, 4990, Tech Specs and Const. Drawings		SR		
iii		Acceptance of formwork before start of concreting		B	Physical / visual	Before start of each concreting	As per provisions and tolerances, Tech Specs and Const. Drawings		SR	√	
3.11	DAMP PROOF COURSE						Tech Specs and Const. Drawings				

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				DATE : 22.1.2014			DOCUMENT NO.	5709-004-QVE-Q-161			
				PAGE :		Page 4 of 13	MAIN CONTRACTOR				
Sl. No	Activity and operation	Characteristics / instruments		Class of check	Type of Check	Quantum Of check	Reference Document	Acceptance Norms	Format of Record		Remarks
1	2	3		4	5	6	7	8	9	D*	10
i		Material - Hot bitumen and water proofing materials etc	As agreed / required	B	EIC Approved source and review of MTC/ test reports	Each batch of delivery at site	Tech Specs and Const. Drawings, IS 702		SR	√	
ii		Acceptance of damp proof course	As agreed / required	B	Acceptance	100%	Tech Specs and Const. Drawings		SR		
3.12	GROUTING										
i		Material	As agreed / required	B	EIC Approved source and review of MTC/ test reports	Each batch of delivery	Tech Specs and Const. Drawings		SR	√	
		Type of mix - fluid mix, plastic mix, stiff mix etc.	As agreed / required	C	Physical	Prior to start of work	Tech Specs and Const. Drawings		SR	√	
ii		Mixing, placement, application and grout pressure	As agreed / required	C	Physical	Random in each shift	Tech Specs and Const. Drawings		SR		
iii		Compressive strength	As agreed / required	C	Physical	Random in each shift	Tech Specs and Const. Drawings		SR	√	
iv		Acceptance of the grouts	As agreed / required	B	Physical	Each grout section	Tech Specs and Const. Drawings		SR		
4.00	BRICK MASONARY										
4.1	Test on Bricks										
		Dimensions , shape, compressive strength, water absorption, warpage, efflorescence.	As agreed / required	B	Measurement/ Physical Test	As per relevant IS Code/ One Sample for 30,000 nos. or part thereof	IS: 1077, IS:13757, IS: 12894 / Tech Specs and const. Drawings		Inspection Report	√	Efflorescence shall be checked at each source.
4.2	Masonry construction	Workmanship, verticality and alignment	As agreed / required	B	Visual/ Physical	100%	IS 2212, IS 1905 , Tech Specs and Const. Drawings		SR/LB		
5.00	FINISHING AND ALLIED WORKS								.		
5.1	PLASTERING - WORKMANSHIP										
i		Curing	As agreed / required	C	Physical	100%	Tech specifications, construction drawings and agreed methodology		SR		
ii		Thickness and finishing of plaster, grooves etc	As agreed / required	B	Visual/ Measurement	Random in each shift	Tech Specs and Const. Drawings		SR/LB		
iii		Truness of plastering system	As agreed / required	B	Visual/ Physical	Random in each shift	Tech Specs and Const. Drawings		SR		
5.2	STONE GRIT PLASTER/ GRANULAR TEXTURED COAT FINISH										
i		Material	As agreed / required	B	Approved source and review of MTC	For each lot received at site	Tech Specs and Const. Drawings		SR	√	
ii		Thickness, finishing and grooves etc	As agreed / required	C	Visual/ Measurement	Random in each shift	Tech Specs and Const. Drawings		SR	√	
6.00	SHEETING AND OTHER WORKS										
6.1	PAINTING SYSTEM - CONCRETE WORKS AND PLASTERED MASONARY SURFACES										
i	Materials and accessories- Oil Bound, Acrylic Emulsion, Chemical Resistant, Oil Resistant Paint etc.	Shade, type from brand and manufacturer as approved by NTPC EIC	As agreed / required	B	EIC Approved source and review of MTC/ test reports	Each batch of delivery	Tech Specs and Const. Drawings		SR/MTC	√	
ii	Surface prepration	As required	As agreed / required	C	Physical /visual	Random in each shift	Tech Specs and Const. Drawings		SR		
iii	Acceptance of painted surfaces	As required	As agreed / required	B	Physical	Each surface at random	Tech Specs and Const. Drawings		SR		
6.1.1	PAINTING SYSTEM - STEEL WORKS (OTHER THAN STRUCTURAL STEEL WORKS)										

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		SUB-SYSTEM : CIVIL WORKS		REV. NO .: 1			PACKAGE:				
				DATE : 22.1.2014			DOCUMENT NO.	5709-004-QVE-Q-161			
				PAGE :		Page 5 of 13	MAIN CONTRACTOR				
Sl. No	Activity and operation	Characteristics / instruments		Class of check	Type of Check	Quantum Of check	Reference Document	Acceptance Norms	Format of Record		Remarks
1	2	3		4	5	6	7	8	9	D*	10
i		Paining Materials and accessories	-	B	EIC Approved source and review of MTC/ test reports	Each batch of delivery	Tech Specs and Const. Drawings		SR/MTC	√	Mfr.'s T.C. shall be correlated with the consignment received.
ii		Surface prepration	As agreed / required	C	Physical /visual	Each Erection Mark	Tech Specs and Const. Drawings, Relevant code/ standards		SR	√	
iii		Primer Thickness	Elcometer	C	Measurement	Each Erection Mark	Tech Specs and Const. Drawings		SR	√	
iv		DFT of paint	Elcometer	C	Measurement	Each Erection Mark	Tech Specs and Const. Drawings		SR	√	
v		Acceptance of painted surfaces	Elcometer	B	Visual and measurement	Each Erection Mark	Tech Specs and Const. Drawings		SR		
6.2	INSULATION WORKS										
i	Material	Insulation material, galvanised wire net, aluminium foil, fasteners	As agreed / required	B	EIC Approved source and review of MTC/ test reports	For each lot received at site	Tech Specs and Const. Drawings		SR / LB	√	All tests as per specification
ii		Acceptance of each type of installation	As agreed / required	B	Visual/ Physical	Each installation	Tech Specs and Const. Drawings		SR/LB		
7.00	DOORS , WINDOWS VENTILATORS & GRILL										
7.1	Steel doors										
i		Materials (MS sheet, fasteners, hinges, jambs, lock strike plate etc	As agreed / required	B	Visual/ Physical / test report	For each lot received at site	Tech Specs and Const. Drawings		SR / LB	√	Review of test report / MTC
ii		Flush Door shutters, teak beading	As agreed / required	B	EIC Approved source and review of test reports	For each lot received at site	IS 2202, Tech Specs and Const. Drawings		SR	√	Review of test report / MTC
iii		Hollow metal doors (material and dimensions)	As agreed / required	B	Visual/ Physical/Test report	For each lot received at site	Tech Specs and Const. Drawings			√	Review of test report / MTC
iv		Acceptance	As agreed / required	B	Visual/ Physical	Random	Tech Specs and Const. Drawings		SR/LB		
7.2	Anodised aluminium works										
i		Materials- Aluminium sections, alkali resistant paint	As agreed / required	B	Visual/ Physical / test report	For each lot received at site	IS: 1948, IS: 1949, IS:733, IS1285, IS:1868, IS:11857/ Tech Specs and Const. Drawings		SR / LB	√	Review of test report For aluminium door/windows, check for anodisation as per Tech. Spec
ii		Particle Door	As agreed / required	B	EIC Approved source and / test reports	For each lot received at site	IS:12823 (phenol formaldehyde sythentic resin, BWP type), Tech Specs and Const. Drawings		SR	√	Review of test report / MTC
iii		Acceptance	As agreed / required	B	Visual/ Physical	Random	Tech Specs and Const. Drawings		SR		
7.3	Fire proof doors										
i		Source of supply	As agreed / required	A	Review of purchase order (unpriced copy) / drawings of suppliers / certificate of CBRI	For each source	Tech Specs and Const. Drawings		SR	√	Procured from Approved parties as per relevant IS/Tech, The door drawing proposed for supply should have been tested and approved by CBRI Roorkee for the similar dimensions for minimum 2 hours fire rating.
ii		Receipt inspection	As agreed / required	B	Visual/ Physical/ Review of MTC	For each lot received at site	Tech Specs and Const. Drawings		SR	√	
iii		Finishing and acceptance	As agreed / required	B	Visual / physical	Random	Tech Specs and Const. Drawings		SR		
7.4	Steel windows / Grills/ Louver										

BHEL	BHEL	FIELD QUALITY PLAN									
		ITEM : FQP FOR CIVIL SCOPE OF WORKS		QP NO. :		1	PROJECT:	15 MW SOLAR PV PROJECT AT SINGRAULI			
		SUB-SYSTEM : CIVIL WORKS		REV. NO .: 1			PACKAGE:				
				DATE : 22.1.2014			DOCUMENT NO.	5709-004-QVE-Q-161			
				PAGE :		Page 6 of 13	MAIN CONTRACTOR				
Sl. No	Activity and operation	Characteristics / instruments		Class of check	Type of Check	Quantum Of check	Reference Document	Acceptance Norms	Format of Record		Remarks
1	2	3		4	5	6	7	8	9	D*	10
i		Material fabrication and fixtures	As agreed / required	C	EIC Approved source and review of MTC/ test reports	Each lot of delivery	IS: 1038 / IS:1361, IS: 7452 and Tech Specs and Const. Drawings		SR	√	
ii		Finishing and acceptance	As agreed / required	C	Visual / physical	Random	IS: 1038 / IS:1361, IS: 7452 and Tech Specs and Const. Drawings		SR	√	
7.5	**Glass and glazing**										
i	Clear float glass, tinted glass, curtain glass, hermetically sealed glass	Material	As agreed / required	C	EIC Approved source and review of MTC/ test reports	For each lot received at site	IS: 14900, IS:1081, IS: 3548, IS:5437 Tech Specs and Const. Drawings		SR	√	
ii		Installation finishing and acceptance	As agreed / required	C	Visual/ Physical	Random	Tech Specs and Const. Drawings		SR		Leak proof installation with neoprene gasket
7.6	**False Ceiling**										
i		Materials (gypsum glass, glass fibre membrane, fibre board acoustical tiles etc)	As agreed / required	B	EIC Approved source and review of MTC/ test reports	For each lot received at site	Tech Specs and Const. Drawings		SR	√	Compare MTC with technical specification and requirement
ii		Installation finishing and acceptance	As agreed / required	B	Visual / physical	Random	Tech Specs and Const. Drawings		SR		
7.7	**WATER PROOFING**										
		Methodology for the application of water proofing system	As required	B	Review	for each type of treatment	Tech Specs and Const. Drawings		SR	√	
7.7.1	**General Requirement- Water Proofing**										
i	Polyurethene based coating, polyester scrim cloth, extruded HD dimpled polyurethene	Material	As agreed / required	B	EIC Approved source and review of MTC	For each lot received at site	Tech Specs /Const. Drawings		SR	√	MTC shall contain all the parameters specified in the technical specifications
ii		Acceptance of water proofing work	As agreed / required	B	Physical	100%	Tech Specs and Const. Drawings				
7.7.2	**Roof / Basement Treatment**										
i	Graded under bed	Levels / slopes	As required	C	Physical	100%	Tech Specs and Const. Drawings				
ii	Elastomaric coatings	Material- Primer coat, finishing coat	As required	B	EIC Approved source and review of MTC	Each lot of delivery	Tech Specs and Const. Drawings		SR	√	
iii	Wearing course	Materials - PCC, chicken wire mesh, elastomeric sealant	As required	B	Review of MTC	Each lot of delivery	Tech Specs and Const. Drawings		SR	√	
iv		Acceptance of water proofing work	As agreed / required	B	Physical	100%	Tech Specs and Const. Drawings				
7.8	**Fencing and Gates**										
i	PVC coated/ metallic chain link fencing (IS 2721), Welded wire mesh (IS 1566), Reinforced barbed tape galvanised (IS 2629) etc.	Materials	As agreed / required	B	EIC Approved source and review of MTC/ test reports	Each batch of delivery	Tech Specs and Const. Drawings		SR/MTC	√	MTC shall contain all the parameters specified in the technical specifications / relevant IS Codes
ii		Acceptance of the installation	As agreed / required	B	Physical / measurements	Each installation	Tech Specs and Const. Drawings		SR		
7.9	**FLOOR FINISHES AND ALIED WORKS**										
7.9.1	**Cement Concrete Flooring**										

BHEL	BHEL	FIELD QUALITY PLAN									
		ITEM : FQP FOR CIVIL SCOPE OF WORKS		QP NO. :		1	PROJECT:	15 MW SOLAR PV PROJECT AT SINGRAULI			
		SUB-SYSTEM : CIVIL WORKS		REV. NO .: 1			PACKAGE:				
				DATE : 22.1.2014			DOCUMENT NO.	5709-004-QVE-Q-161			
				PAGE :		Page 7 of 13	MAIN CONTRACTOR				
Sl. No	Activity and operation	Characteristics / instruments		Class of check	Type of Check	Quantum Of check	Reference Document	Acceptance Norms	Format of Record		Remarks
1	2	3		4	5	6	7	8	9	D*	10
i		Glass/ PVC strips in joints	As agreed / required	C	Physical	Random in each shift	Tech Specs and Const. Drawings		SR		
ii		Finishing and acceptance	As agreed / required	B	Physical	100%	Tech Specs and Const. Drawings		SR		
7.9.2	**Tiles**										
i	**Ceramic, vitrified, glass mosaic, acid alkali resistant, heavy duty cement concrete tiles**	Materials	As agreed / required	B	EIC Approved source and review of MTC	Each lot of delivery	Tech Specs and Const. Drawings		SR	√	MTC shall contain all the parameters specified in the technical specifications / relevant IS Codes
ii		Finishing and acceptance	As agreed / required	B	Physical	100%	Tech Specs and Const. Drawings		SR		
7.9.3	**Interlocking Blocks**										
i		Materials	As agreed / required	B	EIC Approved source and review of test reports	Each lot of delivery	Tech Specs and Const. Drawings		SR	√	
ii		Finishing and acceptance	As agreed / required	B	Physical	100%	Tech Specs and Const. Drawings		SR		
7.9.4	**Kota Stone, Granite and Marble**										
i		Quality, texture, thickness, colour for each lot of delivery from approved source	As agreed / required	C	Physical	Each batch of delivery	Tech Specs and Const. Drawings		SR	√	
ii		Finishing and acceptance	As agreed / required	B	Physical	100%	Tech Specs and Const. Drawings		SR		
7.10.6	**Acid / alkali and oil resistant high built seamless epoxy based resin and treatment**										
i	Material	Bricks, vitreous tiles, mortar, sealing, paints, coatings, sheets, fillers etc	As agreed / required	B	EIC Approved source and review of MTC/ test reports	Each batch of delivery	Tech Specs and Const. Drawings		SR	√	Experienced workers under supervisors recommended/ appointed by manufacturer to be deployed
ii		Surface preparation	As agreed / required	C	Physical	Random in each shift	Tech Specs and Const. Drawings, IS 2395				
iii		Finishing and acceptance	As agreed / required	B	Physical	100%	Tech Specs and Const. Drawings		SR		
8.0	**WATER SUPPLY / SANITORY INSTALLATIONS**										
8.1	**Water supply fittings and fixtures**										
i	Materials	GI/ MS pipes and fittings	As agreed / required	B	EIC Approved source and review of MTC/ test reports	Each lot of delivery as per Specifications	Tech Specs and Const. Drawings		SR	√	
ii	Disinfection	Before use	As agreed / required	C	Physical	Each installation	Tech Specs and Const. Drawings		SR		
iii	Hydraulic test	Before use / leakage	As agreed / required	B	Physical	Each installation	Tech specs and const drawings		SR	√	
iv		Acceptance and working	As agreed / required	A	Acceptance	Random	Tech Specs and Const. Drawings		SR		
8.2	**Sand cast iron / cast iron pipes**										
i	**Material**	SCI / CI pipes and fittings / joints	As agreed / required	B	EIC Approved source and review of MTC	Each lot of delivery as per Specifications	Tech Specs and Const. Drawings		SR	√	
ii		Acceptance and leakage	As agreed / required	B	Physical	Random	Tech Specs and Const. Drawings		SR		
8.3	**Sanitary fittings and fixtures**										

BHEL	BHEL	FIELD QUALITY PLAN									
		ITEM : FQP FOR CIVIL SCOPE OF WORKS		QP NO. :		1	PROJECT:	15 MW SOLAR PV PROJECT AT SINGRAULI			
		SUB-SYSTEM : CIVIL WORKS		REV. NO .: 1			PACKAGE:				
				DATE : 22.1.2014			DOCUMENT NO.	5709-004-QVE-Q-161			
				PAGE :		Page 8 of 13	MAIN CONTRACTOR				
Sl. No	Activity and operation	Characteristics / instruments		Class of check	Type of Check	Quantum Of check	Reference Document	Acceptance Norms	Format of Record		Remarks
1	2	3		4	5	6	7	8	9	D*	10
i	**Material**	Sanitory items and fixtures i.e. water closets, urinals, wash basins, sinks, mirrors, shelves, towel rail, soap containers, geyser, water cooler, etc, water supply / sanitation pipes, manhole cover and frames etc	As agreed / required	B	EIC Approved source	Each lot of delivery as per Specifications	Tech Specs and Const. Drawings		SR	√	
ii		Acceptance of installations of all sanitory items and fixtures	As agreed / required	B	Acceptance	100%	Tech Specs and Const. Drawings		SR		
8.4	**RCC Pipes**										
i	Material	RCC pipes	As agreed / required	B	EIC Approved source and review of MTC/ test reports	Each lot of delivery as per Specifications	Tech Specs and Const. Drawings /IS 458		SR	√	
ii		Acceptance and leakage	As agreed / required	B	Physical	Random	Tech Specs and Const. Drawings		SR		
8.5	**Water Storage Tanks**										
i	Material	Over head / loft type	As agreed / required	B	EIC Approved source and review of MTC	Each lot of delivery as per Specifications	Tech Specs and Const. Drawings		SR	√	
ii		Aceptance and leakage	As agreed / required	B	Acceptance	Random	Tech Specs and Const. Drawings		SR		
9.0	**SPECIAL ITEMS**										
9.1	**Earthing Mat (Grounding System)**										
i	Material	Earthing mat	As agreed / required	B	EIC Approved source and review of MTC/ test reports	Each lot of delivery as per Specifications	As per relevant IS and Tech. Specs / Manufacturer's, IS 3043		SR/MTC	√	
ii		Weld sizes & length	Visual/Tape	B	Visual/ Measurement	100%	Tech Specs and Const. Drawings				NTPC approved electrodes shall be used
iii		D P test	DP test Kit	B	Physical	10% at random of the offered lot	Tech Specs and Const. Drawings		TR	√	
iv		Earth test	Earthing test kit	A	Physical	100%	Tech Specs and Const. Drawings,		SR	√	
10.00	**STRUCTURAL STEEL MATERIAL (For Site Fabrication)**										
i	Procured by contractor	Structural steel procured from NTPC approved sources- Mechanical (YS, UTS, Elg, UT if specified),,and Chemical properties (CE as per IS)		A	Review	For each batch of each section delivered at site	Technical Specification and Construction Drawings, IS 2062, 8500		SR	√	Correlated MTC shall be verified. In the event of non submission of MTC , sample shall be selected by FQA for testing
10.1	**PRE-WELDING REQUIREMENTS**										
i		Welding Procedure Specification * (WPS*)	-	A	Review	Each Welding Process	Technical Specification and Construction Drawings, ASME-IX/ AWS D 1.1		WPS	√	*To be approved by CQA
ii		PQR and Welder's Qualification	-	A	Physical	Each welder	PQR/ WQR, AWS-D1.1/ASME-IX,		TR	√	
iii		Welding consumables	-	B	Physical	Random in each shift	Approved WPS, Latest NTPC		SR	√	
10.2	**FIT-UP**										
i		Marking and Cutting	Tape, ruler etc	B	Visual & Measurement	Each plate/ Section	Technical Specification and Construction Drawings/ Approved cutting plan		SR		
ii		Match markings for trial assembled components	-	B	Physical	Each fit-up	Technical Specification and Construction Drawings		SR		

BHEL	BHEL	FIELD QUALITY PLAN									
		ITEM : FQP FOR CIVIL SCOPE OF WORKS		QP NO. :		1	PROJECT:	15 MW SOLAR PV PROJECT AT SINGRAULI			
		SUB-SYSTEM : CIVIL WORKS		REV. NO .: 1			PACKAGE:				
				DATE : 22.1.2014			DOCUMENT NO.	5709-004-QVE-Q-161			
				PAGE :		Page 9 of 13	MAIN CONTRACTOR				
Sl. No	Activity and operation	Characteristics / instruments		Class of check	Type of Check	Quantum Of check	Reference Document	Acceptance Norms	Format of Record		Remarks
1	2	3		4	5	6	7	8	9	D*	10
iii		Weld Fit Up- Edge Preparation/ Gap/ Alignment	Tape, ruler etc	B	Physical	Each fit-up	Technical Specification and Construction Drawings, IS 7215		SR	√	If required suitable stiffners shall be provided to prevent deflection.
10.3	PRE HEATING (wherever applicable)										
i		Pre-Heating Temperature	Thermal chalk	B	Measurement	Each pre-heating	Technical Specification and Construction Drawings, Approved WPS		SR	√	
ii		Post Weld Heat Treatment (PWHT), if required	Thermo couple with time temperature recorder	A	Time & Temperature	Each PWHT	Technical Specification and Construction Drawings, Approved WPS		SR	√	
10.4	WELDING REQUIREMENTS										
i		Sequence of welding	-	B	Physical	Random in each shift	Technical Specification and Construction Drawings, Agreed scheme		SR		
ii		Removal/ grinding of temporary attachments	-	B	Measurement	All cleats/ attachments	Technical Specification and Construction Drawings, Approved Drg.		SR		
iii		Completeness after welding- Dimensions/ distortion	Weld gauge	B	Visual	Each structure component	Technical Specification and Construction Drawings, IS 822		SR	√	
iv		Completeness of welding (each butt & fillet weld)		B	Visual	Each structure component	Technical Specification and Construction Drawings, Approved Drg.		SR	√	
10.50	NON DESTRUCTIVE AND DESTRUCTIVE TESTING										
10.5.1	FILLET WELDS										
i		size and visual examination	As required/ agreed	B	Visual/ Measurement	100%	As per technical specifications and construction drawings, IS 822, AWS D 1.1		SR		As per requirement of NTPC Engineer
ii		Dye Penetration Test	As required/ agreed	B	Physical	5% of Weld length with min. 300mm at each loaction	As per technical specifications and construction drawings, IS 822, AWS D 1.1		SR		
10.5.2	BUTT WELDS										
i		Visual examination	As required/ agreed	B	Visual	Random in each shift	As per technical specifications and construction drawings, IS 822, AWS D 1.1		SR		As per requirement of NTPC Engineer
ii		DPT	As required/ agreed	B	Physical	100% on all butt welds after back gouging on root run and 10% on	As per technical specifications and construction drawings, IS 822, AWS D 1.1		IR		All butt welds to be back gouged before DPT
iii		Radiography Test	As required/ agreed	A	Physical	10%	As per technical specifications and construction drawings, IS 822, AWS D 1.1		IR	√	Wherever RT is not feasible UT to be carried out. In case of failure of any welds in SPOT/RT or UT the % of retesting shall be doubled at that particular loaction. Acceptance criteria of NDT on welds shall be as per AWS D1.1.
10.60	FOUNDATION CHECKS										
i		Dimensions and levels- Shape, lines (including diagonal checks)	Theodolite, Tape etc	B	Physical/ Measurement	Each Foundation	Tech Specs and Const. Drawings		SR	√	
ii		Foundation Bolts and Embedments- Verticality, Levels, pitch distance	Theodolite, Tape, Piano wires etc	B	Physical/ Measurement	Each Foundation	Tech Specs and Const. Drawings		SR	√	
10.70	PAINTING SYSTEM										

BHEL	BHEL	FIELD QUALITY PLAN								
		ITEM : FQP FOR CIVIL SCOPE OF WORKS		QP NO. :		1	PROJECT:	15 MW SOLAR PV PROJECT AT SINGRAULI		
		SUB-SYSTEM : CIVIL WORKS		REV. NO .: 1			PACKAGE:			
				DATE : 22.1.2014			DOCUMENT NO.	5709-004-QVE-Q-161		
				PAGE :		Page 10 of 13	MAIN CONTRACTOR			

Sl. No	Activity and operation	Characteristics / instruments		Class of check	Type of Check	Quantum Of check	Reference Document	Acceptance Norms	Format of Record		Remarks
1	2	3		4	5	6	7	8	9	D*	10
i		Paining Materials and accessories	-	A	Review of MTC	Each batch of delivery	Tech Specs and Const. Drawings		SR/MTC	√	Mfr.'s T.C. shall be correlated with the consignment received.
ii		Submission of painting methodology	-	B	For Review of painting system	Before start of painting work	Tech Specs and Const. Drawings				
iii		Surface prepration	As agreed / required	B	Physical /visual	Each Erection Mark	Tech Specs and Const. Drawings,		SR	√	
iv		Primer Thickness	Elcometer	B	Measurement	Each Erection Mark	Tech Specs and Const. Drawings		SR	√	
v		DFT of paint	Elcometer	B	Measurement	Each Erection Mark	Tech Specs and Const. Drawings		SR	√	
vi		Acceptance of painted surfaces	Elcometer	B	Visual and measurement	Each Erection Mark	Tech Specs and Const. Drawings		SR		
10.80	PRE-ASSEMBLY CHECKS										
i		Punch Erection marks and match marks on members	-	B	Visual/ Physical	Each structural member	Tech Specs and Const. Drawings				Markings for - Assembly designation, Part number, Weight, Any other important
ii		Pre-assembly as per match mark	-	B	Visual/ Physical	Each structural member	Tech Specs and Const. Drawings				
iii		Camber, sweep and total length after trial assembly of structure.	Theodolite, Tape, plumb, piano wires etc	B	Visual/ Physical	Each structural member	Tech Specs and Const. Drawings		SR	√	
iv		Control assembly check at shop	Theodolite, Tape, plumb, piano wires etc	B	Visual/ Physical	Every first and tenth set of identical structure	Tech Specs and Const. Drawings				
V		Completion of primer & intermediate coat of paint		B	Visual / Physical	Random	Tech Specs and Const. Drawings		SR		
10.90	ERECTION CHECKS										
i		Alignment, slopes, level, tolerances of erected member	Theodolite, Tape, plumb, piano wires etc	B	Measurement	Each structural member	Tech Specs and Const. Drawings		SR	√	
ii		Tightening of bolts/ Torque including foundation bolts with lock nuts	Wrench/ Torque wrench if specified	B	Visual/ Physical	Each structural member	Tech Specs and Const. Drawings		SR	√	
iii		Completion of all erection fillet & butt welds		B	Visual	Each structural member	Tech Specs and Const. Drawings		SR	√	
iv		Acceptance of erected structure	Theodolite, Tape, plumb, piano wires etc	B	Visual/ Physical	Each erected structure	Tech Specs and Const. Drawings, IS 7215 and IS 12843		SR	√	
10.10	PERMANENT BOLTS AND NUTS AND WASHERS										
i		Material- Permanent mild steel Bolts, mild steel Nuts, High strength structural Bolts, Washers-Dimensions, properties, Class, storage along with MTC	Screw gauge, Vernier, Tape etc.	A	Physical and MTC Review	Once for each lot of delivery	Tech Specs and Const. Drawings		SR/MTC	√	
ii		Contact surfaces before bolting	-	B	Physical	Random before asembly for bolting	Tech Specs and Const. Drawings, IS 4000		SR		
iii		Inspection of the assembled bolts	-	B	Physical	Randomly in each shift for assembeled bolts	Tech Specs and Const. Drawings, IS 4000		SR		
iv		Tensioning	As agreed / required	B	Physical	Randomly during snug tight test and after full tensinoning	Tech Specs and Const. Drawings, IS 4000		SR	√	
v		Acceptance of installed bolts	-	B	Physical	Each bolt	Tech Specs and Const. Drawings		SR		
13.0	ROAD WORKS										
13.1	Construction of Sub-Grade and earthen/hard soulders										
i		Standard proctor Test	As per IS: 2720	A	Physical	One in every 2000 cum for each type and source of fill materials	As per Tech Specs and Const. Drawings,Section 900 of MORTH specification, IS 2720 (Pt.VII)		SR/TR	√	In cutting or existing levelled ground - quantum of check shall be one per 1000 SQM

BHEL	BHEL	FIELD QUALITY PLAN									
		ITEM : FQP FOR CIVIL SCOPE OF WORKS		QP NO. :		1	PROJECT:	15 MW SOLAR PV PROJECT AT SINGRAULI			
		SUB-SYSTEM : CIVIL WORKS		REV. NO .: 1			PACKAGE:				
				DATE : 22.1.2014			DOCUMENT NO.	5709-004-QVE-Q-161			
				PAGE :		Page 11 of 13	MAIN CONTRACTOR				
Sl. No	Activity and operation	Characteristics / instruments		Class of check	Type of Check	Quantum Of check	Reference Document	Acceptance Norms	Format of Record		Remarks
1	2	3		4	5	6	7	8	9	D*	10
ii		Moisture content of fill before compaction	As per IS: 2720	B	Physical	One in every 2000 cum for each type and source of fill materials	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification, IS 2720 (Pt.II)		SR/TR		In cutting or existing levelled ground - quantum of check shall be one per 1000 SQM
iii		Dry density by core cutter method ---- OR---- Dry density in place by sand displacement method	As per IS: 2720	A	Physical	One in every 500 SQM area for each compacted layer.	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification, IS 2720 (Pt. XXIX)/ IS 2720 (Pt. XXVIII),		SR/TR	√	Both for embankment and cut formation quantum of check - One in every 1000 SQM area for each compacted layer.
iv		Lines, grade and cross section	As required / agreed	B	Physical	One in every 500 SQM area	As per Tech Specs and Const. Drawings		SR		Template, straight edge
13.2	Water Bound Macadam (Non-Bituminous) for base course and sub-base course										
i		Aggregate Impact value	Agrregate Impact value Test Apparatus	A	Physical	One test per 200 cum of Test aggregate	As perTech Specs and Const. Drawings, Section 900 of MORTH specification,		SR	√	
ii		Grading	Set of IS Sieves	B	Physical	One test per 100 cum of aggregate	As perTech Specs and Const. Drawings, Section 900 of MORTH specification,		SR		
iii		Flakiness index and elongation index	Flakiness test gauge	B	Physical	One test per 200cun of agregate	As perTech Specs and Const. Drawings, Section 900 of MORTH specification,		SR		
iv		Atterberg Limits of binding material	Atterberg limits determination	A	Physical	One test per 25 cum of binding material	As perTech Specs and Const. Drawings, Section 900 of MORTH specification,		SR	√	
v		Atterberg Limits of portion of agreggate passing 425 micron sieve	Atterberg limits determination	A	Physical	One test per 100cum of aggregate	As perTech Specs and Const. Drawings, Section 900 of MORTH specification,		SR	√	
vi		Camber, surface, slope	As required / agreed	B	Physical	One in every 500 SQM area	As per Tech Specs and Const. Drawings		SR		Template, straight edge
13.3	Bituminous Macadam for base and binder course										
i		Quality of binder	Penetrometre with St. needle	A	Physical	No. of samples per Lot & tests as per IS:73, IS:217, IS:8887 as applicable	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification, IS 73		SR	√	
ii		Aggregate Impact Value / Los angeles abrasion value	Aggregate Impact ValueTest apparatus	A	Physical	Once per source	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR	√	
iii		Flakiness Index and elongation index of aggregates	Flakiness test gauge	B	Physical	One test per 50 cum of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR		
iv		Stripping value of aggregate (Immersion tray test)	As required / agreed	B	Physical	Initialy one set of 3 representative specimen per source, and on every change of source.	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR		
v		Water sensitivity of mix	As required / agreed	A	Physical	Initialy one set of 3 representative specimen per source, and on every change of source.	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR	√	
vi		Grading of aggregates	Set of Sieves	B	Physical	Two test per day per plant both on individual constituents and mixed aggregate from dryer	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR		
vii		Water absorption of aggregate	As required / agreed			Initially one set of 3 representative specimen per source, and on every change of source.	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR		
viii		Soundness (Magnesium and Sodium Sulphate)	As required as per IS:2386	A	Physical	Once per source by each method and on every change of source	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR	√	

BHEL	BHEL	FIELD QUALITY PLAN								
		ITEM : FQP FOR CIVIL SCOPE OF WORKS		QP NO. :		1	PROJECT:	15 MW SOLAR PV PROJECT AT SINGRAULI		
		SUB-SYSTEM : CIVIL WORKS		REV. NO .: 1			PACKAGE:			
				DATE : 22.1.2014			DOCUMENT NO.	5709-004-QVE-Q-161		
				PAGE :		Page 12 of 13	MAIN CONTRACTOR			

Sl. No	Activity and operation	Characteristics / instruments		Class of check	Type of Check	Quantum Of check	Reference Document	Acceptance Norms	Format of Record		Remarks
1	2	3		4	5	6	7	8	9	D*	10
ix		Percentage of fractured faces	As required / agreed	B	Physical	When gravel is used one test per 50cum of aggregates	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR		
x		Binder content and aggregate grading	Bitumen extractor	A	Physical	Periodic, subject to a min of two tests per day per plant	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR	√	
xi		Control of Temperature of binder and aggregate for mixing and of the mix at the time of laying and rolling	Thermometer	B	Physical	At regular close intervals	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR		
xii		Rate of spread of mixed materials	As required / agreed	B	Physical	Regular control through checks of layer thickness	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR		
xiii		Density of compacted Layer	As required / agreed	A	Physical	One test per 250 sqm of area	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR	√	
13.4	**Bituminous Surfacing - Open graded premix carpet and Seal coat**										
i		Quality of binder	Penetrometre with St. needle	A	Physical	No. of samples per Lot & tests as per IS:73, IS:217, IS:8887 as applicable	IS 73,Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR	√	
ii		Aggregate Impact Value / Los angeles abrasion value	Aggregate Impact ValueTest apparatus	A	Physical	One test per 50 cum of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR	√	
iii		Flakiness Index and elongation indexof aggregates	Flakiness test gauge	B	Physical	One test per 50 cum of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR		
iv		Stripping value of aggregate (Immersion tray test)	As required / agreed	B	Physical	Initialy one set of 3 representative specimen per source, and on every change of source.	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR		
v		Water absorption test		A	Physical	Initialy one set of 3 representative specimen per source, and on every change of source.	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR	√	
vi		Water sensitivity of mix	As required / agreed	A	Physical	Initialy one set of 3 representative specimen per source, and on every change of source.	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR	√	
vii		Grading of aggregates	Set of Sieves	B	Physical	One test per 25 cum of aggregates	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR		
viii		Soundness (Magnesium and Sodium Sulphate)	As required as per IS:2386	A	Physical	Once per source by each method and on every change of source	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR	√	
ix		Polished stone value	As required as per BS:812(Part 114)	B	Physical	As required	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR		
x		Temperature of binder at application	Thermometer	B	Physical	At regular close intervals	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR		
xi		Binder content	Bitumen extractor	A	Physical	One test per 500 cum& not less than two tests per day	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR	√	

BHEL	BHEL	FIELD QUALITY PLAN									
		ITEM : FQP FOR CIVIL SCOPE OF WORKS		QP NO. :		1	PROJECT:	15 MW SOLAR PV PROJECT AT SINGRAULI			
		SUB-SYSTEM : CIVIL WORKS		REV. NO .: 1			PACKAGE:				
				DATE : 22.1.2014			DOCUMENT NO.	5709-004-QVE-Q-161			
				PAGE :		Page 13 of 13	MAIN CONTRACTOR				
Sl. No	Activity and operation	Characteristics / instruments		Class of check	Type of Check	Quantum Of check	Reference Document	Acceptance Norms	Format of Record		Remarks
1	2	3		4	5	6	7	8	9	D*	10
xii		Rate of spread of materials	As required / agreed	B	Physical	One test per 500 cum and not less than 2 tests per day	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR		
xiii		Percentage of fractured faces	Bitumen extractor	A	Physical	When gravel is used one test per 50cum of aggregates	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR	√	
13.5	Tack Coat/ Prime coat/ fog coat										
i		Quality of binder	Penetrometre with Standard needle	A	Physical	No. of samples per Lot & tests as per IS:73, IS:217, IS:8887 as applicable	IS 73,Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR	√	
ii		Temperature of binder at application	Thermometer	B	Physical	At regular close intervals	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR		
iii		Rate of spread of binder	As required / agreed	B	Physical	One test per 500 cum and not less than 2 tests per day	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR		
13.6	RCC Pavements	Concrete - Material, Mix design, Trial Mixes, Production, Transportation, Placement, Compaction, Curing, Test on green concrete, Test on hardened concrete etc.	As required / agreed	-	-	Refer FQP for concrete Works	Refer FQP for concrete Works, , Tech Specs and Const. Drawings, IRC & MOST		-	–	FQP for Concrete Works shall be application for all concrete works
13.7	Alignment, Level, Surface regularity and rectification										
i		Horizontal alignment, Surface levels and Surface regularity	As required / agreed	B	Physical	As per section 900 of MORTH specification	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR		
ii		Rectification	As required / agreed	B	Physical	Each rectification	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR	√	
		Legend to be used: Class # : A = Critical, B=Major, C=Minor; SR, TR, MTC, LB									
Manufacturer/ Sub-supplier	Main-supplier	Categorization Witnessing & Accepting (As per NTPC QA&I System) **Category 'A' FQA Engineer in association with Executing Engineer, Category 'B' Executing Engineer, Category 'C' Executing Engineer** ;**SR** = Site Register , **TR**= Test Report,**MfrTC =** Manufacturer's Test Certificate					For NTPC USE				
Signature		This document shall be read in conjunction with NTPC Tech. Specifications, BOQ, Drawings						REVIEWED BY	APPROVED BY		APPROVAL SEAL