CONTENTS

GENERATION OF SOLAR ENERGY OF CAPACITY OF 1.5 MW AT AF STN AGRA

Drawing - sheets

Signature of Contractor
Date:-

Asst. Dir (Contracts)
For Accepting Officer

*These documents are not attached with the tender and can be seen in the office of **CE (AF) Allahabad / CWE (AF) Agra / GE (AF) (Adm Area) Kheria** during working hours.

Contd..../

Civ- Tele: 2580371

Headquarters
Chief Engineer (AF)
Military Engineer Services
Allahabad-12

958368/ /E8

Mar 2020

M/S_____

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GENERATION OF SOLAR ENERGY OF CAPACITY OF 1.5 MW AT AF STN AGRA

Dear Sir,

1. Tender documents in respect of above work are uploaded on the site www.eprocuremes.gov.in. The tender is on single stage two cover e-tendering system. The contents of Cover I & Cover II are specified in NOTICE INVITING TENDER.

2. Bids will be received online by ACCEPTING OFFICER upto the date and time mentioned in the NOTICE INVITING TENDER (NIT). No tender / bid will be received in physical form and any tender / bid received in such manner will be treated as non bonafide tender / bid.

3. Bid will be opened on due date and time fixed for opening in the presence of tenderers / bidders or their authorised representatives, who have uploaded their quotation bid and who wished to be present at the time of opening the bids.

4. Your attention is also drawn to instruction on filling and submission of tender attached herewith. You may forward your points on tender documents and / or depute you technical representative for discussion on tender / drawings and to clarify doubts, if any, on or before --- Mar 2020. You are requested not to write piece meal points and forward your points duly consolidated before due date viz ---- Mar 2020.

5. Unenlisted contractors are required to submit the scanned copies (in pdf file) of documents required as per eligibility criteria mentioned in ins tructions for filling the tender documents and Appendix 'A' to NIT alongwith EARNEST MONEY DEPOSIT (EMD) and tender fee on e-procurement portal and submit the physical documents in the office of Chief Engineer (Air Force) Allahabad within time limit specified in NIT. Inadequacy / deficiency of documents shall make the bid liable for rejection resulting in disqualification for opening of finance bid.

6. (a) Contractor having not executed standing security bond and standing security deposit in any MES formation shall upload scanned copy of EARNEST MONEY DEPOSIT (EMD) mentioned in Notice of Tender and shall ensure receipt of hard copy of EMD in the office of tender issuing authority before date and time fixed for this purpose. In case of failure to abide by any of these two requirements, the finance bid will not be opened.

(b) Contractor having not executed standing security bond and standing security deposit in any MES formation would be required to deposit individual security deposit on acceptance of tender which will be calculated with reference to the tendered cost as per scales laid down by MES for calculation of "ÉARNEST MONEY" enhanced by 25% subject to maximum of Rs. 1875000/- (Rupees Eighteen Lakh Seventy Five Thousand Only).

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FORWARDING LETTER . . . CONTD

7. Enlisted contractors of MES shall submit the scanned copies (pdf file) of enlistment letter, tender fee and such other documents as mentioned in Appx 'A' to NIT on e-procurement portal and submit physical documents in the office of Chief Engineer (Air Force) Allahabad before date & time fixed for this purpose.

8. The contractor must ensure that the tender / bid on the proper form is uploaded in time as the Accepting Officer will take no cognizance of any quotations / offer received in any other electronic or physical form like email / fax / by hand / through post from tenderer / bidder even if they are received in time.

9. In view of delays due to system failure or other communication related failures, it is suggested that the tender / bid be uploaded, if necessary , sufficiently in advance of the last due date and time fixed.

10. General Conditions of Contracts (IAFW-2249) (1989 Print) and errata and amendments thereto, Schedule of minimum fair wages and MES SSR (Part-I and Part-II) are not enclosed with these documents. These are available for perusal in the Office of GE concerned and this office.

11. ANY TENDERER, WHICH PURPOSE ALTERATIONS TO ANY OF THE CONDITION, SPECIFICATIONS LAID DOWN IN THE TENDER DOCUMENTS OR ANY NEW CONDITOIN, WHATSOEVER, IS LIABLE TO BE REJECTED.

12. Contractor/firm to whom work is awarded within 28 days from the receipt of letter of Acceptance (AOC) shall deposit/render Performance security amount equivalent to 5% of the contract sum in any one of the form viz BGB/FDR or any other Government instruments stipulated by the Accepting officer

13. The tenderer shall evaluate their rate(s) for each item & schedule of the BoQ (Schedule 'A') based on market rates for materials, labour wages as per market and accounting overheads and profits including all taxes / duties, labour welfare cess and Goods and Services Tax applicable as per Government / competent authority orders on the matter and other factors insert the figures in BOQ after satisfying himself the provisions stipulated in the tender documents.

Yours faithfully,

Signature of Contractor
Dated:

Asst. Dir (Contracts)
For Accepting Officer

Contd...../

INSTRUCTIONS ON FILLING AND SUBMISSION OF TENDER

1. EARNEST MONEY DEPOSIT (EMD)

Contractor(s) who are not enlisted with MES / who are enlisted but have not executed the Standing Security Bond shall submit Earnest Money Deposit as detailed in Notice of Tender in one of the following forms, alongwith their tender /bid:-

(a) Deposit at Call Receipt from a Scheduled Bank in favour of Garrison Engineer concerned i.e. **GE (AF) (Adm Area) Kheria Agra**.

(b) Receipted Treasury Challan, the amount being credited to the Revenue Deposit of **GE (AF) (Adm Area) Kheria Agra**.

It is advisable that Earnest Money is deposited in the form of deposit call receipt from an approved Schedule Bank for easy refund. In case the tenderer / bidder wants to lodge 'EARNEST MONEY DEPOSIT' in any other form allowed by MES, a confirmation about its acceptability will be obtained from the Accepting Officer well in advance of the bid submission end date and time. Earnest Money Deposit shall be submitted in the name of concerned GE.

NOTES: - Earnest Money Deposit (EMD) in the form of cheque / Bank Guarantee etc will not be accepted. NON-SUBMISSION OF EARNEST MONEY DEPOSIT (EMD) (scanned copy alongwith Technical Bid & hard copy before the date and time fixed for opening of BOQ) WILL RENDER THE BID DISQUALIFIED FOR OPENING OF COVER II (FINANCE BID).

2. PERFORMANCE SECURITY DEPOSIT

Within 28 days of receipt of letter of acceptance, the successful contractor shall deliver to Accepting Officer a PERFORMANCE SECURITY in any of the forms given below for an amount equivalent to 5% of the contract sum.

(a) A Bank guarantee in the prescribed form.
(b) FDR
(c) Any other approved form of Govt. securities .

3. GENERAL INSTRUCTIONS FOR COMPLIANCE

3.1 The bids received only in the electronic form will be considered. All bids shall be submitted on 'defproc.gov.in' portal. Documents should be scanned and forwarded in 'pdf' form and 'xls' form as indicated.

3.2 Bids shall be uploaded on 'defproc.gov.in' portal on or before the bid closing date mentioned in the tender. No tender /bid in any other electronic or physical form like email /fax / by hand /through post will be considered.

3.3 Bid should be DIGITALLY signed using valid DSC. All pages of tender documents, corrections/alterations shall be signed / initialed by the lowest bidder after acceptance.

3.4 Drawings, if issued in physical form, must be returned duly initialed by the tenderer/bidder in separate envelope indicating his name and address.

3.5 The tender shall be signed, dated and witnessed at all places provided for in the documents after acceptance. All corrections shall be initialed. The Contractor shall initial every page of tender and shall sign all drawings forming part of the tender. Any tender /bid, which proposes alterations to any of the conditions whatsoever, is liable to be rejected.

3.6 In the technical bid, a scanned copy of Power of Attorney in favour of the person uploading the bid using his / her DSC shall be uploaded. In case, the digital signatory himself is the sole proprietor, scanned copy of an affidavit on stamp paper of appropriate value to this effect stating that he has authority to bind the firm in all matters pertaining to contract including the Arbitration Clause, shall be attached in 'pdf' form. In case of partnership concern or a limited company, digital signatory of the bid / tender shall ensure that he is competent to bind the contractor (through partnership deed, general power of attorney or Memorandum and Articles of Association of the Company) in all the matters pertaining to the contracts with Union of India including arbitration clause. A scanned copy of the documents confirming of such authority shall be attached with the tender /bid in 'pdf' form, if not submitted earlier. The person uploading the bid on behalf of another partner(s) or on behalf of a firm or company using his DSC shall upload with the tender / bid a scanned copy (in 'pdf' form) of Power of Attorney duly executed in his favour by such other or all of the Partner(s) or in accordance with constitution of the company in case of company, stating that he has authority to bind such other person for the firm or the Company, as the case may be, in all matters pertaining to the contract including the Arbitration Clause.

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INSTRUCTIONS ON FILLING AND SUBMISSION OF TENDER (Contd...)

3.7 Even in case of Firms or Companies which have already given Power of Attorney to an individual authorizing him to sign tender in pursuance of which bids are being uploaded by such person as a routine, fresh Power of Attorney duly executed in his favour stating specifically that the said person has authority to bind such pertners of the Firm, or the Company as the case may be, including the condition relating to Arbitration Clause, should be uploaded in 'pdf' form with the tender /bid; unless such authority has already been given to him by the firm or the company. It shall be ensured that power of attorney shall be executed in accordance with the constitution of the company as laid down in its Memorandum & Article of Association.

3.8 Hard copies of all above documents should be sent by the contractor to the Tender issuing authority well in advance to be received before the date and time fixed for the same.

3.9 Bid (Cover 1&2) shall be uploaded online well in time.

3.10 The contractor shall employ Indian Nationals after verifying their antecedents and loyalty. Attention is also drawn to special condition 3 referred hereinafter and also conditions 24 & 25 of IAFW 2249 (General Condiotns of contract).

3.11 Tenderers/bidders who uploaded their priced tenders / bids are desirous of being present at the time of opening of the tenders / bids, may do so at the appointed time.

3.12 The tenderer / bidder shall quote his rate on the BOQ file only. No alteration to the format will be accepted, else the bid will be disqualified and summarily rejected.

3.13 In case the tenderer / bidder has to revise / modify the rates quoted in the BOQ (excel sheet) he can do so only in the BOQ, through defproc.gov.in site only before the bid closing time and date.

3.14 In case the BOQ is revised by the department and the bidder has failed to quote in revised BOQ(i.e. he has quoted in previous BOQ), such bid shall be treated as willful negligence by the bidder and his quotation shall be considered non-bonafide

4. **REVOKATION / REVISION OF OFFER UPWARD / OFFERING VOLUNTARY REDUCTION, AFTER CLOSING OF BID SUBMISSION DATE & TIME**

In the event of lowest tenderer / bidder revoking his offer or revising his rates upward / offering voluntary reduction, after closing of bid submission date & time, his offer will be treated as revoked and the Earnest Money deposited by him shall be forfeited. In case of MES enlisted Contractors, amount equal to the Earnest Money stipulated in the Notice of tender, shall be notified to the tenderer/bidder for depositing the amount through MRO. Bids of such Contractors / bidders shall not be opened till the aforesaid amount equal to the earnest money is deposited by him in Govt Treasury. In addition, bids of such tenderer / bidder and his related firm shall not be opened in second call or subsequent calls. Reduction offered by the tenderer /bidder on the freak high rates offered for review shall not be treated as voluntary reduction.

5. **C P M (CRITICAL PATH METHOD)**

5.1 The project planning for work covered in the scope of tender is based on CPM.

5.2 The tenderer / bidder is expected to be fully conversant with the CPM technique and employ technical staff who can use the technique in sufficient details. Sufficient books and other literature on the subject are widely available in the market which the tenderer / bidder may make use of.

5.3 The tenderer's / bidder's attention is drawn to special condition of the tender regarding preparation of the detailed network analysis and time schedule for the work and his liability for employing sufficient resources to adhere to this schedule. Any inability on the part of the tenderer / bidder in using the technique will be taken as his technical inefficiency and will affect his class of enlistment and future prospect / invitation to tenders for future works.

5.4 Department may issue amendments / errata in form of CORRIGENDUM to tender / revised BOQ to the tender documents. The tender / bidder is requested to read the tender documents in conjunction with all the errata / amendments / corrigendum, if any issued by the department.

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INSTRUCTIONS ON FILLING AND SUBMISSION OF TENDER (Contd...)

6. These instructions shall form part of the contract documents.

Asst.Dir (Contracts)

Signature of Contractor For Accepting Officer

Contd...../

IN LIEU OF IAFW 2159 (REVISED 1947)
(To be used in conjunction with General Conditions of contracts IAFW 2249,1989 Print)

MILITARY ENGINEER SERVICES

Tele AF: 2580371

Headquarters
Chief Engineer (AF) Allahabad
Military Engineer Services
Bamrauli Allahabad (UP)
Pin -211012

958368/ /E8 **Mar 2020**

GENERATION OF SOLAR ENERGY OF CAPACITY OF 1.5 MW AT AF STN AGRA

M/s_____of_____is/are here by authorised to tender for the above work. The tender is to be uploaded in the "eprocuremes.gov.in" site before 1800 hours on-------Mar 2020**.**

Any correspondence concerning this tender should be addressed quoting the reference as given to Chief Engineer (AF) Allahabad,211012 and marked as **"CA NO.: CE(AF)/ALD/AGR/45 OF 2019-20".**

THE PRESIDENT OF INDIA DOES NOT BIND HIMSELF TO ACCEPT THE

LOWEST OR ANY TENDER

Signature of Contractor
Dated :

Asst. Dir (Contracts)
for Accepting Officer

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NOTES TO SCHEDULE 'A'
GENERATION OF SOLAR ENERGY OF CAPACITY OF 1.5 MW AT AF STN AGRA

Notes: - GENERAL (APPLICABLE TO ALL PARTS OF SCH 'A')

Schedule 'A' is divided into following parts: -

1.	Schedule 'A' Part -I	Building works	(pre-priced)
2.	Schedule 'A' Part – II	Internal Water Supply	(pre-priced)
3.	Schedule 'A' Part – III	External Water Supply	(pre-priced)
4.	Schedule 'A' Part – IV	External Electrification	(pre-priced)
5.	Schedule 'A' Part – V	Road, Path & Culvert	(pre-priced)
6.	Schedule 'A' Part – VI	Area Drainage	(pre-priced)
7.	Schedule 'A' Part –VII	Compound wall/Gate	(pre-priced)
8.	Schedule 'A' Part –VIII	Sewage Disposal	(pre-priced)
9.	Schedule 'A' Part –IX	Site clearance, excavation and earth work	(pre-priced)
10.	Schedule 'A' Part –X	Solar Power Generator & Miscellaneous items (to be quoted by the tenderer in BOQ)	

1. PERIOD OF COMPLETION

The entire work under this contract shall be completed as under:

Phase I: Within-12 **(Twelve)** Months from the date of handing over of site as indicated in WO No 1 issued by GE (AF) (Adm Area) Kheria Agra. On completion of phase I contractor has to engage a third party MNRE approved consultant for final testing and third party inspection of executed work. The consultant shall certify that the work has been executed in accordance with vetted and approved design.

Phase II: The work of manning and operation mentioned under Schedule 'A' (BOQ item 35.01to 35.16) The Phase-II will commence only after satisfactory completion of Phase-I and for a period of **55 Months** as mentioned under respective items of Manning and operation.

Note: Separate completeion certificate shall be issued for all phases. Maintenance period as per condition no. 46 of IAFW shall start only after completion of Phase-I work. The whole work shall be deemed completed only after completion of Phase-II work. Two final bills shall be progressed separately (One Final Bill for Phase-I and One Final Bill for Phase-II)

2. Description of buildings works and services enumerated in various parts of Schedule 'A' is in brief. It is deemed to be amplified and read in conjunction with special conditions, particular specifications, specification for materials and workmanship and conditions in relevant trade sections of MES Standard Schedule of Rates 2009 Part-I and MES Standard Schedule of Rates 2010 Part II and contract drawings.

3. Reference to drawings as per list of drawings is given under column 3 of Schedule 'A'. In case, the details in respect of items shown on main drawings are not given in the drawings referred to in main drawings, the same shall be followed from any other drawing included in the list of drawings.

4. Any Drawing mentioned in reference on various drawings or anywhere on any drawing forming part of the tender document or anywhere in the tender documents but inadvertently not included in the list of drawings, shall be deemed to form part of the tender.

5. Probable distribution of various items of internal/external services are indicated on drawings. These are tentative and may be varied where necessary at the discretion of GE. The contractor shall not be entitled for any claim on account of such varied alignment or change in quantities.

6. Layout of building work and services indicated in the site plan is tentative. No adjustment in price shall be done on account of final approved layout within the site plan area

7. In case any variation in out to out, centre to centre and internal dimension of the rooms as mentioned on drawings is observed during execution, centre to centre dimensions shall be followed without any financial effect.

7.1. The lump sum quoted by the contractor shall be deemed to include for all minor extra and constructional details which may not have been specifically shown on drawings or given in particular specification but are essential for the execution of work and services in the workman like manner, sound construction and established engineering practice. The details of such items not specifically shown on drawings/specified shall be furnished by GE during execution of the work. In case of difference of opinion between the contractor and the GE as to whether or not certain items of work constitute minor extras/minor constructional details which are deemed to have been included in the contractor's lump sum, the decision of the Accepting Officer shall be final, conclusive and binding.

contd../-

NOTES TO SCHEDULE 'A'(Contd…/)

7.2. The lump sum quoted by the contractor shall also be deemed to include for all items of work specifically shown on drawings but inadvertently not specified in the specifications. The specifications for such items shall be followed as per codal provisions, technical & functional requirement and as decided by CWE. In case of any dispute, the decision of Accepting Officer shall be final, conclusive and binding.

7.3 For structural details like location, size of members structural drawings shall be referred. For all structural members like RCC and steel viz beams, columns, bands, lintels etc including their dimension, details and locations shall be provided as per structural drawings including TD drawings showing structural details, notes etc irrespective of whether they have been indicated in Arch Drawings or erroneously not shown, similarly in Architectural details, including provisioning of built in furniture and all other details (except structural details) shall be followed from Architectural Drawings including TD drawings. The contractor should keep above stipulations in mind while quoting his rates and nothing extra shall be admissible on this account.

8. **APPLICABLE FOR SCHEDULE 'A' PART –I**

8.1 The unit lump sum rates quoted by the tenderer against Schedule 'A' Part-I shall be deemed to include for all items of work shown on drawings and as specified in particular specifications including necessary earth work, returning filling, removal, excavation required for building work complete except items of work covered under Schedule 'A' Part-II to Part XI.

8.2 The cost of building shall be priced based on soil bearing capacity (SBC) 10 tonne per Sq.m. Change in SBC at site, if found at later date, shall be regularized through deviation order.

8.3 However, some of the items which are essential for execution of work in workmanlike manner and entire completion of work even if not shown on drgs and as detailed below shall be deemed to be included in cost of buildings :-

(i) Reinforcement for any RCC member where not indicated on Drgs. The reinforcement details for such items shall be as directed by CWE.

(ii) Lintels over doors, windows, ventilators & openings even if not indicated on drgs.

(iii) Plinth band, lintel band, floor band & roof band for all walls.

(iv) Fittings to doors, windows, cupboards and such other built in furniture items.

(v) Dwarf wall in situations like verandah, passage, etc.

(vi) Concealing of all GI water tubing running inside faces of walls & floors including the locations where tiling work is to be carried out unless otherwise shown on drawings.

In all the above and similar cases the details indicated elsewhere in the drawings, which are similar or near to the missed out items of works shall be followed. Essential/ minimum requirement for completion of work from structural and utility point of view shall be deemed to be included in the lump sum quoted. In the case of difference of opinion between the contractor and GE, decision of the Accepting Officer shall be final, conclusive and binding.

8.4 The cost of the following items, where ever so required are also included in the rates inserted against each item of Schedule 'A' Part I. The lump sum quoted by the contractor in Schedule 'A' Part-I shall be deemed to include provisions of these items also.

(i) PVC storage water tank three layered alongwith inlet & outlet, pipe & connection, float valve, PCC padding placing arrangement etc. complete all as specified. Where capacity of tank is missing, it will be 1000 liters capacity.

(ii) Sanitary fittings, appliances, soil, waste /vent pipes upto first manhole or upto 3m beyond outer edge of plinth protection with connected items of excavation, earthwork, bedding, haunching of pipes, gully and nahani traps with chambers, AC fittings, CI fittings specials etc, complete plumbing work all as per normal Engineering practice, shown on drg and as specified..

(iii) **Fan hooks fixtures and fittings, niches for boxes to house MCB's /DB's /main switch boxes etc.**

(iv) Mirror, niches, peg sets, towel rail, MS rungs, formats, pelmet boxes, curtain rods with brackets, cup boards, ward robes and main switch boxes etc, misc items shown on drgs.

(v) Any other work specifically mentioned in notes to other parts of Schedule 'A' and particular specification.

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(vi) Concealing of conduit and conduit fittings for wiring in roof slab up to the junction of roof and wall.

(vii) Cutting chases for concealed conduit wiring and GI (Water supply) tubing where tiles are in involved and making good with cement mortar (1:3).

(viii) Anti termite treatment to all the buildings mentioned in Schedule 'A' Part I.

(ix) The measures to be adopted for prevention of leakage/seepage and dampness to building in terms of Drg No. CE (AF)/TD/31 Sheet 1/1.

(x) Built in furniture i.e. Rifle racks, steel lockers etc, as Indicated on drawings and as specified in particular specification. In case specification of any built in item of furniture shown on main drgs is not given in PS the same shall be as directed by GE.

(xi) Numbering of building all as directed by GE/Engineer-in-Charge.

(xii) Format made in plaster of CM (1:4) on all buildings all as specified.

(xiii) Provision of rifal rack

(xiv) All other items, which are not covered in notes but shown on drgs shall be deemed to be included in unit rate inserted against Schedule 'A' Part I.

(xv) Irrespective of what ever shown on drawings water proofing treatment to all accessible and non accessible RCC roof slab including passage covered position open to sky shall be carried out all as specification in particular specification and lump sum quoted rates as deemed to be inclusive for the same.

9. **APPLICABLE FOR SCHEDULE 'A' PART II TO XI**

9.1 The quantities mentioned under quantity column are provisional.

9.2 Specifications in MES Schedule Part-I (2009) and preamble to items given in MES Schedule Part II rates (2010) under respective trade section shall also be applicable. If any provision in the description of items of Schedule 'A' and particular specifications is at variance with the provisions given in specification in MES Schedule Part I (2009) and preambles to MES Schedule Part II rates (2010), provision in Schedule "A" and particular specifications shall take precedence thereof.

10. Only TMT bars shall be used in this project all as specified in PS even though CTD bars are shown in drgs and specified in various part of Schedule 'A'. Diameter and spacing of TMT bars shall be same as shown in structural drgs, for other types of reinforcement in structural drgs without any extra cost to the Govt. Where 6 mm dia CTD/MS bars are shown in drgs, 8 mm dia TMT bars shall be used in lieu thereof without changing the spacing and without any extra cost to the Govt.

11. The following abbreviations wherever occur in tender documents shall have the meaning as indicated against each:-

(a)	RM,M,m	-	Running Metre
(b)	CM,cm	-	Cement mortar/Centimeter
(c)	MM,mm	-	Millimeter
(d)	CUM,cum,cuM	-	Cubic Metre
(e)	SQM,Sqm	-	Square Metre
(f)	M/L, M&L	-	Material and Labour
(g)	S/F, S&F	-	Supplying and fixing
(h)	C/O, CO	-	Carried over
(j)	B/F, BF	-	Brought forward
(k)	Kg	-	Kilogram
(l)	X Sqm/X SQM	-	10 Sqm
(m)	X RM/X Rm	-	Ten RM
(n)	N.B.	-	Nominal Bore
(o)	Drg/Drgs/drg/drgs-		Drawing/Drawings/drawing/drawings

12. For the purpose of pricing deviation involved in use of alternate variety of cement in part/full, the rates contained in the MES Schedule will be the same for any type of cement.

13. Bricks and stone aggregates (Coarse & fine) shall be of type & grade as specified in tender and shall conform to the requirement of relevant IS. These materials shall be procured from the source as approved by the GE in writing irrespective of any distance from site of work. Nothing extra shall be payable on this account.

14. In case of any variation in out to out dimensions, centre to centre dimensions and internal dimensions, centre line dimensions shall be followed without any price adjustment.

15. **BLANK**

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NOTES TO SCHEDULE 'A'(Contd…/)

16. The coarse aggregate and fine aggregate (sand) to be incorporated in the work shall be of type and source as indicated here under irrespective of what is indicated elsewhere in tender document:-

(i) For PQC/RCC/PCC/DLC - Crushed stone aggregate conforming to IS :383 from Jhansi (UP)/Gwalior (MP).

(ii) For WBM/Soling - Aggregates conforming to IS:383 from Fatehpur Sikri (UP).

(iii) Fine aggregate (sand) for RCC/PCC/PQC/DLC/Brick work shall be obtained from river Chambal(Dholpur)/Sindh(Dabra).

17. In case of any variation provision shown in size of steel members for similar location/item in different details, higher size shall be provided.

18. Whatever is mentioned elsewhere, the type of coarse aggregates shall be crushed/ broken stone aggregates conforming to IS: 383 (Properties of the aggregates shall conform to IS: 383 unless mentioned otherwise in particular specifications) and shall be obtained from source as approved by the GE.

19. The plinth height of the buildings shall be considered as shown in drawing. In case, the plinth height for any building is not shown in drawing, the same shall be considered as 450 mm above existing average ground level. Any increase/decrease in plinth height during execution of work shall be regularized through a DO.

20. Unless otherwise specified excavation & earthwork involved in Schedule 'A' Part-II to Part XII in this contract shall be measured & paid separately under Schedule 'A' Part X.

21. BREAK DOWN DETAILS FOR PAYMENT

21.1 The tenderer shall submit yard stick for building / structure mentioned in schedule 'A' Part-I in duplicate to GE within one month of acceptance of tender, indicating percentage Payments to be made for each stage along with supporting details i.e detailed estimate. A sample of various stages of building is enclosed as Appendix 'A'. Yard stick will be approved by the CWE Office. The tenderer shall take cognizance of this aspect while quoting the tender. No claim whatsoever arising due to any misinterpretation / misunderstanding on this account shall be admissible. The decision of Accepting Officer, in this regard shall be FINAL AND BINDING.

21.2 There may be certain changes in the yard stick percentages as submitted by the contractor while approving the yard stick by CWE due to market rates of various materials and due to policy of the Dept of withholding sufficient amount for later stages of the building. Contractor shall not have any claim on this account and percentage payment made for each stage as per approved yardstick shall be final and binding.

21.3 Payment against lump sum buildings shall be made as per the approved yard stick.Payment against lump sum buildings shall be allowed in III RAR and onwards to Contractor only after yard stick for the buildings is finalized and approved by CWE. Any delay in the payment of III RAR on account of late submission of yard stick by the Contractor to the GE shall be Contractors responsibility and no claim on this account shall be entertained.

21.4 Makes of various materials/items have been mentioned in Appendix 'A& B' to particular specifications. However makes specified in Sch 'A' shall only be provided when makes are mentioned in Sch 'A'. Makes specified in Schedule 'A' items shall take precedence over makes given in Appendix 'A & B' to particular specifications. However in case no make is specified for a particular item in the tender document, the same shall be BIS marked / approved items from BIS approved manufacturers.

21.5 NOTE for Sch 'A' Part I : Wherever shown in drawings, Saucer drain along the plinth protection of the building and/or along the Apron shall be included in the quoted Lumpsum of that item of Sch 'A' Part I. Rest portion of Saucer drain shall be measured and paid separately.

22 Note for LED lights:- Contractor shall submit the manufacturer's Guarantee/warranty Card for the LED lights supplied by him under this contract. The manufacturer's Guarantee/ Warranty shall specifically mention the Guarantee/warranty period.

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NOTES TO SCHEDULE 'A'(Contd…/)

23 Completion Drawing :- After the work is completed to the entire satisfaction of GE, completion drawing 06 sets showing plan, section, internal electrification, internal water supply, plumbing works, piping work inside swimming pool its connected fittings and other details as directed by GE shall be submitted by the contractor on tracing cloth to GE. These drawing shall be got approved by the contractor from GE. The cost of the same shall be borne by the contractor and the lump sum quoted by contractor shall deem to include for this provision.

24. Schedule 'A' part -XI (miscellaneous items) comprises against the following Schedules:-

1. Internal Water Supply
2. External Water Supply
3. External Electrification
4. Road, Path & Culvert
5. Area Drainage
6. Compound wall/Gate (
7. Sewage Disposal
8. Site clearance, excavation and earth work

Signature of Contractor

Astt. Dir (Contracts)
For Accepting Officer

contd../-

SCHEDULE 'A' PART- II
INTERNAL WATER SUPPLY

Srl No	Description of items of works	Drg No	Unit Rate in Rs	No of units Required	Amount in Rs	Period of completion of individual items after date of handing over the site	Remarks
1	2	3	4	5	6	7	8
1.	S&F 15mm bore Galvanized steel water tubing medium grade fixed complete to walls/ceiling with all required fittings complete all as specified and directed	Refer list of drgs for all items of this sch	116.60 RM	5.00	583.00	For all items refer Sch 'A' Note	
2.	S&F 20mm bore Galvanized steel water tubing medium grade fixed complete to walls/ceiling with all required fittings complete all as specified and directed.		153.80 RM	5.00	769.00		
3.	S&F 25mm Galvanized steel water tubing medium grade fixed complete to walls/ceiling with all required fittings complete all as specified and directed		227.50 RM	5.00	1137.50		
4.	S&F Bib tap 15 mm bore chromium plated fancy types screwed down screwed for iron pipe or for brass ferrule complete all as specified and directed.		180.30 RM	2.00	360.60		
5.	S&F Angle valve 15mm bore chromium plated fancy type screwed both ends for iron pipe or for unions and fixed complete all as specified and directed.		169.00 RM	2.00	338.00		
6.	S&F Gun- metal gate valve 25mm bore with iron wheel head, screwed both end for iron pipe and fixed compete all as specified and directed.		413.80 Each	1.00	413.80		
7.	S&F Pillar tap 15mm fancy type chromium plated with long screwed shanks and fly nuts screwed for iron pipes compete all as specified and directed.		279.90 Each	1.00	279.90		
8.	S&F PVC connection 15 mm size with PTMT nuts of length 450 mm complete all as specified and directed.		73.90 Each	2.00	147.80		
9.	S & F stop value 20 mm bore cost copper allay screwed both end for iron pipe or for brass ferrule compete all as specified and directed		215.00 Each	1.00	215.00		
10.	S & F Concealed stop valve 15 mm bore chromium plated fancy type long shank and cup (concealed type) screwed both ends for iron pipe or for union Complete all as specified and directed		271.00 Each	1.00	271.00		
	Total amount of Schedule 'A' Part-IV C.O. to BOQ			**Rs.**	**4515.60**		

Signature of Contractor
Dated:

Astt. Dir (Contracts)
for Accepting Officer

contd../-

SCHEDULE 'A' PART- II
INTERNAL WATER SUPPLY (Contd.…)

Srl No	Description of items of works	Drg No	Unit Rate in Rs	No of units Required	Amount in Rs	Period of completion of individual items after date of handing over the site	Remark
1	2	3	4	5	6	7	8
11.	S&F Shower rose brass chromium plated with or without swivel joints including fixing to steel pipe of 15mm bore complete all as specified and directed		234.40 Each	1.00	234.40		
12.	S&F Towel Rail 600mm long of PTMT fixed with and including chromium plated brass screws and plastic cleats(Minimum weight 190 gms) complete all as specified and directed		259.40 Each	1.00	259.40		
13.	S&F Towel Ring of PTMT fixed with and including chromium plated brass screws and plastic cleats (minimum weight 90 gms) complete all as specified and directed		133.70 Each	1.00	133.70		
14.	S&F Soap dish vitreous china white approximate size 160mm x 160mm x 90mmfixed to wall complete all as specified and directed		134.70 Each	1.00	134.70		
15.	S&F Shelf of PTMT fixed with and including chromium plated brass screws and plastic cleats (Minimum weight 300 gms) complete all as specified and directed		227.70 Each	1.00	227.70		
	Total amount of Schedule 'A' Part-II C. O. to BOQ			**Rs.**	**989.90**		

COLLECTION OF SCHEDULE 'A' PART-VI

1. Total brought forward from Serial Page No. 13	Rs.	**4515.60**
2. Total brought forward from Serial Page No. 14	Rs.	**989.90**
Total amount of Schedule 'A' Part-V C. O. to BOQ	**Rs**	**5505.50**

Signature of Contractor
Dated:

Astt.Dir (Contracts)
for Accepting Officer

contd../-

SCHEDULE 'A' PART- III
EXTERNAL WATER SUPPLY.

Srl No	Description of items of works	Drg No	Unit Rate in Rs	No of units Required	Amount in Rs	Period of completion of individual items after date of handing over the site	Remarks
1	2	3	4	5	6	7	8
1.	Supply , Fix & testing Steel water tubing medium grade galvanized including all fittings such as bends, elbows, tees, short pieces, connectors, back nuts, diminishing pieces, caps, plugs and unions, etc and fixing complete with clips, wall hooks, wooden plugs, or laying in trenches, etc., also for cutting, screwing and waste and for making forged bends on piping as required for laying in trenches or fixed to wall etc complete all as specified and directed for the following sizes of pipes:-	Refer list of drgs for all items of this sch				For all items refer Sch 'A' Note No 01 on page No 8.	
	(i) 20 mm dia		142.90 RM	80.00	11432.00		
	(ii) 25 mm dia		214.90 RM	505.00	108524.50		
	(iii) 50 mm dia		415.90 RM	842.00	350187.80		
2.	Supply and fixing Gun-metal, globe or gate valves,with iron wheel head, screwed both ends for iron pipe and fixed complete all as specified and directed for the following sizes of pipes:-						
	(i) 20 mm dia		252.20 Each	5.00	1261		
	(ii) 25 mm dia		390.00 Each	1.00	390		
	(iii) 50 mm dia		893.10 Each	8.00	7144.80		
	Cutting existing steel tubing for alterations or additions(each cut measured) for pipe line of 50mm bore		28.10 Each	2.00	56.20		
	Screwing existing steel tubing for alterations or additions (or lengthning screw on pipeto form connector) for the size 50mm bore		47.30 Each	2.00	94.60		
	Total amount of Schedule 'A' Part-III C.O. to BOQ			**Rs.**	**479090.90**		

Signature of Contractor
Dated:

Astt. Dir (Contracts)
for Accepting Officer

contd../-

SCHEDULE 'A' PART-IV
EXTERNAL ELECTRIFICATION

Srl No	Description of items of works	Dr No	Unit Rate in Rs	No of units Requi-red	Amount in Rs	Period of completion of individual items after date of handing over the site	Remarks
1	2	3	4	5	6	7	8
1.	Supply, laying & fixing galvanized steel tubing 40 mm bore "light grade" with GI fittings in trenches/under roads/along pole /wall including flat iron (25mmx6mm) clamps as required for cable protection complete all as specified and directed.		304.60 RM	60.00	18276.00		
2.	Supply, erecting and fixing in true vertical position steel tubular swaged pole (410 SP-22) conforming to IS -2713 (Part I & II) 8.50 mtr long, complete with cast iron base plate, pole cap / finial taper plug, bolts, nuts and washers, welded reduced section and longitudinal weld throughout entire length of pole including two coats of black bituminous paint internally and externally upto planting depth and remaining external portion of pole shall be provided with one coat of red oxide primer and two coats of aluminium paint complete all as specified and directed. Note :- 1. Earth work and PCC for pole shall be measured and paid separately. 2. Numbering of the pole shall be done with synthetic enameled paint. The shape and size of letter shall be as decided by GE and unit rates shall be deemed to be included this item.		7553.10 Each	41.00	309677.10		
3.	Supply, laying, jointing and testing XLPE insulated, armoured, heavy duty electric cable with aluminum conductor 1100 volts grade , laid in trenches/ducts, floors, fixed to walls etc of cross sectional area 10 sqmm 4 core complete all as specified and directed.		128.00 RM	2606.00	333568.00		
4.	Supply, laying, jointing and testing XLPE insulated, armoured, heavy duty electric cable with aluminum conductor 1100 volts grade , laid in trenches/ducts, floors, fixed to walls etc of cross sectional area 16 sqmm 4 core complete all as specified and directed.		160.00 RM	192.00	30720.00		
5.	Supply, laying, jointing and testing XLPE insulated, armoured, heavy duty electric cable with aluminum conductor 1100 volts grade , laid in trenches/ducts, floors, fixed to walls etc of cross sectional area 50 sqmm 3.5 core(main cable) complete all as specified and directed.		305.00 RM	30.00	9150.00		
6.	Supply & laying un-reinforced Precast concrete cable cover, Class HVP,type-1 with peak, size 300mm x180mmx40mm (For HT cable only)		38 EACH	7000	266000.00		
7.	M & L for plain cement concrete (1:4:8) type D-2 (using 40 mm graded aggregate) as in foundation filling in lean concrete for Steel Tubular Poles etc.complete all as specified and directed.		1945.10 Cum	2	3890.20		
	Total amount of Schedule 'A' Part-IV C.O. to BOQ			**Rs.**	**971281.30**		

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SCHEDULE 'A' PART-IV
EXTERNAL ELECTRIFICATION(Contd…)

8.	M & L for plain cement concrete (1:3:6) type C2 (using 40 mm graded aggregate) as in foundation filling and mass concrete for Steel Tubular Poles etc.complete all as specified and directed.		2212.30 Cum	23	50882.90		
9.	M & L for plain cement concrete 1:2:4 type B1 (using 20 mm graded aggregate) as in coping of poles, above ground level, or any other purpose as specified and as directed.		2751.00 Cum	04	11004.00		
10.	Supplying, layng & testing cable XLPE insulated screened PVC beded, galvanised steel strip or wire armored, electric power cables (heavy duty) with aluminium conductor, 11000 volts grade. Of size 3 core 120 Sqmm complete all as specified and directed.		1045.00 RM	1400	1463000.00		
11.	Supply and fix cable joint kit for 11 KV grade cable for indoor termination cold shrink type joint complete with jointing material and accessories suitable for 3 core XLPE armoured aluminium conductor cable of size 120 to 185 Sqmm complete all as specified and directed.		12396.0 EACH	5	61980.00		
12.	M& L , jointing and testing straight through cold shrinkable joint including all materials and accessories suitable for 3 core x 120 sqmm to 3 core 185 Sq mm XLPE armoured aluminium conductor cable of 11000 Volt grade all as per manufacturers recommendation complete all as specified and directed.		27207.0 Each	02	54414.00		
	Total amount carried over to collection of Schedule 'A' Part-IV			**Rs.**	**1641280.90**		

COLLECTION OF SCHEDULE 'A' PART-V

1.	Total brought forward from Serial Page No. 16	Rs.	**971281.30**
2.	Total brought forward from Serial Page No. 17	Rs.	**1641280.90**
Total amount of Schedule 'A' Part-IV C. O. to BOQ		**Rs**	**2612562.20**

Signature of Contractor
Dated:

Astt.Dir (Contracts)
for Accepting Officer

contd../-

SCHEDULE 'A' PART-V
ROAD/PATH & CULVERTS

Srl No	Description of items of works	Drg No	Unit Rate in Rs	No of units Required	Amount in Rs	Period of completion of individual items after date of handing over the site	Remark
1	2	3	4	5	6	7	8
16.	Rolling and consolidation of formation surfaces with 8 tonne to 12 tonne power roller to required level and camber etc including watering wherever required complete all as specified and directed.		8.00 X Sqm	640.00	5120.00		
17.	Material and Labour for Hardcore of gauge n exc. 63 mm, deposited, spread and levelled in layers n exc. 15 cm thick, watered and rammed to a true surface broken stone aggregate complete all as specified and as directed.		895.10 Cum	27.00	24167.70		
18.	M & L for 150mm spread thickness soling (or sub - base) with broken boulders or quarred stone, interstices, filled surface formed and rolled and consolidated to required gradient and camber complete all as specified and as directed.		1203.60 X Sqm	640.00	770304.00		
19.	M & L for 150mm thick compacted thickness of WBM in two layers of 75mm thick (compacted thickness) with coarse aggregate (type of aggregate lime stone, sand stone, flint or quartzite) of grading 2 (63mm to 40mm size) spread rolled and consolidated to gradient and required camber complete all as specified and as directed.		1519.00 X Sqm	640.00	972160.00		
20.	M & L for preparing of unsurfaced water bound macadam by brushing with wire brushes for removing caked mud etc sweeping with brooms and finally fanning the cleaned surface with gunny bags to remove all loose dirt etc complete all as specified and as directed.		109.20 X Sqm	640.00	69888.00		
21.	M & L for applying evenly a primer/tack coat with bituminous primer @ 10 Kg/X Sqm with using paving bitumen VG-30 on WBM surface complete all as specified and as directed.		429.50 X Sqm	640.00	274880.00		
22.	M&L for bituminous premix asphaltic dense concrete 40mm consolidated thickness with 5.5% binder content VG-30 by weight of total mix, rolled and compacted to required camber and gradient using 8 to 12 tonne power road roller complete all as specified and as directed.		2361.40 X Sqm	640.00	1511296.00		
23.	M&L rubber moulded Machine pressed precast conctete interlocking paver block any shape and size with grey cement and pigment confirming to IS 15658-2006 of 60 mm thickness M-35 Grade including 50 mm thick sand cushioning etc complete all as specified and as directed.		550.51 Sqm	360.00	198183.60		
24.	M&L 75 mm thick cement concrete type C-2, 1:3:6 (40mm graded stone aggregate) as in floor /pavings etc. complete all as specified and directed.		196.50 Sqm	360.00	70740.00		
	Total amount of Schedule 'A' Part-V C. O. to BOQ			**Rs.**	**3896739.30**		

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SCHEDULE 'A' PART-V
ROAD/PATH & CULVERTS(Contd.…)

Srl No	Description of items of works	Drg No	Unit Rate in Rs	No of units Required	Amount in Rs	Period of completion of individual items after date of handing over the site	Remark
1	2	3	4	5	6	7	8
25.	M&L for Continuous brick edging with width equal to the length of the brick, laid dry on edge vertically etc. complete all as specified and directed		45.90 RM	3500.00	160650.00		
26.	M&L for PCC (1:2:4) type B-1 (using 20 mm graded crushed stone aggregate) as in bed block and other similar works to be finished even & smooth without extra cement with and using necessary form work with fair finish complete all as specified and directed.		4144.40 Cum	40.00	165776.00		
27.	M&L for 450mm dia Reinforced concrete hume pipe, class NP3, laid and jointed complete with collars etc. complete all as specified and directed		1402.20 RM	50.00	70110.00		
28.	M&L for 600mm dia Reinforced concrete hume pipe, class NP3, laid and jointed complete with collars etc. complete all as specified and directed		1974.80 X Sqm	50.00	98740.00		
	Total amount of Schedule 'A' Part-V C. O. to BOQ			**Rs.**	**495276.00**		

COLLECTION OF SCHEDULE 'A' PART-VI

3. Total brought forward from Serial Page No. 18	Rs.	**3896739.30**
4. Total brought forward from Serial Page No. 19	Rs.	**495276.00**
Total amount of Schedule 'A' Part-V C. O. to BOQ	**Rs**	**4392015.30**

Signature of Contractor
Dated:

Astt.Dir (Contracts)
for Accepting Officer

contd../-

SCHEDULE 'A' PART- VI
AREA DRAINAGE

Sr No	Description of items of works	Drg No	Unit Rate in Rs	No of units Required	Amount in Rs	Period of completion of individual items after date of handing over the site	Remark
1	2	3	4	5	6	7	8
1.	**Material and Labour for** plain cement concrete 1:4:8 type D2 (using 40mm graded stone aggregate) in foundations, filling and mass concrete complete all as specified and as directed.	Refer list of drgs	2303.30 Cum	182.00	419200.60	For all items refer Sch 'A' Note No 01 on page No 8	
2.	M & L brick work with fly ash bricks straight or curved on plan exceeding 6M mean radius built in cement mortar1:4 complete all as specified and as directed.		2421.20 Cum	552.00	1336502.40		
3.	M & L for plain cement concrete1:2:4 type B-0 (using 12.5 mm graded stone aggregate) as in coping including necessary formworks as required finishing the exposed surface even & smooth without using extra cement etc complete all as specified and as directed.		4169.10 Cum	73.60	306845.76		
4.	M & L for plain cement concrete1:2:4 type B-0 (using 12.5 mm graded stone aggregate) as in drain surface including necessary formworks as required to be finished even & smooth without using extra cement etc complete all as specified and as directed.		4110.50 Cum	68.00	279514.00		
5.	**M&L for plain cement concrete 1:4:8 type D-2 (40 mm graded crushed stone aggregate) as in bed to drain pipes including packing under,and haunching against the sides of pipes after they are laid and tested for 200mm bore reinforced concrete pipe complete all as specified and directed.**		253.40 RM	10.00	2534.00		
6.	**M&L for 200 mm bore reinforced concrete pipes, class NP3 of conforming to IS, laid to slope on trenches and jointed with cement mortar 1:1 including collars & necessary testing for ensuring leak proofing complete all as specified and directed.**		495.40 RM	10	4954.00		
7.	M&L 15mm thick rendering on fair faces of brick work or concrete surface in cm 1:4, mixed with water proofing compound (water proofing compound to be measured separately as supply only) surface finished even & smooth without using extra cement complete all as specified and directed.		127.40 Sqm	2400.00	305760.00		
	Total amount of Schedule 'A' Part-VI C. O. to BOQ			**Rs.**	**2655310.76**		

Signature of Contractor
Dated:

Asst. Dir (Contracts)
for Accepting Officer

contd../-

SCHEDULE 'A' PART-VII
(COMPUND WALL/GATE)

Sr l No	Description of items of works	Drg No	Unit Rate in Rs	No of units Required	Amount in Rs	Period of completion of individual items after date of handing over the site	Remarks
1	2	3	4	5	6	7	8
1.	S&F angle iron 50x50x6mm thick fencing post and inclusing cutting up to shape as directed holes conforming to Fe-290(Gde-E-165) complete all as specified and as directed.	Refer list of drgs	48.20 Kg	3108.00	149805.60	For all items refer Sch 'A' Note No 01 on page No 8	
2.	S&F Razor wire fencing with 2.6mm dia and 14mm width 0.5mm thick razor strip and swan neck angle and fixed with 6 rows each side with clamps at 3 nos place of 3m panel 3 rows each side complete all as specified and as directed.		22.00 Rm	13200.00	290400.00		
3.	M & L for preparation of steel surfaces and applying two coats of synthetic enamel paint over a coat of red oxide primer complete all as specified and as directed.		58.20 Sqm	178.00	10359.60		
4.	S&F Mild stell screw bolts (machine made) with hexagonal or square heads at one end and screwed the other, or screwed both ends, each screwed end to be fitted with washers and one hexagonal or square nut, n exc 30 long 16 to 20mm dia of neck complete all as specified and directed.		66.00 Kg	1190.00	78540.00		
5.	M & L for preparation of old steel surfaces of any description and applying one coat of synthetic enamel paint complete all as specified as directed.		27.50 Sqm	200.00	5500.00		
6.	S&F mils steel plate plain or chequered 8mm thick in thickness in reqd size cut notched(ordinary and counter sunk) forming holes without any attachment (of grade Fe-290 Gde E-165) complete all as specified as directed.		493.00 Kg	1000.00	493000.00		
7.	S&F hand rails, half round or otherstock section or core for woodenhand- rail straight, drilled and countersunk for balusters running bars, for doors, balusters, nosing to steps including embedding in concrete and screwing etc, wind ties for roof including cutting tops to shape as directed, drilling holes, notching for wire, etc, flat iron fillets(for securing wire mesh etc) including all necessary drilling, bolting or riveting, etc, and similar work conforming to Fe-290 Gde-165 all as specified and directed by Engineer-in Charge.		70.30 Kg	770.00	54131.00		
	Total amount carried over to collection of Sch 'A' of Part-VII			**Rs.**	**1081736.20**		

Signature of Contractor
Dated:

Asst. Dir (Contracts)
for Accepting Officer

contd../-

SCHEDULE 'A' PART-VIII
(SEWAGE DISPOSAL)

Sr No	Description of items of works	Drg No	Unit Rate in Rs	No of units Required	Amount in Rs	Period of completion of individual items after date of handing over the site	Remarks
1	2	3	4	5	6	7	8
1.	M&L for cement concrete in foundation filling and mass concrete type D2 1:4:8 (40 mm graded stone aggregate) complete all as specified and directed.	Refer list of drgs	2303.30 Cum	0.50	1151.65	For all items refer Sch 'A' Note No 01 on page No 8	
2.	M&L for Brickwork with sub class-B bricks straight or curved on plan .exc 6 m mean radies for man-holes / septifictank/ soakwell etc,. In sewar works built in CM (1:4) complete all as specfied & directed.		2351.90 Cum	3.00	7055.70		
3.	M& L for PCC 1:2:4 type B-I using 20mm graded stone aggregate as in coping bencing complete all specified & directed.		4144.40 Cum	0.30	1243.32		
4.	M&L for rendering 15mm thick in CM 1:4 on fair faces of brick work finished even and smooth without using extra cement complete all as specfied & directed		127.40 Sqm	15.00	1911.00		
5.	M&L for Precast cement concrete 1:2:4 type B-1 using 20mm graded stone aggregate as in cover slabs (for man holes etc), set in cement morter 1:4 complete all as specfied & directed.		4817.60 Cum	0.35	1686.16		
6.	Mild steel TMT bars 8mm dia and over, cut to length, bent to shape required, including cranking, bending spirally for hopping for columns, hooking ends and binding with and including mild steel wire (annealed) not less than 0.9mm dia securing with clips complete all as specified and directed.		48.60 Kg	30.00	1458.00		
7.	M&L for PCC 1:3:6 type C-1 bed to drain pipes 150 mm dia including packing under , and haunching aginst the sides of pipes after they are laid and tested complete all as specified and directed.		194.40 Rm	20.00	3888.00		
8.	M&L for 150mm bore Reinforced concrete pipes , class NP-3 laid and jointed complete with collars complete all as specified and directed		283.30 Rm	20.00	5666.00		
	Total amount carried over to collection of Sch 'A' of Part-VIII			**Rs.**	**24059.83**		

Signature of Contractor
Dated:

Asst. Dir (Contracts)
for Accepting Officer

contd../-

SCHEDULE 'A' PART-IX
SITE CLEARANCE, EXCAVATION AND EARTH WORK

Sr No	Description of items of works	Drg No	Unit Rate in Rs	No of units Required	Amount in Rs	Period of completion of individual items after date of handing over the site	Remarks
1	2	3	4	5	6	7	8
1.	Surface excavation not exceeding 30cm deep and averaging 15cm deep and getting out in soft/loose soil complete all as specified and as directed.	Refer list of drgs	15.90 Sqm	6400.00	101760.00	For all items refer Sch 'A' Note No 01 on page No 8	
2.	Excavation in trenches in soft & loose soil not exceeding 1.5 metre deep and not exceeding 1.5 mtr wide and getting out in soft/loose complete all as specified and as directed.		115.20 Cum	3852.00	443750.40		
3.	Removing excavated material (surplus soil) upto 200 m and depositing where directed at a level not exc. 1.5 m above the starting point, complete all as specified and directed		135.40 Cum	4000.00	541600.00		
4.	Returning, filling in including spreading, levelling, watering and well ramming in layers not exceeding 25 cm thick complete all as specified and as directed.		41.70 Cum	760.00	31692.00		
5.	Removing excavated material not exceeding 50 meters & depositing where directed at a level not exceeding 1.5 mtr above the starting point complete all as specified and as directed.		96.10 Cum	1528.00	146840.80		
6.	Removing excavated material obtained herein before exceeding 250 m but not exceeding 500 m and depositing where directed at a level not exceeding 1.5 mtr above the starting point complete all as specified and as directed.		149.40 Cum	1274.00	190335.60		
7.	Supply & filling in dry sand in cable trenches before and after the cable are laid as in sand cushioning to cables or in any other indicated situation complete all as specified and directed.		678.20 Cum	350.00	237370.00		
8.	Excavation over area not exc 1.5m deep and getting out in soft/loose.		77.40 Cum	8000.00	619200.00		
9.	Surface excavation n. exc 15 cm deep in soft/loose soil complete all as specified and directed.		7.90 Sqm	28000.00	221200.00		
10.	Removing excavated material (surplus soil) upto 100 m and depositing where directed at a level not exc. 1.5 m above the starting point, complete all as specified and directed		109.20 Cum	4000.00	436800.00		
11.	Forming embankments including raising (or lowering) earth, spreading in layers n exc. 30 cm thick; watering, ramming/rolling and finishing to required size, shape, etc., n exc. 1.5 m high from base complete all as specified and directed		50.7 Cum	8000.00	405600.00		
	Total amount Schedule 'A' Part-IX			**Rs.**	**3376148.80**		

Signature of Contractor
Dated:

Asst. Dir (Contracts)
for Accepting Officer

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BOQ PAGES

(SERIAL PAGE NO TO)

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SCHEDULE OF CREDIT
(CREDIT FOR MATERIALS OBTAINED FROM DEMOLITION / DISMANTLING)

NOTE :-

1. The materials listed below retrieved from demolition/dismantling as specified in Schedule of credit shall become the property of the contractor and the credit amount as indicated below shall be recovered from the RAR as the work proceeds. Demolition of the work shall be carried out after it is handed over for demolition all as directed by the Engineer-in-Charge. Any other retrieved item not listed below shall become Govt property.
2. The unit rate of salvage materials which will become the property of contractor as assessed by the department is indicated in the schedule of credit and it is final and binding. The contractor is deemed to have visited the site and made his own assessment regarding condition of the materials. No claim of the contractor. Whatsoever against the department regarding actual cost of salvage material is admissible.
3. The contractor shall be responsible to remove the materials obtained from demolition from the site as directed and the site shall be left clean and tidy and same shall be deemed to be included in the rates quoted for demolition.
4. The contractor shall be allowed to remove the salvage materials from the site only after written approval of the GE after necessary recovery has been made in the RAR. However in case of any dispute regarding demolished item, decision of CWE shall be final and binding upon both the parties.
5. The quantities mentioned under column 3 are approximate and are given as rough guide only. The quantities obtained from items of Schedule 'A' for demolition shall be considered for credit. The tenderer shall not have any claim whatsoever for any variation of quantities given in Schedule of credit.

Srl No	Description of Items	Unit	Obtained Qty	Rate per unit Qty	Amount in Rs.	Remark
1.	Old UNSERVICEABLE CONCERTINA COIL	100RM	11.00	500.00	5500.00	
	Total Amount of Sch of credit C.O. to General summary			Rs.	5500.00	

(Signature of Contractor)

AD (Contracts)
For Accepting Officer

contd../-

SCHEDULE 'B'
ISSUE OF MATERIALS TO THE CONTRACTOR (SEE CONDITION 10 OF IAFW 2249)

Ser No	Particulars	Rates at which materials will be issued to the contractor		Place of issue by name	Remarks
		Unit	Rate in Rs		
1.	2	3	4	5	6

----------NIL----------

SIGNATURE OF CONTRACTOR
Dated:

Astt. Dir (Contracts)
for Chief Engineer (AF)

SCHEDULE 'C'

ISSUE OF TOOLS AND PLANTS (OTHER THAN TRANSPORT) WHICH WILL BE HIRED TO THE CONTRACTOR

(SEE CONDITION 15, 34 AND 35 OF IAFW-2249)

Srl No	**Quantity**	Particulars	Details of MES crew supplied	Hire charges per unit per working day (Rs)	Stand by charges per unit per off day (Rs)	Place of issue by name	Remarks
1	2	3	4	5	6	7	8

----------NIL----------

SCHEDULE 'D'

TRANSPORT TO BE HIRED TO THE CONTRACTOR
(SEE CONDITION 16 & 35 OF IAFW-2249)

Srl No	Quantity	Particulars	Rates per unit per working day	Place of issue by name	Remarks

----------NIL----------

SIGNATURE OF CONTRACTOR
Dated:

Asst. Dir (Contracts)
for Chief Engineer (AF)

contd../-

TENDER

To

The President of India.

Having examined and perused the following documents: -

1. Particular specifications signed by Dir (Contracts) / Dy Dir (Contracts) / Addl Asst Dir (Contracts).

2. Drawings detailed in the list of drawings.

3. Schedule 'A', 'B', 'C' and 'D' attached herewith.

4. MES Standard Schedule of rates 2009 (Part-I) specifications together with amendment No. 1 to 3 and Part-II 2010 (rates) (hereinafter referred to as the MES Schedule) together with amendment No 1 to 59 of SSR-2010 Part II as applicable.

5. General Conditions of Contracts (IAFW-2249 - (1989 Print) together with Errata No 1 to 20 and amendments No 1 to 40

6. Water condition 31 of IAFW-2249, General Condition of Contracts. Water will not be supplied by the MES.

7. Should this tender be accepted I/We agree:-

(a) ***That the sum of Rs _____(Rupees _____ only) forwarded as earnest money shall either be retained as a part of security deposit or refunded by the Govt on receipt of the appropriate amount of security deposit all as per condition 22 of IAFW-2249.

(b) To execute all the works referred to in the said documents upon the terms and conditions contained or referred to therein and as detailed in the General Summary hereinafter and to carry out such deviations as may be ordered vide condition 7 of IAFW-2249 upto maximum of 10% (Ten percent). Further agree to refer all disputes, as required by condition 70 to the sole arbitrator of a serving officer having degree in Engineering or equivalent or having passed final/direct final examination in Subdivision-II of Indian Institution of Surveyors (India) recognised by Govt. of India to be appointed by the Engineer-in-Chief or officiating E-in-C or Director General of Works if specifically delegated in writing by Engineer-in-Chief, Army Headquarters, New Delhi whose decision shall be final, conclusive and binding.

(c) Further agree to refer all the disputes to the extent restricted vide special condition No. 44 of tender documents to the sole conciliator viz., serving officer not below the rank of Superintending Engineer/ Superintending Engineer (Q S & C) having Degree in Engineering or equivalent or having passed final / direct final examination of Sub division-II of Institution of Surveyors (India) to be appointed by Engineer-in-Chief, Army Headquarters, New Delhi or in his absence the Officer officiating as Engineer-in-chief or Director General of works specifically delegated by Engineer-in-chief in writing whose decision shall be final, conclusive and binding.

*** To be deleted where not applicable.

SIGNATURE OF CONTRACTOR
Dated:

Asst. Dir (Contracts)
for Chief Engineer (AF)

contd../-

Brought forward for the Contract sum Rs. _____

Rupees _____

_____

Signature _____Name (in block/capital letters) _____

_____ in the capacity of _____

duly authorised to sign the tender for and behalf of _____

(in block capital).

Witness_____ Date _____

Address _____ Postal: _____

_____ Address:_____

_____ Telegraphic:_____

_____ Address:_____

_____ Telephone No.:_____

ACCEPTANCE

_____alterations have been made in these documents and as evidence that these alterations were made before the execution of the contract agreement; they have been initiated by the contractor and Shri _____ _____ . The said officer is hereby authorized to sign and initial on my behalf the documents forming part of this contract.

The above tender was accepted by me on behalf of the President of India for the Lump-sum of Rs. __ _____(Rupees_____ _____)on the _____day of _____ Dated this _____ day of_____

Chief Engineer
(AF) Allahabad
Accepting Officer
(For and Behalf of the President of India)

contd../-

GENERAL CONDITIONS OF CONTRACTS (IAFW-2249(1989) PRINT)
FOR
LUMP SUM CONTRACTS (IAFW-2159)
AND
MEASUREMENT CONTRACTS IAFW –1779 & 1779-A

It is hereby agreed by * me/us that the General Conditions of contracts including condition 70 pertaining to settlement of disputes by Arbitration (IAFW-2249-1989 Print) containing 33 pages (Serial Page No 29 to 61 with errata No 1 to 20 containing two Pages (Serial Page No 62 to 63) and amendment Nos 1 to 17 containing five pages (Serial Page Nos 64 to 68) and amendment No 18 to 40 issued by MOD vide letter No PC-1 to 33487/IAFW 2249/R/01/2011/D(Works-II) dated 24th March 2015 containing thirteen pages (Serial Page Nos 69 to 81) and amendment Serial No 41 to 48 issued by MOD vide letter No PC-1 to 33487/IAFW 2249/R/858/2018/D(Works-II) dated 14th January 2019 containing seven pages (Serial Page Nos 82 to 88) for English version only forms part of the contract, though not enclosed with the tender documents.

This tender submitted by * me/us is subject to the aforesaid General Conditions of Contracts in IAFW-2249, a copy of which has been supplied to * me/us and is in * my/our possession and which * I/We have read and understood before submission of the tender.

*My/our signature hereunder is deemed to be * my/our having signed the aforesaid General Conditions of Contracts together with errata and amendments (IAFW-2249-1989 Print) forming part of this tender.

*To be deleted whichever is not applicable.

SIGNATURE OF CONTRACTOR
Dated:

Asst. Dir (Contracts)
for Chief Engineer (AF)

contd../-

SCHEDULE OF MINIMUM WAGES

It is hereby agreed that the "Schedule of Minimum Wages" as published by Government of India or provincial Government's Notification whichever is higher issued upto date of submission of tender shall form part of these tender documents.

My/our signature hereunder amounts to my/our having signed the aforesaid documents forming part of the tender.

Note :- "Schedule for minimum wages" referred to above is available for reference, in the office of Chief Engineer (Air Force) Allahabad-211012.

Signature of Contractor
Dated:

Asst. Dir (Contracts)
for Chief Engineer (AF)

SPECIAL CONDITION

1. **GENERAL**

1.1 These special conditions shall be read in conjunction with General Conditions of Contracts, IAFW-2249 including Errata/amendments there to. If any provisions in these special conditions are at variance with the provisions of above mentioned documents the provisions given in these special conditions shall take precedence there over.

1.2 The work under this Contract shall be carried out in accordance with Schedule `A', Particular Specifications, drawings and other provisions made in MES Schedule.

1.3 The term `General Specifications' referred to herein before/ here in after as well as referred to in IAFW- 2249. (General Conditions of Contracts), shall mean the Specifications contained in MES Schedule.

1.4 General rules, specifications, special conditions and all preambles in MES Schedule shall be deemed to apply to the works under this Contract unless specified otherwise in these tender documents, in which case the provisions in these tender documents shall be deemed to take precedence over the provisions made in MES Schedule.

2.0 **VISIT TO SITE BY CONTRACTOR**

2.1 The tenderers shall contact concerned GE for the purpose of inspections of site(s) and examination of relevant documents other than those sent herewith, who will extend reasonable facilities for the purpose. The tenderers shall also make themselves familiar with working conditions, accessibility to site (s), availability of materials and other cogent conditions which may affect the entire completion of work under this contract.

2.2 In case of a tender containing an offer is submitted, the tenderers shall be deemed to have visited the site (s) and made themselves familiar with the working conditions etc. irrespective of whether they actually inspect the site or not.

3.0 **MINIMUM WAGES PAYABLE**

3.1 Refer Condition 58 of IAFW-2249. The contractor shall not pay wages lower than minimum wages for labour as fixed by the Government of India/State Govt/Union territory, whichever is higher.

3.2 Contractor's attention is also drawn, amongst other things to the 'explanations' to the schedule of minimum wages referred to above.

3.3 The fair wages referred to in condition 58 of IAFW-2249 will be deemed to be the same as the minimum wages, referred to above as upto date from time to time.

3.4 Schedule of minimum wages are not enclosed alongwith tender documents. However contractor shall be deemed to have verified the minimum fair wages payable as on the last due date of receipt of tender.

3.5 The contractor shall have no claim whatsoever, if on account of local factor and or regulations, he is required to pay the wages in excess of minimum wages as described above during the execution of work.

4. **LABOUR REGULATION AND ABOLITION ACT**

Contract labour (Regulation and Abolition) Act 1970 is applicable to MES contractors. Rates quoted by the contractor shall be deemed to take into account the cost/extra expenditure etc required to comply with the provisions contained in the said Act and the rules framed regarding labour from time to time by Central/State Govt.

5.0 **The works under this contract lies in RESTRICTED AREA**.

5.1 **CONDITIONS FOR WORKING IN RESTRICTED AREA**

5.1.1 **VISIT TO SITE WITHIN THE RESTRICTED AREA:**

Permission to enter the restricted area at the time of submission of tenders can be obtained through the Garrison Engineer. Tenderers are advised to send prior intimation of visit of their agents, representatives etc. If any, as regards to dates and time of their proposed visit so that necessary arrangements may be made by GE to secure admission. Whether a tenderer visit the site or not, he shall be deemed to have full knowledge of the restrictions of entering into /exiting from the site of works, for working within the Restricted Area.

5.2 ENTRY /EXIT

The Contractor, his agent(s) representatives, workmen etc and his materials, carts, trucks or other means of transports etc will be allowed to enter through and leave from only such gate(s) and at such times as the GE or authorities in charge of the Restricted Area (s) may at their sole discretion permit to be used. The Contractor's authorized representative is required to be present at the place of entry and exit for the purpose of identifying his workmen carts, trucks etc to the person in charge of the security of Restricted Area.

SPECIAL CONDITION ...CONTD

5.3 IDENTITY CARDS OR PASSES :

The contractor, his agent and representatives are required individually to be in possession of an identity card or pass which will be examined by the security staff at the time of entry into or exit from the restricted area at any time or number of times inside restricted area.

5.4 IDENTITY OF WORKERS

5.4.1 Every worker shall be in possession of an identity card. The identity card will be issued after thorough investigation of the antecedents of the labourers by the Contractor and attested by the Officer-in-Charge of the unit concerned in accordance with the standing rules and regulation of the units.

5.4.2 Contractor shall be responsible for the conduct and action of his workers, agents or representatives.

5.4.3 SEARCH

Thorough search of all persons and transport shall be carried out at each gate and as many times as the gate is used for entry/exit and may also be carried out any number of times at the site within the restricted area.

5.5 FEMALE SEARCHER

If the Contractor desires to employ female labours on works to be carried out and a female searcher is not borne on the authorized strength for the establishment the contractor may be asked for employment of a female searcher (Class IV/Gp 'D') for the calculated period. The cost incurred by the Contractor in doing so shall not be reimbursed to him. The Contractor is deemed to have ascertained from GE, before quoting, whether a female searcher is held on the authorized establishment or not. No subsequent claim on this aspect shall be entertained.

5.6 **WORKING HOURS:**

5.6.1 The units controlling restricted area, usually work during six days in the week and remain closed, on 7th day. The working hours available to Contractor's labour and Staff are however appreciately reduced because of time of entry and exit during working hours.

5.6.2 The exact working hours, working days and non working days observed for the restricted area, where works are to be carried out, shall be deemed to have been ascertained by the contractor before submitting his tender. The tenderer attention is invited to the fact that the total number of working hours for an unit are prescribed in regulations and they cannot be increased by the Garrison Engineer or authorities controlling the restricted area.

5.6.3 The definition of "working days" as given under condition 1 (t) of IAFW-2249 does not apply in case where the works are carried out in restricted area.

5.7 **WORK ON HOLIDAYS INSIDE RESTRICTED AREA:**

The Contractor shall not carry out any work on gazetted holidays, weekly holidays and other non-working days except when he is specially authorized in writing to do so by the GE. The GE may at his sole discretion declare any day as holidays or non-working day without assigning any reason for such declaration.

5.8 **ACCESS TO RESTRICTED AREA AFTER COMPLETION OF WORKS:**

After the works are completed and surplus stores etc removed, the Contractor, his agent/representatives or workers etc may not be allowed to have access to the restricted area except for attending to rectification of defects pointed out to him by the GE.

5.9 **FIRE PRECAUTIONS:**

5.9.1 The contractor, his agents, representatives, workers etc. shall strictly observe the orders pertaining to fire precautions prevailing within the restricted area.

5.9.2 Motor transport vehicles, if any allowed by authorities to enter the restricted area must be fitted with serviceable fire extinguishers.

SPECIAL CONDITION ...CONTD

6. **SECURITY OF CLASSIFIED DOCUMENTS**

Contractor's special attention is drawn to conditions 2A and 3 of General Conditions of Contract IAFW-2249. The contractor shall not communicate any classified information regarding works either to sub -contractor or others without prior approval of the Engineer-in-Charge. The contractor shall also not make copies of the design/drawings and other documents furnished to him in respect of works and he shall return all documents on the completion of the works or earlier on determination of the contract. The contractor shall alongwith the final bill attach a receipt from the Engineer-in-Charge in respect of his having returned the classified documents as per condition 3 of General Conditions of Contracts IAFW-2249.

7. **MATERIALS AND SAMPLES**

7.1 Material listed in Appx `A` to special condition will only be accepted if they bear ISI certification marking. Material having only embossing of IS number can be rejected. Materials listed in Appx `A`. will not be accepted even if they are conforming to relevant IS but not having IS marking. In case of deviation price adjustment @ 10% of the cost of article (on minus side only) shall be made for the articles/materials not having ISI marking. Materials listed in Appx `A` & 'B' to particular specification are the products which are manufactured by number of firms and are generally superior to certified products though they do not bear the ISI mark. Such materials shall be accepted if they are conforming to the relevant IS.

7.2 Materials other than listed in condition 7.1 above required to be provided by the contractor for incorporation in this work shall unless otherwise specified in the particular specification, comply with the relevant Indian standard as specified in MES SSR Part-I subsequently amended or revised. Preference shall be given for ISI marked materials in such cases also. Materials required to be incorporated in the work to be procured by the contractor will be preferred in following order of preference.

(a) Materials with ISI marking.
(b) Materials superior to ISI standards but not ISI marked.
(c) Materials conforming to relevant IS.
(d) Materials conforming to the samples kept in the GE's office.

7.3 The contractor shall produce samples of all materials, articles fittings, accessories etc. that he proposes to use and get them approval in writing by the Garrison Engineer. The materials, articles, etc. as approved shall be signed by the Engineer-in-Charge and the contractor's representative. These samples shall be kept in the custody of the Engineer-in-Charge. Contractor's quoted rates shall be deemed to include the cost of materials and labour for this purpose.

7.4 The brands of all materials, articles, fittings etc. approved together with the names of the manufacturers and firms from which supplies have been arranged shall be recorded in the materials passing register.

7.5 The materials for which IS do not exist or which are specified in these particular specifications to conform to the samples kept in the GE`s office, shall comply with the requirement of these samples. The contractors are advised to inspect the sample which shall remain open for inspection with GE during working hours. The contractor shall be deemed to have full knowledge of the samples whether he inspects them or not.

7.6 The contractor shall submit two samples of each item requiring approval of the GE so that an approved sample can be kept in the site office/ incorporated in the sample quarter and other in the AGE/GE office. The contractor shall place order only after approval of the sample by the GE.

8. REIMBURSEMENT/REFUND ON VARIATION IN "TAXES DIRECTLY RELATED TO CONTRACT VALUE"

8.1 The rates quoted by the contractor shall be deemed to be inclusive of all taxes including GST on materials,GST on works Contracts,turnover tax,Labour welfare Cess/tax,Royalties and other levies payable under the respective Statutes.No reimbursement/refund for variation in rates of taxes,Royalties,and other levies,and/or imposition/abolition of any new/existing taxes,Royalties and other levies shall be made except as provided in 8.2(a) to 8.2(d) here in below.

8.2 (a) **The taxes which are levied by Govt at certain percentage rate of contract sum/Amount shall be termed as "taxes directly related to contract value" such as GST on works Contracts, Turnover Tax , Labour Welfare cess/tax and like but excluding Income tax. The tendered rates shall be deemed to be inclusive of all "taxes directly related to contract value" with existing percentage rates as prevailing on last due date for receipt of tenders. Any increase in percentage rates of "taxes directly related to contract value" with reference to prevailing rates on last due date for receipt of tenders shall be reimbursed to the contractor and any decrease in percentage rates of "taxes directly related to contract value" with reference to prevailing rates on last due date for receipt of tenders shall be refunded by the contractor to the Govt/deducted by the Govt from any payments due to contractor. Similarly imposition of any new "taxes directly related to contract value" after the last due date for receipt of tenders shall be reimbursed to the contractor and abolition of any "taxes directly related to contract value" prevailing on last due date for receipt of tenders shall be refunded by the contractor to the Govt/deducted by the Govt from any payments due to contractor.**

SPECIAL CONDITION ...CONTD

8.2 (b) The contractor shall, within a reasonable time of his becoming aware of variation in percentage rates and/or imposition of an further "taxes directly related to contract value", give written notice thereof to the GE stating that the same is given pursuant to this Special Condition, together will all information relating thereto which he may be in a position to supply. The contractors shall submit the other documentary proof/information as the GE may require.

8.2 (c) The contractor shall, for the purpose of this condition keep such books of account and other documents as are necessary and shall allow inspection of the same by a duly authorized representative of Govt, and shall further, at the request of the GE furnish, verified in such a manner as the GE may require, any documents so kept and such other informations as the GE may require.

8.2(d) Reimbursement for increase in percentage rates/imposition of "taxes directly related to contract value" shall be made only if the contractor necessarily and properly pays addition "taxes directly related to contract value" to the govt, without getting the same adjusted against any other tax liability or without getting the same refunded from concerned Govt Authority and submits documentary proof for the same as the GE may require.

9. **CONTRACTOR'S REPRESENTATIVES, AGENTS & WORKMEN**

9.1 Refer condition 25 of IAFW-2249. The contractor shall employ only Indian Nationals as his representative, servants and workmen and verify their antecedents and loyalty before employing them for the work. He shall ensure that no person of doubtful antecedents and nationality is, in any way associated with the work. If for the reasons of technical collaboration or other consideration the employment of foreign national is unavoidable, the contractor shall furnish the particulars to this effect, to the Accepting Officer at the time of submission of tender.

9.2 The GE shall have full powers and without giving any reason to order the contractor immediately to cease to employ, in connection with this contract any representative, any agents, servants and workmen or employees whose continued employment is, in his opinion undesirable. The contractor shall not be allowed any compensation on this account.

10. **SITING OF BUILDINGS**

There may be some changes in location/siting of building shown in site (layout) plan(s) to suit local conditions and/or departmental requirements. The contractor shall have no claim what-so-ever consequent to such changes in the location/siting of works.

11. **PERIOD FOR KEEPING THE TENDER OPEN**

The tender shall remain open for acceptance for a period of 75 days from the bid submission end date(amended through susequent amendment if any). Date shall be counted from the next date of final bid submission end date.

12. **SIGNING OF CONTRACT DOCUMENTS**

The person signing the tender on behalf of another or on behalf of a Firm shall attach with the tender a proper power of attorney duly executed in his favour by such other persons or by all the partners stating that he has authority to bind such other persons or the Firm as the case may be in all matters pertaining to the contract including the arbitration clause.

13. **CRITICAL PATH NETWORK**

13.1 The time and progress chart to be prepared as per Condition 11 of IAFW-2249 (General Conditions of Contracts) shall consist of detailed network analysis and a time schedule. The GE and the contractor will draw the critical path network jointly soon after acceptance of the tender. The time scheduling of the activities will be done by the contractor so as to finish the work within the stipulated time. On completion of the time schedule a firm calendar date schedule will be prepared and submitted by the contractor to the GE who will approved it after due scrutiny. The schedule will be submitted in four copies within two weeks from the date of handing over of site.

SPECIAL CONDITION ...CONTD

13.2 During the currency of the work contractor is expected to adhere to the time schedule and this adherence will be part of the contractor's performance under the contract. During the execution of the work, contractor is expected to participate in the review and updating of the network undertaken by the GE.

13.3 These reviews may be under taken at the discretion of the GE either as periodic appraisal measure or when the quantum of work ordered on the contractor is substantially changed through deviation order or amendments. Any revision of the schedule as a result of the reviews will be submitted by the contractor to the GE within a week who will approve it after due scrutiny. The contractor shall adhere to the revised schedule thereafter. In case of contractor not agreeing to revised schedule, the same will be referred to the Accepting Officer whose decision will be final, conclusive and binding. GE`s approval to the revised schedule resulting in a completion date beyond the stipulated date of completion shall not automatically amount to a grant of extension of time. Extension of time shall be considered and decided by the appropriate authorities mentioned in condition 11 of IAFW-2249 and separately regulated.

13.4 Contractor is expected to mobilize and employ sufficient resources to achieve the detailed schedule within the broad frame work of the accepted methods of working and safety.

13.5 No additional payment will be made to the contractor for any multiple shift work or other incentive method contemplated by him in his work schedule even though the time schedule is approved by the department.

14. **CO-OPERATION WITH OTHER AGENCIES**

The contractor shall permit free access and afford normal facilities and usual convenience to other agencies or departmental workmen, etc. to carryout works of services under separate arrangement. The contractor shall not be allowed any extra payment on this account.

15. **CLEANING DOWN**

Refer condition 49 of IAFW-2249 General Conditions of Contracts. After the work is complete, the contractor shall clean all floors, remove cement/lime/paint drops, clean joinery, glass etc. touch up all painters work and carry out all other necessary items of work to make the premises clean and tidy before handing over the buildings. No additional payment will be made to the contractor for the purpose.

16 & 17. BLANK

18. WATER SUPPLY

(a) Refer condition 31 of General Condition of Contract IAFW-2249, clause 1.13 of MES Schedule, Part-I and Srl 6 on TENDER Page.

(b) Water will not be supplied by the MES. The tenderers are advised to visit the site of works to ascertain availability of water from civil sources or from nearby natural sources outside ministry of Defence land. The contractor shall be allowed, if he so desires, to install hand pumps, tube wells at site of work at places as approved by Engineer-in-Charge and nothing shall be charged from the contractor. The contractor shall remove the hand pumps, tube wells as and when asked to do so by Engineer–in-Charge/GE and in any case on completion of the work and before issue of completion certificate, unless GE desires that these hand pumps, tubes wells be left in position and the contractor agrees to do so without claiming cost thereof from department. No compensation whatsoever shall be admissible to the contractor, if he is required to remove the pump (s) tube wells before completion of work. Use of water from such sources shall only be permitted if, found after testing, potable and fit for use in the work. The water from such sources shall be got tested by the contractor from laboratory approves by the GE, who shall after satisfying himself permit the contractor to use the water from such sources. Testing charges shall be borne by the contractor.

19. **ELECTRIC SUPPLY**

19.1 In case the contractor desires to buy electricity from MES, it will be supplied at point up to 03 km away from site of work shown on site plan./or as decided by the GE.

19.2 Electric supply shall be 415/230 Volt, 50 cycles, three phase AC supply at upto 05 KW.

19.3 The contractor shall be charged for the electric energy consumed at Rupees 7.41 per unit (KWH) for lighting and power.

19.4 The above rate is all in cost rate. Duties and/or taxes if any, levied by State Govt. and/or any Electricity Undertaking and the like on the electricity charges will be borne by the Department.

SPECIAL CONDITION ...CONTD

19.5. Main switches and KWH meter to register the power supplied shall be provided and installed by MES. All other fittings, cable switch, connection etc. for distribution and supply of electricity from main switch to work site shall be arranged by the contractor at his own according to Indian Electricity Rules and along with the routes approved by the GE. The GE shall have free access to inspect all installations, connections, devices for consuming the electricity and if these are not found satisfactory the GE shall have the power to get these disconnected.

19.6 Supply of electricity shall be during the hours as decided by the GE. However MES does not constitute any guarantee for the continuity of supply and no compensation shall accrue to the contractor for the supply becoming intermittent or if there is any breakdown for any reason. Contractor shall have provision of sufficient stand by supply under their own arrangement to ensure that no delay occurs on account of no or intermittent supply from the MES.

19.7 It is the responsibility of contractor to maintain the unit power factor of electric supply. For this contractor shall provide capacitor of appropriate capacity for each connection for installation of his construction equipments.

20. ADVANCES ON ACCOUNT AGAINST MATERIALS (REFER CONDITION 64 OF IAFW- 2249)

20.1 Add the following in continuation of para 8 of Condition 64 of IAFW-2249:-
Provided further, the contractor may be paid advance on account to the full value of the under mentioned materials only, brought on the site, on his furnishing Guarantee Bond(s), from a Scheduled Bank for the amount of the retention money which should otherwise be recoverable from him under the contract. The contractor shall produce genuine purchase Vrs for the materials so procured when demanded by the Engineer in Charge:-

(a) Factory made doors and windows
(b) Sanitary fittings
(c) Electrical fittings
(d) Water supply fittings/fixtures
(e) Iron mongery
(f) AC soil waste/vent pipes
(g) Any other fittings, fixtures & other manufactured items which do not loose their identity as approved by GE.

20.2 The Bank Guarantee Bond(s) shall be executed for a period of six months and on a form as directed by the Accepting Officer. The contractor shall further arrange to extend the period of Guarantee Bond(s) if and when necessary, as directed by the Accepting Officer or shall furnish fresh Guarantee Bond(s) of similar value in lieu.

20.3 It shall be noted that, advance on account to the full value against Bank Guarantee is permissible only in respect of fittings and fixtures and other manufactured items which do not loose their identity.

21. **ROYALTIES**

Delete the existing description of condition 14 of IAFW-2249 and insert the following: - "No quarries on defence land are available ".

22 **CONTRACTORS PLANTS/EQUIPMENT AT SITE** :

22.1 The Contractor alongwith his labour return shall furnish to the Engineer-in-Charge every morning distribution return of his plants/equipments on the site of work stating following particulars:-

(i) Particular of plants/equipments, their make, manufacturer's model No. if any, Registration No., if any, capacity, year of manufacture and year of purchase etc.
(ii) Total No. of (Quantity) on site of work.
(iii) Location indication No. (Quantity) at each location on the site of work.
(iv) For the purpose of this condition, purchase value on the date of purchase for plant/equipment and vehicle No. of trucks and Lorries shall be furnished. However neither the workman's tools nor manually operated tools/equipment shall be given. The Engineer-in Charge shall record the particulars supplied by the contractor in the works diary and sent the return to the GE for record in his office.

23. **OUT OF POCKET EXPENSES**

No out of pocket expenses incurred by the tenderer in submitting his tender shall be reimbursed whether his tender is accepted or not.

24**.** **DAMAGE TO EXISTING WORKS**

Any damage to the existing structures, any existing road etc., during the execution of work shall be made good by the contractor at his own expense. Rectification, replacement, making good and touching up etc. shall be carried out, conforming to the materials and workmanship originally provided and to the satisfaction of the Engineer-in-Charge. In case of any dispute on this account, the decision of the GE shall be final, binding and conclusive.

SPECIAL CONDITION ...CONTD

25 **MINOR CONSTRUCTION DETAILS**

25.1 Unit rates offered by the Contractor in Sch 'A' shall be deemed to include for all minor details of construction which are obviously and fairly intended and which may not have been referred to in these documents but these are essential for the execution of work and services in workmen like manner and sound construction.

25.2 In case of difference of opinion as to whether or not a certain item of work constitutes minor details of construction included in the contractor's quoted rates, the decision of the Accepting Officer shall be final, conclusive and binding.

26. **RECORD OF PROPRIETARY BRANDED MATERIALS WHICH LOOSE IDENTITY AFTER INCORPORATION**

26.1 Proprietary/branded materials such as all types of bitumen, cement, steel, sealing compounds, glass grid, SAMI, paints, bonding agents etc, the quantity of which cannot be checked after incorporation in the work, shall when collected at site, be recorded in Measurement Book with reference to Vr No, make, brand and rate charged by manufacturer/supplier, and signed both by the MES representative and the contractor.

26.2 The contractor shall obtain proprietary/branded materials direct from the manufacturer(s) or from their authorised stockists where such authorised stockists have been appointed. Contractor shall produce original purchase voucher/bill/invoices for full quantities of materials showing quantity and quality of the materials before claiming advance on account payment or before incorporating these materials into the work to satisfy the Engineer-in-Charge that materials comply with the I.S. specifications. These vouchers shall be endorsed, dated and initialed by the Engineer-in-Charge giving the contract number and name of work and a certified copy of each such vouchers signed both by Engineer-in-Charge and the contractor shall be kept in MES record.

26.3 When cost of each category of materials is less than Rs 2500/- production of vouchers may not be insisted upon if the Garrison Engineer is otherwise satisfied of the quality and quantity of the materials.

27. **STORAGE OF MATERIALS**

The contractor shall not be provided any storage accommodation at the site by MES. The contractor shall make his own arrangement as per condition 10 of IAFW-2249 and as directed by the Engineer-in-Charge.

28 **ROAD ROLLERS (Reference condition 15 of IAFW-2249)**

28.1 Road Rollers required for the execution of this work shall be arranged by the contractor under his own arrangements without any extra cost to the department.

28.2 A log book for each road roller shall be maintained by him for recording hours of working of the road roller. Entries in the log book shall be signed by the contractor or his authorised representative and Engineer-in-Charge at site of work.

28.3 To ensure proper consolidation, roller must work for at least the number of days assessed on the basis of output given here in after. If the roller has not worked for the number of days so assessed recovery shall be effected from the contractor for the number of days falling short of the days assessed on the basis of output stipulated. The recovery shall be affected as under:-

(a) Where road roller is hired out only by the department to contractor, at rates given in Schedule 'C'.

(b) Where road roller is hired by the contractor from sources other than department, Rs 1800 per working day of 8 hours for 8 to 12 tonne roller.

(c) Where road roller is hired by the contractor from department and also from sources other than the department at higher of two rates given in Schedule `C` of contract and Para 28.3 (b) above.

28.4 The above provision shall not, however, absolve the contractor of his responsibility of properly consolidating surface as required under the provisions of the contract.

28.5 Out put of Road Roller per day of Eight Hours working of power roller (8 to 12 Tonne):-

(a)	Consolidation of formation surfaces/ sub grade	1850	Sqm
(b)	Consolidation of stone, soling 20 cm thick (spread thickness) with 8 to 10 tone roller.	590	Sqm
(c)	Consolidation of stone, soling 15 cm thick (spread thickness) with 8 to 10 tone roller.	800	Sqm
(d)	Consolidation of water bound macadam (stone metal) 10cm compacted thickness including spreading and consolidation with blinding material.	248	Sqm

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(e)	Consolidation of water bound macadam (stone metal) 7.5 cm thickness (compacted thickness) including spreading and consolidation with blinding material.	372	Sqm
(f)	Consolidation of single coat surface dressing.	774	Sqm
(g)	Consolidation of two coat surface dressing	558	Sqm
(h)	Consolidation of 2.50 cm thick premixed carpet including seal coat.	600	Sqm
(j)	Consolidation of 2 cm thick premixed carpet including seal coat.	744	Sqm
(k)	Consolidation of bituminous mixture 2 parts of broken stone metal and one part of sand and bitumen (consolidated thickness 4 cms)	372	Sqm

Note: - (i) Wherever tandom vibratory roller and pneumatic tyred rollers & vibratiory earth compactor is specified, the output of the same shall be as per manufacturer's instructions for the respective items so as to achieve proper compaction.
(ii) Any other Sch 'A' item for which output not covered above shall be determined on actual site basis as ordered by CWE through BOO.

29. **RETENTION MONEY/COMPENSATION FOR DELAY**

For the purpose of calculating retention money under condition 64 of IAFW-2249 and compensation for delay in completion of work under condition 50 of IAFW-2249, income tax (at source) and like, the value of contract as revised by price variation under condition 63 of IAFW-2249 shall be taken into account.

30. **BANK GUARANTEE BOND**

In case the contractor desires to furnish Bank Guarantee in lieu of retention money/security deposit, the guarantee bond shall be executed as per specimen prescribed by the Govt. of India, Min. of Defence on non-judicial stamp papers of appropriate value from schedule Bank. In case of the BGB is executed from a non-scheduled Bank the same shall be supported with cover from Reserve Bank of India. Guarantee Bond shall come into force after the same is accepted by the Accepting Officer.

31. **MATERIALS IN METRIC SIZES**
If the materials (other than those issued under Sch. `B`) are not available in metric sizes as shown on drawings, the contractor shall provide materials in equivalent inch sizes which should not be less than the metric size dimensions under any circumstances, at no extra cost to the Govt.

32. **LAND FOR TEMPORARY WORKSHOP, STORES ETC**

Delete. The following from line 5 to 9 of sub para 1 of condition 24 of IAFW-2249 reading "In the event of area of land allotted to him" and insert as under:-

"The contractor shall be allotted the area as marked on the layout plan(s) for the purpose of erecting temporary workshop, stores etc. Plot of land so allotted shall not be used for accommodation for labour and canteen, for which the contractor shall make his own arrangements at his own expense. For this purpose, a token rent of Rs. 1/- per year or part of a year will be recovered from the contractor in respect of each and every separate area of land allotted to him. The area so occupied shall be vacated by the certified date of completion and site of work shall be cleared as stipulated in condition 49 of IAFW-2249"

33. **TESTING OF MATERIAL**
33.1 For works costing more than one crore it will be mandatory for the contractor to establish his own laboratory at his own cost at site on commencement of work to carry out test of level 'A' specified in appendix 'B' to special condition here in after. In case the cost of work is less than Rs. 1 crore it will be at the option of the contractor to set up site laboratory. All equipment of the laboratory will be got calibrated by the contractor from the authorised test house at commencement of work and there after on yearly basis and test certificate produced to the GE

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33.2 Contractor will be responsible for carrying out all the tests specified in appendix 'B' for level 'A', level 'B' and level 'C' and all others tests specified elsewhere in tender documents such as test for cement, steel etc. The cost of material and transportation for all the tests will be born by the contractor

33.3 There will be no recovery by the department for the tests of level "A' carried out in the site lab established by the contractor. For level 'B' or any other tests carried out in zonal lab, testing charges will be recovered at the rates given in appendix 'B'. The recovery for the tests carried out in National test house/Engineering college/SEMT wing, CME, Pune etc shall not be effected by the department and the testing charges for such tests will be borne by the contractor himself.

33.4 The test in site lab shall be carried out in the presence of Engineer-in-Charge

33.5 The percentage/selective checks as desired by the accepting officer/GE shall be got done independently in the Zonal/Govt approved labs. The testing charges only for such tests shall be borne by the department. Cost of material shall be born by the contractor. In case test results are found at variance from the results of site lab, the results obtained form the Zonal/Govt approved lab will be final and binding

33.6 For the works costing less than 1 Crore in case contractor does not opt to establish site lab, level 'A' tests shall also be got carried out by the contractor in Zonal lab and recovery shall be effected as specified in Appendix 'B'.

33.7 In case the same are got carried out from other Govt/Govt approved/Engg College, the cost of materials, transportation as well as testing charges will be borne by the contractor

33.8 The contractor shall employ a full time, competent technical representative having diploma in Civil Engineering for carrying out tests in site laboratory. This will be in addition to Engineer (s) employed for supervision of works as required vide condition 25 of IAFW - 2249.

34. **HANDING OVER OF SITE**

Site for execution of work will be available as soon as the work is awarded. In case it is not possible to make the entire site available on the award of work, the contractor will have to arrange his working programme accordingly. No claim whatsoever, for not giving entire site on award of work and for giving site gradually, will be tenable.

56. **QUALIFIED TRADEMEN : (APPLICABLE FOR WORKS COSTING RUPEES ONE CRORE OR MORE)**

In compliance with the condition 26 of IAFW-2249 (General Conditions of Contracts), the contractor shall employ skilled/semi skilled tradesmen who are qualified and possessing certificate in particular trade from Industrial Training Institute/(ITI)/ National Institute of Construction Management and Research (NICMAR)/ similar reputed and recognized Institutes by State/Central Government, to execute the works of their respective trade. The number of such qualified tradesmen shall not less than 25% of total skilled/semi skilled tradesmen required in each trade. The contractor shall submit the list of such tradesmen alongwith requisite certificates to Garrison Engineer for verification and approval. Notwithstanding the approval of such tradesmen by GE, if the tradesmen are found to have inadequate skill to execute the work of their trades, leading to un-satisfactory workmanship, the contractor shall remove such tradesmen within a week after written notice to this effect by the GE and shall engage other qualified tradesmen after prior approval of GE. GE's decision whether a particular tradesmen processes requisite qualification, skill and expertise commensurate with nature of work, shall be final and binding. No compensation whatsoever on this account shall be admissible.

36 **WATCH, WARD AND LIGHTING**

57.1 The Contractor shall provide and maintain all necessary watch, ward and lighting arrangements to keep the traffic off the trenches. Necessary boards and sign posts shall be provided and set up to the entire satisfaction of the Engineer-in-charge.

57.2 The Contractor shall reimburse the loss to the Govt. on account of any damage, which may occur on this account.

37 **PRECAUTION AGAINST RISKS**

The Contractor shall be responsible at his own expense in taking precaution to prevent any damage from what so ever cause arising, other than out of accepted risks and to minimise the amount of any such loss or damage and for adoption of necessary protective measures required for the purpose in compliance with Condition 38 of IAFW-2249 and Rule 5 of the MES SAFETY CODE vide (Annexure `B') of IAFW-2249 until the works have been handed over duly completed to the Engineer-in-charge.

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38 **APPROACHES**

The Contractor shall make arrangements for and provide at his own cost all temporary approaches, if required to the site(s), after obtaining approval in writing of the GE to the layout of such approaches.

39. **RELEASE OF ADDITIONAL SECURITY DEPOSIT:**

39.1 Additional security deposit when deposited by the Contractor as per Condition 22 of the IAFW-2249 shall be released in two stages as under:-

a) 50% of the additional security deposit shall be released on payment of final bill provided there are no claims outstanding against the contractor in respect of the contract in which the additional security is lodged and the final bill is not minus. In the event of departments claims against the contractor becoming and / or the final bills under Condition 66 of IAFW-2249 becoming minus the amount of the security deposit shall be adjusted against the claim due to Government and the balance if any will be released to the contractor.

b) Balance 50% of the additional security deposit will be released to the contractor after expiry of defects liability period as per Condition 68 of IAFW-2249 Provided the contractor shall first have to render a No Demand Certificate (IAFA-451).

c) In order to implement the above procedure, the contractor is advised to deposit the additional security in two equal parts so as to facilitate its release.

d) The above clause is not applicable to release of earnest money/ security deposit by a contractor who has not executed the security bond with the department.

40. **GUARANTEE FOR PRE CONSTRUCTION ANTITERMITE CHEMICAL TREATMENT**

40.1 The main contractor shall stand, guarantee to the Govt for a period of ten years from the certified date of completion of the work for the effectiveness of the treatment for a period of TEN years and said guarantee shall be furnished in favour of Garrison Engineer in writing.

40.2 In case the GE at any time during construction or reconstruction or prior to the expiry of the Guarantee period, finds that the buildings have been infected with termites, the contractor shall, on demand in writing from the GE specifying the building (s) complied of, not withstanding that the same may have been inadvertently passed certified and paid for, undertake to carryout forth with such treatment as may be necessary to render the building (s) free from termite infestation at his own expense, till expiry of the guarantee period. In the event of his failure to do so, within the specified period to be specified by the GE in his demand aforesaid, the GE may undertake such treatment at the risk and expense in all respect, of the Contractor. The liability of the Contractor under this condition however shall not extend beyond the period of TEN Years from the certified date of completion, unless the GE had previously given notice to the contractor to rectify the defects.

40.3 The amount of security deposit to be held back from the Contractor's bill against the guarantee period for antitermite treatment shall be calculated on the amount of antitermite treatment at contract rates as per the scales given below enhanced by 1.25 times of the amount so calculated. This shall be worked out by GE and intimated to the Contractor. This amount shall be refunded to him after the expiry of the guarantee period. Alternatively, the Contractor may give a separate interest bearing security deposit to GE valid for 10 Years for this amount. The scales of calculating such security deposit shall be as per table given below.

	Cost at contract rates	**Amount of Security Deposit**
(i)	*Upto Rs 50 lakhs*	*2% of the amount subject to a minimum of Rs. 5000/-*
(ii)	*Over Rs. 50 lakhs and upto Rs. 100 lakhs*	*Rs. 1, 00,000/- + 1.5% of amount exceeding Rs. 50 lakh*
(iii)	*Over Rs. 100 lakhs and upto Rs. 500 lakhs*	*Rs. 1, 75,000/- + 1% of amount exceeding Rs. 100 lakh*
(iv)	*Over Rs. 500 lakhs and upto Rs. 1500 lakhs*	*Rs. 5, 75,000/- + 0.50% of amount exceeding Rs 500 lakh*
(v)	*Over Rs. 1500 lakhs*	*Rs. 10, 75,000/- + 0.50% of amount exceeding Rs. 1500 lakh subject to maximum of Rs. 18.75 lakh*

40.4 For the purpose of working out amount of security deposit, the cost of antitermite treatment at contract rate shall be at applicable rates in SSR with addition of contract percentage for valuation of deviation for the relevant schedule of the contract.

40.5 The `Security Deposit' referred to in Condition 22 of General Conditions of contract (IAFW-2249) is independent of this Guarantee amount, referred to under Condition 40.3 here in before. Condition 10, 46 and 63 of the General Conditions of contract [IAFW- 2249] shall be deemed to be amended to the extent as mentioned above.

40.6 The contractor shall provide a plate/band of adequate dimensions but not less than 45 cm x 30 cm x 2 cm in CM (1:4) on all the buildings as directed by the Engineer-in-Charge and indicate there on the CA number name of the agency executing the antitermite treatment and the date.

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41 **PRODUCTION OF VOUCHERS FOR MATERIALS** :

Contractor shall produce original purchase vouchers/ Invoices challans alongwith Test Certificates wherever applicable from the manufacturers and or their authorised agents for the full quantity of the materials as applicable as a pre requisite document before submitting claims for payment for advance on account of the work done and or materials collected, in accordance with Condition 64 of IAFW-2249, General Conditions of Contracts.

42 **ACCEPTANCE QUALITY OF WORK AND FINISHES:**

To determine the acceptable standard of materials and workmanship, contractor shall execute sample works for items as specified in Schedule 'A' and in particular specifications under the close supervision of Engineer-in Charge and shall get it approved by the GE. The workmanship of the sample works shall serve as guiding samples for the remaining work.

43 **RECORD OF CONSUMPTION OF CEMENT** :

43.1 For the purpose of keeping a record of cement consumed in the works, the Contractor shall maintain a pucca bound register with serially numbered pages duly initialed by Engineer-in-Charge, showing daily receipt, quantity used in works and balance in hand at the end of each day. This register shall be signed daily by the Contractors representative and MES representative in token of their verification of its correctness. This register shall be checked by Engineer-in-Charge at least once a week and on the day; cement is brought by the contractor.

43.2 The register shall be kept at site in the safe custody of the Contractor during progress of the work and he shall on demand produce the same for verification of inspecting Officer. On the completion of the work, cement register shall be handed over to the Engineer-in-Charge for record with MES.

44 **SPECIAL CONDITION FOR CONCILIATION**

44.1 The following disputes between the parties to the contract shall after written notice by either party to the contract be referred to the "Sole conciliator". This is an serving officer not below the rank of superintending Engineer / Superintending Engineer (QS&C) having degree in Engineering or equivalent or having passed final /direct final Examination of sub division II of Institution of Surveyor (India) recognized by Govt of India to be appointed by the Engineer in Chief, Army Head Quarters, New Delhi or in his absence the officer officiating as Engineer in chief or Director General of works specifically delegated by the Engineer in chief.

44.2 The scope of conciliation shall be restricted to the following types of disputes with financial limits as Rs. 2.00 lacs (Rupees two lacs only) for each claim in dispute.

a) Disputes relating to levy of compensation for delay in completion.
b) Disputes relating to technical examination of works.
c) Disputes relating to interpretation of the provisions of the contract with reference to their application to parties.
d) Disputes relating to non return of schedule "B" stores over issued to the contractor.
e) Any other dispute having fair chances of being resolved by conciliation and consider fit to be referred to conciliation by the parties.

44.3 If the other party rejects the invitation, there will be no conciliation proceedings. If the party initiating conciliation does not receive a reply within 30 days from the date on which he sends or within such other periods of time as specified in the invitation, he may elect to treat this as a rejection of the invitation to conciliate and if he so elects, he shall inform in writing the other party accordingly.

44.4 The party initiating conciliation shall send to the other party a written invitation to conciliate, briefly identifying the subject of the dispute. The conciliation proceedings shall commence when the other party accepts in writing the invitation to conciliate.

44.5. If the conciliator so appointed resigns his appointment or vacates his office or is unable or unwilling to act due to any reason whatsoever, the authority appointing him may appoint a new Conciliator to act in his place.

44.6. The parties shall not initiate during the conciliation proceedings in respect of a dispute that is the subject matter of conciliation proceedings except that a party may initiate arbitral or judicial proceedings where in his opinion such proceedings are necessary for preserving his rights. The failure of conciliation shall in no way absolve the right of the parties to invoke arbitration for the disputes referred to for the conciliation.

44.7. The conciliation proceedings shall be governed as per the Arbitration and Conciliation Act 1996.

44.8 The settlement agreement signed by the parties as a result of conciliation proceedings shall have the same status and effect as it is an arbitral award on agreed terms.

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45. **BLASTING**

Blasting in any form is prohibited.

46. **SITE DOCUMENTS**

In addition to the site documents which are normally maintained for works , the following additional documents (as applicable for this work) shall be maintained at site and signed by GE / his authorised representative and the Contractor :-

a. Sieve analysis and silt test of sand
b. Sieve analysis of stone aggregates of different sizes
c. Water absorption test of stone aggregates of different sizes
d. Flakiness index of stone aggregates of different sizes.
e. Rolling hours
f. Daily work register
g. Register of materials daily arrived at site
h. Materials approved register
i. Cement consumption register
j. Register for temperature control at boiler out at paver
k. Register for clay, silt and impurities in aggregate test.
l. Cube testing register

47. **VALUATION OF DEVIATIONS**

Condition 62 of General Conditions of Contracts (IAFW-2249) shall be referred.

48. **OFFICIAL SECRET ACT**

In reference to condition 2 A of General Conditions of Contracts IAFW-2249, the contractor shall be bound by the Indian Official Secret Act-1923 and particularly section 5 thereof.

49. **CONSTRUCTION ON LABOUR WELFARE TAX**

The lumpsum/unit rate quoted by the tenderers shall be deemed to include the element of tax consequent to building and construction workers (Regulation of employment and condition of services) welfare cess act-1996.

50. **TAX ON WORKS CONTRACT CONSEQUENT UPON CONSTITUTION (FORTY SIXTH AMENDMENT) ACT 86**

The tendered rates shall be deemed to be inclusive of all taxes & levies payable under the respective statues including the Sales tax/VAT imposed by State Govt consequent upon constitution (Forty Sixth) amendment Act 1986. All orders notifications in connection with tax on works contracts issued shall be considered by the tenderer & nothing extra on this account shall be paid/reimbursed by the Department.

51 **EMPLOYMENT OF PERSONNEL**

51.1 The contractor shall employ only Indian National as his representative, servants and workmen and verify their antecedents and loyalty before employing them for work. He shall ensure that no person of doubtful antecedents and nationality is in any way associated with the works. If for reasons of technical collaboration or other consideration the employment of foreign national is unavoidable, the contractor shall furnish the particulars to this effect to the Accepting Officer at the time of submission of the tender. As proof that the contractor has employed only Indian Nationals he shall render a certificate to the GE within one month from the date of acceptance of the tender to this effect. In case the GE desires, contactor will have the police verification done of the personnel employed by him. Contractor's attention is also drawn to condition 25 of IAFW-2249 in this connection.

51.2 The GE shall have full powers and without giving any reason, to require the contractor immediately to cease to employ in connection with this contract, any Agent or servant or employee whose continued employment is, in his opinion, undesirable. The contactor shall not be allowed any compensation on this account.

51.3 Contractor's Supervision : Refer Condition 25 of IAFW-2249 along with latest amendments. Contractor shall employ Engineering staff to supervise the execution of work/contract for the value of contract up to 10 crore as mentioned in amendment No. 27 of IAFW-2249. However Engineering staff for the value of contract more than 10 crore shall be as mentioned below:-

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(i)	For works costing between 10 crore to 15 crore	One Degree holder in Engineering from a Govt recognized institution or equivalent, final or direct final passed of Sub Division II of the Institution of Surveyors (India) with at least 5 years practical experience of works. And Two Diploma holder in Engineering from the Govt. recognized Institution with at least 5 years practical experience of works.
(ii)	For works costing between 15 crore to 25 crore	Two Degree holders in Engineering from a Govt recognized institution or equivalent, final or directional passed of Sub Division II of the Institution of Surveyors (India) with at least 5 years practical experience of works. And Two Diploma holder in Engineering from the Govt. recognized Institution with at least 5 years practical experience of works.
(iii)	For works costing more than 25 crore	Two Degree holder in Engineering from a Govt recognized institution or equivalent, final or direct final passed of Sub Division II of the Institution of Surveyors (India) with at least 5 years practical experience of works. and Three Diploma holder in Engineering from the Govt. recognized Institution with at least 5 years practical experience of works.

Signature of Contractor
Dated

Asst Dir (Contracts)
for Accepting Officer

APPENDIX 'A' TO SPECIAL CONDITIONS

LIST OF CERTIFIED PRODUCTS TO BE INCORPORATED IN WORKS

Sl No	Material
1.	Concrete
	(a) Internal water proofing compounds (IS : 2645)
	(b) Plywood for concrete shuttering work (IS-4990)
2.	Joinery
	Wooden Flush Door Shutters, solid core type (IS-2202)
3.	Builders Hardware
	(a) Steel shutter hinges (IS:1341)
	(b) Non-ferrous Butt Hinges (IS : 205)
	(c) Ferrous Tower Bolts (IS:204)
	(d) Non-ferrous Tower Bolts (IS: 204)
	(e) Door Handles (non-ferrous) (IS:208)
	(f) Parliament Hinges(Ferrous) (IS:362)
	(g) Hydraulically Operated Door Closures (IS:3564)
	h) Continuous Piano Hinges(IS:3818)
	(j) Non-ferrous Metal sliding door Bolts (IS:2681)
	(k) Tee and Strap Hinges (IS:206)
	(l) Mild steel sliding door Bolts (IS:281)
4.	Steel And Iron Work
	(a) Steel doors, windows and ventilators (IS: 1038)
5.	Roof Covering
	Bitumen Felts for water proofing and damp proofing (IS:1322)
6.	Ceiling and Lining
	(a) Plywood for General Purposes (IS: 303) (Second revision)
	(b) Block boards (IS: 1659)
	(c)Veneered decorative plywood (IS: 1328) (Second revision)
	(d) Marine plywood (IS : 710)
	(e) Fiber Hard board (IS : 1658)
7	Flooring
	(a) White Portland cement (IS : 8042)
	(b) Cement concrete flooring (IS : 1237)
8	WATER SUPPLY, PLUMBING, DRAINS AND SANITARY APPLIANCES
	(a) Concrete pipes with or without reinforcement (IS: 458)
	(b) Salt glazed stoneware pipes and fittings (IS: 651)
	(c) Flushing cisterns for water closets and urinals other than plastic (IS: 774)
	(d) Cast copper alloys screw down bib taps and stop valves (IS: 781)
	(e) Galvanised mild steel tubes (IS: 1239)
	(f) Galvanised mild steel tube fittings (IS: 1239)
	(g) Sand cast irons spigot and socket soil waste and ventilating pipes and fittings (IS: 1729)
	(h) Ball valves (Horizontal plunger type) including floats for water supply purposes (IS: 1703)

APPENDIX 'A' TO SPECIAL CONDITIONS (CONTD)

LIST OF CERTIFIED PRODUCTS TO BE INCORPORATED IN WORKS

Sl No	Material
Contd...	(j) Cast iron manhole covers and frames (IS: 1726)
	(k) AC presser pipes (IS: 1592)
	(l) Automatic flushing cisterns (IS: 2326)
	(m) Vitreous china sanitary appliances
	(i) Wash down water closets (IS: 2556 Part II)
	(ii) Squatting pans (IS: 2556 Part III)
	(iii) Wash basins (IS: 2556 Part IV)
	(iv) Laboratory Sinks (IS: 2556 Part V)
	(v) Urinals Bowl type (IS: 2556 Part VI Section I)
	(vi) Half Round Channels (IS: 2556 Part VII)
	(vii) Symphonic wash down water closets (IS: 2556 Part VIII)
	(viii) Foot rests (IS: 2556 Part X)
	(n) Plastic WC seats and covers (IS: 2546)
	(o) Vertically cast iron pressure pipes for water and sewage (IS: 1531)
	(p) Pillar tap (IS: 1793)
	(q) Centrifugally cast (Spun) iron pressure pipes for water gas and sewage (IS: 1536)
	(r) Centrifugally cast (CI spigot and socket soil waste and vent pipes, fittings & accessories) (IS: 3989)
	(s) Rubber sealing rings for gas main water mains and sewers (IS: 5382)
	(t) Cast iron fittings for pressure pipes for water mains and sewers (IS: 1538)
9.	Electrical Works
	(a)Ceiling Rose (IS:371)
	(b)Tumbler switches (IS:3854)
	(c)Socket outlet 3 pin plug and socket (IS:1293)
	(d)Switch fuses (main & switch) (IS:1064 Part-I&II)
	(e)Rigid steel conduit (IS:1063)
	(f)Rigid Non-Metallic conduit (IS:2509)
	(g)Single core cable polyethylene insulated and PVC sheathed cable (IS:1596)
	(h)Starter for tube light (IS:2215)
	(i)Fluorescent lamps (IS: 2418 Part I&II)
	(j)Aluminium stranded conductor (IS: 398 Part I & II)
	(k)Switchgears (IS:2208)
	(l)HRC cartridge fuse links upto 650 volts (IS:9224 Part II)
	(m)Porcelain Insulators for overhead power lines (IS:731)
	(n)MCB (IS:8828)

Signature of Contractor
Dated

Asst. Dir (Contracts)
for Accepting Officer

SPECIAL CONDITIONS [CONTD. /.]

APPENDIX 'B' TO SPECIAL CONDITION

MATERIALS AND THEIR TESTS

Srl No	Material	Tests	Method of testing	Frequency of tests	Level of test	Rate per test Rs.	Remarks
1	2	3	4	5	6	7	8
1.	Brick	1) Compressive strength	IS-3495 (Part-II)	As per IS-5454 as given under:-	A	180/-	Checks for visual and Dimensional characteristics shall also be carried out
		2) Water Absorption	--Do--	Lot Size. sample Size permissible Nos of defective bricks	A	150/-	as per IS:5454
		3) Efflorescence	---Do…				Legend A-Site Lab B-Zonal Lab/Govt Engg college.
			(Part-I)	1001 to 10000 — 5 — 0	A	180/-	C-National test house/SEMT WING/Engg. College.
				10001 to 35000 — 10 — 0			
				35001 to 50000 — 15 — 1			
2.	Coarse Aggregate	1) Sieve Analysis	IS:2386(Part-I)	One test for every 15 cum of aggregates or part there of brought to site.	A	120/-	
		2) Flakiness Index	---do--		A	90/-	
		3) Estimation of deleterious materials	---do--	One test for every 100 cum of aggregate or part thereof.	A	120/-	
		4) Organic impurities	---do--	One test per source of supply	C	120/-	
		5) Moisture content	IS:2386(Part-II)	Regularly as Reqd.	A	120/-	
		6) Specific gravity	--do--	One test for each source of supply.	B	120/-	

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1	2	3	4	5	6	7	8
3.	Fine aggregate	1) Sieve Analysis	(IS:2386Pt-I)	One test for every 15 cum of FA or part thereof when brought to site.	A	180/-	
		2) Test for clay, silt and impurities.	--do--	--do--	A	90/-	
		3) Specific gravity	--do. but (Part-II)	One for each source of supply	B	180/-	
		4) Test for organic impurities	--do--	One test for each source of supply.	C	180/-	
		5) Moisture content	-do-	Regularly as required subject to 2 tests/ per day when being used.	A	180/-	
4.	Cement	1) Setting time	IS-4031-63 Reaffirmed 1980	Once for each consignment or as and when Reqd.	B	180/-	
		2) Soundness	--do--	--do--	C	120/-	
		3) Compressive strength	--do--	--do--	B	360/-	
		4) Fineness	--do--	--do--	C	120/-	
5.	Structural concrete	1) Slump test or compacting factor time or VEE-BEE test	IS-1199	The Min frequency of sampling of concrete of each grade shall be as under :-	A	180/-	(1) Random sample shall be carried out to cover all mix units.
		2) Compressive strength	IS-516	Qty of Conc. IN THE work(M^3) / No of samples 1 - 5 / 1 6 - 15 / 2 16 - 30 / 3 31 - 50 / 4 51 and above / 4+1 for each Addl 50 cum or part thereof	A	120/- per sample	(2) Refer IS-456-2000 Clause. 15.2 for frequency of sampling.
6.	Water for constn purpose	1) Test for acidity	IS:456 & 3025	Once at the stage of approval of source of water	B	240/-	Refer relevant clause of IS-456:2000
		2) Test for alkalinity	-do-		B	240/-	
		3) Test for solid content	-do-		C	300/-	

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1	2	3	4	5	6	7	8
7.	(a) PCC block for walling (Hollow Block)	1) Compressive strength.	IS:2156-1984 (Appx 'B')	8 Blocks out of 14	A	60/-	Samples :- 14 blocks from consignment of every 5000 blocks or part thereof.
		2) Water Absorption.	-do- (Appx 'B')	3 Blocks out of 14	B	120/-	
		3) Density.	-do- (Appx 'A')	5 Blocks out of 14	B	90/-	
	(b) PCC solid block for walling.	1) Compressive strength	IS-2185	12 Blocks out of 18	A	60/-	Samples: - 18 Blocks from consignment of every 1000 or part thereof.
		2) Water absorption.	-do-	3 Blocks out of 18	B	120/-	These Blocks shall be checked for dimensions and weight
		3) Density	-do-	3 Blocks out of 18	B	120/-	
8.	Cement flooring Tiles/Terrazzo tiles	1) Water absorption	IS:1237-1980(Appx 'D')	6 Tiles out of 18	B	180/-	Samples: 18 Tiles from each source of supply selected at Random.
		2) Wet Transverse strength	-do-(Appx "E")	-do-	B	144/-	
		3) Resistance to wear	-do- (Appx 'F')	-do-	C	540/-	
9.	Burnt clay roofing Tiles (Hand Made) IS:2690(Pt-II) LENGTH 150 MM to 250MM, WIDTH 100 MM to 200MM, THICKNESS 35 MM TO 50 MM	1) Water absorption	IS : 3495 (Part-II) -do- (Part-I)	6 Tiles out of 12	B	216/-	Samples 12 tiles from each source of supply selected at Random.
		2) Compressive strength		-do-	A	180/-	
10.	Manglore Pattern Roofing Tiles	1) Water absorption	IS : 654 (Appx 'A')	6 Tiles out of 32	B	180/-	SAMPLES: 32 tiles from each consignment of 3000 tiles or part thereof.
		2) Breaking load	-do- (Appx 'C')	-do-	B	120/-	These tiles shall be checked for dimensions and weight.

CONTD. /.

SPECIAL CONDITIONS [CONTD. /.]

1	2	3	4	5	6	7	8
11.	Timber	1) Specific gravity and weight	IS:1708-1960	Minimum 3 samples from a lot of 4 Cum or 250 pieces of seasoned timber.	B	120/-	
		2) Moisture content	-do-		A	120/-	
12.	Welding of steel work	Visual inspection Test.	IS:822-1970 Clause-7.1	100% by visual inspection	Work site	360/-	Specialised tests, their method and frequency to be decided on consideration of their importance by the Accepting Officer.
13.	Timber paneled and glazed door/ window shutters (including factory made shutter)	a) Dimensions, sizes workmanship and finish	IS:1003-1977 (Pt-I)	Frequency of sampling from each lot shall be as under :-	A	180/-	
				Lot size — Sample Size			
				26 to 50 — 5			
				51 to 100 — 8			
				101 to 150 — 13			
				151 to 300 — 20			
	-do-			301 to 500 — 32			
		b) STRENGTH TEST		501 to 1000 — 50			
	-do-	1) Slamming		1001 and above — 80			
			IS:1303-1990				
		2) Impact Indentation		From each lot 5% of the factory made			
		3) Shock Resistance	-do-	shutter shall be tested for strength tests.	Man-		
		4) Edge Loading			ufac-		
			-do-		turer		
			-do-				

CONTD. /.

SPECIAL CONDITIONS [CONTD. /.]

1	2	3	4	5	6	7	8
14.	Ply Wood (IS:303-1989)	a) Moisture content	IS:1734-1983 (Pt-I)	Six test pieces cut from each of the boards selected shall be subjected to tests.	B	240/-	Sampling shall be as per IS-7835-1975 Tables
		b) Water Resistance	-do- (Part-6)				
15.	Veneered Wood Particle Board (Medium Density) IS:3097-1985	a) Density	IS:635 (Part-1)	Three test specimen from each sample(Size 150mm x 75mm)	C	60/-	Sampling shall be done as per IS: 3087-83 clause 2 with moisture meter.
		b) Moisture content	--do--	--do--	A&B	60/-	
		c) Water absorption	--do-- (Part-16)	--do-- (Size 300mm x 300mm)	A	60/-	
		d) Swelling due to surface absorption	--do--(Part-17)	--do-- (Size 125mm x 100mm)	A	60/-	
		e) Swelling in water	--do--	-do- (Size 200mm x 100mm)	A	60/-	
		f) Modules of rupture	--do-- (Part-4)	Three test specimens as per IS : 2380-1977	B	90/-	
		g) Screw withdrawal strength	--do-- (Part-14)	--do-- as per IS:2385	C	120/-	

Signature of contractor

For accepting officer

PARTICULAR SPECIFICATION

1.0 GENERAL

1.1 Work under this contract shall be carried out in accordance with Schedule 'A', Special Conditions, Particular Specifications, drawings including notes thereon (unless specified otherwise) and general rules and specifications given in MES SSR Part 1 –(2009) as well as general rules, Special Conditions and preambles to the various rates given in MES SSR Part II– (2010) (MES SSR Part I & Part II hereinafter called MES Schedule) and these shall be read in conjunction with each other.

1.2 The term 'General Specification' referred to hereinbefore as well as referred to in IAFW-2249 (General Conditions of Contracts) shall mean the specifications contained in the MES Schedule Part I & IS.

1.3 General Rules, Specifications, Special Conditions, method of measurements, preambles in the MES Schedule shall be deemed to be applicable to the work under this contract, unless specifically mentioned otherwise in these documents.

1.4 The term "as specified", wherever appears in tender documents and drawings, relates to relevant particular specifications and in its absence general specifications.

1.5 Particular specifications in this section given hereinafter shall be generally applicable to all works covered under Schedule "A". The particular specifications are brief and are only to particularize, amend and emphasize the specifications given in MES Schedule, which are not repeated.

1.6 Where specifications/provisions given in these particular specifications are at Variance with the provisions/specifications given in MES Schedule, specifications /provisions given in these particular specifications, hereinafter, shall be followed.

1.7 Where specifications for any item of work are not given in MES Schedule or in these particular specifications, specifications as given in relevant Indian Standard or Code of practice shall be followed.

1.8 Reference to any drawings which is mentioned on the drawing forming part of the tender but not specifically mentioned in the list of drawings shall be deemed to be forming part of the tender. The tenderer shall see such drawings/details in the office of Accepting Officer/concerned CWE/GE before quoting his tender.

1.9 The contractor shall not take cognizance of Note (s) appearing on drawings regarding the bearing capacity of soil taken into consideration while designing the foundation, as it is for departmental purpose only.

2.0 LAYOUT

2.1 In laying out buildings center line dimensions mentioned in the drawings or derived there from shall be strictly followed.

3. MATERIALS THAT LOOSE IDENTITY AFTER INCORPORATION:

3.1 Materials such as water proofing compound, paint, chemicals for anti termite treatment, cement, steel for reinforcement etc. the quantity of which cannot be checked after incorporation in the work shall, when collected at site be recorded in the Measurement Book and signed by both the MES representative and the contractor so as to check and ensure that the required quantity has been brought to site for incorporation in the work. Reference to Purchase Vouchers/invoice No, Name of the manufacturer/dealer from whom materials have been purchased shall be recorded in the Measurement Book (s)

3.2 Unless otherwise specified, the contractor shall obtain/procure materials direct from manufacturers or their authorised dealers/stockists where such authorised stockists have been appointed. The contractor shall produce original voucher/ invoice of supplier to the GE to ensure that the contractor has actually brought all the required quantity and the quality of the materials from the authorised dealer/manufacturers and also to find out the rate. The vouchers/invoice shall be endorsed date and verified and signed by Engineer-in-Charge and the Contractor and kept with the Engineer-in-Charge who shall forward these to the GE soon after completion of works.

3.3 Materials brought at site shall be stored as directed by the Engineer-in-Charge and those already recorded in Measurement Book shall be suitably marked for identification.

3.4 The contractor shall ensure that the materials are brought to the site in original sealed container or packing, bearing manufacturer's marking.

3.5 A register showing the daily consumption of the chemical for anti termite treatment shall be maintained, which shall be signed by the Engineer-in-Charge and the contractor in token of correctness of the entries therein. The register shall also indicate the following:-

(a) Name and address of the manufacturer and supplier.
(b) Requirement of chemical in the work as per specifications.
(c) The quantity actually used in the work.
(d) Batch number of chemical received and it's date of expiry.

PARTICULAR SPECIFICATION(contd...)

4. Blank

5.0 EXCAVATION AND EARTHWORK:

5.1 SURFACE DRESSING:

5.1.1 Surface dressing shall be carried out to a depth not exceeding 30 cm and 15 cm (average) in soft/loose soil to the extent required for the area covered all around the building in order to remove vegetation and/or small inequalities to a width of 3 m beyond the outer edge of plinth protection. The site shall be dressed to slope away from the structure. Cost of surface dressing is deemed to be included in unit rates of buildings of Schedule 'A' Part I.

5.1.2 All spoils obtained from surface dressing shall be disposed off to a distance exceeding 250 m and not exceeding 500 m in all as directed by the Engineer-in-Charge.

5.1.3 Surface dressing shall be carried out before the excavation for foundation is started.

5.1.4 Depth of foundation shown in drawings for the buildings is the depth after surface dressing. GL marked on drawings shall be average GL as fixed by GE after surface dressing.

5.2 EXCAVATION

5.2.1 GENERAL:

5.2.2 The lump sum price quoted by the Contractor for Schedule "A" Part-I shall be deemed to include for all excavation and earthwork in soft/loose soil. Deviation if any shall be priced based on actual soil met with at site at the applicable rates available in MES Schedule of Rates 2010 subject to contractor's percentage for both Add & omit portion.

5.2.3 If hard rock is met with during excavation, it shall be taken out and stacked as directed. Hard rock shall become Contractor's property for which the Contractor shall give a credit at the rate of Rs. 500/- per Cum. of solid measured of hard rock to the Govt (Stack measurement less than 50 % for voids). Soft/disintegrated rock shall be disposed off/reused in filling as and where permitted by the GE. The contractor may use the hard rock obtained from excavation in the work for building as stone, for hard core, lean concrete and WBM if the rock is approved by the GE in writing for use. The hard rock becoming contractor's property shall be removed off the site only after written permission of the Engineer-in-Charge/GE.

5.2.4 The depth of foundation below ground level shown in drawing giving detail of foundation to wall, columns, and footings shall form the basis of lump sum quoted. The depth indicated shall be as obtained after surface dressing/ excavation.

5.2.5 On commencement of work as well as after carrying out the works under site clearance/surface dressing, levels will be taken jointly by the contractor and Engineer-in-Charge at suitable intervals in the grid system as directed by Engineer-in-Charge. These shall be noted down on graph sheet and noted down in level book/register and these shall be signed by both the contractor and Engineer-in-Charge and shall be used to arrive at average ground level after getting the same approved by GE in writing.

5.2.6 Decision of the Garrison Engineer shall be final, conclusive & binding as regards to classification of soils & rocks.

5.3 DEWATERING:

No extra payment over the lump sum amount quoted for buildings and services shall be admissible for dewatering, if water is met with or accumulated in the foundations or any other excavations due to any cause, whatsoever, and for excavation in mud, bailing and pumping of water if required, shall be done as described in Para 3.17 of MES Schedule Part-I.

5.4 TIMBERING:

The contractor's lump sum shall not include the cost of timbering, if any, required to uphold the sides of excavation. If any timbering as specifically ordered to be provided in writing by the Garrison Engineer, consequent upon necessity arising as per site conditions, the same will be paid for under a deviation order. In case timbering to excavation is required and specifically ordered by GE in writing this shall be paid as a deviation.

5.5 FILLING:

5.5.1 (a) Earth obtained from surface dressing shall not be used for filling purposes for works under this contract and shall be removed from the site and filled in low lying area or at location directed by GE.

(b) The approved earth free from roots and other vegetations obtained from excavation shall be used in filling trenches, under floors and in other location as approved by Garrison Engineer.

PARTICULAR SPECIFICATION(contd...)

(c) Expansive or other unsuitable soil obtained from excavation shall not be used in filling. The decision of Engineer-in-Charge as to whether the soil obtained from excavation is suitable or not for filling, either partly or fully shall be final and binding. If the quantity of suitable soil obtained from excavation falls short of the filling required, the contractor shall bring the requisite quantity of approved earth from the places out side Ministry of Defence land, without any extra cost to Government.

5.5.2 FILLING FOR NON EXPANSIVE SOIL:

Contractor's tendered lump sum against Schedule 'A' shall include for the following: -

(a)Contractor shall quote his lump sum taking into consideration that entire quantity of earth obtained from excavation (except that from surface dressing) shall be utilised for filling purposes like, returning, filling in trenches, filling under floors to obtain plinth height as shown on drawing etc and removal of surplus soil, if any, and bringing in approved earth to achieve all filling under the contract.

(b) In such an event where soil obtained from excavation is found unsuitable for filling like black cotton soil etc, the soil as declared unsuitable by the GE, shall be removed and equivalent quantity of approved earth shall be brought by the Contractor.

(c) In case of earth obtained from excavation under this contract is insufficient for filling purposes, the contractor shall bring approved earth required to meet the quantity of filling from quarries situated outside MD land without any extra cost to Government.

(d) The thickness of filling shown in drawings is after consolidation.

(e) All filling shall be spread in layers not exceeding 25 cm thickness, watered and consolidated.

5.6 DISPOSAL OF SURPLUS EXCAVATED EARTH:

All surplus spoil obtained from excavation for building work (Schedule 'A' Part-I) shall be disposed off to a distance not exceeding 250 m at the location (s) as directed by Engineer-in-Charge, deposited, spread and levelled as specified in MES Schedule.

5.7 MOORUM FILLING

Moorum shall be as specified in clause No 3.21 and shall be spread and leveled as specified in clause No 3.21.4 of SSR Part I 1991.

5.8 PRECONSTRUCTION ANTI- TERMITE TREATMENT IN FOUNDATION AND GROUND FLOORS

5.8.1 The pre-construction anti termite treatment shall be carried out in buildings as catered under item No 1.01,1.02 &1.03 of schedule 'A Part I of BOQ with the proportions and with specifications as speci-fied in clauses 3.26.1 of MES Schedule Part-I of 2009 except that no mound treatment shall be provided. Wherever 5 liters or 7.5 liters is mentioned in these clauses of MES Schedule Part-I it shall mean 5 liters or 7.5 liters of emulsion of concentration as indicated in MES Schedule. Antitermite treatment shall be car-ried out with emulsion of the chemical "chemical Chlorpyrifos 20% EC (IS-8944) or Imidacloprid 30.5% SC (IS-16131)" as per IS 6313 parts I and II- 2001. Con-centration by weight percent (Active Ingredients) shall be 1% in both cases of chemicals.

5.8.2 The work of anti termite treatment shall be got done from a specialist pest controller and exterminator agency and shall be a member of Indian Pest Control Association, and holding license as per Clause 13 of the Insecticides Act, 1968 .

5.8.3 The Lump sum quoted for the building mentioned in clause 5.8.1 here- in- before in above shall include the following pre-construction Anti termite-treatment:-

(a) Treatment to Masonry & column foundations, trenches/pits/ basements and treatment of RCC foundations and basements and back fill using chemical all as specified in Para 3.26.6 of MES Schedules Part I.

(b) Treatment to top surface of plinth filling and plinth protection all as specified in para 3.26.7 of MES Schedule Part I.

(c) Treatment at junction of walls and the floor all as specified in para 3.26.8 of MES Schedule part I

(d) Treatment along external perimeter of building all as specified in para 3.26.9 of MES Schedule Part I.

5.8.4 Chemicals brought to site in sealed container bearing ISI certification marks shall only be permitted to be used in the work.

PARTICULAR SPECIFICATION(contd...)

5.8.5 (a) Chemicals shall be stored carefully at site. Seals of containers shall be broken only in the presence of Engineer-in-charge. Empty containers shall be removed off the site promptly. On any particular day, if the contents of the full container could not be used in the work, the container shall be sealed at the end of the day in the presence of Engineer-in-Charge.

(b) Total quantity of chemical required for the work as per specification shall be worked out in order to ensure that full quantity is brought to site and used inthe work. For this purpose, entries shall be made in measurement book (Not forpayment/Not to be abstracted) indicating the brand, name, batch number, date of manufacturing, date of expiry, quantity brought etc, and signed by Engineer-in-Charge as well as the representative of the agency executing the work and contractor's representative.

5.8.6 GUARANTEE

5.8.7 The contractor shall stand a guarantee of 10 (TEN) years to the Government for the work against recurrence of termite infestation (viz. effectiveness of the treatment carried out). For giving guarantee, if any additional treatment over and above that is specified is required, the same shall be carried out by the contractor without any extra cost to the Government. The contractor shall furnish a written guarantee for the effectiveness of the treatment for a period of TEN YEARS in favour of Garrison Engineer.

5.8.8 The amount of security deposit for anti-termite-treatment to be carried out for the building included in Schedule 'A' part I against guarantee period for Anti-termite treatment shall be 2.5% on the amount of anti termite treatment at contract rates subject to a minimum of Rs 2,500/- shall be retained by the Government from the contractor's dues. This amount shall only be released after successful expiry of the guarantee period. The contractor may however, furnish a fixed deposit receipt in lieu from a Schedule bank, pledged in favour of Garrison Engineer for the period of Guarantee in which case the amount if any, deducted from the dues/final bill shall be refunded.

5.8.11 Should the GE at any time during construction or reconstruction or prior to the expiry of the guarantee period, finds that the buildings have been infested with termites, the contractor shall on demand in writing from the GE specifying the building(s) complained of, not-with-standing that the same may have been inadvertently passed, certified and paid for, undertake to carryout such treatment as may be necessary forthwith to render the building(s) free from termite infestation at his own expense till expiry of the guarantee period. In the event of his failure to do so within the specified period to be specified by the GE in his demand aforesaid, the GE may undertake such treatment at the risk and expense in all respects of the contractor. The liability of the contractor under this condition shall not extend beyond the period of ten years from the date of completion, unless the GE had previously given notice to the contractor to rectify the defects.

5.8.12 The contractor shall provide a plate/board of adequate dimension but not less than 90cm x 45 cm x 2 cm thick in cement mortar (1:4) on one side of each building and indicated thereon the Contract No, Name of contractor and Name of the agency executing the antitermite and water proofing treatment and the date of expiry of the guarantee period.

5.9 HARD CORE

Refer Clause 3.27 of MES Schedule Part- I. Hard core shall be of broken stone of gauge not exceeding 63 mm, well graded to provide dense and compact sub base. Unless otherwise indicated or shown in drawings/specifications, the thickness of hard core shall be 100 mm consolidated. Hard core filling where indicated on drawings shall be spread, levelled in layers not exceeding 15 cm thick well rammed, watered and consolidated. Moorum may be used to fill interstices in hard core. Thickness wherever shown on drawings/schedule of finishes shall be treated as consolidated thickness

5.10 BOULDER FILLING

Boulder filling shall be carried out in locations all as shown on respective structural drawings. Boulder filling shall be carried out all as specified under clause 6.4 of MES Schedule Part-I. Boulder shall be hard, tough, clean & free from any deleterious materials. The interstices in boulders filling shall be filled up with moorum/stone chips and shall be watered and well rammed. The boulder filling including moorum/stone chips filling shall be done in two layers of not more than 300 mm each, watered and well rammed.

5.11 SAND BED

Sand bed shall be carried out in the locations and to a thickness all as shown on respective structural drawings. Sand shall be clean, free from dust organic and other extraneous matter. It shall not contain more than 5 % of clay/silt.

6. CONCRETE

6.1 MATERIALS

6.1.1 CEMENT

6.1.1.1 Refer clause 4.3 on page 51 of MES Schedule Part -I.

6.1.1.2 PROCUREMENT AND TESTING OF CEMENT :

[a]. All cement required for completion of this contract shall be ordinary Portland cement 43 grade conforming to IS: 8112-1989 or Portland Pozzolana Cement conforming to IS: 1489 Part–I 1991 and each bag shall be ISI certification mark and manufacture date.

[b]. However the OPC and PPC cement both will not be used in one building. Before commencement of building the contractor will intimate type of cement to be used and get the same approved by GE for each building separately. Thereafter only one type of cement will be used in one building. In case of hard standing/ PQC to runway etc, one continuous length will be treated as one building for the purpose of cement.

[c]. All cement required for completion of this contract shall be procured by the contractor, under his own arrangement direct from the manufacturers. The cement shall be procured from the following manufacturers (in case total consumption of cement is more than 1200 bags) : -

Srl No.	COMPANY NAME	BRAND NAME	ADDRESS	Type of Cement
1	2	3	4	5
1	The Associated Cement Companies Ltd	ACC	414/421, Splendor Forum (4th Floor), 3, Distt Centre, Jasola,New Delhi-110044 Ph-011-46583600	All
2	M/s Ultra Tech Cement	ULTRATECH	'B' Wing, 2nd Floor, Mahakali Caves Road Andheri (East), Mumbai-400093	All
3	The India Cement		Dhun Building, 827, Anna Salai, Chennai-600002	All
4	M/s Dalmia Cement (Bharat) Ltd	DALMIA KONARK	Dalmiapuram, Disttiruchirappalli, Tamil Nadu – 621651	All
5	Century cements	CENTURY	Industry House, 159 Chruch gate Reclamation, Mumbai-400020 Ph-022-22023936	All
6	M/s Saurashtra Cement	SAURASHTRA	Gala No A-1, Ground Floor, Udhyog Sadan No 3 MIDC, Central Road, Andheri (East), Mumbai-400093 Ph 022 32955557/67 MO 9320290081	All
7	The Ramco Cements Ltd. (Formerly Madras cement)	RAMCO	Auras Corporate Centre, 98-A, Dr. Radhakrishnan Salai, Mylapore, Chennai-600004 Ph-044 24878666	All
8	Mangalam Cement Ltd	MANGALAM	PO dityanagar,Morak,Dist-Kota, Rajasthan-326520 Mob-9351468076	All
9	Birla Corporation Ltd	BIRLA	Birla Building (3rd & 4th Floor) 9/1 R.N Mukherjee Road Kolkata-700001 Ph-033-30573700	All
10	Orient Cement	ORIENT	5-9-22/57/D, 2nd and 3rd Floor, GP Birla Centre, Adarsh Nagar, Hyderabad-500063 Ph-04423688600	All
11	M/s Nuvoco Vistas Corporation Ltd (Formerly Lafarge Cenent)	NUVOCO	Equinox Business Park Tower-3, East Wing , 4th loor , LBS Marg , Kurla (West), Kurla Mumbai, Maharastra-400070	All
12	Shree Cement	SHREE	Bangur Nagar, Beawar, Distt-Ajmer, Rajasthan-305901 Ph-01462228101/06	All
13	JK Cement	JK	Kamla Tower Kanpur-208001	All
14	JK Lakshmi Cement Ltd	JK LAKSHMI	Jaykaypuram, Dist-Sirohi, Rajashthan Ph-02971 244409/10	All
15	Jaypee Rewa Cement	JAYPEE	Japee Nagar P.O. Japee nagar, Rewa-486450 (M.P.)	All

Srl No.	COMPANY NAME	BRAND NAME	ADDRESS	Type of Cement
1	2	3	4	5
16	Ambuja Cement Ltd	AMBUJA	Kodinar, PO-Ambujanagar, Taluka-Kodinar, Distt-Junagadh,Gujrat-362715 Ph-02795237000	All
17	M/S Shree Guru Kripa Cement (Pvt) Ltd	SARTAJ	4/4 Trikuta Nagar Jammu Ph- 0191-2472043	(a) OPC 43 (b) PPC
18	M/S Prasakti Cements Ltd.	PRASAKTI cements	123/3RT, Plot #8-3-214/21 Srinivasa Nagar Colony (west) Hyderabad-500038 Tel- 040-44119100/200, Fax: 040-23747562	(a) OPC 43 (b) PPC
19	M/S My Home Industries Ltd	MAHA CEMENT	9th Floor,Block-3,My Home Hub,Madhapur,Hydrabad-500081	(a) OPC 43 (b) PPC (c) PSC
20	M/S Chettinad Cement Corporation Limited	CHETTINAD Cement	4th Floor, Rani Seethai Hall, Anna Salai Hall, Chennai, Tamil Nadu 600006 Tel- 044-42951800 Fax- 044-28291558	(a) OPC 43 (b) PPC
21	M/S Sanghi Industries	Sanghi	10th Floor,kataria Arcade Off SG Highway,PO-Makarba,Dist-Ahmedabad,Pin-380051,Ph-079-26838000	(a) OPC 53 (b) PPC
22	M/s Wonder Cement Ltd	WONDER Cement	17, Old Fatehpura Sevamandir Road, Udaipur-313004, Rajasthan(India) Tele +91-294-33991133 Fax-+91-294-30063333	(a) OPC 43 (b) OPC 53 (c) PPC
23	M/S Kerosam Industries Ltd	Birla Shakti	Cement Division, Office No. 613 to 616, Block-3, White House, VI Floor, 6-3-1192/1/2, Kundanbagh, Begumpet Hyderabad - 500016, Telangana Phone : 040-4334 4555 Fax- +91-40-4334-4534	(a) OPC 43 (b) OPC 53 (c) PPC

Note: Contractor can procure Cement from those makes/ brands approved by the AHQ E- in-Cs Branch even during currency of the contract work.

6.1.1. TESTING :

3

a) The manufacturer is required to carry out inspections and testing of cement in accordance with the relevant BIS provisions. The contractor shall submit the Manufacturer's Test Certificate in original along with the test sheet giving the result of each physical test as applicable and chemical composition of the cement or authenticated copy thereof duly signed by the manufacturer, with each consignment. The Engineer-in-Charge shall record these details in the cement Acceptance/Rejection Register as appended here in below after due verification.

PARTICULAR SPECIFICATION(contd...)

b) The GE may organise independent testing as per IS: 3635 (method of sampling hydraulic cement) and IS: 4001-1995 (Method of Physical test for hydraulic cement) and IS: 4030-1985 (Methods of chemical analysis of hydraulic cement) of random sample of cement drawn from each lot of the consignment from the National Test House, SEMT Wing, CME, Regional Research Laboratories, Govt Engineering collage, IS approved laboratories and Zonal lab etc.

c) The contractor shall make available required quantity of cement and other facilities for testing of cement by GE as specified here-in-before and shall bear the cost of cement and testing thereto irrespective of whether sample passes or fails. GE shall make payment to the testing house lab and direct the contractor to deposit the amount in Govt. treasury in favour of GE concerned and submit the treasury challan to the GE within 10 days of the letter issued by the GE for payment of cost of testing of cement. If contractor fails to do so, the testing charges shall be recovered from the dues of the contractor.

d) The required quantity of samples of the cement shall be taken in two polyethylene bags and sealed by the Engineer-in-Charge in the presence of representative of the contractor. The seal shall be authenticated both by the Engineer-in-Charge and representative of the contractor. Out of two samples, one sample shall be sent for testing and other retained by GE in his office. Record of these samples shall be kept by Engineer-in-Charge in the register and copy of the same shall be sent to GE/CWE/CE by him for record.

e) Cement brought by the contractor shall be allowed to be incorporated in the work after satisfactory test results of sample sent for testing. GE shall inform the contractor, about the test results and permission to incorporate in the work, in writing. GE shall ensure that word "pass" is embossed on both sides of the cement bags of lot, which has been found as per specification as per test result. The cost of embossing as indicated herein above shall be borne by contractor.

f) In case the sample got tested by the GE from the institutions/ laboratories, mentioned here in before, fails, the concerned lot of cement shall stand rejected. The GE shall emboss a mark 'X' on both sides of each bag of the rejected lot. The GE will inform the contractor in writing about the test result and direct him to remove the rejected cement from the site of works within two days of the order by the Engineer-in-charge. Contractor shall have no claim whatsoever on account of rejection and removal of cement.

g) It shall be the responsibility of the contractor to arrange cement well in advance, to facilitate it's testing before use in the work. The contractor shall submit the program of procurement of cement to the GE before the date of commencement of the work indicating date of procurement and quantity.

6.1.1.4 STORING:

[a] (a) Cement shall be stored in covered godown over dry platform at least 20 cm high in such a manners as to prevent deterioration due to moisture or intrusion of foreign matter. In case of store room the stack should be atleast 20cm away from floors and 60 cm from walls. The stacking of cement shall be done as specified in relevant IS. The storage accounting and preservation of cement supplied by the contractor shall be done as per standard Engineering practice till the same is incorporated in the work and the cost of the same shall be deemed to be included in the unit rate/amount quoted by the tenderer. The Engineer-in-charge (EIC) shall inspect once a day to verify that cement lying at site is stored, accounted, preserved and maintained as per the norms. The cement shall be stored so as to differentiate each tested and untested consignment separately with distinct identification. If the GE is not satisfied with the storage/preservation of cement , he may order for any test (s) of cement as applicable for that consignment to ensure its conformity to the quality mentioned in the in the manufacturer's test certificate. The contractor shall bear the cost of necessary testing (s) in this regard and no claim whatsoever shall be entertained.

(b) Stacking of cement shall be done as per relevant IS and as under :-

(i) Each cement consignment shall be stacked separately and removal shall be made on the basis of First in First out.

(ii) Adequate top cover will be provided.

(iii) Stacks in no case shall be higher than 12 bags. The maximum width of each stack shall be 3.00 m. If the stack is more than 7 or 8 bags high, the bags shall be arranged in header and stretcher fashion, i.e. alternatively lengthwise and crosswise so as to pile together and avoid topping over.

PARTICULAR SPECIFICATION(contd...)

(iv) Adequate space shall be kept between two stacks.

(c) Cement godown shall be provided with two locks on each door. The key of one lock at each door shall remain with EIC or his representative and that of the other lock with the contractor's authorized agent at site of works so that cement is removed from the godown only according to daily requirement with the knowledge of both the parties. During the period of storage, if any cement bag (s) is found to be in damaged condition due to whatsoever reason, the same shall be removed from the cement godown on written orders of the GE and suitable replacement for the cement bag (s) so removed shall be made and no claim whatsoever shall be admissible on this account.

(d) In case more than one type of cement is used in the work ie Ordinary Portland cement or Portland Pozzolana Cement, both type of cement shall be stored separately as directed by the Engineer-in-Charge to avoid mixing of these type of cement. Separate record shall be maintained including the location/items where these type of cement are used.

(e) Cement shall be removed from the store only according to daily requirement with the knowledge of both the parties and the EIC and the contractor shall record daily consumption of cement in cement consumption register, which shall be signed. Cement constants given in Appendix 'A' to E-in-C's branch letter No. 19280/E8 dated 03 May 1976 shall from the basis of consumption of cement for various items of works unless specifically indicated otherwise.

(f) In case the consumption of cement as per cement consumption register is found to be more than the estimated quantity of cement due to whatsoever reason, the contractor shall not have any claim whatsoeverfor such excess consumption of cement.

6.1.4.1 SCHEDULE OF SUPPLY

The contractor shall procure the cement timely as required in accordance with CPM chart agreed between GE and the contractor. The contractor will forfeit his right to demand extension of time if the supply of cement got delayed due to his failure in placing order in time to the manufacturer.

6.1.4.2 MEASUREMENTS AND PAYMENT OF CEMENT

(a) The entire quantity of cement shall also be suitably recorded in the measurement book for record purposes as Not to be abstracted before incorporation in the work and shall be signed by the EIC and the contractor.

(b) The payment shall only be allowed after production of original purchase voucher, certified copies of test certificates from manufacturer for each consignment and results of testing carried out in laboratory on receipt of cement (7 days compressive test) are found satisfactory after testing at site as per condition 64 of IAFW-2249. Rate of payment given in SSR shall be applicable for cement irrespective of type of grade of cement specified for use in the work.

6.1.1.5. DOCUMENTATION

[a]. The contractor shall submit original vouchers, test certificates and test sheets from the manufacturer/producers for the total quantity of cement supplied under each consignment to be incorporated in the work. The GE alongwith the relevant documents before sample is taken for the testing shall inspect all consignments received at the work site. The original vouchers and test certificates (original/authenticated) shall be defaced by the Engineer-in-Charge and photocopy of the same shall be kept on record in the office of the GE duly authenticated and with cross reference to the control number recorded in the cement acceptance/rejection register. The cement acceptance /rejection register shall be signed by (JE Civil), Engineer-in-Charge, GE and the Contractor. The Accepting Officer may order a Board of Officers for verification of connected documents produced by the contractor. The entire quantity of cement shall also be recorded in the measurement book (not to be abstracted) for record purpose before incorporation in the work and shall be signed by the Engineer-in-Charge and the contractor.

[b]. Record of cement brought by the contractor shall be maintained on the following format.

PARTICULAR SPECIFICATION(contd...)

CEMENT SUPPLY/ACCEPTANCE REGISTER
CA No & Name of Work _____ Control No* _____

Name of Manufacture/Brand Name/Gde of Cement

(A) Manufacture_____ (b) Brand _____ (c) Grade_____

Qty of cement & lot No/Week No (in Bags): (Qty _____ (b) Lot No/Week No _____

Manufacturer's test certificates No _____ Random Test Details

(a) Physical test report from ____ vide their letter No _____

(Name of approved Lab/Engg College)

(b) Chemical test report from ___ vide their letter No _____

(Name of approved Lab/Engg College)

Details of Physical & Chemical properties

	Physical Requirements (As per IS: 4031)										Chemical Requirements (As per IS: 4032)							
	Specific Surface (M2/Kg)	Soundness by Le Chateliar	Soundness by Auto Clave	Initial Setting time (Minutes)	Final Setting Time (Minutes)	03 Days	07 Days	28 Days	Temp during testing °C	Standard Consistency (%)	Lime Saturation Factor (Ratio)	Alumina iron Ratio (Ratio)	Insoluble Residue (%)	Magnesium (%)	Sulphuric Anhydride (%)	Loss on ignition %	Alkailes (%)	Chlorides (%)
As per relevant IS																		
As per manufacturer's test certificate																		
As per random test certificate																		

Remarks with Signature Accepted/Rejected

Contractor Junior Engineer Engineer-in-Charge Garrison Engineer

Remarks of BOO/Inspecting Officer/CWE

*To be allotted serially by GE consignment wise.

PARTICULAR SPECIFICATION(contd...)

6.2 Lime shall be conforming to approved samples kept in GE's office.

6.3 AGGREGATES

6.3.1 FINE AGGREGATE

Fine aggregate (sand) for concrete work shall conform to materials specifications and grading within the limits of grading Zone I to III as specified in Clause 4.4.1 to 4.4.6 and 4.4.7(2) of MES Schedule Part-I and shall conform to approved sample kept in the office of GE. Mixing of sand for obtaining specified grading from two different sources shall not be permitted.

6.3.2 (a) COARSE AGGREGATE

Coarse aggregate (stone aggregate) for all cement concrete work such as PCC/RCC shall be of approved quality all as specified in clause 4.4.1 to 4.4.7 (1) of MES Schedule Part-I. Mixture of two types of stones shall not be permitted

(b) Coarse aggregate (stone aggregate) 20 mm and below shall be machine crushed and above 20mm may be hand broken.

(c) Grading of coarse aggregate (stone aggregate) unless specified otherwise in the specifications hereinafter in various locations/work i.e. PCC/RCC shall be as specified in MES Schedule Part I.

(d) Coarse aggregate for lime concrete shall however be brick aggregate as specified in clause 4.5 of MES Schedule Part I.

(e) Stone for lean concrete in foundation shall be sand stone conforming to IS: 383 from approved source. Unless otherwise specified in Schedule 'A' stone for all RCC/ PCC/PQC/WMM work shall be crushed Granite/Trap/ Basalt or any other igneous rocks stone from approved source irrespective of any distance from site of work.

6.3.2.1 WATER

Water to be used in this work shall be all specified in IS : 456 of 2000 and in clause 4.9 of SSR Part I (specification). When the water is not issued by the department, the water shall be got tested in Govt. approved laboratory and test certificate shall be submitted to GE. The water shall be used in the work only after receipt of satisfactory test results as per IS.

6.3.2.2 LIME

Lime for mortar in concrete shall be hydraulic lime (Class 'A') conforming to IS :712 - 1984 in the form of quick lime.

6.3.2.3 SURKHI

Surkhi shall be as specified in clause 4.7 of MES schedule Part I.

6.3.3.4. CEMENT CONCRETE MIX :

6.3.3.4.1 Grade of concrete shall be as shown in drawings. At situations where grade of cement concrete is not indicated in drawings the same shall be as under:-

Srl No	Situation	Mix of concrete	Nominal size of graded stone aggregate
1	2	3	4
(a)	Water retaining structure of swimming pool and Balancing Tank	M-30 (Ready Mix Concrete)	20 mm
(b)	All RCC works in beams, cols incl footings, roof slabs including RCC bands, plinth beam, RCC walls, RCC lintels, chajjas, shelves except water retaining structure.	M-25 (Ready Mix Concrete)	20 mm
(c)	Lean concrete, sub base in floors, filling in sunken floor etc.	(1:5:10) (Volumetric mix)	40 mm

PARTICULAR SPECIFICATION(contd...)

(d)	PCC in foundation of walls of buildings lean concrete under plinth/grid/toe beam, in gaps between plinth beam/Column footing and foundation of brick steps under column footings.	(1:4:8) (Volumetric mix)	40 mm
(e)	PCC filling in frames/chowkhat	(1:3:6) (Volumetric mix)	12.5 mm
(f)	PCC floor topping, DPC, shelves etc having thickness less than 40mm.	(1:2:4) (Volumetric mix)	12.5mm
(g)	PCC floor topping 40 mm thick and above but not exc. 100 mm thick.	(1:2:4) (Volumetric mix)	20mm
(h)	All PCC works for which no mix is specified else where	(1:2:4) (Volumetric mix)	20 mm for works above 40 mm thick and 12.5 mm for work below 40 mm thick.
(j)	PCC coping, padding under bearing of RCC beams/lintels/slabs, splash stones PCC blocks for fixing clamps,bed blocks. Cills, plugging for scaffolding holes etc.	(1:3:6) (Volumetric mix)	20 mm
(k)	Water retaining structure of swimming pool and balancing type	M-30 (Design mix)	20mm

6.4.1 BATCHING, MIXING, DEPOSITING AND RAMING

6.4.2 Controlled concrete materials shall be batched by weight only. Combined batching with digital weighing system and mixing plant with auto cut off and computer print out facility shall be used for concreting. The capacity of mini batching plant provided at site shall be adequate enough to execute the work as per the CPM, or otherwise the contractor shall provide single batching plant of higher capacity or more number of batching plants of adequate ca-pacities as required at site, as asked by the GE. No claim what so ever arising out on this account is admissible. The decision of GE in this regard shall be final and binding. The plant/plants shall have the digital system of adding specified quantity of water into concrete mix as per the designmixrequirement.

6.4.3 Water shall be measured either by volume in calibrated tanks or weighed. All measuring equipments shall be kept in a clean serviceable condition and their accuracy checked periodically.

6.4.4 Provisions as in clause 4.11.3.2 to 4.11.3.5 of MES Schedule Part-I shall be followed. All batching of concrete and accuracy of batching shall be as per Clause 10.2 of IS-456: 2000.

6.4.5 The mixing shall be done for at least 2 minutes and until a uniform colour and consistency is achieved.

6.4.6 Quantity of concrete mixed in any one batch shall not exceed the rated capacity of the mixer. The whole of the mixed batch shall be removed before mate-rials for fresh batch enter the drum. Concrete mix as approved shall not be modified by addition of water or otherwise in order to facilitate handling for any other purpose. On ceasing of work and other stoppage exceeding 20 mi-nutes, the mixer and other plants used for handling wet mix shall be tho-roughly washed with clean water. Pickup and throw over blades in the drum of the mixer which are worn down 20mm or more in depth shall be replaced with new blades.

6.4.7 All cement concrete, both plain and reinforced shall be mixed in mechanical mixer as specified in para 4.11.5 and 4.11.5.1 of MES Schedule Part-I. However for small quantity of concreting (other than RCC works) i.e., the quantity of concrete required being less than one batch of mix, the contractor may after obtaining written approval of Engineer in charge which shall be exceptional, adopt hand mix subject to addition of 10% extra cement without price adjustment where hand mixing permitted, it shall be carried out on a concrete platform and care shall be taken to ensure that mixing is continued until the concrete is uniform in colour and consistency.

PARTICULAR SPECIFICATIONS (Contd....)

6.4.7 All cement concrete, both plain and reinforced shall be mixed in mechanical mixer as specified in para 4.11.5 and 4.11.5.1 of MES Schedule Part-I. However for small quantity of concreting (other than RCC works) i.e., the quantity of concrete required being less than one batch of mix, the contractor may after obtaining written approval of Engineer in charge which shall be exceptional, adopt hand mix subject to addition of 10% extra cement without price adjustment where hand mixing permitted, it shall be carried out on a concrete platform and care shall be taken to ensure that mixing is continued until the concrete is uniform in colour and consistency.

6.4.8 All cement concrete both plain and reinforced concrete, shall be deposited and compacted all as specified in Clause 4.11.10 and 4.11.11 of MES Schedule Part-I. However, RCC work in columns, foundation, beams walls, chajjas and slabs etc., shall be compacted using mechanical vibrator, compaction of lean concrete shall be carried out by ramming and consolidated by tamping and rodding as specified. In the event of break down of mechanical mixer and vi-brator, the contractor must have arrangements for standby mechanical mix-er and vibrator.

6.4.9 DESIGN MIX CONCRETE (READY MIX CONCRETE)

6.4.10 Grade of design mix concrete shall be as specified here-in-before and shall be as referred to in IS-456-2000 and as specified hereinafter. Design mix concrete may also be referred to as controlled concrete. Mix design shall be done as per IS-10262 of 1982 (Recommended guidelines for design mix concrete) and as described in SP-23 of 1982 (an IS publication).

6.4.11 The requirement of cement per cubic meter of controlled concrete of grade M25/M-30 shall be as per IS-456 of 2000. The actual requirement of cement for the controlled concrete shall be ascertained by the tests as specified he- reinafter. The design mix for M25 concrete shall be carried out for MOD-ERATE environment conditions and good quality control, however design mix for M30 concrete shall be carried out for SEVERE environment con-ditions and good quality control. The tenderer shall ascertain the quantity of cement required and quote the lump sum accordingly. No claim whatsoever arising on account of quantity of actual cement incorporate in the work on ac- count of design mix is admissible.

6.4.12 (a) Contractor shall use liquid admixtures (Super plasticizers) to achieve the workability and to reduce the water content in design mix. Admixtures shall confirm to IS 9103: 1999 shall be from approved manufacturers as given below: -

(i)M/S STP Limited, New Delhi. (ii) M/s Choksey Chemicals Pvt Ltd
(iii)M/S Fosroc Chemicals (iv) M/S Sika India Pvt Ltd, New Delhi
(v) M/s MAPEI Constr Product India Pvt Ltd (vi) M/s Thermax Ltd
(vii) M/s IWL Limited (vii) M/s Hindcon Chemical Ltd (viii) M/s Maruti Bitumen Pvt Ltd

(b) Para 5.5 of IS 456: 2000 be also referred for quality of admixtures.

(c) For maximum dose of admixtures, please refer para 10.3.3 of IS 456: 2000. (d) Various tests as specified in IS 9103: 1999 shall be carried out for each batch of Admixtures at contractor's cost.

(e) Contractor shall submit original purchase voucher and test certificate of manufacturer for complete quantity of admixtures used in the work before claiming payment for the same.

(f) Complete quantity of admixtures including name of manufacturer, its brand name, date of manufacturing, date of expiry, voucher No. and details of test certificates shall be entered in MB as " Not to be abstracted " duly signed by JE, Engineer-in-Charge, GE and representative of contractor before making payment in RAR."

6.4.13 As soon as possible after receiving the work order to commence the work, the contractor shall submit samples of the materials required for preparing design mix concrete viz cement, coarse aggregate, fine aggregate and admixtures for approval of GE and intimate the place out of the following where they propose to carryout the design mix and preliminary tests RCC M-25 & M-30 grade concrete:-

PARTICULAR SPECIFICATIONS (Contd....)

(i) Any Govt Engineering College

(ii) Any Regional Engineering College

(iii) Command Test Lab (CTL), Lucknow

(iv) National Test House

PARTICULAR SPECIFICATION(contd...)

6.4.14 The cement used in the work shall be as specified here in before. Coarse aggregate shall be crushed stone aggregate. The gradation shall be followed as per clause 4.2 table 2 of IS 383 to obtain maximum density.

6.4.15 After the samples of all the materials are approved by GE in writing sufficient quantities of these materials shall be forwarded by GE at contractor's expense for carrying out design mixes.

6.4.15 PRELIMINARY TESTS

6.4.16 Preliminary tests are tests conducted on the trial mixes of concrete produced in the laboratory with the object of:-

(i) Designing concrete mixes before the actual concreting operation starts.

(ii) Determining the adjustments required in the design, when there is change in the materials used during execution of work.

(iii) Verifying the strength of concrete mix at 28 day

6.4.17 The preliminary tests shall consist of 3 separate sets of tests covering possible variation of gradation of aggregates and each set of test using a minimum 7 cubes of size 150 mm x 150 mm x 150 mm and one slump test. Three cubes shall be tested at 7 days to get indication of minimum strength of 28days. Other 03 cubes shall be tested at 28 days and 01 cube shall be preserved for Government use for subsequent testing. The compressive strength tests of cubes shall be performed as per IS-516. Casting of cubes and testing of these cubes shall be carried out in the presence of contractor's representative, GE / GE`s representative. It will be contractor's responsibility to ensure that design mix is carried out at the earliest. Contractor shall ensure that designmix cal-culations, supporting trail mix (03 Nos) details and test results of trial mixes along with recommended trial mix are submitted to GE at the earliest for his further action. Based on test results, the GE shall approve the design mix in writing. Copy of approved design mix shall be submitted to Accepting Officer within 10 days of approval by GE. The testing charges for the design mix and the tests conducted shall be borne by the contractor. The cost of materials, labour and transport shall also be borne by the contractor.

6.5 WORK TEST:

6.5.1 The work tests shall be carried out at site Lab/Zonal lab of Chief Engineer, AF Allahabad Zone / Command Test Lab (CTL), Lucknow.

6.5.2 Work test shall be conducted as per clause 15 of IS-456 of 2000. At the commencement of the concreting, samples of concrete shall be taken on each day as specified in clause 15 of IS-456 of 2000 and specimens made at the work site out of the concrete being used in the works, for the purpose of testing compressive strength.

6.5.3 From each of these samples, 7 test cubes of size 150 x 150 x 150 mm shall be taken to test 3 specimens at 7 days and 3 specimens at 28 days in MES laboratory. CA No., date of casting and location where concrete is being used shall be marked on each concrete cube. One test cube of preliminary and work test shall be preserved duly marking the date of casting and CA No. for verifica-tion / subsequent testing, if required. The cube shall be preserved by the GE / Engineer-in-Charge until the defects liability period of the work is over.

6.5.4 The testing charges for the work tests conducted in the Zonal Laboratory/Command Test Lab (CTL) shall be at the rate mentioned in Appendix 'B' of Particular specifications and the same shall be effected from the payments due to the contractor in RAR / Final bill whichever is earlier. The cost of materials, labour and transport shall be borne by the contractor. The lump sum quoted shall include the cost of testing the concrete cubes both for design mix / volu-metric mix.

6.5.5 In the event of contractor setting up the laboratory at site as specified here in before in Special Conditions, the contractor shall carry out cube testing in site lab, in presence of Engineer-in-Charge and as specified here in before. Howev-er, random testing up to 5 percent of total tests to check the compressive strength of cube shall be carried out in zonal lab for which testing charges shall be recovered from the contractor at the rate mentioned in Appx 'B'. Con-tractor shall include this aspect in his lump sum while quoting his rates.

6.5.6 The Engineer-in-Charge shall maintain the record for all the test carried out in Site lab /zonal lab /CTL separately. The cost of testing including material, labour etc., incurred shall be borne by the contractor and the lump sum quoted shall be deemed to include this.

PARTICULAR SPECIFICATION(contd...)

6.6MIXING

6.6.1 The mix design and also execution of work shall be carried out by weigh batching. The quantum of cement for execution of work by weigh batching shall be as per mix design.

6.6.2 It shall be ensured that the grading characteristics as adopted in the mix design are followed throughout. Wherever the type and/or batch of cement/aggregate is changed, a fresh mix design shall be carried out. Nothing extra is payable on this account.

6.6.3 The contractor during the progress of work shall not change the mix design without the prior approval of the GE.

6.6.4 Engineer-in-Charge shall maintain a record of actual consumption of cement in proper register (other than the cement register mentioned in special conditions) and initial the entry for every day of quantity of materials used by contractor. The register shall be got checked and signed by GE. In case the consumption of cement as per cement consumption register is found to be more than the estimated quantity of cement due to what so ever reason, the contractor shall not have any claim, whatsoever for such excess consumption of cement.

6.7WATER CEMENT RATIO

6.7.1 It is most important to maintain the water cement ratio constant and to it's correct value. To this effect determination of moisture content in both fine and coarse aggregate should be made as frequently as possible. The frequency for a given job shall be determined by the Engineer-in-Charge. According to weather conditions the amount of water to be added shall be adjusted to compensate any variations in the aggregate, IS-2386 method of test for aggregate, for con-crete, Part II specific gravity, density, voids, absorption and bulking of aggre-gates due to variation in their moisture contents shall apply. The maximum quantity of water to be added shall be determined by mix design to be carried out as specified herein before

6.7.2 Workability of concrete shall be checked at frequent intervals. The slump test or where facilities exist the compacting factor test in accordance with IS-1199 may be adopted for this purpose.

6.7.3 The slump for M-25 shall be between 25 to 75 mm and for M30 grades concrete (except for piles) 50mm to 100mm for medium degree workability as given in clause 7 of IS-456-2000.

6.7.4 Curing shall be carried out all as specified in MES Schedule Part I.

6.7.5Acceptance Criteria: As per Clause 16 of IS-456: 2000.

6.6.A NOMINAL MIX/VOLUMETRIC MIX:

Wherever nominal mix concrete is specified, it shall be as per IS: 456. The periodicity of mix design and other tests on materials/mix shall be as decided by the GE.

6.7.A MIXING

6.7.1. All concrete shall be mixed in mechanical concrete mixer. Where only small quantity of plain cement concrete is involved, hand mixing may be adopted if approved by the Garrison Engineer. The contractor should arrange to wash out and clean the mixing drum on completion of work and or on stoppage of work if stoppage is for more than 20 minutes.

6.8. TRANSPORTING, DEPOSITING AND COMPACTING:

Transporting depositing and compacting generally shall be carried out as specified in Clause 4.11.9, 4.11.10 and 4.11.11 of SSR Part I 2010.

6.9 PROTECTION AND CURING OF CONCRETE:

This shall be carried out in accordance with specifications, given in clause No. 4.11.13 and 4.11.14 of MES Schedule Part I 2010.

6.10 PRECAST CEMENT CONCRETE:

6.10.1 Lintels (without chajja) with a span of less than 1.5 m clear and PCC bed blocks, copings and the like may be precast at the discretion of the contractor all as specified in Clause 4.20 of SSR Part I as applicable. All precast articles shall be set in CM (1:3) with joint to match.

PARTICULAR SPECIFICATION(contd...)

6.11 STRIPPING TIME FOR FORM WORK: The contractor's attention is invited to the stipulation in Clause 4.11.6.3 of SSR Part I regarding stripping of form work. The periods stipulated therein are for concrete using ordinary Portland cement. In case PPC cement used in the work, stripping time of form work applicable as per relevant IS.

6.12 LEAVE/FORM HOLES AND CHASES: The contractor as the work proceeds should Leave/form holes/chases in concrete/masonry and RCC where and as directed by the Engineer-in-Charge and make good in cement and sand mortar (1:3) when ordered to do so.

6.13 FINISH TO CONCRETE SURFACES(refer clause4.11.16, 4.11.16.1, 4.11.16.2(a),(b).(c),(d), (e) and 4.11.16.3 of MES Schedule Part-I.)

(a) xposed surfaces of RCC chajjas, cantilevers and the like (bottom, sides) and soffits and sides of beams, soffit of RCC roof slab/floor slab/waist slab of stairs, sides of isolated column, shelves, RCC parapets, fins/fascias and the like RCC walls shall be plastered not less than 5mm thick with cement mortar (1:3) and finished fair and even without using extra cementafter removal of form work.

(b) Exposed surfaces of RCC columns, beams, lintels, bands etc. which are continuous with plastered surfaces of walls shall be plastered & finished in the same specifications as for adjoining wall surfaces.

(c) Exposed surface of columns, beams, lintels, bands and similar items which are not covered under clause 9.1 (a) and 9.1(b) above shall be finished with a thin layer of 5 mm thick plaster in cement mortar (1:3) and finished fair and even without using extra cement after removal of form work.

(d) If thickness of plaster in cement mortar (1:3) as specified above is required to be increased in excess of 5 mm to achieve fair and even surfaces, it shall be provided by the contractor without any extra cost to Government and the same shall be deemed to have been included in the lump sum amount quoted by the contractor against Schedule 'A' Part I.

(e) Surfaces of concrete which are required to be plastered as indicated above after removal of formwork shall be roughened with wire brush and hacked out closely.

6.14FORM WORK

(a)Refer to clause 4.11.6.1 to 4.11.6.5 and relevant clauses of 7.15 of MES Schedule Part I. Formwork shall be of steel with adjustable steel vertical props and other steel accessories and shall conform to IS 14687:1999 (Guide lines for false work for concrete structure). Release agents shall be applied so as to provide a thin uniform coating to the finished flat surface of shuttering before laying RCC for slabs. Deformed steel sheets shall not be permitted for use as formwork. However for the purpose of pricing DOs, the rates given in MES Schedule Part II for fair finished surfaces for concrete using steel formwork shall be applicable.

(b) Where steel shuttering is not feasible in locations such as soffits and sides of lintels, beams, chajjas and other locations as decided by GE, the plywood board of adequate strength may be used.

6.15 SAMPLING AND TESTING OF CONCRETE:

6.15.1 Refer Clause No. 4.11.17 of MES Schedule Part I.

6.15.2 Tests will be carried out on 15 cm cubes all as per IS: 516. Minimum Six cubes per sample shall be supplied by the contractor for testing.

6.15.3 For relatively small and unimportant works even though testing may be waived off by the GE, the contractor shall be responsible to achieve the desired strength of concrete.

6.15.4 The contractor shall provide all necessary materials (including moulds etc) and labour for mixing and casting of cubes, transporting the cubes to the testing laboratory and bringing back in same and any other assistance that may be required for getting the samples tested in the laboratory without any extra cost. The charges for testing of cubes shall be borne by the contractor. The testing charges shall be as indicated in Appendix 'B' to Special Condition. In case the tests are concluded in site laboratory set up by contractor, the recovery for testing charges shall not be effected.

6.15.5 The concrete which is not upto the desire strength shall be rejected and the same shall be made good by the contractor without any extra cost to Government.

PARTICULAR SPECIFICATION(contd...)

6.16 PCC COVING : PCC coving with PCC (1:2:4) type B-0 using 12.5 mm graded stone aggregate mixed with integral water proofing compound shall be provided at junction of RCC chajja with wall/lintel /beam to the radius of 75 mm irrespective of whether shown or not shown on drawings. Coving shall be 15 cm high on wall and to the full length of chajja.

6.17. FILLETING:

6.17.1 Provide triangular filleting to skirting / dado as directed by Engineer-in-Charge with CM (1:3) finished even and smooth without using extra cement.

6.18 CONCRETE PADDING: Padding under bearing of RCC lintels to make up the height of opening in wall wherever required shall be done with PCC (1:3:6) type C-1 PCC blocks shall not be cut to under sized dimension and used to make up the required height in such positions.

6.19 RCC LINTELS: The bearing of lintels shall be 15 cm or effective depth (Whichever is more), unless otherwise shown on drawings.

6.20 Lintels (without chajja) for opening not exceeding 1.5 m clear span may be precast at contractor's option. However these shall be priced as cast-in-situ lintels in the event of deviation if any. All other lintels and bands shall be cast-in-situ.

6.21 DRIP COURSE/THROATING / WEATHERING: Following works shall be executed whether shown on drawings or not:-

i) Provision of proper drip course and / or throating and weathering to all chajja, roof, cills, coping and the like.

ii) All flat surfaces exposed to weather shall be finished with imperceptible slope for smooth run of rain water. (In cases no slope is mentioned in drawings or specified).

6.22 WINDOW CILL

6.22.1 PCC window cill shall be in Grade M-15 (Nominal mix) finished even and smooth without using extra cement as shown on drawing on external side of wall.

6.22.2 Irrespective of whatever shown on drawing or otherwise specified provide machine polished kota stone slab in one piece and thickness 18-22 mm on internal side of wall rising on walls over 10 mm thick bedding layer in CM 1:6 and jointed in cement slurry in cills of windows/ventilators. Each side bearing shall be 40 mm.

6.23 PLINTH PROTECTION:

6.23.1 Plinth protection shall be of 50 mm thick PCC (1:2:4) type B-1 using 20 mm graded stone aggregate with surface finished even & fair without using extra cement, laid over 75 mm thick [compacted thickness] hardcore of broken stone aggregate as specified here-in-before, over rammed earth/finished surface. Construction joints shall be provided at every 3 m Interval and at every change of direction as specified in SSR and shall be filled with sealing compound grade 'A'.

6.24 RCC JALI

6.24.1 RCC Jali with mix 1:2:4 using aggregate of size 6 mm and below shall be pre-cast with wire reinforcement as per drawings and jointed in cement mortar (1:3). Thickness where not shown on drawings shall be 50 mm. Faces of RCC jali shall have fair and even surface. In the event of deviation RCC jali shall be priced as pre-cast using aggregate of size 12.5 mm subject to contractor's percentage quoted in Schedule `A' part I.

6.25 DAMP PROOF COURSE:

6.25.1 Damp proof course shall be 40 mm thick in PCC (1:2:4) type B-0 using 12.5 mm graded stone aggregate mixed with integral water proofing compound conforming to IS: 2645 and covered with 100 micron thick polythene film. The percentage of water proofing compound shall be as per manufacturer's instructions. The same shall be taken as 3% (by weight of cement) while pricing of any deviation order in omit portion.

6.25.2 Damp proof course shall be laid to the full width of walls, including under door and other opening at plinth level. Damp proof course shall not be provided for portion below door for 100/ 115 mm thick walls, dwarf walls and at locations where RCC / PCC plinth band or RCC plinth beams are provided.

7. 0 BRICK WORK

GENERAL

Irrespective of type / size of bricks shown on drawings contractor shall use old size bricks (non modular bricks) Fly ash bricks (IS 12894-2002 : Pulverized fuel ash lime bricks)for building works. (However in case of non availability of non modular bricks , contractor may use modular Fly ash bricks with price adjustment)subject to following:-

(a)Centre line dimension of walls shown on drawing shall remain unchanged.

(b) No adjustment both 'plus' or 'minus' shall be made in the quoted lump sum on account of changes necessitated in foundations, floor, lintels, cills and the like and any other items of work effected.

PARTICULAR SPECIFICATION(contd...)

(c) In case of difference of levels due to thickness of brick courses the level-ling shall be done by providing PCC (1:3:6) type C-1 levelling course and its cost shall be deemed to be included in the lump sum as offered by the contractor.

7.1 Cement - Cement shall be as specified for concrete work.

7.2 Sand for Mortar - Refer to clause 5.4 of MES Schedule Part I and Ganga sand shall not be used.

7.3 BRICKS

7.3.1 (a) Irrespective of whatever shown on drawing brick work indicated in the drawing shall be using Fly Ash Brick. The Fly ash brick/block shall confirm to IS:12894-2002 (Pulverized fuel ash lime bricks). Fly Ash brick shall be locally available best quality brick, as approved by GE. Fly Ash bricks (solid) will be of size 230mm x 115mm x 75 mm as approved by GE with 28 days average wet compressive strength not less than 75 Kg/Cm2 when tested as per procedure laid down in IS-3495-1992 (Part-I) and water absorption not more than 20% by mass when tested as per procedure laid down in IS-3495 (Part-II) after immersion in cold water for 24 hours. Average drying shrinkage of the blocks will not be more than 0.15% when tested as per IS-4139. The fly ash used in the process of making blocks should confirm to grade II of IS- 3812-1981. The tolerance on dimension of the blocks will be taken as per clause 5.2 of IS-12894: 2002.

(b) The brick shall have smooth rectangular faces with sharp corner & slight round edges, and shall be well burnt, uniform in colour, free from cracks, flaws, nodules of lime and emit clear ringing sound when struck.

(c) Sampling and tests : Samples of bricks shall be subjected to the following tests.

(i) Dimensional tolerance.
(ii) Water absorption.
(iii) Efflorescence.
(iv) Compressive strength.

(d) Sampling: For carrying out the above tests, the samples of brick shall be taken as per IS:5454 at random according to the size of lot given in Table 1 below.The sample thus taken shall be stored in a dry place until tests are made.

(e) The samples shall be taken as below :-

(i) Sampling from a stack : When it is necessary to take a sample from a stack,the stack shall be divided into a number of real or imaginary sections and the required number of real and imaginary sections and the required number of bricks drawn from each section. Sampling from trucks shall be as per IS: 5454 Scale of sampling and criteria for conformity for visual and dimensional characteristics:-

PARTICULAR SPECIFICATION(contd...)

Table-1

No of bricks in a lot	For characteristics specified for individual bricks		For dimensional characteristics for 20 bricks - No of bricks to be selected
	No of bricks to be selected	Permissible no of defective in the sample	
1	2	3	4
2001 - 10000	20	1	40
10000-35000	32	2	60
35001-50000	50	3	80

(ii) Visual characteristics : The bricks shall be selected and inspected for ascertaining their conformity to the requirements specified in subsequent Para .The number of bricks to be selected from a lot and shall be in accordance of Col1 & 2 of Table-1 for visual characteristics in all cases and dimensional characteristics if specified for individual bricks.

(f) Visual characteristics : All the bricks selected above in accordance with Col 1 & 2 of Table 1 shall be examined for visual characteristics as specified in Para-b. If the number of defective bricks found in the sample is less than or equal to the corresponding number as specified in col 3 of table 1 the lot shall be considered as satisfying the requirements of visual characteristics, otherwise the lot shall be deemed as not having met the visual requirements.

(g) Dimensional characteristics : The number of bricks to be selected for inspecting the dimensions and tolerance shall be in accordance with col 1 & 4 of Table 1. These bricks will be divided into groups of 20 bricks thus formed will be tested as per IS : 1077 for all the dimensions and tolerance as given below:-

Type of bricks - Non-modular bricks
Nominal size - 230X114x75mm
Actual size - 230x111x70mm
Dimensional for group of 20 bricks
Length 442 to 478 cm (460 + 18 cm)
Width 213 ro 231 cm (222 + 9cm)
Height 134 to 146 cm (140 + 6cm)

A lot shall be considered having found meeting the Requirements of dimensions and tolerance if none of groups of bricks inspected fails to meet the specified requirements.

(h) Scale of sampling and criteria for physical characteristics shall as per IS 5454.The Lot, which has been found satisfactory in respect of visual and dimensional requirements, shall be next tested for physical characteristics like compressive strength, water absorption, and efflorescence.

(j) The physical requirements of the bricks shall be tested as per IS:3495 (Part I to IV).

(k) The bricks shall have physical characteristics as specified here under:-

(i) Water absorption : 20% Max.
(ii) Compressive strength : 75 Kg/cm2.
(iii) Efflorescence : Nil to Slight sign of efflorescence i.e 0-10% of surface area of the brick should show a thin deposit of salt.

(l) A lot shall be considered having satisfied the requirements of physical Characteristics if the condition stipulated here in are all satisfied:-

(i) The average compressive strength shall satisfy the requirements specified in Clause 10.3.1 (a).
(ii) The acceptance criteria shall be as per IS.
(iii) Average water absorption shall be as specified in Para K(i).
(iv) The number of bricks failing to satisfy the requirements of the efflorescence specified in Para (K) should not be more than the permissible in IS 5454.
(m) Handling and storage of bricks shall be as per Clause 5.6.9 of SSR Part I.
(n) The general quality of brick shall be as per Clause 5.6.5 of SSR Part I

PARTICULAR SPECIFICATION(contd...)

(o) For pricing deviation if any (both plus or minus) involving brick work with old size brick pricing shall be made on the basis of rates for old size bricks sub class 'B' bricks given in MES Schedule of rates subject to contractor's percentage quoted by the tenderer against that schedule. The preamble (e) and (f) given on page 54 of SSR Part II shall stand deleted.

7.4 BEARING PLASTER :

Irrespective of what is shown on drawings, two layers of indigenous bituminous craft paper shall be provided to the full width of brick wall under bearing of lintels, beams, slabs resting on load bearing walls, PCC bed blocks and floor/roof band where casted monolithic with RCC slab on 20mm thick bearing plaster in CM (1:4) finished even and smooth and given one coat of white wash. Each layer of indigenous bituminous craft paper shall weigh not less than 1.20 Kg per 10 Sqm. This provision, however, shall not be made where RCC slabs rest on a levelling course of PCC and in RCC framed structure.

7.5 Size of PCC bed blocks for beam where not shown in the drawings shall be twice the width of beams in length, covering the entire thickness of wall and 200 mm thick (depending upon type of brick) below the RCC beams resting on masonry.

8. WOOD WORK AND JOINERY

8.1.1 Timber for all wooden joinery and wood work shall conform to specifications given in

(a). clause 7.3 of the MES Schedule Part I and defects shall be within the permissible limits as specified in Clause 7.4 and 7.5 of the MES Schedule Part I. Unless otherwise specified timber for all joinery and woodwork shall be 2nd class hard wood (Hollock/Sal/Benteak/Bijasal) and as per the approved sample kept in GE's office.

NOTE: - However, The contractor may provide Shisham wood in lieu of Hollock/Sal/ Benteak/Bijasal wood without any extra cost to Govt.

(b) Timber shall be well seasoned and chemically treated under pressure (kiln dried). Factory made shutters shall also be 'kiln' seasoned only. The moisture content of timber shall not exceed the limits laid down vide clause 7.7 of the MES Schedule Part I.

(c) (i) Preservative anti-termite treatment shall be carried out to all woodwork and joinery. Contractor's quoted rates shall be deemed to cater for this provision. Factory made plywood, particle boards and factory made shutters are not to be further treated with any chemical against termites.

(ii) Wood work and joinery other than factory made, ply wood particle board and factory made shutters as described above shall be treated with copper Napthanate or any other chemical specified in IS: 401 of 1982 and shall be applied in any one of the manners specified in IS or as directed.

(d) Timber surfaces hidden or not exposed to view and in contact with brick work/masonry /concrete shall be left clean sawn and applied with two coats of creosote, unless specified otherwise hereafter.

8.1.2 WORKMANSHIP

(a). Dimensions of various parts of joinery shall be as shown on drawing and shall supersede those stipulated in clause 8.20& 8.24 of MES Schedule Part I. For the purpose of pricing deviations, factory made shutters shall be classified as second class hard wood and priced accordingly at the applicable rates in MES Schedule Part-II and no adjustment in SSR rates shall be done for change in sizes of stiles and rails

(b). Irrespective of what is shown on drawings, use of nails in the joinery is prohibited. Wood screw of appropriate size shall be used and shall be of "Nettle fold" brand or any other equivalent brand as approved by GE.

(c). All joinery work shall be of full dimensions as shown on drawings. Overall sizes of joinery as shown on drawings shall be maintained. Tolerance in sizes and thickness shall be all as specified in SSR Part-I.

(d). Plugging/wooden gutties to walls wherever shown on drawings or where required shall be done with wooden plugs made out of hard wood (Hollock/Bijasal/ SAL/Benteak/Shisham/Teak) as per clause 7.29 of MES Schedule Part I.

8.2. PLY WOOD AND PARTICLE BOARD

(a). Un-veneered particle board where indicated shall be flat pressed, BWP grade bonded with phenol formaldehyde synthetic resin adhesive conforming to IS: 3087 (Type I Part I) all as specified in para 12.13 of MES Schedule Part I.

(b). Veneered particle board where indicated shall be three layers flat pressed with commercial or teak veneer (both sides) as indicated on drawing/specified and shall be BWP grade bonded with phenol-formaldehyde synthetic resin adhesive as per IS-3097-Grade I, Type-I for commercial veneer and decorative veneer all as specified in para 12.14 of MES Schedule Part I.

PARTICULAR SPECIFICATIONS (Contd....)

(c) Plywood where indicated shall be BWP grade bonded with phenol formaldehyde synthetic resin adhesive conforming to IS: 303 for general purpose plywood and IS: 1328 for decorative face plywood. Facing shall be of teak veneer as shown on drawing/specified.

(d). The pre-laminated particle board in all situations shall be three layered ISI marked (IS: 12823 Grade I) with pre-lamination of approved shade on one side and matching white on other side and pre-laminated on both sides (for partitions) as shown on drawings. The lump sum quoted by the contractor shall be deemed to include the above provisions.

(e). Marine plywood shall be as per IS: 710-1976 (specifications for marine plywood) (Kit ply) and bonded with best quality phenol formaldehyde synthetic adhesive BWP type or hot pressed at high pressure and temperature.

(f). Thickness of particle board shall 18/19 mm and of plywood 6 mm, if not specifically specified on drawings.

8.3.1 FRAME (CHOWKHAT) FOR DOORS EXEPT WC/BATH

PRESSED STEEL FRAME: -Where pressed steel frames/chowkhats are shown on drgs these shall be machine pressed steel rebated made out of 1.25 mm thick MS sheets (factory made). Pressed steel frame shall comply to IS: 4351(1976). Hollow space of chowkhat frames shall be filled with PCC (1:3:6) Type C-0 using 12.5 mm graded stone aggregate as the work proceeds. Refer Clause 10.27.1 of MES Schedule Part-I. For other specifications unless specified otherwise hereafter profile and section, size of frame and lugs/hold fasts shall be as shown on drawing and not as in IS. Back of chowkhat and MS hold fasts/lugs shall be given one coat of bituminous paint over primer before fixing in position. All exposed surfaces of chowkhats shall be given two coats of synthetic enamel paint over a coat of red oxide primer.

8.3.2 FACTORY MADE SOLID PVC DOOR FRAMES WC/BATH

Solid Single PVC Door Frame solid PVC Door Frame of the size 50 x 47mm made out of 5mm PVC sheet. The door profiles are to be reinforced with 19xl9mm M.S. Square tube. EPDM rubber gasket weather seal to be provided through out the frame. The profile shall be mitre cut at two corners and joined by inserting 2nos. of 150mm long brackets of 15x15mm M.S. square tube inside the 19mm x 19mm M.S. square tube and suitably screwed all as per table of clause 8B.3.1 of SSR Part II 2010

8.4. SHUTTER

8.4.1. Paneled, partly paneled and wire gauge shutters for all wooden doors are shown on drawings shall be factory made as under:-

(a). Stiles, rails, sash bars: These shall be of 35 mm thick. Other details all as shown on drgs. ASCU Vacuum pressure treated out of kiln seasoned hard wood second class of species bijasal/hollock/ben teak all as per IS: 1003.

NOTE: - In case factory made shutters with aforesaid species of timber are not available due to any reason, the contractor shall provide factory made shutters made from Shisham wood without any extra cost to Govt.

(b). Panel for panelled doors :

(i) Unless otherwise shown on drawings, panel for panelled doors for Internal and external doors (OTHER THAN BATH AND WC) shall be of 12 mm thick 7 ply commercial plywood/(water proof), exterior grade BWR.

(ii)FOR BATH, TOILET AND WC FACTORY MADE SOLID PANEL PVC DOOR SHUTTER

30 mm thick Factory Made Solid Panel PVC Door Shutter consisting of frame made out of M.S. tubes of 19mmx 19mm for stiles, & 15mm x 15mm for top & bottom rails. M.S. frame shall be covered with 5mm thick heatmoulded PVC sheet 'C' channel having a 5mm thick PVC sheet strip of 20mm width stuck inside with solventcement, forming stiles, and 5mm thick PVC sheets for top rail, lock rail & bottom rail on either side, and 10mm(5mm x 2) thick, 20mm wide cross PVC sheet as gap insert for top rail & bottom rail. Panelling of 5mm thickPVC sheet to be fitted in the M.S. frame welded / sealed to the stiles & rails with PVC sheet beading, and joinedtogether with solvent cement adhesive etc. complete as per direction of Engineer-in-charge, manufacturer'snstructions and drawing. The width of stiles & rails will be in proportion to the width of the door shutter as per table of clause 8B.2.1 of SSR Part II 2010. Contractor may use PVC doorframe but at no extra cost to Govt.

PARTICULAR SPECIFICATION(contd...)

8.4.2. Only one type of species of timber shall be used in stiles and rails. Shutters with mixed species will not be accepted

8.4.3. The factory made shutters shall be brought to site without application of primer. Filler coat on panel inserts shall be applied after approval of doors and shall be left for hardening before application of primer.

8.4.4. The manufacturer shall ensure testing of door samples from the lot as per IS specification from named approved lab and submit necessary testing report/ certificate for acceptance.

9. BUILDER'S HARDWARE

9.1 (a) All articles of builder's hardware shall comply with the relevant IS specifications and the specifications given in the MES Schedule for the relevant item. Builders' hardware shall be provided all as specified in Schedule of fittings and as specified in relevant drawings and shall be ISI marked.

(b) In case the size of particular fittings is not shown in the drawings, it shall be of size as directed by the GE.

(c) Screws used for fixing items of Builders hardware shall be as specified in clause 9.2.6 of MES Schedule Part-I. Unless specified otherwise elsewhere, screws shall be dipped in adhesive before fixing on particle board.

(d) Irrespective of what is shown on drawings, all articles of builder's hardware (other than for steel windows, butt hinges and rising door springs with magnetic catches) shall be extruded sections, aluminium anodized white.

(e) Butt hinges shall be of SS, IS marked.

(f) The contractor shall produce samples of each article of builder's hardware (fittings) which he proposes to use and get it approved. The sample shall be labelled as such, signed by the GE and the contractor. These shall be kept in the custody of the GE till the completion of work. In case rat-tail spring door closers are mentioned on drawings these shall be changed to helical door springs, 150 mm long of an approved make.

9.2 ARTICLES :

(a) Butt hinges for doors shall be SS conforming to IS and all as specified in clause 9.7.2 of MES Schedule Part I. Butt hinges shall be run welded to machine pressed steel sheet frame/angle frame and screwed to timber shutters.

(b) Size of sliding bolts unless otherwise specified shall be 300 mm with 16 mm dia shoot.

(c) MS tower/ Barrel Bolts shall be with bolt shoot 10 mm dia up to size 125 mm and 12mm dia for size 150mm and above. For steel window, the dia of bolt shall be 10 mm.

(d) All other articles of builders hardware shall comply with the requirement of relevant IS and as specified in MES Schedule Part I.

(e) Stainless steel wire cloth/gauge for mosquito/fly proofing shall be as specified in clause9.25.3 of MES Schedule Part I. It shall have 0.36 mm nominal dia of wire and 1.40 mm average with of aperture for mosquito/fly proofing and as approved by GE.

(f) Hydraulic door closures- Hydraulic door closures shall comply the requirement of IS: 3564-1974 and shall be of suitable designation as required and directed by the GE. It shall be of aluminium alloy body anodized. Closures shall be universal type suitable for both clockwise and anti-clock wise without any change in parts of the closure.

10. STEEL AND IRON WORK :

10.1 All steel and iron work shall be as per details shown on drawings and shall be carried out as described in MES Schedule Part I and as specified here-in-after.

PARTICULAR SPECIFICATION(contd...)

10.2 PROCUREMENT AND TESTING OF STEEL :

(a) REINFORCEMENT STEEL All steel for reinforcement to be used in the work shall be contractor's supply. The contractor shall procure steel for reinforcement (TMT bars) directly from the following main producers of steel :-

1	2	3	4	5	6
Srl No	COMPANY NAME	BRAND NAME	ADDRESS	Type of Steel Grades	REMARKS
1.	Rashtriya Ispat Nigam Limited (RINL),	RINL	Visakhapatnam Steel Plant Visakapatnam-530031, India Tel: (91891) 518226, 518376 Fax: (91891) 518316 E-mail: cmdvsp@itpvis.ap.nic.in	All	
2.	Tata Iron & Steel Company (TISCO, or Tata Steel),	TATA	Bombay House,2, 4, Homi modi Street Mumbai-400001, India Tel: (9122) 2049131 Fax: (9122) 2049522, 2770840 E-mail: corpcomm@jsr.tatasteel.com (Br office for North: Jeevan Tara Bldg, Patel Chowk, New Delhi)	All	
3.	Steel Authority of India Limited, (SAIL)	SAIL	Central Marketing Organization, Northern Region 17th Floor, scope Minar, Laxmi Nagar Distt Centre, Delhi-110092	All	
4.	M/S Jai Balaji Industries Ltd.,	Balaji Shakti	5 Bentek Street, Kolkata – 700001 Delhi Office 510, Block-B, Navraung House, 21 Kasturba Gandhi Marg, New Delhi-110001 Tel: (011) 43620219, 43620220 Mob: 7838272772, 9958936103 E-mail: info@jaibalajigroup.com	TMT Bars of Gde Fe 500 Fe 500D	
5.	M/S Shyam Steel Industries Ltd	SHYAM	Shyam Towers EN-32, Sector-V, Salt Lake, Kolkata-700091 Tel: (033) 40074007 Fax: (033) 40074010 E-mail: marketing@shyamsteel.com	TMT Bars of Gde Fe 500 Fe 500D CRS	
6.	M/S Steel Exchange India Ltd.,	SIMHADRI TMT	My Home Laxminivas Apartments, Ameerpet, Hyderabad-500016, A.P. Tel: (040) 23403725 Fax: (040) 23413267, E-mail: info@seil.co.in	TMT Bars of Gde Fe 500 Fe 500D HSCRM	
7.	M/S Jindal Steel and Power Ltd.	JINDAL PANTHER	OP Jindal Road, Hissar , Haryana -125005, Tel: +91 166 2222471-84 Fax: +91 166 220476	TMT Bars of Gde Fe 500/ Fe 500D Fe 550/ Fe 550D & *CRS with sizes (8-40 mm)	
8.	M/S SRMB Srijan Ltd.,	SRMB	SRMB House, 7, Khetra das lane Kolkata-700012 Tel: 033-6600 6600 Fax: 033- 22110483	TMT Bars of Gde Fe 500/ Fe 500D Fe 550/Fe 550D (Size 8-32 mm)	
9.	M/S Shri Bajrang Power & Ispat Ltd.,	GOEL TMT	Vill- Borjhara, Urla Industrial Area, Raipur-493 221, Chhattisgarh Tel: 0771 4288019/29/39	TMT Bars of Gde Fe 500 Fe 500D (Size 8-32 mm)	

10.	M/S JSW Steel Ltd.,	NEOSTEEL	JSW Centre,Bandra Kurla Complex, Bandra (Eat) Mumbai- 400051, Maharashtra Phone :022-42861000 Fax: 022-42863000	TMT Bars of Gde Fe 500 Fe 500D CRS (Size 8-40 mm)	
11	M/S Shyam Metalics & Energy Ltd,	SEL	Viswakarma, 1st Floor, 86 C, Tapsia Roas, Kolkata - 700046 Ph: 91 33 2285 2212 Website: www.shyamgroup.com	TMT Bars of Gde Fe 500, Fe 500D (Size 8-32 mm)	
12.	M/S Kamachi Industries Ltd.	KAMACHI	ABC Trade Centre, 3rd Floor (Inside Devi Theatre Complex) Old No. 50, New No. 39, Anna Salai, Chennai- 600002, India Tel: +91-044-42961100 Fax: +91-044-42961122 E-mail: sales@kamachitmt.com Website: www.kamachitmt.com	TMT Bars of Gde Fe 500, Fe 500D Fe550, Fe 550D HCRM (Size 8-40 mm)	
13.	M/S Real Ispat & Power ltd	G K TMT	Vrindavan, Near IDBI Bnk Civil Lines Raipur - 492001, C.G. Tel: +91-771-4224000 Fax: +91-771-4224010 E-mail: real@realispat.com Website: www.realispat.com	TMT Bars of Gde Fe 500 Fe 500D (Size 8-36mm)	
14	M/S Super Smelters Ltd. Kolkata	SUPER SHAKTI	Premlata, 39, Shakespeare Sarani, 3rd Floor, Kolkata - 700017 Tel/Fax: + 91-33-2289-2734/36 E-mail: info@supershakti.in Website: www.supershakti.in	TMT Bars of Gde Fe 500 Fe 500D, Fe 550 (Size 8-32mm)	
15	M/S Electrotherm (India) Ltd	ET TMT	Survey No. 72, Village : Palodia, Taluka : Kalol, Dist. : Gandhinagar - 382115 Gujarat, India. Tel +91-2717-660550/+91-2717-660649	TMT Bars of Gde Fe 500 Fe 500D, Fe 550 & CRS (Size 8-32mm)	
16.	M/S Adhunik Industries Ltd.	ADHUNIK Fe 500 SD	Lansdowne Towers, 2/1A, Sarat Bose Road 6th Floor Kolkata 700020, West Bengal, INDIA Tel 033 30517100	TMT Bars of Gde Fe 500D (Size 8-32mm)	
17.	M/S Gallantt Metal Ltd	GALLANTT TMX	Ward 10BC, Plot No. 123, Ground Floor, Gandhi Dham Kutch, Gujarat - 370201 Tel: +91-2836-228164 Fax: +91-2836-235787 E-mail: gml@gallantt.com Website: www.gallantt.com	TMT Bars of Gde Fe 500 Fe 500D CRS (Size 8-32mm)	
18.	M/S Rashmi Metaliks Ltd	RASHMI TMT	Premlata Building, 39, Shakespeare Sarani, 6th Floor, Kolkata - 700017 Tel: 033-22894255/56 Fax: 033-22894254 E-mail: mkt.domesticdip@rashmigroup.com Website: www.rashmigroup.com	TMT Bars of Gde Fe 500 (Size 8-32mm) Fe 500D, Fe550D (Size 8-25mm)	

Srl No	COMPANY NAME	BRAND NAME	ADDRESS	Type of Structural Steel	REMARKS
19.	M/S Rashtriya Ispat Nigam Limited (RINL)	RINL	Visakhapatnam Steel Plant Visakhapatnam - 530 031, India Tel: (91 891) 518226,518376 Fax: (91 891) 518316 E-mail: cmdvsp@itpvis.ap.nic.in	Structural Steel (Angle, Beam, Column, Channel, Plate)	
20.	M/S Tata Iron & Steel Company (TISCO, or Tata Steel)	TATA	Bombay House, 2, 4 Homi Modi Street Mumbai - 400 001, India Tel: (91 22) 204 9131 Fax: (91 22) 204 9522, 287 0840 E-mail: corpcomm@jsr.tatasteel.com (Br office for North : Jeevan Tara Bldg, Patel Chowk, New Delhi)	Steel (Angle, Beam, Column, Channel, Plate)	
21.	M/S Steel Authority of India Limited (SAIL)	SAIL	Central Marketing Organization, Northern Region 17th Floor, scope Minar, Laxmi Nagar Distt. Centre, Delhi - 110092	Steel (Angle, Beam, Column, Channel, Plate)	
22.	M/S Jindal Steels and Power Ltd.	JINDAL	Jindal centre, Plot No 2, Sector- 32, Gurgaon- 122001, Haryana Tel: 0124 661 2000 Fax: 0124 661 2125 Website: www.jindalsteelpower.com	Steel (Angle, Beam, Column, Channel, Plate)	

Note: Contractor can even procure TMT bars from the primary producer approved by the AHQ E-in-Cs Branch during currency of the contract work.

(f) The documents in support of purchase of steel shall be furnished to GE for verification. The particulars of the manufacturers of steel shall be furnished by the contractor for every lot of steel separately as per the Performa given in Annexure-I.

(b) **STRUCTURAL STEEL**: : structural rolled and tubular mild steel sections shall be procured directly from main producers i.e. SAIL/RINL/TISCO/Jindal. In case of non availability with primary producers ,the structural steel can be procured from secondary steel producers like (i) Kashi Vishwanath Steels Ltd, A-80, Vivek Vihar, Phase-I, Delhi-110095 (ii) M/S Shyam Steel Ltd, 29, Ganesh Chandra Avenue, Ist Floor, Kolkata-13, Tele-03322379444, 22373311. FAX-03322366937, (iii) M/S K L Steel Pvt Ltd, Post Box No 61, Lal Kuan, Bulandshahar Road, Ghaziabad (UP), Tele :0120-2867911, 2867915, FAX-0120-2867917, (iv) M/S Shree Parashnath Re-Rolling Mills Ltd, Admin office:- 3511 Part Dr B C Roy Avenue,Durgapur-713201 Ph:- 0343-2550537/2550538 FAX-0343- 2554457 , (v) M/S SRMB Srijan Pvt Ltd Kolkatta (vi) M/S Amba Shakti Ispat Ltd Solan(H.P.) & from the any other secondary producer approved by the EINC Br. even during currency of the contract) however with a reduction of 5%(five percent) of the accepted rate of structural steel. In case the desired section of structural steel is not rolled/manufactured by primary producers, there shall be no price adjustment in use of structural steel procured from approved secondary producers.

(c) Reinforcement steel, structural steel and Galvanised steel sheets & fabric reinforcement for concrete may be permitted to be procured from authorized dealers of main producers in case the total requirement of steel is less than 5 tonnes and specifically approved by Accepting Officer in writing.

(d) Steel sections for railings, gates, fencing, guard bars, grills, steel chowkhat, holdfasts etc., which do not constitute structural members, can be procured from main producers/ secondary producers/ BIS marked manufacturers or their authorized dealers at the option of Contractor after written permission from the GE and will be without any minus price adjustment.

(e) Contractor shall submit manufacturers test certificate for the each consignment of Steel section to be used for fencing /security & compound wall posts/strut .

(f) The documents including manufacturers test results in support of purchase of steel shall be furnished to GE for verification. The particulars of the manufacturers of steel shall be furnished by the contractor for every lot of steel separately as per the Performa given in Annexure-I.

(c)GALVANISED STEEL SHEETS & FABRIC REINFORCEMENT FOR CONCRETE: These shall be procured directly from main producers/BIS marked manufacturers as approved here-in-before at the option of Contractor without any minus price adjustment.

(d) Reinforcement steel, structural steel and Galvanised steel sheets & fabric reinforcement for concrete may be permitted to be procured from authorized dealers of main producers in case the total requirement of steel is less than 5 tones and specifically approved by Accepting Officer in writing.

(e) Steel sections for railings, gates, fencing, guard bars, grills, steel chowkhat, holdfasts etc., which do not constitute structural members, can be procured from main producers/ secondary producers/ BIS marked manufacturers or their authorized dealers at the option of Contractor without any minus price adjustment. Tests will not be insisted upon for such steel sections.

(f) The documents in support of purchase of steel shall be furnished to GE for verification. The particulars of the manufacturers of steel shall be furnished by the contractor for every lot of steel separately as per the Performa given in Annexure-I.

10.3. TESTING OF STEEL :

(a) The contractor shall submit the manufacturer's Test certificate in original alongwith the test sheet giving their results of each mechanical test as applicable and the chemical composition of the steel or authenticated copy thereof duly signed by the manufacturer with each consignment. The Engineer-in-Charge shall record these details in a steel Acceptance Register after due verification.

(b) It will be mandatory for the GE to carry out simple field test and record the findings before the contractor is allowed to use steel in the work. CWE may also carry out random checks and record his remarks in the Steel Test Register. Such simple testing includes sand papering the cross section of the TMT bar and dipping it in chemical solution to give a clearly defined annular ring of tempered steel. Cost of all such facilities for test shall be borne by the contractor.

(c) The Accepting Officer may order a board of Officers for random check of steel and verification of connected documents. In case of such check, if it is found that steel brought on site/incorporated in work does not meet the requirements laid down in the contract, such steel/work in which such steel has been incorporated shall be rejected or devalued based on the defects. In this regard decision of the Accepting Officer shall be final and binding. Contractor shall have no claim whatsoever on account of such rejection.

(d) Independent testing of steel by the GE from random samples of steel drawn from various lots from National Test House, SEMT, CME, Regional Research Labs, Govt Engineering College, Zonal Lab or Govt approved Labs etc, as per the recommended frequency given here-in-after shall be optional at the discretion of the GE in case of procurement of steel from main producers and testing charges shall be borne in accordance with Condition 10 A of IAFW-2249 i.e. testing charges shall be borne by the Deptt, if the test results are found in order otherwise these shall be borne by the Contractor.

(e) Independent testing of steel by the GE from random samples of steel drawn from various lots from National Test House, SEMT, CME, Regional Research Labs, Govt Engineering College, Zonal Lab or Govt approved Labs etc as per the recommended frequency given here-in-after shall be mandatory in case of procurement of steel from secondary producers and testing charges shall be borne by the contractor irrespective of the outcome of test results.

(f) In both the cases at sub Para 10.3 (d) & (e) above, the Contractor at his cost shall provide all facilities required for the testing and cost of materials consumed in tests shall also be borne by the Contractor.

(g) The elongation of reinforcement steel shall not be less than 18%.

10.4 FREQUENCY OF NORMAL MASS, TENSILE, BEND AND REBEND TESTS OF STEEL.

NOMINAL SIZE	QUANTITY
STEEL REINFORCEMENT	
(a) Bars size less than 10mm.	One sample (three specimens) for each test for every 25 tones or part thereof).
(b) Bars size 10mm to 16mm.	One sample (Three specimens) for each test for every 35 tones or part thereof).
(c) Bars size over 16mm.	One sample (Three specimens) for each test for every 45 tones or part thereof.
STRUCTURAL STEEL	
(a) Tensile test including %age elongation	One test for every 25 tones of steel or part thereof).
(b) Bend test	-One test for every 10 tones of steel or part thereof.

NOTE: - APPLICABLE FOR ALL TESTS.

For various tests, acceptance criteria, tolerance etc. refer to steel supply/Acceptance form given here-in-after and relevant BIS Codes.

PARTICULAR SPECIFICATION(contd...)

STEEL SUPPLY & ACCEPTANCE REGISTER

1. CA NO & Name of Work
2. Contract No
3. Name of Manufacturer's T.C. No
4. Manufacturer
5. Random Test Details

(a) Physical test report from _____ vide their letter No _____
(Name of approved Lab/Engg College)

(b) Chemical test report from_____ vide their letter No_____
(Name of approved Lab/Engg College)

6. Types of Steel, Dia & Qty (a) Type: TMT/CRS (b) Dia-____mm
(c) Actual Wt___MT (d) Conversion Wt ____MT.

	Chemical Test						Mechanical Test						
	Carbon%	Sulphur%	Phosphorous %	Maganese%	Silicon %	Corrosion Resistant Element	Wt per meter	Stress(N/mm2) 0.2% proof	Tensile Strength (N/mm2)	Elengation % (Not less than 18%)	Bend Test	Rebend Test	Remarks
As per IS-1786													
As per manufacturer's test certificate													
As per independent test													

Remarks with Signature Accepted/Rejected

Contractor Junior Engineer Engineer-in-Charge Garrison Engineer

Remarks of BOO/Inspecting Officer/CWE

10.5 DOCUMENTATION

(a) The contractor shall submit original purchase vouchers from the manufacturer for the total quantity of steel supplied under each consignment to be incorporated in the work. All consignments received at work site shall be inspected by the GE alongwith relevant documents before acceptance. The original vouchers and the test certificates shall be defaced by the Engineer-in-Charge and photocopy of the same shall be kept on the record in the office of GE duly authenticated and with cross reference of control number recorded in the steel Acceptance Register and will be signed by JE (Civil), Engineer-in-Charge, GE and the contractor duly endorsed CA No & Year.

(b) The entire quantity of all steel items shall be recorded in Measurement Book indicating size, quantities, voucher numbers, dates brought on site for record purposes as “not to be abstracted” and signed by Engineer-in-Charge and the contractor before incorporation in the work.

(c) Irrespective of what is shown in drgs or specified else where, steel reinforcement to be used in this project shall be Thermo Mechanically Treated steel bars.

10.6 (a) STEEL FOR REINFORCEMENT

(i) High strength deformed steel bars produced by thermo mechanical treatment process (TMT steel bars of grades Fe-500 /Fe 500D/Fe550/Fe550D) meeting all other requirements of IS-1786.

Note :- For Swimming pool, Diving pool, Balancing tank , Hazardous tank, RCC over Head water tank , High strength corrosion resistant deformed steel bars (from primary producers as approved by E-in-C’s Branch) produced by Thermo Mechanical Treatment process (TMT steel bars) of grade Fe-500 /500Dmeeting all other requirements of IS-1786,shall be used.Minimum elongationshall be 18%.

(ii) Mild steel bars shall conform to IS-432 (Part-I) and Grade I.

PARTICULAR SPECIFICATION(contd...)

(b) STRUCTURAL STEEL

(i) Structural steel standard quality shall conform to IS-2062-2006 (sixth revision) and Grade Fe-410-W (Gde E-250), quality A. The above mentioned steel shall be provided in the locationmentioned in drawings and in clause 10.4.1 of MES Sch Part I.

(ii) Structural Steel ordinary quality shall be used for structures not subjected to dynamic loading. This steel shall not be used where welding is used in fabrication and in earth quake zone where severe damage is expected and design of structure based on plastic theory. The steel shall conform to IS-2062-2006 (sixth revision) and Fe-290 (Gde E-165). The above mentioned steel shall be provided in the location specified in drawings and in clause 10.4.2 of MES Sch Part I.

(iii) Structural steel ordinary quality shall be used in railing, gates, fencing, guard bars, grills, holdfasts, door and window frames etc, and shall conform to IS-2062-2006 (sixth revision), Fe-290 (Gde E-165). The above mentioned steel shall be provided in the location specified in drawing and in clause 10.4.3 of MES Schedule Part I.

(c) Galvanised steel sheets (Plain and corrugated) : Conforming to IS-277.

10.6.1 For pricing of deviation in respect of steel items, the quality of steel shall be taken as under: -

(a) Structural steel : Standard quality Fe410-W (Gde E-250) quality A As (other than mentioned in MES Schedule. general purposes)

(b) MS round bars for : IS-432(Part I) reinforcement Gde I mild steel/twisted bars and as mentioned in MES Schedule 6 mm can be wire drawn quality.

(c) TMT.Bars for : TMT bars Fe 500/Fe 500d/Fe 550d conforming to reinforcement IS 1786-1985

(d) Steel (general purpose) : Ordinary quality Fe 290 (Gde E-165)

(e) Fabric reinforcement for concrete: Conforming to IS -1566.

10.6.2 The steel shall be procured and brought to the site one month before it is required to be incorporated in the work taking into account the time required for it's inspection and acceptance as specified here-in-before.

10.6.3 Contractor shall be responsible for proper storage, preservation and maintenance of steel at site till it is consumed in the work. Steel rejected shall be stacked separately, so marked and removed as directed by GE.

10.7. REINFORCEMENT:

(a) Reinforcement of mild steel and deformed cold twisted bars shall be of TMT bars in lieu thereof without change of any spacing all as shown on drawings in accordance with the provisions of IS: 456 of 2000 without any extra cost to Govt.

(b) Reinforcement shall be fabricated, placed in position all as shown on drawings and specified in Clause 10.17 to 10.22 of MES Schedule Part- I.

(c) Laps and crossing shall be tied with mild steel wire (annealed) (soft drawn) of diameter not less than 0.90mm. Laps shall be staggered.

(d) Irrespective of whether corner reinforcement is indicated or not in RCC plan showing reinforcement of slabs, corner reinforcement shall be provided as shown in TD (typical drawings).

(e) The contractor shall be responsible for accurate fixing of reinforcement shown on drawings, and shall not pour any concrete until the reinforcement has been inspected in position and approved in writing by the GE. The contractor shall take necessary precaution to prevent any displacement of reinforcement bars during concreting.

PARTICULAR SPECIFICATIONS (Contd....)

10.8. STRUCTURAL STEEL WORK :

Structural steel work shall be executed as specified in relevant clauses of section 10 of MES Schedule Part I.

NOTE :

Steel for holdfasts, grills, guard bars, cooler brackets etc shall be ordinary quality. Balance structural steel shall be of standard quality. Test certificate for ordinary quality steel is not required.

10.9. MS BLACK, BOLTS, NUTS AND WASHERS

(a) All MS Black, Bolts and nuts shall conform to IS: 1353 part I to III of 1984 and round washer shall conform to IS: 5370, IS: 5372 or IS: 5374 where ever specification are not available, the American standard specifications to be followed.

(b) Bolts, heads, nuts, shall be of such length as to project and clear thread beyond the nuts when fixed in position and these shall fit in the holes without any shake. The nut shall fit in the threaded ends of bolts properly.

(c) The round washers shall be placed under the heads and nuts of permanent bolts. Maximum two washers for one nut and one for each bolt head shall be used. Bolts threads shall be out side limit of jointing members and un threaded portion of bolt shall not be out side the washer.

(d) Bolts, Nuts & washers shall be thoroughly cleaned and dipped in double boiled linseed oil before used. The bolts shall be tightened starting from the enter of joints towards the edge.

11 to 13 Blank

14. MILD STEEL SHEET

MS sheet /plates shall be of thickness as shown on drawings in various locations conforming to Fe-410-S.

15. STEEL WINDOWS AND VENTS:

(a) Steel windows and ventilators where shown on drawings shall be factory made and as per clause 10.25 of MES Schedule Part I except that the corners of frames shall be welded to form solid welded joints conforming to the requirements listed in IS-1038 and the process of welding adopted shall be 'FLASH BUTT' welding. "Z" section for steel windows shall conform to relevant IS.

(b) Steel windows frames shall be provided with horizontal glazing bars as per drawings. These glazing bars shall be welded. Fixing and glazing of windows/ventilators shall be in accordance with IS: 1081. Glazing shall be fixed to frames with oil putty. Special spring glazing clips shall be used if the size exceeds that specified in aforesaid IS.

(c) Steel window/ventilator frames in contact with brick work/concrete shall be painted in mastic of one part of bitumen and three parts of sand or ready-made mastic supplied by the manufacturers. Painting with cement will not be allowed in any case.

(d) Hinges for side hung shutters shall be box type as specified in IS: 1038. Fittings (Builders hardware) for steel windows shall be of MS black japanned, pressed steel heavy duty, corrosion resistant without wrinkle finish. In lieu of lock handle MS Black japanned tower bolt two Nos on each shutter shall be provided.

(e) Steel windows/ vents shall be fixed to walls with lugs/ hold fasts embedded in PCC blocks. Lugs shall not be provided for fixing to lintels even though its provision exists in the Indian standard specifications and/or drawings. Lugs shall be embedded in PCC (1:3:6) type C-1 using 20 mm graded stone aggregate size 150 x 150 x 200 mm deep.

(f) The contractor shall procure steel windows and ventilators from the firms indicated in Appendix 'C'. Steel windows and ventilators manufactured at site will not be accepted. Samples of the steel windows/vents and fittings accessories shall be submitted to the GE by the contractor for his approval in writing before placing bulk order for procurement.

(g) The dimensions of steel windows/ventilators unless otherwise indicated on the drawings, shall conform to IS: 1038. However, minor variations in the overall size to suit the standard practice of the manufacturer will be acceptable without any price adjustment either in the quoted rates or while pricing deviations.

(h) Steel windows/ventilators & lugs shall be given one shop coat of anti-corrosive zinc chromate primer. Two coats of synthetic enamel paint of approved shade shall be given after erection.

(j) In case of deviations, the rate given in the MES Schedule shall be deemed applicable for pricing steel windows and ventilators with above specifications.

(k) Wherever windows marked with 'F' double window are shown on drawings, two separate frames, one for glazed shutter/ paneled shutter and one for gauze shutter as shown on drawing shall be provided. Gap between two frames on cill shall be filled with cement mortar (1:4) and finished smooth.

16. EXPANDED METAL :

Expanded metal, where shown on drawings shall be of gauge as approved by the GE. Unless otherwise specified it shall weigh not less than 4 Kg per Sqm.

17. HOLD FASTS/LUGS:

Hold Fasts/lugs to steel frames shall be of section as shown on drawings but of length as under:-

(a) Frames chowkhats for doors /Six numbers to each frame and 250 mm long cup board (MS angle or pressed steel)

(b) Frames for windows, Four numbers to each frame and 200 mm long Independent grills fixed in openings frames for lobby shutters etc.

(c) Frames for vents etc. Two numbers, 200 mm long.

Hold fasts/lugs 250 mm long shall be embedded in PCC (1:3:6) blocks using 20 mm graded stone aggregate of size 1 Bk x ½ Bk x thickness of wall and with 200 mm length shall be embedded in PCC block 150 x 150 x 200 mm deep. Hold fasts/lugs in the RCC columns etc shall be fixed all as shown on drawings.

18. MILD STEEL GRILLS:

Grills shall be provided as per patterns & location shown on drawings. Where type of grills is not mentioned it shall be type 'B'. Grills shall be welded to the frame of glazed window. Where grill is to be fixed independent in the opening, it shall be fixed with 25 x 5 mm FI holdfasts four numbers embedded in PCC block as specified above.

19. BLANK

20. ROOFING

20.1. RCC SLABS:

20.1.1. RCC floor/roof slab shall be laid to the required thickness all as shown on drawings.

20.1.2. RCC roof slabs shall have a finished slope of all as shown on drawing. However where slope is not shown the same shall be finished to the slop of 1:40.

20.1.3 WATER PROOFING TREATMENT TO ROOFS:

20.1.3.1 Before taking up roof treatment, RCC roof slab shall be tested by ponding with 25 mm height of water for 72 hours.

20.1.3.2 Testing by ponding shall be done after completion of curing of slab & removal of form work.

20.1.3.3 Location of leakage/seepage if any observed after ponding of RCC roof for 72 hrs, there will be identified and marked for inject grouting to be carried out by the contractor without any extra cost. The roof will be rechecked for any seepage/leakage by ponding with water for 72 hrs before further proceeding with the treatment.

20.1.3.4 The grouting will be carried out using polymer modified water proof grout Manufactured by the firms shown in make of products under strict supervision of specialist firm. The detail procedures for inject grouting are as under:-

(a) Use polymer modified water proof grout.
(b) Drill 12 mm dia holes upto 40mm depth and provide PVC nozzles/entry ports over grid @ 1 m c/c or less depending upon situation.
(c) Before injecting the grout compressed air to be blown to remove all dirt and dust.
(d) Grouting at pressure of 5 kg/cm2 to be done till refusal/rejection or appearance of grout from adjacent nozzle.
(e) After grouting is completed, the nozzles will be sealed with CM 1:3 & cured.

WATER PROOFING TREATMENT TO RCC ROOF & SUNKEN FLOOR shall be as per below :

1.Water proofing treatment shall be provided with Polymeric water proofing membrane (weighting not less than 3.0 Kg/Sqm) on prepared surface as per manufacturer instruction and under strict supervision of manufacturer technical representative.

PARTICULAR SPECIFICATION(contd...)

2.Material: Polymeric water proofing membrane shall consist of a centre core 90-micron thick high-density polyethylene film protected on both sides with a high quality polymeric asphaltic mix. The polymeric asphaltic mix will be protected on both sides with thermo fusible HMHDPE film.

3 Technical specifications

(i) Thickness of polyethylene (centre core)	90 to 100 Micron
(ii) Heat resistance 1000C for 1 hour	Does not drip
(iii) Cold resistance at (-) 5 0C	Does not break/ crack
(iv) Tensile strength	
Lengthwise	110 N/Sq cm
Cross wise	100 N/Sq cm
(v) Elongation	
Length wise -	> 300%
Cross wise	> 300%
(vi) Weight Sqm	Not less than 3Kg per
4. Application	
(i) Apply 10 mm thick plaster in cement mortar (1:3) with WPC as per manufactures instructions when concrete is green. However in the event of deviations the quantity of water proofing compound shall be considered @ 3% by weight of cement. The make of WPC shall be as per Appendix'	
(ii) The surface of roof, sunken floor, parapet and gutters, drain mouths, etc. over which waterproofing treatment is to be applied shall be cleaned of all foreign matter such as, fungus, moss, dust etc by wire brushing and dusting. For cast iron drain out lets a groove shall be cut around to tuck in the treatment. Concrete angle-fillets shall be provided at junctions between roofs and vertical faces of walls (parapet and other walls), around obstacles such as pipes, chimneystacks, etc. and other similar situation to ease up about corners.	
(iii) Apply bituminous primer conforming to IS: 3384-1986 @ 0.30 litre per Sqm to be applied on prepared surface.	
(iv) Hot blown grade 85/25 bitumen as per IS : 702-1988 @ 1.2 Kg/Sqm will be applied over	
primer .	
(v) Polymeric water proofing membrane will be laid and bonded completely to the substrate. The overlaps are then sealed/ fused by flame as per manufactures' instructions.	

Topping of polymeric membrane:

20.2 WATER PROOFING TREATMENT TO NON APPROACHABLE ROOF

20.2.1 Irrespective of what is specified elsewhere or shown on drawings, water proofing treatment to all RCC roof slab shall be carried out as under:-

(a)Providing finished slope of 1:30 to RCC roof slab or as indicated in Drgs.

(b) Providing average 10mm thick plaster in CM 1:3 mixed with water proofing compound when concrete is still green.

(c) After the concrete is fully dried, it shall be cleared free from dust and shall be painted with a coat of bituminous primer @ 0.30liters/Sqm.

(d) After primer, the entire roof surface shall be painted with hot blown bitumen grade 85/25 conforming to IS-702 @ 1.2 Kg/Sqm.

(e) Over hot bitumen, polymeric water proofing membrane consisting of 90 to 100 micron thick central core of HMHDPE film and standard weight 3 Kg/Sqm shall be laid with 100mm side lap/end lap on prepared surfaces as per manufacturer's instruction and under strict supervision of manufacturer's technical representative.

(f) Topping will be done with brick tiles 40 mm thick laid over a bedding layer 20 mm thick screed of cement mortar 1:4 . The cement mortar screed shall be mixed with polymer based liquid water proofing additive @5% by weight of cement or as per manufacturer's instructions . The tiles joints shall be filled with cement mortar 1:3 mixed with crude oil as per SSR -2009 (PartI). After laying the brick tiles the work shall be cured with water by ponding.

20.3 WATER PROOFING TREATMENT TO APPROACHABLE ROOF USING POLYMERIC WATER P ROOFING MEMBRANE

Irrespective of what is specified elsewhere or shown on drawings, water proofing treatment to all RCC roof slab shall be carried out as under:-

(a) Providing finished slope of 1:40 to RCC roof slab or as indicated in Drgs.

PARTICULAR SPECIFICATION(contd...)

(b) Providing average 10mm thick plaster in cement mortar 1:3 mixed with polymer based water proofing compound when concrete is still green.

(c) After the concrete is fully dried, it shall be cleared free from dust and shall be painted with a coat of bituminous primer @ 0.30 liters/Sqm.

(d) After primer, the entire roof surface shall be painted with hot, blown bitumen grade 85/25 conforming to IS-702 @ 1.2 Kg/Sqm.

(e) Over hot bitumen, polymeric water proofing membrane consisting of 90 to 100 micron thick central core of HMHDP film and standard weight 3 Kg/Sqm shall be laid with 100mm side lap/end lap on prepared surfaces as per manufacturer's instruction and under strict supervision of manufacturer's technical representative.

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(f) Laying 20mm thick PCC tiles machine pressed, factory made as per relevant IS -1237-1980 laid over a bedding layer 20mm screed in cm 1:4. The cement mortar screed shall be mixed with polymer based liquid water proofing additive @ 5% by weight of cement as per manufacturer's specifications/instructions and tiles joints shall be filled with polymer based cement proof joint filter manufactured by M/S Bauchemic (I) Pvt Ltd or M/S Rolle constructions chemicals or equivalent.

20.4 WATER PROOFING FOR SUNKEN SLABS

(a) The sunken slab shall be laid to a slope of 1:40 outwards with 40mm dia GI Pipe spout projecting 100 mm beyond outer face of the wall. All vertical sides shall be cast monolithically with sunken floor with M-25 grade concrete. The trough constructed shall be tested to seepage/leakage by ponding the same with water for 72 hours. In case any seepage is noticed, the portion shall be grouted with cement slurry mixed with suitable chemicals and tested again. The process of grouting and testing shall be repeated till no seepage/leakage/wetness is observed.

(b) Treatment same as specified for approachable roof except item as specified in Para 20.3(f) above (except PCC tiles).

(c) Sunken floor shall be filled up with PCC 1:5:10.

Notes: -

(a) Polymeric water proofing compound shall be as per manufacturer's specifications. Polymeric water proofing compound manufactured by M/S Bauchemi (India) Pvt Ltd. Bombay or equivalent may be used.

(b) Suitable embodiment of polymeric water proofing membrane shall be inserted into walls/parapet walls. Special care shall be taken in laying the polymeric water proofing membrane at singularities such as drains, expansion joints etc. Details of lying shall be followed from manufacturer's guide. Technical specifications for polymeric shall be as under:-

(i) It shall have a centre core of HMHDP (High molecule High density polythene) film of thickness (90+10) micron.

(ii) Both sides of the centre core will be covered with polymeric asphaltic mix. The polymeric mix is protected on both sides with thermo fusible HMHDPE film:-

20.4A ROOF TREATMENT FOR OPEN GARAGES

15mm thick plaster in cement mortar 1:3 with WPC as per manufacturers specification while concrete is still green (i.e. with three days of carting of roof slab) or over a coat of bonding chemical of make FOSROC/ Pidifite for proper bond of plaster layer with base concrete slab.

20.5 METHOD OF LAYING

20.5.1 The sequence of operation for all types of treatment shall be a follows:-

(a) Preparation of the surface including cleaning of roof surface of all foreign materials.

(b) Laying of treatment on roofs and provision of flashings.

(c) Treatment of gutters and drain mouths.

(d) Surface finishing and

(e) Cleaning and removal of surplus materials.

PARTICULAR SPECIFICATION(contd...)

20.5.2 Throughout the laying operations, care shall be taken to avoid puncturing of the membrane.

20.5.3 The number of laps shall be minimized by selecting film of suitable width and laying it as specified here-in-after. The minimum width of laps shall be 10cm between adjacent membranes and at the end.

20.5.4 As far as possible, the membrane shall be laid down as follows:-

(a) Flat roofs - At right angles to the direction of flow of water with the overlap facing downwards.

(b) Sloping roof - Successive layers laid along the slope.

(d) Curved shell roof - Across the slope in order to avoid excessive laps in the trough portion.

20.5.5 As far as possible, laps shall be avoided in the troughs or valleys, where unavoidable, they shall be covered by an additional membrane strip of adequate width.

20.5.6 Wherever membrane is to be carried over from horizontal to vertical surface, it should be over a fillet and protected with cement plaster or any other treatment. This applies to the portions of the structures, such as corners, gutters, junctions, parapets and all vertical faces.

20.5.7 Typical details of the treatment in case of roofs projecting beyond the wall, junctions of roof with parapet walls and roof with projecting features. The purpose of adopting these details is to ensure that the moisture does not find its way through an unguarded weak link in the complete treatment.

20.5.8 Where parapets exist and down take water pipes are provided to drain off the rain-water, extra piece of membrane shall be provided in the opening covering the edge of the water pipe and covered with cement plaster 1:6.

20.6 FLOODING TEST TO RCC SLABS

20.6.1 On completion of casting of RCC slabs and sealing up pores the Contractor shall carryout flooding test of each RCC slab after 28 days of curing of RCC slab. Flooding test shall be carried out by forming earthen bunds over parts of the roof slab and at selected locations as directed by the GE. Water shall be ponded for minimum depth of 50 mm and shall be allowed to remain over slab for a period of 72 hours. During this period if any defect such as leakage/seepage etc is noticed it shall be rectified by the contractor by grouting to the satisfaction of the GE. After rectification of the defects more tests shall be carried out at the discretion and to the satisfaction of the GE.

20.6.2 Testing : The contractor will submit original purchase voucher along with the test certificate for each consignment/lot of material brought at site. Independent testing will also be carried out be GE for least one test sample consisting of three test e specimen at random from each lot. The polymeric membrane shall be got tested from the test house as mentioned here under :-

Frequency of test At least one test consisting of three sample specimen of polymeric membrane at random from each lot. The polymeric membrane shall be got tested from the test house as mentioned hereunder:-

(a) Chemical and metallurgical, Services T.S. No. 63, SIDCO Industrial Estate Ekkaduthangal, Chennai-600097 Fax No: 44-2312944.

(b) Central Institute of Plastic Engineering and Technology (Ministry of Chemical and fertilizer, Govt of India) Guindy, Chennai-600032, Fax No : 94-44-2344673

(c) National Test House, Alipore, Kolkatta.

(d) Regional Testing Centre (Northern Region), NABL Accredited laboratory
Shaeed Capt. Gaur Marg, Okhla Industrial Estate, New Delhi-20

20.6.3 MAKES

(a) Hyperplas polymeric water proofing membrane manufactured by IWL India Limited, C&D Laxmi Bhawan, 609, Anna Salai, Chennai - 600006.

(b) Super Thermolay APP PL/MT by STP Texsa limited 570 phase V Udyog, Gurgaon 122016 India.

(c) HYDROSTOP Waterproofing Membrane of Tiki Tar.

PARTICULAR SPECIFICATION(contd...)

20.7 Execution of work

20.7.1 The work will be got executed through authorized applicator of the manufacture under strict supervision of Engineer-in-Charge.

PARTICULAR SPECIFICATION(contd...)

21. GUARANTEE FOR WATER PROOFING TREATMENT

21.1. The main contractor shall stand; guarantee to the Govt for a period of ten years from the certified date of completion of the work for the effectiveness of the treatment shall be furnished in favour of Garrison Engineer in writing.

21.2. If the GE at any time during construction or reconstruction or prior to the expiry of the Guarantee period, finds that the buildings have leakage seepage from the roof, the contractor shall, on demand in writing from the GE specifying the building (s) complied of, not withstanding that the same may have been inadvertently passed certified and paid for, undertake to carryout forth with such treatment as may be necessary to render the building (s) free from leakage seepage at his own expense, till expiry of the guarantee period. In the event of his failure to do so, within the period to be specified by the GE in his demand aforesaid, the GE may undertake such treatment at the risk and expense in all respect, of the Contractor. The liability of the Contractor under this condition however shall not extend beyond the period of TEN Years from the certified date of completion, unless the GE had previously given notice to the contractor to rectify the defects.

21.3. The amount of security deposit to be held back from the Contractor's bill against the guarantee for water proofing treatment shall be calculated on the amount of water proofing treatment at contract rates as per the scales given below enhanced by 1.25 times of the amount so calculated. This shall be worked out by GE and intimated to the Contractor. This amount shall be refunded to him after the expiry of the guarantee period. Alternatively, the Contractor may give a separate interest bearing security deposit to GE valid for 10 Years for this amount.

	Cost at contract rates	Amount of Security Deposit
(i).	Upto Rs. 50 lakhs	2% of the amount subject to a minimum of Rs. 5000/-
(ii).	Over Rs. 50 lakhs and upto Rs. 100 lakhs	Rs. 1,00,000/- + 1.5% of the amount exceeding Rs. 50 Lakhs
(iii).	Over Rs. 100 lakhs and upto Rs. 500 lakhs	Rs. 1,75,000/- + 1% of the amount exceeding Rs. 100 Lakhs
(iv).	Over Rs. 500 lakhs and upto Rs. 1500 lakhs	Rs. 5,75,000/- + 0.5% of the amount exceeding Rs. 500 Lakhs
(v).	Over Rs. 1500 lakhs	Rs. 10,75,000/- + 0.5% of the amount exceeding Rs. 1500 Lakhs subject to Rs. 18.75 Lakhs

22. GUARANTEE & MAINTENANCE:

The contractor shall obtain Guarantee for 10 years from the manufacturer and submit to the GE after completion and testing of roof. Any defect/leakage /seepage observed during this period notified by the GE in writing shall be made good by the contractor through the manufacturer or their authorised applicator to the entire satisfaction of GE within a reasonable period, failing which, the defects shall be got rectified at the contractors risk and cost. The defects liability period mentioned purpose of this condition. All the expenditure incurred in getting the defects rectified shall be borne by the contractor.

23. FLOOR FINISHES:

23.1 GENERAL:

(a) Type of floor topping shall be provided to details as shown on drawings/ Schedule of finishes and as specified here in after. Flooring shall be laid as indicated in SSR Part -I.

(b) Floor topping shall be extended over dwarf walls, doors and other openings.

(c) Cement for floors shall be as described here in before.

(d) PCC sub floor may not be laid in panels/bays. For the purpose of deviation, the rates as given in SSR Part-II for flooring shall be applicable.

(e) Unless otherwise shown in drawings, the dividing line between the floors of different types, wherever they so meet between adjoining rooms, shall be determined on the basis of the finish visible when the doors are closed so that no dissimilarity appears and the finish shall accordingly be provided.

PARTICULAR SPECIFICATION(contd...)

23.2 FLOOR TOPPING:

(a) Cast in situ PCC floor topping shall be laid in panels as per clause 13.32.1 and 13.38 of SSR Part-I respectively. The pattern/layout of panels in rooms shall be as directed of GE.

(b) Joints in floor topping shall not be staggered while providing glass strips.

(c) Unless otherwise shown on drawings/Schedule of finishes and/or specified hereinafter, PCC floor toppings shall be finished even and smooth using extra cement and no plastering for finishing floor shall be allowed.

23.3 GLASS DIVIDING STRIPS:

(a) Glass dividing strips shall also act as form work and in case of deviation no deduction/ addition for form work shall be made over PCC flooring rates as given in SSR Part- II.

(b) Top of glass dividing strips shall be rubbed smooth finished with Carborandum stone wherever required.

(c) Unless otherwise specified, pin headed glass dividing strip 4mm thick shall be provided in all PCC floor/terrazzo floor to a depth of 38 mm in 40 mm thick topping. It shall be suitably increased where thickness of topping is more. Glass dividing strip shall however not be provided in all such locations where thickness of floor topping (i.e. wearing layer/surface) exceeds 75mm.

23.4 PCC PAVING

Unless otherwise shown on drawings or mentioned in Schedule 'A', specification for provision of paving shall be all as specified for plinth protection except that it shall be laid in bays not exceeding one m on either side.

TYPES OF FLOOR: Unless otherwise mentioned in drgs and in schedule of finishes floors shall be provided as specified here-in-after.

I.CEMENT FLOORING:

In all the places where PCC topping with sub base has been indicated in drgs, the same shall be provided as per the Schedule of finishes and as specified here-in-below.

(a) 40 mm thick, PCC (1:2:4), type B-1, using 20 mm graded stone aggregate, with glass dividing strips, 4 mm thick and 38 mm in width, over a coat of neat cement slurry over 75 mm thick PCC (1:5:10), type E-2, using 40 mm graded stone aggregate, sub base over well rammed earth. PCC floor shall be finished even and smooth without using extra cement. Size of each panel shall not exceed 1.20 m x 1.20 m.

(b) 50 mm thick, PCC (1:2: 4), type B-1, using 20 mm graded stone aggregate, over 75 mm thick PCC (1:5:10), type E-2, using 40 mm graded stone aggregate sub base over well rammed earth and all as specified in Para a) above.

© 75 mm thick, PCC (1:2:4), type B-2 using 40 mm graded stone aggregate, over 75 mm thick PCC (1:5:10), type E-2, using 40 mm graded stoneaggregate, sub base over well rammed earth and all as specified in Para (a)above.

(d) 100 mm thick, PCC (1:2:4), type B-2 using 40 mm graded stone aggregate over 100 mm thick PCC (1:5:10), type E-2, using 40 mm graded stone aggregate, sub base over well rammed earth and all as specified in Para (a) above. PCC topping shall be laid in alternate bays of panel size not exceeding 1.2 m x 1.2 m.

(e)50 mm thick, PCC (1:1½:3), type A-1, using 20 mm graded stone aggregate, with brass dividing strips over 100 mm thick PCC(1:2:4), type B-1, over 250 mm thick PCC(1:4:8), type D-2, using 40 mm graded stone aggregate, as in sub base over well rammed earth. PCC floor shall be finished even and smooth without using extra cement. Size of panel shall not exceed 1.2 m x 1.2 m

(f) 100 mm thick, PCC (1:2:4), type B-2, using 40 mm graded stone aggregate over,150 mm thick compacted thickness hard core over well rammed earth. PCC topping shall be laid in alternate bays, size not exceeding 1.2 m x 1.2 m.

NOTE FOR SRL 1 (a) TO (f):

(I) PCC topping shall be provided after brushing neat cement slurry @ 3 Kg/Sqm over sub base.

(g) 40 mm thick, PCC(1:2:4), type B-1, using 20mm graded stone aggregate over cement slurry @ 3 Kg/Sqm over well cleaned RCC slab/concrete in first floor. It shall be finished smooth without using extra cement.

PARTICULAR SPECIFICATION(contd...)

II. TERRAZZO FLOORING:

(a) In all the places where terrazzo finish has been shown in the drawings shall be provided as per schedule of finishes and as specified here-in-after:-

(b) Terrazzo flooring shall be provided as specified in Para 13.38 of SSR (Part-1) of 2009, 10 mm thick layer of terrazzo topping with grade No 1 marble aggregate as specified in Para 13.5 of SSR-2009(Part-I) over 30 mm thick, PCC (1:2:4) type B-1, using 20 mm graded stone aggregate with 4 mm thick and 38 mm in width glass dividing strip laid over a coat of neat cement slurry brushed @ 3 Kg/Sqm, over 100 mm thick PCC (1:5:10) type E-2, using 40 mm graded stone aggregate as sub base, over well rammed approved earth filling of required depth. Cement for Terrazzo flooring shall be white cement. Colour of marble chips shall be as directed by GE.

(c) Terrazzo flooring on first floor shall be provided as specified in Para 13.38 of SSR (Part-I) of 2009, 10 mm thick layer of terrazzo topping with grade No. 1 marble aggregate as specified in Para 13.5 of SSR -2009 (Part-I) over 30 mm thick PCC (1:2:4) type B-1, using 20mm graded stone aggregate with 4mm thick and 38mm in width glass dividing strips laid over a coat of neat cement slurry brushed @ 3 Kg/Sqm over well cleaned RCC slab.

III. NON SKID CERAMIC TILES FLOORING

(a) Rectified /joint less tiles of size 300x300mm for flooring shall be of uniform texture. Water absorption shall be less than 2%. Tiles shall be made finished; 6-7 mm thick hydraulically pressed with breaking strength 350 to 400 Kg/Sqm and weighing not less than 14 Kg/Sqm. It shall be free from bubbles, distortion due to overheating. Size and shade of tiles shall be directed by GE.

(b) Tiles shall be set in cement slurry over 15 mm thick screed in CM(1:4), over 25 mm thick PCC(1:2:4), type B-1, over 75mm thick PCC(1:5:10), type E-2, using 40 mm graded stone aggregate, over rammed earth. Joints shall be cleaned immediately after laying tiles and filled with white cement mixed with coloring pigment to match with the shade of tiles.

(c) Non skid ceramic tiles flooring on first floor shall be provided over 15mm thick screed bed in CM (1:4) over 20mm thick PCC (1:2:4) type B-1 using 20mm graded stone aggregate over well cleaned RCC slab and sat in cement slurry.

IV. KOTA STONE FLOORING

(a) Kota stone flooring shall be provided as specified in para 13.47 of SSR (Part-1) 2009. Kota stone in flooring shall be 18-22 thick laid on 20mm thick screed bed in CM (1:6), over 75mm thick P.C.C (1:5:10) type E-2 using 40mm graded stone aggregate, over well rammed approved earth. Kota stone shall be of size 550X550mm except at borders and shall be mirror finish & shall be hard, of uniform texture & without cracks flaws etc. Joints shall be filled in grey cement using pigment. Top surface shall be grinded and polished to achieve mirror finish. Full length Kota stone in one piece shall be provided on all the steps, stairs irrespective of what ever shown on drawing or mentioned elsewhere in the tender documents.

(b) Kota stone flooring on first floor shall be provided as specified in Para 13.47 of SSR (Part–I) 2009. Kota stone flooring shall be 18-22 thick laid on 20mm thick screed bed in CM (1:6) over well cleaned RCC slab.

(c) A border of 100 mm wide marble strip shall be provided in Kota stone flooring as shown on drgs.

V MARBLE TILES FLOORINS

Marble tiles flooring shall be provided as specified in para 13.39.6 of SSR (part–I) 2009. Marble tiles in flooring shall be 14-16 mm thick laid on 20 mm thick screwed bed in CM 1:6 over 75 mm thick PCC 1:5:10 type E-2 using 40mm graded stone aggregate over well rammed approved earth.

VI VITRIFIED TILES

Vitrified tiles flooring shall be provided as specified in para 13.15 of SSR (part –I) 2009. Vitrified tiles in flooring shall be 9 to 10 mm thick laid on 20 mm thick screed bed in CM 1:6 over 75 mm thick PCC 1:5:10 type E-2 using 40mm graded stone aggregate over well rammed approved earth.

PARTICULAR SPECIFICATION(contd...)

VIII PCC MOULDED INTERLOCKING BLOCK

PCC moulded interlocking block shall be 80mm thick and of any shape and size approved by the GE. It shall be of design mix M-35 ISI marked, laid over 80 mm thick sand cushioning over 25 mm thick PCC (1:2:4) type B-1 over 75mm thick PCC (1:5:10) type E-2 using 40mm graded stone aggregate over well compacted earth. The joint of block shall be filled with sand and watering to ensure proper locking.

IX CHEQUERED CEMENT CONCRETE TILES

Chequered cement concrete tiles, shall conform to IS 13801-1993 specification for Chequered cement concrete tiles. Chequered tiles shall be with the centre to centre distance of chequers not less than 25mm and not more than 50mm, the groove in chequers being uniform and straight with the depth of grooves not less than 3mm. Tiles shall be manufactured by pressure process. Thickness of wearing layer measured from top of the chequers shall not be less than 6mm.

Unless otherwise directed, the tiles shall be supplied with initial grinding and grouting of the upper layer. The upper layer of the tiles shall be free from projections, depressions and cracks, holes, cavities and other blemishes. The edges of the tiles may be rounded. All angles shall be right angles and all arises shall be sharp and true. The colour and texture of the wearing layer shall be uniform throughout its thickness. The size of Chequered Tiles shall be 250mm x 250mm x 22mm thick. The tolerance on length or breadth of tiles shall be +1mm and tolerance on thickness of tiles shall be +5mm. In addition the difference in thickness between the thickest and thinnest tile in the sample shall not exceed 3mm.

X VITRIFIED PAVING TILES ON SIDE WALK

Vitrified exterior paving tiles shall be of thickness not less than 9mm thick and of size 300mm x 300mm laid on 15mm thick screed bed in CM (1:4), over 75mm thick P.C.C. (1:5:10) type E-2 using 40mm graded stone aggregate, over 100mm thick stone aggregate hard core over well rammed approved earth. The tile shall be of make Orient or equivalent to Endura of M/S Johnson as approved by the GE.

23.6. TYPE OF SKIRTING /DADO

(a) KOTA STONE SKIRTING

Kota stone skirting shall be of 12 mm thick machine cut and mirror polished kota-stone 100mm high fixed over 10 mm thick rendering in CM (1:4).

(b) GLAZED TILES DADO/SKIRTING:

Irrespective of whatever shown on drawings the height of dado shall be 2100mm in toilet and bath. Glazed ceramic tiles shall be as specified in Para 13.15 and shall be provided in accordance with Para 13.40 of SSR Part- I. Tiles shall be 6 mm to 8 mm thick of size, shape and colour as directed by the GE. Tiles shall be pasted on 10 mm thick rendering in CM (1:4). Tiles shall be first quality free from bubbles & manufacturing defects.

(c) CEMENT SKIRTING/DADO

Setting coat shall be 5mm thick in CM (1:2), over 10mm thick rendering coat in CM (1:4), surface finished even and smooth using steel trowel

(d) TERRAZZO SKIRTING/DADO /TERRAZZO FINISH

It shall be 6 mm thick terrazzo topping with grade No (zero) marble aggregate as specified in para 13.5 of SSR 2009 (Part –I), over 10 mm thick rendering in CM (1:4). The composition and shade of terrazzo shall be as per adjacent flooring. It shall be cut and polished with bees wax polish. Dado/ skirting shall be returned in jambs, openings, cills of openings, niches etc unless otherwise specified. Specification for terrazzo finish on surface like RCC shelves, ceiling, platform, ground sink including PCC and the like shall be same as specified for dado herein before. Exposed edges of shelves, platform etc shall also have terrazzo finish as mentioned above where indicated in drawings. Terrazzo shall be in cement concrete using white cement, marble stone dust and marble chips.

NOTES:-

(i) All cutting and grinding shall be with machine except in situations where grinding by machine is not possible grinding by hand shall be permitted.(ii)Terrazzo surfaces shall be wax polished.

APRON

24.

24.1. In all places where PCC topping has been indicated in drg, it shall be provided as per the schedule of finishes and as specified here in below:-

(a) 75 mm thick PCC (1:2:4) type B-2 using 40 mm graded stone aggregate, over 100 mm thick PCC (1:5:10) type E-2 using 40 mm graded stone aggregate sub base over well rammed earth.

(b) 75 mm thick PCC (1:2:4) type B-2 using 40 mm graded stone aggregateover 100 mm thick hardcore over well rammed earth.

24.2. Top surface shall be finished even and fair without using extra cement. PCC topping shall be laid in alternate bays. Proper construction joints shall be formed as specified in SSR and filled with sealing compound.

PARTICULAR SPECIFICATION(contd...)

25. HARD STANDING

Topping in hard standing shall be 150 mm thick in PCC (1:2:4) mix type B-2 over 150 mm thick PCC (1:5:10) type E-2. Top surface shall be finished even and fair without using extra cement. Floor topping shall be laid in alternate bays. Proper construction joints shall be formed as specified in SSR and filled with hot bitumen.

26. RAMP

(a) Floor topping in ramp shall be PCC(1:2:4) type B-2 using 40 mm graded stone aggregate, over PCC(1:5:10) type E-2 using 40 mm graded stone aggregate as sub base over rammed earth. Thickness of topping and sub base shall be as shown on drgs/schedule of finishes. Where thickness of PCC topping has not been shown, it shall be 100mm thick.

(b) Top surface shall be finished even and fair without using extra cement.PCC topping shall be laid in alternate bays. Proper construction joints shall be formed as specified in SSR and filled with sealing compound.

(c) Sides of ramps shall be finished with 15 mm thick plaster in CM(1:4) in one coat finished even and smooth without using extra cement.

27. PLASTERING AND POINTING :

27.1. GENERAL :

(a) All external plaster shall be done out upto 150 mm below ground level except where steps, ramps, plinth protection and shaft/passage with PCC are provided.
(b) Plaster and skirting/dado shall be returned in jambs, soffits of lintels and window cills etc, unless otherwise shown on drgs, height of skirting & dado shall be 100 mm & 1150 mm respectively.
(c)Thickness of plaster shall be the finished thickness exclusive of dubbing. Dubbing wherever required shall be executed without any extra cost.
(d) All corners, angles, junctions and edges unless otherwise specified shall be truly vertical or horizontal as the case may be and shall be carefully finished.

(e) Irrespective of what is specified and shown on drawing, 12mmx12mm continuous groove shall be provided in plaster throughout at the junction of wall & RCC slab. Trowel groove shall be provided at the junction of walls and RCC columns/RCC beams as directed. In other situations where it is not desirable to make groove, chicken wire mesh 30 cm wide shall be provided under the plaster.

27.2. PLASTER TO INTERNAL SURFACES

15 mm thick plaster in CM (1:6) finished even and smooth without using extra cement above skirting/dado in one coat.

27.3. PLASTER TO EXTERNAL SURFACES :

15mm thick in CM (1:4) mixed with water proofing compound as per manufacturer's instructions. Plaster shall be finished fair and even without using extra cement. Top and sides of parapet on roof shall also be plastered in CM 1:4 except wall cladding or where any other finishes are shown on drawings.

27.4. PLASTER ON RCC CHAJJAS :

Top surfaces of the RCC chajjas shall be plastered in CM (1:4) 15mm thick mixed with water proofing compound as per manufacturer's instructions. Irrespective of whether shown on drawings or not, the plaster shall be taken up to 200 mm height over adjacent vertical surface of wall in addition to external plaster for a length equal to length of chajja. Thickness of plaster at junction of wall and chajja shall be rounded to 50mm radius.

28. WHITE WASH / COLOUR WASH / DISTEMPER / CEMENT BASE PAINT

28.1. GENERAL

[a] White wash/colour wash/distemper/cement paint shall be carried out as specified in section 15 of MES Schedule Part -I and as indicated in Schedule of finishes, after preparation of surfaces as specified. Unless otherwise specified all plastered surfaces shall be given three coats of white wash/colour wash to match with adjoining surfaces. Plastered surfaces above false ceiling and behind wall paneling shall be given three coats of white wash only.

[b] All exposed surfaces of parapets, sides of steps, risers, ramps, faces of columns, jallies etc and the like shall be treated with same finish as provided for the surrounding surfaces, plastered surfaces above false ceiling shall be given three coats of white wash only.

28.2. WHITE WASH :

White wash where indicated in Drgs/Schedule of finishes shall be in three coats using fat lime after preparation of surface as specified in Para 15.12 of SSR Part-I of 2009.

28.3 COLOUR WASH :

Two coats of colour wash over a coat of white wash including preparation of surfaces as specified in Para 15.12.6 of SSR Part-I of 2009.

PARTICULAR SPECIFICATION(contd...)

28.4. OIL BOUND DISTEMPER

Whatever shown on drawings internal schedule of finishes of Sch `A` Part I (Buildings) item No 1.01, 1.02 and 1.03 shall be applied two coats of oil bound distemper over a coat of primer all as specified in Para 15.13 of SSR Part-I of 2009. Surface shall be prepared by applying one coat of cement base wall care putty to remove any unevenness above Skirting/Dados.

28.5. CEMENT BASE PAINT :

Whatever shown on drawings external schedule of finishes of Sch `A` Part I (Buildings) item No 1.01, 1.02 and 1.03 shall be applied two coats of cement base paint over a coat of primer after preparation of surfaces, all as specified in MES Schedule ABOVE Plinth Protection. To prevent algae and moss growth and efflorescence, silicon base water repellent compound may be added to mixture at the rate as recommended by the manufacturer. Cement based paint conforming to IS: 5410-1969 and shall be ready mix & of make as approved by GE.

28.6. FIRE RESISTANT PAINT

Fire resistant paint shall be of standard make, conforming to IS. It shall be applied in two coats over a coat of primer or as per manufacturer's instruction. Make and shade of paint shall be got approved from GE before placing order for bulk supply.

28.7. ANTICORROSIVE PAINT POLYURETHANE PAINT

Anticorrosive paint shall be of standard make conforming to IS. It shall be applied in two coats after preparation of surface or as per manufacturer's instructions. Make and shade of paint shall be got approved from GE before placing order for bulk supply.

29. OIL BOUND DISTEMPER/ACRYLIC EMULSION PAINT/PLASTIC EMULSION PAINT, POLYURETHANE PAINT ON PLASTER/ CONCRETE/ BRICK OR STONE SURFACES.

The surface shall be cleaned, prepared and alkali resistance primary coat shall be applied all as per IS: 109 of 1968. Depression/Cracks and unclean surface shall be prepared with putty made of clay and paint and rubbed smooth.

After the surface is dry, primer shall be applied with brush followed by two consecutive finishing coats of paint/distemper.

Oil bound distemper/plastic emulsion /acrylic emulsion and polyurethane paint shall be standard make and shall be got approved from GE, before ordering for bulk supply.

30. PAINTING :

30.1. GENERAL

(a) Refer Section 17 of MES Schedule Part I for paints and painting work.

(b) Three coats of paint wherever occurs/specified in these documents /drawings on wooden or steel surfaces shall consist of one priming coat, one under coat and one finishing coat and paint for these shall be of the same manufacturer. Tint of paint shall be as directed by the GE.

(c) Preparation of surfaces of woodwork and steel work for painting shall be carried out as specified in clause 17.6.1, 17.6.1.1 and 17.6.1.2 and 17.8.1, 17.8.1.1 and 17.8.1.2 of MES Schedule Part I.

(d) The contractor shall inform the GE within three weeks of the acceptance of the tender, the brand and names of the manufacturers of paint, which he proposes to incorporate in the works for his approval.

(e) Wooden or steel surfaces embedded in or in contact with masonry/brick work or concrete shall be treated with two coats of hot tar. Hold fasts, lugs shall be given two coats of tar and sanded all as specified in MES Schedule Part I.

30.2. SURFACES OF WOOD WORK :

(a) All exposed surfaces of wood work and joinery and other wood work including block boards/particle boards/plywood, unless otherwise specified or indicated on drawings shall be treated with two coats of synthetic enamel paint over a coat of pink primer.

(b)In case of un-veneered particle board /plywood panels, an additional coat of filler shall be provided before applying the primer and subsequent coats of paint.

30.3. STEEL AND IRON SURFACES :

(a) All steel and iron work, unless otherwise specified or indicated in drawings, shall be treated with two coats of synthetic enamel paint over a coat of red oxide zinc chromate primer.

(b) Reinforcement and galvanized surfaces (except wire gauge) shall not be painted. Wire gauge (mosquito proofing) shall however be given a coat of French blue paint.

(c) Exposed surfaces of MS/CI brackets and MS fan hook and boxes etc shall be painted with two coats of synthetic enamel paint over a coat of red oxide primer.

PARTICULAR SPECIFICATION(contd...)

31. MISCELLANEOUS:

31.1. FORMATS :

Formats for numbering of buildings and display for anti-termite treatment shall be in 10mm thick setting coat in CM (1:4) over plastered surfaces of external walls, Size of letters and figures to be engraved shall be 50 mm x 100 mm (minimum) and painted black on white background of paint. Details for ATT and water proofing of roof shall be shown on the same format.

31.2. TOWEL RAIL:

Towel rail shall be of brass chromium plated 18/19mm dia (wall thickness shall not less than 1 mm) with heavy weight bracket at ends and fixed with chromium plated steel screws on wooden gutties. Unless otherwise shown on drgs the size of towel rail shall be 600 mm long.

31.3. RCC PARAPET, RAILING, FACIA AND FINS :

(a) RCC parapet, railing, fins etc shall be provided as shown on drawings and shall be cast monolithically with slabs/beam.

(b) Exposed surfaces of RCC parapet, railing, facia and fins shall be plastered not less than 5mm thick in CM (1:3) finished even and smooth using steel trowel without using extra cement.

31.4. SOAP NICHES :

These shall be provided where shown on drawings. Inside finish of the soap niche shall be same as that of dado. Where niche is not coming in dado, it shall have 5 to 7 mm thick ceramic tiles white. Where it is shown to be of vitreous china, it shall be got approved from GE before procuring.

31.5. FAN HOOK AND BOX

Fan hook shall be made out of 12mm dia MS round bars of shape and size complete with box all as shown on drawings. It shall be given a coat of steel primer before placing in position.

31.6. OVERHEAD SERVICES WATER TANKS :

HDPE service overhead water tanks having triple layered wall shall be of capacity and placed at location as shown on drawings/as directed by GE depending upon load distribution on roof slab. It shall have lockable cover. In case tanks of capacity shown on drawings are not available, tank of next higher capacity shall be provided without any price adjustment. Tanks shall be placed on 75 mm (average) thick PCC (1:3:6) Type C-1 padding. For each tank GI light grade 300mm long, over flow pipe of same dia as that of inlet pipe with PVC anti-mosquito cap and 25mm dia GI light grade wash out pipe extended 300mm from outer edge of PCC padding shall be deemed to be included in the cost of respective building in addition to tank fittings such as connection, float valve, ball valve and stop cock for inlet, outlet and washout pipes.

31.7. COOLER STAND

Cooler stand shall be provided as shown on drgs and as specified here in below:-(a)Brick masonry / RCC slab Cooler stand: Brick Work shall be in CM (1:6) & RCC shall be M-25 mix. Exposed surfaces of brickwork shall be plastered in CM (1:4), 15 mm thick and shall be given the same finish as on adjoining wall.

(b)Angle Iron Cooler Stand: Angle for frame work shall be made of MS angle iron of size 50 x50 x 6 mm all as shown on drgs. The ends of angle frame shall be embedded in PCC block (1:3:6) type C-1 using 20 mm graded stone aggregate of size 150 x 150 x 230 mm. Angle shall be painted with Spanish paints and embedded portion shall be tarred.

31.8. RCC STAIR CASE

(a) RCC stair case shall be provided to details all as shown on drawings.

(b) All RCC shall be of grade M-25 (Design Mix) using 20 mm graded stone aggregate.

(c) 18 to 20 mm thick polished Kota stone, over 20 mm screed in CM (1:4) over cement slurry brushed @ 3 Kg per Sqm shall be provided over Treads and Landing. 18 to 20 mm thick polished Kota stone shall be provided over 15mm thick cement plaster in cm 1:4 on riser of steps.

(d) All MS work (In railing) shall be provided as shown on drgs. Painting on steel surfaces as specified here in before.

(e) Soffits of steps and landing shall be white washed as specified here in before unless otherwise specified.

31.9. BRICK STEPS :

Brick steps shall be provided all as shown on drawings. Brick work shall be in CM (1:4) sides and risers of steps shall be plastered CM (1:4), 15mm thick and treads of steps shall have 40 mm thick PCC (1:2:4) type B-0 using 12.5 mm stone aggregate finished even and smooth without using extra cement and having XPM impression.

31.10. RUNGS :

In blocks where stair is not provided or the stair is not upto roof slab, rungs shall be provided at one place so as to reach the roof for repairs etc, Rungs shall be of mild steel round bars of 20 mm dia and shall be fixed in RCC as the work proceeds and on brick wall embedded in PCC block (1:3:6) type C-1. Rungs shall be provided at spacing shown on drawing and shall be fixed staggered. Rungs shall be given two coats of black bituminous paint all over. Size of PCC block if not shown on drawings shall be 150 mm x 150 mm x 230 mm.

PARTICULAR SPECIFICATION(contd...)

31.11. PCC CILL :
Cills shall be in PCC (1:3:6) type C-1 Top finish of cill shall be same as for dado or as for the wall as the case may be.

31.12. NITCHES BOXES FOR MAIN SWITCH/ELECTRIC METER/WATER METER :
(a) Boxes shall be fabricated out of MS Sheet, MS angle, MS flat etc all as shown in drawings. MS work shall be painted as specified here-in-before.
(b) Niches shall be provided as per details on drawings and be finished with 15mm thick plaster in CM (1:4)
(c) Wood work in nitches shall be of first class hard wood Teak.

31.13. CURTAIN ROD :
Curtain rod where indicated in the drawings shall be provided with 18/19mm dia of steel chromium plated, pipe 16 gauge with wooden brackets FI clamps, wooden beads/ wooden fillets and bracket etc all as shown on the drawing.

31.14. PELMET BOX (PB):
Pelmet box shall be provided to details & situations where shown on drgs. These shall be made with pre-laminated particle board 18 mm thick, three layers flat pressed melamine face pre-laminated particle board with exterior grade ISI marked, IS: 3087 grade I and IS: 12823 Grade I type II melamine finish on one face and balancing coat on other side. 6 mm thick teak wood beading shall be provided on all open edges of particle board.

31.15. VENATION BLINDS
Venetian blinds horizontal type 25 mm wide vanes made of aluminium alloys including all fixing /operating arrangement shall be provided to windows in rooms where so indicated in Schedule of finishes or drgs. Pelmet box shall not be provided on windows where venetian blind is to be provided. Size, shape and colour of Venetian blind shall be decided by GE and shall be fixed as per manufacturer's instructions. (Make: Vista lavouor /Mac/Samrat/Dec).

31.16. PEGS :
Aluminium anodized pegs commercial type (cast or extruded section) shall be provided on wall/ wood with cadmium plated screws.

31.17. MIRROR:
Mirrors shall be 5.00 mm thick with square corners polished fixed to 5 mm thick plywood (kitply) backing and with aluminium channel frame fixed to walls with brass chromium plated screws to wall all as shown on drgs. Mirrors shall be SWASTIC or ATUL make as approved by GE.

31.18. COOKING PLATFORM, SERVICE COUNTER AND SHELVES:
(a). RCC cooking platform and service counter shall be of M-25 design mix and of size as shown on drg. Top of kitchen platform and service counter shall have 20 mm thick polished Kota stone, over 20 mm screed in CM (1:4) over cement slurry brushed @ 3 Kg per Sqm over RCC slab.
(b). RCC shelves shall be 40 mm thick (where thickness not shown on drawings) all as shown on drawings. Exposed surfaces shall be plastered not less than 5 mm thick in CM (1:3) finished even and smooth using extra cement.

31.19. STAINLESS STEEL SINK WITH DRAINING BOARD:
(a)Stainless steel sink with drainage board shall be of not less than 1 mm thick Stainless steel (AISI 304) sheet and of size 1040 mm x 510 mm of approved make.
(b)Fixing shall be as recommended by the manufacturer. Waste water pipe from waste fitting of sink to Nahani / Floor trap shall be 32 mm dia GI light grade pipe, waste coupling shall be standard chromium plated.

31.20. OPENING FOR EXHAUST FAN :
Opening for exhaust fan shall be provided wherever shown on drawing. Provn of exhaust fan and making connection shall be payable separately.

31.21. STEEL DOORS:
Mild steel doors shall be provided to details all as shown on drawings. These shall be given two coats of synthetic enamel paint over a coat of red oxide zinc chromate primer.

31.22. STEEL GATE:
Steel gate shall be provided all as shown on drawing and subject to :-
(a) Excavation and earth work in any type of soil.
(b) Lean concrete PCC (1:4:8) type D-2.
(c) Pillar- RCC (M-25) type B1 using 20mm stone aggregate using TMT bars including necessary form works as required
(d) MS work conforming to Fe-410-O.
(e) Finishes as specified here-in-before.

31.23. COLLAPSIBLE DOORS:
Collapsible doors shall be made of MS 20mm x 5mm flat iron and channel section made to shape. Top and bottom of the doors shall move in the channel with rollers. Channel and rail shall be embedded in lintel and floor. Proper locking arrangement shall also be provided as directed by GE.

PARTICULAR SPECIFICATION(contd...)

31.24 ANODISED ALUMINIUM DOOR, WINDOWS AND VENTILATORS:
Aluminium door, windows and ventilators shall be provided as shown on drgs. Aluminum sections incorporated in doors, window and ventilators shall conform to designation 63400 given in IS: 737-1986. Minimum average thickness of coating of anodizing on all aluminium section and fittings shall be 15 micron and shall conform to IS: 1968-1983. The testing of anodizing coating shall be in accordance with IS 5523. To avoid damages, scratching etc PVC protection sheet shall be used while fixing of frame. Fixing of frame, shutters shall be as per manufacturer's instructions. Irrespective of what is shown on drg glazing shall be 5.5 mm thick tinted glass conforming to IS: 2856. Floor hinge for aluminum shutter shall be of Make; SANDHU or equivalent as approved by GE. Hydraulic door closer shall be as specified here-in-before. Grills (Type 'B') to aluminium windows shall be provided as per TD drawings. Rubber gasket, aluminium clips and/or strip shall be provided to hold the glass in position.

31.25 ALUMINIUM GLAZED PARTITION:
Aluminium glazed partition shall be provided to details as shown on drg. Glazing shall be of sheet glass 4 mm thick and the aluminium sheet covering shall be 1 mm thick anodized sheet. Frame shall be fixed to wall with proper wooden gutties and 50 mm long steel screws with washers. Aluminium frame shall be of standard make and of weight as given in drg. Rubber gasket aluminium clips and/or strips shall be provided to hold the glass sheet in position.

31.26 FIRE POINT :- The same shall be constructed at locality as shown in the drgs:-

(a) PCC bed shall be 1:3:6 type C-2 using 40mm graded stone aggregate.
(b) Brick work is situations as shown in drg shall be of CM 1:4
(c) Plaster finish work shall be of 15mm thick in CM 1:4.
(d) PCC block for fixing vertical angle post shall be of 1:2:4 type B-1 using 20mm graded stone aggregate of size and shape as shown in drg structure
(e) MS work used in the structure work shall be of gradeE-250 (Fe 41W quality 'A', conforming to IS-2062.
(f) Roof shall be of 0.80mm thick GI steel sheeting with two corrupted stide lap fixed with `J' or `L' type screw.
(g) All steel members and roof sheet shall be treated with two coats of synthetic enamel paint (Red Colour) over a coat of red oxide primer and writing work shall be with white colour paint.
(h) Rest all as shown in drg.

31.27. GLAZING FOR STEEL WINDOW:

(a) Unless otherwise shown on drawings/specified elsewhere, the sheet glass in pans up to 0.5 Sqm (each) shall be 3mm thick and exceeding 0.5 Sqm (each) it shall be 4 mm thick plain sheet glass 'B' quality as specified in MES Schedule conforming to IS: 1761

(b) Pin headed figured glass shall be conforming to IS: 5437 for glazing. Where thickness of pin head glass is not shown on drawings it shall be 3mm thick

(c) Glass will be fixed as specified in Clause 16.9.2 (for wood surrounds) and clause 16.10.1 (for steel surrounds) of SSR Part I. Putty shall be as specified in Clause 16.5 of MES Schedule Part I.

31.28. RAIN WATER PIPES:

(a) Irrespective of what is shown on drawings, rain water pipes shall be of HDPE medium density (ISI marked) 160 mm dia for hanger and 160 mm dia for other buildings. RWP fixed to the walls with MS holder bat clamps embedded in cement mortar (1:3) conforming to IS: 13512-1992 or in RCC as the case may be. These shall be provided all as specified in MES schedule Part I and given same finish as for wall. Pipes shall be jointed properly as per manufacturer's instructions or as specified

(b) Grating shall be of PVC round type for PVC pipes and CI grating for CI pipes not less than weighing 1.50 kg each at the inlet to RW/down take pipes.

31.29. DRIP COURSE:
Drip course shall be provided under the projection of roof slab, projected balcony and chajjas etc, It shall be made in CM (1:4) and shall of size 40 mm x 20 mm thick (average).

31.28. CONSTRUCTION JOINTS/CRUMPLE JOINTS:

These shall be provided to details as shown on drgs Gap shall be filled with 25 mm thick preformed filler fiber board. Covering sheet shall be fixed with screws in wooden gutties /plugs to wall at 150 c/c.

31.30. SPLASH STONE:
Splashed stone shall be provided below the shoe of each rain water pipe as shown on drawings. In case details not shown on drawings, it shall be 500 x 750 x 75 mm thick self faced Shahabad/Dholpur stone slab set on 10mm thick CM (1:6) screed.

PARTICULAR SPECIFICATION(contd...)

32. SANITARY FITTINGS AND PLUMBING WORKS:

32.1. GENERAL

The work of supplying, fixing/laying and jointing of water closets, wash hand basin, all pipes and fittings with accessories/traps and GT for building is included in schedule 'A' Part-I and shall be carried out upto first manhole but excluding the manhole.

32.1.1. Water closets, wash hand basin etc shall be vitreous china first/standard quality white glazed and shall conform to relevant part of IS: 2556 (Vitreous china sanitary appliances) and shall be ISI marked or of superior quality and finish. Tolerance in the size of fittings as given in IS shall be permissible. Also refer relevant clause of MES Schedule Part-I.

32.1.2. Flush pipe and sockets of flushing rim of WC shall be jointed with Epoxy Putty manufactured by Unique Enterprises or M-Seal or any other equivalent Epoxy putty.

32.1.3. 'P' or 'S' trap shall be jointed to WC pan with Epoxy Putty.

32.1.4. Plumbing work shall be carried out as specified in Section 18.13 to 18.23 of MES Schedule Part-I and the Contractor shall employ licensed plumber.

32.1.5. Where not indicated elsewhere angle iron bracket shall be fixed to walls with PCC (1:3:6) Type C-1 block of size 100 mm x 100 mm x 75 mm.

32.1.6. Cast iron brackets shall be fixed on walls with wooden plugs (built in walls) or plugged to walls. Size of PCC blocks shall be 100mm x 100mm x 75mm and shall be in PCC (1:3:6) Type C-I.

32.1.7. Excavation and earth work up to first manhole shall be deemed to be included in the cost of respective building in Schedule 'A' Part-I.

32.2. WATER CLOSET ETC

32.2.1. SQUATT PATTERN WC

32.2.2. Squatt pattern WC conforming to IS: 2566 (Part III) of 580 mm length of vitreous china white glazed having ISI marked with P or S trap of cast iron, foot rest of Squatt pattern WC shall be rectangular 250 mm x 120 mm conforming to IS: 2506 (Part X). Orissa pattern WC shall be of size 580mm x440mm vitreous China white glazed with cast iron 'P' or 'S' trap.

32.2.3. PVC low level flushing cistern of 10 litres capacity with complete internal fittings shall be provided. Flush pipe shall be PVC tube 32 mm dia of adequate length. Fixing of PVC flushing cistern shall be as per manufacturer's Instructions

32.2.4. Cast iron bracket for low level chinaware flushing cistern shall be fixed in PCC (1:3:6) type C-1 of size 100 x 100 x150 mm. The pan shall be set in lime concrete (1:2) at least 15cm around and finished just below the rim to receive the specified thickness of floor unless shown otherwise on drawing

NOTE :-

Where flushing cistern cannot be fixed in wall due to window lintel as per sanitary plan, the same shall be fixed on the side wall as directed by GE without any adjustment in price.

32.2.5. WATER CLOSET (EUROPEAN)

Water closet European type (pedestal pattern) where shown on drawings shall comprise as under :-

[a]. Vitreous china white water closet apparatus (pedestal pattern) of height 400 to 410 mm rear outlet, conforming to IS and ISI marked with integral 'P' or 'S' trap having minimum 75 mm water seal. The closet shall be screwed to and including wooden plugs embedded into floor.

[b]. Seat and cover shall be of thermostat material conforming to IS: 2548 (Part-I) black plastic closed solid pattern flat bottom, hinged with chromium plated brass hinges, rubber buffers of suitable size and ISI marked.

[c]. PVC low level flushing cistern of 10 litres capacity with internal fittings, make commander/ champion white.

[d]. Flush pipe of adequate length shall be chromium plated brass tube, 32 mm dia.

[e]. Toilet paper holder shall be box type vitreous china.

32.2.6. URINALS:

[a]. Urinals shall be of vitreous chinaware flat back half stall type conforming to IS: 2556 (Part VI-Sec I) white all as specified in clause 18.32.7.2 of SSR Part I. Urinal basin shall be first quality of the make as approved by GE. Waste pipe shall be of PVC heavy duty with brass coupling on top. Vitreous chinaware partition wall shall be provided between two urinals as shown on drgs. Whatsoever shown on drawings each urinals shall be provided a 15 mm fancy type chromium plated turn stop cock to urinal as directed by GE.

PARTICULAR SPECIFICATION(contd...)

[b]. W.H.B:
Wash hand basin shall be provided as shown on drawings shall generally comprise as under:-

[c]. Vitreous china (white) wash hand basin with flat back of size 630 x 450 mm conforming to ISL -2556 (Part IV).

[d]. 32 mm bore chromium plated steel waste coupling screwed to GI pipe with plug and chain.

[e]. Waste pipe from WHB shall be provided concealed in toilet including provn of bottle trap and bend.

[f]. A pair of painted angle iron (40 x 40 x 5 mm) bracket fixed in wall with PCC block 100 mm x 100 mm x150 mm PCC (1:3:6) Type C-I.

32.3. CI SOIL WASTE/ VENT PIPE AND FITTINGS:

[a]. All soil & waste shall be of centrifugally cast (spun) pipe bearing IS: 3989 of 1994 spigot and socket ends and shall bear ISI marking. Vent pipe shall be 75 mm dia PVC pipes fixed with slotted cowl. CI fittings and accessories shall be as suitable for spun pipes as specified in IS-3989.

[b]. CI bend where resting on ground for soil pipes shall be with duck foot/heal rest. All other CI bends, tees junctions etc shall be of required angle and shall be with oval access door for maintenance.

[c]. Jointing of CI pipes and fittings shall be with run lead joints as specified for concealed pipes and cement joints in CM (1:1) as specified for exposed pipes.

[d]. All soil, waste and vent pipes and their fitting shall be fixed along vertical face of wall and shall be kept 50 mm to 75 mm away from face of wall while fixing.

[e]. Exposed surfaces of soil, waste and vent pipes, their fittings and accessories shall be given two coats of paints to match adjoining wall finish.

[f]. Soil/waste pipe from WC to first manhole/GT shall be 100/75mm dia CI pipe.

[g]. Cast iron pipe and fitting shall be secured with cast iron holder bats or mild steel clamps all as specified in clause 11.37 & 11.58.5 of MES Schedule Part-I.

32.4. SGSW PIPES:
Disposal pipe from GT to first manhole shall be glazed stone ware pipe 100 mm dia Grade 'A' jointed in cement mortar (1:1) and with bedding and haunching in PCC (1:4:8) type D-2 using 40 mm graded stone aggregate all as specified. Testing shall be done as mentioned in SSR Part –I under section 18.

32.5. CI NAHANI TRAP:
Cast Iron Nahani trap with long arm shall conform to IS 3989 with 75 mm outlet, Nahani trap shall be with CI grating and shall be given two coats of black bituminous paint all over before fixing. Nahani trap shall have long outlet where required to cross thickness of wall and to avoid joint in the middle of the wall.

32.6. GULLY TRAP/FOOR TRAP:
Gully trap shall be Salt glazed stone ware, square body as per IS: 651 size 150 mm x 150 mm with 'P' type 100 mm outlets and MS/CI grating. The gully trap shall be set in PCC (1:3:6) type C-1 with foundation, side brick wall and kerb. Cover to the gully trap shall be solid type with single seal all-round and jointing shall be done in CM (1:1).

32.7. TESTING:
All soil, vent and waste pipe shall be tested as specified in section 18 of MES Schedule Part-I. All CI Pipes shall be tested by filling with water to check leakage if any before fixing in position.

NOTE:

1. The work of plumbing and sanitary work as specified here-in-before and as shown on drawings shall be for the complete sanitation and plumbing work of the respective buildings in Schedule 'A' Part-I in all respect. Nothing extra shall be payable if any additional items other than these shown on drawings are required to complete the work of sanitary and plumbing.
2. Cost of platform barbed wire around it, PCC path & wicket gate etc shall be deemed to be included in cost given in Schedule 'A'. It shall be provided as specified here in after.

33 to 52. BLANK

53 ROAD, PATH AND CULVERT

53.1 GENERAL

(a) Work shall be executed as described in Schedule 'A' and as shown on drawing. Layout shall be approved by GE before execution of work. For general works like excavation and earth work, concrete, brick work, plaster etc refer relevant clauses of particular specifications here-in-before for building work.

(b)Road shall comprise of premixed carpet over bituminous concrete over water bound macadam layer over soling over prepared formation as per items of Schedule 'A' decided by GE. Top level (finished level) and gradient of road shall be as decided by GE considering cognate conditions of layout of road alignment and surrounding area before execution of road work.

PARTICULAR SPECIFICATION(contd...)

53.2 MATERIAL

(a) All materials required for road work shall be stacked for measurements before incorporation in the work.

(b) The quantities collected shall be sufficient for works required and in addition(at no extra cost to the Govt) also adequate for repairing to fill hollows appearing during the execution of works.

(c) Measurements of stacks shall be jointly taken by the Engineer-in-Charge and the contractor's representative and shall be recorded in the measurement book as a check of the quantities brought for the work. The measurement of stacks recorded in measurement book shall be signed by the contractor and the Engineer-in-Charge.

53.3 EXCAVATION AND EARTH WORK

The contractor's representative and the Engineer-in-Charge, shall jointly take the levels of existing ground at suitable intervals as directed by the GE and enter the same in measurement book/level book. The drawings shall be prepared jointly showing block levels, plan, longitudinal sections, cross sections thereof. Authorised quantity of work to be executed for the purpose of payment shall be worked out from 'L' sections and subsequent earth works/filling other than authorised will not be considered for payment. Excavation and earth filling shall commence only after the aforesaid 'L' and cross sections are drawn. Commutation of areas shall be done with "Trapezoidal Formula" and volume with "prismoidal formula". Earth filling, if any, in formations and sub grade of roads shall be carried out in layers not exceeding 25cm thick (spread thickness). Each layer shall be sufficiently watered and consolidated with 8 to 10 tonne power roller. The grade should be brought to the proper levels, camber and gradient by filling all sunken and soft portions with earth so as to prepare the surface for receiving sub base.

53.4 MATERIAL FOR ROAD WORK

S.No	Test	Test Method	Requirement
1	Los Angeles Abrasion value*	IS :2386(Part -4)	35 Percent Maximum
2	Aggregate impact value*	IS :2386(Part -4)	30 Percent Maximum
3	Flakiness and Elongation** Indices (Total)	IS :2386(Part -1)	30 Percent Maximum
4	Coating and stripping of bitumen aggregate Mixtures	AASHTOT 182	Min retained coating 95 percent
5	Soundness	IS :2386(Part -5)	
	(i) Loss with sodium sulphate	5 cycle	12 Percent Maximum
	(ii) Loss with magnesium sulphate	5 cycle	18 Percent Maximum
6	Water absorption	IS :2386(Part -3)	2 Percent Maximum

*Aggregates may satisfy requirements of either of the two tests.

** To determine this combined proportion, the flaky stone from a representative sample should first be separated out. Flakiness index is weight of flaky stone metal divided by weight of stone sample. Only the elongated particles are separated out from the remaining (non-flaky) stone metal. Elongation index is weight of elongated particles divided by total non flaky particles. The value of flakiness index and elongation index so found are added up.

(ii) Fine aggregate.

Refer clause 20.B.2.3.1.1 of SSR Part I 2009.

(iii) Filler

Refer Para 20.B.2.5 of SSR Part I. The filler materials shall be lime stone dust as specified in SSR.

53.4 Aggregate Gradation

Course aggregate, fine aggregate, filler shall be so graded or combined as to conform the requirement as given below.:-

PARTICULAR SPECIFICATION(contd...)

IS Seive Designation	Percent passing the sieve by weight
13.2 mm	100
9.5 mm	90-100
4.75 mm	35-51
2.36 mm	24-39
1.18 mm	15-35
300 Micron	9-19
75 Micron	3-8

53.5 BITUMEN FOR PREMIXED BITUMINOUS CONCRETE

Bitumen to be used in the work shall be paving bitumen of VG-30 grade, conforming to IS 1973-1961 (Revised). The bitumen shall be arranged by the contractor from the authorized dealer /manufacturer of the petroleum product. Necessary purchase vouchers and test certificate shall be produced by the contractor in token of having brought the materials from manufacturer/authorized dealer which shall be submitted to Engineer-in-Charge for verification before incorporating in work/payment. The Engineer-in-Charge shall record in MB, the quantity of bitumen as proprietary items with reference to purchase vouchers procured by the contractor indicating the name of manufacturer, sources of materials from where purchased , type and grade of bitumen.

The bitumen shall be procured from any of the followings:

(a) M/S Indian oil corporation.
(b) M/S Bharat Petroleum Ltd.
(c) M/S Hindustan Petroleum Corporation Ltd.

53.A Contractor shall produce documentary evidence after getting hot mix plant owner that bitumen used in the bituminous premix has been procured of make /manufacturer IOC/BPCL/HPCL.

53. 6 FORMATION

Preparation and compaction of formation surfaces shall be done by 8 to 10 tonne power roller all as per clause 20-A, 22 of MES schedule Part I.

53.7 SOLING

Soling shall be of broken stone boulders and shall comply with other requirements, spread, laid and rolled all as given in section 20-A, 20.1 of SSR Part I.

53.8 WATER BOUND MACADAM (Base course)

53.8.1 Course aggregate shall be crushed or broken stone of grading II as laid down in clause 20.A.3.1 of MES Sch Part I and shall be laid and rolled all as mentioned in Sch 'A'.

53.8.3 Binding material mentioned in MES schedule shall be moorum best quality locally available as approved the GE. WBM surface shall be kept open to traffic for a period of at least two months. A certificate to this affect shall be kept on record duly signed by GE.

53.8.4 The consolidation of WBM shall be done with 8 to 10 tonne power roller. Sufficient water shall be sprinkled and rolling shall continue till thick mud slurry is formed and rolls with the wheel of the roller.

53.9 BLANK

53.10

53.11 APPLICATION OF TACK COAT

The bitumen shall be heated to temperature as recommended by the manufacturer in the manner as approved by Engineer-in-Charge and be applied uniformly over the prepared surface using sprayers. The tack coat shall be applied just ahead of spreading of the pre coated bituminous concrete. The bitumen well heated in a Tar boiler to be arranged by the contractor.

53.12 PREPARATION OF PREMIX

Mixing shall be done by hot mix plant. The temperature of binder at the time of mixing shall be in the range 1500C - 1600C and that of aggregate in the rate1550C - 1630C provided that difference in temperature between binder and aggregate at no time exceeds 140C. Mixing shall be thorough to ensure that a homogeneous mixture is obtained in which all particles of the aggregate are coated uniformly with binder. The discharge temperature of mix shall be between 1300C to 1600 C.

53.13 SPREADING OF MIX

Immediately after application of tack coat, the mix shall be spread evenly with mechanical paver to the desired thickness and to correct camber and distributed evenly as directed by the Engineer-in-Charge. The temperature of mix at the time of laying shall be in the range of 120 o C to 160 o C. Mix with a temperature of less than 120 o C shall not be put into paver spreader. The surface shall then be checked to camber by means of camber board and all in equalities found shall be corrected immediately.

PARTICULAR SPECIFICATION(contd...)

53.14 ROLLING

53.14.1 The rolling shall start longitudinally along the edges and proceed towards the center of the road, overlapping on successive trips of the roller by at least half the width of the rear bill. On the super elevated portion of the road rolling shall commence from the lower edge and progress gradually towards the upper edge of the pavement, parallel to the center line of pavement/road.

53.14.2 The speed of the roller shall not exceed 5 Km per hour to avoid displacement of the mix.

53.14.3 To prevent adhesion of the mix to roller wheels, the wheels shall be kept damp with water. Excess water shall be avoided. Fuel oil, lubricating or kerosene shall not be used for this purpose.

53.14.4 Areas of the road in accessible to the roller shall be thoroughly compacted with hand tampers/hand rollers.

53.14.5 Rolling operation shall be completed in every respect before the temperature falls down below 100 0 C and shall continued until entire surface has been rolled to compaction and all roller marks eliminated. In each pass of roller preceding track shall be overlapped uniformly by at least 1/3 width.

53.14.6 When the roller has once passed over the whole area, any high spot or depression which becomes apparent shall be corrected by removing or adding mix and therefore shall be rolled again to compaction and uniform surface.

53.14.7 The edges along and transverse of the carpet laid and compacted earlier shall be cut to their full depth so as to expose fresh surface and shall be painted with a thin surface coat of appropriate binder before the new mix is placed against it.

53.15 MIXING IN HOT MIX PLANT

Hot mix plants of adequate capacity to yield mix of proper and uniform quality shall be used for heating and mixing aggregate and binder. The plant may either be a batch type or a continuous one having a co-ordination set of essential units such as dryer for heating the aggregate, arrangements for grading and batching by weight or volume the required quantities of aggregate, binder heating and control unit for metering out the correct quantity of heated binder together with a paddle mixer for immediate mixing binder and aggregate. The hot mix plant shall be fitted with temperature measuring devices both for aggregate and bitumen. The binder shall be heated to the correct temperature. The correct quantity of aggregate shall be fed in the plant, alongwith specific quantity of binder. The mixing shall be continued till homogeneous mix is obtained in which all the particles of aggregate are coated uniformly. The variation from the specified temperature shall not be more than 100 o C on the lower side only.

53.16 BRICK EDGING

Continuous brick on end vertically edging shall be provided straight or to curvature as directed.

53.17 STONE KERB :

Stone kerb shall be provided of roughly squared sand stone of size 15x30 cm.

53.18 RECORD OF MATERIALS

Before any on account payment against materials brought at site allowed, materials such as aggregate, screening and stone chippings brought by the contractor for incorporation in the work shall be recorded in MB duly signed by the contractor and Engineer-in-Charge. This is required to justify the materials required and material brought by contractor at site. Necessary allowances for unevenness of ground where materials are stacked shall also be taken into account.

PARTICULAR SPECIFICATION(contd...)

56. INTERNAL WATER SUPPLY:

56.1 SCOPE

The work covers internal water supply as described in Schedule 'A' under respective parts, Notes to Schedule 'A', as shown on drgs and as specified here-in-after.

Work shall be carried out by licensed plumbers.

The following Indian Standard shall be applicable in addition to those mentioned in MES Schedule Part-I.

STANDARD OF QUALITY AND WORKMANSHIP

Refer condition 25 of General Conditions of Contracts (IAFW-2249). All water supply works shall be carried out by the licensed plumber and in the supervision of a qualified supervisor. The contractor shall on demand by Engineer-in- Charge produce such evidence of qualifications of his workmen/supervisors to GE either at commencement of work or at any time thereafter during the currency of contract. Such record shall be kept in works dairy with reference to license of plumbers. The entire work shall be of high class with best workmanship and to the entire satisfaction of Engineer-in-Charge.

All equipment and materials incorporated in this work shall be of standard make and shall be ISI marked.

IS NO	SUBJECT
1172	Code of basic requirement for water supply drainage and sanitation (second revision)
2065	Water supply in buildings, Code of practice (First revision)

56.2. All pipe runs shall be truly vertical/horizontal. At all corners, either bend or elbow shall be provided. Suitable sleeves shall be provided for full width of the wall where the pipe is passing through wall. The sleeves shall also be of medium grade GI pipe.

56.3. Steel water tubes (pipes) galvanised shall be medium grade all as specified in MES Schedule. It shall be given two coats of oil paint white over a coat of primer.

56.4. Copper alloy bib cocks and stop cocks shall comply to IS: 781 high pressure qualities. Crutch handles, spindles, glands etc of stop cocks and bib taps shall be of cast brass (extruded rolled or forged) in lieu of brass rod and as specified in IS: 781 without any price adjustment. Ball valve shall be as specified in para 18.19 of MES Schedule Part-I. The sample of the following shall be submitted to GE for their approval within 30 days of the date of issue of the work order, before any bulk order is placed:-

56.5 SAMPLES

56.5.1 Samples of fittings shall be produced by the contractor for approval of the GE before commencement of the work and his approval shall be obtained in writing. The sample of the following shall be submitted to GE for their approval within 30 days of the date of issue of the work order, before any bulk order is placed:-

(a) GI pipe fittings.
(b) Stop cocks, bib cocks and pillar cocks
(c) Polythylene connection.
(d) Float valves.
(e) Shower rose.
(f) Half turn valve of make 'L & K' or "KING" as approved by GE.
(g) Gate valves

56.6 GI PIPES/FITTINGS

56.6.1 Mild steel water pipes galvanised except those issued under schedule 'B' shall be of medium grade and shall conform to IS-1239 (Part-I) and shall be distinguished by colour bands i.e. light grade with yellow, medium grade with blue and heavy grade with red. The tubes shall have the ISI certification mark at standard length.

56.6.2 Mild steel galvanised iron fittings shall be as per IS-1239 (Part II). The fittings may be welded or seamless. Alternatively the pipe fittings shall be of galvanized malleable cast iron conforming to IS-1878.

56.7 BIB TAPS AND STOP VALVES

56.7.1 Brass bib taps and stop valves (cocks) shall be marked IS-781 high-pressure quality. The crutch handle, spindles, glands, etc of stop valves and bib taps shall be of cast brass (rolled or forged) in lieu of brass rod as specified in IS- 781 without any price adjustment. Fancy bib taps and stop valves shall be of approved make and shall be nickel-chromium plated and conform to IS-8931- 1978.

56.7.2 Pillar taps shall be of cast copper alloy, chromium plated conforming to IS:1795-1974. The minimum finished mass of pillar taps shall be as specified in clause 18.16.2 of MES Schedule Part I. Fancy pillar taps shall be as specified in clause 18.16.1 and 18.16.2 of the MES Schedule Part I.

PARTICULAR SPECIFICATION(contd...)

56.7.3 Ferrules- These shall conform to the specifications given in MES Schedule Part I and will be as per IS-2692-78. The materials for different parts shall be as per table I given in IS. For taking out branch connection up to 50mm dia from main, ferrule will be used and for branch connection above 50mm dia, Tee will be used.

56.8 LAYING OF PIPE IN TRENCHES

56.8.1 Pipe shall be laid in trenches not less than 60cms below ground level or as directed by Engineer-in-Charge. Refilling of trenches with soft earth shall not be carried out untill the laying and jointing have been completed and tested.

56.8.2 Excavation and preparation of trenches shall be as per clause 18.42 of MES Schedule (Part I).

56.9 WATER TANKS

56.9.1 Cost of service water tanks (HDPE polythene tanks as shown in the drawings) including fittings and hoisting in position is included in the unit rates of buildings mentioned in Schedule 'A' Part-I .

56.9.2 Rotational moulded polyethylene triple layered water storage tanks shall be as per IS-12701-1991 and BIS certification marking, make shall be as per Appendix.

56.9.3 The inlet connection shall be provided with a plunger type ball valve of brass of the dia of inlet pipe with polythene float ball. 25 mm bore GI Over flow pipe shall be taken from roof top to ground level with perforated PVC mosquito cover screwed to the pipe, whether shown on drawing or not.

56.9.4 Ball valve for water tank and flushing cisterns shall be of high pressure grade of brass with polythene float ball conforming to IS-1703 and as specified in clause 18.19 of MES chedule (Part-I). The rod of the ball valve shall be cast or extruded brass at the option of the contractor.

56.10 POLYTHENE CONNECTORS

56.10.1 Polythene pipe connector with two sets of mild steel chromium plated adaptors to connect steel tubing to the flushing cistern/WHB shall be as per samples kept in the office of GE and of approved make. The connector shall be of adequate length suitable for 15mm nominal bore GI pipe complete with brass unions at tails and rubber washers. Longer lengths up to 40 cm may be used without any price adjustment.

56.10.2 The weight of the pipe shall not be less than 150 gms per metre and gross overall weight of the polythene pipe used in polyethylene pipe and connector not less than 80 grams. The polyethylene pipe used in polyethylene pipe connector shall conform to IS-3076.

56.10.3 Cost of polyethylene connectors required for wash hand basins and cisterns etc is deemed to be included in the lump sum cost of buildings mentioned in Schedule 'A' Part I.

56.11. TESTING :

56.11.1 Testing pressure shall be the maximum working pressure as specified in IS and there shall not be sweating or leakage in joints and fittings. A test certificate will be prepared and signed both by Engineer-in-Charge and contractor. The test should be carried out before pipe are covered by plaster/concrete etc.

56.11.2 All Equipment for testing shall be provided by the contractor.

56.12 DRAWINGS:

Contractor shall submit 6 copies of drawing for internal water supply layouts duly signed for records.

57. INTERNAL ELECTRIFICATION:

57.1. SCOPE

The work covers Internal Electrification as described in Schedule 'A' under respective parts, Notes to Schedule 'A', as shown on drgs and as specified here in after.

57.2. WORKMANSHIP:

[a]. The work carried out shall be of the highest standard conforming to latest edition of Indian Electricity Act and rules framed there under as applicable and Para 19.2 of SSR 1991 (part I) read in conjunction with relevant IS codes for Internal electrification and code of practice for electric wiring installation as per IS: 2274 with amendments. All cable connection to the MCBs shall be by using copper lugs/thimbles only.

PARTICULAR SPECIFICATION(contd...)

[b]. Refer condition 25 of General conditions of contracts (IAFW 2249). All electric work shall be carried out properly by skilled and licensed electrician under the supervision of qualified electrical supervisor. The contractor shall on demand by Engineer in Charge produce such evidence of qualifications of his workmen and supervisor during the currency of contract. This provision shall be complied with even if the contractor himself is qualified and enlisted for electrical work.

[c]. All the work shall be executed as per the code of practice and as listed in the IS. All electrical work shall be governed by the requirement as specified under the Indian electricity Act/Rules with latest amendments. The code of practice for electric wiring installation as per IS: 2274 with amendment No. 1 will be strictly followed.

[d]. Internal wiring shall conform to IS: 732 code of practice for electrical wiring installation. Point wiring shall be with 1100 Volts grade cable with stranded copper conductor all as described in Schedule 'A' items :-

(a) Screws: All screws shall be of galvanised iron or steel chromium plated.
(b) Link clips : These shall be of aluminium conforming to IS: 2412
(c) Sunk cast iron/pressed steel terminal boxes. Terminal boxes shall be of suitable sizes required to mount switches, regulators and 3 pin sockets.

Conduit wiring and battened wiring shall be carried out all as described in Schedule 'A' and as specified in MES Schedule part I.

57.3. SAMPLES

[a]. The GE in writing before incorporation in the work shall be first approved samples of all electrical fittings. Utility light fittings shall be of the best quality available and conform to the samples kept in GE's office duly approved by him.Samples of the following shall be supplied within 30 days of the date of issue of work order :-

(a) All types of cable

(b) Fittings, wires and accessories used for Internal Electrification.

(c) The contractor shall ensure that the materials used in the works are identical with the approved samples. The materials shall be brought to the site by the contractor in the makers' original packing with the seal intact or with wrapper and shall not be installed unless approved by Engineer in Charge.

[b]. Height of switch boards, socket outlet, light fittings and fans etc shall be as shown in drawings or as directed by the GE.

[c]. All electrical fittings & wiring shall run clear of doors, windows & other openings.

[d]. Arrangement for lighting circuit shall be as decided by Engineer in Charge. Permissible number of points per circuit shall not be more than 8.

[e]. Loop in system of wiring shall be followed throughout the Installations.

[f]. No burrs or twisted joints shall be made at intermediate points in the through run of cable. If inevitable, such joint shall be made through proper cut out.

[g]. In any condition cables shall not come in contact with metallic pipe or non earthed metal work.

[h]. Not more than two power socket out let points shall be wired on one circuit.

[j]. Diagonal run of wiring shall not be permitted.

[k]. Suitable inspection boxes shall be provided for periodical inspection or to facilitate removal of wiring. In concealed wiring these shall be mounted flush with the walls.

[l]. For conduit wiring colour coding and colour of insulation of wires shall be got approved before the wires/cables are procured.

[m]. Where conduits are concealed, these shall be held in chases with MS hooks except in RCC work where these can be secured to reinforcement with binding wire.

(n) Cutting and forming chases in brick work/concrete where directed shall be done while the building work is in progress prior to the commencement of plastering to brick work. Gaps/voids of all cut/formed chases including recesses formed for terminal boxes for housing power plugs, switches, sockets etc shall be filled flush with cement concrete (1:3:6) type C-1, using 20 mm graded stone aggregate or in cement mortar (1:3) mix after fixation of pipes/boxes etc prior to the plastering of walls at no extra cost.

(o) Clause 19.101 to 19.111 and 19.114 of SSR Part I will be referred to for workmanship. Special attention is drawn to clause 19.111 of SSR Part I for method of passing conductors through walls and floors.

57.4. MATERIALS:

[a]. All materials to be incorporated in the work shall be of the highest standard and unless specified otherwise, shall strictly comply with the relevant ISS or BSS for which no ISS has been published.

[b]. Unless otherwise specified point wiring shall be with 1100 volt grade cable conforming to IS: 694 with stranded copper conductor all as described in different items of Schedule 'A'.

PARTICULAR SPECIFICATION(contd...)

[c]. Wooden battens/blocks/Boards shall be of well seasoned hard wood wrought on all exposed surfaces and coated with shellac varnish. The finished minimum thickness of batten shall be 10 mm

57.5. CONDUIT & CONDUIT FITTINGS:

PVC conduits shall be of PVC medium grade of 25mm dia ISI marked. Conduit fittings shall be of un plasticised PVC conforming to IS: 3419.

[a] MS BOXES :-

For housing the various fittings such as switches, sockets, fan regulators etc, shall be of sheet pressed steel not less than 2mm thick conforming to IS: 5133. The boxes shall be painted with two coats of black bituminous paint and shall be embedded in walls in cement mortar 1:3 and need not be fixed with plugs or screws. The minimum depth of these boxes shall be 75 mm and each box shall have an earth dolly. Corner of boxes shall have 3 mm thick MS sheet corners with screwed holes for fixing laminated sheet, 3 mm uniform thickness. Laminated sheet shall be fixed with brass screws & washer to MS box. It shall be of the colour as decided by GE.

(b) PLASTIC LAMINATED SHEET TO COVER CAST IRON BOXES FOR POINT WIRING:'Hylam / Wood lite / Anchor brand with the make embossed on the sheet.

MATERIALS - The materials shall be as follows:-

Sl No	Materials	Reference to Para of SSR (Part-I)
(a)	Cable cords and earthing leads	19.24
(b)	Cable for internal wiring for light power	19.25
(c)	Wooden battens, blocks and boards	19.28
(d)	Conduit and conduit fittings and accessories	19.29
(e)	Plug/Gutties	19.30
(f)	Screws and fastenings, link clips	10.31
(g)	Ceiling rose	19.32
(h)	Shades	19.33
(j)	Bulkhead fittings	19.34
(k)	Socket outlets	19.40
(l)	Lamp holders	19.41
(m)	Main switch	19.45
(n)	Switch boards	19.105
(o)	Distribution fuse board	19.44
(p)	Miniature circuit breaker	19.46

57.6. EQUIPMENTS AND MATERIALS

Piano type switches, lamp holder, main switches and socket outlets/switch fuse, cable for internal wiring, miniature circuit breaker etc shall be of the make as approved by GE. Flexible chord 23/.0076 shall conform to IS: 434. Steel Conduit shall be stove enameled black rigid steel conduit conforming to IS: 9539 (Part I).

[a] The following tests shall be carried out to the entire satisfaction of the Engineer -in-Charge before the work is finally handed over by the contractor and completion certificate is issued :-

(a)	Polarity test	Test results shall be lower then the minimum specified in IE rules/ISS.
(b)	Insulation resistance test	
(c)	Continuity test sectional and overall	
(d)	Earth resistance test	This is not to exceed one ohm

[b]. Clause 19.146 of SSR (Part I) is also applicable.

57.6.1 LAYOUT PLAN

(a) Locations of various light fittings/fans/socket outlet, main switches and DBS are tentatively shown on drawings.

(b) The layout of equipment, fittings etc and alignment of cables shown on drawings are tentative. The exact position of these shall however, be approved by the GE in wiring before the contractor shall take the work in hand without any price adjustment.

57.6.2 TYPE OF ELECTRIC SUPPLY

Type of electric supply will be 4 wire, 50 cycles, 415/230 volts, AC.

57.6.3 EARTHING

57.6.3.1 The earthing shall be strictly in conformity with MES Schedule Part I electrical plate No.3 Earth plate shall be galvanised iron pipe shall light grade, concrete PCC type D-2 (1:4:8), wire mesh 0.63 mm and funnel of PGI sheet, PCC cover and frame shall be 10mm thickness: -

PARTICULAR SPECIFICATION(contd...)

(a) All metal parts shall be provided with a continuous earth wire stranded PVC insulated copper conductor of size 1.00 Sqmm conforming to IS-732.

(b) Supply and fixing of switch fuse distribution boards shall include for the earth continuity conductor as specified above.

(c) No extra payment shall be made if the contractor is required to provide extra depth of pit and extra quantity of charcoal dust to achieve specified test result.

(d) Necessary tests as per SSR part I/Relevant IS shall also be conducted by the contractor without any extra cost and test results thereon shall be kept on record.

57.6.4 ELECTRIC METER / SWITCH BOXES

57.6.4.1 Electric meter boxes shall be provided as per drgs. Cost of electric meter boxes is included in the lump sum cost of buildings mentioned in Schedule 'A' Part I.

57.7. RECORD DRAWINGS:

The contractor shall submit 6 copies of the following drawings duly signed by him to the Engineer-in-Charge without any extra cost :-

(a) Internal wiring diagram to include :-

(i) Lights, switches, sockets, fans etc and circuit diagram as per symbols adopted in the extract drawings.

(ii) All outlets marked with circuit number to which they belong.

(iii) Typical section indicating mounting heights adopted.

(b) Drawing for each panel board shall be submitted by the contractor before execution for approval of the Engineer-in-Charge.

(c) One copy of the above drawings shall be submitted to the Engineer-in-Charge within 15 days of the placing of the work order for his approval and remaining with any alterations as directed by the Engineer-in- Charge within 15 days of the completion of work.

58. SEWAGE DISPOSAL:

58.1. GENERAL

The work of external sewage disposal includes external sewage disposal beyond internal sanitary installation as described in relevant items Schedule 'A', as specified here-in-after, as specified here-in-before for the relevant trades of works , as shown on drawing as directed.The work of sewage disposal shall be carried out as described in Schedule 'A' items, as shown on drawings and as directed by Engineer-in-Charge. Layout of sewage line and manhole shall be approved by GE before execution of work. For general works like excavation and earth works, concrete, brick work, plaster etc refer relevant clauses here-in-before.

58.2 SUB SOIL WATER LEVEL

58.2.1 The contractor is advised to ascertain the maximum and minimum sub soil water level as excavation for sewers may extend beyond sub soil water level and deeper foundations may be necessitated due to site conditions. No extra payment on this account shall be admissible to the contractor, if he has to work under sub soil water level.

58.3 PIPE TRENCHES

58.3.1 Trenches for pipe shall be excavated to the lines, level and gradient as directed by the Engineer-in-Charge. Filling to a depth of 150mm above the top of the pipe shall be made with earth free from clods, etc, and above this level filling shall be done as described in MES Schedule. Surplus spoil shall be disposed off as directed.

58.2. CLASS NP -2 REINFORCED CEMENT CONCRETE PIPE:

Reinforced concrete pipes for drains shall be non-pressure type, class NP2 and shall conform to IS 458-2003. Specification for concrete pipes with or without reinforcement. Bends, junctions and specials shall be of cast iron and of suitable size. The ends of concrete pipes shall be suitable for butt end joints. The butt ends shall be prepared for collar joint with grooves. The pipe joints shall be capable of withstanding the same pressure as the pipe. Concrete pipes shall be straight and free from cracks excepting craze cracks. The ends of pipes shall be square with their longitudinal axis so that when placed in a straight line in the trench, no opening between ends in contact shall exceed 3 mm in pipes upto 600 mm diameter and 6 mm in pipes greater than 600 mm in diameter. The outside and inside surfaces of the pipes shall be smooth dense and hard and shall not be coated with cement wash or other preparation. The pipe shall be free from defects resulting from imperfect grading of the aggregate, missing or moulding. Pipe shall be free from local dents or bulges greater than 3 mm in depth and extending over a length in any direction greater than twice the thickness of barrel.

58.3 SALT GLAZED STONE WARE PIPES

PARTICULAR SPECIFICATION(contd...)

58.3.1 Salt glazed stone ware pipes and fittings shall be conforming to IS-651 and shall be laid in trenches on PCC bed as specified in sch 'A' , over compacted earth all as directed and as described in clause 18.68 of MES Schedule Part I. Concrete bed to pipes and the hunching or encasing to the pipes shall be provided as indicated in the Schedule 'A'. Concrete bed shall be provided all as described in clause 18.68 of MES Schedule Part I and as described in Schedule 'A'. SGSW pipes shall be of make as mentioned in Appendix 'D' or any other make as approved by GE.

58.3. MANHOLES

Manhole shall be built all as specified in clause 18.78 of MES schedule Part I with the following modifications.

(i) Cover slab RCC M-25 design mix to be provided.

(ii) In lieu of cast iron cover, precast RCC manhole covers as described in clause 27.6 below shall be provided.

(iii) Brick work in walls - CM 1:4 with sub class 'A' bricks.

(iv) Steps in manholes shall be cast iron (CI Rungs) and shall be coated with a black bituminous composition.

58.4 RCC MANHOLE COVER

58.4.1 RCC Manhole covers shall be of precast M-25 design mix as shown on drawings. These shall have MES markings as per design approved by GE.

58.5 TESTING

Water and smoke tests shall be carried out to ensure that the manholes, sewers are without any leakage. Results of the tests carried out on various sections of the sewer shall be signed both by Engineer-in-Charge and contractor or their representative. All material and labour etc required for testing shall be provided by the contractor without any extra cost to the Govt.

58.5. SEPTIC TANK WITH SLUDGE CHAMBER:

a) Septic tank shall be constructed as specified below:-

b) Excavation and earth work in soft/loose soil

c) Floor/Foundation - PCC (1:2:4) type B2 using 40 mm graded stone aggregate.

d) All brick work in wall shall be in CM (1:4) using sub class 'A' bricks.

e) Internal plster 15mm thick in CM (1:4) with the addition of integral water proofing compound as per manufacturers instructions. For the purpose of deviation the quantity water proofing compound shall be considered @ 3% by weight of cement.

f) RCC M-25 (design Mix) slab with reinforcement as shown on drgs.

g) Manhole cover shall be of Precast RCC cover.

h) MS steps all as shown on drgs & two coats of bituminous paint shall be applied on it.

i) Pipe and Fittings - Vent/outlet pipes including cowls and CI sluice valves all as shown on drg..

j) Baffle wall shall be of RCC M-25 (design mix) as shown on drgs.

k) Returning, filling in including spreading, leveling, watering & well ramming & removing surplus soil to a distance exc 50 mtr but n. exc 100 metre.

58.6. SOAK WELL

a) Soak well shall be constructed as specified below:-

b) Excavation and earthwork in soft/loose soil.

c) Foundation shall be of PCC (1:3:6) type C2 using 40 mm graded stone aggregate.

d) Brick work in dwarf wall shall be in CM [1:6] and foundation shall be of PCC (1:4:8) type D2 using 40 mm graded stone aggregate.

e) Brick work in CM 1:4 for solid walls & honey comb shall be in CM (1:4) using sub class 'A' bricks.

f) Slab shall be of M-25 grade with precast RCC cover.

g) Band shall be of PCC 1:2:4 type B-1.

h) Brick bats shall be with hard broken bricks of gauge not exceeding 100 mm.

i) Returning, filling in including spreading, leveling, watering & well ramming & removing surplus soil to a distance exc 50 mtr but n. exc 100 metre.

Note: Sub class 'A' bricks being used for man hole ,septic tank and soak well should have very less water absorption (< 10 %) with very high compressive strengths (>175Kg/Cm2) As per IS 4885-1988.

58.7 CI RUNGS/STEPS

58.7.1 The rungs shall conform to IS: 5455-1969. The step shall be clean, well cast and they shall be free from air and sand holes, cold shuts and warpings which are likely to impair the utility of castings.

PARTICULAR SPECIFICATION(contd...)

58.7.2 The portion of the step which projects from the wall of the manhole shall have a raised chequerred design to provide an adequate non-slip grip. Any ribs, cheque ring, lettering of other projection for thick purpose shall be raised above the general plane of top surface of step and shall be placed particularly along the edges of treads. It is considered that in this position the most protection given s against slip.

58.7.3 Rungs shall be provided in all manholes over 0.8m in depth shall preferably be of cast iron and suitable dimensions (see IS : 5455-1969*). May be 300 mm apart horizontally as well as vertically and shall project a minimum of 100mm beyond the finished surface of the manhole wall. The top rung shall be 450 mm below the manhole cover and the lowest not more than 300 mm above the benching. Footrests shall be painted with coal tar, the portion embedded in masonry on cement concrete block being painted with thick cement slurry before fixing.

59. EXTERNAL ELECTRIFICATION

59.1. GENERAL

a) Specifications of materials and workmanship shall be all as described in MES Schedule (Part-1 Except where specifically mentioned otherwise in these documents. General rules, preambles to various sections, rates, special conditions, methods of measurements etc given in MES Schedule shall apply to this contract unless otherwise mentioned in these tender documents. The location and distribution of various items in the drawings are tentative. Alterations can be made by the GE as per site requirements and there shall be no price adjustment on this account. The lump sum quoted by the contractor against Schedule 'A' shall be deemed to include expenditure on account of all extras which are not specifically shown on drawings or given in particular specifications but are essential to the execution of work.

b) In case of difference of opinion in this respect between the contractor and GE/CWE, the decision of the Accepting Officer shall be final, conclusive and binding.

c) On completion of entire work the contractor shall submit in triplicate to the Engineer in Charge layout plan showing actual position of poles, overhead lines, routes, cable run and all other information that will be necessary for maintenance and operation.

59.2. LAYOUT

The layout of OH lines/UG cable shown on site plan is tentative. The electric lines and cables shall be laid by the route as actually directed by the Engineer in Charge. The contractor shall measure on the ground the actual length along with route and work out the exact requirement of electric lines and cable before placing order for the same.

59.3. EXCAVATION AND EARTH WORK

a) Excavation for laying of underground cables/poles/struts and fixing of stay, etc shall be restricted to dimensions shown in the drawings and as directed by the Engineer in Charge. The minimum depth and width of the trenches shall be as laid in paras 19.74, 19.74.1 and 19.76 of SSR Part I respectively. In case of excavation of poles/struts and stays, excavation in excess of required depth shall be made good by the contractor in cement concrete 1:4:8 type D-2 without any extra cost to the Govt.

b) The trenches for cables shall be excavated to levels/gradients as directed by the Engineer in Charge.

c) All excavated earth shall be deposited at least one m clear to the edge of the excavation. When roads have to be crossed, trench up to half the width of road shall be dug at a time and proper notice, sign boards and lights shall be displayed and watchman posted to prevent accident.

d) Refilling of earth in trenches shall be done in 25cm thick layers with excavated soil approved by the Engineer-in-Charge in a manner and to ensure greater compactness and solidity. Each layer shall be well rammed, surplus soil removed as provided in Schedule 'A'.

59.4 CONCRETE, BRICKS, AGGREGATE SAND ETC

Concrete work shall be carried out all as specified here-in-before. For other general specifications such as bricks, aggregates, sand etc refer relevant items in Schedule 'A' and Particular Specifications given here in before.

59.5. CABLE PROTECTION

(a). Cable shall be protected in trenches by providing sand cushioning and cable covers all as described in Schedule 'A' items.

(b). On poles/walls cable shall be protected by GI protection pipes all as specified. The pipes shall be fixed to pole by means of proper MS clamps.

(c). Pipe for laying of cable and earth wire shall conform to IS: 1239.

PARTICULAR SPECIFICATION(contd...)

(d). Ends of pipe shall be properly sealed with wooden bush and bitumen compound after drawing the cables through pipe.

59.6. CABLE END BOX

Cable end box shall be epoxy cold resin filled type suitable for relay voltage grade as described and jointed as per relevant IS/manufacturers instruction.

59.7. CABLE GLANDS

Cable glands shall be of brass chromium plated of appropriate size as per IE Rules.

59.8. SUPPORTS, CLAMPS ETC

(a). The clamps shall be made out of MS flat iron of size not less than 50 x 6 mm. All nuts, bolts, washers used in fixing clamps shall be of galvanised mild steel and of size 19 mm dia.

(b). While calculating the weight of steel, the weight of nuts/bolts/washers etc shall be included for payment and weight of paint will not be included for payment.

59.9. EARTH WIRE

(a). Earth wire shall be of 4 mm dia galvanised iron and shall be stretched on poles with clamps or eye body hooks.

(b). The earth wire shall be paid by weight either by calculating from table or actual, should these differ only lesser shall be paid. No extra allowance for sag and jointing shall be made while computing the weight of GI wire

(c). Earthing to metal supports with and accessories shall be done by 2.5 mm dia wire, connected to main continuous earth wire running on poles. Nothing extra shall be paid on this account.

(d). The contractor shall furnish the test certificate from the manufacturers of the following equipments/instruments, material and accessories to GE, in accordance with the relevant ISS.

59.10. LT CABLES

(a). LT cables shall be of 2/3/3½ or 4 core aluminium conductors, XLPE insulated Heavy duty and suitable for 1100 volts grade and conforming to IS: 7098 (Part-I). Cross section area of these cables shall be armoured unless specified otherwise in Schedule 'A'.

(b). The aluminium conductors used should be stranded, compacted and circular/shaped and the main insulation should be of cross linked polyethylene (XLPE) with inner sheathing PVC wrapped or PVC extruded and each core of the cable should have colour identification all as specified in IS.

(c). Armour over the inner sheath should be either of strip or wire type and outer sheath should be of extruded PVC conforming to IS: 5831 of 1970.

59.11. LAYING OF HT/LT CABLES

a) The work of underground cables shall be carried out as specified in IS: 1255-1983 or latest edition and as described in section 19 (Electrical works section) sub clause 19.74 to 19.82.2 and 19.83 to 19.86.1 of MES Standard Schedule of Rates 2009 (Part–I specifications). The cables under road crossing, railway tracks etc (existing or proposed) shall be enclosed in GI pipes. The sizes of the pipes shall be as decided by the Engineer-in-Charge or as described in Schedule 'A'. Size of the pipe shall be such that the suitable space around the cable is available. The pipe shall be provided through out the width of roads, drains and extended for 1200mm on either side of the road. The joints of GI pipe shall be as specified in standard schedule of Rates 2009 (Part-I specifications). GI pipes shall be of light grade conforming to IS: 1239. The both ends of pipes shall be sealed with wooded plug/pegs and bitumen compound after drawing the cable through pipe.

b) Where the cables are to be laid in the trenches, 80 mm thick cushion of clean dry sand shall be provided in the trench before laying the cable. After the cable has been uncoiled and laid properly into the trenches, it shall be covered with dry sand to a depth of 150mm. This sand will gently punned down thus providing good bedding for the protective cable covers. The punning shall be done by hand and mechanical punners shall not be used. The depth of cable trenches shall be minimum 600 mm and 800 mm respectively for LT and HT cables and width of the trenching shall not be less than 450 mm.

PARTICULAR SPECIFICATION(contd...)

c) The reinforced pre cast concrete cover or bricks for protection of cable for covering the cables shall be as specified herein before. The pre cast cover shall be laid flat (width of protection being equal to length of brick). After the layer of pre cast cover/brick is laid the remaining trenches will be filled with excavated earth all as described in Schedule 'A'.

d) Care should be taken during laying of cable to avoid sharp bending and twisting. Cable shall be unwound from the drum by lifting the drum on the center shaft supported both ends with suitable Jacks/stands. Under no circumstances the cable winding shall be lifted off a coil or drum lying flat at the flanges to avoid serious twist and damages. Further the minimum bending radius of 15 x diameter of the cable should be ensured.

e) The cable shall be snaked to provide a 4 m length of cable for further joints at all straight joints (both side of the joint i.e. 4 m on each side) of cable laid in trenches and a 3 m lengths at terminal cable boxes. The above additional length of cable specified for snaking shall also be measured and paid for under the respective items of cables in Schedule 'A'. Laying pre cast cover/brick protection and sand cushion at places where cables are snaked shall be done as directed by the GE.

f) Cable path indicators shall be provided at distance of every 100 meters and at cable joints and turning of all cables except for street light cables and 2 core cables. The cost of these indicators shall be deemed to be included in the unit rates quoted for the respective cables. Cable path indicators shall be of CI plate of minimum 150 mm dia and 4mm thick indicating cable size and voltage written on it. The CI path indicator shall be fixed on MS angle iron with minimum two numbers of nuts and bolts. The nuts shall be tucking welded with bolts after full tightening. The size of MS angle iron shall be 30 mm x 30 mm x 6 mm and the length of angle iron should be 900mm adequate to ensure minimum planting depth of 400 mm below ground and 300 mm above GL. The angle iron, at the location of planting should be splitted and bent to shape to provide better grip and should be embedded in PCC (1:3:6) type C-1 using 20 mm graded stone aggregate and of size 200 x 200 x 300 mm. MS angle iron shall be painted with one coat of red oxide primer throughout length and thereafter it will be painted with two coats of synthetic enamel paint and bituminous paint in the portion above ground and below ground respectively. The cable path indicators shall be erected at the time of refilling the trenches and the cable path indicator shall be painted as under:-

(i) For HT 11 KV cables - "BROWN"
(ii) For LT cables - "BLUE"

g) While laying cables in ducts, care should be taken to ensure that the cables do not touch each other and minimum clear gap equivalent to diameter of the bigger cable should be provided. Further the cables should be fixed with suitable MS Flat iron (Minimum size 20 mm x 3 mm) clamps in the cable ducts to avoid jumbling. If necessary, cables may be fixed with clamps on the walls of the duct. Where cables are to be fixed by means of suitable clamps or bracket or on cable racks fixed along poles/steel structure, they shall be drawn through pipe as directed. Wherever the cables are embedded in the floor, it should be laid in the GI pipe all as directed. The cost of clamps etc shall be deemed to be included in the unit rate quoted for the respective cables.

h) Lay out of cables shown in the drawings is for guidance only. The contractor shall, however, verify the cable lengths actually required at site before procurement of the same.

i) Joints in cable shall not be at distance less than 300 meters. When large length of cable are to be laid, exceeding 500 m, which is a standard drum length, the joints will be done at interval of 500 m. Straight through joints shall be measured and paid separately under the respective items of Schedule 'A'.

j) The unit rates quoted for respective LT cables, shall be deemed to include the cost of cable glands, lugs/thimbles, preparation and making cable end joints including crimpling etc all as specified. The termination of LT cables in to Transformers/Switch gears/Feeder pillar-boxes/Distribution boxes shall in-variably be done through lugs or thimbles only to avoid loose connections. No termination of cables without suitable lugs/thimbles will be accepted. However, cable termination in case of HT cables shall be measured & paid separately under the respective items of Schedule 'A'.

k) The metal sheath, metal screen (if any) and armour of all the LT/HT cables should be effectively earthed at both the ends all as specified in IS: 1255-1983 and SSR part I.

l) **PARTICULAR SPECIFICATION(contd...)**

The cables should be purchased directly from the manufacturers or their authorized dealers only. Contractor should also submit the test certificate from the manufacturers besides carrying out the field tests. All new cables should be tested for insulation resistance using 1000 V, 2.5 KV and 5.0 KV IR Tester for LT, 11 KV and 33 KV grade cables respectively. Cables should be tested for insulation resistance between all the phase to phase and from each phase to earth before decoiling the cable from the drum and also after laying the cable in the trenches. Only after satisfactory results are obtained, cable jointing and termination work should commence. The test results of completed cable installation should also be measured and entered into record book for comparison purposes during service life of the cable installations. Arrangement for carrying out all these tests shall be made by the contractor without any extra cost to Govt in the presence of Garrison Engineer/ Engineer-in-Charge. The record of all such tests shall also be signed by Engineer-in-charge and contractor and countersigned by Garrison Engineer. At the closing of the work on every day, cable ends should be covered with suitable rubber/plastic caps and sealed effectively by insulating tap/bitumen to avoid any ingress of moisture into the cable.

m) Unless otherwise specified in Schedule 'A' the cost of cutting through roads/drains for laying cable under roads/drains and making good shall be deemed to be included in the unit rate of cables laid in pipes.

n) Wherever HT/LT cable will be crossing or running parallel to existing telephone cables, suitable measures will be taken and distance will be observed as per relevant ISS/IE Rules on the subject.

59.12. CABLE END TERMINATION AND STRAIGHT THROUGH JOINT FOR 1100V GRADE XLPE CABLES:

(a). Cable and termination Indoor/ outdoor type and straight through joints for LT cables shall be based on cast resin system. The casting resin should be polyurethane based having compatibility with the cable components. The cast resin should be suitable to provide adequate electrical insulation, mechanical protection and moisture imperviousness to the joint. The joint should be suitable for compression connection/ mechanical connector/soldering of cable conductors to meet the technical requirement as required at site. The termination kit should be designed for easy installation and have a crutch sealing arrangement for environmental protection on the core trifurcation.

(b). All the jointing of cables in joint boxes etc and filling in of the compound shall be done strictly as per the instructions furnished by the manufacturers of the cables and joint boxes.

(c). The joints should be suitable to withstand mechanical impact, heat shock tests, load cycle test and water penetration test (under pressure) without damage to the outer sheath.

(d). No separate payment for providing above joints for LT cables shall be admissible. Rates quoted for cables shall be deemed to include for this provision.

59.13. STANDARD OF QUALITY AND WORKMANSHIP

(a). The supply and installation of all electrical equipment and accessories shall strictly comply with provisions contained in the latest edition of Indian Standard Code of practice/specifications as applicable to above mentioned works, except where such regulation and rules are modified by these Specifications.

(b). Refer condition 25 of General Conditions of Contracts IAFW-2249. All electrical work shall be carried out by properly skilled and electrical supervisors/ Engineers. The contractor shall, on demand by the Engineer-in-Charge produce such evidence of Qualifications of his workmen/ supervisors/ Engineers, either at commencement of work or at any time thereafter during the currency of the contract. The entire work shall be of high class with the best workmanship and to the entire satisfaction of GE/Engineer-in-Charge.

(c). The Kiosk, transformer, cables, accessories, etc. incorporated therein shall be capable of giving satisfactory operation under the climatic conditions.

(d). The design and manufacture of the equipment shall be of highest standard to ensure continuous and trouble free service.

59.14. EARTHING:

a) Earthing shall generally conform to the requirement of IS: 3043-1987 (Code of practice for earthing) and IE Rules Nos 32, 51, 61, 62, 67, 69, 88 (2) and 90 and all as specified in clause Nos 19.137 to 19.146 of SSR Part I 2009.

PARTICULAR SPECIFICATION(contd...)

b) The neutral conductor of a three phase four wire system shall be earthed by not less than two separate and distinct connections each having its own electrode both at the generating station and at the substation. For earthing of neutral of 33/11 KV transformers, copper plate electrode shall be used.

c) The frame of every stationery motor, metallic parts of transformers, HT/LT switchgear panels shall be earthed by two separate and distinct connections with earth. This electrode used shall be galvanised iron or steel plate type.

d) The earth electrode shall not be situated less than 1.5 meter away from any building and its location should be selected such that the soil has reasonable chance of remaining moist. Entrance, pavements and roadways shall be avoided for locating the earth electrode. The distance between any two-earth electrodes shall preferably be not less than 8 m.

e) The type of earthing shall be as described in relevant item of schedule 'A'. The contractor shall obtain approval of Engineer-in-charge for layout of earthing before commencement and shall be executed in the presence of his representative. Excavation shall be passed by Engineer–in-charge before filling.

f) Galvanised steel pipe electrode shall be of medium grade 40 mm dia and 2.5 m in length. Pipe electrodes shall be cut tapered at the bottom and provided with 12mm holes (Staggered) at 75mm center to center up to 2 m of length from bottom. The electrode shall be buried in the ground vertically with its top not less than 1.25 m below ground level all as specified in Electrical plate No. 2 of SSR part I of 2009 except the modification mentioned in these particular Specification and Schedule 'A'.

g) Plate electrode shall be of 600 x 600 x 6 mm or 600 x 600 x 3 mm in case it is made of galvanised iron steel and copper respectively all as specified in schedule 'A'. The plate electrode shall be surrounded with charcoal dust and common salt mixture to a packed thickness of 300 mm on two sides perpendicular to the face of the plate and 150 mm below, above and out ward on remaining sides. The earthing shall be executed as shown in Electrical plate No. 3 of MES Standard Schedule of Rate 2009 (Part I) except modification mentioned in these particular Specifications and Schedule 'A'.

h) The charcoal dust and common salt mixture and returning filling shall be done in layers not exceeding 15 Cm and shall be properly watered and rammed. Surplus soil shall be disposed off and site left cleared on completion. Common salt and charcoal dust as available in the market shall be used for earthing.

i) The depth of earth electrode shall be as specified in Schedule 'A' but the ultimate depth of earth electrode would depend on the nature of soil and contractor is required to take it to a depth where sufficient moisture exist and natural conditions are suitable for resistance as specified below.

j) Main earthing lead shall be of minimum size 4 mm dia GI wire or 32 x 6 mm GI strip or 20 x 3 mm /32 x 6 mm copper strip as described in Schedule 'A'. The cost of earthing quoted in schedule 'A' (unless otherwise mentioned in Schedule 'A') shall be deemed to include the main earthing lead of 7.5 m from the electrode.

k) The earthing lead and protection pipe from electrode onwards shall be suitably protected from mechanical injury by a 15 mm dia GI pipe in case of GI wire and by 40 mm dia GI pipe in case of GI or copper strip from earth electrode to the test point. Protection pipe (unless otherwise mentioned in Schedule 'A') shall be measured and paid separately beyond 7.5 m length from earth electrode. The protection pipe used shall be of light grade.

l) The earthing system shall be mechanically robust and joint shall be capable of retaining low resistance even after many passage of fault current. Inter connections of earth continuity conductors and main and branch earth wire shall be made in such a way that reliable and good electrical connections are permanently ensured. All the joints of earth strip shall be made by welding and brazing with suitable overlap in case of GI earth strip and copper earth strip respectively. The overlap should not be less than twice the width of the earth strip. Before welding/brazing, the joints should be prepared and levelled properly. In case of welding, the welded area, after jointing, should be cleaned thoroughly by steel wire brush and sand papers, thereafter it shall be painted with two coats of bituminous paint to arrest the rusting. Further earth strip where exposed shall be painted with two coats of aluminium paint over one coat of red oxide paint.

PARTICULAR SPECIFICATION(contd...)

m) In the case of plate earth electrode, the earthing lead shall be properly levelled and welded in case of steel plate electrode and brazed in case of copper plate electrode and thereafter it shall also be securely bolted to the plate with two bolts, nuts, check nuts, and washers. The length of GI/ Copper earth strip to be welded/ brazed with earth plate shall not be less than 150mm. In case of pipe electrode, it shall be connected by means of through bolts, nuts and washers and cable sockets as indicated in IS: 3043. All material used for connecting the earth lead with electrode shall be galvanised iron in case of GI pipe or GI plate earth electrode and of tinned brass in case of copper plate electrode. The welded area shall be properly cleaned by steel wire brush and emery papers and thereafter it shall be painted with two coats of bituminous paint to arrest the rusting of the earth plate and electrode.

n) Each earth system shall be so devised that the testing of individual earth is possible. The earth test point terminal block shall be provided in the circuit of each earth pit at a suitable location as directed by Engineer-in-Charge. Earth test point terminal block shall be made of gun metal/phosphorous bronze or galvanised iron or steel of size 75 x 75 x 25mm where earth lead is of copper or GI steel plate/GI wire respectively. Test point terminal block shall be drilled and screwed including 3 Nos of 8 mm dia 25 mm long hexagonal head screws for fixing of earth strip or wire. These screws shall be made of tinned copper in case of gun metal/phosphorous bronze terminal block else where it will be of Galvanised steel. In case of GI wire earth lead, it shall be connected to test terminal point using hexagonal headed screw and cable socket.

o) Concrete chamber including coping shall be PCC (1:2:4) mix using 20mm graded stone aggregate. All the internal surfaces of concrete chamber shall be given 12 mm thick plaster in CM (1:4) finished fair without using extra cement. Funnel in the chamber shall be with wire gauge of 22 meshes per linear inch. The frame for earth pit shall be of MS angle iron of size 40 x 40 x 6 mm with RCC cover. The angle iron frame shall be firmly fixed into the PCC earth pit and RCC cover shall be 40 mm thick (1:2:4) type B-1 using 20mm graded stone aggregate with 8 mm dia TMT bars @ 75 mm C/C both ways with MS handle 12 mm dia. The other details as described in the schedule 'A'.

p) On completion of the Installations, the earth resistance of each earth electrode shall be measured as specified in IS: 3043. The earth resistance of the whole system shall be as near to Zero as possible but shall not exceed one ohm in case of Earthing for Neutral of transformers/DG sets and HT system. Further in respect of other installations, value of earth system resistance shall not be more than 5 ohms.

q) Earth resistance test shall be carried out by the contractor using his own measuring instrument and in the presence of Engineer-in-Charge and the test results shall be recorded and signed by contractor and the Engineer-in-charge. However, on testing after completion, if desired earth resistance is not obtained, the additional number of earthing may be made by the contractor and connected in Parallel with suitable earth strip all as directed by Garrison Engineer at no extra cost to Govt.

59.15. MOULDED CASE CIRCUIT BREAKERS (MCCBs)

Moulded case circuit breakers (MCCBs) shall be suitable for operational voltage of 415 Volt AC, 50 Hz, 3 phase, 4 wire system for a rated current and ultimate breaking capacity as mentioned in Schedule 'A' and it shall conform to IS: 13947 (Part 2) and IEC: 60947 (Part 2). All MCCBs shall be of four-pole version unless mentioned other wise in Schedule 'A'.

a) MCCBs shall be of Compact and elegant design suitable for reversible load and line terminations without affecting its performance. MCCBs shall be suitable for fixing flush on the panels and shall be provided with handle operating mechanism including Rotary Handle vari-depth type.

b) The insulating case and cover of MCCBs shall be made of high resistant and flame retardant thermosetting insulating materials. The switching mechanism shall be quick make, quick break and trip free. The position of the operating knob/handle shall clearly indicate ON, OFF and TRIP position.

c) Each pole shall be provided with a pair of contacts, which shall open at a high speed over a large distance under short circuit faults. The special designed arc cut outs of insulating materials shall be provided to contain the arc by providing effective arc quenching device.

PARTICULAR SPECIFICATION(contd...)

d) The tripping mechanism shall be thermal release or Electronic release or thermal magnetic release for protection for over load and short circuit as per the details given below: -

Capacity Of MCCBs	Ultimate breaking Capacity	Overload release	Short circuit release
1	2	3	4
Upto 125 Amps	16 KA	Adjustable Thermal release (range 70% to 100 % of rated current)	Fixed magnetic type suitable for 10.0 In
160 to 630 Ams	36 KA	Adjustable Thermal release (range 70% to 100 % of rated current)	Adjustable magnetic release (3.5 to 10 times of rated current)
800 and 1250 Amps	50 KA	Adjustable electronic release (over load Zone range 40% to 100 % of rated current)	Adjustable electronic release(range (5 to 10 times of rated current)

e) Under voltage trip, mechanical interlocks etc shall be provided as per standard practice and ISS. Under voltage trip shall be designed to operate when the control voltage drops below a tripping threshold i.e. 20% to 70% of rated voltage and shall be suitable for operation on 230V/415V AC.

f) The terminals shall be suitable for both copper and aluminium terminations as specified. The MCCBs shall be one of the makes mentioned herein after in these Particular Specifications.

59.16. MCBs, DISTRIBUTION BOARDS AND PLUG & SOCKET DBs

a) Distribution boards shall be factory made and conforming to IS: 8623 suitable for universal mounting copper bus bar, Neutral bar, and Earth bar, Standard DIN bar Rail and cable ties for cable management. Top and bottom shall have removable gland plates with knock outs. The copper bus bar shall be suitable for 100 amps unless specified other wise in Schedule 'A'.

b) SPN Distribution boards shall be suitable for provision for DP/SPN MCBs/ Isolators as incomer and SP outgoings all as specified and shall be flush mounting type. The degree of protection shall be IP-43 protection with acrylic door unless specified otherwise in Schedule "A".

c) TPN distribution boards shall be suitable for FP/TPN MCBs/Isolator as in comer and TPN/SP outgoings all as specified and shall comply with IP-43 protection with metal door unless mentioned otherwise in Schedule 'A'.

d) All distribution boards shall be fixed flushed on the wall at locations as directed by Garrison Engineer.

e) MCBs: - All MCBs shall be conforming to IS: 8828 of 1996 and shall be ISI marked. These shall be suitable for 'C' curve and 10KA breaking capacity and shall be provided with box terminal on top and bottom both suitable for adopting cable size up to 35 Sqmm. The enclosure of MCBs shall be of 'Molded Self Extinguishing thermo set plastic and these shall be suitable for snap fixing on standard Din Rail. The current capacities and poles shall be all as mentioned in Schedule 'A'.

f) MCBs Isolators – All MCB type isolators shall conform to IS: 13947-3 and shall be suitable for impulse voltage of 6KV and short time with stand capacity of 1000 Amps for 0.3 seconds.

g) Plug and Socket DBs :- Plug and socket distribution Boards including SP/DP MCBs for protection of appliances like window type/split type Air conditioners and Geysers shall only be provided all as specified. Similarly distribution boards with MDS Legrands type P-17 Tempera plugs and sockets including TPN/FP MCBs shall be provided to make available 3 phase 415 volts, 50Hz AC electric supply in Technical Buildings. All these plug and socket DBs shall be of universal mounting type.

h) The makes of Distribution Boards, Plug and socket DBs and MCBs shall be all as specified here in after and the models/Type shall be as indicated in the respective Schedule.

PARTICULAR SPECIFICATION(contd...)

GUARANTEE AND MAINTENANCE

59.17 The entire installations (after satisfactory completion of all test specified in the contract documents and taking over) shall be deemed to be guaranteed by the contractor for efficient performance for twelve months from the certified date of completion of work. In case of any fault arising during this period, the contractor will do the rectification/replace the defective parts, as the case may be at his own expense. A fresh guarantee for further period of 12 months from the date of rectification/replacement of such item shall be furnished by the contractor. The defects liability period referred to in condition 46 of IAFW-2249 (General Condition of Contracts) for purpose of this contract, shall be deemed to be the period covered by the guarantee given by the contractor.

60. EXTERNAL WATER SUPPLY:

60.1 GENERAL

(a) Work shall be carried out by licensed plumbers

(b) Layout of pipes shall be generally as shown on drawings.

(c) The holes through walls, floors etc, around the pipes shall be made good with cement and sand mortar (1:4) for full thickness and finished as per surrounding surface.

(d) The location and distribution of various items on the drawings are tentative. Alteration can be made by GE as per the site requirements and there shall be no price adjustment on this account. The rates quoted by the contractor against each item of Schedule 'A', shall be deemed to include expenditure on account of all extras which are not specifically shown on drawings or given in particulars specifications but are essential for the execution of work. In case of difference of opinion in this respect between the contractor and the GE, the decision of the Accepting officer shall be final, conclusive and binding.

a) Material and workmanship required to be incorporated in these works and services and testing shall be as given under specification and workmanship in the trade section of MES Standard Schedule of Rates Part-I & II duly modified by these particular specifications and notes on the drawings.

b) Layout of water supply pipeline including fittings shown on drawings is tentative. The exact layout/alignment of water supply pipe line including their fittings etc shall however be as directed and approved by the Engineer-in-Charge in writing before commencement of work.

c) On completion of the entire work, the contractor shall submit on tracing cloth to the Engineer-in-Charge, layout plans drawn to a suitable scale, showing actual routes/alignment of various pipe lines(with indication of their sizes) and fittings and location of various valve, valve chamber etc without any extra cost. The said layout plans shall indicate the distance of pipe lines from the main buildings and roads. All sizes and dimensions shall be shown in the above plans in metric units (i.e. in CGS system) only. All work shall be carried out by licensed plumbers/fitters/skilled labourers.

60.2. EXCAVATION AND EARTH WORK:

Excavation for pipes/cables shall be done all as specified in MES Schedule.
Workmanship shall be as specified in clause 18.42 of MES Schedule Part I.

a) Before commencement of excavation the contractor and Engineer-in- Charge shall jointly take levels at suitable intervals decided by Engineer-in-Charge along the alignment marked on the ground and point the same in longitudinal section. The proposed levels shall be signed by the contractor and GE as a token of acceptance, the minimum depth of excavation for pipes shall be 70 cms below ground level. The quantity of excavation shall be calculated from the prismoidal formula as far as possible. Note : Invert levels for the purpose of this shall be taken as bottom most levels of pipe and not the flow.

(c) The contractor shall excavate to levels as shown in longitudinal sections. Excavation made deeper than required level shall be made good by the contractor at his own expense with approved earth by ramming and watering in 150mm layer. No payment shall be made for extra depth excavated and filled by the contractor.

(d) The width at bottom of excavation in trenches for various bores of pipe shall be as specified in section 3 clause 32.3 on page 21 of MES Schedule Part II at joints of pipes and fittings. Width of excavation shall be sufficient for a person to make proper joints. Extra excavation if required on account of this and any excavation in addition to the authorised widths will not be measured and the lump sum rate quoted against the item shall be deemed to include for these allowances.

(e) When roads have to be crossed, half the width shall be dug at a time and proper working notices, signs and light shall be displayed and a watchman shall be posted to avoid accidents.

b) **PARTICULAR SPECIFICATION(contd...)**

N ote : Invert levels for the purpose of this shall be taken as bottom most levels of pipe and not the flow.

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(h) When roads have to be crossed, half the width shall be dug at a time and proper working notices, signs and light shall be displayed and a watchman shall be posted to avoid accidents.

60.3 RETURN, FILLING IN TRENCHES AND DISPOSAL

(a) After excavation is carried out to required depth, the bottom of trenches shall be evenly dressed and well rammed before pipes are laid down. Unless otherwise specified, all trenches shall be filled back with spoil obtained from excavation, watered, rammed and consolidated to the satisfaction of Engineer-in-Charge and shall be laid in regular layer not exceeding 150mm thick. The returning filling specified above shall be done up to height of 80mm above ground level. Settlement of earth in trenches which may take place during the execution of work or during the maintenance period shall be made up to date
by the contractor at his own cost.

(b) Joints of pipes shall be kept open and no filling over the joints shall be done till pipe is tested. In case these are filled up or get filled up during the course of time, these shall again be opened before commencing the testing of the pipe line and after ward, the trenches shall be properly filled.

(c) Pipes shall not be laid directly over rock [where rock excavation is done] but 150mm cushion of approved earth, well rammed shall be provided below the pipes.

(d) All surplus spoil obtained form excavation shall be removed to a distance not exceeding 100 metres and spread and levelled at places as directed by Engineer- in-Charge without any extra cost to Govt.

60.4 GI PIPES:

a) GI pipes and fittings shall be medium grade, conforming to IS 1239 (Part I) and IS –1239 (Part II) respectively with tolerance as specified in Clause 18.42 of SSR Part I.

b) GI pipes and fitting shall be laid at a depth not less than 225mm and not more than 450mm below ground level all as specified in Clause 18.50 of SSR Part I.

c) Jointing of GI pipes and fittings shall be done as specified in Clause 18.50.3 of SSR Part I.

60.5 CAST IRON PRESSURE PIPES

60.5.1 Centrifugal cast iron pipes shall confirm to IS 1536-2001 : Specification for centrifugally cast (spun) iron pressure pipes for water and vertically cast iron pressure pipes shall conform to IS 1537-1976 : Specification for vertically cast iron pressure pipes for water. Spigot and socket pipe (centrifugally) shall be of Class LA, Class A and Class B and flanged pipes (centrifugally) shall be of Class A & Class B as indicated. Vertically cast iron pressure pipe shall be of Class 'A' or Class 'B' with spigot and socket ends or flanged ends as indicated or specified. Cast iron fittings shall conform to IS-1538-1993. Also refer Clause 18.2, 18.2.1 to 18.2.4.6 of MES Schedule 2009 Part I. The fittings shall withstand hydrostatic test pressure without showing leakage, sweating or defects of any kind as laid down in IS Manufacturer Test Certificate shall be produced by the contractor.

60.6 DUCTILE IRON PIPES AND FITTINGS

60.6.1 All Ductile iron centrifugally cast spun) pressure pipe shall conform to IS-8329-2000 and fittings shall conform to IS 9523-2000. Spigot and socket pipes and flanged pipes shall be as described Schedule 'A'. Laying, jointing and testing of D.I. pipes shall be as per IS-12288-1987. The fittings shall withstand hydrostatic test pressure without showing leakage, sweating or defects of any kind as laid down in IS Manufacturer Test Certificate shall be produced by the contractor.

60.7 FLANGED JOINTS

PARTICULAR SPECIFICATION(contd...)

60.7.1 Jointing material used between flanges of pipes/fittings shall be of thickness 3.00mm and samples shall be got approved from the GE before procurement in bulk. Flanges shall conform to IS-6392" Specification for steel pipe flanges" shall be welded or screwed (at the option of contractor without any price adjustment on the pipe/fittings as per IS equirement. The numbers and position of holes on the flanges shall be as per IS requirement. Nuts, bolts and washers shall be of MS as per IS.

60.8 JOINTING OF CI PIPES AND FITTINGS

60.8.1 (a) No flange or spigot and socket joint shall be buried in the masonry of the valve chambers.

(b) Cast iron fittings and specials such as bends, tapers, tees, connecting pieces etc. shall be carefully and accurately aligned and jointed to pipes all as described under relevant clause of IS 3114 of 1985 as amended.

(c) While laying pipes in trenches care shall be taken that no earth etc gets inside pipe. The work when completed shall be tested as per IS requirements

(d) (i) In run lead joints for pipes, fitting and specials, molten lead and spun yarn will be used. The spun yarn shall be handled with care in order to prevent contamination and shall be dry when put into place in the joints. The yarn shall be free of oil, fat or greasy substances.

(ii) When a single strand of yarn is used, it shall have an over lap at the top not more than 5 cms. When more than single strand is required for a joint, each strand shall be cut to sufficient length so that the ends of pipe will meet without causing overlap. The end of the strand shall meet on opposite side of the pipes and not on the top or the bottom. Successive strand of yarning material shall be driven home separately.

(iii) The lead for caulking purposes shall conform to IS 782-1978. The quantity of lead and spun yarn required for different sizes of pipes shall be as specified in clause 18.48.24 of MES Schedule Part I.

60.9 DETECTION OF CRACKS OF PIPES/TUBES

60.9.1 The pipes/tubes and fittings shall be inspected for defects and rung with a light hammer preferably while suspended to detect cracks. If doubt persists further confirmation shall be obtained by pouring little paraffin on the pipe at the suspected spot. The pipes/tubes and fittings shall be inspected for defects and rung with a light hammer preferably while suspended to detect cracks. If doubt persists further confirmation shall be obtained by pouring little paraffin on the pipe at the suspected spot.

60.10 SLUICE VALVES/REFLUX OR NON RETURN VALVES

60.10.1 Sluice valve shall comply with the requirements of IS 14846-2000 and shall be of class PN 1. The make of sluice valve shall be as mentioned in Appendix 'D'.

60.11 Non Return Valves (Reflux Valves)

60.11.1 These shall be flanged, swing check type valves, single door pattern conforming to IS –5312 (Pt I). The valves shall be with or without by-pass arrangement and of the makes as mentioned in Appendix..

60.11.2 The valves shall be fixed as specified in clause 18.57 of MES Schedule Part I.

60.12 Testing of Pipes and pipe lines; -

60.12.1 All pipes and fittings shall be inspected carefully before being laid. Broken or defective pipes shall not be used and removed from the site of works. Pipes shall be rung with light hammer preferably white suspended to detect cracks. If doubt persists, confirmation may be obtained by powering a little paraffin on the inside of the pipe at the suspected spot, if crack is present the paraffin seeps through and shows on the outer surface.

60.13 Testing of Distribution pipeline: -

60.13.1 (a) Pressure and leakage test:- After a new pipe line has been laid, jointed,the test shall be carried out as directed at in double the working pressure for period of two hours.

(i) A record of the above tests shall be maintained and separate register duly signed by the contractor and Engineer –in-charge.

(ii) All facilities and equipments for testing will be arranged by the contractor at the own cost.

(iii) Any cracked or defective pipes, fittings valves and joints discovered as a result of the above test shall be removed and replaced by the contractor at his own cost and the test shall be repeated till the results are obtained to the satisfaction of the Engineer –in-charge.

(iv) During the leakage test should any pipe or joint fitting disclose leakage pipe should be removed/replaced until the leakage is removed to the satisfaction of Engineer –in-charge and as specified.

60.14 Testing of pressure pipe rising main :-

60.14.1 The pressure pipe rising main only will be subjected to testing in accordance with para 18-48. 7 of SSR part-I.

PARTICULAR SPECIFICATION(contd...)

60.4. VALVE PIT CHAMBER: The unit rate for valve chamber in Sch 'A' and as shown on drawings shall include for :-

(a) Excavation and earth work shall be in any type of soil. Surplus soil shall be disposed off to a distance not exceeding 50 metres.

(b) PCC in foundation shall be 1:4:8 type D-2 using 40mm graded stone aggregate and top exposed surface finished fair without using extra cement.

(b) Brick work shall be one brick thick wall built in CM (1:4).

(c) Coping shall be in PCC (1:2:4) Type B-1.

(d) Plaster 12mm thick in CM (1:4) shall be provided on all brick and concrete surfaces internally, surface finished fair and even without using extra cement.

(e) Cover shall be of 6.0 mm thick mild steel sheet fixed with MS angle iron 40mm x 40mm x 6 mm thick and locking arrangement all as shown on drawing. All steel and iron work shall be given two coats of synthetic enamel paint over a coat red oxide primer.

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63. GUARANTEE AND MAINTENANCE

The entire installations (after satisfactory completion of all test specified in the contract documents and taking over) shall be deemed to be guaranteed by the contractor for efficient performance for twelve months from the certified date of completion of work. In case of any fault arising during this period, the contractor will do the rectification/replace the defective parts, as the case may be at his own expense. A fresh guarantee for further period of 12 months from the date of rectification/ replacement of such item shall be furnished by the contractor. The defects liability period referred to in condition 46 of IAFW-2249 (General Condition of Contracts) for purpose of this contract, shall be deemed to be the period covered by the guarantee given by the contractor.

64. SITE CLEARANCE/EXCAVATION & EARTH WORK

After completion of works the entire site of work shall be cleaned all as per provisions specified in MES Schedule Part-I (2009). Contractor rates shall be deemed to include for levelling/cleaning of area around the buildings, removal of any debris as directed by Engineer-in-Charge to a distance or on clause No 5.6 here-in-before, removing cement splashes, white wash splashes on floors, walls. Contractor shall handover the buildings neat & clean. Rates quoted shall be deemed to cover this aspect.

65. SITE CONDITION

It is assumed that before tendering the Contractor would have visited the site and familiarized himself with all the local conditions and means of transportation and communications. No claim of whatsoever nature would be entertained at a later date on account of the Contractor's ignorance of the local conditions.

66. WORKMANSHIP

All the work shall be carried out in a workmanship like manner and as per the best practices of the trade.

67. RATES

The rates mentioned in the schedule of quantities / to be quoted for any particular item by the tenderer are / shall be inclusive of the cost of material, erection, connection, testing, labour, supervision, tools, plant, transportation, storage, insurance, excise duty, local taxes, contingencies, breakage, wastage and all other sundries. The rate shall also be inclusive of cutting holes, making chases in RCC or brick and making good the same. No claim for extra would be entertained on this account.

68. MATERIALS

All materials to be supplied by the Contractor shall be new. All packed items shall arrive at site in original packing only. Any items found defective or damaged shall be replaced by the Contractor at his own expenses.

69. INSTRUMENTS FOR MEASURMENT AND TESTING

The Contractor shall provide, free of cost, all equipment, instruments, labour and all other allied assistance required by the Engineer-in-Charge or their representatives for measurement and testing of the works.

70. COORDINATION WITH OTHER TRADES

The Contractor shall be responsible for coordinating his work with works of other trades sufficiently ahead of time to avoid unnecessary hold ups. Hangers, sleeves, recesses etc. shall be left in time as the work proceeds.

PARTICULAR SPECIFICATION(contd...)

71. UP-KEEP OF THE SITE

It shall be the responsibility of the Contractor to clear away, from time to time all debris and excess material generated by the activities of his workers.

72. PROTECTION

All work shall be adequately protected, to the satisfaction of the Engineer-in-Charge, so that the whole work is free from the damage throughout the period of construction up to the time of handing over.Before handing over the work, the Contractor shall clean all elements of the complete installation, remove plasters, stickers, rust stains and all other foreign matter and leave every part in acceptable condition and ready for use to the satisfaction of the Engineer-in-Charge.

73. COMPLETION DRAWINGS

The contractor shall submit, after the completion of the work, one set of originals and two sets of prints of the As-Fitted drawings / Completion drawings of all floors giving followings: -

(a) Run and size of conduits, inspection, and junction and pull boxes.

(b) Size and numbers of conductor in each conduit.

(c) Location of all detectors, manual call points, response indicators, hooters etc.

(d) Location and details of all zonal control panels and main control and indicating panels.

(e) A complete wiring diagram as installed and schematic drawings showing all connections in the complete fire detection and alarm system.

(f) Layout and particulars of all cables.

74. SOLAR POWER SYSTEM

TECHNICAL SPECIFICATIONS

The proposed project shall be commissioned as per the technical specifications given below:

DEFINITION

A grid Tied solar Photo Voltaic (SPV) power plant consists of SPV array, Module Mounting Structure, Power Conditioning Unit (PCU) consisting of maximum power point tracker (MPPT), Inverter, and controls & protections, interconnecting cables and switches. PV array is to be mounted on a suitable structure. Grid tied SPV system is without battery and should be designed with necessary features to supplement the grid power during day time. Components and parts used in the SPV power plants including the PV modules, metallic structures, cables, junction box, switches PCUs etc should conform to the BIS or IEC or international specifications, wherever such specifications are available.

Solar PV system shall consist of following equipments/components.

- Solar PV modules consisting of required number of crystalline PV modules.
- Grid Tie inverter Unit with remote monitoring system
- Mounting structures
- Junction boxes
- Earthing and lightening protections
- IR/UV protected PVC cables, pipes and accessories

74.1 DESIGN:

74.1.1 The items of Work mentioned in this Schedule shall be executed as per following:-

74.1.2 The above item shall be quoted and executed on ground based on Contractor's own design on Performance Guarantee Basis. The Performance Guarantee is related to achieving the 1500 KWP generation with specified efficiency and efficacies. The Contractor shall also be responsible for desired operational efficacy and desired efficiency of the System during its life cycle of minimum fifteen years. The designed system by the contractor should be equivalent or superior in terms of following parameters:- a) KWh output. b) Ammortization period. c) Return on Assets.

74.1.3 The design shall be got vetted from any one of the following agencies (Approved Agencies):- (i) National Institute of Solar Energy (ii) Sardar Swarn Singh National Institute of Renewable Energy (iii) Solar Energy Corporation of India (iv) The Indian Renewable Energy development Agency. The vetting agency shall certify the design.

74.1.4 The successful Contractor shall submit the following documents duly vetted by any one of the approved agency, within **Four weeks** of placement of work order for approval of Accepting Officer. Please note that incase there is any delay in submission of vetted design/drawings beyond the said period recovery will be made @ of Rs 10,000/- per day.

74.1.4.1 (a) Design Calculations:- The tenderer should work out design based on the conditions prevalent at GE (AF) Bamrauli building plan, structural specifications, as existing. The complete design calculations using PVSYS & PVSOL Software or any other software shall be submitted.

74.1.4.2 (b) Plan depicting layout of all equipments and Sub-systems of the PV System. This shall be self contained and self explanatory representation of layout of equipments and subsystems. The dimensioned drawing of the site of work clearly marked with all subsystems components etc shall be sum

74.1.4.3 (c) Schematic Diagram of the Electrical system: This shall contain specifications, sizes, current, voltage and fault levels ratings of all cables, switch gears and instrumentation & control systems and all metering and interlocking etc.

74.1.5 All the documents/ technical details mentioned above duly vetted as specified above shall be approved by Accepting Officer within 15 days of submission. Accepting Officer may approve the documents as submitted by Contractor or may suggest modification/ alteration in documents/ technical specifications duly supported with reasons for the same. The work shall be executed based on the approved documents. The decision of Accepting Officer shall be Final and Binding.

74.1.6 The design drawings and other technical details submitted by the successful contractor, along with all calculations, drawings, technical write ups etc shall become departmental property. Department may use these subsequently as deemed necessary. The contractor shall have no claim on these documents and their subsequent use by the department.

PARTICULAR SPECIFICATION(contd...)

74.1.7 After completion the contractor must engage a third party MNRE approved consultant for final testing and third party inspection of executed work. The consultant shall certify that the work has been executed in accordance with vetted and approved design. The contractor shall propose a panel of three consultant for this purpose. The final decision on the consultant to be engaged shall be taken by accepting officer. All cost and charges for engagement of consultant shall be borne by the contractor. Testing and commissioning shall be conduct by MNRE approved consultant/agency in presence of GE, Engineer-In-Charge and contractor.

74.1.8 Department will give completion of the work to the contractor only on the basis of completion report submitted by the third party consultant engaged by the contractor.

74.1.9 PAYMENT:-

Yardstick to be adopted by department for execution of **Phase-I** work:

(a) On submission of vetted and approved design - 2% of Contract Value of solar plant and connected item.

(b) On receipt of Complete quantity of PV Module as per design - 35 % of Contract Value of solar plant and connected item.

(c) On receipt of Complete quantity of Mounting structure as per design – 08 % of Contract Value solar plant and connected item.

(d) On receipt of Complete quantity of other accessories as per design - 15 % of Contract Value solar palnt and connected item.

(e) Installation and Commissioning- 20%

(f) Final Testing as per design - 20 %

74.1.10 COMPLETION:-

(a) The contractor on completion of work shall clean entire site of work by removing surplus materials, debris or other rubbish etc. stagnated during the period of contract and ensure the whole premises clean and tidy to the entire satisfaction of Engineer-In-Charge, before handing over the site to MES.

(b) After Completion the contractor must engage a third party MNRE approved consultant for final testing and third party inspection of executed work. The consultant shall certify that the work has been executed in accordance with vetted and approved design. The contractor shall propose a panel of 3 consultant for this purpose. The final decision on the consultant to engaged shall be taken by the Accepting Officer. All cost and charges for engagement of consultant shall be borne by the contractor. Testing and commissioning shall be conduct by MNRE approved consultant/agency in presence of GE, Engineer-In-Charge and contractor. Commissioning process shall be adopting the standard like BS EN 62446 and the following tests shall be carried out:-

i) Earth Test (ii)Open Circuit Voltage Test (iii) Polarity Test

iv)Short circuit current test (v)Operating current test

vi)Insulation test (vii)Safety and performance ratio test of the plant

viii)Any other test as per OEM recommendation and latest MNRE norms/IS.

c) The General Scope of Work includes commissioning of the power plant and evacuation of power corresponding to the guaranteed performance at the Evacuation Point. Contractor shall operate and maintain the facility and shall demonstrate guaranteed performance of the plant in the form of CUF as plant acceptance test as mentioned in Annexure I: Details Required for Power Plant Performance Guarantee Test and obtaining Inspection and successful electrical commissioning certificate from the GE.

63.1.11 FINAL COMISSIONING AND PLANT ACCEPTANCE

Final commissioning of the plant shall be carried out by the senior SEI after third party test.

74.2 SOLAR PHOTOVOLTAIC MODULES:

74.2.1 For PV modules country of origin (make in India only).

74.2.2 The PV modules used must qualify to the latest edition of IEC PV module qualification test or equivalent BIS standards Crystalline Silicon Cell Modules IEC 61215/IS14286. In addition, the modules must conform to IEC 61730 Part-2 requirements for construction & Part-2 requirements for testing, for safety qualification or equivalents IS.

(a) For the PV modules to be used in a highly corrosive atmosphere throughout their lifetime, they must qualify to IEC61701/IS61707

(b) The total solar PV array capacity should not be less than allocated capacity (kWp) and should comprise of solar crystalline modules of minimum 325 Wp and above wattage.

(c) Protective devices against surges at the PV module shall be provided. Low voltage drop bypass diodes shall be provided.

(d) PV modules must be tested and approved by one of the IEC authorized test centers.

(e) The module frame shall be made of corrosion resistant materials, preferably having anodized aluminum.

(f) The bidder shall carefully design & accommodate requisite numbers of the modules to achieve the rated power in his bid. The department shall allow only minor changes at the time of execution.

PARTICULAR SPECIFICATION(contd...)

(g) Other general requirement for the PV modules and subsystems shall be the following:

i. The rated output power of any supplied module shall have tolerance of +/- 3%.

ii. The peak-power point voltage and the peak-power point current of any supplied module and/or any module string (series connected modules) shall not vary by more than 2 (two) per cent from the respective arithmetic means for all modules and/or for all module strings, as the case may be.

iii. The module shall be provided with a junction box with either provision of external screw terminal connection or sealed type and with arrangement for provision of by-pass diode. The box shall have hinged, weather proof lid with captive screws and cable

74.2.3 Module deployed must use a RF identification tag. Following information must be mentioned in the REIF used on each module (This can be inside or outside the laminate, but must be able to withstand harsh environment conditions).

(a) Name of the manufacturer of the module
(b) Name of the manufacturer of solar cells.
(c) Month & year of the manufacture (separate for solar cells and modules)
(d) Country of origin (make in India only)
(e) I-V curve for the module wattage, lm, Vm and FF for the module
(f) Unique serial No and model No of the module
(g) Date and year of obtaining IEC PV module qualification certificate
(h) Name of the test lab issuing IEC certificate
(i) Other relevant information on traceability of solar cells and module as per ISO 9001 and ISO 14001

74.2.4 The PV modules must be tested and approved by one of the IEC authorized test centers. In addition a PV module qualification test certificate as per IEC standard, issued by ETDC, Bangalore or Solar Energy Centre will also be valid.

74.2.5 Solar cells and PV modules:- Technical specifications of PV module for use in Grid/Off grid solar power plants will be as under :-

(a) The PV modules used in the solar power projects must qualify to the latest edition of the following International Electrotechnical Commission (IEC) PV module qualification test or equivalent BIS standards.

(i) Crystalline silicon solar cell modules	-	IEC 61215/BIS 14286
(ii) Thin film modules	-	IEC 61646 /Equivalent BIS
(iii) Concentrator PV modules	-	IEC 62108 / Equivalent BIS
Additional Checks		
(iv) PV modules (For construction & safety) Equivalent BIS	-	IEC 61730 (Part I & II) /
(v) PV modules corrosive atmosphere	-	IEC 61701/BIS 61701
(vi) PV modules in sandy environment	-	IEC 600068-2-68

74.2.6 Technical requirement of BoS items of SPV plants:- Technical specifications of power conditioners including MMPT & Protection for use in grid solar power plants are as under:-

(i) Environment testing	IEC 60068-2/Eq. IS
(ii) Efficiency Measurement	IEC 61683/IS 61683
(iii) Project safety	IEC 62109- 1 & 2
(iv) Grid connectivity Interface	IEC 61727:2004
(v) Interconnection PV inverter	IEC 62116
(vi) Electromagnetic interface	IEC 610002, 3, 6
(vii) Ingress Protection	IP 54 & IP 21
(viii) Batteries	As per relevant BIS Std
(ix) Cables	IEC 60227 / IS 694. (UV resistant, DC rated, plug & play)
(x) Earthing / Lighting	IEC 62561 / IS 3043 : 1986
(xi) Surge Arrestors	IEC 60364-5-53 / Relevant IS code
(xii) Circuit Breakers	IEC 60947 1, 11, III/IS 60947, EN 50521
(xiii) Junction boxes & Enclosures	IP 65/ IP 21
(xiv) Meters	As per DISCOM guidelines / IS 16444
(xv) Grid connectivity	As prevalent in the state / as per CEA

PARTICULAR SPECIFICATION(contd...)

74.3. Warranty:-

(a) Material warranty:

(a). Warranty on output and life of structure should be as under:-

(i) Output wattage of PV modules should not be less than 90% at the end of 10 years and 80% at the end of 25 years.

(ii) The mechanical structures, electrical works, storage batteries and overall workmanship of the grid solar power must be warranted for a minimum of 5 years.

(b) Material warranty is defined as:

(i) The manufacturer should warrant the solar module(s) to be free from the defects and /or failures specified below for a period not less than twenty five (25) years from the date of completion of the project.

(ii) Defects and/or failure due to quality of manufacturing

(iii) Defects and/or failures due to quality of materials

(iv) Non conformity to specifications due to faulty manufacturing and/or inspection process. If the solar module(s) fails to conform to this warranty, the contractor will repair or replace the solar module(s), at the own arrangement without any extra cost.

(c) PERFORMANCE WARRANTY:

(i) The predicted electrical degradation of power generated not exceeding 20% of the minimum rated power for the 25 year period and not more than 10% after ten years period of the full rated original output.

(d) PERFORMANCE RATIO (PR):-

The ratio between the actual and theoretically energy outputs of the SPV plant is termed as Performance Ratio (PR) and measured in accordance with IEC 61724. Based on prevailing climatic and temperature condition in India, a performance ratio shall vary between 75% to 90% as per site conditions.

74.4. ARRAY STRUCTURE

I. Hot dip galvanized MS mounting double pole static structures may be used for mounting the modules/panels/arrays. Each structure should have angle of inclination as per the site conditions to take maximum isolation. However to accommodate more capacity the angle inclination may be reduced until the plant meets the specified performance ratio requirements.

II. The mounting structure shall be so designed to withstand the speed for the wind zone of the location where a PV system is proposed to be installed (as per relevant IS code/ NBC). It may be ensured that the design has been certified by a recognized lab/institution in this regard and submit wind loading calculation sheet to department. Suitable fastening arrangement such as grouting and calming should be provided to secure the installation against the specific wind speed.

III. The mounting structure steel shall be as per latest IS 2061: 1992 and galvanized of the mounting structure shall be in compliance of latest IS 4759.

IV. Structural material shall be corrosion resistant and electrolytically compatible with the materials used in the module frame, its fasters, and nuts and bolts. Aluminum structures also can be used which can withstand the wind speed of respective wind zone. Necessary protection towards rusting to be provided either by coating or anodization.

V. The fasters used should be made up of stainless steel. The structure shall be designed to allow easy replacement of any module. The array structure shall be so designed that it will occupy minimum space without sacrificing the output from the SPV panels

74.5 JUNCTION BOXES (JBs)

I. The junction boxes are to be provided in the PV array for termination of connecting cables. The J. Boxes (JBs) shall be made of GRP/FRP/Powder coated Aluminum/ cast aluminum/M.S alloy with full dust, water & vermin proof arrangement. All wires/cables must be terminated through cable lugs. The JBs shall be such that input & output termination can be made through suitable cable glands.

II. Copper bus bars/terminal blocks housed in the junction box with suitable termination threads conforming to IP65 standard and IEC 62208 hinged door with EPDM rubber gasket to prevent water entry. Single/ double compression cable glands. Provision of earthing. It should be replaced at 5 feet height or above for ease of accessibility.

III. Each junction box shall have high quality suitable capacity varristors (MOVs)/SPDs, suitable reverse blocking diodes. The junction boxes shall have suitable arrangement monitoring and disconnection for each of the groups.

IV. Suitable markings shall be provided on the bus bar for easy identification and the cable ferrules must be fitted at the cable termination points for identification.

PARTICULAR SPECIFICATION(contd…)

74.6. DC DISTRIBUTION BOARD:

I. DC distribution panel to receive the DC from the array field.

II. DC DPBs shall have sheet from enclosure of dust & vermin conform to IP65 protection. The bus bars are made of copper desired size. Suitable capacity MCBs/MCCB shall be provided for controlling the DC power output to the PCU along with necessary surge arrestors.

74.7. AC DISTRIBUTION PANEL BOARD:

I. AC distribution panel board (DPB) shall control the AC power from PCU/inverter, and should have necessary surge arrestors. Interconnection from ACDB to mains at LT bus bar while Ingrid tied mode.

II. All switches and the circuit breakers, connectors should conform to IEC 60947, part I,II and III/IS60947 part I,II and III.

III. The changeover switches, cabling work should be undertaken by the bidder as part of the project.

IV. All the panel's shall be metal clad, totally enclosed, rigid, floor mounted, air-insulated, cubical type suitable for operation on three phase/single phase, 415 or 230 volts, 50 Hz.

V. The panels shall be designed for minimum expected ambient temperature of 45 degree Celsius, 80 percent humidity and dusty weather.

VI. All indoor panels will have protection of IP54 or better. All outdoor panels will have protection of IP65 or better.

VII. Should conform to Indian electricity Act and rules (till last amendment).

VIII. All the 415 ACX equipment like bus support insulators, circuit breakers, SPDs, VTs, etc, mounted inside the switchgear shall be suitable for continuous operation and satisfactory performance under the following supply conditions

Variation in supply voltage	+/-10%
Variation in supply frequency	+/-3Hz

74.8. SOLAR POWER CONDITIONING UNIT (Central Solar Inverter)

Grid TIE central Solar Inverter specification defines a high reliability single/three-phase, with integral MPPT controller, digital signal processing (DSP), high frequency pulse width modulated (PWM) system, utilizing MOSFT/IGBTs, hereafter referred to as the "Solar PCU".
Solar PCU has been designed to utilize renewable solar energy and providing high quality regulated and conditioned AC power to the Bank loads.

Solar PCU shall mandatorily consist of the MPPT controller, GRID TIE Inverter and associated items. The PCU integrates within itself, all of the following systems:

i. CENTRAL GRID TIE Inverter, capable to sync with GRID
ii. MPPT based controller
iii. DSP controller for digital setting (no analogue set points will be accepted)
iv. Essential protection devices.
v. Suitable breaker/isolator at array and PCU

Features:

- Multiple 32 bits DSP controllers
- High efficiency > 98% at STC
- Highly Efficient Grid Tie Solar Inverter
- PF correction while on mains / grid supply (Line interactive)
- Active harmonic filtering when load on mains (Load Harmonic corrections)
- Load balancing
- Higher Array Voltage capacity optionally available
- Inbuilt MPPT controller
- DC fan for low power consumption
- Variable fan speed – increased reliability, lesser dust suction inside the cabinet
- Modular construction gives highest MTTR

PARTICULAR SPECIFICATION(contd...)

TECHNICAL SPECIFICATION FOR INVERTERS ARE AS UNDER:-

(i)	Nominal voltage	415 V +/- 10%, 3 phase, 50 Hz
(ii)	Control	Micro processor / DSP
(iii)	Switching Device	IGBT / MOSFET
(iv)	Grid Freq. Synchronization	+/- 3Hz or more
(v)	Ambient Temp	-20 oC to 50 oC
(vi)	Humidity	95% non condensing
(vii)	Protection of enclosure	IP 20 / IP 65
(viii)	No load losses	< 1% of rated power
(ix)	Inverter Efficiency	>97% (without inbuilt galvanic isolation) >93% (without inbuilt galvanic isolation)
(x)	PF	> 0.9
(xi)	THD	< 3%

(xii) Inverter should have internal protection arrangements against any sustainable fault in feeder line and against the lighting on feeder.

(xiii) Should have isolating transformer

(xiv) Inverter generated harmonics, flicker, DC injection limits, volt range, frequency range and anti-islanding measures should follow latest CEA guidelines /IEC 62116/BIS code.

(xv) Three phases PCU/inverter shall be used with each power plant system.

(xvi) PCU/inverter shall be capable of complete automatic operation including wake-up, synchronization & shutdown.

(xvii) The output of power factor of PCU inverter is suitable for all voltage ranges or shrink of reactive power; inverter should have internal protection arrangement against any sustainable fault in feeder line and against the lightning on feeder.

(xviii) Built-in meter and data logger to monitor plant performance through external computer shall be provided.

74.9 INTEGRATION OF PV POWER WITH GRID:

The output power from SPV would be fed to the inverter which converts DC produced by SPV array to AC and feed it into the main electricity grid after synchronization. In case of grids failure, or low or high voltage, solar PV system shall be out of synchronization and shall be disconnected from the grid. Once the DG set comes into service PV system shall again be synchronized with DG supply and load requirement would be met to the extent of availability of power.

74.10 DATA ACQUISITION SYSTEM / PLANT MONITORING

i. Data acquisition system shall be provided for each module of the solar PV plant.

ii. Data logging provision for plant control and monitoring, time and date stamped system data logs for analysis with the high quality, suitable PC. Metering and instrumentation for display of system parameters and status indication to be provided.

iii. Solar Irradiance: An integrating Pyranometer/solar cell based irradiation sensor (along with calibration certificate) provided, with the sensor mounted in the plane of the array. Readout integrated with data logging system.

iv. Temperature: temperature probes for recording the solar panel temperature and/or ambient temperature to be provided complete with readouts integrated with data logging system.

v. The following parameters are accessible via the operating interface display in real time separately for solar power plant:

(a) AC voltage
(b) AC output current
(c) Output power
(d) DC input voltage
(e) DC input current
(f) Time active
(g) Time disabled
(h) Time idle
(i) Power produced
(j) Protective function limits (Viz-AC over voltage, AC under voltage, over frequency, under frequency ground fault, PV starting voltage, PV stopping voltage).

PARTICULAR SPECIFICATION(contd...)

vi. All major parameters available on the digital bus and logging facility for energy auditing through the internal microprocessor and read on the digital front panel at any time and logging facility (the current values, previous values for up to a month and the average values) should be made available for energy auditing through the internal microprocessor and should be read on the digital front panel.

vii. PV array energy production: digital energy meters to log the actual value of AC/DC voltage, current & energy generated by the PV system provided. Energy meter along with CT/PT should be of 0.5 accuracy class.

viii. Computerized DC string/array monitoring and AC output monitoring shall be provided as part of the inverter and/or string/array combiner box or separately.

ix. String and array DC voltage, current and power, inverter AC output voltage and current (all 3 phases and lines), AC power, and AC energy (all 3 phases and cumulative) and frequency shall be monitored.

x. Computerized AC energy monitoring shall be in addition to the digital AC energy meter.

xi. The data shall be recorded in a common work sheet chronologically date wise. The data file shall be MS Excel compatible. The data shall be represented in both tabular and graphical form.

xii. All instantaneous data shall be shown on the computer screen.

xiii. Software shall be provided for USB download and analysis of DC and AC parametric data for individual plant.

xiv. Provision for internet monitoring and download of data shall be also incorporated.

xv. Remote server and software for centralized internet monitoring system shall be also provided for download and analysis of cumulative data of all the plants.

xvi. Simultaneous monitoring of DC and AC electrical voltage, power, current, energy and other data of the plant for correlation with solar and environment data shall be provided.

xvii. Remote monitoring and data acquisition through remote monitoring system software at the owner location with latest software/hardware configuration and service connectivity for online/real time data monitoring/control complete to be supplied and operation and maintenance/control to be ensured by they supplier. Provision for interfacing these data on owner server and portal in future shall be kept.

74.11. POWER CONSUMPTION

Regarding the generated power consumption, priority need to give for internal consumption first and thereafter any excess power can be exported to grid.

74.12. PROTECTIONS

The system should be provided with all necessary protections like earthing, lightening, and grid islanding as follows:

(a) LIGHTENING PROTECTION

I. The SPV power plants shall be provided with lightening & over voltage protection. The main aim in this protection shall be reduce the over voltage to a tolerance value before it reaches the PV or other sub system components. The source of over voltage can be lightening, atmosphere disturbances etc the entire space occupying the SPV array shall be suitably protected against lightening by developing required number of lightening arrestors. Lightening protection should be provided as per IEC 62305 standards. The protection against induced high-voltages shall be provided by the use of metal oxide barristers (MOVs) and suitable earthing such that induced transients find an alternate route to earth.

(b) SURGE PROTECTION

Internal surge protection shall consist of three MOV type surge-arrestors connected from +ve and –ve terminals to earth (via Y arrangement)

PARTICULAR SPECIFICATION(contd...)

(c) EARTHING PROTECTION

- Each array structure of the PV yard should be grounded/earthed properly as per IS: 3043-1987. In addition the lightening arrester/masts should be earthed inside the array field. Earth resistance shall be presence of the representative of department/owner as and when required after earthing by calibrated earth tester, PCU, ACDB and DCDB should also be earthed properly.
- Earth resistance shall not be more than 5 ohms. It shall be ensured that all the earthing points are bonded together to make them at the same potential.

(d) GRID ISLANDING

- In the event of a power failure on the electric grid, it is required that any independent power-producing inverters attached to the grid turn off in a short period of time. This prevents the DC-to-AC inverters from continuing to feed power into small sections of the grid, known as “islands”. Powered islands present a risk to workers who may expect the area to be unpowered, and they may also damage grid-tied equipment. The ground based PV system shall be equipped with islanding protection. In addition to disconnection from the grid (due to islanding protection) disconnection due to under over voltage conditions shall be also be provided. A manual disconnect 4 pole isolation switch beside automatic disconnection to grid would have to be provided at utility end to isolate the grid connection by the utility personnel to carry out any maintenance. This switch shall be locked by the utility personnel.

74.13. CABLES

Cables of appropriate size to be used in the system shall have the following characteristics:

i. Shall meet IEC 60227/IS 694, IEC 60502/IS 1554 standards
ii. Temp. Range: -10oC to +80oC.
iii. Voltage rating 660/1000V
iv. Excellent resistance to heat, cold, water, oil, abrasion, UV radiation
v. Flexible
vi. Sizes of cables between array interconnections, array to junction boxes, junction boxes to inverter etc shall be so selected to keep the voltage drop (power loss) of the entire solar system to the minimum. The cables (as per IS) should be insulated with a grade special grade PVC compound formulated for outdoor use.
vii. Cable routing/Marking: all cable/wires are to routed in GI cable tray and suitably tagged and marked with proper manner by good quality ferule or by other means so that the cable easily identified.
viii. The cable should be so selected that it should be compatible up to the life of the solar PV panels i.e. 25 years.
ix. The rating given is approximate. Bidder to indicate size and length as per system design requirement. All the cables required for the plant provided by the bidder. Any change in cabling sizes if desired by the bidder/approved after citing appropriate reasons. All cable schedules/layout drawings approved prior to installation.
x. Multi strand, annealed high conductivity copper conductor PVC type ‘A’ pressure extruded insulation or XLPE insulation. Overall PVC/XLPE insulation for UV protection armored cable for underground laying. All cable trays including covers to be provided. All cables conform to latest edition of IEC/equivalent BIS standards as specified below: BoS item/component standard description standard number cables general test and measuring methods, PVC/XLPE insulated cables for working voltage up to and including 100 V, UV resistant for outdoor installation IS/IEC 69947.
xi. The size of each type of DC cable selected shall be based on minimum voltage drop however; the maximum drop shall be limited to 1%.
xii. The size of each type of AC cable selected shall be based on minimum voltage drop however; the maximum drop shall be limited to 2%.

PARTICULAR SPECIFICATION(contd...)

74.14. CONNECTIVITY

The maximum capacity for interconnection with the grid at a specific voltage level shall be specified in the distribution code/supply code of the state and amended from time to time. Following criteria have been suggested for selection of voltage level in the distribution system for ready reference of the solar suppliers.

Plant Capacity	Connecting voltage
Up to 10 kW	240V-single phase or 415V-three phase at the option of the consumer
Above 10kW and up to 100kW	415-three phase
Above 100kW	At HT/EHT level (11kV/33kV/66kV) as per DISCOM rules

a) The maximum permissible capacity shall be 0.6 MW for a single net metering point.
b) Utilities may have voltage levels other than above; DISCOMS may be consulted before finalization of the voltage level and specification is made accordingly.
c) For large PV system (above 1000 kW) for commercial installation having large load, the solar power can be generated at low voltage levels and stepped up to 11 kV level through the step up transformer. The transformers and associated switchgear would require to be provided by the SPV bidders.

74.15 TOOLS & TACKLES AND SPARES:

a) After completion of installation & commissioning of the power plant, necessary tools & tackles are to be provided free of cost by the bidder maintenance purpose. List of tools and tackles to be supplied by the bidder for approval of specifications and make from OWNER.
b) A list of requisite spares in case of PCU/inverter comprising of a set of control logic cards. IGBT driver cards etc junction boxes. Fuses, MOVs/arrestors, MCCB etc along with spare set of PV module be indicated which shall be supplied along with the equipment. A minimum set of spares shall be maintained in the plant itself for the entire period of warranty and operation & maintenance which upon its use shall be replenished.

74.16 DANGER BOARDS AND SIGNAGES:

Danger boards should be provided as and where necessary as per IE act/IE rules as amended up to date. The signage shall be provided one each at battery –cum-control room, solar array and main entry from administrative block. Text of the signage may be finalized in consultation with OWNER.

74.17 FIRE EXTINGUISHERS:

The firefighting system for the proposed power plant for fire protection shall be consisting of:

a) Portable fire extinguishers in the control room for fire caused by electrical short circuit
b) Sand buckets in the control room
c) The installation of fire extinguishers should confirm to TAC regulations and BIS standards. The fire extinguishers shall be provided in the control room housing PCUs as well as on the roof or site where the PV arrays have been installed.

74.18 DRAWING & MANUALS:

a) Two sets of engineering, electrical drawings and installation and O&M manuals are to be supplied Bidders shall provide complete technical data sheets for each equipment giving details of the specifications along with make/ makes in their bid along with basic design of the power plant and power evacuation, synchronization along with protection equipment.
b) Approved ISI and reputed makes for equipment be used.
c) For complete electro-mechanical works, bidders shall supply complete design, details and drawings for approval to owners before progressing with the installation work.

PARTICULAR SPECIFICATION(contd...)

74.19 PLANNING AND DESIGNING

a) The bidder should carry out survey at the site and accordingly design strings & arrays layout considering optimal usage of space, material and labor. The bidder should submit the array layout drawings for approval.
b) Department reserves the right to modify the landscaping design, layout and specification of sub-systems and components at any stage as per local site conditions/requirements.
c) The bidder shall submit preliminary drawing for approval & based on any modification or recommendation, if any. The bidder submits three sets and soft copy in CD of final drawing for formal approval to proceed with construction work.

74.20 DRAWINGS TO BE FURNISHED BY BIDDER AFTER AWARD OF CONTRACT

a) The contractor shall furnished the following drawings award/intent and obtain approval
b) General arrangement and dimensioned layout
c) Schematic drawing showing the requirement of SV panel, power conditioning Units(s)/inverter, junction Boxes, AC and DC distribution Boards, meters etc.
d) Structural drawing along with foundation details for the structure
e) Itemized bill of material for complete SV plant covering all the components and associated accessories
f) Layout of solar power array

74.21 SOALR PV SYSTEM FOR MEETING THE ANNUAL ENERGY REQUIREMENT

The solar PV system will be installed for meeting upto 90% of the annual energy requirement depending upon the area of ground available and the remaining energy requirement of the office building will be met by drawing power from grid at commercial tariff of DISCOMs.

74.22 SAFETY MEASURES:

The bidder shall take entire responsibility for electrical safety of the installation(s) including connectivity with the grid and follow all the safety rules & regulation applicable as per electricity Act, 2003 and CEA guidelines etc.

74.22.1 415V(± 10%)/11kV Step up Transformers

1.5 MW step up transformer shall be used for 1.5 MW AC SPV Power Plant. Transformer shall be connected to Interface panel through suitable cables. The Contractor shall furnish Guaranteed Technical Particulars as per Data Sheet. The detail specification of step up transformer is as under.

PARTICULAR SPECIFICATION(contd...)

74.22.2 General Requirements:

The intention of the specification is to provide information for the design of the above mentioned transformers to be fully suitable in every respect for the functions designated. It is required that the CONTRACTOR agrees to furnish all apparatus, appliance and material whether specifically mentioned or not, but which may be found necessary to complete, perfect, or test any of the herein specified units in compliance with the requirements implied in this specification.

1. All terminal screws, studs, nuts and bolts shall be in accordance with the Indian Standards.
2. All electrical and mechanical equipment shall be designed and manufactured so that no damage will result from transportation, installation and operation of the equipment under the climatic conditions to which it will be subjected.\

3. All materials used shall conform to this specification and appropriate standards and shall be new in all respects.

The transformers, their accessories and fittings, transformer oil, etc. shall conform to the latest edition of the following standards (as amended up to date) except where specified otherwise in this specification:

(a) Transformer. : IS: 2026

(b) Transformer oil. : IS: 335/93

(c) Bushings. : IS: 2099, 3347, 8603

(d) Fittings and accessories for transformers. : IS: 3639

(e) Code of practice for selection installation & maintenance of transformer. : IS: 10028

(f) Guide for loading of oil immersed transformers. : IS: 6600

(g) Method of impulse voltage testing: IS: 2070

(h) Gas & Oil operated Relay. : IS: 3637

(i) Specifications for insulating Kraft paper. : IS: 9335

(j) Specifications for solid insulating press Boards for electrical purposes. : IS: 1576

(k) Ready mixed paint, brushing zinc chromate, painting: IS: 104

(l) Determination of water content in oil for porcelain bushing transformers. : IS: 2362

(m) Dimensions for clamping arrangements for bushings. : IS: 4257

(n) Selection, Installation and maintenance of transformers: Silica-gel: IS: 3401 and IS: 10028

(o) Terminal Connector: IS: 5561

(p) Gas & Oil operated Relay : IS: 3637

(q) Method of impulse voltage testing: IS: 2070

74.22.3 Type and Rating:

(a) The transformers shall be of copper wound 1.5MW, **415V(± 10%)** /11kV, 3 phase, natural cooled, double wound, core type construction, oil immersed and shall be suitable for outdoor service as step-up transformers (At times however these may be required to work under reversal of power also).
(b) The transformers covered by this specification are to run in parallel with transformers which are being installed or will be installed in future (for same rating) and as such the characteristics of the transformers covered in this specification for the sub-station will be identical so as to enable these transformers to run in parallel. The technical particulars of transformers required are as under:

(i) Maximum continuous rating at reference ambient temperature specified: 1.5 MW

(ii) Frequency: 50 Hz

(iii) No. of phases : 3 phase

(iv) Rated primary Voltage on principal tap : 11 KV

(v) Rated secondary Voltage : **415V(± 10%)** as per inverter LV

(vi) Winding connections:

a. HV side : Delta
b. LV side: Star
c. Vector group reference: Dy11y11 (typical)

(vii) Type of cooling: ONAN

(viii) Percentage impedance at normal voltage & 75 Deg.C average winding temperature between HV-LV with tolerance as per ISS. : 4.5 % As per inverter OEM

(ix) Off load tap changer : Having 9 equal steps (in step of 2.5% of each to have voltage variation of ±10% on HV side Also match the range of requirement of HV voltage viz-a-viz Inverter output voltage.

(x) Maximum Current density for HV & LV: 3 Amp/mm sq (for Cu winding incl. tapped winding wound)

(xi) Neutral unbalance current: Not exceeding 2.0%

(xii) Type of terminal: HV side: Suitable cable for inter connection LV Side: Suitable for connecting LT Cables

74.22.4 Efficiency: The percentage loading for the maximum efficiency shall be clearly stated at unity power factor or >0.9 Pf.

74.22.5 Insulation:

1. The dielectric strength of the winding, given insulation and the bushings shall conform to the values given in IS: 1180 (latest IS) for highest system voltage of 11 KV, 1.1 kV and shall be suitable for the following impulse test\power frequency test voltages.

Serial No SYSTEM Voltage HST.SYSTEM voltage IMPULSE TEST Voltage PF TEST Voltage
i. 11kV 13 kV 125 kVp 50 kV
ii. 415 kV 1.1 kV - 2.5 kV

74.22.6 Cooling:

(a) Transformer shall be provided with ONAN type cooling.

(b) The ONAN cooling of the transformers shall be by natural circulation of air while the circulation of oil shall be effected by natural convection, the maximum oil flow being assured by a method whereby the return flow of cooled oil is made to enter the tank at a level coinciding with the bottom of the hot columns of oil thus avoiding centre heads of cold oil at the bottom of the tank. Out flow shall be arranged to coincide as nearly as possible with the hot oil level at the top of the tank so that the total available difference will be fully employed in circulating the oil round the shortest possible paths.

(c) The windings of the transformers shall be designed to deliver continuously rated KVA corresponding to ONAN cooling. Radiators shall be provided for cooling purpose. These shall be directly mounted on the tank on both sides in a balanced manner & not on one side only.

74.22.7 Transformer Core:

(a) The core shall be built up with thin lamination of high grade, non ageing, low loss, high permeability, cold rolled, grain oriented silicon steel specially suitable for transformer core. The particulars of laminated steel to be employed shall be furnished along with DC magnetization, B-H and iron loss curves.

(b) If required after being sheared the laminations shall be treated to remove all burrs and shall be re-annealed to remove all residual stresses. At least one side of each lamination shall be coated with a double baked enamel insulation coating which will not deteriorate due to pressure and the action of hot oil. The nature of insulation shall be specified.

(c) Every care shall be exercised in the selection, treatment and handling of core steel to ensure that as for as practicable, the laminations are flat and the finally assembled core is free from distortion.

(d) The design of the magnetic circuit shall be such as to avoid discharges, development of short circuit paths within itself or to the earthed clamping structure and the production of flux components at right angles to the plane of the laminations which may cause local heating.

74.22.8 Winding:

(a) The copper windings shall be so designed that all coil assemblies of identical voltage ratings shall be inter changeable and field repairs to the windings can be made readily, without special equipment. The coils shall be between adjacent sections by insulating spacers and bracers. Bracings and other insulation used in the assembly of the windings shall be arranged to ensure a free circulation of the oil and to reduce hot spots in the windings. The windings shall be designed to reduce to a minimum the out of balance forces in the transformer at all ratios. The double paper covering insulation shall be used in HV &LV coils

PARTICULAR SPECIFICATION(contd...)

74.22.9 Insulating Oil:

(a) The oil for first filling shall be supplied with each transformer. The oil shall be EHV grade and shall comply relevant IS with latest amendments.

(b) Particular attention shall be paid to deliver the oil for topping up free from moisture having uniform quality throughout in the non-returnable new steel drums.

(c) The quantity of oil for first filling of each transformer shall be stated. Quantity of oil required for filling of conservator and radiators shall also be stated.

74.22.10 Tank :

(a) The transformer tank and cover shall be fabricated from good commercial grade low carbon steel suitable for welding and of adequate plate thickness. The tank and the cover shall be of welded construction. All seams shall be welded and where practicable they shall be double welded. The transformer tank shall have sufficient strength to withstand without permanent distortion.

74.23 11KV VACUUM CIRCUIT BREAKER PANEL BOARD

74.23.1 GENERAL: Vacuum Circuit Breaker shall be incorporated in H T Panel wherever specified. VCBs shall conform to IEC 298 and 694 IS 3427, BS 5227 and VDE 0670, part 6 as well as the regulations mentioned therein. VCBs shall be suitable for operation on 11KV, 3 phases, 50Hz, AC supply.

1.2 TYPE AND CONSTRUCTION

1.2.1 The metal clad panel shall be fully extensible and compartmentalized to give.
(a) Circuit Breaker Compartment
(b) Busbar Compartment
(c) CT and Cable Compartment

1.2.2 The compartment shall be safe to touch and compartments thus formed shall be dust proof & vermin proof. A light test is to be conducted after assembly by placing lights in different compartments of 11 KV and no light should come out from compartments. A separate metering chamber for fixing the necessary instrumentation metering and protective equipment shall be mounted on the top and bottom of the panel at the front.

74.23.2 SPECIFICATIONS

1.2.3 The VCB shall consist of three air insulated poles incorporating mechanism of interrupters. The body of interrupters shall be made of nickel chromium steel supported on insulators made out of metalized aluminum oxide. The contacts shall be of chromium copper and butt shaped.

1.2.4 Vacuum circuit breaker shall be mounted on truck or a carriage mechanism. In case of truck mechanism, the breaker shall be on a trolley while in a carriage mechanism, shall be separate door and it shall be possible to perform all operations with front door closed. The drawout carriage shall have two position for the circuit breaker Viz isolated/ test & service position. Busbars shall be insulated type made of high conductivity copper supported on moulded monobloc designed to withstand full short circuit currents and shall be provided all along the length of the HT Board.

1.2.5 It shall be horizontal isolation, horizontal drawout type, or vertical isolation Horizontal drawout fully interlocked, with dust and vermin proof construction, suitable for indoor installation. The panel shall be supplied be supplied with the manufacturers test certificates.

1.2.6 Certificated with date of manufacture and shall be complete in all respects as per details in the schedule of quantities. The steel work should have undergone a rigorous rust proofing process comprising alkaline degreasing, decaling in dilute sulphuric acid and recognized phosphating process and shall then be given powder coating (Electrostatic) paint of manufacturers standard shade.

1.2.7 The switchgear constructions shall be such that the operating personnel are not endangered by breaker operation and internal explosions, and the front of the panel shall be specially designed to withstand these. Pressure relief flaps shall be provided for safely venting out gases produced inside the high voltage compartment busbar compartment and termination compartment. These flaps shall be vented upwards and cannot be opened from outside. These relief flaps shall be of such construction as not to permit ingress of dust/ water in harmful quantities under normal working conditions. Enclosure shall be constructed with sheet steel of atleast 2.0 mm thickness. It shall have a rigid, smooth, leveled, flawless finish.

PARTICULAR SPECIFICATION(contd...)

1.2.8 Total height of the HT Panel board shall be max. 2700 mm approximately and width 620 mm (approx...). On the incoming breaker panel, a 100V A burden and class 0.5 accuracy potential transformer 11 KV/v3/110v/v3 with Lt Fuses shall be provided. These shall be three single phase PTs cast resin insulated type. Adequate space at the rear of the panel shall be provided with suitable termination arrangement for termination of cables.

1.2.9 The making contact arms (upper & lower) of the circuit breaker shall be provided in the busbar and cable compartment for the fixed contacts.

1.2.10 Safety shutters shall be provided to cover up the fixed high voltage contacts on busbar and cable sides when the carriage is moved to Isolated/Disconnected position. The shutters shall move automatically with the movement of the drawout carriage. It shall, however, be possible to open the shutters of busbars side and cable side individually.

1.2.11 Mechanically operated circuit breaker auxiliary switched of minimum 4 No + 4 NC ways, shall be provided for control and indication purpose. Control wiring shall be done by using 1.5 sq.mm 1.1 KV grade stranded copper PVC insulated cable. All control fuses shall be HRC link type.

1.2.12 Terminal blocks shall be clamp type suitable for connection of only 2 wires per terminal and shall be 650 V grade. The LT Control circuit shall be routine tested to withstand 2.0 K V for one minute.
1.2.13 Busbar compartment shall be provided at the rear. Electrolytic copper busbars shall be or rectangular cross section and isolated. Busbars shall be supported properly by cast epoxy resin insulators so as to withstand thermal and dynamic stresses during system short circuits. Busbars shall be provided with necessary colour coding for phased indication. The busbars shall be designed to withstand a temperature rise of 60 deg. C above and ambient temp of 45 deg. C.

1.2.14 SURGE SUPRESSORS: 11 KV Surge suppressors are to be provided as below;
Incomer:- Incoming side cables side Outgoing :- Outgoing side cables side

74.23.3 BUSBAR AND INSULATOR:- All busbars and jumper connections shall be of electrolytic copper conforming to relevant IS standards. They shall be adequately supported on epoxy insulators to withstand electrical and mechanical stresses due to specified short circuit currents. Busbar cross section shall be uniform throughout the length of switchboard. Contact surface at all joints shall be properly cleaned and No-oxide grease applied to ensure an efficient and trouble free connections. All bolted joints shall have necessary washers for maintaining adequate contact pressure. All connection hardware shall have high corrosion resistance. Busbars insulators shall be of track-resistance, high strength non-hygroscopic, Non-combustible type & shall be suitable to withstand stresses due to over voltage and short circuit current. Busbar shall be supported on the insulator such that the conductor expansion and contraction are allowed without straining the insulators. The temp of the busbars and all other equipments, when carrying the rated of relevant Indian standards, duly considering the specified ambient temperature.

74.23.4 EARTHING AND PROTECTION EARTHING: - Copper earthing bus shall be provided. It shall be bolted/ welded to the framework of each pane. The earth bus shall have sufficient cross time fault currents to earth without exceeding the allowable temp rise. Suitable arrangement shall be provided at each end of the earth for bolting owners earthing conductors and earth bus shall run inside at the back of the panel for entire length. Facilities shall be provided for integral earthing of busbars and feeder circuit.

74.23.5 METERING AND PROTECTION:- The VCB Panel Board shall be provided with epoxy resin current transformers for metering and protection. The CTs shall conform in all respects to IS 2705-1964 Part-I, II and III. These shall have accuracy class of 0.5 / 1.0 for metering of 5P 10 for protection. Potential transformers shall be epoxy cast resin type and confor to specifications of IS : 3156-1965 Part-I, II and III and shall be class-0.5. Ammeter and Voltmeter to be installed on panel shall be of digital type, Electronic type digital energy analyser having parameter of KW, KWH power factor, Frequency etc. with 30 days memory shall be provided. All meters shall be tested for 2000V for 1 minute switches and shall be 96 mm square pattern flush mounting type with necessary selectors switches. Necessary indicating lamps of low voltage type with built in resistors shall be provided (Max wattage 2.5 w)

74.23.6 OPERATING MECHANISM:- Vaccum Circuit Breaker shall be equipped with motorized spring charge. These operating mechanisms shall be of the stored energy type. In the closed state of the breaker, the energy stored in the springs shall be suitable for O-C-O duty.

INTERLOCKING AND SAFETY ARRANGEMENT:- Vaccum Circuit Breaker shall be provided with the following safety and interlocking arrangements:
(i) The drawout carriage cannot be moved from either test/ disconnected to service position or vice versa, when the circuit breaker is ON'
(ii) The Circuit breaker cannot be switched ON' when the carriage is in any position between test and service position.
(iii) The front door of the panel cannot be opened when the breaker is in service position or in an intermediated position.

PARTICULAR SPECIFICATION(contd...)

(iv) The low voltage plug and socked cannot be disconnected in any position except test/ isolated position.
(v) The door cannot be closed unless the LV plug has been fitted.
(vi) Individual explosion vents shall be provided for breaker, busbar, cable chambers on the top of the panel to let out the gases under pressure generated during an unlikely enent of a fault inside the panel.
(vii) Circuit Breaker and sheet metal enclosure shall be fully earthed.
(viii) It shall be possible to mechanically close and trip the circuit breaker through push buttons with the circuit breaker in service position and the door closed.
(ix) Self locking shutters shall be provided which close automatically and shall be interlocked with the movement of the drawout carriage mechanism.

74.23.7 RATING:- The rating of the vaccum circuit breaker shall be as per the drawings and schedule of quantities. The rated/ breaking capacity of the breaker shall be 350 MVA(18.37 KA RMS) at 11 KV. The rated making capacity shall be as per the relevant standards.

74.23.8 ACCESSORIES:- Circuit breakers shall be provided with the following accessories.

(i) Auxiliary Switch with minimum 4 NO + 4 NC auxiliary contacts.
(ii) Tripping Coil
(iii) Mechanical Operation Counter
(iv) Spring Charging Handle

74.23.9 ADDITIONAL ACCESSORIES:- The loose items to be supplied with the 11 KV VCB Panel Board shall comprise of the following:

(i) Instruction Book
(ii) Maintenance Manual
(iii) Reachingin / out handle
(iv) Handle for spring charging mechanism
(v) Foundation bolts
(vi) Busbar Earthing

74.23.10 MOUNTING:- Vaccum Circuit Breakers shall be mounted as per manufacturers standard practice.

74.23.11 AUXILIARY SUPPLY

(i) The tripping shall be at 110 Volt D.C/ through a power pack unit. Each breaker (VCB) shall be provided with separated power pack unit.

(ii) Space heater, closing, indication and other auxiliary supply requirement shall be at control fuse and link shall be provided at one place in the panel for receiving the Incoming/ Outgoing cables. A control transformer of 1 KVA capacity 11/0.415/230 volts shall be provided along with incomer breaker of HT Panel Board for providing auxiliary supply 230 volts.

74.23.12 TESTS

74.23.12.1 FACTORY TESTS:- The circuit breaker panel shall be subjected to routine tests at manufacturers works in accordance with the details specified in the relevant IS specifications. These shall however necessarily comprise of the following.

(a) Power frequency voltage test on the main power circuit.
(b) Verification of the correct wiring/ Functional Test.
(c) Dielectric test at 1.5KV on the control circuit. Apart from above, the vendor shall submit the routine test certificates for the following equipment.
(i) Circuit Breakers
(ii) Current Transformers
(iii) Voltage Transformers

The vendor shall submit the type test certificate for following alongwith the offer.
(a) Temperature rise test
(b) Impulse and power frequency voltage test
(c) Short time current test on circuit breaker

74.23.12.2 SITE TEST

74.23.12.2 .1 GENERAL

PARTICULAR SPECIFICATION(contd...)

(i) Verification for completion of equipment, physical damage/ deformities
(ii) Alignment of panel, interconnection of busbars and lightness of bolts and connection etc.
(iii) Interconnection of panel earth busbar with plant earthing grid.
(iv) Interpane wiring between transport sections.
(v) Cleanliness of insulators and general cleanliness of panel to remove traces of dust, water etc.

74.23.13 CIRCUIT BREAKER AND PANEL

(i) Check for free movement of circuit breaker, lubrication of moving part and other parts as per manufacturers manual.

(ii) Manual/ Electrical operations of the breaker and functional test as per drawings.
(iii) Meggar before the Hi Pot test.

(iv) HT Test- Hi Pot test (Power frequency withstand test for one minute at 28 KV RMS) At site Hi Pot test is carried out at 80% of 28KV RMS value.

(v) Meggar after the HI Pot test

(vi) CT/PT ratio/ polarity primary injection test.

(vii) Secondary injection test on relays to practical characteristics

NOTE: Clause No. 4 & 6 – These tests can be conducted at the factory. If these are conducted at factory satisfactorily, these need not be conducted at site.
1.12.4 These tests as per the clauses above shall be witnessed by the representative of accepting officer has to be given in advance.

74.24 TECHNICAL SPECIFICATION OF 11KV SF6 / VCB METAL ENCLOSED, INDOOR (PANEL TYPE) / OUTDOOR RING MAIN UNIT (RMU). (IEC standard equipment)

1.1 SCOPE OF SUPPLY This specification covers design, manufacture, shop testing, inspection, packing, delivery to site, erection, testing and commissioning of 11 KV Metal Enclosed, panel type, extensible Indoor/ Outdoor SF6 /VCB, RING MAIN UNIT (RMU) fully type tested according to IEC 60298 standards. This RMU should be complete with all components necessary for its effective and trouble free operation along with associated equipment etc. such components should be deemed to be within the scope of work. The design of the switchgear should be exclusive and specific responsibility of supplier and should be comply with current good engineering practice, the relevant codes and recommendation, the project specific requirements. The RMU should be fixed type SF-6, insulated circuit breakers, with O / C & E/F relay for the protection of the transformer. It should be maintenance free equipment, having stainless steel robotically welded enclosure.

1.2 STANDARDS AND REFERENCE DOCUMENTS 25.2.1 Codes and Standards The RING MAIN UNIT (RMU) should be designed, manufactured and tested according to the latest version of: IEC 60694 Common specifications for high-voltage switchgear and control gear standards. IEC 60298: A.C metal-enclosed switchgear and control gear for rated voltages above 1 KV and up to and including 72KV and the IEC Codes herein referred. IEC 60129: Alternating current Disconnector (isolators) and earthing switches IEC 60529: Classification of degrees of protection provided by enclosures IEC 60265: High-voltage switches-Part 1 : Switches for rated voltages above 1 kV and less than 52 kV IEC 60056: Circuit breakers IEC 60420: High-volltage alternating current switch-fuse combinations IEC 60185: Current transformers IEC 60186: Voltage transformers IEC 60255: Electrical relays Any other codes recognized in the country of origin of equipment might be considered provided that they fully comply with **IEC standards. The design of the switchgear should be based on safety to personnel and equipment during operation and maintenance, reliability of service, ease of maintenance, mechanical protection of equipment, interchangeability of equipment and ready addition of future loads.**

Load break switch (630 A)
(i) Load break switch should have the following:

- Manually operated **12 KV**, 630a Load Break switch and Earthing Switch with making capacity – Live Cable II LED Indicators thru Capacitor Voltage Dividers mounted on the bushings. - Mechanical ON/OFF/EARTH Indication –Anti-reflex operating handle **(ii) Cable Testing facility without disconnecting the cable terminations, cable joints and terminal protectors on the bushing.** Cable terminations - Cable boxes suitable for 1 X 3C x 300 sq mm XLPE Cable with right angle Cable Termination Protectors.

1.3 Circuit Breaker. (200A / 630A)
(i) Circuit Breaker should have the following:

- Manually operated 200 A / 630A SF6 / Vacuum circuit breaker and Earthing Switch with making capacity

PARTICULAR SPECIFICATION(contd...)

- Mechanical tripped on fault indicator
- Auxiliary contacts 1 NO and 1 NC
- Anti-reflex operating handle
- Live Cable II LED Indicators thru Capacitor Voltage Dividers mounted on the bushings.
- O/C + E/F self powered relay
- Shunt trip circuit for external trip signal
- Mechanical ON/OFF/EARTH Indication

Cable boxes suitable for 1 X 3C x 300 sq mm XLPE Cable with right angle Cable Termination / protectors / boots

1.4 INDOOR RMU

1. MODULAR DESIGN, PANEL TYPE WITH FRONT CABLE ACCESS,
2. RMU MUST BE MADE OF ROBOTICALLY WELDED STAINLESS STEEL.
3. Offered RMU must be extensible.

1.5 OUT DOOR RMU

1. Hermetically sealed metallic Epoxy / Stainless steel enclosure for OUT DOOR RMU application. The manufacturers shall conform the normal current ratings mentioned in GTP at 45 deg. Ambient without derating.

2. Enclosure with I.P.54 standard protection.

3. Offered RMU must be extensible.

4. Cable boxes shall be on Front / side / rear sides.

5. Three way type, with two nos. of 630 Amp isolators and 200 Amp. "T" – off circuit breaker.

6. RMU ENCLOSURE MUST BE SHIELDED AGAINST SOLAR IRRADIATION AND TESTED FOR AMBIENT OF 45 / 50 DEGREE C. **The manufacturers shall conform the normal current ratings mentioned in GTP at 50 deg. Ambient without derating. 25.2.6 DIELECTRIC MEDIUM** SF6 / VCB GAS shall be used for the dielectric medium for 11KV/22KV RMUS in accordance with IEC376. It is preferable to fit an absorption material in the tank to absorb the moisture from the SF5 / VCB gas and to regenerate the SF6 / VCB gas following arc interruption. The SF6 / VCB insulating medium shall be constantly monitored via a temperature compensation gas pressure indicator offering a simple go, no-go indication.

1.6 GENERAL TECHNICAL REQUIREMNTS 25.3.1 Fixed type SF-6 gas insulated / Vacuum circuit breakers. It should be maintenance free, having stainless steel robotically welded enclosure for IN DOOR RMU & hermatically sealed metallised Epoxy Enclosure / Stainless steel enclosure for OUT DOOR RMU application.
1.7 Low gas pressure devices- 1.2 Bar pressure. RMU should have full rating with 0.0 Bar gas pressure.
1.7 Live cable indicators- High operator safety. 25.3.4 Fully Rated integral earthing switch on each device.
1.8 Self powered Microprocessor Based relay- Does not require any external source of power.
1.9 Units fully **SCADA** Compatible. Retrofitting at site possible at a later date. Line switches (Load break switches) as well as T- OFF circuit Breaker can be operated by remote.
1.10 For indoor Cable boxes should be front access and interlocked with earth switch. No rear access required. For outdoor RMUs cable boxes shall be on sides/rear/front.
1.11 Cable testing possible without disconnection of cables. 25.3.9 Compact in dimension.
1.12 Circuit Breaker with self powered O/C & E/F RELAY.
1.12 Low pressure, sealed for life equipment, can operate at – 0II bar pressure.
1.13 Cable ear thing switch on all switching device-standard, for operator safety.
1.14 Enclosure with IP 54 standard protection for OUTDOOR RMUs and IP2X for INDOOR RMUs.
1.15 All live parts should be inside a hermetically sealed metalized Epoxy enclosure / stainless steel enclosure for out door type RMU & 3mm stainless steel robotically welded enclosure for indoor RMU.

2.1 General structural and mechanical construction

2.1 The offered RMU should be of the fully arc proof metal enclosed, free standing, floor mounting, flush fronted type, consisting of modules assembled into one or more units. Each unit is made of a cubicle sealed-for life with SF6 / VCB and contains all high voltage components sealed off from the environment.

2.2 The overall design of the indoor switchgear should be such that front access only is required. It should be possible to erect the switchboard against a substation wall, with HV and LV cables being terminated and accessible from the front.

PARTICULAR SPECIFICATION(contd...)

2.3 The units should be constructed from 3 mm thick stainless steel sheets. The design of the units should be such that no permanent or harmful distortion occurs either when being lifted by eyebolts or when moved into position by rollers.

2.4 For outdoor RMUs a weather proofing process shall be carried out. SHEET METAL MUST BE GRIT BLASED / THERMALLY SPRAYED AND POLYURETHANE PAINTED WITH ABOUT 70 MICRON THICKNESS, TO ACHIVE OUTDOOR WORTHINESS AND CORROSION PROOF NESS.

2.5 RMU ENCLOSURE MUSH BE SHIELDED AGAINST SOLAR IRRADIATION AND TESTED FOR A AMBIENT OF 45 / 50 DEGREE C WITHOUT DERATING OF THE EQUIPMENT.

2.6 The cubicle should be have a pressure relief device. In the rare case of an internal arc, the high pressure caused by the arc will release it, and the hot gases is allowed to be exhausted out at the bottom / top / rear of the cubicle. A controlled direction of flow of the hot gas should be achieved.

2.7 The switchgear should have the minimum degree of protection (in accordance with IEC 60529)
-IP 67 for the tank with high voltage components
-IP 2X for the front covers of the mechanism
-IP 3X for the cable connection covers
-IP 54 for the outdoor enclosure.

75 COMPREHENSIVE MAINTENANCE AND MANNING AND OPERATION OF SOLAR POWER PLANT:

75.1 SCOPE OF WORK:

(a) The work comprises of comprehensive maintenance, manning/operation of Solar Power Plant including repairs as and when required. The Schedule 'A' (BOQ Item 28.10 to 44.10) list out the items in brief and further amplified in succeeding Para for efficient, smooth functioning of the system to meet the end use of satisfactory maintenance of desired inside conditionings.

(b) The contractor shall be solely responsible for all personnel deputed for the jobs and all transport required for conveyance of equipment for repairs at this works with proper gate passes and bringing back duly repaired.

(c) The representative of the department shall be notified the place of repairs being undertaken and shall have to provide access to ascertain smooth handling and proper repair action.

(d) The operating personnel shall be provided with protective clothing and shall wear them while operating the plant. In case of any accident/ injury, fatal or partial disability, the contractor shall be solely responsible for settling all claims/ compensation department will have a right to recover any sum indicated/ claimed by labour commissioner /court directive. GE will however, ensure that contractor has provided all adequate and required measures for workmen and contractor may get his personnel insured as desired by him at his own discretion.

(e) The work under this contract shall be carried out all as specified and listed in Schedule 'A' (BOQ Item 28.10 to 44.10) to the entire satisfaction of GE/Engineer-in-Charge.

(f) The minimum staff deployed by contractor is as follows:

(i) One trained Electrician and one helper in each shifts for attending/ monitoring the breakdown and preventive maintenance. The electrician must have ITI in Electrical and having experience of 02 Years in operation & maintenance of solar power plant and familiar with SCADA operating system, weathering monitoring system, HT/LT installation and security and safety features complete. The Necessary technical qualification certificate shall be produced for verification of Engr-in-charge & get the written approval on record before deploying for works.

75.2 OPERATION:

a) The Solar Power Plant with an inventory of various items, equipments & electrical/sanitary fittings will be handed over for proper accounting and upkeep. The taking over on expiry of contract shall be as per inventory and any damage/loss, GE's decision in this regard will be final and binding.

(b) The tenderer shall submit names & address of the workers to be employed for operation and maintenance of the plant for providing security passes after necessary security/check by the security agency. In case photo passes are the requirement, contractor shall get the same & no extra is deemed to be paid on this account.

PARTICULAR SPECIFICATION(contd...)

(c) All efforts shall be made to obtain security passes and assistance to quick on the action will be given by department.

(d) The installation standing order issued by GE/Engineer-in-Charge will be strictly adhered to. Any violation by the staff will be severely dealt with including handing over them to police custody. Contractor shall ensure and strictly warn the individual on this account. Contractor shall have a qualified supervisor in addition to oversee the personnel and take proper instructions from Engineer-in-Charge's office once a week for any remedial measures contemplated.

(e) The plant is totally under the control of contractor with adequate space for stores, spares and T&P required for operation and maintenance. The Solar Power Plant including other rooms shall be kept clean, neat and tidy duly cleaning the dust on ceiling fan, electric panels, electric fittings, pumps, other machinery, window glass panes etc. All walls and floor shall be kept clean and staff should be advised not to put hand print etc. on walls. The lighting in plant room shall be fully functional and contractor shall ensure replacement immediately at no extra cost to department.

(f) The installation shall be frequently visited by inspecting officers of MES and needs emphasis for proper upkeep in a presentable state all the time. Surrounding areas in the fenced area of up to 6 Mtr all-round plant room shall be cleared of bushes/shrubs and grass to give neat appearance of the area under contractor's maintenance.

(g) Cost of all consumables including salaries of the operating staff, cost of stationary, arranging training of MES personnel for one month, expenditure incurred on various tests to be carried out and all other expenses to keep the plant in 100% functional condition shall be deemed to be included in the operation cost.

75.3 MAINTENANCE:

(a) The contractor shall be fully conversant with the daily, weekly, monthly, quarterly, half yearly checks/ maintenance need on various equipments installed. Manufacturer's specific maintenance Schedule shall be ensured in addition to the normal maintenance Schedule.

(b) The operating staff shall maintain the following neatly:-

(i) Daily Log sheet.

(ii) A register of record of periodical maintenance carried out data wise and will be signed by the contractor and Engineer-in-Charge.

(iii) Necessary daily log register and periodical register shall be provided by contractor without additional cost and rates quoted against items of Schedule 'A' shall be deemed to include for the same and the register will become the property of the Govt.

(c) The contractor shall ensure by preventive maintenance occurrence of any possible breakdown to keep the plants in serviceable condition at all time.

(d) The contractor will attend on the same day any defect due to fair wear and beyond the control of operator/department.

(e) The contractor shall ensure by preventive maintenance occurrence of any possible breakdown to keep the plants in serviceable condition at all time.

(f) The rate quoted for comprehensive maintenance shall also include repair/ replacement of defective components as considered necessary by GE in terms of condition 46 of IAFW-2249. The rate quoted for comprehensive maintenance shall not include for repair/ replacement of defective components during defect liability period.

Penal Recovery:

(a) In the event of failure to achieve specified in the conditioned space due to non-operation of the plant or other reasons the contractor shall be penalized at twice the quoted rate(for one day) as penalty per day for such failure /lapses.

(b) In case of failure of contractor regarding fulfilling requirement of stores, the contractor shall bear the cost of penal recovery.

(c) Regarding penal; recovery, the decision of Garrisson Engineer shall be final and binding.

PARTICULAR SPECIFICATION(contd...)

LIST OF MAKES

Sr. No	Description	Make
1.	Solar Modules/Panels	MNRE approved Make.
2.	Solar Inverters	ABB/Schneider/TMEIC (Toshiba Mitsubishi), Seimens.
3.	Array Box, Fuse Box & Combiner Box	MNRE approved Make.
4.	Power Transformer/Inverterduty Transformers	ABB/SIEMENS/Schneider/Crompton Greaves/ITE Gurgaon/GE Power
5.	Solar cable	Lapp/top/Leone
6.	HT Cable	Polycab /Universal/KEI/KEC (RPG)/Havelles
7.	LT Power & Control Cables	Polycab /Universal/KEI/KEC (RPG)/Havelles
8.	Communication Cables	Polycab/Finolex/Lapp/Leoni/Top/Sterlite/KEI
9.	Isolator –horizontal central break with ES	ABB/Siemens/AREVA
10.	Porcelain Insulators	AdityBirla / IEC/Modern Insulator Ltd./BHEL
11.	HT Termination Kits	Raychem/Densen
12.	Current Transformer	Kappa/Siemens/PACTIL /Pragati/Schneider/ABB
13.	Voltage Transformer	Kappa/Siemens/PACTIL /Pragati/Schneider/ABB
14.	HV Panel	ABB/SIEMENS/SCHNEIDER/L&T
15.	HV Breakers	ABB/SIEMENS/SCHNEIDER/L&T
16.	RMU	ABB/SIEMENS/SCHNEIDER/L&T
17.	Earth Electrodes (maintenance free)	Jef-Eco Safe/ Altec / JK / Indelec /DEHN
18.	Earthing	DEHN/VNT/JEF/
19.	Lightning –ESE or conventional	NIMBUS / LPI/ Indelec/ ERICO/ Lamco/ Oblum/ ABB/DEHN
20.	Fire Protection Equipment	Nitin/ SafeEX/ Tyco
21.	LV Panel	Shivanjali/Vidyut/RSI /Swati/Lotus (with ABB/ Schneider/ Siemens components)/ ECS
22.	LV Circuit Breaker	ABB/Siemens/Schneider
23.	Meters	Schneider / L&T /Secure/
24.	Lightning Arrestor	Schneider/BHEL/GE(Power)/OBLUM/W/s Insulators/Southern Insulators
25.	Lighting Fixture	Bajaj/Philips/Wipro/ CGL
26.	Lighting DB	Schneider/Legrand/MDS/ABB
27.	Power DBs	Schneider/Legrand /ABB
28.	Solar Cable Connectors	Multicontact / Phoenix for sunclicks
29.	Cable glands	Comet/ Braco / Hex
30.	Lugs	Braco/ Comet/ Hex
31.	Cabletrays	Inar Profile/Patny system/ HB Engg
32.	Cableties	KSS weather resistantties (UV protected)
33	UPS (with Isolation transformer)	APC/ Luminous/ ABB/Emerson/Numeric/Makes-Hitachi/TMEIC/EMERSON
34.	Battery	Exide/ AMCO/Panasonic/Sinetrac/Prestolite
35.	Battery Charger	Exide/ AMCO/Panasonic/Sinetrac/Prestolite
36.	Weather Station	As per SD specified make / as per Technical Specification. (a) Pyranometer – Kipp&Zonen SMP 11 (b) Hygrothermometer – RM Young/ © Rain Gauge – RM Young (d) Wind sensor – RM Young (e) Module Tempsensors – Campbell Scientific
37.	MFM/TVM meters	Secure/ Conserve/ Schneider
38.	Analog/ Digital Meters	L&T/ Havells/HPL/IndoAsian/Secure/Legrand
39.	MCCB/MCB	ABB/GE(Power)/SCHNEIDER/Legrand/L&T Lexic/C&S Electric Ltd
40.	Terminals Blocks DC 1000V	Phoenix/ ABB
41.	Relays	ABB/Siemens/GE/Alstom
42.	Control switches / selector switches	Keycee / L&T/ Siemens /Schneider/ Switrondevices
43.	Fuse DC	Copper bussman/ Littlefuse/ABB/ Feraz/Mersen
44.	Fuse base DC	ABB/Phoenix contact
45.	DC Disconnector	ABB/ Socomec
46.	Buzzer/ Annunciator/ Bell	Alan

PARTICULAR SPECIFICATION(contd...)

47.	Push Button & Indicating lamps	Siemens/ Schneider/ L&T/ ABB/ Teknic/
48.	SPD	Dehn/Phoenix contact
49.	Diodes	Paramount/Semikron/BHEL
50.	ACSR Conductor	Indian Aluminium Co/Bharat Conductor/Aluminium IND
51.	Clamps & connectors	Exalt / Best & Crompton/ Milind Engg
52.	Socket	CGL/ Anchor-Roma
53.	Power pack	Emersen
54.	Trackers	Scorpious/ Nextrack/Osolar/ Justamp/ID MITECH/Genious Trackers
55.	Computer	HP, Acer, Dell
56.	Laser Printer	HP, Epson, Canon
57.	Water Pump	Kirloskar, Shakti

Notes:-

(i) **Makes/brands/manufacturers of materials/items not mentioned here-in before but required in the work shall be of Ist quality/ISI marked & shall be approved by GE.**

(ii) Items shall be considered whichever is applicable only.

(iii) Sources indicated are only for guidance and approval of the Garrison Engineer shall be taken prior to procurement of materials and its incorporation.

76. QUALITY CONTROL PLAN

(To be submitted by contractor within 30days of commencement of contract)

PART I

1	Contract Agreement Reference No					
2.	CPM Net work prepared and approved by GE					
3.	Resource scheduling done base on CPM					
4.	Site Laboratory (with equipments) set up as per Contract Agreement (CA)					
5.	Concrete mix design submitted and approved.					
6.	Preliminary works completed to standard engineering practice					
7.	Arrangements for water made (including testing of water).					
8.	Arrangement for electric supply made					
9.	Materials					
Sl No	Item	Source as per CA	Contractor's plan of Sourcing	Refer to testing clause	Agency for testing	Responsibility for testing
10.	List of all T & P, make and numbers that the contractor would deploy at site of work.					
11.	Name of person nominated by contractor for exercising quality control.					
12.	Qualifications / Experience of person at Serial No. 11 above.					
13.	Names of supervisors with their qualifications / experience employed by contractor.					
14.	Confirmation that contract requirements relating to quality of all materials and quality standards of workmanship and finishes and acceptance criteria are explained and understood by all.					
15.	Confirmation that requirement of tests to be conducted on materials before approval of samples and during execution, tests on workmanship, tests before acceptance including the testing procedure, sampling techniques, frequency and agencies responsible for testing are understood and shall be complied with.					
16.	Method to be adopted for maintaining records of test result.					
17.	Certificate that contractor shall maintain a log of all materials received at site as per the following format :-					
Sl No	Date	Material	Quantity received	Source	Whether as per approved sample or not	Test carried out by supplier	Tests to be carried out before incorporation
18	General Remarks by contractor of his plan of actions to ensure that quality standards.						

PART-II

(To be completed by GE before forwarding for approval by CWE)

1.	Verification of Serial No 2 to 8 of Part I.	
2.	Verification of Serial No 9 to 18 of Part I.	
3.	Confirmation that Stage Passing Register laying down the stages and authority responsible for approving the same has been prepared, shown to contractor and kept at site.	
4.	Confirmation that all sites as required by contract had been handed over to contractor on the date fixed in the Work Order No 01.	
5.	Confirmation that arrangements for Govt liability in supply of water electricity have been made and no hold up on this account is expected.	

Date (Signature of GE)

Approved by CWE

Signature of Contractor

Asst. Dir (Contracts)
for Accepting Officer

ANNEXURE –I

DETAILS REQUIRED FOR POWER PLANT PERFORMANCE GUARANTEE TEST

1. The Contractor shall fill the CUF for 12 months period considering the reference Global Average Rediation indicated in the below table.

2. The same will be used for the Performance Guarantee purpose.

3. The CUF for the respective year should in no case be lower than the minimum CUF factor given in the table below.

4. This year 1 CUF factor given by the Contractor should not be lower than total of Performance Guarantee in table 02 below i.e 15%.

5. The Contractor shall furnish performance guarantees for the Solar PV modules for O&M period as given below :-

Table - 01: - Solar PV module performance guarantee

Particulars	% of the specified actual capacity or requisite capacity of the PV panel (whichever is lower)	Applicable test codes
Degradation at the end of the 10th year of operation from the date of take over		
Degradation at the end of the 25th year of operation from the date of take over		

PARTICULAR SPECIFICATION(contd...)

ANNEXURE –I(Contd...)

Table : - 2 Solar PV power plant net power generation

1. The table below indicated the CUF for each of the year during O&M period.

2. The below quoted CUF for any year shall be permitted with maximum 1% degradation factor in previous year generation.

3. Also, the CUF quoted by the Contractor should not be lower than the Minimum CUF given in the table below for the respective years.

4. Bids failing to fulfill the conditions stated in point above can be rejected by the Company for further evaluation.

Sr No.	Year	Minimum CUF as given in the Bid by the Company	Minimum CUF as given in the Bid by the Contractor
1	First 11 Months	15%	
2	Second 11 Months	14.83%	
3	Third 11 Months	14.66%	
4	Fourth 11 Months	14.49%	
5	Fifth 11 Months	14.33%	

PARTICULAR SPECIFICATION(contd...)

APPENDIX 'A' TO PS

(ISI MARKED PRODUCTS COMMONLY AVAILABLE)

Sl No	Name of item	List of makes/brands/manufacturers
A B/R ITEMS		
1.	Builders Hardware	(a) M/S Ajanta Steel Pvt Ltd 14, Netaji Subash Road, Kolkata- 700001 (b) M/S M C Power & Co 46, Ezra Street, Calcutta-700001 (c) M/S Orissa Aluminium Product B-34, Industrial Estate Cuttack-753021 (d) M/S J H Aluminium A-15 & B-16 Industrial Estate Kodungalyr, Madras (e) M/S Elte Enterprises C/6 Shalimar Hardware 133, Jarg Mahal, Dhobitalao, Bombay (f) M/S Mohan Metal Industries 178/2-A Bhole Nath Nagar, Shahadara, Delhi-110032 (g) GLACIAR Brands M/S Shri Balaji Industies Sarswati Rund Road, Ajamabad Mathura (UP)
2.	Plywood / Particle Board.	(a) Sudrshan Plywood Industries, Kolkata (b) Kitply (c) Bhutan Board (d) Nepal Board
3.	Bituminous Product	(a) M/S Faridabad Spinning & Woolen Mills Pvt Ltd 837, SP Mukherjee Marg, Delhi/ 110086 (b) S N Industries Faridabad (c) Hindustan Petroleum & Colas Ltd (Himcal).
4	Float valve for O.H. tank etc	(a) Superflo float valve (b) Leader, Bombay, Metal & alloy Co, Mumbai
5	Flooring tiles (Mosaic/terrazzo IS-1237)	(i) M/S Mehtab Tiles 8, Rani Shopping Centre Bhanwar Kua, Lain Road, Indore-452001 (ii) Johnson, (iii) Spartek (iv) Orient (v) Khajaria (vi) Kera tiles
6.	Vitrified tiles/Ceramic tiles	(i)Regency ceramic Ltd (ii) MudIeshwal ceramics (Trade Name Naven) (iii) HNR Johnson (Trade Name Marbonite) (iv) Kajaria (v) Somany (vi) Orient Bell
7.	Low level PVC flushing Cisterns	(a) Commander (b) Parryware (Slimline)
8.	CI soil & waste spun pipes S/S (IS-3989)	(a) Jayaswals Neco Ltd, Nagpur (b) Carporate Ispat alloys Ltd Durgapur (713012) (c) Indoswedish Products, Agra (d) Ashutosh Iron factory, Nagpur (e) SKF Pipes Mathura
09.	HDPE water Storage Tanks	(a) Sintex (b) Dhara (c) Tuff

Contd.../-

APPENDIX 'A' TO PS

Sl No	Name of item	List of makes/brands/manufacturers
10.	Factory made Shutters	(a) M/S Chandigarh Timber Products, Chandigarh (b) M/S Wood Fab A-12, Sector 13 GIDA, Gorakhpur (c) Supreme Doors & Allied Products 345/317, Shita Bazar, Jajman, Kanpur-208010 (d) M/S Luxmi doors, Faizabad Road, Lucknow. (e) M/S Narbada Wood Products, MI Rajya Van Vikas Nagam Ltd Industrial Area, Kheda, Itarsi. (f) M/S Choithi Industries,106/369, Jeenat Market,Ist Floor, Kalpi Road, Kanpur. (g) M/S Joinery Manufacturing Co., Calcutta. (h) M/S Surbhi Metal (India) Pvt Ltd Bhatinda House, Shikargarh chowk Army Area, Jodhpur. (j) M/S Oriental Door MIG-76, KDA Colony, Jagmak, Kanpur (k) M/S Goyaal Industrial Corp. 14/5, Mathura Road, Faridabad, Haryana. (l) M/s MP Wood Products 124, Labriya Bheru Dhar Road ,INDORE,MP
11.	Aluminium doors	(a) M/S Ajit India (Pvt) Ltd. (b) M/S Jindal Aluminium Ltd (c) M/S Crystal Bombay
12.	Steel Windows Ventilators (as per IS-1038 of 1983)	(a) BLANK (b) M/S Aswani & Sons , E-50, Patel Nagar –11, Gaziabad. Ph -2851788 (c) M/S Surabhi metals Pvt Ltd,Bhatida, Shikar Chowk Army Area,Jodhpur-342006(Raj) (d) M/S Agew Steel Mfg Pvt Ltd, (e) M/S Shiv Mullar, Ahmedabad (f) M/S Hanuman Structural Pvt Ltd, Bada Bazar, Katihar (Bihar)-854015 (g) M/S Agra Timber & Steel Products, AGRA (h) M/S Loyal Safe Woks, B-111, Mayapuri Industrial Area, Phase I, New Delhi-110064
13.	Pressed steel door frames	(a) M/S Raymus structural and Engineering Pvt Ltd, B-20, Sarvalaya, Enclave, New Delhi-17 (b) M/S Swagat, National Jali Udyog Pvt Ltd. 48/C,Industrial Area No.1, AB Road, Dewas-455001 (c) M/S Shirke Polynovm shirke structural Pvt Ltd 7276 Industrial estate, Pune-411036 (d) M/S Ashwani & Sons E-15, Patel Nagar-II Ghaziabad-201003(UP) Phone -2851788 (e) M/S Krishna Engineering works (steel Fabricates) C-238, Indra Nagar,Lucknow-226016 (f) M/S Agra Timber and steel products Agra (g) M/S Inswar Industries,Meerut 175/A, Bombay Bazar, Meerut Cantt.
14.	PAINT(SYNTHETIC ENAMEL/ACRYLIC EMULSION/ANTICORROSIVE/ POLYURETHANE)	(a) Asian Paints (Apcolite Brand) (b) Shalimar Paints (Superlac Brand) (c) Jonson & Nicholson Paints Ltd (Borolac Brand) (d) Berger Paints (Luxol Brand)

Contd.....

APPENDIX 'A' TO PS (CONTD)

Sl No	Name of item	List of makes/brands/manufacturers
15.	Cement based paints	(a) Super Snowceem (b) Duracem (c) Cemkote
16.	Oil bound distemper	(a) Good lass Nerolac paints (b) Shalimar Paints (c) Johnson & Nicholson (d) Asian Paints (e) BERGER
17.	Integral water proofing compound	(a) Water Seal (e) Pidilite Industries (b) Impermo (f) Snow India Ltd (c) Acco proof (g) STP Ltd (d) CICO
18	False Ceiling	(a) Armstrong Ceiling tiles (b) Gypsum board (c) Everest E Board
19.	Galvalume Sheet	(a) M/S Crill colour Roof (India) Ltd (b) M/S Ispat Industries Ltd (c) M/S Tata Bluescope
20.	SGSW pipes	(a) Perfect Jabalpur (b) Devraj Industries Gaziabad.
21.	PVC/Rubber /Tiles/Sheets	(a) Premier (b) Vinayl (c) BHOR
22.	Stainless Steel sink & draining Board	(a) NIRALI (b) AMCO (c) Blue Star (d) Kobra
23.	Barbed Wire	(a) M/S Swastika Polysteel Pvt Ltd (b) M/S Amar Promotors Pvt Ltd
24.	PVC Doors/Window/ frames/ partition	(a) M/S Rajshree Plastiwood Ltd, Kanchan Bagh, Indore. (b) M/S Sintex Industires Ltd, Kalol, North Gujrat. (c) Polycon , Balegudam Jaipur
25.	Water proofing treatment	a) Hyperplas polymeric water proofing membrane manufactured by IWL India Limited, C&D Laxmi Bhawan, 609, Anna Salai, Chennai - 600006. (b) Super Thermolay APP PL/MT by STP Texsa limited 570 phase V Udyog, Gurgaon 122016 India. (c) HYDROSTOP Waterproofing Membrane of Tiki Tar. or equivalent approved by CBRI Roorki
26.	SEWER BRICKS	(a) M/S Priya clay Products Pvt. J-1/160, Rajouri Garden,New Delhi-110027 (b) M/S Ritu Bricks Pvt. Ltd. UTI Shop No 8, Ajmer Road, Bhilwara, Rajasthan (c) M/S Maruthi Bricks works 19/7, 5th floor, 'Maruthi mansion' Cunningham Road, Banglore-560052, Karnatka (d) M/S Priya Bricks Pvt. Ltd. 88/S-A, Block-'E' New Alipore, Kolkata-700071 (e) M/S Red Ceramics Limited 53, Chowringhee Road, Kolkata-700071 (f) M/S Modern Bricks & Engg. Works Barwala Road, Dera, BASSI, Distt. – Pataiala
27.	GI pipe	(a) Tata (b) Prakash (c) Jindal (d) Swastic
28.	Agency for carrying out antitermite treatment	(a) M/S Singhal Pesticides, AGRA (b) M/S Crop Health Products Ghaziabad (c) M/S Pest Control India Limited (d) Montari Industries Ltd 75, Nehru Place, New Delhi (e) M/S All Solutions House No. 55, Sector- East Extn. A., Green Avenue, Trikuta Nagar, Jammu.

APPENDIX 'A' TO PS

(ISI MARKED PRODUCTS COMMONLY AVAILABLE)

Sl No	Name of item	List of makes/brands/manufacturers
29.	External Weather coat paint	**(a) Apex ultima (Asian paints)** **(b) Berger paints (superior quality)** **(c) Nerolec paint (Superior quality)**
30.	**Vitreous china sanitary fittings**	**(a) Parry ware** **(b) Hind ware** **(c) Cera**
31.	**Plumbing items such as Bib/stop cock, Pillar Tap soap tray, shower rose etc**	**(a) Jaquar (d) Plumber** **(b) Marc (e) Jal** **(c)ARK (f) L&K**
32.	**Glass panes tinted/plain/pinhead**	**(a) Modi** **(b) Saint gobin** **(c) AIS**
33.	**Wall putty**	**(a) JK wall putty (b) Birla wall putty**
34.	**Mosaic/PCC Plain/chequered tiles/interlocking Paver blocks**	**(a) NITCO,Mumbai (b) Redsun Tiles & Pavers,Panchkula (c)Star Tiles & Industries Rama Devi Kanpur (d) Mayur Interlocking Pavers,Lucknow €M/s Mehtab Tiles 8,Rani Shopping Centre,Bhanwar,Indore**

Note: Makes/brands/manufacturers of materials/items not mentioned here-in before but required in the work shall be of Ist quality/ISI marked & shall be approved by GE.

Signature of Contractor
Dated:-

Asst. Dir (Contracts)
for Accepting Officer

APPX 'B' TO PS

E/M ITEMS

1. TRANSFORMERS 33KV/11KV AND 33KV/433V

(a) ABB. (d) Schneider
(b) Crompton Greaves Ltd. (e) ITE Gurgaon (f) GE(Power) (g) Voltam Ltd
(c) Siemens

2. TRANSFORMER (ABOVE 500 KVA CAPACITY)

(a) ABB. (d) Schneider
(b) Crompton Greaves Ltd. (e) ITE Gurgaon (f) GE(Power)
(c) Siemens

3. TRANSFORMER (UPTO 500KVA CAPACITY)

(a) ABB. (d) Schneider
(b) Crompton Greaves Ltd. (e) ITE Gurgaon (f) GE(Power)
(c) Rajasthan Transformer (g) Indotech

4. 33KV & 11KV SWITCH GEAR PANELS (HT PANEL)

(a) Alstom Ltd (d) Southern Switchgears
(b) Crompton Greaves Ltd (e) Easun Reyroll
(c) Kirloskar Electric Co. Ltd. (f) MEI (g) Havells

5. VACCUM CIRCUIT BREAKER (VCBs) & SF-6 BREAKERS 33KV & 11KV

(a) Alstom Ltd (f) Southern Switchgears
(b) Crompton Greaves Ltd (g) BHEL
(c) Kirloskar Electric Co. Ltd.
(d) ABB (Asea Brown Boveri) Ltd.
(e) Siemens

6. OIL CIRCUIT BREAKERS (OCBs) 33KV & 11 KV

(a) Alstom Ltd (d) Southern Switchgears
(b) Crompton Greaves Ltd (e) Easum Reyroll
(c) Kirloskar Electric Co. Ltd.

7. POTENTIAL TRANSFORMERS (PTs) AND CURRENT TRANSFORMERS (CTs) (VOLTAGE CLASS 33 KV & 11KV)

(a) Siemens
(b) ABB
(c) Kappa
(d) Schneider
(e) PACTIL
(f) Pragati

8. ELECTRO MECHANICAL RELAYS

(a) Alstom Ltd
(b) Easun Reyroll
(c) ABB
(d) Siemens

9. DIGITAL RELAYS

(a) Alstom
(b) L & T
(c) JVS
(d) Easum Reyroll

10. 33 KV & 11 KV XLPE CABLES

(a) ICL (Industrial Cable Ltd)
(b) CCI (Cable Corporation of India Ltd)
(c) Asian Cables Corporation Ltd.or R P G Ltd)
(d) Plaza
(e) IN CAB
(f) Havells
(g) Universal
(h) Krishna/MPCAB
(j) Gloster

11. XLPE CABLES 1100V GRADE

(a) Ekta Cable
(b) Havells
(f) Polycab
(c) Krishna/MPCAB
(d) NICCO
(e) INCAB
(g) Plaza
(h) Finolex
(j) Gloster

12. PVC CABLES 1100V GRADE

(a) National Cables
(b) Finolex
(g) CCI (Cable Corporation of India Ltd)
(d) Havells
(e) Plaza
(f) Ekta Cable
(g)Gloster

13. COLD SHRINKABLE/CABLE END TERMINATIONS AND STRAIGHT THROUGH JOINTS 33KV & 11 KV GRADE

Birla – 3 M Ltd

14. 1100 VOLT GRADE CABLE END TERMINATION AND STRAIGHT THROUGH JOINTS (CAST RESIN TYPE)

(a) M-Seal
(b) Denson
(c) Birla 3M Ltd
(d) Raychem

15. LT SWITCH GEAR PANELS (LT Panels)

(a) Essaar Universal (Pvt) Ltd, Kanpur
(b) Continental Engineers, Lucknow
(c) Asian Switchgears, Kanpur
(d) Havells

16. AIR INSULATED TRUNK BUSBARS

(a) L&T (Larsen & Toubro Ltd)
(b) Essaar Universal (Pvt) Ltd, Kanpur
(c) Control And Switchgear Co. Ltd

17. AIR CIRCUIT BREAKERS (ACBs)

(a) L&T (Larsen & Toubro)
(b) Easun Reyroll
(c) Southern Switchgears
(d) Control & Switchgear Co. Ltd
(e) MEI
(f) Havells
(g) General Electric

18. MOULDED CASE CIRCUIT BREAKERS (MCCBs)

Group 'A'

(a) ABB (b) Schnider (c) GE (Power)
(d) Legrand (e) L&T lexic (f) C&S Electric Ltd

19. FUSE SWITCH & SWITCH FUSE UNITS

(a) L&T (Larsen & Toubro Ltd)
(b) Havells
(c) HPL
(d) Crompton Greaves

20. ON LOAD CHANGE OVER SWITCHES

(a) Havells (b) Standard (c) HPL (d) L&T (Larsen & Toubro Ltd)

21. DISTRIBUTION BOARDS (SPN/TPN)/RCCBS

(a) L&T (Larsen & Toubro Ltd)
(b) Havells
(c) Standard
(d) Legrand
(e) Indoasian
(f) HPL

22. MINIATURE CIRCUIT BREAKERS (MCBs) & ISOLATOR SWITCHES

(a) Havells
(b) HPL India
(c) Indoasian
(d) Standard
(e) HPL
(f) Lexic of Legrand
(g) Siemens
(h) Martin Gerin
(j) Hegar of L & F

23. PLUG AND SOCKET DBs (SPN/TPN/FP)
(a) Havells
(b) L & T
(c) Indoasian
(d) Standard
(e) Salabh Switch Gear (India) Pvt Ltd

24 LIGHTENING ARRESTORS

(a) Schneider
(b) BHEL
(c) GE(Power)
(d) Oblum
(e) WS Insulators
(f) Southern Insulators

25. STEEL TUBULAR POLES
(a) Jindal
(b) Bombay Tubes and Poles, Mumbai
(c) National Tubing Co., Kanpur
(d) BCW Kanpur
(e) Bharat Conduits and steel works, Kanpur

26. GANG OPERATED AIR BREAK ISOLATORS

(a) Jaipuria Brothers
(b) HEI
(c) ECE Calcutta
(d) MEC Trivandrum

27. INSULATORS HT/LT
(a) Modern Insulators
(b) Jaipuria Brothers
(c) WS Insulators
(d) Jayshree Insulators
(e) Mysore Porcelain

28. ACSR Conductors
(a) ALIND
(b) Indian Aluminium Company
(c) Bharat Conductors

29. PANEL METERS (AMMETERS, VOLTMETERS, PF METER, FREQUENCY METER AND KVAR METERS)

(A) ELECTRO MECHANICAL TYPE
(a) Rishabh Industries Pvt Ltd (Marketed by L&T)
(b) AE
(c) IMP
(d) DIP
(e) Simco
(f) MECO

(B) DIGITAL TYPE
(a) Meco
(b) Enerco
(c) HPL Socomec
(d) Rishabh Industries Pvt Ltd

30. ELECTRONIC ENERGY METERS

(a) Datapro
(b) L&T
(c) Havells
(d) HPL Socomec

31. TIMERS (TIME SWITCHES)

(a) Larsen & Toubro
(b) BCH
(c) SIEMENS
(d) Indoasian

32. HPSV/HPMV/MV FITTINGS

(a) Philips
(b) Bajaj
(c) Crompton Greaves Ltd
(d) Havells
(e) GE

33. SERVO CONTROLLED AUTOMATIC VOLTAGE STABILIZERS

(a) Automatic Electric Ltd, Mumbai (AE)
(b) Brent Ford
(c) Powerware
(d) VOLINA
(e) M/s Sen & Pandit Kolkata

34. DG SETS

(i) ENGINE

(a) KIRLOSKAR Oil Engines
(b) CUMMINS
(c) TATA
(d) Ashok Leyland
(e) Greaves Cotton
(f) Mahindra Powerol

(ii) ALTERNATORS

(a) Kirloskar Electric Co.
(b) Stemford
(c) NGEF
(d) Jyoti
(e) C&S

56. FR PVC CASING CAPPING

(a) Aristoplast (b) National
(c) Plaza (d) Plast box

36 RCC POLES

(a) Concrete Udyog Jhansi
(b) Mohan Concrete Udyog Lucknow

58. RUBBER MAT(Electrical Insulation)

(a) Jyoti
(b) Jaipuria Brothers
(c) Atlas Electricals

38. ROTARY/SELECTOR SWITCHES

(a) Salzer Electronics Ltd (Marketed by L&T)
(b) HPL India Limited
(c) Shirke
(d) Raas
(e) Kayler
(f) Siemens
(g) Switron

39. UPS

(a) Tata Libert(Emerson)
(b) APC
(c) APLAB

40. APFC PANEL

(a) L & T
(b) Power Ware
(c) Intel

41. Electronic Meter

(a) L & T
(b) HPL SOCOMBC
(c) Havells
(d) Accurale

42. Wiring cables

(a) National Cables
(b) Finolex
(c) Nicco Corporation Ltd
(d) Plaza
(e) Rallison
(f) Universal Cables
(g) Grand Lay
(h) Salabh Switch Gear (India) Pvt Lt

43. PVC INSULATED COPPER CONDUCTOR ARMOURED POWER CABLES AND MULTI STRANDED FLAT CABLES/CONTROL CABLES

(a) National Cables
(b) Finolex
(c) Ekta Cables
(d) Havells
(e) Plaza
(f) Universal Cables
(g) Grand Lay
(h) Paragon
(j) Kalinga

44. CONDUITS STEEL

(a) Kalinga
(b) Bharat Steel tubes Kanpur
(c) Jindal (d) AKG
(e) CTI Kanpur (f) Asian

45. CONDUITS RIGID PVC AND ACCESSORIES

(a) Jindal (e) Srinath Pipes Ltd
(b) AKG (f) Seiko
(c) AG (g) R K Electricals
(d) Finolex

APPX 'B' TO PS

46. WIRING ACCESSORIES
(a) Anchor (b) Kinjal (c) Cona (d) Plaza

47. LUMINARIES/TUBE LIGHT FITTINGS
(a) Philips
(b) Bajaj
(c) Crompton Greaves

48. CFL/LED AND LAMPS
(a) Philips
(b) Bajaj
(c) Crompton Greaves

49. FLAMEPROOF FITTINGS
(a) Sudhir Switchgears pvt Ltd
(b) Atlas India Ltd
© Bajaj
(d) Flexpro Electrical

50. FLAME PROOF LUMINARIES
(a) Sudhir Switchgears Pvt Ltd
(b) Baliga
(c) Bajaj
(d) GE (e) Havells

51. FLAME PROOF SWITCHGEARS (LT)
(a) Sudhir Switchgears Pvt Ltd
(b) Atlas India Ltd
(c) Bajaj
(d) Flexpro Eectricals Pvt Ltd

52. EXHAUST FANS/BRACKET FAN/AIR CIRCULATORS
(a) Bajaj (e) Havells
(b) Almonard (f) Orient
(c) Khaitan (g) Usha
(d) Crompton Greaves (h) Polar

53. PIANO TYPE SWITCH/SOCKET & CEILING ROSE
(a) Anchor (b) Havells
(c) Kay
(d) Kinjal (e) Plaza
(f) Leader (g) Cona

54. PLASTIC LAMINATED SHEET
(a) Anchor
(b) HYLAM
(c) National

Contd……/-

55. DOMESTIC LIGHTS FITTING WALL BRACKET FITTING
(a) Vikash
(b) Prakash
(c) Bajaj
(d) Crompton Greaves

56. ELCB/RCCB/A&D/DBs

Group 'A'	Group 'B'
(a)Control and switch Gears	(a) Legrand
(b)Standard	(b) Siemens
(c)Havells	(c) Eleger (L&T)
(d)Indoasian	(d) Merlin Gerin
(e)HPL India	

57. SUBMERSIBLE PUMP SES
(a)Kirloskar (b)KSB (c)Calama (d)Worthington

58. CI PIPES (IS-1536(1976) AND IS-1537(1976)
(a) KESORAM (b) ELECTRO STEEL (c) Kejriwal

59. DI PIPES:- (a) Electrosteel (b) IISCO

60. CI FITTINGS
(a) KESORAM (b) Upadhaya (c) Kejriwal

61. SLUICE VALVE /NON RETURN VALVE/RETURN VALVE
(a) Kirloskar (b) Leader (c) BIR (d) Kalpana (e) Upadhaya

62. STOP VALVE/GATE VALVE
(a) Zoloto (b) Leader

63. MS PIPE ERW
(a) NIC O (b) AKG (c) Vikas

64. PVC CONDUITE PIPE
(a) AG (b) AKG (c) Jindal

APPX 'B' TO PS

65. CHLORONOME PLANT
(a) JESCO (b) CAPITAL-CONTROL

66. BOOSTER PUMP FOR CHLORONOME PLANT
(a) Kirloskar (b) Crompton (c) Siemens

67. AIR COMPRESSOR

(a) Elgi Eqipment Ltd
(b) Ingersoll Rand

68. AXIAL FLOW FAN
(a) Usha (b) Almonard (c) Bajaj

69. PUMPS OF WATER SUPPLY

(A) CENTRIFUGAL PUMPS
(a) Beacon (b) Kirloskar (c) Jyoti (d) Crompton Greaves

(B) VERTICAL TURBINE PUMPS
(a) Jyoti (b) KSB (c) Worthington

(C) MOTORS
(a) Siemens (b)Alstom (c) Jyoti
d) Crompton Greaves (e) NGEF

(D) HORRIZONTAL PUMPS
(a) Tullu (b) CRI

70. MOTOR STARTERS

(A) AIR COOLED
(a) L & T (b) BCH (c) Bentex (d) Siemens

(B) OIL COOLED
(a) Jyoti (b) MEI

71. <u>EOT CRANE</u>

(a) Kone
(b) Rockwell Hoisto
(c) Tojym steel
(d) Pull-Mac
(e) hitech
(f) Hercules hoists
(g) Pioneer cranes
(h) Dinesh.Cranes, Mumbai

72. <u>AC</u>

(a) Godrej
(b) Carrier
(c) Hitachi
(d) Blue Star
(e) Daikin
(f)LG (g) Toshiba

Note: Makes/brands/manufacturers of materials/items not mentioned here-in before but required in the work shall be of Ist quality/ISI marked & shall be approved by GE.

Signature of Contractor

Asst. Dir (Contracts)
for Accepting Officer

LIST OF DRAWINGS

NAME OF WORK:	GENERATION OF SOLAR ENERGY OF CAPACITY OF 1.5 MW AT AF STN AGRA

Ser No	Description of Drgs	Drg No	Sheet No.	Date of Drg	Date of revision
1	**2**	**3**	**4**	**5**	**6**
1.	Site Plan showing external B/R services (Phase-I)	CE/ALD/LP-508	1/2	29.02.2020	-
2.	Site Plan showing external E/M services (Phase-I)	CE/ALD/LP-508	2/2	29.02.2020	
3.	Schematic Diagram Showing External Electrification of Solar Power Plant 1.5MW	CE/ALD/1022-EM	1/3	29.02.2020	
4.	5X2 Module Mounting Structure of Solar Power Plant 1.5MW	CE/ALD/1022-EM	2/3	29.02.2020	
5.	Schematic Diagram of Solar Power Plant 1.5MW	CE/ALD/1022-EM	3/3	29.02.2020	
	GRID BASED SOLAR PROJECTS				
6.	Plan and section view of Control Room	CE/ALD/950-AURA (R2)	8/16	08.11.2018	
7.	Control Room Elevation Plan	CE/ALD/950-AURA (R1)	9/16	16.12.2017	21.08.2018
8.	Power House/Control Room	CE/ALD/950-AURA (R2)	10/16	04.12.2018	
9.	Power House/Control Room	CE/ALD/950-AURA (R2)	11/16	04.12.2018	
	TD DRAWINGS				
10.	General Structural Notes [Typical RCC Details]	E-in-C/SD/6628	1/1	02.07.1992	09.12.2002
11.	Details of valve pit	CEAF/TD/EM01	1/1	16.03.93	-
12.	Typical details for LT distribution pole and street light fittings etc	CEAF/TD/EM/08	1/1	07.01.10	09-08-02
13.	Detail of chemical earthing	CE/ALD/TD/EM/28 (R)	1/1	26.11.07	-
14.	Earthing Pit.	CE/ALD/TD/EM/23	1/1	09.06.2003	24.06.2003
15.	Prevention of Leakage/Seepage and dampness to buildings	CEAF/TD/31	1/1	05.10.95	20.11.98
16.	Typical Detail Of Steel Gate(5.0m to 5.50m wide) high with 2 nos. wicket gate 1.20m wide each.	CEAF/TD/58	1/1	30.12.1997	15.05.2012
17.	Typical Detail of Aluminium Window & Fixed Glazing	CE/ALD/TD-102	1/1	03.03.2001	04/11/2009
18.	Ductile detailing of Reinforcement Concrete Structure subjected to Seismic	CEAF/TD/114 [R]	1/1	16.08.2007	__
19.	General notes on RCC Works	CE/ALD/TD/122	1/1	17.12.2002	23.03.2011

Contd….

LIST OF DRAWINGS (Contd…)

Ser N	Description of Drgs	Drg No	Sheet No.	Date of Drg	Date of revision
	2	3	4	5	6
20.	Typical Detail Plan, Elevation , Sec, Schedule of Fittings & Details:- Aluminium Glazed Door with Aluminium Partition Wall.	CEAF/ALD/TD-126	1/1	07/07/2003	13.08.2003
21.	Detail of Pressed Steel Framed Door	CE/ALD/ TD-171(R)	1/1	10/10/2012	-
22.	Preesed Steel Framed Window Detail	CE/ALD/ TD-172	1/1	09/10/2009	-
23.	Preesed Steel Framed Window Detail	CE/ALD/ TD-172	2/2	09/10/2009	-
24.	Typical Detail Of plinth Protection, BK steps, BK Drain, Ramp, Rcc Jali &XPM Partition	CE/ALD/TD-196	1/1	29.02.12	
25.	Detail fixing of exhaust fan & detail of fan hook box plan and sections	CE/ALD/TD-197	1/1	29.02.12	
26.	General Notes on Architectural Drawings, General Schedule of Finishes & Standard Specifications;	CE/ALD/ TD-199	1/1	29.02.2012	28.01.2014
27.	Typical location, details fittings & fixtures of toilet	CE/ALD/TD–204	1/1	29.02.2012	
28.	Detail of external cable duct with Precast RCC cover	CE/ALD/TD–209	1/1	29.02.2012	
29.	Moulded PVC Door(Solid Core):- Plan ,Elevation, Section & Details of SCD	CE/ALD/TD–212	1/1	07.05.2012	-
30.	Plan, elevation, section & details of solid panel PVC door (PVD)	CE/ALD/TD-214	1/1	07-05-12	
31.	Typical Detail of Cable Duct (Inside Bldg)	CE/ALD/TD–216	1/1	30.05.2012	
32.	Typical Details of Valve Pit	CE/ALD/TD–220-ST	1/1	26.07.2012	
33.	Typical details of brick, manhole.	TD/222	2/2	04-12-68	14-03-91
34.	Detail of Aluminium Door and Partition Wall	CE/ALD/TD–224	1/1	17/10/2012	-
35.	Typical details of fixing HDPE water storage tanks over RCC roof slab.	CE/ALD/TD–233	1/1	27.09.13	
36.	Rain Water Harvesting/ Ground Water Recharge /Wells	CE/ALD/TD–284-ST	1/1	15.09.2017	-
37.	Detail of wall pegs, curtain rod, and pelmet box	CE/ALD/ TD-566-R	1/1	16.1.1989	25.02.1989
38.	Detail of manhole with RCC slab and RCC cover	TD/571(R)	1/1	20.05.91	08.01.13
39.	Section thro Roads, Path Details of Culverts RCC Hume Pipe	CELZ/TD/575	1/2	16.06.1989	04.10.1989

Contd….

LIST OF DRAWINGS (Contd…)

Ser No	Description of Drgs	Drg No	Sheet No.	Date of Drg	Date of revision
1	2	3	4	5	6
40.	Details of Culverts RCC/Hume Pipe	CELZ/TD/575	2/2	16.06.1989	-
41.	Typical drains	TD-577	1/1	16.06.89	-
42.	Switch box & meter Box (For single/ Double Unit)	CE/ALD/TD-595	1/1	16.9.1969	
43.	Errata Sheet	CE/ALD/TD-600	1/1	28-12-89	01-08-91
44.	Errata Sheet	CE/ALD/TD-604	1/1	15-02-90	
45.	Errata Sheet	CE/ALD/TD-623	1/2	07-12-94	-
46.	Errata Sheet	CE/ALD/TD-623	2/2	07-12-94	-

Signature of Contractor

Asst. Dir (Contracts)
for Accepting Officer

MILITARY ENGINEER SERVICES
NOTICE INVITING TENDER (NIT)

1. A tender is invited for the work as mentioned in Appendix 'A' to this NOTICE INVITING TENDER (NIT).

2. The work is estimated to cost as indicated in aforesaid Appendix 'A'. This estimate, however, is not a guarantee and is merely given as a rough guide and if the work cost more or less, a tenderer / bidder will have no claim on that account. The tender shall be based on as mentioned in aforesaid Appendix 'A'.

3. The work is to be completed within the period as indicated in aforesaid Appendix 'A' in accordance with the phasing, if any, indicated in the tender from the date of handing over of site, which will be on or about two weeks after the date of Acceptance of tender.

4. Normally contractors whose names are on the MES approved list (for the area in which the work lies) and enlisted in the appropriate class / category & fulfill requisite eligibility criteria may submit bid/tender . A contractor who is not enlisted for the area in which the work lies but whose name is in the MES approved list of any MES formation and who has deposited standing security and executed standing security Bond may bid without depositing earnest money alongwith the tender.

5. Under no circumstances will a father and his son(s) or other close relatives who have business dealing with one another be allowed to tender / bid for the same contract as separate competitors. A breach of this condition will render the tenders/bids of both the parties liable for rejections.

6. The Chief Engineer (AF) Allahabad will be the Accepting Officer herein after referred to as such for purpose of the contract.

7. The Technical Bid and Financial Bid (Cover-1 and Cover-2 respectively) shall be uploaded by the tenderer/bidder on or before the date and time mentioned in NIT. A scanned copy of DD with enlistment details / documents & relevant certificates mentioned in Appx A to the NIT shall be uploaded as packet 1 / cover-1 ('T' bid) of the tender / bid on e-tendering portal. DD is refundable in case T bid is not admitted resulting in non-opening of 'Q' bid'. The applicant contractor shall bear the cost of bank charges for procuring and encashment of the DD and shall not have any claim from Government whatsoever on this account.

7.1. Tender form and conditions of contract and other necessary documents shall be available on defproc.gov.in site for download and shall form part of contract agreement in case the tender / bid is accepted.

7.2 In case the contractor who has not executed the Standing Security Bond, the Cover-I shall be accompanied with by Earnest Money of amount as mentioned in Appendix 'A' in the form of deposit at call receipt in favour of concerned CCE / GE / GE(I) / AGE (I) (see Appendix 'A') by a scheduled Bank or in receipted treasury Challan the amount being credited to the revenue deposit of the concerned CCE / GE / GE(I) / AGE(I) (see Appendix 'A').

7.3 If the Accepting Officer accepts the tender / bid, the contractor/ firm shall be required to lodge Performance Security Deposit , five percent (05 %) of accepted contract sum within 28 days of receipt of Acceptance Letter (AOC).

7.4 The CCE / GE/ GE(I) / AGE(I) will return the Earnest Money wherever applicable to all unsuccessful tenderer / bidders by endorsing an authority on the deposit-at-call receipt for its refund, on production by the tenderer , bidder a certificate of the Accepting Officer that a bonafide tender / bid was received .

7.5 The CCE / GE / GE(I) / AGE(I) will return the Earnest Money to the successful tenderer / bidder only after receipt of the Performance Security Deposit as mentioned in para 7.3 above.

8 Copies of the drawings and other document pertaining to the work signed for the purpose of identification by the Accepting Officer or his accredited representatives, sample of materials and stores to be supplied by the contractor will also be available for inspection by the tenderer / bidder at the office of Accepting Officer and concerned GE / GE(I) /AGE(I) during working hours.

NOTICE INVITING TENDER (NIT) (Contd…….)

9. The tenderers / bidders are advised to visit the site of work by making prior appointment with GE / GE(I)/ AGE(I) / Project Manager who is also the Executing Agency of the work (see appendix 'A'). The tenderers / bidders are deemed to have full knowledge of all relevant documents, samples, site etc., whether they have inspected them or not.

10. Any tender / bid which proposes any alteration to any of the conditions laid down or which proposes any other condition or prescription whatsoever, is liable to be rejected.

11. The uploading of bid implies that bidder has read this notice and the Conditions of Contract and has made himself aware of the scope and specification of work to be done and of the conditions and rates at which stores, tools and plants etc will be issued to him and local conditions and other factors having bearing on the execution of the work.

12. Tenderers / bidders must be in possession of a copy of the MES Standard Schedule of Rates (See appendix 'A') including amendments and errata thereto.

13. Invitation for e-tender does not constitute any guarantee for validation of 'T' bid and subsequent opening of finance bid of any applicant / bidder, even of enlisted contractors of appropriate class and category merely by virtue of enclosing DD. Accepting Officer reserves the right to reject the 'T' bid and not to open the finance bid of any applicant / bidder. 'T' bid validation shall be decided by the Accepting Office based on, inter alia, capability of the firm as per criteria given in Appx 'A' to this NIT. The applicant contractor / bidder will be informed regarding non-validation of his 'T' bid assigning reasons thereof through the defproc website. The applicant contractor / bidder if he so desires may appeal to the next higher Engineer authority viz Chief Engineer Central Command, Lucknow on email id ceengrll-mes@nic.in with a copy to the Accepting Officer on email before the scheduled date of opening of Financial Bid. The decision of the Next Higher Engineer Authority (NHEA) shall be final and binding. The contractor / bidder shall not be entitled for any compensation whatsoever for rejection of his bid.

14. The Accepting Officer reserves the right to accept a tender submitted by a Public Under taking, giving a price preference over other Tender(s) / bids which may be lower, as are admissible under the Government Policy. No Claim for any compensation or otherwise shall be admissible from such tenderer / bidder whose tender / bid is rejected.

15. Accepting Officer does not bind himself to accept the lowest or any tender / bid or to give any reason for not doing so.

16. This Notice Inviting Tender (NIT) including Appendix 'A' shall form part of the contract.

Signature of Contractor For Accepting Officer

APPENDIX 'A' TO NOTICE INVITING TENDER

1.	Name of work	**GENERATION OF SOLAR ENERGY OF CAPACITY OF 1.5 MW AT AF STN AGRA**
2.	Estimated Cost	Rs 1049.94 Lakhs (At par Market)
3.	Period of completion	12 (Twelve) Months
4.	Cost of tender documents	Rs. 3000.00 in the shape of DD / Bankers cheque from any schedule Bank in favour of GE (AF) (Adm Area) Kheria Agra and payable at **Agra**
5.	Website / portal address	www.defproc.gov.in and www.mes.gov.in
6.	Type of Contract	The tender shall be Lump sum based on Drawing and specifications IAFW – 2159 and GCC (IAFW-2249) with Sch 'A'(list of items of work) to be priced by tenderers. The tenderes are required to quote their lump sum amounts for prepriced parts of schedule 'A' and quote rates against items of other parts of schedule 'A'.
7.	Information Details	
	(a) Bid submission start date	As per mentioned on portal address : www.defproc.gov.in
	(b) Bid submission end date	
	(c) Date / time for opening of bid (Cover-1)	
8.	Eligibility Criteria	
	(A) For MES enlisted Contractors	(i) All contractors enlisted with MES in Class 'S' and above and category a(i) & b(i) shall be considered qualified provided they do not carry adverse remarks in WLR of competent engineer authority. (ii) Contractor should have MOU with solar power firms of of rating 1A/ 1B/ 1C/ 2A/ 2B/ 2C given by CRISIL / CARE / FITCH / ICRA / SMERA / Bricks works Ratings Pvt Ltd having experience as given below for technical support for design and execution of work of installation of solar power plant of requisite capacity. **(iii) Experience of having successfully completed works of Solar Power Plants in Government Department / PSU during last seven years ending last day of the month previous to the one in which applications are invited should be any of the following: -** **One work of capacity ≥ 1.2 MW Solar capacity of plant.** **OR** **Two works of capacity ≥ 0.75 MW Solar capacity of plant.** **OR** **Three works of capacity ≥ 0.60 MW Solar capacity of plant.** Enlisted contractors who are either having above mentioned solar rating themselves fulfilling the criteria laid down here in above or meeting the criteria laid down for unenlisted contractors shall also be considered eligible.

	(B) For Un-enlisted contractors	**(i)** Un-enlisted contractor who are willing to apply for the bid, they should meet the enlistment criteria of **'S' class** pertaining to annual turnover, fixed assets & financial criteria, solvency, working capital, immovable property/fixed assets, T&P, No recovery outstanding in any Govt. Department, Police verification/ passport etc. Enlistment criteria may be seen in Para 1.4 & 1.5 of section-1 of Part-I of MES Manual of Contracts- 2007 (Re-print 2012) as available in all MES Details given in instructions for completion of tender documents are to be complied with by the tenderers. ii) Contractor should have MOU with solar power firms of of rating 1A/ 1B/ 1C/ 2A/ 2B/ 2C given by CRISIL / CARE / FITCH / ICRA / SMERA / Bricks works Ratings Pvt Ltd having experience as given below for technical support for design and execution of work of installation of solar power plant of requisite capacity. However requirement of MOU is exempted for contractors who themselves are having requisite rating by rating agency mentioned here-in-before. **(iii) Experience of having successfully completed works of Solar Power Plants in Government Department / PSU during last seven years ending last day of the month previous to the one in which applications are invited should be any of the following: -** **One work of capacity ≥ 1.2 MW Solar capacity of plant.** **OR** **Two works of capacity ≥ 0.75 MW Solar capacity of plant .** **OR** **Three works of capacity ≥ 0.60 MW Solar capacity of plant.** iv) They should not have any adverse remark in work load return of competent engineer authority.
	(C) For all contractors	i. Contractor will not be allowed to execute the work by subletting or through power of attorney holder on his behalf to a third party / another firm except sons / daughters/ spouse of proprietor / partner / Director and firm's own employees, Director, Project Manager. This shall be subject to certain conditions which will be prescribed in the NOT forming part of the tender documents. ii. **Notarised** MOU with eligible solar power firms shall contain that solar power firms shall provide all technical expertise during design, vetting of design, during execution, testing and commissioning of the plant and shall be responsible for desired output of the plant. iii. In a tender, the eligible solar power firms can either bid as direct participant / bidder or under MoU with MES enlisted / un-enlisted contractor, but cannot bid simultaneously for the same tender as direct participant/ bidder as also under MoU with MES enlisted/ un-enlisted contractor. iv. MoU will be permitted between only one eligible solar firms and one MES enlisted/ unenlisted contractor, bidding for the same tender. v. In case any violation of condition at 8 (c) (iii) & (iv) above is noticed, all such bids shall be treated as invalid.

9.	Tender issuing and Accepting Officer	**Chief Engineer (AF) Allahabad**
10	Executing agency	GE (AF) Adm Area Kheria Agra
11	Earnest Money	Rs. 8,49,970.00 in the form of DD / Bankers cheque from any scheduled Bank in favour of **GE (AF) (Adm Area) KHERIA AGRA** and payable at **AGRA**. BGB not acceptable. MES enlisted contractor are exempted from submission of EMD (Scanned copy to be uploaded online and original to be submitted offline before due date of opening of cover No 1 i.e. technical bid)

NOTES:-

(a) Contractor one class below (two class below in case of remote and difficult area) may also bid for the tender. Their application shall be considered subject to fulfillment of other eligibility criteria given in NIT when number of applicants of eligible class qualifying for the tender are less than 7(seven)

(b) In case number of eligible class contractors satisfying the eligibility criteria given in NIT are 7 or more than 7, application of one class below the eligibility class shall not be considered except those who have previously completed similar works satisfactorily and are meeting the criteria of upgradation in respect of past experience and/or average annual turnover as applicable and financial soundness (solvency/financial soundness and working capital) provided the value of work is less than twice the tendering limit of such contractors. Contractors one class below the eligible class may upload necessary documents wrt works experience and financial soundness in cover 1 of tender (T bid).

(c) (i) Applications not accompanied by scanned copies of requisite DD / Bankers Cheque towards cost of tender and earnest money (as applicable), shall not be considered for validation of 'T' bid and their finance bids will not be opened.

(ii) Tenderers /bidders to note that they should ensure that their original DDs and earnest money (as applicable) are received within 05 (Five) days of bid submission end date.

(iii) In case of applications from enlisted contractors of MES, where scanned copies of requisite DD / Bankers Cheque towards cost of tender has been uploaded but physical copies are not received by the stipulated date, finance bids will be opened. However non-submission of physical copies of cost of tender shall be considered as willful negligence of the bidder with ulterior motives and such bidder shall be banned from bidding for a period of six months commencing from the date of opening of finance bid.

(iv) In case of applications from unenlisted contractors, where scanned copies of requisite DD / Bankers cheque towards cost of tender has been uploaded but physical copies are not received by the stipulated date, finance bids will not be opened. Name of such contactors alongwith complete address shall be circulated for not opening of their bids for a period of six months commencing from the date of opening of finance bid.

(v) In case of applications / bids (enlisted contractor as well as unenlisted contractor) where scanned copies of requisite Earnest money (as applicable) were uploaded but the same are not received in physical form within stipulated time, such bids shall not qualify for opening of finance bid.

(vi) In case any deficiency is noticed, in the documents required to be uploaded by the tenderers as per NIT, after opening of cover 1 (T bid) and during technical evaluation, a communication in the form of e-mail/ whatsapp/ sms/ speed post etc. shall be sent to the contractor to rectify the deficiency within a period of 7 days from the date of communication failing which financial bid (cover-2) shall not be opened and contractor shall not have any claim on the same.

(d) Contractor may note that they shall not be loaded beyond their tendering limit as under :-

(aa) In case contractor of eligible class are selected for issue of tender : 4 to 5 times the tendering limit.

(bb) In case of one class below contractors are selected for issue of tender : 6 to 7 times.

(cc) In case of unenlisted contractors: 2 times the upper tendering limit of class for which contractor meets the criteria for enlistment.

APPENDIX 'A' TO NOTICE INVITING TENDER …Contd

(e) **Contractors enlisted with MES will upload following documents for checking eligibility:**-

(i) Applications for bid in Firm's letter head.
(ii) Enlistment letter.
(iii) Scanned copy of DD of cost of tender.
(iv) Scanned copy of EPF code No
(v) Goods & Service tax registration No
(vi) Bidder shall upload scanned copy of Integrity Pact (IP) in cover 1 (Technical Bid) duly signed all the pages of pact by the authorized signatory of the firm in token of their agreement to bound the firm by its provision.Bidder who fail to upload signed copy of the Integrity Pact (IP) in cover 1 (Technical Bid). Their bid shall not be considered for validation of T bid and their financial bid (Cover 2) will not be opened. Original Integrity Pact (IP) shall be forwarded by post within 05 (Five) days of bid submission end date
(vii) All documents required for Pre Qualification Criteria as mentioned in the Eligibilty criteria as mentioned in Para 8 above

(f) **Contractors not enlisted with MES will upload following documents (scanned copy in pdf formats) for checking eligibility:**-

Contractors not enlisted with MES will upload necessary documents for enlistment in eligible class & category of work, including Affidavit for no recovery outstanding. List of documents required for enlistment in MES has been given in Para 1.4 and 1.5 of Section 1 of Part I of MES Manual on Contracts 2007 (Reprint 2012). Following documents shall also be uploaded amongst others:-

(i) Details of three highest valued similar nature of works executed during last five years, financial year-wise in tabular form giving name of work, Accepting Officer's tender details, viz, Address, Telephone, FAX No., E-mail ID etc, date of acceptance of tender and actual date of completion. This shall be duly signed by proprietor / all partners / authorized director of Pvt / Public Ltd, as applicable. It should indicate whether extension was granted or compensation was levied. Attested copy of acceptance letter and completion certificate shall be enclosed of each work. In case performance report has been given by the client same shall also be submitted duly attested.

(ii) Latest working Capital Certificate from the Nationalized /Scheduled Bank issued within last 6 months for the amount not less than Rs. 50 Lakhs in prescribed format.

(iii) Latest Solvency Certificate from the Nationalized /Scheduled Bank issued within last 6 months for the amount not less than Rs. 4 crores in prescribed format.

(iv) Minimum reserve in the name of company (Total of Immovable/fixed & Movable assets) shall not be less than Rs.80 Lakhs supported with Notarized affidavit & valuation reports (80 % of total asset shall be in the shape of Immovable asset).

(v) Unenlisted Bidder/contractor shall render Notarized affidavit affirming that they have not been banned by any Govt /Semi Govt / State Govt Dept/Agency /PSU & DSV for participating in tender.

(vi) Affidavits for possession of movable & immovable properties by proprietor / partner owning the immovable property alongwith Valuation Certificate from Regd Valuer in support of movable & immovable properties. In case of Limited company, the immovable property is required to be in the name of the company. In addition of Limited Company, the immovable property is required to be in the name of the Company.

(vii) In addition, the unenlisted contractors shall also furnish affidavit on non-Judicial stamp paper in the form of hard copy declaring their turnover for last 2 (Two) years.

(viii) Scanned copy of DD of cost of tender and earnest money.

(ix) Scanned copy of EPF code No

(x) Goods &Service tax registration No

APPENDIX 'A' TO NOTICE INVITING TENDER …Contd

(xi) Bidder shall upload scanned copy of Integrity Pact (IP) in cover 1 (Technical Bid) duly signed all the pages of pact by the authorized signatory of the firm in token of their agreement to bound the firm by its provision.Bidder who fail to upload signed copy of the Integrity Pact (IP) in cover 1 (Technical Bid). Their bid shall not be considered for validation of T bid and their financial bid (Cover 2) will not be opened. Original Integrity Pact (IP) shall be forwarded by post within 05 (Five) days of bid submission end date

(x) All documents required for Pre Qualification Criteria as mentioned in the Eligibilty criteria as mentioned in Para 8 above

(g) In case of rejection of technical / prequalification bid, contractor may appeal to next higher Engineer authority i.e. Chief Engineer Central Command on email id ceengrll-mes@nic.in with a copy to Accepting officer on email id cezafa2-mes@nic.in against rejection within 5 days of uploading of 'Technical evaluation summary'. The decision of Chief Engineer Central Command shall be final and binding. However, contractor / bidder shall not be entitled to any compensation whatsoever for rejection of technical / prequalification bid.

(h) Court of the place from where tender has been issued shall alone have jurisdiction to decide any dispute out of or in respect of this tender. After acceptance of tender ,Condition 72-Jurisdiction of Courts of IAFW-2249 shall be applicable."

(j) **Performance security deposit** shall be submitted within 28 days of receipt of letter of acceptance, the successful contractor shall deliver to Accepting Officer a PERFORMANCE SECURITY in any of the forms given in Condition 19 of IAFW-2249 (Amended vide Amendment No 47 of IAFW-2249) for an amount equivalent to Five (05%) percent of the contract sum.

(Anuj Yadav)
AEE (QS & C)
AD(Contracts)
For Chief Engineer (AF)

_____
Signature of Contractor

Case file: 958368/ /E8
Chief Engineer (AF)
Allahabad-211012

Mar 2020

To be signed by the bidder and same signatory competent / authorized to sign the relevant contract on behalf of MES.

INTEGRITY PACT

GENERAL

1. Whereas the President of India, represented by Chief Engineer (CE) hereinafter referred to as Principal / Owner and the first part, has floated the Tender (NIT No.958368/ /E8 dated Mar 2020.) and intends to award , under laid down organizational procedure, contract for **GENERATION OF SOLAR ENERGY OF CAPACITY OF 1.5 MW AT AF STN AGRA**. hereinafter referred to as works / Services and M/s _____ represented by,_____ (which term unless expressly indicated by the contract, shall be deemed to include its successors and its assignees), hereinafter referred to as the Bidder/Contractor and the second part is willing to carryout the works / services.

2. Whereas the Bidder is a Proprietorship Concern / Partnership Firm / Limited Liability Firm / Private Limited Company / Limited Company / Joint Venture constituted in accordance with the relevant law in the matter and the Principal / Owner is Chief Engineer (CE) / Chief Construction Engineer (CCE) / Commander Works Engineer (CWE)/ Garrison Engineer (I) (GE (I)) /Garrison Engineer (GE) performing its functions on behalf of the President of India.

Objectives

OBJECTIVES

3. Now, therefore, the Principal / Owner and the Bidder agree to enter into this pre-contract agreement, referred to as INTEGRITY PACT (IP), to avoid all forms of corruption by following a system that is fair, transparent and free from any influence/prejudiced dealings prior to, during and subsequent to the conclusion of the contract to be entered into with a view to:-

3.1 Enabling the Principal / Owner to get the desired works / services at a competitive price in conformity with the defined specifications of the Services by avoiding high cost and the distortionary impact of corruption on public procurement.

3.2 Enabling Bidders to abstain from bribing or any corrupt practice in order to secure the contract by providing assurance to them that their competitors will also refrain from bribing and other corrupt practices and the Principal / Owner will commit to prevent corruption, in any form, by their officials by following transparent procedures.

COMMITMENTS OF THE PRINCIPAL / OWNER

4. The Principal / Owner commits itself to the following:-

4.1. The Principal / Owner undertakes that, no official of the Principal / Owner, connected directly or indirectly with the contract will demand, take a promise for or accept, directly or through intermediaries, any bribe, consideration, gift, reward, favour or any material or immaterial benefit or any other advantage from the Bidder, either for themselves or for any person, organisation or third party related to the contract, in exchange for an advantage; in the bidding process, bid evaluation, contracting or implementation process related to the Contract.

4.2 The Principal / Owner will, during the pre-contract stage, treat all Bidders alike and will provide to all Bidders the same information and will not provide any such information to any particular Bidder which could afford an advantage to that particular Bidder in comparison to other Bidders.

4.3 All the officials of the Principal / Owner will report to the appropriate Government office any attempted or completed breach(s) of the above commitments as well as any substantial suspicion of such a breach.

5. In case of any such preceding misconduct on the part of such official(s) is reported by the Bidder to the Principal / Owner willful and verifiable facts and the same is prima facie found to be correct by the Principal / Owner, necessary disciplinary proceedings, or any other action as deemed fit, including criminal proceedings may be initiated by the

Principal / Owner and such a person shall be debarred from further dealing related to the tender / contract process. In such a case while an Inquiry is being conducted by the Principal / Owner the tender process / proceedings under the contract would not be stalled.

COMMITMENTS OF BIDDERS

6. The Bidder commits himself to take all measures necessary to prevent corrupt practices, unfair means and illegal activities during any stage of his bid or during any pre-contract or post- contract stage in order to secure the contract or in furtherance to secure it and in particular commits himself to the following-:

6.1 Bidder will not offer, directly or through intermediaries, any bribe, gift, consideration, reward, favour any material or non-material benefit or other advantage, commission, fee, brokerage or inducement to any official of the Principal / Owner, connected directly or indirectly with the bidding process, or to any person, organization or third party related to the contract in exchange for any advantage in the bidding, evaluation, contracting and implementation of the Contract.

6.2 The Bidder further undertakes that he has not given, offered or promised to give, directly or indirectly any bribe, gift, consideration, reward, favour any material or non-material benefits or other advantage, commission, fees, brokerage or inducement to any official of the Principal / Owner or otherwise in procuring the Contract or forbearing to do or having done any act in relation to the obtaining or execution of the contract or any other Contract with the Government for showing or forbearing to show favour or disfavour to any person in relation to the Contract or any other Contract with the Government.

6.3 The Bidder will not collude with other parties interested in the contract to impair the transparency, fairness and progress of the bidding process, bid evaluation, contracting and implementation of the contract.

6.4 The Bidder will not accept any advantage in exchange for any corrupt practice, unfair means and illegal activities.

6.5 The Bidder would not enter into conditional contract with any Agent(s), broker(s) or any other intermediaries wherein payment is made or penalty is levied, directly or indirectly, on success or failure of the award of the contract.

6.6 The Bidder commits to refrain from giving any complaint directly or through any other manner without supporting it with full and verifiable facts. Complaint will be processed as per Guidelines for Handling of Complaints in vogue. In case the complaint is found to be vexatious, frivolous or malicious in nature, it would be construed as a violation of Integrity

PREVIOUS TRANSGRESSION

7.1 The Bidder declares that no previous transgression occurred in the last three years immediately before signing of this Integrity Pact with any other company in respect of any corrupt practices envisaged hereunder or with any Public Sector Enterprise in India or any Government Department in India.

7.2 If the Bidder makes incorrect statement on this subject, Bidder can be disqualified from tender process or the contract and if already awarded, same can be terminated for such reason.

COMPANY CODE OF CONDUCT

8.1 Bidders are advised to have a company code of conduct (clearly rejecting the use of bribes and other unethical behaviour) and a compliance program for the implementation of the code of conduct throughout the country.

SANCTION FOR VIOLATION

9.1 Any breach of the aforesaid provisions by the Bidder or any one employed by him or acting on his behalf (whether with or without the knowledge of the Bidder) or the commission of any offence by the Bidder or any one employed by him or acting on his

behalf, as defined in Chapter IX of the Indian Penal Code, 1860 or the Prevention of Corruption Act 1988 or any other act enacted for the prevention of corruption shall entitle the Principal / Owner to take all or any one of the following actions, wherever required:-

(i) Technical bid of the Bidder will not be opened. Bidder will not be entitled to or given any compensation. However, the proceedings with the other Bidder(s) would continue.

(ii) Financial bid of the Bidder will not be opened. Bidder will not be entitled to or given any compensation. However, the proceedings with the other Bidder(s) would continue.

(iil) The Earnest Money Deposit shall stand forfeited either fully or partially, as decided by the Principal / Owner, in case contract is not awarded to the Bidder and the Principal / Owner shall not be required to assign any reason therefor. For enlisted contractors an amount less than or equal to Earnest Money Deposit as decided by the Principal/ Owner shall be deducted from any amount held with the Department / any payment due.

(iv) To immediately cancel the contract, if already concluded / awarded without any compensation to the Bidder.

(v)To en cash the Performance Security furnished by the Bidder.

(vi)To cancel all or any other Contract(s) with the Bidder.

(vii)To temporarily suspend or temporarily debar / permanently debar the bidder as per the extant policy.

(viii)If adequate amount is not available in the present tender / contract, the deficient amount can be recovered from any outstanding payment due to the Bidder from the Principal / Owner in connection with any other contract for any other works/services.

(ix)If the Bidder or any employee of the Bidder or any person acting on behalf of the Bidder, either directly or indirectly, is closely related to any of the officers of the Principal / Owner, or alternatively if any close relative of an officer of the Principal / Owner has financial interest/stake in the Bidder's firm, the same shall be disclosed by the Bidder at the time of submission of tender. Any failure to disclose the interest involved shall entitle the Principal / Owner to debar the Bidder from the bid process or rescind the contract without payment of any compensation to the Bidder. The term 'close relative' for this purpose would mean spouse whether residing with the Government servant or not, but does not include a spouse separated from the Government servant by a decree or order of a competent Court; son or daughter or step son or step daughter and wholly dependent upon Government servant, but does not include a child or step child who is no longer in any way dependent upon the Government servant or of whose custody the Government servant has been deprived of by or under any law; any other person related, whether by blood or marriage, to the Govt servant or to the Government servant's wife or husband and wholly dependent upon Government servant.

(x)The Bidder shall not lend to or borrow any money from or enter into any monetary dealings or transactions, directly or indirectly, with any employee of the Principal / Owner and if he does so, the Principal / Owner shall be entitled forthwith to cancel the contract and all other contracts with the Bidder.

9.2 The decision of the Principal / Owner to the effect that a breach of the provisions of this Integrity Pact has been committed by the Bidder shall be final and binding on the Bidder. However, the Bidder can approach the Independent External Monitor(s) (IEMs) appointed for the purposes of this Pact.

INDEPENDENT EXTERNAL MONITORS (IEMS)

10.1. MoD has appointed the following Independent External Monitors for this pact in consultation with the Central Vigilance Commission:-

Sl No.	Name of IEM	e-mail ID

10.2 Details of Nodal officer nominated by E-in-C's Branch are as follows:-

Name :
e-mail id :
Mobile No :

(Updated details to be filled)

10.3. In case of any complaint with regard to violation of Integrity Pact, either party can approach IEMs with copy to the Nodal Officer and the other party. If any such complaint from bidder is received by the Principal / Owner, the Principal / Owner shall refer the complaint to the Independent External Monitors for their recommendations / inquiry report.

10.4 If the IEMs need to peruse the relevant records of the Principal/ Owner and/or of the Bidder / Contractor in connection with the complaint sent to them, the Principal/ Owner and/ or the Bidder/ Contractor shall make arrangement for such perusal of records by the IEMs as demanded by them including unrestricted and unconditional access to the project documentation and minutes of meeting. If records / documents of Sub—Contractor(s) are also required to be perused by the IEMs, the Bidder shall make arrangement for such perusal of records by the IEMs as demanded by them. IEMs are under obligation to treat the information and documents of the Principal/Owner and Bidder/ Contractor/Sub—Contractors with confidentiality.

10.5. The task of the IEMs, is to review independently and objectively, any complaint received with regard to violation Integrity Pact and offer recommendations or carry out inquiry as deemed fit. The IEMs are not subject to any instructions by the representatives of the parties and shall perform their functions neutrally and independently. The report of inquiry, if any, made by the IEMs shall be submitted to either of the following for a final and appropriate decision in the matter keeping in view the provision of this Pact:-

(a) Engineer-in-Chief in normal cases
(b) CVO(MES & BRO) /MoD in cases involving vigilance angle

11.0 EXAMINATION OF BOOKS OF ACCOUNTS

In case of any allegation of violation of any provisions of this Integrity Pact or payment of commission, the Principal / Owner or its agencies shall be entitled to examine the Books of Account of the Bidder and the Bidder shall provide necessary information of the relevant financial documents in English and shall extend all possible help for the purpose of such examination.

12.0 LAW AND PLACE OF JURISDICTION

This Pact is subject to Indian Law. The place of performance and jurisdiction is the seat of the Principal / Owner.

13.0 OTHER LEGAL ACTIONS

The actions stipulated in this Integrity pact are without prejudice to any other legal action that may follow in accordance with the provisions of the extant law in force relating to any civil or criminal proceedings.

14.0 SIGNING OF INTEGRITY PACT ON BEHALF OF BIDDER

(a) PROPRIETORSHIP CONCERN — The Integrity Pact must be signed by the proprietor or by an authorised signatory holding power of attorney signed by the proprietor.

(b) PARTNERSHIP FIRM - The Integrity Pact must be signed by all partners or by one or more partner holding power of attorney signed by all partners.

(c) LIMITED LIABILITY FIRM - The Integrity Pact must be signed by all partners or by one or more partner holding power of attorney signed by all partners.

(d) PRIVATE LIMITED / LIMITED COMPANY - The Integrity Pact must be signed by a representative duly authorized by Board resolution.

(e) JOINT VENTURE - The Integrity Pact must be signed by all partners and members to Joint Venture or by one or more partner holding power of attorney signed by all partners and members to the Joint Venture.

15.0 VALIDITY

15.1. The validity of this Integrity Pact shall be from date of its signing. It expires for the Contractor after the final payment under the contract has been made or till the continuation of Defect liability period, whichever is later and for all other bidders, till the Contract has been awarded.

15.2 Should one or several provisions of this Pact turn out to be invalid; the remainder of this Pact remains valid. In this case, the parties will strive to come to an agreement to their original intentions.

INTEGRITY PACT

To

_____
_____
_____

SUB-TENDER ID NO_____FOR THE WORK GENERATION OF SOLAR ENERGY OF CAPACITY OF 1.5 MW AT AF STN AGRA

Dear Sir,

It is hereby declared that MES is committed to follow the principle of transparency, equity and competitiveness in public procurement.

The subject Notice Inviting Tender (NIT) is an invitation to offer made on the condition that the Bidder will sign the Integrity Pact, which is an integral part of tender/bid documents, failing which the tender/bidder will stand disqualified from the tendering process and the bid of the bidder would be summarily rejected.

This declaration shall form part and parcel of the Integrity Pact and signing of the same shall be deemed as acceptance and signing of the Integrity Pact on behalf of MES.

Yours faithfully,

Chief Engineer (AF) Allahabad

INTEGRITY PACT

To

Chief Engineer (AF)
Bamrauli,
Allahabad

SUB-TENDER ID NO_____FOR THE WORK GENERATION OF SOLAR ENERGY OF CAPACITY OF 1.5 MW AT AF STN AGRA

Dear Sir,

I/We acknowledge that MES is committed to follow the principles thereof as enumerated in the Integrity Pact enclosed with the tender/bid document.

I/We agree that the Notice Inviting Tender (NIT) is an invitation to offer made on the condition that MWe will sign the Integrity Pact, which is an integral part of tender document, failing which I/We will stand disqualified from the tendering process I/We acknowledge that THE MAKING OF THE BID SHALL BE REGARDED AS AN UNCONDITIONAL AND ABSOLUTE ACCEPTANCE of the conditions of the NIT.

I/We confirm acceptance and compliance with the Integrity Pact in letter and spirit and further agree that execution of the said Integrity Pact shall be separate and distinct from the main contract, which will come into existence when tender/bid is finally accepted by MES. IWe acknowledge and accept the validity of the Integrity Pact, which shall be in line with Para 15 of the enclosed Integrity Pact.

I/We acknowledge that in the event of my/our failure to sign and accept the Integrity Pact, while submitting the tender/bid, MES shall have unqualified, absolute and unfettered right to disqualify the tender/bidder and reject the tender/bid in accordance with terms and conditions of the tender/bid.

Yours faithfully,

(Authorised signatory of the Bidder)