

=====

TENDER SPECIFICATION

TENDER NO. BHEL/NR/SCT/RSC VARANASI/OFFCIE REPAIR/1026

FOR

**“REPAIR AND RENOVATION OF THE RSC VARANASI OFFICE COMPLEX
AT SHIVPUR, TARNA IN BHEL, HERP COLONY, VARANASI, U.P.”**

PART I – TECHNICAL BID



Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector – Northern Region,
Plot No. 25 , Sector - 16A ,
Distt. Gautam Budh Nagar, NOIDA – 201 301(INDIA)



ISO 9001, ISO 14001,
OHSAS 18001 & SA 8000
certified company
SubContract and Purchase Deptt.

Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector – Northern Region,
Plot No. 25 , Sector - 16A ,
Distt. Gautam Budh Nagar, NOIDA – 201 301(INDIA)
Phone: 0091-0120- 2416440/ 2416262
Fax 091-0120-2416528
Email: rmchandra@bhelpsnr.co.in/
susmitabasu@bhelpsnr.co.in

TENDER NO. BHEL/NR/SCT/RSC VARANASI/OFFCIE REPAIR/1026

IMPORTANT NOTE

PURCHASER OF THIS TENDER DOCUMENT IS ADVISED TO CHECK AND ENSURE COMPLETION OF ALL PAGES OF TENDER DOCUMENT AND REPORT ANY DISCREPANCY TIMELY FOR CORRECTIVE ACTION, IF ANY, TO THE ISSUING AUTHORITY BEFORE THE BIDS ARE SUBMITTED. ORIGINAL COPY OF TENDER DOCUMENT COMPLETE IN ALL RESPECTS MUST BE SUBMITTED BACK AS PART OF THE BID WITHOUT WHICH THE SAME IS LIABLE TO BE REJECTED BY BHEL.

THIS TENDER SPECIFICATION ISSUED TO:

M/S-----

Rev 01
1st Jun
2012

NOTICE INVITING TENDER

(Document No PS:MSX:NIT)

Bharat Heavy Electricals Limited



=====

NOTICE INVITING TENDER (NIT)

NOTE: BIDDER MAY DOWNLOAD FROM WEB SITES OR PURCHASE TENDERS FROM THIS OFFICE ALSO

=====

To

Dear Sir/Madam

Sub : NOTICE INVITING TENDER

Sealed offers in two part bid system are invited from reputed & experienced bidders (meeting PRE QUALIFICATION CRITERIA as mentioned in Annexure-I) for the subject job by the undersigned on the behalf of BHARAT HEAVY ELECTRICALS LIMITED as per the tender document. Following points relevant to the tender may please be noted and complied with.

1.0 Salient Features of NIT

SL NO	ISSUE	DESCRIPTION
i	TENDER NUMBER	BHEL/NR/SCT/RSC VARANASI/OFFCIE REPAIR/1026
ii	Broad Scope of job	“REPAIR AND RENOVATION OF THE RSC VARANASI OFFICE COMPLEX AT SHIVPUR, TARNA IN BHEL, HERP COLONY, VARANASI, U.P.”
iii	DETAILS OF TENDER DOCUMENT	
a	Volume-IA	<i>Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc</i> Applicable
b	Volume-IB	<i>Special Conditions of Contract (SCC)</i> Applicable
c	Volume-IC	<i>General Conditions of Contract (GCC)</i> Applicable
d	Volume-ID	<i>Forms and Procedures</i> Applicable
e	Volume-II	<i>Price Schedule (Absolute value).</i> Applicable
iv	Issue of Tender Documents	1. <u>Sale from BHEL PS Regional office at :</u> Start : 10/02/16 , Time : 0900 HRS Closes: 3/03/16 , Time :1200 HRS 2. From BHEL website (www.bhel.com) Tender documents will be available for downloading from website till due date of submission Applicable
v	DUE DATE & TIME OF OFFER SUBMISSION	Date : 3/03/16, Time : 1500 HRS Place : Noida Applicable
vi	OPENING OF TENDER	Date : 3/03/16 (Within 2 hours of the latest due date and time of offer submission). Applicable

		Notes: (1) In case the due date of opening of tender becomes a non-working day, then the due date & time of offer submission and opening of tenders get extended to the next working day. (2) Bidder may depute representative to witness the opening of tender	
vii	EMD AMOUNT	Rs 40,000/-	Applicable
viii	COST OF TENDER	Rs 2000/-.	Applicable
ix	LAST DATE FOR SEEKING CLARIFICATION	Date: 24/02/2016 Along with soft version also, addressing to undersigned & to others as per contact address given below	Applicable
x	SCHEDULE OF Pre Bid Discussion (PBD)		Not Applicable.
xi	INTEGRITY PACT & DETAILS OF INDEPENDENT EXTERNAL MONITOR (IEM)		Not Applicable
xii	Latest updates	Latest updates on the important dates, Amendments, Correspondences, Corrigenda, Clarifications, Changes, Errata, Modifications, Revisions, etc to Tender Specifications will be hosted in BHEL webpage (www.bhel.com -->Tender Notifications →View Corrigendums) <u>and not in the newspapers</u> . Bidders to keep themselves updated with all such information	

- 2.0 The offer shall be submitted as per the instructions of tender document and as detailed in this NIT. Bidders to note specifically that all pages of tender document, including these NIT pages of this particular tender together with subsequent correspondences shall be submitted by them, duly signed & stamped on each page, as part of offer. **Rates/Price including discounts/rebates, if any, mentioned anywhere/in any form in the techno-commercial offer other than the Price Bid, shall not be entertained.**
- 3.0 Unless specifically stated otherwise, bidder shall remit cost of tender and courier charges if applicable, in the form of Demand Draft drawn in favour of Bharat Heavy Electricals Ltd, payable at Power Sector Regional HQ at Noida issuing the Tender, along with techno-commercial offer. Bidder may also choose to deposit the Tender document cost by cash at the Cash Office as stated above against sl no iv of 1, on any working day; and in such case copy of Cash receipt is to be enclosed with the Techno Commercial offer. Sale of tender Documents shall not take place on National Holidays, holidays declared by Central or State Governments and BHEL PS HQ at Noida, Sundays and second/ last Saturdays
- 4.0 Unless specifically stated otherwise, bidder shall deposit EMD through Demand Draft/Pay Order in favour of Bharat Heavy Electricals Ltd, payable at Noida. For other details and for 'One Time EMD' please refer General Conditions of Contract.
- 5.0 **Procedure for Submission of Tenders:** The Tenderers must submit their Tenders to Officer inviting Tender, as detailed below:
- PART-I consisting of 'PART-I A (Techno Commercial Bid)' & 'PART-I B (EMD/COST of TENDER)' in two separate sealed and superscribed envelopes (ENVELOPE-I & ENVELOPE-II)
 - PART-II (Price Bid) – in sealed and superscribed envelope (ENVELOPE-III)
 - One set of tender documents shall be retained by the bidder for their reference

- 6.0 The contents for ENVELOPES and the superscription for each sealed cover/Envelope are as given below.
(All pages to be signed and stamped)

Sl no	Description	Remarks
	Part-I A	
	ENVELOPE – I superscribed as : PART-I (TECHNO COMMERCIAL BID) TENDER NO : NAME OF WORK : PROJECT: DUE DATE OF SUBMISSION: CONTAINING THE FOLLOWING:-	
i.	Covering letter/Offer forwarding letter of Tenderer.	
ii.	Duly filled-in 'No Deviation Certificate' as per prescribed format to be placed after document under sl no (i) above. Note: - In case of any deviation, the same should be submitted separately for technical & commercial parts, indicating respective clauses of tender against which deviation is taken by bidder. The list of such deviation shall be placed after document under sl no (i) above. It shall be specifically noted that deviation recorded elsewhere shall not be entertained. - BHEL reserves the right to accept/reject the deviations without assigning any reasons, and BHEL decision is final and binding. - In case of acceptance of the deviations, appropriate loading shall be done by BHEL - In case of unacceptable deviations, BHEL reserves the right to reject the tender	
iii.	Supporting documents/ annexure/ schedules/ drawing etc as required in line with Pre-Qualification criteria. It shall be specifically noted that all documents as per above shall be indexed properly and credential certificates issued by clients shall distinctly bear the name of organization, contact ph no, FAX no, etc.	
iv.	All Amendments/Correspondences/Corrigenda/Clarifications/Changes/ Errata etc pertinent to this NIT.	
v.	Integrity Pact Agreement (Duly signed by the authorized signatory)	If applicable
vi.	Duly filled-in annexures, formats etc as required under this Tender Specification/NIT	
vii.	Notice inviting Tender (NIT)	
viii.	Volume – I A : <u>Technical</u> Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc	
ix.	Volume – I B : Special Conditions of Contract (SCC)	
x.	Volume – I C : General Conditions of Contract (GCC)	
xi.	Volume – I D : Forms & Procedures	
xii.	Volume – II (UNPRICED – without disclosing rates/price, but mentioning only 'QUOTED' or 'UNQUOTED' against each item	
xiii.	Any other details preferred by bidder with proper indexing.	

	PART-I B	
	ENVELOPE – II superscribed as: PART-I (EMD/COST of TENDER)	

	TENDER NO : NAME OF WORK : PROJECT: DUE DATE OF SUBMISSION: CONTAINING THE FOLLOWING:-	
i.	1. Earnest Money Deposit (EMD) in the form as indicated in this Tender OR Documentary evidence for 'One Time EMD' with the Power Sector Region of BHEL floating the Tender 2. Cost of Tender (Demand Draft or copy of Cash Receipt as the case may be)	

	PART-II	
	PRICE BID consisting of the following shall be enclosed	
	ENVELOPE-III superscribed as: PART-II (PRICE BID) TENDER NO : NAME OF WORK : PROJECT: DUE DATE OF SUBMISSION: CONTAINING THE FOLLOWING	
i	Covering letter/Offer forwarding letter of Tenderer enclosed in Part-I	
ii	Volume II – PRICE BID (Duly Filled in Schedule of Rates – rate/price to be entered in words as well as figures)	

	OUTER COVER	
	ENVELOPE-IV (MAIN ENVELOPE / OUTER ENVELOPE) superscribed as: TECHNO-COMMERCIAL BID, PRICE BID & EMD TENDER NO: NAME OF WORK: PROJECT: DUE DATE OF SUBMISSION: CONTAINING THE FOLLOWING:	
i	○ Envelopes I ○ Envelopes II ○ Envelopes III	

SPECIAL NOTE: All documents/ annexures submitted with the offer shall be properly annexed and placed in respective places of the offer as per enclosure list mentioned in the covering letter. BHEL shall not be responsible for any missing documents.

- 7.0 Deviation with respect to tender clauses and additional clauses/suggestions in Techno-commercial bid / Price bid shall NOT be considered by BHEL. Bidders are requested to positively comply with the same.
- 8.0 BHEL reserves the right to accept or reject any or all Offers without assigning any reasons thereof. BHEL also reserves the right to cancel the Tender wholly or partly without assigning any reason thereof. Also BHEL shall not entertain any correspondence from bidders in this matter (except for the refund of EMD).

9.0 Assessment of Capacity of Bidders:

Bidders capacity for executing the job under tender shall be assessed 'LOAD' wise and 'PERFORMANCE' wise as per the following:

- I. **LOAD:** Load takes into consideration **ALL** the contracts of the Bidder under execution with BHEL Regions, irrespective of whether they are similar to the tendered scope or not. The 'Load' is the sum of the unit wise identified packages (refer Table-1) for contracts with BHEL Regions. The cut off month for reckoning 'Load' shall be the month, two (2) months preceding the month corresponding to the 'latest date of bid submission', in the following manner:

(Note: For example if latest bid submission is in Aug 2011, then the 'load' shall be calculated upto and inclusive of June 2011)

i). Total number of Packages

Total number of Packages in hand = P

Where

- 'P' is the sum of all unit wise identified packages under execution with BHEL Regions as of the cut off month defined above, including packages yet to be commenced, excepting packages which are on HOLD due to reasons not attributable to Bidder..

- II. **PERFORMANCE:** Here 'Monthly Performance' of the bidder for all the packages (**under execution/** executed during the 'Period of Assessment' in all the Power Sector Regions of BHEL) **SIMILAR** to the packages covered under the tendered scope, excepting packages not commenced shall be taken into consideration. The 'Period of Assessment' shall be 6 months preceding the cut off month. The cut off month for reckoning 'Period of Assessment' shall be the month two (2) months preceding the month corresponding to the 'latest date of bid submission', in the following manner:

(**Note:** For example if 'latest date of bid submission' is in Aug 2011, then the 'performance' shall be assessed for a 6 month period upto and inclusive of June 2011, for all the unit wise identified packages (refer Table I)

i). Calculation of Overall 'Performance Rating' for 'similar Package/Packages' for the tendered scope under execution at Power Sector Regions for the 'Period of Assessment':

This shall be obtained by summing up the 'Monthly Performance Evaluation' scores obtained by the bidder in all Regions for all the similar Package/packages', divided by the total number of Package months for which evaluation should have been done, as per procedure below:

- $P_1, P_2, P_3, P_4, P_5, \dots, P_N$ etc be the packages (**under execution/** executed during the 'Period of Assessment' in all Regions) **SIMILAR** to the packages covered under the tendered scope, excepting packages not commenced. Total number of similar packages for all Regions = P_T (i.e $P_T = P_1 + P_2 + P_3 + P_4 + \dots P_N$)
- Number of Months ' T_1 ' for which 'Monthly Performance Evaluation' as per relevant formats, should have been done in the 'Period of Assessment' for the corresponding similar package P_1 . Similarly T_2 for package P_2 , T_3 for package P_3 , etc for the tendered scope. Now calculate cumulative total months ' T_T ' for total similar Packages ' P_T ' for all Regions (i.e $T_T = T_1 + T_2 + T_3 + T_4 + \dots T_N$)
- Sum ' S_1 ' of 'Monthly Performance Evaluation' Scores ($S_{1-1}, S_{1-2}, S_{1-3}, S_{1-4}, S_{1-5}, \dots S_{1-N}$) for similar package P_1 , for the 'period of assessment' ' T_1 ' (i.e $S_1 = S_{1-1} + S_{1-2} + S_{1-3} + S_{1-4} + S_{1-5} + \dots S_{1-N}$). Similarly S_2 for package P_2 for period T_2 , S_3 for package P_3 for period T_3 , etc for the tendered scope for all Regions. Now calculate cumulative sum ' S_T ' of 'Monthly Performance Evaluation' Scores for total similar Packages ' P_T ' for all Regions (i.e ' $S_T = S_1 + S_2 + S_3 + S_4 + S_5 + \dots S_N$).
- Overall Performance Rating ' R_{BHEL} ' for the similar Package/Packages (under execution/** executed during the 'Period of Assessment') in all the Power Sector Regions of BHEL):

$$= \frac{\text{Aggregate of Performance scores for all similar packages in all the Regions}}{\text{Aggregate of months for each of the similar package for which performance should have been evaluated in all the Regions}}$$

$$= \frac{S_T}{T_T}$$

- e) Bidders to note that the risk of non evaluation or non availability of the 'Monthly Performance Evaluation' reports as per relevant formats is to be borne by the Bidder

f) Table showing methodology for calculating 'a', 'b' and 'c' above

Sl no	Item Description	Details for all Regions							Total
(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)
1	Similar Packages for all Regions → (under execution/ executed during period of assessment)	P ₁	P ₂	P ₃	P ₄	P ₅	...	P _N	Total No of similar packages for all Regions = P _T ie Sum (Σ) of columns (iii) to (ix)
2	Number of Months for which 'Monthly Performance Evaluation' as per relevant formats should have been done in the 'period of assessment for corresponding similar Package' (as in row 1)	T ₁	T ₂	T ₃	T ₄	T ₅	...	T _N	Sum (Σ) of columns (iii) to (ix) = T _T
3	Monthly performance scores for the corresponding period (as in Row 2)	S ₁₋₁ , S ₁₋₂ , S ₁₋₃ , S ₁₋₄ , ... S _{1-T1}	S ₂₋₁ , S ₂₋₂ , S ₂₋₃ , S ₂₋₄ , ... S _{2-T2}	S ₃₋₁ , S ₃₋₂ , S ₃₋₃ , S ₃₋₄ , ... S _{3-T3}	S ₄₋₁ , S ₄₋₂ , S ₄₋₃ , S ₄₋₄ , ... S _{4-T4}	S ₅₋₁ , S ₅₋₂ , S ₅₋₃ , S ₅₋₄ , ... S _{5-T5}		S _{N-1} , S _{N-2} , S _{N-3} , S _{N-4} , ... S _{N-TN}	-----
4	Sum of Monthly Performance scores of the corresponding Package for the corresponding period (as in row-3)	S ₁	S ₂	S ₃	S ₄	S ₅	...	S _N	Sum (Σ) of columns (iii) to (ix) = S _T

- ii) Calculation of Overall 'Performance Rating' (R_{BHEL}) in case 'similar Package/Packages' for the tendered scope ARE NOT AVAILABLE, during the 'Period of Assessment':

This shall be obtained by summing up the 'Monthly Performance Evaluation' scores obtained by the bidder in all Regions for ALL the packages, divided by the total number of Package months for which evaluation should have been done. 'R_{BHEL}' shall be calculated subject to availability of 'performance scores' for at least 6 'package months' in the order of precedence below:

- 'Period of Assessment.
- 12 months preceding the cut-off month
- 24 months preceding the cut-off month
- 36 months preceding the cut-off month

In case, R_{BHEL} cannot be calculated as above, then Bidder shall be treated as 'NEW VENDOR'. Further eligibility and qualification of this bidder shall be as per definition of 'NEW VENDOR' described in 'Explanatory Notes'

- iii) Factor "L" assigned based on Overall Performance Rating (R_{BHEL}) at Power Sector Regions.:

Sl no	Overall Performance Rating (R_{BHEL})	Corresponding value of 'L'
1	=60	NA
2	> 60 and ≤ 65	0.4
3	> 65 and ≤ 70	0.35
4	> 70 and ≤ 75	0.25
5	> 75 and < 80	0.2
6	≥ 80	NA

III. **'Assessment of Capacity of Bidder':**

'Assessment of Capacity of Bidder' is based on the Maximum number of packages for which a vendor is eligible, considering the performance scores of similar packages, as below:

Max number of packages $P_{Max} = (R_{BHEL} - 60)$ divided by corresponding value of 'L'
i.e. $(R_{BHEL} - 60)/L$

Note:

- In case the value of P_{Max} results in a fraction, the value of P_{Max} is to be rounded off to next whole number
- For $R_{BHEL} = 60$, $P_{Max} = '1'$
- For $R_{BHEL} \geq 80$, there will be no upper limit on P_{Max}

The Bidder shall be considered 'Qualified' as per 'Assessment of Capacity of Bidder' for the subject Tender if $P \leq P_{Max}$
(where P is calculated as per clause 9.I)

IV. **Explanatory note:**

- Similar package means Boiler or ESP or Piping or Turbine or Civil or Structure or Electrical or CI, etc at the individual level irrespective of rating of Plant, and irrespective of whether the subject tender is a single package or as part of combined/composite packages. Normally Boiler, ESP, Piping, Turbine, Electrical, CI, Civil, Structure, etc is considered individual level of package. For example in case the tendered scope is a Boiler Vertical Package comprising of Boiler, ESP and Power Cycle Piping (i.e the 'identified packages as per Table-1 below), the 'PERFORMANCE' part against sl no II above, needs to be evaluated considering all the identified packages (ie Boiler, ESP and Power Cycle Piping) and finally the Bidder's capacity to execute the tendered scope is assessed in line with III above
- Identified Packages (Unit wise)

Table-1

	Civil	Electrical & CI	Mechanical
	i). Enabling works ii). Pile and Pile Caps iii). Civil Works including foundations iv). Structural Steel Fabrication & Erection v). Chimney vi). Cooling Tower vii). Others (Civil)	i). Electrical ii). CI iii). Others (Elec & CI)	i). Boiler & Aux (All types including CW Piping if applicable) ii). Power Cycle Piping/Critical Piping iii). LP Piping iv). ESP v). Steam Turbine Generator set & Aux vi). Gas Turbine Generator set & Aux vii). Hydro Turbine Generator set & Aux viii). Turbo Blower (including Steam Turbine) ix). Material Handling x). Material Management xi). Material Handling & Material Management xii). Others (Mechanical)

- c) Bidders who have not been evaluated for at least six package months in the last 36 months in the online BHEL system for contractor performance evaluation in BHEL PS Regions, wef July'2010 shall be considered "NEW VENDOR".

A 'NEW VENDOR' shall be considered qualified subject to satisfying all other tender conditions

A 'NEW VENDOR' if awarded a job (of package/packages identified under this clause) shall be tagged as "FIRST TIMER" on the date of first LOI from BHEL.

The "FIRST TIMER" tag shall remain till execution of work for a period of not less than 09 months, from the commencement of work of first package

A Bidder shall not be eligible for the next job as long as the Bidder is tagged as "FIRST TIMER" excepting for the Tenders which have been opened on or before the date of the bidder being tagged as 'FIRST TIMER'.

After removal of 'FIRST TIMER' tag, the Bidder shall be considered 'QUALIFIED' for the future tenders subject to satisfying all other tender conditions including 'Capacity Evaluation of Bidders'.

In case assessment of 'FIRST TIMER' cannot be done for 9 months due to completion of work in less than 9 months, the 'FIRST TIMER' tag will be removed and the vendor shall be considered as 'NEW VENDOR' for any new tender/s, provided the average score for which Performance Evaluation has been done, is not less than 60%.

- d) In the unlikely event of all bidders shortlisted against Technical and Financial Qualification criteria not meeting the criteria on 'Assessment of Capacity of Bidders' detailed above, OR leads to a single tender response on applying the criteria of 'Assessment of Capacity of Bidders' or due to non-approval by Customer, then BHEL at its discretion reserves the right to consider the further processing of the Tender based on the **Overall Performance Rating 'R_{BHEL}'** only, starting from the upper band.

- e) 'Under execution' shall mean works in progress as per the following:

- i. up to Boiler Steam Blowing in case of Steam Generator and Auxiliaries
- ii. upto Synchronisation in case of all other works excepting sl no (i) and (iii)
- iii. Upto execution of at least 90% of anticipated contract value in case of Civil & Structures (unit wise), Enabling works and upto 90% of material unloading (in tonnage) as per the original contract in case of MM Package.

Note : BHEL at its discretion can extend (or reduce in exceptional cases in line with Contract conditions) the period defined against (i), (ii) and (iii) above, depending upon the balance scope of work to be completed.

- f) Performance evaluation in CL 9 above is applicable to Prime bidder and consortium partner (or Technical tie up partner) for their respective scope of work.

10.0 Since the job shall be executed at site, bidders must visit site/ work area and study the job content, facilities available, availability of materials, prevailing site conditions including law & order situation, applicable wage structure, wage rules, etc before quoting for this tender. They may also consult this office before submitting their offers, for any clarifications regarding scope of work, facilities available at sites or on terms and conditions.

11.0 For any clarification on the tender document, the bidder may seek the same in writing or through e-mail, as per specified format, within the scheduled date for seeking clarification, from the office of the undersigned. BHEL shall not be responsible for receipt of queries after due date of seeking clarification due to postal delay

or any other delays. Any clarification / query received after last date for seeking clarification may not be normally entertained by BHEL and no time extension will be given.

- 12.0 BHEL may decide holding of pre-bid discussion [PBD] with all intending bidders as per date indicated in the NIT. The bidder shall ensure participation for the same at the appointed time, date and place as may be decided by BHEL. Bidders shall plan their visit accordingly. The outcome of pre-bid discussion (PBD) shall also form part of tender.
- 13.0 In the event of any conflict between requirement of any clause of this specification/ documents/drawings/data sheets etc or requirements of different codes/standards specified, the same to be brought to the knowledge of BHEL in writing for clarification before due date of seeking clarification (whichever is applicable), otherwise, interpretation by BHEL shall prevail. Any typing error/missing pages/ other clerical errors in the tender documents, noticed must be pointed out before pre-bid meeting/submission of offer, else BHEL's interpretation shall prevail.
- 14.0 Unless specifically mentioned otherwise, bidder's quoted price shall deemed to be in compliance with tender including PBD.
- 15.0 Bidders shall submit Integrity Pact Agreement (Duly signed by authorized signatory who signs in the offer), **if applicable**, along with techno-commercial bid. This pact shall be considered as a preliminary qualification for further participation. **The names and other details of Independent External Monitor (IEM) for the subject tender is as given at point (1) above.**
- 16.0 The Bidder has to satisfy the Pre Qualifying Requirements stipulated for this Tender in order to be qualified. The Price Bids of only those bidders will be opened who will be qualified for the subject job on the basis of satisfying the Pre Qualification Criteria specified in this NIT as per Annexure-I (as applicable), past performance etc. and date of opening of price bids shall be intimated to only such bidders. BHEL reserves the right not to consider offers of parties under HOLD.
- 17.0 In case BHEL decides on a 'Public Opening', the date & time of opening of the sealed PRICE BID shall be intimated to the qualified bidders and in such a case, bidder may depute one authorised representative to witness the price bid opening. BHEL reserves the right to open 'in-camera' the 'PRICE BID' of any or all Unsuccessful/Disqualified bidders under intimation to the respective bidders.
- 18.0 Validity of the offer shall be for **six months** from the latest due date of offer submission (including extension, if any) unless specified otherwise.
- 19.0 BHEL reserves the right to decide the successful bidder on the basis of Reverse Auction process. In such case all qualified bidders will be intimated regarding procedure/ modality for Reverse Auction process prior to Reverse Auction and price will be decided as per the rules for Reverse Auction. .
- However, if reverse auction process is unsuccessful as defined in the RA rules/procedures, or for whatsoever reason, then the sealed 'PRICE BIDS' will be opened for deciding the successful bidder. BHEL's decision in this regard will be final and binding on bidder.
- 20.0 On submission of offer, further consideration will be subject to compliance to tender & qualifying requirement and customer's acceptance, as applicable.
- 21.0 In case the bidder is an "Indian Agent of Foreign Principals", 'Agency agreement has to be submitted along with Bid, detailing the role of the agent along with the terms of payment for agency commission in INR, along with supporting documents.
- 22.0 The bidders shall not enter into any undisclosed M.O.U. or any understanding amongst themselves with respect to tender.
- 23.0 **Not used**
- 24.0 The bidder shall submit documents in support of possession of 'Qualifying Requirements' duly self certified and stamped by the authorized signatory, indexed and properly linked in the format for PQR. In case BHEL requires any other documents/proofs, these shall be submitted immediately.

- 25.0 The bidder may have to produce original document for verification if so decided by BHEL.
- 26.0 The offers of the bidders who are on the banned list as also the offer of the bidders, who engage the services of the banned firms, shall be rejected. The list of banned firms is available on BHEL web site www.bhel.com.
- 27.0 BHEL reserves the right to go for Reverse Auction (RA) instead of opening the sealed envelope price bid, submitted by the bidder. This will be decided after techno-commercial evaluation. All bidders to give their acceptance for participation in RA. Non-acceptance to participate in RA may result in non-consideration of their bids, in case BHEL decides to go for RA.

In case BHEL decides to go for Reverse Auction, only those bidders who have given their acceptance to participate in RA will be allowed to participate in the Reverse Auction. Those bidders who have given their acceptance to participate in Reverse Auction will have to necessarily submit „online sealed bid“ in the Reverse Auction. Non-submission of „online sealed bid“ by the bidder will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines in vogue.”

Information and General Terms and Conditions governing RA shall form part of the RFQ/ Enquiry.

- 28.0 It may please be noted that guidelines/rules in respect of Suspension of Business dealings', 'Vendor evaluation format', 'Quality, Safety & HSE guidelines', etc may undergo change from time to time and the latest one shall be followed.

29.0 **Micro and Small Enterprises (MSE)**

Any Bidder falling under MSE category, shall furnish the following details & submit documentary evidence/ Govt. Certificate etc. in support of the same along with their techno-commercial offer

Type under MSE	SC/ST owned	Others
Micro		
Small		

Note: - If the bidder does not furnish the above, offer shall be processed construing that the bidder is not falling under MSE category.

MSE suppliers can avail the intended benefits only if they submit along with the offer, or before price bid opening, attested copies of either EM-II certificate having deemed validity (two years from the date of issue of acknowledgement in EM-II) or valid NSIC certificate or EM-II certificate along with CA certificate (format enclosed as Annexure - 3) applicable for the year, certifying quantum of investment in plant and machinery within the permissible limit as per the act for relevant status (Micro or Small) where the deemed validity of EM-II is over. Date to be reckoned for determining the deemed validity will be last date of technical bid submission. Non submission of such documents will lead to consideration of their bids at par with other bidders and MSE status of such suppliers shall be shifted to Non MSE supplier till the supplier submits these documents.

MSEs shall be exempted from payment of earnest money at the time of tender deposit. However, there is no exemption of security deposit submission

No benefits shall be applicable for that particular enquiry if the required documents are not submitted before price bid opening.

30.0 **Order of Precedence**

In the event of any ambiguity or conflict between the Tender Documents, the order of precedence shall be in the order below:

- Amendments/Clarifications/Corrigenda/Errata etc issued in respect of the tender documents by BHEL
- Notice Inviting Tender (NIT)
- Price Bid
- Technical Conditions of Contract (TCC)—Volume-1A

- e. Special Conditions of Contract (SCC) —Volume-1B
- f. General Conditions of Contract (GCC) —Volume-1C
- g. Forms and Procedures —Volume-1D

for BHARAT HEAVY ELECTRICALS LTD

(SCT)

Enclosure

- 01. Annexure-1: Pre Qualifying criteria.
- 02. Annexure-2: Check List.
- 03. Annexure-3: Chartered Accountant certificate for MSMED
- 04. Annexure-4: General Terms And Conditions Of Reverse Auction (RA)
- 05. Annexure-5: Authorization of representative who will participate in the online Reverse Auction Process
- 06. Annexure-6 Modification in standard GCC clauses
- 07. Annexure-7: Feedback Form: From where did you get information reg. this tender
- 09. Other Tender documents as per this NIT

ANNEXURE - 1**PRE QUALIFYING REQUIREMENTS**

JOB	REPAIR AND RENOVATION OF THE RSC VARANASI OFFICE COMPLEX AT SHIVPUR, TARNA IN BHEL, HERP COLONY, VARANASI, U.P.
TENDER NO	BHEL/NR/SCT/RSC VARANASI/OFFCIE REPAIR/1026

SL NO.	Name and Description of qualifying criteria	Bidders claim in respect of fulfilling the PQR Criteria	
			Page no. of supporting document
A	Submission of Integrity Pact duly signed	Not Applicable	
B	Assessment of Capacity of Bidder to execute the work as per sl. no. 9 of NIT	Applicable	By BHEL
C C-1	<u>Technical</u> <u>Bidder who wish to participate should have:</u> Experience of having successfully Executed Similar Works during last 7 years ending last day of month previous to the one in which applications are invited should be either of the following: C-1.1 Three (03) similar completed works costing not less than the amount equal to Rs.6.6 Lakhs. OR C-1.2 Two (02) similar completed works costing not less than the amount equal to Rs. 8.25 Lakhs. OR One (01) similar completed work costing not less than amount equal to Rs. 13.2 Lakhs.	Applicable	
D	<u>FINANCIAL</u>	Applicable	
D-1	<u>TURNOVER</u> Bidders must have achieved an average annual financial turnover (Audited) of Rs. 5.0 Lakhs or more over last three Financial Years (FY) i.e. (2012-2013, 2013-2014, 2014-2015). Bidder shall submit audited accounts (balance sheets and profit & loss account) in support of this. In case audited financial statements have not been submitted for all the three years as indicated above, then the applicable audited statements submitted by the bidders against the requisite three years, will be averaged for three years i.e. total divided by three		
D-2	<u>NET WORTH</u> Net worth of the Bidder based on the latest Audited Accounts as furnished for 'D-1' above should be positive. Net Worth = Paid up share capital + Reserves. (Net worth is required to be evaluated in case of companies)		

D-3	<u>PROFIT</u> Bidder should have earned cash profit in any one of the three financial years as applicable in the last three financial years defined in 'D-1' above based on latest Audited accounts. Profit shall be NET profit (PAT +Non cash expenditure viz. depreciation) earned during any one of the three financial years as in 'D-1' above.		
E	Approval of Customer	Not Applicable	
F	Consortium Criteria	Not Applicable	
	<u>Explanatory Notes for QR 'C'</u> - For QR 'C' above the word 'Executed' means the bidder should have achieved the Technical Criteria, specified in the QR (as in 'C' above), even if the total contract has not been completed or closed. (The Bidder shall submit the work completion certificate issued by Customer / Contractor.) - For QR 'C' value of work is to be updated as per the PVC formula of GCC with Indices for "All India Avg. Consumer Price Index for Industrial Workers" with base month as date of execution and indexed up to two months prior to the bid opening month. This condition will be applicable only for the completed jobs and not for the jobs in progress as on date of technical bid opening. - If the Qualifying work is executed in the last seven years period, as specified above, even if it has been started earlier, the same will also be considered meeting the qualifying requirements. - The word 'Similar Works' means Civil Works for Construction and Development OR Repair & Renovation of Buildings (Residential / Commercial / Industrial) OR Any Other Civil Construction Work. - Relevant documents, meeting above requirements at C & D, shall be submitted by bidders.		

BIDDER SHALL SUBMIT ABOVE PRE-QUALIFICATION CRITERIA FORMAT, DULY FILLED-IN, SPECIFYING RESPECTIVE ANNEXURE NUMBER AGAINST EACH CRITERIA AND FURNISH RELEVANT DOCUMENT INCLUSIVE OF WORK ORDER AND WORK COMPLETION CERTIFICATE ETC IN THE RESPECTIVE ANNEXURES IN THEIR OFFER.

ANNEXURE - 2**CHECK LIST****NOTE:- Tenderers are required to fill in the following details and no column should be left blank**

1	Name and Address of the Tenderer		
2	Details about type of the Firm/Company		
3.a	Details of Contact person for this Tender	Name : Mr/Ms Designation: Telephone No: Mobile No: Email ID: Fax No:	
3.b	Details of alternate Contact person for this Tender	Name : Mr/Ms Designation: Telephone No: Mobile No: Email ID: Fax No:	
4	EMD DETAILS	DD No: Date : Bank : Amount: Please tick (☒) whichever applicable:- ONE TIME EMD / ONLY FOR THIS TENDER	
5	Validity of Offer	TO BE VALID FOR SIX MONTHS FROM DUE DATE	
		APPLICABILITY (BY BHEL)	ENCLOSED BY BIDDER
6	Whether the format for compliance with PRE QUALIFICATION CRITERIA (ANNEXURE-I) is understood and filled with proper supporting documents referenced in the specified format	Applicable	YES / NO
7	Audited profit and Loss Account for the last three years	Applicable/ Not Applicable	YES/NO
8	Copy of PAN Card	Applicable/ Not Applicable	YES/NO
9	Whether all pages of the Tender documents including annexures, appendices etc are read understood and signed	Applicable/ Not Applicable	YES/NO
10	Integrity Pact	Applicable/ Not Applicable	YES/NO
11	Declaration by Authorised Signatory	Applicable/ Not Applicable	YES/NO
12	No Deviation Certificate	Applicable/ Not Applicable	YES/NO
13	Declaration confirming knowledge about Site Conditions	Applicable/ Not Applicable	YES/NO
14	Declaration for relation in BHEL	Applicable/ Not Applicable	YES/NO
15	Non Disclosure Certificate	Applicable/ Not Applicable	YES/NO
16	Bank Account Details for E-Payment	Applicable/ Not Applicable	YES/NO
17	Capacity Evaluation of Bidder for current Tender	Applicable/ Not Applicable	YES/NO
18	Tie Ups/Consortium Agreement are submitted as per format	Applicable/ Not Applicable	YES/NO

19	Power of Attorney for Submission of Tender/Signing Contract Agreement	Applicable/ Not Applicable	YES/NO
20	Analysis of Unit rates	Applicable/ Not Applicable	YES/NO

NOTE : STRIKE OFF 'YES' OR 'NO', AS APPLICABLE. TENDER NOT ACCOMPANIED BY THE PRESCRIBED **ABOVE APPLICABLE DOCUMENTS** ARE LIABLE TO BE SUMMARILY REJECTED.

DATE :

AUTHORISED SIGNATORY
(With Name, Designation and Company seal)

ANNEXURE - 3**Certificate by Chartered Accountant on letter head**

This is to Certify that M/S ,
(hereinafter referred to as 'company') having its registered office at
..... is registered under MSMED Act 2006, (Entrepreneur
Memorandum No (Part—II) dtd: ,
Category: (Micro/Small)). (Copy enclosed).

Further verified from the Books of Accounts that the investment of the company
as on date..... as per MSMED Act 2006 is as follows:

- 1. For Manufacturing Enterprises:** Investment in plant and machinery (i.e.
original cost excluding land and building and the items specified by the Ministry of Small
Scale Industries vide its notification No. S.O.1722(E) dated October 5, 2006:

Rs Lacs

- 2. For Service Enterprises:** Investment in equipment (original cost excluding land and
building and furniture, fittings and other items not directly related to the service rendered or as
may be notified under the **MSMED** Act, 2006:

Rs Lacs

The above investment of RsLacs is within permissible limit of
Rs..... Lacs for Micro / Small **(Strike off which is not applicable)**
Category under MSMED Act 2006.

Date:

(Signature)

Name -

Membership number -

Seal of Chartered Accountant

ANNEXURE - 4**GENERAL TERMS AND CONDITIONS OF REVERSE AUCTION (RA)**

Against this enquiry for the subject item/ system with detailed scope of supply as per enquiry specifications, BHEL may resort to “REVERSE AUCTION PROCEDURE” i.e., ON LINE BIDDING (THROUGH A SERVICE PROVIDER). The philosophy followed for reverse auction shall be English Reverse (No ties).

1. For the proposed reverse auction, technically and commercially acceptable bidders only shall be eligible to participate.
2. Those bidders who have given their acceptance for Reverse Auction (quoted against this tender enquiry) will have to necessarily submit “online sealed bid” in the Reverse Auction. Non submission of “online sealed bid” by the bidder for any of the eligible items for which techno commercially qualified, will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines in vogue.
3. BHEL will engage the services of a service provider who will provide all necessary training and assistance before commencement of on line bidding on internet.
4. In case of reverse auction, BHEL will inform the bidders the details of Service Provider to enable them to contact & get trained.
5. Business rules like event date, time, bid decrement, extension etc. also will be communicated through service provider for compliance.
6. Bidders have to fax the Compliance form before start of Reverse auction. Without this, the bidder will not be eligible to participate in the event.
7. In line with the NIT terms, BHEL will provide the calculation sheet (e.g., EXCEL sheet) which will help to arrive at “Total Cost to BHEL” like Packing & forwarding charges, Taxes and Duties, Freight charges, Insurance, Service Tax for Services and loading factors (for non-compliance to BHEL standard Commercial terms & conditions) for each of the bidder to enable them to fill-in the price and keep it ready for keying in during the Auction.
8. Reverse auction will be conducted on scheduled date & time.
9. At the end of Reverse Auction event, the lowest bidder value will be known on auction portal.
10. The lowest bidder has to fax/e-mail the duly signed and filled-in prescribed format for price breakup including that of line items, if required, as provided on case-to-case basis to Service provider within two working days of Auction without fail.
11. In case BHEL decides not to go for Reverse Auction procedure for this tender enquiry, the Price bids and price impacts, if any, already submitted and available with BHEL shall be opened as per BHEL’s standard practice.
12. Bidders shall be required to read the “Terms and Conditions” section of the auctions site

of Service provider, using the Login IDs and passwords given to them by the service provider before reverse auction event. Bidders should acquaint themselves of the „Business Rules of Reverse Auction“, which will be communicated before the Reverse Auction.

13. If the Bidder or any of his representatives are found to be involved in Price manipulation/ cartel formation of any kind, directly or indirectly by communicating with other bidders, action *as per extant BHEL guidelines*, shall be initiated by BHEL and the results of the RA scrapped/ aborted.
14. The Bidder shall not divulge either his Bids or any other exclusive details of BHEL to any other party.
15. In case BHEL decides to go for reverse auction, the H1(s) bidder (whose quote is highest in online sealed bid) may not be allowed to participate in further RA process.

ANNEXURE - 5**Authorization of representative who will participate in the on line Reverse Auction Process;**

1	NAME & DESIGNATION OF OFFICIAL	
2	POSTAL ADDRESS (COMPLETE)	
3	TELEPHONE NOS. (LAND LINE & MOBILE BOTH)	
4	FAX NO.	
5	E-MAIL ADDRESS	
6	NAME OF PLACE/ STATE/ COUNTRY, WHEREFROM S/HE WILL PARTICIPATE IN THE REVERSE AUCTION	

ANNEXURE - 6

Modification / Deletions in Standard Clause of General Conditions of Contract (GCC) or Special Conditions of Contract (SCC)

- I. Clause No. 4.1.4, 4.1.9 & 4.1.10 of SCC (Consumables & Other Items) shall not be applicable.
- II. Clause No. 4.2.2 of SCC (Obligations in respect of T&Ps & MMEs to be provided by BHEL) shall not be applicable.
- III. Clause No. 8.3.2, 8.3.3, 8.3.4 of SCC (Statutory Inspection of Work) shall not be applicable.
- IV. Clause No. 2.12 of GCC (ORC) shall not be applicable.
- V. Clause No. 2.17 of GCC (PVC) shall not be applicable.
- VI. Clause No. 2.13 of GCC (Interest bearing recoverable advance) shall not be applicable.

ANNEXURE - 7**Feedback Form: From where did you get information reg. this tender**

1	NEWSPAPER ADVERTISEMENT (NAME OF NEWSPAPER)	
2	BHEL WEBISTE (TENDER NOTIFICATION) (www.bhel.com)	
3	CENTRAL PUBLIC PROCUREMENT PORTAL OF GOVERNMENT OF INDIA (CPP PORTAL) (www.eprocure.gov.in)	
4	EMAIL COMMUNICATION FROM BHEL	
5	ANY OTHER SOURCE (GIVE DETAILS)	



TECHNICAL CONDITIONS OF CONTRACT (TCC)

NAME OF WORK: REPAIR AND RENOVATION OF THE RSC VARANASI OFFICE COMPLEX AT SHIVPUR, TARNA IN BHEL, HERP COLONY, VARANASI, U.P.

BHARAT HEAVY ELECTRICALS LIMITED



TENDER NO. BHEL/ NR/SCT/ RSC/VNS/ CIV R&M/.....
TECHNICAL CONDITIONS OF CONTRACT (TCC)
CONTENTS

Sl No	DESCRIPTION	Chapter	No. OF PAGES
Volume-IA	Part-I: Contract specific details		
1	General Information	Chapter- I	3
2	Scope of Works	Chapter-II	4 - 8
2	Facilities in the scope of Contractor/BHEL (Scope Matrix)	Chapter-III	9 – 13
3	T&Ps and MMEs to be deployed by Contractor	Chapter-IV	14 – 15
4	T&Ps and MMEs to be deployed by BHEL on sharing basis	Chapter-V	16
5	Time Schedule	Chapter-VI	17
6	Terms of Payment	Chapter-VII	18
7	Taxes and other Duties	Chapter-VIII	19 - 21
8	Construction Material	Chapter-IX	22 – 24
9	Other Important Conditions	Chapter-X	25 – 29
10	Annexure		30
Volume-IA	Part-II: Technical Specifications		31 - 79

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-I: General Information

NAME OF OWNER	REGIONAL SERVICE CENTRE- VARANASI, BHARAT HEAVY ELECTRICALS LIMITED
ADDRESS	REGIONAL SERVICE CENTRE, TARNA SHIVPUR, VARANASI, UTTAR PRADESH- 221003
NEAREST RAILWAY STATION	VARANASI JUNCTION
NEAREST AIRPORT	LAL BAHADUR SHASTRI INTERNATIONAL AIRPORT
MAXIMUM TEMPERATURE	45 DEG. C
MINIMUM TEMPERATURE	2 DEG C

Note: - The bidder is advised to visit and examine the site of WORKS and its surroundings and obtain for himself on his own responsibility all information that may be necessary for preparing the bid and entering into the CONTRACT. All costs for and associated with site visits shall be borne by the bidder.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter - II: Scope of Works

2.0 GENERAL SCOPE OF WORK

- 2.1 This tender specification covers all the Civil, Architectural, Sanitary, Water Supply and Electrical works for the “Repair and Renovation of the RSC Varanasi Office Complex at Shivpur, Tarna in BHEL, HERP colony, Varanasi, U.P.”. The Regional Service Centre (RSC) at Varanasi of BHEL PSNR is located in Shivpur, Tarna in BHEL, HERP colony premises with a plinth area of 280 sqm. The Office building is a two storey RCC structure with total floor area of approx. 500 sqm. The total plot area of the complex is approx. 2000 sqm. which includes Building approach, Service area, Horticulture works, Security cabin, Temporary T&P Store and Temporary parking area.
- 2.2 Work under this tender includes supply of all required materials, labour, consumables, transportation, sample testing such as cement, TMT, Structural Steel, Permanently colour coated GI Sheets, false ceiling, steel / wooden door, brick work, aggregates etc. for completion of Tender Scope in all respect.
- 2.3 The complete works shall be carried out as per BOQ cum Rate schedule. If any work covered in the scope of contract cannot be executed using items available in BOQ, supplementary / extra items shall be made and rates for such items shall be worked out as per **GCC clause 2.15.7**. However contractor shall be bound to execute all the works under the scope of the contract and decision whether an extra item is applicable or not, shall be taken by BHEL Engineer which will be binding on the contractor.
- 2.4 In case the description / specifications as per BOQ are found to be incomplete, Indian Standard Codes (IS Codes) specifications shall be followed. Quantities mentioned in the BOQ cum Rate Schedules, are approximate only and liable for variation due to change of scope of work / variation in schedule of quantities, changes in design etc. The tenderers shall undertake to execute actual quantities as per advice of BHEL Engineer and accordingly the final contract price shall be worked out on the basis of quantities actually executed at site and payments will also be regulated for the same. The quantities indicated against each item may vary to any extent and no compensation will be payable in variation of Individual quantity.
- 2.5 The scope of the work of **“Repair and Renovation of the RSC Office Complex at BHEL, Varanasi”** is to be carried out as per the Bill of Quantities Cum Rate Schedule

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter - II: Scope of Works

(Price Bid). Scope under this package shall generally include but not limited to the works mentioned below:

- 2.5.1 Earthwork, Plain and Reinforced Concrete Works.
- 2.5.2 Internal and External painting of the Office Building.
- 2.5.3 Aluminum Partition and False Ceiling works.
- 2.5.4 Flooring works/Tiling works in Toilets & Pantry.
- 2.5.5 External Lighting and Renovation of Parking area.
- 2.5.6 Water proofing repair works.
- 2.5.7 Sanitary and Water Supply Works.
- 2.5.8 Electrical/LAN/Telephone cabling for Workstations
- 2.5.9 Other Miscellaneous works viz. Misc. Repair works, sign boards, fencing, sanitary works, dismantling etc.

The works shall include dismantling, repair & renovation works, earth work, plain & reinforced cement concrete, reinforcement, scaffolding, formwork, earth filling, disposal, electrical works, fencing, finishing, furnishing works, sanitary, water supply, waterproofing, brickwork etc. as well as **including supply of all materials, consumables, labour, Tools & Plants, transportation and storage, sample testing etc. all complete as per BOQ, specifications and drawings for proper and successful execution of the job.**

2.6 **RESPONSIBILITIES OF CONTRACTOR:**

Unless otherwise specified, the work to be provided by the contractor for the items mentioned in the “Bill of Quantities” shall include but not be limited to the following.

- 2.6.1 Furnishing all labour, materials, supervision, construction plans, equipment, supplies, transport, to and from the site, fuel, electricity, compressed air, water, transit and storage insurance and all other incidental items and temporary works not shown on specified but reasonably implied or necessary for the proper completion, maintenance and handling over the works, except in accordance with the stipulations laid down in the contract documents and additional stipulations as may be provide by the engineer during the course of works.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter - II: Scope of Works

- 2.6.2 Furnishing samples of all materials required by the engineers for testing / inspection and approval for use in the works. The samples may be retained by the engineer for final incorporation in the works.
- 2.6.3 Furnishing test reports for the products used or intended to be used, if called for the specifications or if so desired by the BHEL Engineer.
- 2.6.4 Giving all notices, paying all fees, taxes etc., in accordance with the general conditions of contract, that are required for all works including temporary works.
- 2.6.5 Arranging manufacturer's supervision for items of work done as per manufacturer's specifications when so specified.

2.7 APPROVED MAKE OF MATERIALS:

Sl. No.	MATERIAL	APPROVED MAKE
1	STRUCTURAL/REINF. STEEL	SAIL/TATA/JINDAL
2	ORDINARY PORTLAND / POZZOLONA PORTLAND CEMENT (GREY) (43 GRADE)	ACC/BIRLA/JAYPEE/ULTRATECH CEMENT Ltd. /AMBUJA/JK CEMENT/SHREE CEMENT Ltd./ J.K LAKSHMI/BINANAI
3	WHITE CEMENT	BIRLA WITE/J.K. WHITE
4	ADMIXTURES	FOSROC/MBT/SIKA/CICO/ASIAN
5	LAMINATED PARTICLE BOARDS / LAMINATES	NAVOPAN/KITPLY/NATIONAL/ ARCHIPLY/CENTURY PLY
6	PERMANENTLY COLOR COATED PROFILED GS SHEET	TATA BLUSCOPE / JINDAL
7	FINISHING	
A)	STEEL PRIMER	ICI/NEROLAC/BERGER/ASIAN PAINTS
B)	WATER PROOFING CEMENT PAINT / TEXTURED EXTERIOR PAINT / OIL BOUND WASHABLE DISTEMPER / ENAMEL PAINT	ICI/NEROLAC/BERGER/ASIAN PAINTS/JENSON & NICHOLSON
C)	HYDRAULIC DOOR SPRING,	HRADWYN/GODREJ/GRACE/EVEREST/DORMA

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter - II: Scope of Works

	HYDRAULIC DOOR CLOSER	
D)	ALUMINUM SECTIONS	HINDALCO/JINDAL/INDIAN ALUMINIUM CO.
E)	LOCKS, LATCH, FITTINGS	GODREJ/HARRISON/PLAZA/ DORMA.
F)	ANODISED ALUMINIUM HARDWARE (HEAVY DUTY)	EVERITE/ SIGMA (ISI MARKED)/ DORMA
8	SANITARY AND WATER SUPPLY FITTINGS	
A)	GI & MS PIPE	PRAKASH SURYA/JINDAL HISSAR/TATA STEEL TUBES Ltd.
B)	GI FITTINGS	UNIK/KS/AMCO/AVR/NVR/RR
C)	GUN METAL VALVES, GLOBES	LEADER/ZOLOTO/KILBURN/CIM VALVES
D)	BRASS STOP COCK & BIB COCK	ZOZLOTO/SANT/L&K/LEADER/JAINKO
E)	MIRROR GLASS	ATUL/MODI GUARD/GOLDEN FISH
F)	VITROUS CHINA SANITARY WARES	PARYWARE/HINDWARE/SEABIRD/ ORIENT/CERA
G)	PVC FLUSHING CISTERN	COMMANDER/CORAL/HINDWARE (SLIM LINE)/HINDUSTAN SPEED FLO
H)	PLASTIC SEAT COVER FOR W.C.	COMMANDER/DIPLOMAT/HINDWARE/ADMIRAL
I)	CP FITTINGS, MIXER PILLAR TAPS, WASHERS	KINGSTEN/GEM/PARKO/TECHNO/JAL/ESS ESS/JAQUAR/CRABTREE/JAINKO
J)	CP ACCESSORIES	KINGSTON/PARKO/GEM/JAL/ESS ESS/JAQUAR
K)	GLAZING GLASS	SAINT GLOBAIN / ASAHI / PILINGTON
L)	CERAMIC GLAZED TILES	KAJARIA / SOMANY / NITCO / ORIENT
9	ELECTRICAL ACCESSORIES, WIRES & CABLES	
A)	SWITCHES AND SOCKETS (MODULAR TYPE SWITCHES)	ANCHOR / MK / LK
B)	PVC INSULATED (FRLS) COPPER CONDUCTOR CABLES	FINOLEX/HAVELLS/RR CABLES / POLYCAB / UNIVERSAL
C)	TELEPHONE WIRES, CABLES & ACCESSORIES	MOLLEX/BELDEN/LAP KABEL/LEGRAND
D)	LT CABLES- ALUMINIUM CONDUCTOR CABLE	FINOLEX/HAVELLS/CCI/POLYCAB/UNIVERSAL
E)	CABLE GLANDS	COMET/JAINSONS/BRACO

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter - II: Scope of Works

10	ELECTRICAL EQUIPMENT	
A)	EXHAUST FANS, CEILING FANS, WALL MOUNTED FANS	ALSTOM/CROMPTON/BAJAJ/ORIENT/KHAITAN
B)	LIGHT FITTINGS	CROMPTON/PHILIPS /WIPRO
C)	CFL & FL LAMPS	PHILLIPS/ WIPRO /BAJAJ/ CROMPTON/ OSRAM
E)	KWH METERS ETC.	BHEL/GE/L&T/HAVELS
F)	MCBs & MCB DBs (10 KA)	MDS/ L&T-HAGGER/ RAJ.L/ HAVELS
G)	EARTH LEAKAGE CIRCUIT BREAKER (ELCB)	MDS/ L&T-HAGGER/ RAJ.L/ HAVELS/ EURO

Note:

1. If the make of the materials as mentioned in the above list is not available in the market or is not suiting the site / technical conditions, equivalent make may be used after approval of BHEL Engineer.
2. If the make of any material is not mentioned in the above list, contractor shall use the materials of reputed manufacturers only after getting it approved by BHEL Engineer.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter – III: Facilities in the scope of Contractor/BHEL

Sl. No.	Description	Scope / to be taken care by		Remarks
		BHEL	Bidder / Contractor	
3.1.0	ESTABLISHMENT			
3.1.1	FOR CONSTRUCTION PURPOSE:			
3.1.1.1	Open space for office	Yes		BHEL shall provide free of charge limited open space for office and store as and where available within the office complex.
3.1.1.2	Open space for storage	Yes		
3.1.1.3	Construction of bidder's office, canteen and storage building including supply of materials and other services. (As per need)		Yes	
3.1.1.4	Firefighting equipment like buckets, extinguishers etc.		Yes	
3.1.2	FOR LIVING PURPOSES OF THE BIDDER			
3.1.2.1	Open space		Yes	
3.1.2.2	Living accommodation		Yes	
3.2.0	ELECTRICITY			
3.2.1	<u>Electricity For construction purposes</u> (To be specified whether chargeable or free)	Yes		Construction power, for construction purposes as well as office use will be provided by BHEL Free of Charge at one point near erection/ construction site from supply point.
3.2.1.1	Nearest point source	Yes		
3.2.1.2	Further distribution for the work to be done which include supply of materials and execution		Yes	

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter – III: Facilities in the scope of Contractor/BHEL

Sl. No.	Description	Scope / to be taken care by		Remarks
		BHEL	Bidder / Contractor	
3.2.2	<u>Electricity for living accommodation of the bidder's staff, engineers, supervisors etc</u>		Yes	To be arranged by bidder at his own cost
3.3	WATER SUPPLY			
3.3.1	For construction purposes:			
3.3.1.1	Making the water available at single point	Yes		BHEL will make available water for construction/ testing purposes close to the construction areas free of charge at a single point in site. Any further distribution shall be the responsibility of the contractor. Potable / drinking water shall also be provided free of charge at a single point in site & further distribution shall be the responsibility of the contractor.
3.3.1.2	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.3.2	<u>Water supply for bidder's office, stores, canteen etc. at construction site</u>	Yes		
3.3.2.1	Making the potable water available at single point	Yes		
3.3.2.2	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.4.0	LIGHTING			
3.4.1	For construction work (supply of all the necessary materials) 1. At office / storage area 2. At the construction site /area		Yes	
3.4.2	For construction work (execution of the lighting work/ arrangements) 1. At office / storage area 2. At the construction site /area		Yes	
3.4.3	Providing the necessary consumables like bulbs, switches, etc during the course of construction		Yes	

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter – III: Facilities in the scope of Contractor/BHEL

Sl. No.	Description	Scope / to be taken care by		Remarks
		BHEL	Bidder / Contractor	
3.4.4	Lighting for the living purposes of the bidder at the colony / quarters		Yes	
3.5.0	COMMUNICATION FACILITIES FOR SITE OPERATIONS OF THE BIDDER			
3.5.1	Telephone, fax, internet, intranet, e-mail etc.		Yes	
3.6.0	CONSTRUCTION FACILITIES			
3.6.1	Engineering Works for construction :			
3.6.1.2	Drawings for construction methods and detailed shop drawings.	Yes	Yes	In consultation with BHEL.
3.6.1.3	Preparation of site construction schedules and other input requirements		Yes	In consultation with BHEL
3.6.1.4	Review of performance and revision of site construction schedules in order to achieve the end dates and other commitments	Yes	Yes	
3.6.1.5	Weekly construction schedules based on Sl. No 3.6.1.3		Yes	In consultation with BHEL.
3.6.1.6	Daily construction / work plan based on Sl. No 3.6.1.5		Yes	In consultation with BHEL.
3.6.1.7	Periodic visit of the senior official of the bidder to site to review the progress so that works are completed as per schedule. It is suggested this review by the senior official of the bidder should be done once in every two months.		Yes	

Notes:

FACILITIES TO BE PROVIDED BY BHEL / CONTRACTOR

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter – III: Facilities in the scope of Contractor/BHEL

- 3.7 Contractor shall be responsible for providing all necessary facilities like residential accommodation, transport, electricity, water, medical facilities etc. as required under various labour laws and statutory rules and regulations framed there under to the personnel employed by him.
- 3.8 Provision of distribution lines of power & water from the central points to the required place with proper distribution boards observing the safety rules laid down by the authorities of the state shall be done by the contractor, supplying all the materials like cables, distribution board, switch boards, TPN, CBS, ELCBS/ MCCBS / Copper / Brass clamps, copper conductor, change over switches, pipes, valves etc. at his own cost. If any failure is caused in supply of the power and water, it is the responsibility of the contractor to make alternate arrangements at his cost. The contractor shall adjust his working shift / hours accordingly and deploy additional manpower if necessary so as to achieve the targets.
- 3.9 In case of power cuts / load shedding no compensation for idle labour or extension of time for completion of work will be given to contractor.
- 3.10 Adequate lighting facilities such as flood lamps, hand lamps and area lighting shall be arranged by the contractor at the site of construction, contractor's material storage area etc. within finally accepted rates.
- 3.11 No claim for damages will be entertained by the Company (BHEL) on account of interruptions of water supply or limitation of quantity of water as aforesaid or on account of the water so taken being not fit for construction purposes or on any other account in connection with such water supply.
- 3.12 Contractor to satisfy himself that the water drawn by him is fit for construction / consumption and adequately treat such water at his cost when it is not found fit for the said purposes.
- 3.13 The Contractor should make arrangements for storage of sufficient quantity of water required for work.
- 3.14 The Contractor shall during the progress of the work, provide, erect and maintain at his own expenses all necessary temporary workshops, stores, consumables, offices, etc. required for the proper and efficient execution of the work. The planning, setting and erection of these buildings shall have the approval of the BHEL Engineer and the Contractor shall at all times keep them tidy and in a clean and sanitary condition to the entire satisfaction of the BHEL Engineer.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter – III: Facilities in the scope of Contractor/BHEL

- 3.15 On completion of work or as and when required by BHEL, all the temporary buildings, structures, pipe lines, cables etc. shall be dismantled and leveled and debris shall be removed as per instruction of BHEL by the contractor at his cost. In the event of his failure to do so, same will be got done by the BHEL and expenses incurred shall be recovered from the contractor along with prevailing overhead. The decision of BHEL Engineer in this regard shall be final.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter – IV: T&Ps and MMEs to be deployed by the contractor

A. TOOLS & PLANTS: Indicative list of T&Ps	
Sl. No.	EQUIPMENT
1	CONCRETE MIXER M/C OF SUITABLE CAPACITY
2	CONCRETE VIBRATORS
3	JCB/ EXCAVATOR/ DOZER/ JACK HAMMER WITH COMPRESSOR
4	ROLLERS/ VIBRO ROLLERS / PLATE COMPACTORS
5	TRUCKS / LORRIES / TRACTORS / DUMPERS
6	WATER TANKER
7	DEWATERING PUMP
8	WINCHES
9	WELDING MACHINES
10	TYRE MOUNTED MOBILE CRANES / HYDRA (14MT TO 20MT)

NOTES:

1. The above list is only indicative and these T&Ps may not be required for entire contract period but contractor will ensure that these T & Ps are provided as per need. Contractor will assess actual quantity and period of requirement based on his experience. **Contractor has to mobilize / maintain adequate numbers of equipment for meeting the work schedule and intermediate milestones as notified by BHEL Engineer.**
2. Other terms and conditions regarding T&Ps / MMEs please also refer clause for T&Ps & MMEs in SCC.
3. All the tools and plants required for this scope of work are to be arranged by the contractor within the quoted rates. The list is suggestive in nature. Any additional T&Ps required to be arranged by the contractor.
4. If work gets delayed due to non-availability of T&Ps, BHEL reserves the right to get the work done at the risk and cost of contractor without prejudice to rights of BHEL as in GCC.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter – IV: T&Ps and MMEs to be deployed by the contractor

B. <u>MONITORING & MEASURING EQUIPMENTS:</u> INDICATIVE LIST OF MMEs	
Sl. No.	EQUIPMENT
1	TOTAL STATION
2	AUTO LEVEL
3	MEASURING TAPE
4	PLUMB BOBS
5	COMPRESSION STRENGTH TESTING EQUIPMENT
6	CONSTRUCTION MATERIAL TEST EQUIPMENT
7	CONCRETE CUBE MOULD (150mm X 150mm X 150mm)
8	CONCRETE SLUMP CONE
9	COARSE AGGREGATE SIEVES & SAND SIEVES
10	SIEVE SHAKER

Note:

1. The above list is only indicative and these MMEs may not be required for entire contract period but contractor will ensure that these MMEs are arranged as per need. Contractor will assess actual quantity and period of requirement based on his experience.
2. Other terms and conditions regarding T&Ps / MMEs please also refer clause for T&P & MMEs in SCC.
3. All the MMEs required for this scope of work are to be arranged by the contractor within the quoted rates. The list is suggestive in nature. Any additional MMEs required to be arranged by the contractor.
4. Contractor should set up the field laboratory with facilities required for material & concrete testing, alternatively all the materials used and proposed to be used for construction may be tested in an authorized and accredited laboratory outside and the material test reports shall be furnished to BHEL Engineer before use of material in work.
5. If work gets delayed due to non-availability of MMEs, BHEL reserves the right to get the work done at the risk and cost of contractor without prejudice to rights of BHEL as in GCC.

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – V: T&Ps and MMEs to be deployed by BHEL on sharing
basis

NOT APPLICABLE

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter – VI: Time Schedule

TIME SCHEDULE

6.1 INITIAL MOBILIZATION

After receipt of fax LOI, Contractor shall discuss with Project Manager / Construction Manager regarding initial mobilization. Contractor shall mobilize necessary resources within 2 weeks of issue of fax letter of intent or as per the directive of Project Manager / Construction Manager. Such resources shall be progressively augmented to match the schedule of milestones as directed by BHEL Engineer.

6.2 START DATE / ZERO DATE

The schedule date of start of work shall be the date after 2 weeks of issue of LOI. However The Actual Date of Start of Contract Period (Zero Date) shall be date of handing over of site to contractor for work and shall be certified by the BHEL Engineer.

6.3 CONTRACT COMPLETION PERIOD

Entire work as detailed in tender specification shall be completed within **3 months** from the actual date of start of contract period (Zero Date). Contractor has to mobilize adequate resources to meet BHEL's commitments to their customer as indicated from time to time.

6.4 Detailed Work completion Schedule will be submitted for approval by the successful bidder within 2 weeks of issue of LOI.

6.5 In case due to reasons not attributable to the contractor, the work gets delayed and scheduled completion gets extended, time extension will be accordingly granted by BHEL.

6.6 The work under the scope of this contract is deemed to be completed in all respects, only when all the works are carried out as per satisfaction of BHEL. The decision of BHEL on completion date shall be final and binding on the contractor.

6.7 In order to meet above schedule in general, and any other intermediate targets set, to meet BHEL requirements, contractor shall arrange & augment all necessary resources from time to time on the instructions of BHEL.

6.8 CONSEQUENCE OF DELAY

It may be noted that in the event delay in completion is attributable to the contractor, BHEL will impose LD on the contractor as per GCC.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VII: Terms of Payment

7.0 TERMS OF PAYMENT

- 7.1 The 'Engineer' will certify regarding the actual work executed in the measurement books and bills, which shall be accepted by the contractor in measurement book.
- 7.2 The Contractor shall be paid monthly running bill as per Chapter – X of SCC and Clause Nos. 2.22 & 2.23 of GCC. The format for billing shall be approved by BHEL before raising invoices.
- 7.3 The contractor on certification of the engineer at site be entitled for payments of his running bills which shall be subject to any deduction/retention specifically under clauses 2.22 of GCC and 10.0 of SCC.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter- VIII: Taxes & Duties

8.0	TAXES & DUTIES The contractor shall pay all (save the specific exclusions as enumerated in this contract) taxes, fees, license charges, deposits, duties, tools, royalty, commissions or other charges which may be levied on the input goods & services consumed and output goods & services delivered in course of his operations in executing the contract. In case BHEL is forced to pay any of such taxes, BHEL shall have the right to recover the same from his bills or otherwise as deemed fit. However, provisions regarding Service Tax and Value Added Tax (VAT) on output services and goods shall be as per following clauses.
8.1	Service Tax & Swachh Bharat Cess on Service Tax Service Tax and Swachh Bharat Cess on Service Tax as applicable on output Services are included in contractor's scope; therefore contractor's price/rates shall be inclusive of Service Tax and Cess on Output Services. BHEL shall not reimburse any amount to service tax A/c due to any reason whatsoever. Contractor shall obtain prior written consent of BHEL before billing the amount towards such taxes. The Service Tax Rules permit more than one option or methodology for discharging the liability of tax/levy/duty and BHEL will have the right to adopt the appropriate one considering the amount of tax liability on BHEL/Client as well as procedural simplicity with regard to assessment of the liability. The option chosen by BHEL shall be binding on the Contractor for discharging the obligation of BHEL in respect of the tax liability to the Contractor. Contractor shall submit to BHEL documentary evidence of Service Tax registration certificate specifying name of services covered under this contract. For the purpose of claiming any Service Tax from BHEL, the following procedure shall be adopted: Contractor shall submit serially numbered Service Tax and Cess Invoices, signed by him or a person authorized by him in respect of taxable service provided, and shall contain the following, namely: A. The name, address and registration number of the contractor B. The name and address of the party receiving taxable service (BHEL) C. Description, classification and value of taxable service provided and D. The Service Tax &/or Swachh Bharat Cess payable thereon. E. Service tax and Swachh Bharat Cess should not be combined. All the above conditions shall be fulfilled in the invoice for payment of Service Tax and/or Swachh Bharat Cess by BHEL. Where more than one nature of Service under Service Tax Rules is involved, the invoice mentioned above shall contain the breakup of all values for each nature of Service. Name and address of the contractor should be same in the service tax invoice and

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter- VIII: Taxes & Duties

	monthly bill. Any change in the name and address in past should be supported by documentary evidence duly certified by the registering authority. Purpose of above requirements, inter alia, is to enable availment of CENVAT credit by BHEL. As per recent amendment time restrictions for taking cenvat credit is within 12 months from date of invoice. Wherever CENVAT credit could not be availed by BHEL within statutory time limit of 12 months due to delay in submission of invoice or for any other reason attributable to contractors, liability towards loss of such CENVAT credit shall be passed on to contractors.
8.2	VAT (Sales Tax /WCT)
8.2.1	Civil Works: As regards Value Added Tax (VAT) on transfer of property in goods involved in Works Contract (previously known as Works Contract Tax) applicable as per local laws, the price quoted by the contractor shall be inclusive of the same. Contractor shall obtain prior written consent of BHEL before billing the amount towards such taxes. In case contractor opts for composition, it will be with the prior express consent of BHEL. The VAT Rules permit more than one option or methodology for discharging the liability of tax/levy/duty and BHEL will have the right to adopt the appropriate one considering the amount of tax liability on BHEL/Client as well as procedural simplicity with regard to assessment of the liability. The option chosen by BHEL shall be binding on the Contractor for discharging the obligation of BHEL in respect of the tax liability to the Contractor. BHEL also reserves the right to demand "Tax Invoice" under the relevant VAT Act, from the Contractor. Where such taxes are required to be paid by the contractor subject to the above, this will be reimbursed on production of proof of payment made to the authorities by the Contractor. The contractor has to take all necessary steps to minimize tax on input goods by purchasing the materials from any registered dealer of the concerned state only.
8.2.2	Works other than Civil Works: The rates quoted by the Contractor shall be inclusive of VAT/Sales Tax and BHEL shall not reimburse any amount on this account due to any reason whatsoever.
8.2.3	Common to all Works (Both Civil and Other than Civil) The Contractor shall register himself with the respective Sales Tax authorities of the state if applicable and submit proof of such registration to BHEL along with the first RA bill. Deduction of tax at source shall be made as per the provisions of law unless otherwise found exempted. In case tax is deducted at source as per the provisions of law, this is to be construed as an advance tax paid by the contractor and no reimbursement thereof will be made unless specifically agreed to. Contractor has to make his own arrangement at his cost for completing the formalities, if required, with Sales Tax/VAT Authorities, for bringing all their

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter- VIII: Taxes & Duties

	material, plant and equipment etc. at site for the execution of the work, including arrangement of Road Permits if and as applicable under the relevant VAT Act.
8.3	Modalities of Tax Incidence on BHEL Wherever the relevant tax laws permit more than one option or methodology for discharging the liability of tax/levy/duty, BHEL will have the right to adopt the appropriate one considering the amount of tax liability on BHEL/Client as well as procedural simplicity with regard to assessment of the liability. The option chosen by BHEL shall be binding on the Contractor for discharging the obligation of BHEL in respect of the tax liability to the Contractor.
8.4	New Taxes/Levies & change in tax law In case the Government imposes any new levy/tax on the output service/goods/work of subcontractor after award of the contract, the same shall be reimbursed by BHEL at actual. The reimbursement on a/c of new levy /tax is limited to direct transaction between BHEL & subcontractor In case any new tax/levy/duty etc. becomes applicable after the date of Bidder's offer, the Bidder/Contractor must convey its impact on his price duly substantiated by documentary evidence in support of the same before opening of Price Bid. Claim for any such impact after opening the Price Bid will not be considered by BHEL for reimbursement of tax or reassessment of offer. No reimbursement/recovery on account of increase/reduction in the rate of taxes, levies, duties etc. on input goods/services/work of the subcontractor shall be made. Such impact shall be taken care of by the Price Variation/Adjustment Clause (PVC) if any. In case PVC is not applicable for the contract, Bidder has to make his own assessment of the impact of future variation if any, in rates of taxes/duties/ levies etc. in his price bid.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-IX: CONSTRUCTION MATERIALS

9.1 CONSTRUCTION MATERIALS:

- 9.1.1 The contractor shall at his own expenses provide all materials including cement, sand, aggregates, bricks, water proofing materials, reinforcement, Structural Steel, paints, welding electrodes etc. as per BOQ cum Rate Schedule & Technical Specifications required for the work.
- 9.1.2 All materials to be provided by the Contractor shall be of the best kind in conformity with the specifications laid down in the contract or as per relevant Indian standard and the Contractor shall, if requested by the BHEL Engineer, furnish proof to the satisfaction of BHEL Engineer that the materials so comply.
- 9.1.3 The Contractor shall, at his own expense and without delay, supply to the BHEL Engineer samples of materials proposed to be used in the works. The BHEL Engineer shall within seven days of supply of samples or within such further period as he may require will intimate to the Contractor in writing, whether samples are approved by him or not. If samples are not approved, the Contractor shall forthwith arrange to supply to the BHEL Engineer for his approval fresh samples complying with the specifications laid down in the Contract. Any delay in approval of samples (original or fresh ones) shall not make the contractor eligible for any compensation.
- 9.1.4 The BHEL Engineer shall have full powers for removal of any or all of the materials brought to site by the Contractor which are not in accordance with the Contract specifications or do not conform in character or quality to samples approved by him. In case of default on the part of the Contractor in removing rejected materials, the BHEL Engineer shall be at liberty to have them removed by other means. The BHEL Engineer shall have full powers to procure other proper material to be substituted for rejected materials and in the event of the Contractor refusing to comply, he may cause the same to be supplied by other means. All costs, which may attend upon such removal and / or substitution shall be borne by the Contractor.
- 9.1.5 The Contractor shall indemnify BHEL, its representatives or employees against any action, claim or proceeding relating to infringement or use of any patent or design or any alleged patent or design rights and shall pay any royalties or other charges which may be payable in respect of any article or material or part thereof included in the Contract. In the event of any claim being made or action being brought against BHEL or any agent, servant or employee of BHEL in respect of any such matters as aforesaid, the Contractor shall immediately be notified thereof, provided that such indemnity shall not apply when such infringement has taken place in complying

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-IX: CONSTRUCTION MATERIALS

with the specific directions issued by BHEL but the Contractor shall pay any royalties or other charges payable in respect of any such use, the amount so paid being reimbursed to the Contractor only if the use was the result of any drawings and / or specifications issued after submission of the tender.

- 9.1.6 The BHEL Engineer shall be entitled to have tests carried out as specified in the Contract for any materials supplied by the Contractor other than those for which, as stated above, satisfactory proof has already been furnished, at the cost of the Contractor and the Contractor shall provide at his expense all facilities which the Engineer may require for the purpose. If no tests are specified in the Contract, and such tests are required by the Engineer, the Contractor shall provide all facilities required for the purpose and the charges for these tests shall be borne by the Contractor only. The cost of materials consumed in tests shall be borne by the Contractor in all cases except when otherwise provided.
- 9.1.7 In addition the Contractor shall perform / submit at his own cost such tests / samples as may be required by the BHEL Engineer out of the materials used by the company except for the costs of materials used in such tests / samples.
- 9.1.8 After acceptance of the Contract, if Contractor desires BHEL to supply any other materials, such material may be supplied by BHEL, if available, at rates to be fixed by the BHEL Engineer along with prevailing departmental charges (current rate of 30%). BHEL reserve the right not to issue any material. The non issue of such material will not entitle the Contractor for any compensation whatsoever either in time or in cost.
- 9.1.9 Material required for the works, whether brought by the Contractor or supplied by BHEL, shall be stored by the Contractor only at places approved by the Engineer. Storage and safe custody of material shall be the responsibility of the contractor.
- 9.1.10 BHEL's officials concerned with the Contract shall be entitled at any time to inspect and examine any materials intended to be used in or on the works, either on the Site or at factory or workshop or other place(s) where such materials are assembled, fabricated, manufactured or at any place (s) where these are lying or from which these are being obtained and the Contractor shall give such facilities as may be required for such inspection and examination.
- 9.1.11 All materials brought to the Site shall become and remain the property of BHEL and shall not be removed off the Site without the prior written approval of the BHEL Engineer. But whenever the Works are finally completed and advance, if any, in

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-IX: CONSTRUCTION MATERIALS

respect of any such material is fully recovered, the Contractor shall at his own expense forthwith remove from the Site all surplus material originally supplied by him and upon such removal, the same shall re-vest in and become the property of the Contractor.

9.1.12 It shall be the responsibility of the contractor to obtain prior approval of BHEL, regarding suppliers, type of electrodes etc. before procurement of welding electrodes / TIG wires. On receipt of electrodes at site these shall be subjected to inspection and approval by BHEL. The contractor shall inform BHEL details regarding type of electrodes, batch No. date of expiry etc. and produce test certificate for each lot / batch with correlation of batch / lot no. with respective test certificate. No electrode will be allowed to be used without valid test certificate.

9.1.13 All charges on account of Octroi, terminal or sales tax and other duties on material obtained for the works from any source shall be borne by the contractor.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-X: OTHER IMPORTANT CONDITIONS

10.1 INSTRUCTIONS TO TENDERERS

The Tenderer are advised to physically visit the site and fully acquaint themselves with site conditions, transportation routes, various distances and the fact that other contractors would be working in this area and their structures are to be protected. The material brought and stacked for construction should not make hindrance to other works. **Necessary precaution and arrangements including sprinkling of water during work as acceptable to BHEL for safety & security for the above have to be made by the contractor. No claim will be entertained by BHEL on ground of lack of knowledge and the contractor's rates shall be deemed to have taken this into account.**

The contractor, in the event of this work awarded to him, shall establish an office at site and keep posted an authorised, responsible officer with valid Power of Attorney for the purpose of the contract. Any order or instructions of the 'BHEL Engineer' or his duly authorized representative, communicated to the contractor's representative at site office will be deemed to have been communicated to the contractor at his legal address.

10.2 EXECUTION OF WORK

10.2.1 The work shall be executed in a workman like manner and to the entire satisfaction of the BHEL Engineer and as per technical specification issued with tender, IS codes, CPWD specifications as applicable. In case of conflict, the decision of the Engineer shall be final & binding.

10.3 SITE DRAINAGE

10.3.1 All water including sub-soil water which may accumulate on the Site during the progress of the works or in trenches and excavations, including monsoon period shall be removed by the contractor from the Site to the satisfaction of the BHEL Engineer. It will also be responsibility of the contractor to de-water all the foundation pits, trenches with suitable de-watering methods like, pumping out, well point system etc. Considering the depth of water table at plant site. All such expenditure on de-watering shall be deemed to be included in quoted rates.

10.4 INSPECTION AND STAGE APPROVAL OF THE WORK

10.4.1 All work embracing more than one process shall be subject to examination and approval at each stage thereof and the Contractor shall give due notice in writing to the BHEL Engineer when each stage is ready. In default of such notice being

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-X: OTHER IMPORTANT CONDITIONS

received, the Engineer shall be entitled to approve the quality and extent thereof at any time he may choose and in the event of any dispute, the decision of the BHEL Engineer thereon shall be final and conclusive.

10.5 UNCOVERING AND MAKING GOOD

10.5.1 The Contractor shall uncover any part of the Works and/or make openings in or through the same as the Engineer may from time to time direct for his verification and shall reinstate and make good such part to the satisfaction of the BHEL Engineer. If any such part has been covered up or put out of view after being approved by the BHEL Engineer and is subsequently found on uncovering to be executed in accordance with the Contract, the expenses of uncovering and / or making opening in or through, reinstating and making good the same shall be borne by BHEL. In any other case all such expenses shall be borne by the Contractor.

10.6 DISCREPANCIES AND ADJUSTMENT OF ERRORS

10.6.1 The several documents forming the Contract are to be taken as mutually explanatory of one another, Technical Conditions being followed in preference to special conditions and special conditions in preference to general conditions.

10.6.2 In case of discrepancies between schedules of quantities, the specification, the following order of preference shall be observed.

(a) Description in schedule of quantities.

(b) Technical Conditions of Contract

(c) Technical Specifications

(d) Special Conditions of Contract

(e) General conditions of contract

If there are varying or conflicting provisions made in any one document forming part of the contract, the BHEL Engineer shall be the deciding authority with regard to the document.

10.6.3 Any error in description, quantity in schedule of quantities or any omission therefrom shall not vitiate the contract or release the contractor from the execution of the whole or any part of the works comprised therein according to the specifications or from any of his obligations under the contract.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-X: OTHER IMPORTANT CONDITIONS

10.6.4 If neither drawing nor specification contain any mention of minor details of construction which in the opinion of the BHEL Engineer whose decision shall be final and conclusive, are reasonable and obviously and fairly intended for satisfactory completion of work, such details shall be provided by the contractor without any extra cost, as if they were specially mentioned and shall be deemed to be included in the scope of works.

10.7 HSE & OHSAS:

10.7.1 The contractor shall comply with the requirements / stipulations of chapter- IX of SCC towards Health Safety and Environment.

10.8 NUISANCE

10.8.1 The Contractor shall not at any time do, cause or permit any NUISANCE on Site or do anything which shall cause unnecessary disturbance or inconvenience to owners, tenants or occupiers of other properties near the Site and to the public generally.

10.9 MATERIAL OBTAINED FROM EXCAVATION

10.9.1 Materials of any kind obtained from excavation on the Site shall remain the property of BHEL and shall be disposed of as the BHEL Engineer may direct, at no extra cost.

10.10 TREASURE, TROVE, FOSSILS etc.

10.10.1 All fossils, coins, articles of value or antiquity and structures and other remains or things of geological or archaeological interest discovered on the site shall be the absolute property of BHEL and the Contractor shall take reasonable precautions to prevent his workmen or any other person from removing or damaging any such article or thing, shall immediately upon discovery thereof and before removal acquaint the BHEL Engineer with such discovery and carryout the BHEL Engineer's directions as to the disposal of the same.

10.11 PROTECTION OF WORKS

10.11.1 Trees designated by the BHEL Engineer shall be protected from damage during the course of the Works and earth level within 1 meter of each such tree shall not be charged. Where necessary, such trees shall be protected by providing temporary fencing.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-X: OTHER IMPORTANT CONDITIONS

10.11.2 The contractor shall provide and maintain at his own expense all lights, guards, fencing and watching when and where necessary or required by the BHEL Engineer for the protection of the Works or for the safety and convenience of those employed on the Works or the public.

10.11.3 The contractor shall have total responsibility for protecting his works till it is finally taken over by the BHEL. No claim will be entertained by the BHEL Engineer for any damage or loss to the contractor's works and the contractor shall be responsible for the complete restoration of the damaged works to its original condition to comply with the specifications and drawings. Should any such damage to the contractor's works occur because of other party not under his supervision or control, the contractor shall make his claim directly with the party concerned. The contractor shall not cause any delay in the repair of such damaged works because of any delay in the resolution of such disputes. The contractor shall proceed to repair the work immediately and no cause thereof will be assigned pending resolution of such disputes.

10.12 PROTECTION OF EMBEDMENTS, BOLTS ETC.

10.12.1 The contractor shall ensure proper protection to the satisfaction of the BHEL Engineer, of all bolts, inserts, embedment etc. from weather by greasing, rapping them with gunny bags or canvas or by any other means as directed by Engineer. Cost of such protections shall be deemed to be included in the rates quoted for the item.

10.13 QUALITY ASSURANCE

10.13.1 The contractor has to establish / arrange at site the field testing facilities for testing of civil construction materials and concrete cubes for ensuring the proper quality, grade and strength of the materials used in the construction in line with technical specifications / as directed by BHEL Engineer. Contractor has to submit detailed report for testing of all material used etc. All testing shall be done as per IS code specifications. If further test is required by the BHEL Engineer to be carried from outside laboratory, the cost of the same shall be borne by the contractor.

10.14 COMPLETION OF WORK

10.14.1 The works shall be completed to the entire satisfaction of the BHEL Engineer and in accordance with the completion schedule as specified in the Contract, and all unused stores, materials, tools & plants, equipment, temporary buildings, site office, labour hutments, power / water distribution arrangements etc. shall be

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-X: OTHER IMPORTANT CONDITIONS

removed and the site of work, cleared of rubbish and all waste materials shall be delivered up clean and tidy to the satisfaction of the BHEL Engineer at the Contractor's expenses.

10.14.2 BHEL shall have power to take over from the Contractor from time to time such sections of the work as have been completed to the satisfaction of the BHEL Engineer. Such work however shall not be treated as have been completed until the extra works are executed to the satisfaction of BHEL Engineer. The Guarantee period shall commence only after handing over of the entire works.

10.15 COMMENCEMENT OF GUARANTEE PERIOD:

10.15.1 **The Guarantee period shall commence only after completion & handing over of the entire works.** The BHEL Engineer shall certify to the contractor the date on which the work is completed & handed over and the date thereof for commencement of Guarantee Period. The duration of Guarantee Period shall be as per GCC.

10.16 METHOD OF MEASUREMENT

10.16.1 Method of measurements if not specified in the tender, shall be as per relevant IS Codes / CPWD specifications.

10.17 MODIFICATION / DELETION OF GCC & SCC CLAUSES:

- I. Clause No. 4.1.4, 4.1.9 & 4.1.10 of SCC (Consumables & Other Items) shall not be applicable.
- II. Clause No. 4.2.2 of SCC (Obligations in respect of T&Ps & MMEs to be provided by BHEL) shall not be applicable.
- III. Clause No. 8.3.2, 8.3.3, 8.3.4 of SCC (Statutory Inspection of Work) shall not be applicable.
- IV. Clause No. 2.12 of GCC (ORC) shall not be applicable.
- V. Clause No. 2.17 of GCC (PVC) shall not be applicable.
- VI. Clause No. 2.13 of GCC (Interest bearing recoverable advance) shall not be applicable.

TECHNICAL CONDITIONS OF CONTRACT (TCC)
ANNEXURE

Annexure-I: BOQ cum Rate Schedule

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

1.0	GENERAL
1.1	The work shall be carried out strictly in accordance with the specifications mentioned herein / as per relevant IS Code / CPWD specifications. In case of any ambiguity the most stringent specifications shall be applicable and BHEL Engineer-in-charge shall be the authority regarding deciding the applicability of the specifications, whose decision shall be binding on the contractor.
1.2	<u>SAMPLE OF MATERIAL:</u> The Contractor shall produce samples of all materials and shall obtain approval of these in writing from Architects/BHEL before he places bulk order for the materials for incorporation in the works. The samples must be produced at least six weeks before they are to be incorporated in work. Materials to be incorporated in the work shall be of approved makes and quality as specified/approved by BHEL and shall conform to latest relevant IS.
2.0	<u>DISMANTLING WORK</u>
2.1	GENERAL This chapter relates to buildings only.
2.2	Precautions: All materials obtained from dismantling or demolition shall be the property of the BHEL unless otherwise specified and shall be kept in safe custody until they are handed over to the BHEL Engineer-in-Charge/ authorized representative.
2.3	The demolition shall always be well planned before hand and shall generally be done in reverse order of the one in which the structure was constructed. The operations shall be got approved from the BHEL Engineer-in-Charge before starting the work. Due care shall be taken to maintain the safety measures prescribed in IS 4130.
2.4	Necessary propping, shoring and or under pinning shall be provided to ensure the safety of the adjoining work or property before dismantling and demolishing is taken up and the work shall be carried out in such a way that no damage is caused to the adjoining work or property. Wherever specified, temporary enclosures or partitions and necessary scaffolding with suitable double scaffolding and proper cloth covering

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

	shall also be provided, as directed by the BHEL Engineer-in-Charge.
2.5	Necessary precautions shall be taken to keep noise and dust nuisance to the minimum. All work needs to be done under the direction of BHEL Engineer-in-Charge. Helmets, goggle, safety belts etc. should be used whenever required and as directed by the Engineer-in-Charge. The demolition work shall be proceeded with, in such a way that it causes the least damage and nuisance to the adjoining building and the public.
2.6	Dismantling shall be done in a systematic manner. All materials which are likely to be damaged by dropping from a height or by demolishing roofs, masonry etc. shall be carefully removed first. Chisels and cutters may be used carefully as directed. The dismantled articles shall be removed manually or otherwise, lowered to the ground (and not thrown) and then properly stacked as directed by the BHEL Engineer-in-Charge.
2.7	Where existing fixing is done by nails, screws, bolts, rivets, etc., dismantling shall be done by taking out the fixing with proper tools and not by tearing or ripping off.
2.8	Any serviceable material, obtained during dismantling or demolition, shall be separated out and stacked properly as directed by the Engineer-in-Charge within a lead of 50 metres. All unserviceable materials, rubbish etc. shall be disposed off as directed by the Engineer-in-Charge.
2.9	The contractor shall maintain/disconnect existing services, whether temporary or permanent, where required by the Engineer-in-Charge.
2.10	No demolition work should be carried out at night especially when the building or structure to be demolished is in an inhabited area.
2.11	Screens shall be placed where necessary to prevent injuries due to falling pieces.
2.12	Water may be used to reduce dust while tearing down plaster from brick work.
2.13	Safety belts shall be used by laborers while working at higher level to prevent falling from the structure.
2.14	First-aid equipment shall be got available at all demolition works of any magnitude.
3.0	REPAIR WORK
3.1	REPAIRS TO PLASTER
3.1.1	The work includes cutting the patch and preparing the wall surface. Patches of 2.50 square metres and less in area shall be measured under

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

	item of 'Repairs to Plaster' under this sub-head. Plastering in patches over 2.5 square metres in area shall be paid for at the rate as applicable to new work under sub head 9.0 'Finishing'.
3.1.2	Scaffolding Scaffolding as required for the proper execution of the work shall be erected. If work can be done safely with the ladder or jhoola these will be permitted in place of scaffolding.
3.1.3	Cutting The mortar of the patch, where the existing plaster has cracked, crumbled or sounds hollow when gently tapped on the surface, shall be removed. The patch shall be cut out to a square or rectangular shape at position marked on the wall as directed by the Engineer-in-Charge or his authorized representative. The edges shall be slightly under cut to provide a neat joint.
3.1.4	Preparation of Surface The masonry joints which become exposed after removal of old plaster shall be raked out to a minimum depth of 10 mm in the case of brick work and 20 mm in the case of stone work. The raking shall be carried out uniformly with a raking tool and not with a basuli, and loose mortar dusted off. The surface shall then be thoroughly washed with water, and kept wet till plastering is commenced. In case of concrete surfaces, the same shall be thoroughly scrubbed with wire brushes after the plaster had been cut out. The surface shall be washed and cleaned and kept wet till plastering is commenced.
3.1.5	Application of Plaster Mortar of specified mix with the specified sand shall be used. The surface shall be finished even and flush and matching with the old surrounding plaster. All roundings necessary at junctions of walls, ceilings etc. shall be carried out in a tidy manner. All dismantled mortar & rubbish etc. shall be disposed off within 24 hours from its dismantling promptly as directed by the Engineer-in-Charge.
3.1.6	Protective Measure Doors, windows, floors, articles of furniture etc. and such other parts of the building shall be protected from being splashed upon. Splashing and droppings, if any, shall be removed by the contractor at his own cost and the surface cleaned. Damages, if any, to furniture or fittings and fixtures shall be recoverable from the contractor.
3.1.7	Curing

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

	Curing shall be started as soon as the plaster has hardened sufficiently not to be damaged when watered. The plaster shall be kept wet for a period of at least 7 days. During this period, it shall be suitably protected from all damages at the contractor's expense by such means as the Engineer-in-Charge may approve. The dates on which the plastering is done shall be legibly marked on the various sections plastered so that curing for the specified period thereafter can be watched.
3.1.8	Finish The plaster shall be finished to a true and plumb surface and to the proper degree of smoothness as required. The work shall be tested frequently as the work proceeds with a true straight edge not less than 2.5 m long and with plumb bobs. All horizontal lines and surfaces shall be tested with a level and all jambs and corners with a plumb bob as the work proceeds.
3.2	MAKING OPENINGS IN BRICK MASONRY
3.2.1	Before making opening it is necessary to examine that the wall exclusive of opening is adequate to take the load coming on the structure. All the structural members supported on the walls which have direct bearing over the area in which opening is to be made, shall be properly supported with props to relieve the load from masonry wall till the lintel over the opening is strong enough to take the load. Care should also be taken not to disturb the adjoining masonry.
3.2.2	The portion to be dismantled may be clearly marked on both sides of the wall. Dismantling shall be carried out from top to bottom within the marked area. The sides of the opening shall be as far as possible, parallel and perpendicular to the plane of wall.
3.2.3	Making Opening: I) The openings for fixing door/window frames shall be to the extent of accommodating the hold fast. The hold fasts shall be fixed in cement concrete 1:3:6 (1 cement: 3 coarse sand: 6 stone aggregate 20 mm nominal size) or in masonry as required. Where only opening is to be made in the masonry, the width of the opening shall be such that the sides of the masonry can be built true to line and plumb and such masonry built shall conform to the specifications of the particular type of masonry in which the opening is made with particular reference to size of corner stones

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

	etc. In order to get continuity with old masonry, proper key shall be provided. The height of the opening shall be such that it can accommodate the required depth of the RCC lintel also. II) The sides of opening in masonry shall be cleaned of all dust, mortar, brick bats/loose stones, chips etc. and the surface left rough and thoroughly wetted. III) The lintel shall be invariably cast first in the opening made for the purpose. One side of the shuttering shall be kept open in the beginning till the concrete is laid. The shuttering shall then be fixed for half of the opening and concreting completed. IV) Curing of lintel casted shall be done for a minimum period of 7 days. V) Precast RCC lintel or R.S. Joist may also be used if directed by the Engineer-in-Charge.
3.2.4	Finishing: I) After the surface of the sides of masonry opening and lintel are sufficiently dry and set, it shall be cleaned free of dust, loose mortar etc. and wetted thoroughly. It shall then be plastered or pointed as required flush with the surrounding masonry work. Any other portion of the wall if damaged shall be finished in similar manner. II) After the cement plaster/pointing has been thoroughly cured and have dried the surface shall be either white or colour washed/painted as required. The surface of the wall which is spoiled due to splashing of mortar shall be cleaned forthwith.
3.3	RE- PAINTING / WHITE WASHING
3.3.1	Scaffolding: I) Wherever scaffolding is necessary, it shall be erected on double supports tied together by horizontal pieces, over which scaffolding planks shall be fixed. No ballies, bamboos or planks shall rest on or touch the surface which is being white washed. II) For all exposed brick work or tile work, double scaffolding having two sets of vertical supports shall be provided. The supports shall

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

	be sound and strong, tied together with horizontal pieces over which scaffolding planks shall be fixed. Note : In case of special type of brick work, scaffolding shall be got approved from Engineer-in-Charge in advance. III) Where ladders are used, pieces of old gunny bags shall be tied on their tops to avoid damage or scratches to walls. IV) For white washing the ceiling, proper stage scaffolding shall be erected.
3.3.2	Preparation of Surface: I) Before new work is white washed, the surface shall be thoroughly brushed free from mortar droppings and foreign matter. II) In case of old work, all loose particles and scales shall be scrapped off and holes in plaster as well as patches of less than 50 sqcm area shall be filled up with mortar of the same mix. Where so specifically ordered by the Engineer-in-Charge, the entire surface of old white wash shall be thoroughly removed by scrapping and this shall be paid for separately. Where efflorescence is observed the deposits may be brushed clean and washed. The surface shall then be allowed to dry for at least 48 hours before white washing is done.
3.3.3	Preparation of Lime Wash: The lime wash shall be prepared from fresh stone white lime (Narnaul or Dehradun quality). The lime shall be thoroughly slaked on the spot, mixed and stirred with sufficient water to make a thin cream. This shall be allowed to stand for a period of 24 hours and then shall be screened through a clean coarse cloth. 40 gm of gum dissolved in hot water, shall be added to each 10 cubic decimeter of the cream. The approximate quantity of water to be added in making the cream will be 5 litres of water to one kg of lime. Indigo (Neel) upto 3 gm per kg of lime dissolved in water shall then be added and stirred well. Water shall then be added at the rate of about 5 litres per kg. of lime to produce a milky solution.
3.3.4	Application: I) The white wash shall be applied with moonj brushes to the

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

	specified number of coats. The operation for each coat shall consist of a stroke of the brush given from the top downwards, another from the bottom upwards over the first stroke, and similarly one stroke horizontally from the right and another from the left before it dries. II) Each coat shall be allowed to dry before the next one is applied. Further each coat shall be inspected and approved by the Engineer-in-Charge before the subsequent coat is applied. No portion of the surface shall be left out initially to be patched up later on. III) For new work, three or more coats shall be applied till the surface presents a smooth and uniform finish through which the plaster does not show. The finished dry surface shall not show any signs of cracking and peeling nor shall it come off readily on the hand when rubbed. IV) For old work, after the surface has been prepared a coat of white wash shall be applied over the patches and repairs. Then a single coat or two or more coats of white wash as stipulated in the description of the item shall be applied over the entire surface. The white washed surface should present a uniform finish through which the plaster patches do not appear. The washing on ceiling should be done prior to that on walls. Note : In case of Hessian ceiling, on no account, lime shall be used as it rots cloth and hessian.
3.3.5	Protective Measures Doors, windows, floors, articles of furniture etc. and such other parts of the building not to be white washed, shall be protected from being splashed upon. Splashing and droppings, if any shall be removed by the contractor at his own cost and the surfaces cleaned. Damages if any to furniture or fittings and fixtures shall be recoverable from the contractor.
4.0	EARTHWORK:
4.1	PROTECTIONS
4.1.1	Excavation where directed by the Engineer-in-Charge shall be securely barricaded and provided with proper caution signs, conspicuously displayed during the day and properly illuminated with red lights and/or written using fluorescent reflective paint as directed by Engineer-in-

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

	charge during the night to avoid accident.
4.1.2	The Contractor shall take adequate protective measures to see that the excavation operations do not damage the adjoining structures or dislocate the services. Water supply pipes, sluice valve chambers, sewerage pipes, manholes, drainage pipes and chambers, communication cables, power supply cables etc. met within the course of excavation shall be properly supported and adequately protected, so that these services remain functional. However, if any service is damaged during excavation shall be restored in reasonable time.
4.1.3	Excavation shall not be carried out below the foundation level of the adjacent buildings until underpinning, shoring etc. is done as per the directions of the Engineer-in-Charge for which payment shall be made separately.
4.1.4	Any damages done by the contractor to any existing work shall be made good by him at his own cost. Existing drains pipes, culverts, overhead wires, water supply lines and similar services encountered during the course of execution shall be protected against damage by the contractor. The contractor shall not store material or otherwise occupy any part of the site in manner likely to hinder the operations of such services.
4.2	SITE CLEARANCE
4.2.1	Before the earth work is started, the area coming under cutting and filling shall be cleared of shrubs, rank vegetation, grass, brushwood, trees and saplings of girth up to 30cm measured at a height of one metre above ground level and rubbish removed up to a distance of 50 metres outside the periphery of the area under clearance. The roots of trees and saplings shall be removed to a depth of 60cm below ground level or 30 cm below formation level or 15 cm below sub grade level, whichever is lower, and the holes or hollows filled up with the earth, rammed and leveled.
4.2.2	Lead of 50 m mentioned in the 'Schedule Of Quantities' is the average lead for the disposal of excavated earth within the site of work. The actual lead for the disposal of earth may be more or less than the 50 m for which no cost adjustment shall be made in the rates.
4.2.3	Disposal of Earth shall be disposed off at the specified location or as decided by the Engineer-in- Charge. The contractor has to take written permission about place of disposal of earth before the earth is disposed-off, from Engineer-in-Charge.
4.3	SURFACE DRESSING: Surface dressing shall include cutting and filling up to a depth of 15 cm

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

	and clearing of shrubs, rank vegetation, grass, brushwood, trees and saplings of girth upto 30 cm measured at a height of one metre above the ground level and removal of rubbish and other excavated material upto a distance of 50 metres outside the periphery of the area under surface dressing. High portions of the ground shall be cut down and hollows depression filled upto the required level with the excavated earth so as to give an even, neat and tidy look.
4.4	EXCAVATION IN ALL KIND OF SOILS: I) After site clearance and before commencement of excavation or filling, the contractor shall take levels at 3 meters intervals in either directions or at lesser intervals as considered necessary at site for the entire plot. A record of these levels shall be signed jointly by contractor, Engineer-in-charge of BHEL. II) All excavation operations manually or by mechanical means shall include excavation and 'getting out' the excavated materials. In case of excavation for trenches, basements, water tanks etc. 'getting out' shall include throwing the excavated materials at a distance of at least one metre or half the depth of excavation, whichever is more, clear off the edge of excavation. In all other cases 'getting out' shall include depositing the excavated materials as specified. The subsequent disposal of the excavated material shall be either stated as a separate item or included with the items of excavation stating lead. III) During the excavation the natural drainage of the area shall be maintained. Excavation shall be done from top to bottom. Undermining or undercutting shall not be done. IV) In firm soils, the sides of the trenches shall be kept vertical up to a depth of 2 metres from the bottom. For greater depths, the excavation profiles shall be widened by allowing steps of 50 cms on either side after every 2 metres from the bottom. Alternatively, the excavation can be done so as to give slope of 1:4 (1 horizontal: 4 vertical). Where the soil is soft, loose or slushy, the width of steps shall be suitably increased or sides sloped or the soil shored up as directed by the Engineer-in- Charge. It shall be the responsibility of the contractor to take complete instructions in writing from the

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

	Engineer-in-Charge regarding the stepping, sloping or shoring to be done for excavation deeper than 2 metres. V) The excavation shall be done true to levels, slope, shape and pattern indicated by the Engineer-in-Charge. Only the excavation shown on the drawings with additional allowances for centering and shuttering or as required by the Engineer-in-Charge shall be measured and recorded for payment. VI) In case of excavation for foundation in trenches or over areas, the bed of excavation shall be to the correct level or slope and consolidated by watering and ramming. If the excavation for foundation is done to a depth greater than that shown in the drawings or as required by the Engineer-in-Charge, the excess depth shall be made good by the contractor at his own cost with the concrete of the mix used for levelling/ bed concrete for foundations. Soft/defective spots at the bed of the foundations shall be dug out and filled with concrete (to be paid separately) as directed by the Engineer-in-Charge. VII) While carrying out the excavation for drain work care shall be taken to cut the side and bottom to the required shape, slope and gradient. The surface shall then be properly dressed. If the excavation is done to a depth greater than that shown on the drawing or as required by the Engineer-in-Charge, the excess depth shall be made good by the contractor at his own cost with stiff clay puddle at places where the drains are required to be pitched and with ordinary earth, properly watered and rammed, where the drains are not required to be pitched. In case the drain is required to be pitched, the back filling with clay puddle, if required, shall be done simultaneously as the pitching work proceeds. The brick pitched storm water drains should be avoided as far as possible in filled-up areas and loose soils. VIII) In all other cases where the excavation is taken deeper by the contractor, it shall be brought to the required level by the contractor at his own cost by filling in with earth duly watered, consolidated and rammed. IX) In case the excavation is done wider than that shown on the drawings or as required by the Engineer-in-Charge, additional filling wherever required on the account shall be done by the contractor at his own cost. X) The excavation shall be done manually or by mechanical means as
--	--

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

	directed by Engineer-in-charge considering feasibility, urgency of work, availability of labour /mechanical equipments and other factors involved. Contractor shall ensure every safety measures for the workers. Neither any deduction will be made nor any extra payment will be made on this account.				
4.5	WATER BOUND MACADAM WITH STONE AGGREGATE: Stone aggregate of specified size is used. This is a standard sub base/base and is used where stone aggregate is available at reasonable rates. This consists of clean crushed coarse aggregate mechanically interlocked by rolling and voids thereof filled with screening and binding material with the assistance of water, laid on a prepared sub grade, sub-base, base or existing pavement as the case may be. Water bound macadam may be used as a sub base, base course or surfacing course.				
4.5.1	QUANTITIES OF MATERIALS: Quantities of coarse aggregate, screening and binding material required to be stacked for 100 mm approximate compacted thickness of W.B.M. for 10 sqm. for stone aggregate of the size 90 mm to 45 mm and for stone aggregate of other size, 63 mm to 45 mm and 53 mm to 22.4 mm quantity of coarse aggregate and stone screening for 75 mm approximate compacted thickness of WBM base for 10 sqm. shall be as per Table Below:				
		Coarse Aggregate		Stone Screening	Binding Material
	Classification	Size Range	Net Quantities	Grading / Classification and Size	Quantity
	Grading I	90 mm to 45 mm	1.21 Cum to 1.28 Cum	Type A 13.2 mm	0.27 to 0.30 Cum
	Grading 2	63-45 mm	0.91 Cum to 0.96 Cum	Type A 13.2 mm	0.12 Cum to 0.15 Cum
	Grading 2	63-45 mm	0.91 Cum to 0.96 Cum	Type B 11.2 mm	0.20 Cum to 0.22 Cum
					0.08 Cum to .10 Cum
					0.10 Cum to 0.12 Cum
					0.16 Cum to 0.18 Cum

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

	Grading 3	53-22.4 mm	0.91 Cum to 0.96 Cum	Type B 11.2 mm	0.18 cum to 0.21 Cum	0.14 Cum to 0.17 Cum									
Note: Net Quantity = Loose Quantity measured in stacks minus 7.5%															
4.5.2	The quantity of binding material required for 75 mm (approximate) compacted thickness will be 0.09 cum/10 sqm in the case of W.B.M. base course and 0.13 cum/10 sqm when the W.B.M. is to function as a surface course.														
4.5.3	Preparation of Foundation In the case of an existing unsurfaced area, where new materials is to be laid, the surface shall be scarified and reshaped to the required grade, camber and shape as necessary. Weak places shall be strengthened, corrugations removed and depressions and pot holes made good with suitable materials, before spreading the aggregate for W.B.M. Where the existing surface over which the sub base of W.B.M. is to be laid is black topped, to ensure effective internal drainage, furrows 50 mm x 50 mm (depth of furrows increased to reach bottom of bituminous layer where necessary) at one metre intervals shall be cut in the existing bituminous surface at 45 degree to the central line of the carriageway before the W.B.M. is laid.														
5	BRICK WORK														
5.1	<u>MATERIAL:</u> Sand for masonry mortars – Unless otherwise indicated, sand for masonry mortars shall consist of natural coarse sand (generally termed as coarse sand) crushed stone sand or crushed sand or a combination of any of these approved by the Engineer-in-charge of BHEL conforming to IS : 2116-1965 specifications for sand for masonry mortars. Sand shall be hard, durable, clean and free from adherent coatings and impurities such as iron particles, alkalies, salts, coal, mica or similar laminated or other materials exceeding the specified limit. Grading of sand shall be as under: <table><tr><td>IS Sieve</td><td colspan="2">Percentage Passing by Weight</td></tr><tr><td colspan="3">-----</td></tr><tr><td></td><td>Unreinforced Masonry</td><td>Reinforced Masonry</td></tr></table>						IS Sieve	Percentage Passing by Weight		-----				Unreinforced Masonry	Reinforced Masonry
IS Sieve	Percentage Passing by Weight														

	Unreinforced Masonry	Reinforced Masonry													

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

	<table><tr><td>4.75 mm</td><td>100</td><td>100</td></tr><tr><td>2.36 mm</td><td>90-100</td><td>90-100</td></tr><tr><td>1.18 mm</td><td>70-100</td><td>70-100</td></tr><tr><td>600 Micron</td><td>40-100</td><td>40-100</td></tr><tr><td>300 Micron</td><td>05-70</td><td>05-70</td></tr><tr><td>150 Micron</td><td>0-15</td><td>0-15</td></tr></table>	4.75 mm	100	100	2.36 mm	90-100	90-100	1.18 mm	70-100	70-100	600 Micron	40-100	40-100	300 Micron	05-70	05-70	150 Micron	0-15	0-15
4.75 mm	100	100																	
2.36 mm	90-100	90-100																	
1.18 mm	70-100	70-100																	
600 Micron	40-100	40-100																	
300 Micron	05-70	05-70																	
150 Micron	0-15	0-15																	
	The maximum quantities of clay, fine silt and fine dust in sand shall not be more than 4 percent by weight, organic impurities shall be below that obtained by comparison with the standard solution as specified in IS:2386 (Part-II-1983).																		
5.2	<u>COMMON BURNT CLAY BUILDING BRICKS:</u> Common burnt clay building bricks (hereinafter termed as bricks) shall conform to the requirements laid down in IS:1077-1976 for common burnt clay building bricks. Bricks shall be class designation 75, sub class 'A' as per parameters given in the IS regarding edges, dimensions etc. The overall dimensions shall however be as per local practice of moulds. Water absorption after immersion in cold water for 24 hours shall not exceed 20% and grading for efflorescence shall be less than moderate. Bricks shall be free from cracks, flaws and nodules of free lime. Dimension shall be all within tolerance. Under/over burnt bricks and warped bricks shall be totally rejected. Bricks shall be of first class quality and from Kilns approved by BHEL.																		
5.3	<u>WORKMANSHIP – MASONRY MORTARS:</u>																		
5.3.1	<u>PREPARATION OF CEMENT MORTARS:</u> Mortar shall be of mix as indicated. The mixing specified is by volume. Mixing shall be done in a mechanical mixer. The mortar shall be mixed for at least three minutes after adding of water. Cement mortar be freshly mixed for immediate use. Any mortar which has commenced to set shall be discarded and removed from the site.																		
5.3.2	<u>BOND:</u> All brick works shall be built in English bond, unless otherwise indicated. Half brick walls shall be built in stretcher bond. Header bond shall be used for walls curved on plan for better alignment, header bond shall also be used in foundation, stretchers may be used when the thickness of wall renders use of header impracticable. Where the																		

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

	thickness of footings is uniform or a number of courses, the top course of the footing shall be of headers. For load bearing walls, brick course at DPC level and at all slab levels below the bearing of slab shall be as bricks on edges. Half or cut brick shall not be used except where it is necessary to complete the bond. Overlap in stretcher bond is usually half brick and is obtained by commencing each alternate course with a half brick. The overlap in header bond, which is equally half the width of the brick, is obtained by introducing a three-quarter brick in each alternate course at quoins. In general, the cross joints in any course of brick work shall not be nearer than a quarter of brick length from those in the course below or above it.
5.3.3	<u>CURING:</u> The bricks shall be adequately wet before use and brick work shall be constantly kept wet for at least seven days.
5.4	<u>HALF BRICK WALLS:</u> The bricks shall be laid in stretcher bond in cement and sand mortar 1:4 (1 cement: 4 coarse sand) or as indicated. The reinforcement shall be 2 Nos. MS round bars or as indicated and as described in section-VII steel and iron work. The diameter of bars shall be 6 mm. The first layer of reinforcement shall be used at second course and then at every fourth course of brick work. The bars shall be properly anchored at their ends where the portions and or where these walls join with other walls. The laid steel reinforcement shall be completely embedded in mortar. Overlap in reinforcement if any, shall not be less than 1 foot. The cover i.e. the mortar interposed between the reinforcement bars and brick shall not be less than 6 mm. The mortar covering in the direction of joints shall be not less than 15 mm.
5.5	<u>BRICK WORK IN FOUNDATION UPTO PLINTH:</u> Brick work in foundation shall be with brick of class designation 7.5 upto plinth level in cement mortar 1:6 (1 cement: 6 coarse sand). Brick masonry wall shall be at locations shown on drawings in all the blocks.
5.6	<u>BRICK WORK IN SUPER STRUCTURE:</u> Brick work in superstructure including parapets etc. shall be bricks of class designation 7.5 in cement mortar 1:6 (1 cement: 6 coarse sand).

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

6.0	<u>CONCRETE (PLAIN & REINFORCED):</u> <u>DESCRIPTION:</u> The section covers the requirements for the furnishing of cement concrete work including materials, proportioning, batching, mixing, testing, placing, compacting, finishing, jointing, curing and all other work as required for cast-in-place reinforced concrete. Cement concrete shall be composed of cement, fine aggregate, coarse aggregate, water, with or without admixtures as approved, proportioned and mixed as specified. Approved make of Plasticizers may be used with specific approval of BHEL.
6.1	<u>SLUMP:</u> Only sufficient water shall be added to the cement and aggregate during mixing to produce concrete having a sufficient workability to enable it to be well consolidated, to be worked in to the corners of the shuttering and around the reinforcement to give the specified surface finish, and to have the specified strength. Water cement ratio shall be maintained as per IS:456-2000 when a suitable amount of water has been determined, the resulting consistency shall be maintained through out the corresponding parts of the work and tests shall be conducted to ensure the maintenance of this consistency according to the standard method of test for consistencies of concrete (slump test). Slump shall be determined at the point of placement after concrete has been deposited. Water cement ratio will be got approved from BHEL and as a guide it will be 0.55 to 0.45.
6.2	<u>ADMIXTURES:</u> Admixtures as approved by BHEL may be used strictly as per IS:456-2000 and nothing extra will be paid for the use of the same. Admixture used should not impair durability of concrete nor combine with constituents to form harmful compounds not increase the risk of corrosion of reinforcement. Dosages of retarders, plasticizers and super-plasticizers if used shall not exceed 0.5, 1.0 and 2.0 percent respectively by weight of cementitious materials.
6.3	<u>REPORT FOR INSPECTION AND TESTING:</u> During concreting operations, the Contractor shall conduct inspection and testing as described in subsequent paras, and all reports thereon shall be submitted in summary form to the Engineer-in-charge of BHEL.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

6.4	<u>MATERIALS:</u> Before bringing to the site, all materials for cement concrete shall be got approved by the BHEL. All samples as approved shall be deposited in the office of BHEL before placing orders for the materials with suppliers. The materials brought on to the works shall conform in every respect to their approved samples. Fresh samples will be deposited with BHEL whenever type of source of any material changes. The Contractor shall check each fresh consignment of materials as it is brought on to the works to ensure that they conform to the specifications and/or approved samples. The BHEL shall have the option to have any of the materials tested at an independent Laboratory to find whether they are in accordance with specifications at the Contractor's expense. All bills, vouchers and test certificate which in the opinion of BHEL are necessary to convince him as to the quality of materials or their suitability shall be produced for his inspection when required. Any materials which have not been found to conform to the specifications and not approved by the BHEL shall be rejected forthwith and shall be removed from the site by the Contractor at his own cost within the time as stipulated. The BHEL shall have the powers to cause the Contractors to purchase and use materials from any particular source, as may be in his opinion be necessary for the proper execution of the work.
6.5	<u>PLANT:</u> The Contractor shall obtain the approval of the BHEL for all plants he proposes to use for the manufacture and placing of concrete. The arrangement and capacity of plant for the manufacture of concrete shall be agreed with BHEL and equipment plant and machinery as considered necessary for obtaining quality and speed of construction will require to be used by Contractor within his cost. The Contractor shall maintain all items of plant at all times in a clean and efficient working condition.
6.6	<u>CEMENT:</u> Cement shall be stored on a raised floor in dry weather proof and draught free but well ventilated shed. Cement bags shall be stacked close together

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

	away from external walls and in stack not more than ten bags to avoid lumping under pressure. Cement stored during monsoon or cement expected to be in store for more than eight weeks shall be completely enclosed in suitable gauge polythene sheet so arranged that the flap close on the top stack. The Contractor shall ensure that protective polythene sheet is not damaged at any time during use. Consignments of cement shall be used in order of delivery. A record shall be kept of the batch numbers of cement deliveries in such a form that the part of the works in which the cement is used can be readily identified. The Contractor shall be responsible for the storage of cement at the site and no claim will be entertained in the event of any damage occurring to cement due to faulty storage by the Contractors or on account of his negligence. Cement stored on site for a period longer than eight weeks shall be tested to the satisfaction of the BHEL before it is used in the works. Cement which has so deteriorated in quality that it no longer conforms in all respects to the requirements of this specification will be condemned by the BHEL and shall not be used in the works. The Contractor shall immediately remove from the site all cement which has been so condemned.
6.7	AGGREGATES: Aggregates shall be stored on a suitable well drained raft of concrete, timber, metal or other approved material. The storage of aggregate on the ground will not be permitted. Each size of aggregate shall be stored separately in such a manner as to prevent spillage and mixing of one aggregate with an adjacent aggregate. The aggregate in the bins shall be so deposited that a minimum of 300 mm is left between the top of the division wall and any part of the aggregate stack.
6.8	POURING AND CONSOLIDATION: The layers of concrete shall be placed that the bottom layer does not

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

	finally set before the top layer is placed. The vibrators shall maintain the whole of concrete under treatment in an adequate state of agitation, such that demarcation and effective compaction is attained at a state, commensurate with the supply of concrete from mixers. The vibrator shall continue during the whole period occupied by placing of concrete, the vibrators being adjusted so that the center vibrations approximates to the center of the mass being compacted at the time of placing. Shaking of pouring of concrete and reinforcement for the purpose of compaction should be avoided. Compaction shall be completed before initial setting starts i.e. within thirty minute of addition of water to the dry mixtures are shall be taken to ensure that concrete is not over liberated so as to cause segregation. The concrete shall be deposited in its final position in a manner to preclude segregation of ingredients. In deep trenches and footings, pile caps, concrete shall be placed through chutes. In case of column and walls, the shuttering shall be so adjusted that the vertical drop of concrete is not more than 1.5 m at a time. A key shall be made at the end of each casting in concrete columns of appropriate size to give proper bonding to columns as per relevant IS/directions of the BHEL. In case of concreting of slabs and beams, it shall be by pumping concrete and wherever permitted manually by BHEL, wooden planks or cat walks supported directly on the centering by means of wooden blocks or lugs shall be provided to convey the concrete to the place of deposition without disturbing the reinforcement in any way. Labour shall not be allowed to walk over the reinforcement. Pre-moulded cement cubes or plastic blocks will be placed between form work and reinforcement to achieve uniform cover of concrete. Where the shape of element is such that form work has re-entrant angles, the form work shall be removed as soon as possible after the concrete has set, to avoid shrinkage cracking occurring due to the restraint imposed.
6.9	SAMPLING AND TESTING OF CONCRETE: (TO TEST ITS COMPRESSIVE STRENGTH) Samples from fresh concrete shall be taken as per IS:1199-1959 (method of sampling of concrete) and cubes shall be made, cured and tested at 7 days for obtaining a quicker idea of strength of concrete and 28 days in accordance with IS:516-1959 (method of test for strength of concrete) for

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

	a acceptance/rejection of concrete. For testing cement concrete, the Contractor shall arrange for all tools/moulds for making necessary cubes and shall bear all the charges for making the cubes, curing and testing through an approved laboratory.
6.10	CURING: As soon as the concrete surface is hard enough to resist marring, curing shall be started. The concrete shall be kept covered with polythene sheet, waterproof paper or water holding materials such as straw or burlap or by spraying on a curing compound. If an approved curing compound is used, it should be applied immediately after final finishing. Care should be taken that adequate and uniform coverage is obtained. The concrete surface shall be kept constantly wet to avoid alternate wetting and drying the curing period.
7.0	<u>STRUCTURAL STEEL WORK FOR COLUMNS, TRUSSES (MEDIUM GRADE PIPES), PURLINS, SIDE TIES BOTTOM TIES ETC.</u>
7.1	Laying Out A figure of the steel structure to be fabricated shall be drawn on a level platform to full scale. This may be done in full or in parts, as shown on drawings or as directed by the Engineer-in-Charge of BHEL. Steel tape shall be used for measurements.
7.2	Fabrication Fabrication shall generally be done as specified in IS 800. In major works or where so specified, shop drawings giving complete information for the fabrication of the component parts of the structure including the location, type, size, length and details or rivets, bolts or welds, shall be prepared in advance of the actual fabrication and approved by the Engineer-in-charge. The drawings shall indicate the shop and field rivets, bolts and welds. The steel members shall be distinctly marked or stenciled with paint with the identification marks as given in the shop drawings. Great accuracy shall be observed in the fabrication of various members, so that these can be assembled without being unduly packed, strained or forced into position and when built up, shall be true and free from twist, kinks, buckles or open joints. Wooden or metal sheet templates shall be made to correspond to each member, and position of rivet holes shall be marked accurately on them and holes drilled. The templates shall then be laid on the steel members,

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

	and holes for riveting and bolting marked on them. The ends of the steel members shall also be marked for cutting as per required dimensions. The base of steel columns and the positions of anchor bolts shall be carefully set out at the required location.
7.3	The steel section shall be straight or to be straightened or flattened by pressure unless required to be of curvilinear form and shall free from twists. These shall be cut square either by shearing or sawing to correct length and measured by steel tape. No tow pieces shall be welded or joined to make up for the required length of member.
7.4	Erection Steel members shall be hoisted and erected in position carefully, without any damage to itself, other structures and equipment and injury to workmen. The method of hoisting and erection proposed to be adopted by the contractor shall be got approved from the Engineer-in-charge in advance. The contractor however shall be fully responsible for the work being carried out in a safe and proper manner without unduly stressing the various members and proper equipment such as derricks, lifting tackles, winches, ropes etc. shall be used.
7.5	The work of erection may be done in suitable units as may be directed by the Engineer-in-charge. Fabricated members shall be lifted at such points so as to avoid deformation or excessive stress in members. The structure or part of it placed in position shall be secured against over-turning or collapse by suitable means
7.6	Painting All surfaces which are to be painted, oiled or otherwise treated shall be dry and thoroughly cleaned to remove all loose scale and loose rust. Surfaces not in contact but inaccessible after shop assembly, shall receive the full specified protective treatment before assembly. This does not apply to the interior of sealed hollow sections. Part to be encased in concrete shall not be painted or oiled. A priming coat of approved steel primer such as Red Oxide/Zinc Chromate primer conforming to IS 2074 shall be applied before any member of steel structure are placed in position or taken out of workshop.
8.0	ROOFING:
8.1	CORRUGATED GALVANISED STEEL SHEET ROOFING C.G.S. Sheets These shall be of the thickness specified in the description of the item and shall conform to IS 277.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

	The sheets shall be of 275 grade of coating unless otherwise specified in the description of item.
8.2	The sheets shall be free from cracks, split edges, twists, surface flaws etc. They shall be clean, bright and smooth. The galvanizing shall be non-injured and in perfect condition. The sheets shall not show signs of rust or white powdery deposits on the surface. The corrugations shall be uniform in depth and pitch and parallel with the side.
8.3	Slope: Roof shall not be pitched at a flatter slope than 1 vertical to 5 horizontal. The normal pitch adopted shall usually be 1 vertical to 3 horizontal.
8.4	Laying and Fixing: The sheets shall be laid and fixed in the manner described below, unless otherwise shown in the working drawings or directed by the Engineer-in-Charge.
8.4.1	The sheets shall be laid on the purlins to a true plane, with the lines of corrugations parallel or normal to the sides of the area to be covered unless otherwise required as in special shaped roofs.
8.4.2	The sheets shall be laid with a minimum lap of 15 cm at the ends and 2 ridges of corrugations at each side. The above minimum end lap of 15 cm shall apply to slopes of 1 vertical to 2 horizontal and steeper slopes. For flatter slopes the minimum permissible end lap shall be 20 cm. The minimum lap of sheets with ridge, hip and valley shall be 20 cm measured at right angles to the line of the ridge, hip and valley respectively. These sheets shall be cut to suit the dimensions or shapes of the roof, either along their length or their width or in a slant across their lines of corrugations at hips and valleys. They shall be cut carefully with a straight edge chisel to give a smooth and straight finish.
8.4.3	Lapping in C.G.S. sheets shall be painted with a coat of approved steel primer and two coats of painting with approved paint suitable for G.S. sheet, before the sheets are fixed in place.
8.4.4	Sheets shall not generally be fixed into gables and parapets. They shall be bent up along their side edges close to the wall and the junction shall be protected by suitable flashing or by a projecting drip course, the later to cover the junction by at least 7.5 cm. The laying operation shall include all scaffolding work involved.
8.4.5	Sheets shall be fixed to the purlins or other roof members such as hip or valley rafters etc. with galvanised J or L hook bolts and nuts, 8 mm diameter, with bitumen and G.I. limpet washers or with a limpet washer filled with white lead as directed by the Engineer-in-Charge. While J

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

	hooks are used for fixing sheets on angle iron purlins, and L hooks are used for fixing the sheet to R.S. joists, timber or precast concrete purlins. The length of the hook bolt shall be varied to suit the particular requirements. The bolts shall be sufficiently long so that after fixing they project above the top of the nuts by not less than 10 mm. The grip of J or L hook bolt on the side of the purlin shall not be less than 25 mm. There shall be a minimum of three hook bolts placed at the ridges of corrugations in each sheet on every purlin and their spacing shall not exceed 30 cm. Coach screws shall not be used for fixing sheets to purlins.																
8.4.6	The galvanized coating on J or L hooks, and bolts shall be continuous and free from defects such as blisters, flux stains, drops, excessive projections or other imperfections which would impair serviceability. The galvanized coating should conform to IS 1367 (Pt. XIII) The mass of coating per square meter of the surface shall be as under: <table><tr><th colspan="4">Mass and Equivalent Thickness of Coating</th></tr><tr><th>Minimum Mass</th><th>Average Thickness</th><th>Minimum Mass</th><th>Individual Thickness</th></tr><tr><td>(g/m²)</td><td>(µm)</td><td>(g/m²)</td><td>(µm)</td></tr><tr><td>375</td><td>54</td><td>300</td><td>43</td></tr></table>	Mass and Equivalent Thickness of Coating				Minimum Mass	Average Thickness	Minimum Mass	Individual Thickness	(g/m ²)	(µm)	(g/m ²)	(µm)	375	54	300	43
Mass and Equivalent Thickness of Coating																	
Minimum Mass	Average Thickness	Minimum Mass	Individual Thickness														
(g/m ²)	(µm)	(g/m ²)	(µm)														
375	54	300	43														
8.4.7	Where slopes of roofs are less than 21.5 degrees (1 vertical to 2.5 horizontal) sheets shall be joined together at the side laps by galvanized iron bolts and nuts 25 × 6 mm size, each bolt provided with a bitumen and a G.I. limpet washer or a G.I. limpet washer filled with white lead. As the overlap at the sides extends to two corrugations, these bolts shall be placed zig-zag over the two overlapping corrugations, so that the ends of the overlapping sheets shall be drawn tightly to each other. The spacing of these seam bolts shall not exceed 60 cm along each of the staggered rows. Holes for all bolts shall be drilled and not punched in the ridges of the corrugations from the underside, while the sheets are on the ground.																
8.5	Wind Tie: Wind ties shall be of 40 x 6 mm flat iron section or of other size as specified. These shall be fixed at the heaves of the sheets. The fixing shall be done with the same hook bolts which secure the sheets to the purlins. The ties shall be paid for separately unless described in the item of roofing.																
8.6	Finish: The roof when completed shall be true to lines, and slopes and shall be leak proof.																
8	CEILING																

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

9	<u>FINISHING:</u>
9.1	CEMENT PLASTER The cement plaster shall be 12 mm, 15 mm or 20 mm thick as specified in the item.
9.1.1	Scaffolding For all exposed brick work or tile work double scaffolding independent of the work having two sets of vertical supports shall be provided. The supports shall be sound and strong, tied together with horizontal pieces over which scaffolding planks shall be fixed. For all other work in buildings, single scaffolding shall be permitted. In such cases the inner end of the horizontal scaffolding pole shall rest in a hole provided only in the header course for the purpose. Only one header for each pole shall be left out. Such holes for scaffolding shall, however, not be allowed in pillars/columns less than one metre in width or immediately near the skew backs of arches. The holes left in masonry works for scaffolding purposes shall be filled and made good before plastering. Note: In case of special type of brick work, scaffolding shall be got approved from Engineer-in-charge in advance.
9.1.2	Preparation of Surface The joints shall be raked out properly. Dust and loose mortar shall be brushed out. Efflorescence if any shall be removed by brushing and scrapping. The surface shall then be thoroughly washed with water, cleaned and kept wet before plastering is commenced. In case of concrete surface if a chemical retarder has been applied to the form work, the surface shall be roughened by wire brushing and all the resulting dust and loose particles cleaned off and care shall be taken that none of the retarders is left on the surface.
9.1.3	Mortar The mortar of the specified mix using the type of sand described in the item shall be used. For external work and under coat work, the fine aggregate shall conform to grading IV. For finishing coat work the fine aggregate conforming to grading zone V shall be used.
9.1.4	Application of Plaster Ceiling plaster shall be completed before commencement of wall plaster.
9.1.5	Plastering shall be started from the top and worked down towards the floor. All putlog holes shall be properly filled in advance of the plastering as the scaffolding is being taken down. To ensure even thickness and a

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

	true surface, plaster about 15 × 15 cm shall be first applied, horizontally and vertically, at not more than 2 metres intervals over the entire surface to serve as gauges. The surfaces of these gauged areas shall be truly in the plane of the finished plaster surface. The mortar shall then be laid on the wall, between the gauges with trowel. The mortar shall be applied in a uniform surface slightly more than the specified thickness. This shall be brought to a true surface, by working a wooden straight edge reaching across the gauges, with small upward and side ways movements at a time. Finally the surface shall be finished off true with trowel or wooden float according as a smooth or a sandy granular texture is required. Excessive troweling or over working the float shall be avoided.
9.1.6	All corners, arrises, angles and junctions shall be truly vertical or horizontal as the case may be and shall be carefully finished. Rounding or chamfering corners, arrises, provision of grooves at junctions etc. where required shall be done without any extra payment. Such rounding, chamfering or grooving shall be carried out with proper templates or battens to the sizes required.
9.1.7	When suspending work at the end of the day, the plaster shall be left, cut clean to line both horizontally and vertically. When recommencing the plastering, the edge of the old work shall be scrapped cleaned and wetted with cement slurry before plaster is applied to the adjacent areas, to enable the two to properly join together. Plastering work shall be closed at the end of the day on the body of wall and not nearer than 15 cm to any corners or arrises. It shall not be closed on the body of the features such as plasters, bands and cornices, nor at the corners of arrises. Horizontal joints in plaster work shall not also occur on parapet tops and copings as these invariably lead to leakages. The plastering and finishing shall be completed within half an hour of adding water to the dry mortar. No portion of the surface shall be left out initially to be patched up later on. The plastering and finishing shall be completed within half an hour of adding water to the dry mortar.
9.1.8	Thickness Where the thickness required as per description of the item is 20 mm the average thickness of the plaster shall not be less than 20 mm whether the wall treated is of brick or stone. In the case of brick work, the minimum thickness over any portion of the surface shall be not less than 12 mm.
9.1.9	Curing Curing shall be started as soon as the plaster has hardened sufficiently

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

	not to be damaged when watered. The plaster shall be kept wet for a period of at least 7 days. During this period, it shall be suitably protected from all damages at the contractor's expense by such means as the Engineer-in-Charge may approve. The dates on which the plastering is done shall be legibly marked on the various sections plastered so that curing for the specified period thereafter can be watched.
9.1.10	Finish The plaster shall be finished to a true and plumb surface and to the proper degree of smoothness as required. The work shall be tested frequently as the work proceeds with a true straight edge not less than 2.5 m long and with plumb bobs. All horizontal lines and surfaces shall be tested with a level and all jambs and corners with a plumb bob as the work proceeds.
9.1.11	Precaution Any cracks which appear in the surface and all portions which sound hollow when tapped, or are found to be soft or otherwise defective, shall be cut out in rectangular shape and redone as directed by the Engineer-in-Charge. (i) When ceiling plaster is done, it shall be finished to chamfered edge at an angle at its junction with a suitable tool when plaster is being done. Similarly when the wall plaster is being done, it shall be kept separate from the ceiling plaster by a thin straight groove not deeper than 6 mm drawn with any suitable method with the wall while the plaster is green. (ii) To prevent surface cracks appearing between junctions of column/beam and walls, 150 mm wide chicken wire mesh should be fixed with U nails 150 mm centre to centre before plastering the junction. The plastering of walls and beam/column in one vertical plane should be carried out in one go. For providing and fixing chicken wire mesh with U nails payment shall be made separately
9.2	PRESSED CERAMIC TILE FLOORING
9.2.1	Pressed Ceramic Tiles The tiles shall be of approved make and shall generally conform to IS 15622. They shall be flat, and true to shape and free from blisters crazing, chips, welts, crawling or other imperfections detracting from their appearance. The tiles shall be tested as per IS 13630.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

	Classification and Characteristics of pressed ceramic tiles shall be as per IS 13712. The tiles shall be square or rectangular of nominal size. Table 1,3,5, and 7 of IS 15622 give the modular preferred sizes and table 2,4,6 and 8 give the most common non modular sizes. Thickness shall be specified by the manufacturer. It includes the profiles on the visible face and on the rear side. Manufacturer/supplier and party shall choose the work size of tiles in order to allow a nominal joint width upto 2mm for unrectified floor tiles and upto 1mm for rectified floor tiles. The joint in case of spacer lug tile shall be as per spacer. The tiles shall conform to table10 of IS 15622 with water absorption 3 to 6% (Group BII). The top surface of the tiles shall be glazed. Glaze shall be either glossy or matt as specified. The underside of the tiles shall not have glaze on more than 5% of the area in order that the tile may adhere properly to the base. The edges of the tiles shall be preferably free from glaze. However, any glaze if unavoidable, shall be permissible on only upto 50 per cent of the surface area of the edges.
9.2.2	Colored Tiles Only the glaze shall be colored as specified. The sizes and specifications shall be the same as for the white glazed tiles.
9.2.3	Decorative Tiles The type and size of the decorative tiles shall be as follows : (i) Decorated white back ground tiles The size of these tiles shall be as per IS 15622. (ii) Decorated and having coloured back-ground The sizes of the tiles shall be as per IS 15622.
9.2.4	Preparation of Surface and Laying Base concrete or the RCC slab on which the tiles are to be laid shall be cleaned, wetted and mopped. The bedding for the tile shall be with cement mortar 1:4 (1 cement : 4 coarse sand) or as specified. The average thickness of the bedding shall be 20 mm or as specified while the thickness under any portion of the tiles shall not be less than 10 mm. Mortar shall be spread, tamped and corrected to proper levels and allowed to harden sufficiently to offer a fairly rigid cushion for the tiles to be set and to enable the mason to place wooden plank across and squat on it.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

	Over this mortar bedding neat grey cement slurry of honey like consistency shall be spread at the rate of 3.3 kg of cement per square metre over an area upto one square metre. Tiles shall be soaked in water washed clean and shall be fixed in this grout one after another, each tile gently being tapped with a wooden mallet till it is properly bedded and in level with the adjoining tiles. The joints shall be kept as thin as possible and in straight lines or to suit the required pattern. The surface of the flooring during laying shall be frequently checked with a straight edge about 2 m long, so as to obtain a true surface with the required slope. In bath, toilet W.C. kitchen and balcony/verandah flooring, suitable tile drop or as shown in drawing will be given in addition to required slope to avoid spread of water. Further tile drop will also be provided near floor trap. Where full size tiles cannot be fixed these shall be cut (sawn) to the required size, and their edge rubbed smooth to ensure straight and true joints. Tiles which are fixed in the floor adjoining the wall shall enter not less than 10 mm under the plaster, skirting or dado. After tiles have been laid surplus cement slurry shall be cleaned off.
9.2.5	Pointing and Finishing The joints shall be cleaned off the grey cement slurry with wire/coir brush or trowel to a depth of 2 mm to 3 mm and all dust and loose mortar removed. Joints shall then be flush pointed with white cement added with pigment if required to match the color of tiles. Where spacer lug tiles are provided, the half the depth of joint shall be filled with polysulphide or as specified on top with under filling with cement grout without the lugs remaining exposed. The floor shall then be kept wet for 7 days. After curing, the surface shall be washed and finished clean. The finished floor shall not sound hollow when tapped with a wooden mallet.
9.3	PRESSED CERAMIC TILES IN SKIRTING AND DADO
9.3.1	The tiles shall be of approved make and shall generally conform to IS 15622. The tiles shall be pressed ceramic covered by a glaze thoroughly matured and fitted to the body. The tiles shall be sound, true to shape, flat and free from flaws and other manufacturing defects affecting their utility. The top surface of the tiles shall be glazed. The underside of the tiles shall

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

	not have glaze on more than 5% of the area in order that the tile may adhere properly to the base. The edges of the tiles shall be free from glaze, however, any glaze if unavoidable shall be permissible on only upto 50 per cent of the surface area of edges. The glaze shall be free from welts, chips, craze, specks, crawlings or other imperfections detracting from the appearance when viewed from a distance of one metre. The glaze shall be either glossy or matt as specified. The glaze shall be white in colour except in the case of coloured tiles when colours shall be specified by the Engineer-in-Charge. There may be more than one colour on a tile.
9.3.2	Dimensions and Tolerances Glazed pressed cramic tiles shall be made square or rectangular in sizes Table 1, 3, 5 & 7 of IS 15622 give the modular sizes and table 2, 4, 6 & 8 of IS 15622 gives the sizes of non-modular tiles. The tiles shall conform to IS 15622 for dimensional tolerance, physical and chemical properties. Half tiles for use as full tiles shall have dimensions which shall be such as to make the half tiles when jointed together (with 1 mm joint) match with dimensions of full tiles. Tiles may be manufactured in sizes other than those specified above. The thickness of the tiles shall be 5 mm or 6 mm or as specified. The dimensions of fittings associated with the glazed tiles namely cover base, round edge tile, angles corner cups, ridge and legs, cronices and capping beads shall be of the shape and dimensions as required and the thickness of fittings shall be the same as the thickness of tiles given above.
9.3.3	Preparation of Surfaces The joints shall be raked out to a depth of at least 15 mm in masonry walls. In case of concrete walls, the surface shall be hacked and roughened with wire brushes. The surface shall be cleaned thoroughly, washed with water and kept wet before skirting is commenced.
9.3.4	Laying 12 mm thick plaster of cement mortar 1:3 (1 cement : 3 coarse sand) mix of as specified shall be applied and allowed to harden. The plaster shall be roughened with wire brushes or by scratching diagonal at closed intervals. The tiles should be soaked in water, washed clean, and a coat of cement slurry applied liberally at the back of tiles and set in the bedding mortar. The tiles shall be tamped and corrected to proper plane and lines. The

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

	tiles shall be set in the required pattern and jointed. The joints shall be as fine as possible. Top of skirting or dado shall be truly horizontal and joints truly vertical except where otherwise indicated. Odd size/cut size of tile shall be adjusted at bottom to take care of slope of the flooring. Skirting and dado shall rest on the top of the flooring. Where full size tiles cannot be fixed these shall be cut (sawn) to the required size and their edges rubbed smooth. Skirting /dado shall not project from the finished "surface of wall" by more than the tile thickness, undulations if any shall be adjusted in wall.
9.3.5	Curing and Finishing The joints shall be cleaned off the grey cement grout with wire/coir brush or trowel to a depth of 2 mm to 3 mm and all dust and loose mortar removed. Joints shall then be flush pointed with white cement added with pigments if required to match the colour of tiles. The work shall then be kept wet for 7 days. After curing, the surface shall be washed and finished clean. The finished work shall not sound hollow when tapped with a wooden mallet.
9.4	Aluminium Work
9.4.1	Aluminium Sections: Aluminium sections used for fixed/openable windows, ventilators, partitions, frame work & doors etc. shall be suitable for use to meet architectural designs to relevant works and shall be subject to approval of the Engineer-in-Charge for technical, structural, functional and visual considerations. The aluminium extruded sections shall conform to IS 733 and IS 1285 for chemical composition and mechanical properties. The stainless steel screws shall be of grade AISI 304. The permissible dimensional tolerances of the extruded sections shall be as per IS 6477 and shall be such as not to impair the proper and smooth functioning/operation and appearance of door and windows. Aluminium glazed doors, windows etc. shall be of sizes, sections and details as shown in the drawings. The details shown in the drawings may be varied slightly to suit the standards adopted by the manufacturers of the aluminium work, with the approval of Engineer-in-Charge. Before proceeding with any fabrication work, the contractor shall prepare and submit, complete fabrication and installation drawings for each type of glazing doors, windows, ventilators and partition etc. for the approval of

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

	the Engineer-in-Charge. If the sections are varied, the contractor shall obtain prior approval of Engineer-in- Charge and nothing extra shall be paid on this account.
9.4.2	Anodising: Standard aluminium extrusion sections are manufactured in various sizes and shapes in wide range of solid and hollow profiles with different functional shapes for architectural, structural glazing, curtain walls, doors, window & ventilators and various other purposes. The anodizing of these products is required to be done before the fabrication work by anodizing/electro coating plants which ensures uniform coating in uniform colour and shades. The extrusions are anodized up to 30 micron in different colours. The anodized extrusions are tested regularly under strict quality control adhering to Indian Standard.
9.4.3	Powder Coating I) Material: The powder used for powder coating shall be Epoxy/polyester powder of make approved by the Engineer-in-Charge. The contractor shall give detailed programme for powder coating in advance, to facilitate the inspection by Engineer-in-Charge or his authorized representative. II) Pre-treatment: Each aluminium alloy extrusion or performed section shall be thoroughly cleaned by alkaline or acidic solutions under the conditions specified by chemical conversion coating supplier and then rinsed. A chemical conversion coating shall be applied by treatment with a solution containing essentially chromate ions or chromate and phosphate ions as the active components as applicable. The amount of the conversion coating deposited depends on the type used by the conversion coating chemical supplier. The conversion coating shall be thoroughly rinsed either with the solution specified by the conversion coating chemical supplier or with de-mineralized water and then dried at the temperature for the time specified by the conversion coating chemical supplier. The contractor shall submit the detail specifications and application procedure for application of conversion coating for approval of Engineer-in-Charge. The metal surface after the conversion coating pretreatment and prior to the application of the coating shall be free from dust or powdery deposits.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

	III) Process: The polyester powder shall be applied by electrostatic powder spray method. Before start of powder coating the contractor shall submit detail specification for application of polyester powder from manufacturer of the polyester powder for approval of Engineer-in-Charge. The powder coating shall be applied as per the specification approved by Engineer-in-Charge. IV) Thickness: The thickness of the finished polyester powder coating measured by micron meter shall not be less than 40 micron nor more than 120 micron at any point. V) Performance Requirements for the Finish: (a) Surface appearance: The finish on significant surfaces shall show no scratches when illuminated and is examined at an oblique angle, no blisters, craters; pinholes or scratches shall be visible from a distance of about 1 m. There shall not be any visible variation in the colour of finished surfaces of different sections and between the colours of different surfaces of same section. (b) Adhesion: When a coated test piece is tested using a spacing of 2 mm between each of the six parallel cuts (the cut is made through the full depth of powder coating so that metal surface is visible) and a piece of adhesive tape, approximately 25 mm x 150 mm approved by the Engineer-in-Charge is applied firmly to the cut area and then removed rapidly by pulling at right angles to the test area, no pieces of the finish other than debris from the cutting operation shall be removed from the surface of the finish. VI) Protection of Powder Coated / Anodizing Finish: It is mandatory that all aluminium members shall be wrapped with self-adhesive non-staining PVC tape, approved by Engineer-in-Charge.
9.5	PANELLING MATERIAL:
9.5.1	Float Glass: The glass shall be clear float glass and should be approved by the Engineer in Charge. It shall be clear, float transparent and free from cracks subject to allowable defects. The float glass shall conform to the IS 14900.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

9.5.1.1	Thickness: The thickness of float glass shall depend on the size of panel. The tolerance in thickness shall be as under:				
	Nominal Thickness (in mm)		Tolerance (in mm)		
	4.0		± 0.3		
	5.0		± 0.3		
	6.0		± 0.3		
	8.0		± 0.6		
9.5.1.2	Allowable Defects: The allowable defects shall be as per Table below:				
	Sl. No.	Defects	Central	Outer	Remarks
	1.	Gaseous inclusion. Max size mm	3.0	6.0	Separated at least by 30.0 cm
	2.	Opaque gaseous inclusion. (Max size. Mm)	3.0	6.0	Separated by at least 60.0 cm
	3.	Knots, dirt and stones, Max size. mm	1.0	1.0	Separated by at least 30.0 cm
	4.	Scratches, Rubs and Crush	Faint	Light	Separated by at least 30.0 cm
	5.	Bow, percent. Max	0.5	0.5	
	6.	Reams, Strings and lines	Light	Light	
	7.	Waviness	Nil	Nil	
	8.	Surplus Stains	Nil	Nil	
		Corner breakage and chip	Not more than Nominal Thickness of Float Glass		
9.5.1.3	Allowable Cluster of Defects: The allowable cluster of defects mentioned under Sl. No. 1, 2 & 3 of Table above shall be as per IS 14900.				
9.5.1.4	Tests				
9.5.1.4.1	Thickness: The thickness of float glass shall be measured with micrometers or a caliper which is graduated to 0.01 mm or with a measuring instrument having an equivalent capacity.				

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

9.5.1.4.2	Scratches, Rubs and Crush : Place the sample of float glass in a vertical position approximately 50 cm from the viewer's position and look through it using either day light without direct sunlight or a background light suitable for observing each type of defect. <table border="1" data-bbox="358 384 1367 600"> <tr> <th data-bbox="358 384 862 426">Intensity of Scratches, Rubs, Crush</th><th data-bbox="862 384 1367 426">Intensity Distance Limit</th></tr> <tr> <td data-bbox="358 426 862 510">Faint</td><td data-bbox="862 426 1367 510">Shall not be detectable beyond 50 cm</td></tr> <tr> <td data-bbox="358 510 862 600">Light</td><td data-bbox="862 510 1367 600">Detectable between 50-100 cm and not beyond 100 cm.</td></tr> </table>	Intensity of Scratches, Rubs, Crush	Intensity Distance Limit	Faint	Shall not be detectable beyond 50 cm	Light	Detectable between 50-100 cm and not beyond 100 cm.		
Intensity of Scratches, Rubs, Crush	Intensity Distance Limit								
Faint	Shall not be detectable beyond 50 cm								
Light	Detectable between 50-100 cm and not beyond 100 cm.								
9.5.1.4.3	Bow: Depending on the side on which bow is present, stand the sample vertically on a wooden plank. Stretch a thread edge to edge. Measure the longest perpendicular. Distance from the thread to the surface of float glass facing the thread and express it as percentage of the length of float glass from edge along the thread.								
9.5.1.4.4	Reams, Strings and Lines: Focus a light projector with a 500 W lamp and an objective lens with an approximate 5 cm aperture and about 30 cm focal length on a flat white projection screen placed about 760 cm from the light source in a dark room. Place the float glass in a vertical position parallel to the screen between the light and the screen. Move the glass slowly towards the screen with a vertical oscillating motion. The shadowgraph read out is the distance at which the distortion just blends with the general shadow of the glass on the screen. <table border="1" data-bbox="358 1161 1367 1388"> <tr> <th data-bbox="358 1161 862 1245">Intensity of Reams, Strings & Lines</th><th data-bbox="862 1161 1367 1245">Intensity Distance Limit</th></tr> <tr> <td data-bbox="358 1245 862 1287">Light</td><td data-bbox="862 1245 1367 1287">7.5 cm</td></tr> <tr> <td data-bbox="358 1287 862 1329">Medium</td><td data-bbox="862 1287 1367 1329">5.0 cm</td></tr> <tr> <td data-bbox="358 1329 862 1388">Light</td><td data-bbox="862 1329 1367 1388">2.5 cm</td></tr> </table>	Intensity of Reams, Strings & Lines	Intensity Distance Limit	Light	7.5 cm	Medium	5.0 cm	Light	2.5 cm
Intensity of Reams, Strings & Lines	Intensity Distance Limit								
Light	7.5 cm								
Medium	5.0 cm								
Light	2.5 cm								
9.5.1.4.5	Perspective Distortion: When tested as per test procedure described below it shall not give distorted vision of straight stripe pattern. Test Procedure for Perspective Distortion Perspective distortion shall be examined by looking through the specimen glass which may be placed at about 4.5 m distance in such a direction that the incident angle to it is 50 degree (4 mm or above) and by observing a screen set up perpendicularly to the line of vision about 4.5 m further ahead of the specimen over the total width of about middle part of the specimen from the horizontal direction. The specimen glass shall be kept with the drawn direction at manufacture vertical and, on the surface of the screen, the strip pattern of white and								

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

	black parallel straight lines of 25 mm width and inclined 45 degrees from the vertical shall be provided and its surface shall be luster less.																								
9.5.2	EPDM- GASKETS The EPDM Gaskets shall be of size and profile as shown in drawings and as called for, to render the glazing, doors, windows, ventilators etc. air and water tight. Samples of gaskets shall be submitted for approval and the EPDM gasket approved by Engineer-in-Charge shall only be used. The contractor shall submit documentary proof of using the above material in the work to the entire satisfaction of Engineer-in- Charge. The EPDM gasket shall meet the requirements as given in Table below: <table><tr><th>Sl. No.</th><th>Description</th><th>Standard Follow</th><th>Specification</th></tr><tr><td>1</td><td>Tensile Strength Kg.f /cm2</td><td>ASTM-D 412</td><td>70 Min.</td></tr><tr><td>2</td><td>Elongation at break %</td><td>ASTM-D 412</td><td>250 Min.</td></tr><tr><td>3</td><td>Modulus 100% kgf /cm2</td><td>ASTM-D 412</td><td>22 Min.</td></tr><tr><td>4</td><td>Compression set % at 0° CC 22 Hrs.</td><td>ASTM-D 395</td><td>50 Max.</td></tr><tr><td>5</td><td>Ozone Resistance</td><td>ASTM-D 1149</td><td>No visible cracks</td></tr></table>	Sl. No.	Description	Standard Follow	Specification	1	Tensile Strength Kg.f /cm2	ASTM-D 412	70 Min.	2	Elongation at break %	ASTM-D 412	250 Min.	3	Modulus 100% kgf /cm2	ASTM-D 412	22 Min.	4	Compression set % at 0° CC 22 Hrs.	ASTM-D 395	50 Max.	5	Ozone Resistance	ASTM-D 1149	No visible cracks
Sl. No.	Description	Standard Follow	Specification																						
1	Tensile Strength Kg.f /cm2	ASTM-D 412	70 Min.																						
2	Elongation at break %	ASTM-D 412	250 Min.																						
3	Modulus 100% kgf /cm2	ASTM-D 412	22 Min.																						
4	Compression set % at 0° CC 22 Hrs.	ASTM-D 395	50 Max.																						
5	Ozone Resistance	ASTM-D 1149	No visible cracks																						
9.5.3	SEALANT																								
9.5.3.1	The sealants of approved grade and colour shall only be used. The silicone for perimeter joints (between Aluminium section and RCC/Stone masonry) shall be of make approved by the Engineer in Charge.																								
9.5.3.2	Method of Application Surface Preparation: Clean all joints and glazing pockets by removing all foreign matter and contaminants such as grease, oil, dust, water, frost, surface dirt, old sealants or glazing compounds and protective coatings.																								
9.5.3.3	Masking Areas adjacent to joints shall be masked to ensure neat sealant lines. Masking tape shall not be allowed to touch clean surfaces to which the silicone sealant is to adhere. Tooling shall be completed in one continuous stroke immediately after sealant application and before a skin forms and masking shall be removed immediately after tooling.																								

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

9.5.3.4	Application Install backer rod of appropriate size and apply silicone sealant in a continuous operation using a positive pressure adequate to properly fill and seal the joint. The silicone sealant shall be tooled with light pressure to spread the sealant against backing material and the joint surfaces before a skin forms. A tool with convex profile shall be used to keep the sealant within the joint. Soap or water shall not be used as a tooling aid. Remove masking tape as soon as silicone joint is tooled. Tolerance: A tolerance of + 3 mm shall be allowed in the width of silicone joints. The depth of the joints at throat shall not be less than 6 mm.
9.6	PAINTING / SURFACE FINISHING:
9.6.1	WHITE WASHING
9.6.1.1	Preparation of Mix: I) The lime wash shall be prepared from fresh stone white lime (Narnaul or Dehradun quality) The lime shall be thoroughly slaked on the spot, mixed and stirred with sufficient water to make a thin cream. This shall be allowed to stand for a period of 24 hours and then shall be screened through a clean coarse cloth. 40 gm of gum dissolved in hot water, shall be added to each 10 cubic decimetre of the cream. The approximate quantity of water to be added in making the cream will be 5 litres of water to one kg of lime. II) Indigo (Neel) upto 3 gm per kg of lime dissolved in water, shall then be added and stirred well. Water shall then be added at the rate of about 5 litres per kg. of lime to produce a milky solution.
9.6.1.2	<u>Application:</u> I) The white wash shall be applied with moonj brushes to the specified number of coats. The operation for each coat shall consist of a stroke of the brush given from the top downwards, another from the bottom upwards over the first stroke, and similarly one stroke horizontally from the right and another from the left before it dries. II) Each coat shall be allowed to dry before the next one is applied. Further each coat shall be inspected and approved by the Engineer-in-Charge before the subsequent coat is applied. No

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

	portion of the surface shall be left out initially to be patched up later on. III) For new work, three or more coats shall be applied till the surface presents a smooth and uniform finish through which the plaster does not show. The finished dry surface shall not show any signs of cracking and peeling nor shall it come off readily on the hand when rubbed. IV) For old work, after the surface has been prepared as described coat of white wash shall be applied over the patches and repairs. Then a single coat or two or more coats of white wash as stipulated in the description of the item shall be applied over the entire surface. The white washed surface should present a uniform finish through which the plaster patches do not appear. The washing on ceiling should be done prior to that on walls. Note: In case of Hessian ceiling, on no account, lime shall be used as it rots cloth and hessian.
9.6.1.3	<u>Protective Measures:</u> Doors, windows, floors, articles of furniture etc. and such other parts of the building not to be white washed, shall be protected from being splashed upon. Splashings and droppings, if any shall be removed by the contractor at his own cost and the surfaces cleaned. Damages if any to furniture or fittings and fixtures shall be recoverable from the contractor.
9.6.2	WATER PROOFING CEMENT PAINT
9.6.2.1	The cement Paint shall be (conforming to IS 5410) of approved brand and manufacture. The cement Paint shall be brought to the site of work by the contractor in its original containers is sealed condition. The material shall be brought in at a time in adequate quantities to suffice for the whole work or at least a fortnight's work. The materials shall be kept in the joint custody of the Contractor and the Engineer-in-Charge. The empty containers shall not be removed from the site of work till the relevant item of the work has been completed and permission obtained from the Engineer-in-Charge.
9.6.2.2	Preparation of Surface For New Work, the surface shall be thoroughly cleaned of all mortar dropping, dirt dust, algae, grease and other foreign matter by brushing and washing. Pitting in plaster shall be made good and a coat of water

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

	proof cement Paint shall be applied over patches after wetting them thoroughly.
9.6.2.3	Preparation of Mix Cement Paint shall be mixed in such quantities as can be used up within an hour of its mixing as otherwise the mixture will set and thicken, affecting flow and finish. Cement Paint shall be mixed with water in two stages. The first stage shall comprise of 2 parts of cement Paint and one part of water stirred thoroughly and allowed to stand for 5 minutes. Care shall be taken to add the cement Paint gradually to the water and not vice versa. The second stage shall comprise of adding further one part of water to the mix and stirring thoroughly to obtain a liquid of workable and uniform consistency. In all cases the manufacturer's instructions shall be followed meticulously. The lids of cement Paint drums shall be kept tightly closed when not in use, as by exposure to atmosphere the cement Paint rapidly becomes air set due to its hygroscopic qualities. In case of cement Paint brought in gunny bags, once the bag is opened, the contents should be consumed in full on the day of its opening. If the same is not likely to be consumed in full, the balance quantity should be transferred and preserved in an airtight container to avoid its exposure to atmosphere.
9.6.2.4	<u>Application:</u> I) The solution shall be applied on the clean and wetted surface with brushes or spraying machine. The solution shall be kept well stirred during the period of application. It shall be applied on the surface which is on the shady side of the building so that the direct heat of the sun on the surface is avoided. The method of application of cement Paint shall be as per manufacturer's specification. The completed surface shall be watered after the day's work. II) The second coat shall be applied after the first coat has been set for at least 24 hours. Before application of the second or subsequent coats, the surface of the previous coat shall not be wetted. III) For new work, the surface shall be treated with three or more coats of water proof cement Paint as found necessary to get a uniform shade. IV) For old work, the treatment shall be with one or more coats as found necessary to get a uniform shade.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

9.6.2.5	Precaution I) Water proof cement Paint shall not be applied on surfaces already treated with white wash, colour wash, distemper dry or oil bound, varnishes, Paints etc. It shall not be applied on gypsums, wood and metal surfaces. If water proofing cement is required to be applied on existing surface, previously treated with white wash, colour wash etc., the surface shall be thoroughly cleaned by scrapping off all the white wash, colour wash etc. completely. Thereafter, a coat of cement primer shall be applied followed by two or more coat of water proof cement. II) The specifications in respect of scaffolding, protective measures, measurements and rate shall be as described under 13.14. The coefficient for cement Paint on RCC Jalli shall be the same as provided in Sl. No. 7 of Table 1 under para 13.23.6.4 for painting trellis for Jaffri work.
9.6.3	TEXTURED EXTERIOR PAINT,
9.6.3.1	Material The paint shall be (Texured exterior paint/Acrylic smooth exterior paint/premium acrylic smooth exterior paint) of approved brand and manufacture. This paint shall be brought to the site of work by the contractor in its original containers in sealed condition. The material shall be brought in at a time in adequate quantities to suffice for the whole work or at least a fortnight's work. The materials shall be kept in the joint custody of the contractor and the Engineer-in-Charge. The empty containers shall not be removed from the site of work till the relevant item of work has been completed and permission obtained from the Engineer-in-Charge.
9.6.3.2	Preparation of Surface For new work, the surface shall be thoroughly cleaned off all mortar dropping, dirt dust, algae, fungus or moth, grease and other foreign matter of brushing and washing, pitting in plaster shall make good, surface imperfections such as cracks, holes etc. should be repaired using white cement. The prepared surface shall have received the approval of the Engineer in charge after inspection before painting is commenced.
9.6.3.3	Application I) Base coat of water proofing cement paint.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

	All specifications in respect of base coat of water proofing cement paint shall be as described under 9.6.2. II) Before pouring into smaller containers for use, the paint shall be stirred thoroughly in its container, when applying also the paint shall be continuously stirred in the smaller containers so that its consistency is kept uniform. Dilution ratio of paint with potable water can be altered taking into consideration the nature of surface climate and as per recommended dilution given by manufacturer. In all cases, the manufacturer's instructions & directions of the Engineer-in-charge shall be followed meticulously. III) The lids of paint drums shall be kept tightly closed when not in use as by exposure to atmosphere the paint may thicken and also be kept safe from dust. IV) Paint shall be applied with a brush on the cleaned and smooth surface. Horizontal strokes shall be given, First and vertical strokes shall be applied immediately afterwards. This entire operation will constitute one coat. The surface shall be finished as uniformly as possible leaving no brush marks.
9.6.4	OIL BOUND WASHABLE DISTEMPER,
9.6.4.1	Materials Oil emulsion (Oil Bound) washable distemper (IS 428) of approved brand and manufacture shall be used. The primer where used as on new work shall be cement primer or distemper primer as described in the item. These shall be of the same manufacture as distemper. The distemper shall be diluted with water or any other prescribed thinner in a manner recommended by the manufacturer. Only sufficient quantity of distemper required for day's work shall be prepared. The distemper and primer shall be brought by the contractor in sealed tins in sufficient quantities at a time to suffice for a fortnight's work, and the same shall be kept in the joint custody of the contractor and the Engineer-in-Charge. The empty tins shall not be removed from the site of work, till this item of work has been completed and passed by the Engineer-in-Charge.
9.6.4.2	Preparation of the Surface For new work the surface shall be thoroughly cleaned of dust, old white or colour wash by washing and scrubbing. The surface shall then be allowed to dry for at least 48 hours. It shall then be sand papered to give a smooth and even surface. Any unevenness shall be made good by

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

	applying putty, made of plaster of paris mixed with water on the entire surface including filling up the undulations and then sand papering the same after it is dry. In the case of old work, all loose pieces and scales shall be removed by sand papering. The surface shall be cleaned of all grease, dirt etc. Pitting in plaster shall be made good with plaster of paris mixed with the colour to be used. The surface shall then be rubbed down again with a fine grade sand paper and made smooth. A coat of the distemper shall be applied over the patches. The patched surface shall be allowed to dry thoroughly before the regular coat of distemper is applied.
9.6.4.3	Application I) Priming Coat : The priming coat shall be with distemper primer or cement primer, as required in the description of the item. Note: If the wall surface plaster has not dried completely, cement primer shall be applied before distempering the walls. But if distempering is done after the wall surface is dried completely, distemper primer shall be applied. II) Oil bound distemper is not recommended to be applied, within six months of the completion of wall plaster. However, newly plastered surfaces if required to be distempered before a period of six months shall be given a coat of alkali resistant priming Paint conforming to IS 109 and allowed to dry for atleast 48 hours before distempering is commenced. For old work no primer coat is necessary. III) Distemper Coat: For new work, after the primer coat has dried for at least 48 hours, the surface shall be lightly sand papered to make it smooth for receiving the distemper, taking care not to rub out the priming coat. All loose particles shall be dusted off after rubbing. One coat of distemper properly diluted with thinner (water or other liquid as stipulated by the manufacturer) shall be applied with brushes in horizontal strokes followed immediately by vertical ones which together constitutes one coat. The subsequent coats shall be applied in the same way. Two or more coats of distemper as are found necessary shall be applied over the primer coat to obtain an

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

	even shade. A time interval of at least 24 hours shall be allowed between successive coats to permit proper drying of the preceding coat. For old work the distemper shall be applied over the prepared surface in the same manner as in new work. One or more coats of distemper as are found necessary shall be applied to obtain an even and uniform shade. 15 cm double bristled distemper brushes shall be used. After each day's work, brushes shall be thoroughly washed in hot water with soap solution and hung down to dry. Old brushes which are dirty and caked with distemper shall not be used on the work.
9.6.5	SYNTHETIC ENAMEL PAINT
9.6.5.1	Synthetic Enamel Paint (conforming to IS 2933) of approved brand and manufacture and of the required colour shall be used for the top coat and an undercoat of ordinary Paint of shade to match the top coat as recommended by the same manufacturer as far the top coat shall be used.
9.6.5.2	Painting on New Surface
9.6.5.2.1	Preparation of Surface: I) Wooden Surface: The wood work to be painted shall be dry and free from moisture. The surface shall be thoroughly cleaned. All unevenness shall be rubbed down smooth with sand paper and shall be well dusted. Knots, if any shall be covered with preparation of red lead made by grinding red lead in water and mixing with strong glue sized and used hot. Appropriate filler material conforming to IS 345 with same shade as Paint shall be used where specified. The surface treated for knotting shall be dry before Paint is applied. After obtaining approval of Engineer-in-Charge for wood work, the priming coat shall be applied before the wood work is fixed in position. After the priming coat is applied, the holes and indentation on the surface shall be stopped with glazier's putty or wood putty. Stopping shall not be done before the priming coat is applied as the wood will absorb the oil in stopping and the latter is therefore liable to crack. II) Iron & Steel Surface: All rust and scales shall be removed by scrapping or by brushing with steel wire brushes. Hard skin of oxide formed on the surface of wrought iron during rolling which becomes loose by rusting, shall be removed. All dust and

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

	dirt shall be thoroughly wiped away from the surface. If the surface is wet, it shall be dried before priming coat is undertaken. III) Plastered Surface: The surface shall ordinarily not be painted until it has dried completely. Trial patches of primer shall be laid at intervals and where drying is satisfactory, painting shall then be taken in hand. Before primer is applied, holes and undulations, shall be filled up with plaster of paris and rubbed smooth.
9.6.5.2.2	Application: The number of coats including the undercoat shall be as stipulated in the item. (a) Under Coat: One coat of the specified ordinary Paint of shade suited to the shade of the top coat, shall be applied and allowed to dry overnight. It shall be rubbed next day with the finest grade of wet abrasive paper to ensure a smooth and even surface, free from brush marks and all loose particles dusted off. (b) Top Coat: Top coats of synthetic enamel Paint of desired shade shall be applied after the undercoat is thoroughly dry. Additional finishing coats shall be applied if found necessary to ensure properly uniform glossy surface.
9.6.5.3	Painting on Old Surface
9.6.5.3.1	Preparation of Surface: Where the existing Paint is firm and sound it shall be cleaned of grease, smoke etc. and rubbed with sand paper to remove all loose particles dusted off. All patches and cracks shall then be treated with stopping and filler prepared with the specified Paint. The surface shall again be rubbed and made smooth and uniform. If the old paint is blistered and flaked it will be necessary to completely remove the same.
9.6.5.3.2	Painting: The number of coats as stipulated in the item shall be applied with synthetic enamel Paint. Each coat shall be allowed to dry and rubbed down smooth with very fine wet abrasive paper, to get an even glossy surface. If however, the surface is not satisfactory additional coats as required shall be applied to get correct finish.
10	SANITARY / SEWAGE

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

10.1	WHITE VITROUS CHINA PEDESTAL TYPE WATER CLOSET (EUROPEAN TYPE W.C. PAN)
10.1.1	GENERAL REQUIREMENTS FOR INSTALLATION OF W.C. PAN The work shall be carried out, complying in all respects with the requirements of relevant byelaws of the local body in whose jurisdiction the work is situated.
10.1.2	Any damage caused to the building, or to electric, sanitary, water supply or other, installations etc. therein, either due to negligence on the part of the contractor, or due to actual requirements of the work, shall be made good and the building or the installation shall be restored to its original condition by the contractor. Nothing extra shall be paid for such restoration works except where otherwise specified.
10.1.3	For making good the damage to the under mentioned items of work, the specifications as given in the following paras shall apply, unless directed otherwise. (a) Masonry Work: The masonry work shall be made good by using the same class of bricks, tiles or stones as was damaged during the execution of the work. The mortar used shall be cement mortar 1:5 (1 cement: 5 fine sand) or as directed by the Engineer-in-Charge. (b) Plain Concrete Work : Concrete work for sub-grade of the flooring, foundations and other plain concrete works shall be cement concrete 1:5:10 (1 cement : 5 coarse sand : 10 graded stone aggregate 40 mm nominal size). A coat of neat cement slurry shall be applied at the junction with old work, before laying fresh concrete. (c) Cement Concrete Flooring and R.C.C. Work : Cement concrete 1:2:4 (1 Cement : 2 Coarse sand : 4 graded stone aggregate 20 mm nominal size) shall be used after applying a coat of neat cement slurry at the junction with old work, and the surface finished to match with the surrounding surface. (d) Plastering: Cement plaster 1:4 (1 cement: 4 sand) shall be used. The sand shall be fine or coarse, as used in the original work. The surface shall be finished with two or more coats of white wash, colour wash, distemper or painting as required, but where the surface is not to be white washed, colour washed, distempered or painted, it shall be finished as required to match with the surrounding surface. (e) Other Items: Damage to any other item shall be made good as directed by the Engineer-in- Charge.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

	Note: In all the above operations the damaged portion shall be cut in regular geometric shape and cleaned before making good the same.
10.1.4	All exposed G.I., C.I. or lead pipes and fittings shall be painted with approved quality of paint and shade as specified. The painting work shall conform to specification described under SH: Painting.
10.1.5	All sanitary and plumbing work shall be carried out through licensed plumbers.
10.1.6	On completion of the work the site shall be cleaned and all rubbish disposed-off as directed by the Engineer-in-Charge.
10.1.7	Various sanitary fittings described under 17.1 including fixing shall be enumerated individually or in combination under relevant items of works as described below. When used in combination, specifications as described under relevant paras shall apply but nothing extra shall be paid for making connections required for successful functioning of the combination.
10.2	INSTALLATIONS OF FLUSHING CISTERN Fixing I) Low Level Cistern: The cistern shall be fixed on C.I. cantilever brackets which shall be firmly embedded in the wall in cement concrete (1:2:4) block 100 x 75 x 150 mm. Connection between cistern and closet shall be made by means of 40 mm dia flush bend with rubber or G.I. inlet connection as specified. II) Automatic Cistern: Clause as above shall apply except that CP Brass stop cock shall be provided for cistern having a capacity of more than 5 liter. The main & distribution flush pipe shall be fixed to the wall by means of standard pattern holder bat clamp. III) Painting: The brackets shall be painted, if specified, with two or more coats of paint of approved shade and quality.
10.3	WHITE VITROUS CHINA WASH BASIN
10.3.1	Wash basins shall be of white vitreous china conforming to IS 2556 (Part-I) and IS 2556 (Part-4). Wash basins either of flat back or angle back as specified shall be of one piece construction, including a combined overflow. All internal angles shall be designed so as to facilitate cleaning. Each basin shall have a rim on all sides, except sides in contact with the walls and shall have a skirting at the back. Basins shall be provided with single or double tap holes as specified. The tap holes shall be 28 mm square or 30 mm round or 25 mm round for pop

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

up hole. A suitable tap hole button shall be supplied if one tap hole is not required in installation. Each basin shall have circular waste hole to which the interior of basin shall drain. The waste hole shall be either rebated or beveled internally with dia meter of 65 mm at top. Each basin shall be provided with a non-ferrous 32 mm waste fitting. Stud slots to receive the brackets on the underside of the wash basin shall be suitable for a bracket with stud not exceeding 13 mm diameter, 5 mm high and 305 mm from the back of basin to the centre of the stud. The stud slots shall be of depth sufficient to take 5 mm stud. Every basin shall have an integral soap holder recess or recesses, which shall fully drain into the bowl. A slot type of overflow having an area of not less than 5 sq. cm, shall be provided and shall be so designed as to facilitate cleaning of the overflow.

Where oval shape or round shape wash basins are required to be fixed these shall be fixed preferably in RCC platform with local available stone topping either fully sunk in stone top or top flush with the stone topping as directed by Engineer-in-Charge.

The wash basins shall be one of the following patterns and sizes as specified

(a) Flat back: 660 x 460 mm (Surgeon's Basin)

630 x 450 mm

550 x 400 mm

450 x 300 mm

(b) Angle back: 600 x 480 mm

400 x 400 mm

White glazed pedestals for wash basins, where specified shall be provided. The quality of the glazing of the pedestal shall be exactly the same as that of the basin along with which it is to be installed. It shall be completely recessed at the back to accommodate supply and waste pipes and fittings. It shall be capable of supporting the basin rigidly and adequately and shall be so designed as to make the height from the floor to top of the rim of basin 75 to 80 cm. All the waste fittings shall be brass chromium plated, or as specified.

Waste Fittings for Wash Basins and Sinks

The waste fittings shall be of nickel chromium plated brass, with thickness of plating not less than service grade 2 of IS 4827 which is capable of receiving polish and will not easily scale off. The fitting shall conform in all respect to IS 2963 and shall be sound, free from laps, blow holes and fittings and other manufacturing defects. External and internal

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

	surfaces shall be clean and smooth. They shall be neatly dressed and be truly machined so that the nut smoothly moves on the body. Waste fitting for wash basins shall be of nominal size of 32 mm. Waste fittings for sinks shall be of nominal size 50 mm.
10.3.2	<u>Installation of wash Basin:</u> The installation shall consist of an assembly of wash basin, pillar taps, C.I. brackets, C.P. brass or P.V.C. union, as specified. The wash basin shall be provided with one or two 15 mm C.P. brass pillar taps, as specified. The height of top of the rim of wash basin from the floor level shall be within 750 mm to 800 mm. <u>Fixing:</u> The basin shall be supported on a pair of C.I. cantilever brackets conforming to IS 775 and be embedded in cement concrete (1:2:4) block 100 x 75 x 150 mm. Use of M.S. angle or Tee section as bracket is not permitted. Brackets shall be fixed in position before dado work is done. The wall plaster on the rear shall be cut to rest over the top edge of the basin so as not to leave any gap for water to seep through between wall plaster & skirting of basin. After fixing the basin, plaster shall be made good and surface finished matching with the existing one. S.C.I. floor traps conforming to IS 1729 having 50 mm water seal (minimum 35 mm in two pipe systems with gully trap) should be used. Waste pipes laid horizontally should have gradient not flatter than 1 in 50 and not steeper than 1 in 10. The waste water from wash basin shall be discharged directly to vitreous semi-circular open drain, discharging to a floor trap and finally to the vertical stack on upper floors and in case of ground floor, the waste water shall be discharged either directly to the gully trap or through the floor trap. C.P. brass trap and union are not to be used in such situations. If waste pipe is concealed or crosses the wall, waste water shall be discharged through non-ferrous trap like PVC Engineering plastic or C.P. brass and union to vertical stack. Where so specified a 20 mm G.I. puff pipe terminating with a perforated brass cap screwed on it on the outside of the wall or connected to the anti-syphon stack shall be provided.
10.4	STAINLESS STEEL KITCHEN SINK
10.4.1	Stainless steel kitchen sink shall be of sizes as specified and shall be conforming to IS 13983.
10.4.2	<u>Installation of Sink:</u> The installation shall consist of assembly of sink C.I. brackets, union and G.I. or P.V.C. waste pipe.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

	Fixing The sink shall be supported on C.I. cantilever brackets, embedded in cement concrete (1:2:4) block of size 100 x 75 x 150 mm. Brackets shall be fixed in position before the dado work is done. The C.P. brass or P.V.C. union shall be connected to 40 mm nominal bore G.I. or PVC waste pipe which shall be suitably bent towards the wall and shall discharge into a floor trap. C.P. brass trap and union. The height of front edge of sink from the floor level shall be 80 cm.
10.5	BEVELLED EDGE MIRROR
10.5.1	The mirror shall be of superior glass with edges rounded off or beveled, as specified. It shall be free from flaws, specks or bubbles. The size of the mirror shall be 60 x 45 cm unless specified otherwise and its thickness shall not be less than 5.5 mm. It shall be uniformly silver plated at the back and shall be free from silvering defects. Silvering shall have a protective uniform covering of red lead paint. Where beveled edge mirrors of 5.5 mm thickness are not available, fancy looking mirrors with PVC beading/border or aluminium beading or stainless steel beading/border based on manufacture's specifications be provided nothing extra shall be paid on this account. Backing of mirrors shall be provided with environmentally friendly material other than asbestos cement sheet.
10.5.2	<u>Installation of Mirror:</u> The mirror shall be mounted on backing with environmentally friendly material other than asbestos cement sheet shall be fixed in position by means of 4 C.P. brass screws and C.P. brass washers, over rubber washers and wooden plugs firmly embedded in walls. C.P. brass clamps with C.P. brass screws may be an alternative method of fixing, where so directed. Unless specified otherwise the longer side shall be fixed horizontally
10.6	GLASS SHELF
10.6.1	Glass shelf shall consist of an assembly of glass shelf, with anodised aluminium angle frame to support the glass shelf. The shelf shall be of glass of best quality with edges rounded off, and shall be free from flaws specks or bubbles. The size of the shelf shall be 60 x 12 cm unless otherwise specified and thickness not less than 5.5 mm. The shelf shall have C.P. brass brackets which shall be fixed with C.P. brass screws to rawl plugs firmly embedded in the walls.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

10.7	PTMT TOWEL RAIL
10.7.1	The towel rail shall be of PTMT as specified and as per direction of Engineer-in-charge.
10.7.2	Installation of Towel Rail: It shall be fixed in position by means of C.P. brass screws on wall surface by PVC dash fasteners, firmly embedded in wall.
10.8	MEDIUM GRADE G.I. PIPE
10.8.1	The pipes (tubes) shall be galvanised mild steel hot finished seamless (HFS) or welded (ERW) HRIW or HFW screwed and socketed conforming to the requirements of IS 1239 Part-I for medium grade. They shall be of the diameter (nominal bore) specified in the description of the item, the sockets shall be designated by the respective nominal bores of the pipes for which they are intended.
10.8.2	Galvanizing shall conform to IS 4736: The zinc coating shall be uniform adherent, reasonably smooth and free from such imperfections as flux, ash and dross inclusions, bare patches, black spots, pimples, lumping runs, rust stains, bulky white deposits and blisters. The pipes and sockets shall be cleanly finished, well galvanized in and out and free from cracks, surface flaws laminations and other defects. All screw threads shall be clean and well cut. The ends shall be cut cleanly and square with the axis of the tube.
10.8.3	All screwed tubes and sockets shall have pipe threads conforming to the requirements of IS 554. Screwed tubes shall have taper threads while the sockets shall have parallel threads.
10.8.4	All tubes shall withstand a test pressure of 50 Kg/sq.cm without showing defects of any kind.
10.8.5	Fittings: The fittings shall be of mild steel tubular or wrought steel fittings conforming to IS 1239 (Part-2) or as specified. The fittings shall be designated by the respective nominal bores of the pipes for which they are intended.
10.9	G.M. FULL WAY VALVE
10.9.1	These shall be of the gun metal fitted with wheel and shall be of gate valve type opening full way and of the size as specified. These shall generally conform to IS 778
10.10	C.P. BRASS 15 MM STOP COCK & BIB COCK (VALVE)
10.10.1	A bib tap is a draw off tap with a horizontal inlet and free outlet and a stop valve is a valve with suitable means of connections for insertion in a

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHNICAL SPECIFICATIONS

	pipe line for controlling or stopping the flow. They shall be of specified size and shall be of screw down type and shall conform to IS 781. The closing device shall work by means of disc carrying a renewable non-metallic washer which shuts against water pressure on a seating at right angles to the axis of the threaded spindle which operates it. The handle shall be either crutch or butterfly type securely fixed to the spindle. Valve shall be of the loose leather seated pattern. The cocks (taps) shall open in anti-clock wise direction. The bib tap and stop valve shall be polished bright.
10.11	C.P. BRASS SHOWER
10.11.1	The shower rose shall be of chromium plated brass of specified diameter. It shall have uniform perforations. The inlet size shall be 15 mm or 20 mm as required.