CREATIVE MUSEUM DESIGNERS

(Section 8 company guaranteed by NCSM)
NCSM Campus, Building II, 6th Floor, 33, Block - GN, Sector - V, Bidhan Nagar,
Kolkata - 700091, India. Phone: 033 2357 6041, Website : www.cmdncsm.in

NOTICE INVITING TENDER FOR EXTERNAL CIVIL WORK

Ref. No.: CMD 007.12.35(WORKS)/23-24/24 Dated 08.02.2024

Tenders are invited from reputed and experienced civil contractors for **"External Civil Works (Security Room, Development of Parking Area and Peripheral Roads, Under Ground Water Tank, Balance Retaining Wall, Drains etc.) in connection with proposed K.D. Malaviya National Oil Museum at Khanapara, Guwahati, Assam"** at an **estimated cost of Rs. 237.05 Lakhs (including GST). Interested civil contractors may please collect the Tender document from CMD Kolkata office from 15.02.2024 (except Sundays & Holidays) or download from CMD website (www.cmdncsm.in). Last date of submission of Tender (in hard copies only) is 07.03.2024. Pre-bid Meeting shall be held on 26.02.2024 at 11.00 AM.**

Corrigendum, Addendum etc. pertaining to this tender, if any, will be available in Company's website (www.cmdncsm.in) only.

CREATIVE MUSEUM DESIGNERS

(Section 8 company guaranteed by NCSM)
NCSM Campus, Building II, 6th Floor, 33, Block - GN, Sector - V, Bidhan Nagar,
Kolkata - 700091, India. Phone: 033 2357 6041, Website: www.cmdncsm.in

Date : 07.03.2024

CORRIGENDUM-2

Corrigendum to **Notice Inviting Tender No. CMD007.12.35(WORKS)/23-24/24 Dated 08.02.2024, for External Civil Works**.
With reference to the above and Tender Document hosted in Company's website (**www.cmdncsm.in**) on 15.02.2024, the following may please be noted

(i) As per Clause no. 7, Page no. 4 of Tender document, the last date for submission of completed Tender document is hereby extended up to 11.00 AM on 18.03.2024 (Monday).

Save and except the above all other terms & conditions of Tender will remain same.

CREATIVE MUSEUM DESIGNERS

(Section 8 company guaranteed by NCSM)
NCSM Campus, Building II, 6th Floor, 33, Block - GN, Sector - V, Bidhan Nagar, Kolkata - 700091, India. Phone: 033 2357 6041, Website: www.cmdncsm.in

Date : 27.02.2024

CORRIGENDUM-1

Corrigendum to Tender Document **[Ref. No. CMD 007.12.35(WORKS)/23-24/24 Dated 08.02.2024, Notice Inviting Tender for External Civil Work]**

With reference to the above and Tender Document hosted in Company's website (**www.cmdncsm.in**) on 15.02.2024, the following may please be noted.

(i) As per Clause no. 7.1 of NIT, Page no. 5 of Tender Document, Pre-Bid discussion with the intending bidders was held on 26.02.2024 at Creative Museum Designers, Kolkata office**.**

Now we are furnishing the **''Reply to Pre-Bid Queries''** vide **'ANNEXURE-F'** which will be an integral part of above tender.

Bidders are requested to submit this **'ANNEXURE-F'** duly signed & stamped along with the tender. **In case of any clarification, please may contact Head of Engineering - Civil of Creative Museum Designers, Kolkata (Phone No. 033 2357 6041, Mob. No. +91-7439381243) or email to cmd.ncsm.civil@gmail.com.**

'ANNEXURE-F'

REPLY TO PRE-BID QUERIES

EXTERNAL CIVIL WORKS (SECURITY ROOM, DEVELOPMENT OF PARKING AREA AND PERIPHERAL ROADS, UNDER GROUND WATER TANK, BALANCE RETAINING WALL, DRAINS ETC.) IN CONNECTION WITH PROPOSED K D MALAVIYA NATIONAL OIL MUSEUM AT KHANAPARA, GUWAHATI, ASSAM [TENDER NO.: CMD007.12.35(WORKS)/23-24/24 Date: 08.02.2024]

Date of Pre-Bid Meeting: 26.02.2024

Sl. No.	Reference Tender Clause No./ Page No.		Subject	Bidder's Query	CMD's Reply
	Section	Page No.			
1	Appendix to NIT	19	Security Deposit/ Retention Money/ Performance Guarantee: 10% of the Contract Value including Earnest Money Deposit (EMD) as follow, i. EMD: 2.5% of the tender value ii. Performance Guarantee: 7.5% (including 2.5% EMD) of contract value. iii. Balance amount 2.5% of contract value to be deducted from each Running Account Bill & Final Bill and shall be kept as Retention Money. Or Total 10% by Bank Guarantee to be submitted upon award of work.	i. Bidder requested to reduce the Security Deposit/ Retention Money/ Performance Guarantee from 10% to 2.5%, in case the job is awarded and balance 7.5% to berecocered from Running Bills/ Final Bill.	Revised Security Deposit/ Retention Money/ Performance Guarantee shall be as follows: 10% of the Contract Value including Earnest Money Deposit (EMD) as follow, i. Performance Guarantee: 5.0% (including 2.5% EMD) of contract value. ii. Balance amount 5.0% of contract value to be deducted from each Running Account Bill & Final Bill and shall be kept as Retention Money.
			On receipt of the L.O.I from the CMD by the successful tenderer shall furnish a Bank Guarantee or Demand Draft (From Nationalized Bank/Scheduled Bank) in favour of Creative Museum Designers, Kolkata of an amount equivalent to 7.5% (including 2.5% EMD) or 10% of the contract value towards Security Cum Performance Guarantee, valid up to completion of Defect Liability Period plus 12 (twelve) calender months.		On receipt of the L.O.I from the CMD by the successful tenderer shall furnish a Bank Guarantee or Demand Draft (From Nationalized Bank/Scheduled Bank) in favour of Creative Museum Designers, Kolkata of an amount equivalent to 5% (including 2.5% EMD) towards Security Cum Performance Guarantee, valid up to completion of Defect Liability Period plus 12 (twelve) calender months.
2	Notice Inviting Tender (NIT) Clause No. 7	4	Completed tender documents will be received up to 07.03.2024 till 11.00 AM.	ii. Bidder also requested to extend the tender submission date up to 14.03.2024.	Due date of submission of Tender document i.e. 07.03.2024 shall remain unchanged.
					Save and except the above all other terms & conditions etc. will remain same as the Tender document.

Shri N. Dasgupta
Curatorial Expert, CMD

Shri B.K.Basu
Head of Engineering - Civil, CMD

Shri Saikat Sikdar
S.E., NCSM

Dr. Deblina Chakraborty
Curator, CMD

Shri K.K. Mishra
F.O., CMD

TENDER DOCUMENT
FOR
EXTERNAL CIVIL WORKS (SECURITY ROOM, DEVELOPMENT OF PARKING AREA AND PERIPHERAL ROADS, UNDER GROUND WATER TANK, BALANCE RETAINING WALL, DRAINS ETC.) IN CONNECTION WITH PROPOSED K D MALAVIYA NATIONAL OIL MUSEUM AT KHANAPARA, GUWAHATI, ASSAM

TENDER NO. CMD 007.12.35(WORKS)/23-24/24 DATE: 08.02.2024

……..

(Name of the Company)

CREATIVE MUSEUM DESIGNERS
(Section 8 company guaranteed by National Council of Science Museums)
NCSM Campus, 33, Block- GN
6th Floor, CRTL Building – II, Sector-V
Bidhan Nagar, Kolkata-700091
Website: www.cmdncsm.in

TENDER DOCUMENT

FOR

EXTERNAL CIVIL WORKS (SECURITY ROOM, DEVELOPMENT OF PARKING AREA AND PERIPHERAL ROADS, UNDER GROUND WATER TANK, BALANCE RETAINING WALL, DRAINS ETC.)

FOR

CONSTRUCTION OF K.D. MALAVIYA NATIONAL OIL MUSEUM, KHANAPARA, GUWAHATI, ASSAM

FOR

CREATIVE MUSEUM DESIGNERS

ISSUED TO: .....

INDEX OF TENDER DOCUMENT

NOTICE INVITING TENDER (NIT)
Tender No. CMD007.12.35(WORKS)/23-24/24

No. CMD007.12.35(WORKS)/23-24/24 **Date: 08.02.2024**

1. The Creative Museum Designers is a Section 8 Company guaranteed by National Council of Science Museum, Kolkata.

2. Sealed tenders are hereby invited from reputed and experienced Engineering/Technical contractors capable of carrying out the work of **"External Civil Works (Security Room, Development of Parking area and Peripheral Roads, Under Ground Water Tank, Balance Retaining Wall, Drains etc.) in connection with Proposed K. D. Malaviya National Oil Museum at Khanapara, Guwahati, Assam**" with excellent finishing quality and having resource and adequate past experience during the preceding seven years in successfully executing works of similar nature to that referred herein above.

3. The place of work would be **K D Malaviya National Oil Museum, Khanapara, Guwahati, Assam, 2 Kms from the City Centre and 0.5 Kms away from NH-37.**

4. Estimated cost of the work is approximately **₹2,37,05,188.00 (including GST)**

5. **Time of completion of work will be 12 (Twelve) months from the date of issuance of Letter of Intent** for External Civil works (Security Room, Development of Bus Stand area and Periphery Road, Water Treatment Plant, Balance Retaining Wall, Drains etc.).

   Defect Liability Period will be up to 01 (One) year after successful completion of entire work under scope of the tender.

6. Contract documents consist of the NIT, General Conditions of the Contract, Special Condition of Contract, one set of tender drawings, Technical Specifications, Schedule of Quantities and Rates of various items, Summary of Price etc.

7. The set of tender documents will be available between **11.00 AM to 6.00 PM** on any working days from **15.02.2024 to 07.03.2024 and also available in our website (www.cmdncsm.in) from 15.02.2024.** Completed tender documents will be received **up to 07.03.2024 till 11.00 AM** and will be opened on the same day at 03.00PM in the conference hall of CMD in the presence of the tenderers or their authorized representatives who may like to attend. Tenderers may note that opening of the tenders in their presence or in the presence of their authorized representatives is not obligatory on the part of the Company. In case the tenderers or their authorized representatives are not present, tenders will be opened as per rules and on scheduled time and date unless it is notified otherwise by the Company earlier. The Company reserves the right to alter the dates of issue, receipt and or opening of tenders etc. if so necessary.
   Corrigendum, Addendum etc. pertaining to this tender, if any, will be available in Company's web site (www.cmdncsm.in) only.

7.1 **Prebid Discussion:** Prebid discussions will be held on **26.02.2024 at 11.00 AM in the office of Creative Museum Designers, Salt Lake, Kolkata** in presence of Consultants and the intending bidders.

8. BIDDER QUALIFICATION CRITERIA:

Bidders intending to participate shall fulfil the following Qualification criteria:

8.1 **Experience Criteria (techno- Commercial)**

8.1.1 Bidders shall fulfil the following experience criteria.

The bidders should have experience of executing similar work i.e. External Civil Works (Security Room, Development of Parking area, Peripheral Roads, Under Ground Water Tank, Balance Retaining Wall, Drains etc.) having minimum contract values as indicated below in last 07 (seven) years reckoned from the due date for submission of bid. Bidders have to submit copies of Work Order (s)/ Letter of Intent (s), Job Completion Certificate (s)/ relevant documents etc. confirming proof of execution of work/ executed value of work of similar in nature.

a) One contract having minimum value of 80% of estimated value i.e. **₹1,89,64,150.00**
b) Two contracts each having minimum value of 50% of estimated value i.e. **₹1,18,52,594.00**
c) Three contracts each having minimum value of 40% of estimated value i.e. **₹94,82,075.00**

Similar work means External Civil works complete for Civil works for Land Development/ Area Grading, Industrial Roads, Drainage works, Building & various R.C.C. works related to Security Room, Development of Parking area, Peripheral Road, Under Ground Water Tank, Balance Retaining Wall, Drains etc. successfully with high quality of workmanship & time.

Bidder should submit their Bid as an individual agency but not as Joint Venture or Associate / Consortium with other agency. Bidders in the form of Direct or Indirect Joint Venture / Consortium/ Special Purpose Vehicle (SPV)/ Special Purpose Entity (SPE) are not permitted.

8.2 **Financial Criteria.**

8.2.1 **Annual turnover :** Bidder must have minimum average annual financial turnover **₹1.80 Crs. (Rupees One Crore and Eighty Lakhs Only)** during the last three financial years ending 31st March, 2023 i.e, 2020-2021, 2021-2022 & 2022-2023. The copies of audited balance sheet / Certificate of Chartered Accountant to be submitted.

8.2.2 **Bank Solvency** : Bidder shall have a Latest Bank Solvency of **₹59.25 Lakhs**. The Bidder shall submit in original/ attested copy of the Latest Bank Solvency Certificate, not older than 03 (three) months prior to date of issue of this Tender., issued by any Nationalized/ Scheduled Bank.

8.2.2a**) Net worth** : Bidder shall not have incurred any loss in more than two years during the last five years ending 31.03.2023. Bidder should submit net worth certificate duly certified by a practising Chartered Accountant.

b) The bidder must have PAN issued by the Income Tax Department of India.

c) Bidder should have GST, PF & ESI registration with the concerned authority.

9. Bidder having pending Litigation / Court Case with CMD/ NCSM / OIL against previous Tender(s)/ Contract(s) will not be considered.

''ANNEXURE –A''

10. Bidders are requested to furnish the following details in seriatim as under, in support of Prequalification criteria.

Conditions for Qualification:

Sl. No.	Description	To be filled by agency
a)	Name of the Agency	
b)	Year of Establishment	
c)	Registered office with full address	
d)	Full Postal Address of communication	
e)	Telephone Number(s) of office	
f)	Contact person Name with Mobile No.	
g)	E-Mail ID	
h)	Website if any	
i)	i. Nature of Entity - Limited Company, Partnership etc. (attach copy of partnership Deed/ Certification of incorporation as applicable) ii. Date of Incorporation	
j)	The bidder should have to submit their Bid as an Individual Agency i.e. not as Joint Venture or Associate/ Consortium with other Agency. Bidders in the form of Direct or Indirect Joint Venture/ Consortium/ Special Purpose Vehicle (SPV) / Special Purpose Entity (SPE) are not permitted	
k)	Name (s) of Director / Proprietor / Partners with address and telephone nos.	
l)	Technical Staff employed (Attach a separate of sheet of the employees with qualifications)	
m)	Qualification Criteria: I. Techno Commercial Criteria:	

	The bidders should have experience of executing similar work i.e. External Civil works complete for Civil works for Land Development/ Area Grading, Industrial Roads, Drainage works, Building & various R.C.C. works related to Security Room, Development of Parking area, Peripheral Road, Under Ground Water Tank, Balance Retaining Wall, Drains etc. having minimum contract value as indicated below in last 7(seven) years reckoned from the due date for submission of Bid document **i. One contract having minimum value of 80% of estimated value i.e. ₹1,89,64,150.00** **ii. Two contracts each having minimum value of 50% of estimated value i.e. ₹1,18,52,594.00** **iii. Three contracts each having minimum value of 40% of estimated value i.e. ₹94,82,075.00**	
	<u>II. Financial Criteria:</u> **i. Average Annual Turnover for last 5 (five) years** **ii. Net worth** **iii.Bank Solvency Certificate from Nationalized Bank/ Scheduled Bank**	
n)	**PAN of Bidder with supporting document**	
o)	**PF/ ESIC/ GST Registration etc. of Bidder with documentary evidence**	
p)	**Copy / copies of completion certificate(s) of similar type of work(s) stated in Sl. No. N above duly certified by respective Owner(s) / Client(s) mentioning name and nature of work(s), date(s) of commencement/**	

	completion and value(s) of the job(s) executed in last 7(seven) years.	
q)	**Yearly Sales /Turnover and Audited Balance Sheet duly signed by Chartered Accountant with his / her Seal, Signature & Registration Number for Last 3 (three) years i.e. 2020-2021, 2021-2022 and 2022-2023.**	
r)	**P.F. Registration No. (if not registered with PF Department, successful Bidder have to take Registration within one month from the date of award.)**	
s)	**Current Income Tax Deposition Acknowledgement.**	
t)	**Constitution and legal status along with attested copies of Deeds / Articles and Memorandum of Association etc. as applicable.**	
u)	**Power of Attorney in favour of the Authorised Signatory who has signed the bid (In case of other than Proprietor / CEO / Partner etc.).**	
v)	**Whether any Civil Suit / Litigation arisen in the contracts executed during the last 5 years / being executed. If yes, please furnish the name of the contract, employer, nature of work, contract value, work order and date & details of litigation briefly**	
w)	**Details of work in hand and current commitment. (As per enclosed ANNEXURE-A2)**	
x)	**No Deviation Certificate in Bidder's Letter Head (ANNEXURE – C1)**	
y)	**List of Plant & Machineries & other construction equipment's owned by the Firm. (As per ANNEXURE-A3)**	
z)	**List of Clients (Details with Location) As per enclosed ANNEXURE-A1**	

Important Notes:

1. **Bidder is liable to be disqualified, even though they meet the qualifying criteria, if they :**

a) **Made misleading or false representations, statements and attachments submitted in proof of the qualification requirements, and / or**

b) **Record of poor performance such as abandoning the works, not properly completing the supply order, inordinate delays in execution or supply, litigation history, or financial failures etc.**

c) **If the tenderer deliberately gives wrong information / submit fake, false, fabricated, forged documents in his tender, CMD reserves the right to reject such tender at any stage or to cancel the contract if awarded and forfeit the Earnest Money / Security Deposit / any other money due.**

2. **The Bidder must provide any further details required for the review upon request from CMD. Failure to comply with any request of CMD for such information will result in rejection of their offer.**
3. **CMD may, in its absolute discretion suspend or disqualify a Bidder/ Bidders who, at any time, is considered to have breached any of the qualification conditions or has performed in an unsatisfactory manner without assigning any reason whatsoever.**
4. **CMD will not be liable for any loss or damages incurred by the bidder/ bidders in the above exercise.**

I / We hereby solemnly declare that all the information / statements are true to the best of my / our knowledge. I / We also declare that my / our firm is not involved in any Litigation or Arbitration with any company for last 5 years. I / We further declare that the decision of Creative Museum Designers regarding finalization of Selection of contractors shall be final and binding on me/ us.

Place:

Date:

(Signature with date & seal)

N.B.: All the documents shall be submitted in Hard Copies.

''ANNEXURE – A1''

TABLE A: DETAILS OF ALL WORKS OF CLASS/ NATURE COMPLETED DURING THE LAST SEVEN YEARS

S. No.	Name of work/ project and location (Give brief of nature of work)	Name of the Owner/organization and designation Name of officer signing agreement	Cost of works in crores of rupees Estimated cost put to tender Tendered Cost	Stipulated date of start as per agreement Actual date of start	Stipulated date of completion Actual date of completion	Litigation/ Arbitration Pending / inprogress withdetails*	Name and Address and Phone no. of officer to whom reference may be made	Give brief reason for delayin execution, if any	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

* Indicates gross amount claimed and amount awarded by arbitrator

Signature of applicant(s)

''ANNEXURE – A2''

TABLE-B: PARTICULARS OF CURRENT PROJECTS IN PROGRESS/AWARDED

PARTICULARS OF PROJECTS UNDER EXECUTION OR AWARDED

S. No.	Name of work/ project and location (Give brief of nature of work) Role in project (as main contractor or Sub Contractor, State name of maincontractor)	Name of client Owner or organization	Cost of Works in crores of rupees Estimated cost put to tender Tendered Cost	Stipulated date of start as per agreement Actual dateof start	Stipulated date of completion	Up to date percentage progress of work	Slow progress if any and reasons thereof	Name and Address/ Phone no.of officer to whom reference may be made	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

Certified that the above list of works is complete/ in progress and no work has been left over and that the information given is correct.

Signature of applicant(s)

TABLE-C: PARTICULARS OF SIMILAR PROJECTS COMPLETED IN THE LAST SEVEN YEARS

DETAILS OF ALL WORKS OF SIMILAR CLASS COMPLETED DURING THE LAST SEVEN YEARS ENDING LAST DAY OF THE MONTH AS ON 31/03/2023

S. No.	Name of work/ project and location (Give brief of nature ofwork)	Owner or organization name and designation Of officer signing agreement	Cost of Works in crores of rupees Estimated cost put to tender Tendered Cost	Stipulated date of start as per agreement Actual dateof start	Stipulated date of completion Actual date of completion	Litigation/ Arbitration Pending in progress with details*	Name and Address and Phone no. of Officer to whom reference may be made	Give brief reason for delay in execution	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

Signature of applicant(s)

''ANNEXURE – A3''

TABLE-D: LIST/DETAILS OF PLANT & EQUIPMENT LIKELY TO BE DEPLOYED/ USED ON THE PROJECT/ WORKSHOP

S. No.	Name of equipment	Capacity / specification	Age	Condition	Quantity	Ownership Status			Current Location	Remarks
						Personally owned	Leased	To be purchased		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)

Signature of applicant(s)

11. **Earnest Money**:

a) The Earnest Money amounting to **Rs. 5,92,630/- (Rupees Five Lakh Ninety Two Thousand Six Hundred Thirty Only)** being approx. 2.5% of the estimated value of the work (rounded off to the nearest rupee), only in the form of **Bank Guarantee/ Pay Order/ Demand Draft/ Banker's Cheque/ NEFT** from any Nationalized Bank/Scheduled Bank. For NEFT, the details of our Banker is furnished as below:

Details of Bankers:		
Bank Name:	**:**	**INDIAN OVERSEAS BANK**
Beneficiary Name:	**:**	**CREATIVE MUSEUM DESIGNERS**
Bank Address:	**:**	**Indian Overseas Bank, GN 34/2, Sector - V, II Studio, Saltlake, Kolkata - 700091, West Bengal, India**
A/c No.:	**:**	**164201000001214**
IFSC Code:	**:**	**IOBA0001642**

Bank Guarantee/ Pay order/ Demand Draft/ Banker's Cheque / NEFT to be drawn in favour of **Creative Museum Designers payable at Kolkata**. Demand Draft/ Banker's Cheque/ Documents confirming NEFT(amount must be credited to CMD's account as mentioned above on or before the last date of submission i.e. **07.03.2024 up to 11.00 AM**) for the Earnest Money Deposit must accompany the Part I of tender as indicated in Clause 20 below. All the tenderers must submit their complete document within the last date of submission i.e. **07.03.2024 up to 11.00 AM**. Tenders received after the due date and/ or without Earnest Money Deposit (EMD) will be summarily rejected. No deviation from the mode of depositing Earnest Money, stipulated above, will be permissible and any deviation will render the tenders liable for rejection.

The validity period of Bank Guarantee (EMD) shall be minimum 120 (One hundred twenty) days from the due date of opening of tender with claim period up to 12(Twelve) months. This validity period of B.G may be extended with mutual consent, if required by CMD for any unavoidable reason(s).

b) **Demand Draft / Pay Order/ Banker's Cheque/ NEFT** must be drawn only on Nationalized Bank/Scheduled Bank at the place mentioned in Clause 11 above, failing which the Earnest Money deposited shall be deemed as inadequate, and the tender shall be liable for rejection.

c) EMD of unsuccessful bidders/ tenderers shall be returned upon finalisation of the Tender, without any interest.

11.1 **Tender Fees** : Tenderers / Bidders to submit **Rs. 5,900/- (Rupees Five Thousand Nine Hundred Only) including GST,** towards the cost of Tender Document By **Demand Draft / Banker's Cheque/ Pay order/ NEFT** and to be drawn in favour of Creative Museum Designers , payable at Kolkata as per details given in Clause 11 above.

Tender Fees is NON- REFUNDABLE.

12. **Security Deposit (SD):**

The successful bidder shall deposit **10%** of total contract value as **Security Deposit/Retention Money in the form of Demand Draft or Bank Guarantee**. The EMD submitted by the successful bidder within 30 (thirty) days on issuance of L.O.I. and the same will be returned after receiving total 10% of contract value as security deposit in the form of Demand Draft/ Bank guarantee. The security deposit so submitted in the form of Demand Draft will be retained till completion of Defect Liability Period without any interest. **The security deposit so submitted in the form of Bank Guarantee shall have validity period up to completion of Defect Liability Period (DLP) plus 01 (one) year claim period**. Please refer to the Clause 17 of General Conditions of Contract.

13. Tenderers, who do not fulfil any of the above conditions or are incomplete in respect of any document(s) supporting the above qualification criteria are liable for summary rejection.

14. The company does not bind itself to accept the lowest tender and reserves to itself the authority to reject or partially accept any or all the tenders, tendered items or schedules received without assigning any reason whatsoever.

15. Canvassing in connection with tenders is strictly prohibited and the tenders submitted by the tenderers who resort to canvassing will be liable for rejection on that ground alone.

16. Tenders incorporating additional conditions are liable to be rejected.

17. The tenderers must declare in writing that they are no way related to any official(s) in the Creative Museum Designers, Kolkata and National Council of Science Museums (NCSM), Kolkata.

18. All Applicable Statutory Taxes and Duties on equipments, GST on materials & services, freight & transit Insurance F.O.R. site and any other payments to be made to the local authorities for the completion of the job will be inclusive in the rate offered by the successful tenderer & payable by them. Nothing extra will be payable for increase in such taxes or duties even if imposed or levied either before or after the tenders are opened or during currency of contract.

19. Before submitting the tender, the tenderer shall examine all specifications, drawings, conditions of contract and inspect the site. The tender must be balanced in respect of individual items so that the rates quoted shall remain in force even if the quantities deviate before or during the execution of the work.

20. The tender must be submitted [in two separate sealed covers marked Part I (Techno-Commercial bid) and Part II (Financial bid)] and addressed to the Company and each envelope super scribed ‘‘Tender for **External Civil Works (Security Room, Development of Parking area and Peripheral Roads, Under Ground Water Tank, Balance Retaining Wall, Drains etc.) in connection with Proposed K. D. Malaviya National Oil Museum at Khanapara, Guwahati, Assam**----Part I (Techno-Commercial bid) Due Date on…….’’ and ‘‘Tender for **External Civil Works (Security Room, Development of Parking area and Peripheral Roads, Under Ground Water Tank, Balance Retaining Wall, Drains etc.) in connection with Proposed K. D. Malaviya National Oil Museum at Khanapara, Guwahati, Assam**-------Part II (Financial bid) Due Date on……..’’ and finally both Part I & Part II to be sealed in a separate sealed envelope supercribing ‘‘Tender for **External Civil Works (Security Room, Development of Parking area and Peripheral Roads, Under Ground Water Tank, Balance Retaining Wall, Drains etc.) in connection with Proposed K. D. Malaviya National Oil Museum at Khanapara, Guwahati, Assam**”. The contents of Part I & II will be as follows:

(a) The sealed cover marked Part I shall contain the following documents only:

(i) Earnest Money and Tender Fees in the form as described in Clause 11 of the Notice Inviting Tender (NIT).
(ii) Documents in support of Bidders qualification criteria as per Clause 8 above & all other documents as per Clause 10 (Page 7 to 9).
(iii) An up to date and valid Audited Balance Sheet & Income Tax Returns for last 03 (three) years of the bidder in original or true copy thereof duly attested by a Chartered Accountant and the Permanent A/C No. Of the bidder.
(iv) Forwarding letter (in duplicate) clearly indicating the documents attached therein. The tenderer has to clearly state in the forwarding letter that he has not quoted any extra condition along with the tender in title Part II sealed envelope.
(v) Each and every page of the tender document to be duly signed and stamped by the tenderer.
(vi) Necessary Power of Attorney/ Authorization in favour of the person, signing the tender document to be submitted.
(vii) Declaration as per **ANNEXURE – C2**.
(viii) Declaration for No-Deviation of Tender as per **ANNEXURE – C1**

(b) The sealed cover marked Part II shall contain the Offer Form complete with financial bid i.e. Schedule of Quantities & Rates (As per **ANNEXURE – D**) and Summary of Price Sheet (As per **ANNEXURE - E**) duly signed and stamped by the tenderer on each and every pages and should not have any additional condition whatsoever. If any such additional conditions found in this cover it will not be taken into consideration for further evaluation.

21. For the purpose of opening of the tenders as described in Clause 7 of the Notice Inviting Tender (NIT) it is clarified that only the sealed envelope marked Part I will be opened first. Initially the documents

contained in Part I will be opened & scrutinized and agencies will be shortlisted for opening the Part II. The shortlisted agencies will be informed about the opening date & time of Part II. In case documents in envelope marked Part II are not opened at all, the same will be returned to the tenderer treating it as invalid and his/their acknowledgements will be obtained in token of receipt of the same.

22. However, after opening Part I, if required, CMD may send communications through email to tenderers seeking necessary documents, clarifications etc. for the purpose of qualification.

23. Earnest Money is liable to be forfeited if the successful tenderer selected for the work fails to submit the acceptance of Letter of Intent (LOI) within 07 (seven) days & sign the formal agreement along with submission of Security Cum Performance Guarantee within 30 (Thirty) days from the date of issue of Letter of Intent (LOI) by the Company.

24. The successful tenderer will be issued a Letter of Intent by the Company and will be given 15 (fifteen) days mobilisation time which shall be counted from the date of issue of the Letter of Intent (LOI). Within the mobilisation time the tenderer must scrutinise all the drawings, CPM/PERT/BAR CHART, specifications, etc. and obtain clarifications from the authority wherever necessary and submit a revised & detailed BAR CHART. During the mobilisation time, the tenderer shall also mobilise all his resources including men and materials, obtain the supply of water and electricity necessary for construction, erect a temporary office/godown at site and sign an Agreement with the Company in approved format on a non-judicial stamp paper of Rs.100/- (Rupees One Hundred only). **The date of commencement of work shall be the date of issue of Letter of Intent (LOI).**

25. The validity period of the tender shall be **120 (One hundred twenty)** days from the date of opening of tenders. This period may be extended with mutual consent if required by CMD for any unavoidable reason(s).

APPENDIX TO NOTICE INVITING TENDER

(a) SUMMARY CONDITIONS OF CONTRACT		
Name of Work	:	External Civil Works (Security Room, Development of Parking area and Peripheral Roads, Under Ground Water Tank, Balance Retaining Wall, Drains etc.) in connection with Proposed K. D. Malaviya National Oil Museum at Khanapara, Guwahati, Assam.
Structural Consultant/ Sanitary Plumbing Consultant	:	Kothari & Associates, 14B, Camac Street, Kolkata-700017/ Lalit Kumar Bose, 46/A, S.N.Roy Road, Kolkata - 700038
Scope of Work	:	External Civil Works (Security Room, Development of Parking area and Peripheral Roads, Under Ground Water Tank, Balance Retaining Wall, Drains etc.)
Time of Completion	:	**12 (Twelve)** months from the date of letter of intent as per Clause 5 & 24 of NIT.
Defect Liability Period (DLP)	:	**01 (One)** Year from the date of completion as certified by CMD.
Minimum value of work for Interim Payment (Running Account Bill)	:	**25 (Twenty five)** lakhs only and 01 (one) running account bill will be processed in a month.
Cost of Tender (Non Refundable)	:	**Rs. 5,900/- (including GST)**
Earnest Money to be deposited with the tender	:	**Rs. 5,92,630/-** (Rupees Five Lakh Ninety Two Thousand Six Hundred Thirty only)
Liquidated damages for non-completion of work in time [Clause 61d of the General Conditions of Contract (GCC)]	:	0.5(Zero Point Five) percent per week of the contract value subject to a maximum of 10% (ten percent) of the contract value awarded
Payment terms	**:**	All payments will be made on actual measurement / work done basis as certified by the Engineer-in-Charge (EIC).
(b) RETENTION MONEY FOR INTERIM PAYMENT		
Security Deposit / Retention Money/ Performance Guarantee	:	10% of the Contract Value including Earnest Money Deposit (EMD) as follow, i. EMD: 2.5% of the tender value ii. Performance Guarantee: 7.5% (including 2.5% EMD) of contract value. iii. Balance amount 2.5% of contract value to be deducted from each Running Account Bill & Final Bill and shall be kept as Retention Money. Or Total 10% by Bank Guarantee to be submitted upon award of work.
		On receipt of the L.O.I from the CMD by the successful tenderer shall furnish a Bank Guarantee or Demand Draft (From Nationalized Bank/Scheduled Bank) in favour of Creative Museum Designers, Kolkata of an amount equivalent to 7.5% (including 2.5% EMD) or 10% of the contract value towards Security Cum Performance Guarantee, valid up to completion of Defect Liability Period plus 12 (twelve) calender months.

		The same shall be submitted within 30 (thirty) days from the date of issuing Letter of Intent (LOI)
Release of Security Deposit/ Retention Money/ Performance Guarantee	:	Shall be released after completion of Defect Liability Period (DLP) of the contract, without any interest.
Escalation Clause	:	As per Clause 36 of General Conditions of Contract (GCC).
Period of submitting final bill by the successful bidder	:	Within 03 (three) months from the date of virtual completion of work

INSTRUCTIONS TO BIDDERS (ITB)

1.	**SINGLE PERCENTAGE BASED** Bids are invited by CMD in **two part system** from resourceful & capable tenderers fulfilling the Qualifying Criteria furnished in **ANNEXURE – A, ANNEXURE – A1, ANNEXURE – A2 & ANNEXURE – A3** of the NIT by Creative Museum Designers (CMD) for the work : **"External Civil Works (Security Room, Development of Parking area and Peripheral Roads, Under Ground Water Tank, Balance Retaining Wall, Drains etc.) in connection with Proposed K. D. Malaviya National Oil Museum at Khanapara, Guwahati, Assam.**"
	Procedure for Submission of Bid:
	Tender Fee – The Tenderer must submit **₹ 5,900.00 (Rupees Five thousand nine hundred only) including GST** as cost of Tender Document (TD) (non-refundable) in the form of A/c Payee **Demand Draft (DDs) / Pay Order/ Banker's Cheque/ NEFT** in favour of Creative Museum Designers (CMD) payable at Kolkata as cost of Tender Document (Non-refundable) along with their offer.(No A/c Payee Cheque/ Cash shall be considered).Tax Invoice shall be prepared by CMD, Kolkata Office for cost of tender document. The Offer of the Bidder shall not be considered further if the Cost of Tender Document and EMD are not submitted in the form and manner as stated above and their offer is liable to be rejected.
	In case of non-submission of Tender Fee, EMD and any other documents (Hard-copy) specified in NIT /Tender Document, the offer will be summarily rejected.
	Under no circumstances the Tenderers should incorporate any changes/ modifications etc., in the Tender Document itself to avoid rejection of their Tenders.

	If any tenderer withdraws or make any changes in his offer already submitted before the expiry of the above validity period or any extension thereof without the written consent of the company, the offer may be liable to be cancelled and the amount submitted by the bidder against EMD will be forfeited.
	Prebid Discussion: Prebid discussions will be held on **26.02.2024** at **11.00 AM** in the office of **Creative Museum Designers, Saltlake, Kolkata** in presence of the intending bidders.
	Bid shall be submitted **in two part system**:

	Part I (Techno – Commercial):	Containing one Copy each of following documents :
		(i) Bidder should submit the Tender Fee, Letter of Submission (in Company's letter head); Detail of information to be furnished by the bidder and Power of Attorney in favour of the person who has signed the bid and Earnest Money Deposit (EMD) etc.
		(ii) No Deviation Certificate (as per **ANNEXURE – C1**), Format for declaration & undertaking (as per **ANNEXURE – C2, ANNEXURE – C3 & ANNEXURE – C4**) in Bidder's Letter Head to be furnished by the bidder.
		(iii) Documents pertaining to Qualifying Criteria furnished in Clause 10 of the NIT.
		(iv) Signed & Stamped **NIT, ITB, GCC, SCC, Technical Specification, Un-priced SOQR** with the word **" Quoted"** written against each Item, Drawing i.e. complete NIT documents as a token of acceptance along with all other submittals as prescribed in the Bidding document.
	Part-II (Financial bid):	The Financial Bid format is provided in **Offer Form,** the rates offered should be entered on SINGLE PERCENTAGE RATE basis (to be applicable on all items) on the "Summary Sheet" as provided in **ANNEXURE - E**. The Financial Bid / SOQR template must not be modified / replaced by the bidder; else the bid submitted is liable to be rejected for further evaluation.

		Telegraphic or Fax or Email offers shall not be accepted under any circumstances.
		Due date for submission of tender document is **07.03.2024** up to **11.00 hrs.** and shall be addressed to, **Head of Engineering - Civil,** **CREATIVE MUSEUM DESIGNERS** **NCSM Campus, 33, Block-GN, Building-II** **Bidha Nagar, Sector –V, Kolkata – 700091** **Phone No. 033 2357 6041** **Email:cmd.ncsm.civil@gmail.com**

2.	**<u>Tender Validity</u>** Tender submitted by tenderer shall remain valid for acceptance for a period **of 120 days** from the last date set for submission of the tender. The tenderer shall not be entitled within the said period of 120 (one hundred twenty) days to revoke or cancel or vary the offered rate in tender or thereof, without the consent of CMD. In case tenderer revokes or cancels or varies his tender in any manner without the consent of CMD, within this period, his earnest money/retention money will be forfeited.
3.	This Tender is a Single Percentage Rate tender with estimated item rates already mentioned in the Schedule Of Quantities & Rates (SOQR). Bidder has to quote single percentage, variation from the same (On total amount only) proposed by him either in positive or in negative or at par as the case may be in the Summary Sheet and Offer Form provided separately. Summary sheet & Offer Form and Schedule Of Quantities & Rates (SOQR) duly stamped & signed shall only be included in the PRICE BID.
4.	Price Bids of those Bidders who will be Techno-commercially qualified for the subject job on the basis of evaluation of techno commercial bids, will be opened on specified date. The date & time to open the Financial bid (Part –II) shall be **<u>intimated to the qualified bidders only through EMAIL</u>**.
5.	The complete signed and stamped Tender Document and all other required documents pertaining to this tender shall be submitted by the Tenderers as a token of Tenderer's acceptance.
6.	**<u>EVALUATION OF BIDS</u>** Techno-Commerial (Part-I) Bids submitted by the tenderer will be opened first and evaluated based on documentary evidences submitted along with the offer for qualification. After qualification of Bidders, Price Part (Part – II) of the Tender will be considered for opening in respect of the qualified tenderers only for Evaluation of Price.
7.	**<u>AUTHORISATION AND ATTESTATION</u>** Tender shall be signed by a person duly authorized/empowered to do so. An attested copy of the Power of Attorney, in case the tender is signed by an individual other than Director/ Proprietor / Partner, shall be submitted along with the tender.
8.	**<u>LANGUAGE</u>**

	The tenderer shall quote the rates in figures & words **in English language.**
9.	The successful Tenderer shall accept Letter of Intent (LOI) within 7 (seven) days & sign the formal agreement within 30 (thirty) days from the date of issue of Letter of Intent (LOI) by CMD, failing which the award of work may be liable to be cancelled.
10.	**Tenderers are advised to inspect and examine the site and its surroundings and satisfy themselves before submitting their tenders** about the nature of the work and site situation, environments, facilities available, position of material and labour, means of transport and access to Site (so far as is practicable), the form and nature of the site, the accommodation they may require and in general shall themselves obtain all necessary information as to risks, contingencies and other circumstances which may influence or affect their tender. No claim will be entertained later on the grounds of lack of knowledge of any of these conditions. **A tenderer shall be deemed to have full knowledge of the site whether he inspects it or not and no extra charges consequent on any misunderstanding or otherwise shall be allowed. The tenderer shall be responsible for arranging and maintaining at his own cost all materials, tools & plants, water, electricity, access, facilities for workers and all other services required for executing the work unless otherwise specifically provided for in the contract document. Submission of a tender by tenderer implies that he has read these instructions and all other contract documents and has made himself aware of the scope and specifications of the work to be done and local conditions and other factors having a bearing on the execution of the work.**

11	**REJECTION OF TENDER AND OTHER CONDITIONS**
11.1	CMD does not bind itself to **accept the lowest** or any other tender and reserves to itself the authority to reject any or all the tenders received without assigning any reason thereof. Tenders in which any of the prescribed condition is not fulfilled or any condition including that of conditional rebate is put forth by the tenderer shall be liable for rejection.
11.2	Conditional tenders, unsolicited tenders, tenders which are incomplete or not in the form specified or defective or have been materially altered or not in accordance with the tender conditions, specifications etc., are liable to be rejected.
11.3	Tenders are liable to be rejected in case of unsatisfactory performance of the tenderer with CMD/ NCSM, or tenderer under suspension (hold / banning / delisted) by CMD/NCSM. CMD reserves the right to reject a bidder in case it is observed that they are overloaded and may not be in a position to execute this job as per the required schedule. The decision of CMD will be final in this regard.

11.4	If a tenderer who is a proprietor expires after the submission of his tender or after the acceptance of his tender, CMD may at their discretion, cancel such tender. If a partner of a firm expires after the submission of tender or after the acceptance of the tender, CMD may then cancel such tender at their discretion, unless the firm retains its character.
11.5	If the tenderer deliberately gives **wrong information** in his tender, CMD reserves the right to reject such tender at any stage or to cancel the contract if awarded and forfeit the Earnest Money / Security Deposit / any other money due.
11.6	Canvassing in any form in connection with the tenders submitted by the Tenderer shall make his offer liable for rejection.
11.7	Tenderer must submit the declaration as per ANNEXURE – C2 stating the non relationship with any Employee of CMD/ NCSM.
11.8	The successful tenderer should not sub-contract part or complete work detailed in the tender specification undertaken by him without written permission of CMD. The tenderer is solely responsible to CMD for the work awarded to him.
11.9	The Tender submitted by a techno commercially qualified tenderer shall become the property of CMD, which under no circumstances shall be returned to the bidder.
11.10	Unsolicited discount received after the due date and time of Bid Submission shall not be considered for evaluation.
11.11	CMD shall not be liable for any expenses incurred by the bidder for site visit and preparation of the tender etc. irrespective of whether the tender is accepted or not.
11.12	The Bidder must provide any further details required for the review upon request from CMD. Failure to comply with any request by CMD for such information will result in rejection of their Offer. CMD may, in its absolute discretion suspend or disqualify a Bidder / Bidders who, at any time, is considered to have breached any of the qualification conditions or has performed in an unsatisfactory manner without assigning any reason whatsoever.

12.	**<u>Tender Documents to be submitted to</u>**
	Head of Engineering-Civil, **CREATIVE MUSEUM DESIGNERS** **NCSM Campus, 33, Block-GN, Building-II** **Bidha Nagar, Sector –V, Kolkata – 700091** **Phone No. 033 2357 6041** **Email:cmd.ncsm.civil@gmail.com**
13.	**Bidder should submit the documents only in Hard Copy** to the address as mentioned above.
(a)	Power of Attorney in favor of the person who has signed the bid.
(b)	Letter of Submission in Bidder's Letter Head as per **ANNEXURE - B**
(c)	No Deviation Certificate in Bidders letter head as per prescribed format (**ANNEXURE - C1**).
(d)	Declaration & Undertaking in Bidders letter head as per prescribed format (**ANNEXURE – C2, ANNEXURE - C3 & ANNEXURE – C4**)
(e)	Documents pertaining to Qualifying Criteria furnished in Clause 10 of the NIT (as per **ANNEXURE – A, ANNEXURE – A1, ANNEXURE – A2 & ANNEXURE – A3**).
(f)	**Tender Fee: ₹ 5,900.00 (Rupees Five thousand nine hundred only) including GST** in the form of **<u>Demand Draft (DDs) / Pay Order / Banker's Cheque / NEFT</u>** in favour of Creative Museum Designers payable at Kolkata as cost of Tender Document (Non-refundable) (**in original**). Tax Invoice shall be prepare by CMD, Kolkata Office for cost of tender document.
(g)	**Earnest Money Deposit (EMD) :** The Earnest Money Deposit will be of **₹ 5,92,630.00 (Rupees Five Lakh Ninety Two Thousand Six Hundred Thirty only).** EMD shall be submitted along with the Bid in the form of **<u>Bank Guarantee/ Pay Order/ Demand Draft/ Banker's Cheque/ NEFT</u>** valid for the period of 120 days. **(<u>No A/c Payee Cheque / Cash shall be considered</u>).**

''ANNEXURE – B''

FORMAT FOR LETTER OF SUBMISSION

SINGLE PERCENTAGE RATE Tender for **EXTERNAL CIVIL WORKS (SECURITY ROOM, DEVELOPMENT OF PARKING AREA AND PERIPHERAL ROADS, UNDER GROUND WATER TANK, BALANCE RETAINING WALL, DRAINS ETC.) IN CONNECTION WITH PROPOSED K. D. MALAVIYA NATIONAL OIL MUSEUM AT KHANAPARA, GUWAHATI, ASSAM.**

Tender No.: CMD007.12.35(WORKS)/23-24/24 Date: 08.02.2024

I / We have read and examined the Instructions to Bidders, General Conditions of Contract (GCC), Special Condition of Contract (SCC), Technical Specification, Schedule of Quantities & other documents and Rules referred to in the conditions of contract and all other contents in the tender document for the work.

I/We hereby tender for the execution of the work specified for the CMD within the time specified in tender viz., schedule of quantities and in accordance in all respects with the specifications and the Conditions of contract (GCC & SCC) and with such materials as are provided for, by, and in respects in accordance with, such conditions so far as applicable.

We agree to keep the tender open for **120 days** from the due date of submission of tender thereof and not to make any modifications in its terms and conditions.

The cost of tender document of value **₹ 5,900.00 (Including GST)** has been deposited in the shape of Demand Draft (DDs) / Pay Order/ Banker's Cheque / NEFT of a Nationalised / Scheduled Bank issued in favour of Creative Museum Designers. if I/we agree that Creative Museum Designers or his successors in office shall without prejudice to any other right or remedy available in law, be at liberty to forfeit the said earnest money absolutely, otherwise the said earnest money shall be retained by him towards retention money to execute all the works referred to in the tender documents upon the terms and conditions of contract.

We accept that we will automatically be kept under Black Listing/Holiday List from being eligible for bidding in any contract with Creative Museum Designers during the period of bid validity from the date of occurrence, if we are in breach of our obligation(s) under the bid conditions because we:

(a) Have withdrawn our Bid during the period of bid validity specified in the letter of Bid, or

(b) Having being notified of the acceptance of our Bid by CMD during the period of Bid validity, (i) have failed or refused to execute the Contract, if required, or

(ii) have failed or refused to furnish the Performance Guarantee within prescribed period in accordance with the clause of Tender.

Further if I/we fail to commence work as specified, I/we agree that Creative Museum Designers or his successors in office shall without prejudice to any other right or remedy available in law, be at liberty to forfeit the performance guarantee absolutely,

I/we hereby declare that I/we shall treat the tender documents, Technical Specification and other records connected with the work as secret/ confidential documents and shall not communicate information derived there from to any person other than a person to whom I/we am/are authorized to communicate the same or use the information in any manner prejudicial to the safety of the State.

Date :_____

Signature of Contractor
Postal Address

Witness:

Address :

Occupation :

''ANNEXURE – C1''

Creative Museum Designers

(Section 8 Company guaranteed by National Council of Science Museums)
Govt. of India, Block- GN. Sector-V Bidhan Nagar, Kolkata-700 091

NO DEVIATION CERTIFICATE

[To be submitted in Bidder's Letter Head]

To, **Date: …….**
Head of Engineering - Civil,
CREATIVE MUSEUM DESIGNERS
NCSM Campus, 33, Block-GN, Building-II
Bidha Nagar, Sector –V
Kolkata – 700091

Subject : **No Deviation Certificate for "External Civil Works (Security Room, Development of Parking area and Peripheral Roads, Under Ground Water Tank, Balance Retaining Wall, Drains etc.) in connection with Proposed K. D. Malaviya National Oil Museum at Khanapara, Guwahati, Assam.**"

NIT/ Tender No. : CMD 007.12.35(WORKS)/23-24/24 **Date: 08.02.2024**

We hereby agree to fully comply with, abide by and accept without variation, deviation or reservation all technical, commercial and other conditions whatsoever of the Biding Documents and Amendment(s)/Addendum(s) to the biding documents, if any, for subject work issued by Creative Museum Designers.

We hereby further confirm that any terms and conditions if mentioned in our Bid (un-priced) as well as price part) shall be recognised and shall be treated as null and void.

SIGNATURE OF THE BIDDER

NAME OF BIDDER

COMPANY SEAL

''ANNEXURE – C2''

Creative Museum Designers

(Section 8 Company guaranteed by National Council of Science Museums)
Govt. of India, Block- GN. Sector-V Bidhan Nagar, Kolkata-700 091

[To be submitted in Bidder's Letter Head]

Tender No.: CMD.007.12.35(WORKS)/23-24/24 **Date: 08.02.2024**

DECLARATION - 1

This is to certify that neither I / We / Any of us is in anyway related to any employee in CREATIVE MUSEUM DESIGNERS, KOLKATA & NATIONAL COUNCIL OF SCIENCE MUSEUMS, KOLKATA.

Date: (Signature of the tenderer)

Place: with company seal/rubber stamp

''ANNEXURE – C3''

Creative Museum Designers

(Section 8 Company guaranteed by National Council of Science Museums)
Govt. of India, Block- GN. Sector-V Bidhan Nagar, Kolkata-700 091

[To be submitted in Bidder's Letter Head]

Tender No.: CMD.007.12.35(WORKS)/23-24/24 **Date: 08.02.2024**

DECLARATION - 2

We, do hereby accept the General Terms and Conditions, Special Conditions of Contract, Technical Specifications etc. as provided by the CREATIVE MUSEUM DESIGNERS, KOLKATA along with tender documents for **"External Civil Works (Security Room, Development of Parking area and Peripheral Roads, Under Ground Water Tank, Balance Retaining Wall, Drains etc.) in connection with Proposed K. D. Malaviya National Oil Museum at Khanapara, Guwahati, Assam**" and also undertake to execute the job strictly as per the specifications & drawings as provided along with the tender documents in the event of placement of any work order on us.

Signature of the tenderer / Constituted Attorney.

(With date and Official Seal)

Date:……..

Place:…….

''ANNEXURE – C4''

Creative Museum Designers

(Section 8 Company guaranteed by National Council of Science Museums)
Govt. of India, Block- GN. Sector-V Bidhan Nagar, Kolkata-700 091

[To be submitted in Bidder's Letter Head]

Tender No.: CMD.007.12.35(WORKS)/23-24/24 **Date: 08.02.2024**

UNDERTAKING

This is to certify that I/we have carefully gone through the drawings/specifications, etc. given in the tender document & have clearly understood the site working conditions, time schedule given and have accordingly quoted my balanced rates after going through all details.

I/we hereby give an undertaking that I/we shall carryout the work strictly as per the given specifications, and shall complete the same within the stipulated time frame.

Date: (Signature of the tenderer)

Place: with company seal/rubber stamp

FORMAT FOR BANK GUARANTEE BOND

(For EMD only)

1. In consideration of the (Name and address of the Company) hereinafter called the Company having stipulated under Clause 11 of the Notice Inviting tender No. …….. for the work of (mention name of work as in NIT) at the aforesaid site agreed to accept payment of Earnest Money for due fulfillment of the terms and conditions contained in the said NIT (including appendix) for participation in the tender from (Name and address of the prospective tenderer) (hereinafter called the prospective tenderer) by production of a bank guarantee of (Mention amount of EMD in figure & words) only, we (Name and address of Bank furnishing guarantee (Br. Code ……..) (hereinafter referred to as "The Bank") do hereby undertake to pay to the Company an amount not exceeding (mention EMD amount in figure & Words) only against any loss or damage caused to or suffered or would be caused to or suffered by the Company by reasons of any breach by the said prospective tenderer of any of the terms or conditions contained in the said NIT (including appendix) relating to participation in the tender.
2. We, (Name of Bank), do hereby undertake to pay the amounts due and payable under this guarantee without any demur, merely on a demand from the Company stating that the amount claimed is due by way of loss or damage caused to or would be caused to or suffered by the Company under National Council of Science Museums by reasons of any breach by the said prospective tenderer of any of the terms or conditions contained in the said NIT (including appendix) or by reason of the prospective tenderer's failure to comply with conditions contained in the said NIT relating to participation in the tender. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding (mention amount of EMD in figures and words) only.
3. We, (Name of Bank) further agree that the guarantee herein contained shall remain in full force and effect during the period as mentioned in Clauses 23 and 24 of the said NIT (including appendix) or the period stipulated under Clause 25 for deciding the tender and that it shall continue to be enforceable till the dues of the Company under or by virtue of the said NIT (including appendix) have been fully paid and its claims satisfied or discharged or the Company certified that the terms and conditions of the said NIT (including appendix) have been fully and properly honoured and carried out by the said prospective tenderer for participation in the tender and accordingly discharges the guarantee. Unless a demand or claim under this guarantee is made on us in writing on or before the periods stipulated above, we shall be discharged from all liability under this guarantee thereafter.
4. We, (Name of the Bank) further agree with the Company that they shall have the fullest liberty without our consent and without affecting in any manner our obligation hereunder to extend time of deciding the tender as may be expedient and to forbear or enforce any of the terms and conditions relating to the NIT (including appendix) and we shall not be relieved from our liability by reason of any such extension being granted to the said proposed tenderer for any forbearance, or act of omission on the part of the Company or any indulgence by the Company to the said proposed tenderer or by any such matter or thing whatsoever which under the law relating to surety.
5. We, (Name of the Bank) lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Company in writing.

Dated, the …….. day of ……..…….

For ……..

(Authorised signatory of the Bank with Seal)

FORMAT FOR BANK GUARANTEE BOND

(For Security Deposit/ Performance Bank Guarantee only)

1. In consideration of the…….....…….. (Hereinafter called "The Company") having agreed to exempt .....……..... (Hereinafter called the "successful tenderer' from the demand, under Clause 12 of the Notice inviting tender No. …… dated …… and/or the terms and conditions of an Agreement dated ……. Made between the Company and successful tenderer(s) …… for ……(hereinafter called "the said agreement") of Earnest Money/Retention Money for the due fulfilment by the said Contract(s) of the terms and conditions contained in the said NIT or the conditions of (execution of work) or the agreement on production of a bank guarantee of Rs……(Rupees…… ……only),

2. We ……..…….(hereinafter referred to as "The Bank") do hereby undertake to pay to the Company an amount not exceeding Rs……..…….. against any loss or damage caused to or suffered or would be caused to or suffered by the Company by reasons of any breach by the said successful tenderer of any of the terms or conditions contained in the said NIT, the conditions of Contract or the Agreement.

3. We, ……. do hereby undertake to pay the amounts due and payable under this guarantee without any demur, merely on a demand from the Company stating that the amount claimed is due by way of loss or damage caused to or would be caused to or suffered by the Company under National Council of Science Museums by reasons of any breach by the said successful tenderer of any of the terms or conditions contained in the said NIT or the conditions of contract or the Agreement or by reason of the successful tenderer's failure to perform as per conditions contained the said NIT or the condition of contract or the Agreement. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However our liability under this guarantee shall be restricted to an amount not exceeding Rs……

   Note:**(Bank guarantee bond towards Retention Money/Security deposit as defined under Clause 17 of the General Conditions of Contract at the time of signing of agreement on award of work acceptable only if furnished by any of the Nationalised Banks/Scheduled Banks.)**

4. We, ……..further agree that the guarantee herein contained shall remain in full force and effect during the period as mentioned in Clause 5 of the said NIT read with Clause 20 of the General Conditions of Contract, or the period that would be taken for the performance of the said Agreement and that it shall continue to be enforceable till the dues of the Company under or by virtue of the said NIT or the conditions of contract or the Agreement have been fully paid and its claims satisfied or discharged or the Company certified that the terms and conditions of the said NIT

or the conditions of contract or the Agreement have been fully and properly honoured and carried out by said successful tenderer and accordingly discharges the guarantee.

Unless a demand or claim under this guarantee is made on us in writing on or before the ……..

We shall be discharged from all liability under this guarantee thereafter.

1. We,..... lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Company in writing.

Dated, the ……. day of ……

For ……

(Authorised signatory of the Bank with seal)

Creative Museum Designers

(Section 8 Company guaranteed by National Council of Science Museums)
Govt. of India, Block- GN, Sector-V, Bidhan Nagar, Kolkata-700 091

OFFER FORM

Tender No.: CMD.007.12.35(WORKS)/23-24/24 **Date: 08.02.2024**

I/We have read, understood and accepted all the General Terms and Conditions etc. for **"External Civil Works (Security Room, Development of Parking area and Peripheral Roads, Under Ground Water Tank, Balance Retaining Wall, Drains etc.) in connection with Proposed K. D. Malaviya National Oil Museum at Guwahati"** as per enclosed specification by Creative Museum Designers, Kolkata. I/We hereby offer my/our rates for the said tender:-

1. Name of the Tenderer :

2. Permanent address (in case of Firm/: Company, address of the registered office including jurisdiction of the police station should be given)

3. Telephone Nos. a) Office :
   b) Workshop/Factory:
   c) Mobile :
4. Name of the Bankers and their address:
5. Price offer

Cost of K. D. Malaviya National Oil Museum at Guwahati, Assam as per enclosed specification by Creative Museum Designers, Kolkata:

I/We agree to carry out the work mentioned in the schedule at……% (…….....percent) **above** the rates shown in the priced schedule of probable items with approximate quantities.

OR

I/We agree to carry out the work mentioned in the schedule at……% (…….....percent) **below** the rates shown in the priced schedule of probable items with approximate quantities.

OR

I/we agree to carry out the work mentioned in the schedule at **par** rates shown in the priced schedule of probable items with approximate quantities

6. GST No**:** **…….**

   SAC/HSN code no: …….

   GST charged separately (%) **……..**

   Total Amount (Including GST) (Rs) …….

Total amount quoted by us for (in figures) Rs**.....** are strictly in accordance with the Creative Museum Designers, Kolkata.

Total amount including GST(In words)……

Date: Signature of the Tenderer/Authorised Official Seal

FORMAT FOR LETTER OF INTENT

…… Date……

(Mention file number)

Sub: Letter of intent for the work of ……..

Dear Sir/Madam,

With reference to your tender dated …….. (and further clarification vide letter number …….. dated ……) # it is intended to award the aforesaid work at the tendered amount of ₹……..

You are, therefore, requested to sign an agreement as per standard format already printed in the tender documents purchased by you while tendering for this job. For this purpose, you are requested to send us a non-judicial stamp paper of appropriate value for preparing contract Agreement within a week from the date of this letter.

You are also requested to deposit Bank Guarantee (from Nationalized Bank/ Scheduled Bank) duly issued / assigned in favour of Creative Museum Designers, Kolkata of an amount of Rs……. as Security cum Performance Guarantee, which shall be submitted within 15 (fifteen) days from the date of issuing of LOI. The validity of Performance Guarantee shall be up to completion time and additional 12 (twelve) calender months from the date of completion time.

You may avail of 15(fifteen) days mobilisation time from the date of issue of this letter of intent for mobilisation your men, materials and other necessary resources for the construction. During mobilisation period, you are requested to study all the drawings and designs annexed hereto and the Bar-Chart and obtain clarifications from the architect or this office immediately.

Please note that the work has to be completed within ……. Weeks/months in which mobilisation time period of 15 (fifteen) days is also included. The date of commencement of work would be reckoned as the date of issue of this letter (as per Clause 24 of NIT).

Thanking you,

Yours faithfully,

Sd/-

Head of Engineering - Civil

Letter of intent is to be issued in the letter head of the of the company and a photocopy is to be maintained as office copy on which signature of the authorised representative of the successful tender is to be obtained with date at the time of issue of original letter of intent. # Delete words within brackets if not applicable in specific case.

FORMAT FOR ARTICLES OF AGREEMENT

INSTRUCTIONS (not to be typed in Agreement)

(Articles of Agreement have to be typed on non-judicial stamp paper. The value of the stamp paper varies from state to state and is to be known form the particular place. The stamp paper will be purchased by the successful tenderer and the agreement may be typed by the Company according to the format.)

ARTICLES OF AGREEMENT made at ……..

…….
(Place)

This…….. day of …….
(Date) (Month & Year)

Between the …….

……..

Hereinafter referred to as the CMD which expression shall be include its successors and assigns on the one part and……

……
(name of the successful tenderer)

Trading in the name and style of……
……..
……
…….
(Name and complete address of the successful tenderer)
Hereinafter referred to as the successful tenderer which expression shall be include his/their respective heirs, executors, administrators and assigns on the other part.

WHEREAS the CMD is desirous of getting the work of

…….
…… therein done and has caused
(Name of the work)

Notice Inviting Tender (Including appendix), drawings, schedule of quantities and specifications describing the work and conditions of contract prepared by……
……
……

…….
(Name and address of the company)

AND WHEREAS the said NIT (including appendix) drawings as per list attached, specifications and the priced schedule of quantities and conditions of contract have been signed by or on behalf of the parties hereto. AND whereas the Successful tenderer has deposited in Cash or Bank Draft a sum of ₹…….....
(exact amount in words)

The amount being 2.5% of the estimated value of the tender rounded off to the nearest hundred with the Company as Initial Security for the die performance of this Agreement as provided in the said conditions.

NOW IT IS HEREBY AGREED AND DELARED BY AND BETWEEN THE PARTIES HERETO AS FOLLOWS:

1. In consideration of the payments to be made to him as hereinafter provided the successful tender shall upon and subject to the conditions herein contained execute and complete the work within **12 (Twelve)** months form the date of issue of letter of intent (as defined under Appendix of NIT) and as per the said drawings and such further detailed drawings as may be furnished to him from time to time and described in the said specifications and the said priced schedule of quantities along with the progress of the building work.
2. The Company shall pay to the successful tenderer such sum as shall become payable hereunder at the time and in the manner specified in the said conditions.
3. Time is the essence of this agreement and the successful tenderer shall proceed with the work, throughout the stipulated period of this contract, strictly according to the CPM/PERT/BAR CHART attached herewith and forming a part of this agreement. At any stage during execution, if any work lags behind the target as indicated in the CPM/PERT/BAR-CHART for reasons directly attributable to the successful tenderer, he shall pay or allow the CMD to deduct from any money due to him a liquidated damage as per Clause 61 of the General Conditions of Contract.
4. This agreement comprises the work above and all subsidiary works connected therewith, even though such work may not be shown on the drawings, or described in the said specifications or the priced Schedule of Quantities.
5. The Company through the Engineer (As defined under Clause 3 of General Conditions of Contract) reserves to itself the right of altering the drawings and of adding to or omitting any item of work or of having portions of the same carried out departmentally or otherwise and such alterations or variations shall not vitiate this agreement.
6. In the case of any disputes or differences arising out of or in connection with, or concerning this Agreement, it shall be settled by arbitration. The arbitration shall be conducted by an expert as Arbitrator in the field acceptable to both the parties. In case of disagreement, it shall be through three experts in the field, one to be appointed by each party and the third presiding expert to be jointly appointed by the expert referred to. The arbitration shall be as per the provision of the Arbitration and Conciliation (amendment) Act, 2015 and the decision of the panel so appointed shall be final and binding on both the parties to this Agreement. In regard to all disputes or claims arising out of the contract of whatever nature, the place of jurisdiction shall be at Kolkata only (As defined under Clause 53 of General Conditions of Contract).

The provisions of the Arbitration and Conciliation Act 2015 or any statutory modification or re-enactment thereof and of the rules made there under for the time being in force shall apply to arbitration proceedings under this clause.

In witness whereof the parties have set their respective hands the day and the year and the place hereinabove written.

Signed by for and on behalf of the company

……..

In the presence of

1) ……..

Seal

2) ……

Signed by the said Successful tenderer…….

In the presence of

1)……..

Seal

2)……

GENERAL CONDITIONS OF CONTRACT (GCC)

1. DEFINITION OF TERMS:

The various terms appearing in the Tender Document shall have the following meaning unless they are repugnant to the context otherwise:

(a)	**COMPANY**	**:**	**CREATIVE MUSEUM DESIGNERS (CMD) – A Section 8 Company guaranteed by National Council of Science Museums, NCSM Campus, 33, Block-GN, Building – II,6th Floor, Bidhannagar, Sector – V, Kolkata - 700091**
(b.1)	**OWNER/CLIENT**	**:**	**M/S. K D MALAVIYA NATIONAL OIL MUSEUM TRUST (KDMNOMT)**
(b.2)	**STRUCTURAL CONSULTANT/ SANITARY PLUMBING CONSULTANT**	**:**	**M/S. KOTHARI & ASSOCIATES, 14B, CAMAC STREET, KOLKATA – 700017/ LALIT KUMAR BOSE (LKB) , 46/A, S.N. ROY ROAD, KOLKATA - 700038**
(c)	**BIDDER/TENDERER**	**:**	**The firm/party who shall tender quotation to the company.**
(d)	**CONTRACTOR**	**:**	**The Bidder who's quoted offer will be accepted, either in full or in part, by CMD.**
(e)	**WORK(s)**	**:**	**Jobs awarded to the contractor by CMD.**
(f)	**LOI/ WORK ORDER/ AGREEMENT**	**:**	**The Formal letter/notification issued to the Contractor awarding the work(s) in full or in part by the Company together with the applicable terms and conditions etc. as are finally and mutually agreed to between the Company and the Contractor.**
(g)	**SITE/WORK SITE**	**:**	**The premises where the work will be executed by the Contractor and shall include the lands, buildings, structures etc. erected thereupon.**
(h)	**ENGINEER-IN-CHARGE**	**:**	**The Officer/Engineer nominated and authorized by the company for the time being for the purpose of operating the contract or any work covered thereunder.**
(i)	**ACCEPTING AUTHORITY**	**:**	**MANAGING DIRECTOR of the company.**

2. INTERPRETATION:

The terms as used in the tender documents and agreement and named hereunder shall have the meanings herein assigned to them except where the subject or context otherwise requires: -

"This agreement" shall comprise of the Articles of Agreement along with the Appendix, General Conditions of Contract, Special Condition of Contract, Priced Schedule of Quantities, Technical Specifications and Drawings and CPM/PERT/BAR CHART attached hereto and including those to which only a reference is made herein.

"Work" or "Works" shall mean all work or works defined by bills of quantities, Drawings Specifications and such other work or works as the successful tenderer may be entrusted with for carrying out under this agreement as per Clause 5 of the Articles of Agreement.

Company shall mean Creative Museum Designers (CMD) which shall include the persons for the time being in management of the Company and its assigns.

NCSM means National Council of Science Museums, Kolkata.

KDMNOMT means K D Malaviya National Oil Museum Trust, the Owner of the Project.

STRUCTURAL CONSULTANT shall means M/s Kothari & Associates, 14B Camac Street, Kolkata – 700017.

SANITARY PLUMBING CONSULTANT shall means Lalit Kumar Bose (LKB), 46/A, S.N. Roy Road, Kolkata – 700038.

"Engineer" shall mean the representative of CMD or authorized as such by the Company or in the event of his ceasing to be Engineer for the work such other firm or persons as may be appointed by the Company as Engineer for this work. (Further elaboration given in Clause 3 below):

"Successful tenderer" shall mean **Accepted Lowest Bidder** and shall include his/their respective heirs, executors, administrators and assigns.

''Site'' shall mean the site of the construction works as shown on the site plan attached hereto including any buidings and erection thereon and any other land adjoining these to (inclusive) as aforesaid allotted by the Company for the use of successful tenderer.

"Act of Insolvency" shall mean any act of insolvency as defined by the Presidency Towns Insolvency Act, or the Provincial Insolvency Act or any "Amending Statue.

"Notice in Writing" or "Written Notice" shall mean a notice or communication in written, typed or printed or printed characters sent (unless delivered personally or otherwise proved to have been received)

by registered post to the last known private or business address or the registered office of the addressee and shall be deemed to have received when in the ordinary course of post it would have been delivered. "Virtual Completion" shall mean that the works carried out are fit for occupation in every respect including removal of scaffolding, plant, surplus material and rubbish and cleaning of dirt from work and site.

Words imputing persons include firms and corporations words imputing the singular only also include the plural and vice versa where the context so requires.

Short headlines are given to each Clause for convenience only and they will not limit the meaning or scope of the Clause in any way.

3. ENGINEER:

The plans, agreement and documents above mentioned shall form the basis of this agreement and the decision of the said Engineer for the time being as mentioned in the said conditions, in reference to all matters or dispute as to material and workmanship shall be final and binding on both the parties.

The term "Engineer" shall mean the firm or person(s) appointed by the Company to superintend the work. He/They will receive his/their instruction for the work from the Company.

The successful tenderer shall afford the said Engineer(s) every facility and assistance for examining the work and materials and for checking and measuring works and materials.

The Engineer or any Authorised Assistant of the Engineer shall have the power to give notice to the successful tenderer or to his Supervisor of non-approval of any work, or materials, and such work shall be suspended or the use of such materials shall be discontinued. The work from time to time be examined by the Engineer or the Engineers Assistant but such examination shall not in any way exonerate the successful tenderer from the obligation to remedy any defects due to materials or workmanship not in accordance with the contract which may be found to exist at any stage of the work or may appear within the defects liability period mentioned in Clause 37 of General Conditions of Contract (GCC).

4. SCOPE OF THE CONTRACT:

The successful tenderer shall carry out and complete the works in every respect in accordance with this contract and in accordance with the directions of the Engineer and to the satisfaction of the Engineer and CMD. The Engineer may from time to time issue further drawings and/or written instructions, detailed directions and explanations in regard to:

a. The variation or modification of the design, quality or quantity of works for the addition or omissions or substitution of any work.
b. Any discrepancy in the drawings or between the schedule of quantities and/or drawing and/or specification.
c. The removal from the site of any material brought therein by the successful tenderer and the substitution of any other materials there from.
d. The removal and/or re-execution of any works executed by the successful tenderer.
e. The dismissal from the works of any persons employed thereupon.

f. The opening up for inspection of any wok covered up.

g. The amending and making good of any defects under Clause 37.

h. The rectification and making good of any defects under clauses herein after mentioned and those arising during the maintenance period/ defect liability period.

The successful tenderer shall comply with and duly execute any work comprised in such instructions, detailed directions and explanations, provided always that if the engineer's instructions involved variation from the priced Schedule of Quantities, such instruction shall be issued by CMD and the successful tenderer shall take the action stipulated in Clause 60.

If the work shown on any such further drawings or detailed drawings or that may be necessary to comply with any such instructions, directions, or explanations be in the opinion of the successful tenderer, extra to that comprised in or reasonably to be inferred from the contract he shall before proceeding with such work, give notice in writing to this effect to the Engineer, and in the event of his not doing so three days before the commencement of such work the successful tenderer shall not be entitled to any allowance in respect of any such extra work. But if such notice has been duly given and the Engineer and the "successful tenderer, fail to agree as to whether or not there is any extra, then if the engineer decides that the successful tenderer is to carry out the said work, the successful tenderer shall do so accordingly, and the question whether or not there is any extra and if so, the amount thereof shall failing agreement be settled by the Arbitration as provided in Clause 52 on a reference being made by the successful tenderer.

5. SCOPE OF WORK:

The work consists of **"External Civil Works (Security Room, Development of Parking area and Peripheral Roads, Under Ground Water Tank, Balance Retaining Wall, Drains etc.) in connection with Proposed K. D. Malaviya National Oil Museum at Khanapara, Guwahati, Assam"** to be carried out in accordance with the technical specification, job procedure, drawings and Schedule of Quantities & Rates. It includes furnishing all materials, labour, tools and equipment and management necessary for the incidental to the construction and completion of the work. All work, during its progress and upon completion, shall conform to the code, standard, specification, approved drawings etc.

The Contractor shall forthwith comply with and duly execute any work comprised in such CMD's instructions, provided always that verbal instructions, directions and explanations given to the Contractor's or his representative upon the works by CMD shall if involving a variation be confirmed in writing to the Contractor's within seven days.

- The Client / Employer reserves the right to get the work executed in the best and most economical manner, and may add or may not operate any item(s) of work(s) as CMD may consider fit.
- The Client / Employer reserve the right to increase or decrease the scope of work and/or not to operate any one or more of the item(s) of work(s) of the Schedule of Quantities & Rates. It is the responsibility of the Contractor to ascertain from the Engineer–in–charge, the items to be operated with their actual quantities before making any arrangement(s) for taking up work under the item(s). No claim, whatsoever, from the Contractor will be entertained for non-operation of any of the item(s) or for variation in quantity of any of the item(s).

- The payment shall be made on the basis of actual quantities executed under various item(s) and the accepted rates thereof, and not on the quantities mentioned in the Schedule of Quantities & Rates.
- The work in general consists Percentage Based Item Rate as per "Schedule of Quantities & Rates (SOQR)".
- Dismantling of existing Brickwork/R.C.C./P.C.C. etc. if required for successful execution of the work, is to be done by successful bidder as per instruction of CMD/ Structural Consultant/LKB including rendering of the same.
- The Scope of Work may also include such other related works as covered in 'Schedule of Quantities & Rates (SOQR)' although they may not be specifically mentioned in the above paragraphs and all such incidental items not specified but reasonably implied and necessary for the completion of the work as a whole, shall be deemed to be directed by the Employer
- CMD also reserves the right to accept tender either for full quantity of work or part thereof or divide the works amongst more than 1 (One) Contractor without assigning any reason for any such action.
- CMD also reserves the right to take away part of initially awarded work from Contractor in case of his unsatisfactory work progress and award the same to other Agencies, in order to meet the time schedule of owner/client or for any other reason or contingency at the cost & risk of the Contractor. In this regard Employer's decision will final & binding on the Contractor.
- The Contractor shall provide a detailed schedule of work along with material and labour deployment on monthly basis.
- The Contractor shall, after completion of work, clear the site of all debris and left over materials, at his own expense to the entire satisfaction of Engineer-in-Charge or his authorized representative. In case of any failure by the Contractor, the employer will get set at risk and cost of the Contractor.
- If required, Contractor shall submit to CMD / KDMNOMT the entry challan of incoming materials for verification of Stores and record.
- It should be clearly understood that it is entirely the Contractor's responsibility and liability to find, procure and use the required tools and plants and accessories at his own cost for efficient and methodical execution of the work. CMD / KDMNOMT shall have the right to check the sufficiency or quality of the Contractor's tools from time to time and the Contractor shall carry out all reasonable instructions of KDMNOMT in this respect.

6. SUCCESSFUL TENDERER TO PROVIDE EVERYTHING NECESSARY:

The successful tenderer shall provide everything necessary for the proper execution of the works according to the true intent and meaning of the drawings and specification and bill of quantities taken together, whether the same may or may not be particular shown on the drawings or described in the specification or included in the bill of quantities, provided that the same is to be reasonably inferred there from and if he finds any discrepancy in the drawings or between the drawings and specification and bill of quantities, he shall immediately refer the same to the Engineer who shall decide which shall be followed. Figured dimensions shall be followed in reference to scale.

The successful tenderer shall supply, fix and maintain at his cost during the execution of any works, all the necessary centering, scaffolding, staging, planking, timbering, shuttering, shoring, pumping, fencing,

boarding, watching and lighting by night as well as by day required for the proper execution and protection of the public and the safety of any adjacent roads, streets, cellars, vaults, eaves, pavement, walls, houses, buildings and all erections, matters or thing, and they shall take down and remove any or all such centering, scaffolding etc. as occasion shall require or when ordered to do so and shall fully reinstate and make good all matters and all things disturbed during the executing of the works to the satisfaction of the Engineer before a Virtual Completion Certificate is issued.

The successful tenderer shall make his own arrangements for laying temporary water and electrical power lines including excavation if necessary so as not to cause any obstruction along locations approved by the Engineer. The water supply lines, hose pipes, electrical lines, underground or overhead etc. belonging to them should not cause damage to the property of the company including gardens, plants, flowers, hedges, flower pots in the campus etc. Any expenditure incurred by the company due to damage so caused shall be debited to the successful tenderer's account.

CMD shall on no account be responsible for the expense incurred by the successful tenderer for labour accomodation or electric power or water obtained from elsewhere.

7. DRAWINGS, DESIGNS ETC.

Tender drawings are diagrammatic but shall be followed as closely as actual construction permits. Any deviations made shall be in conformity with the architectural and other service drawings.

The successful tenderer shall verify all dimensions at the site and bring to the notice of the Engineer all discrepancies or deviations noticed.The Engineer's decision shall be final and binding.

All drawings issued by CMD are its own property and shall not be lent, reproduced or used on any other works than intended without the written permission of the Company.

Large scale size details and manufacturer's dimension for materials to be incorporated shall take precedence over small scale drawings.

One complete set of drawing, specifications and schedule of quantities shall be furnished by the Engineer to the successful tenderer and the Engineer shall furnish, within such time as he may consider reasonable, one copy of any additional drawing which in his opinion may be necessary for the execution or any part of work. Such copies shall be kept on the works, and the Engineer and his representatives shall at all reasonable time have access to the same and they shall be returned to the Engineer by the successful tenderer before the issue of the certificate for the balance of this account under the contract.

CMD will make all efforts to give all drawings, designs, decision etc. from time to time and the successful tenderer shall make timely requests for the same. No claim whatsoever shall however be entertained for compensation for the delay in supply of drawings, designs, decisions, running payments etc. from the successful tenderer. Drawings shown at the time of issue of tenders and forming part of the contract shall indicate the scope of work and drawings issued subsequently during the execution of work shall be deemed to be drawings elaborating the basic scheme. If any detailed drawings show an item for execution, which in the opinion of the successful tenderer is not covered under the items of the contract, he shall immediately refer it to the Engineer, for final decision. The decision of the Engineer as to whether it is an extra item or not or whether it is covered by contracts and if not what extra rate

should be paid shall be final and binding on both the parties to the contract i.e. CMD and the Successful tenderer.

8. REFERENCE DRAWINGS & SHOP DRAWINGS:

Reference Drawings

The Successful tenderer shall maintain one set of all drawings issued to him as reference drawing. These shall not be used at the site.

All corrections, deviations and changes made at the site shall be shown on these reference drawings for incorporation in the completion drawings. All changes to be made shall be initiated by the Engineer.

Shop Drawings

The Successful tenderer at his own cost shall submit to the Engineer-in-Charge/ CMD 6 copies (six) of all shop drawings related to Structural steel work, Aluminium door/window, bar bending schedule, Electrical work, etc. for approval. The successful agency shall prepare all shop drawings and take the approval from CMD before starting the work and also submit as-built drawings of all the works executed by the successful agency after completion of work.

9. SCHEDULE OF QUANTITIES & RATES (SOQR):

The quantities for various items of works as shown in the Schedule of Quantities & Rates (SOQR) of probable items of works are based on the basic design drawing prepared and issued by CMD. However, if quantity variations become necessary due to Design consideration / Site conditions etc. those have to be done by the Contractor at the time of execution of work at their finally accepted rates(s). No conditional rate will be allowed in any case.

10. ERROR IN SCHEDULE OF QUANTITIES, IF ANY:

If any error appears in the schedule of quantities, other than the Tenderer's prices and calculation, it shall be rectified by the engineer after informing the Company. Such variation shall constitute a deviation of the item(s)/contract and shall be dealt with as hereinafter provided.

11. NOMENCLATURE OF ITEM:

Nomenclatures of the items of works mentioned in the priced schedule are only a brief description of the work. The work shall have to execute in accordance with the specifications/ drawings for the work to the satisfaction of the Engineer of the work. Any omission in the description will not absolve the successful tenderer from his responsibilities to complete the work in a satisfactory manner.

12. METRIC UNITS:

The schedule of quantity indicate the unit of Metric system. The mode of measurement of different items of work shall be as per details contained in the specification and special conditions with the equivalent of the units mentioned therein in Metric system.

13. CPWD/PWD SPECIFICATIONS AND I S CODES:

CPWD/PWD specifications & relevant I.S Code of practice shall be applicable, for all items of work.

14. ORDER OF PRECEDENCE:

If any discrepancy is noticed between the conditions and specifications, drawing etc. the following would be the order of precedence:

a. Schedule of Quantities.
b. Notice Inviting Tender (NIT).
c. General Conditions of Contract (GCC) & Special Conditions of Contract (SCC)
d. Drawings and notes thereon.
e. Technical Specification as provided with this document for external civil work etc.
f. ASHRAE standards/ ARI/ CPWD/ PWD Specifications & I.S. Codes.

15. SITE INSPECTION:

The work site is at Khanapara, Guwahati, K D Malaviya National Oil Museum Project, Assam. Tenderers are advised to inspect and examine the site and its surroundings and satisfy themselves before submission of their offer as to the nature of the site and Sub-Soil, the quantities and nature of work and materials necessary for completion of the works and the means and access to the site, accommodation they may require and all other necessary information as to the risk contingencies and other circumstances which may influence or affect their offers and work. A tenderer shall be deemed to have full knowledge of the Site whether he inspects it or not and no extra charge consequent to any misunderstanding or otherwise shall be allowed.

16. SUFFICIENCY OF QUOTATION:

The Bidder shall be deemed to have satisfied himself before tendering as to the correctness and sufficiency of his quotation for the works and of the rates and prices quoted in the Schedule of Quantities & Rates in which rates and prices shall, except as otherwise provided, cover all his obligations and liabilities under the Contract and all matters and things necessary for the proper completion and maintenance of the Works.

17. SECURITY DEPOSIT/ PERFORMANCE BANK GUARANTEE:

This shall mean and be 10% of the contract value awarded including the initial security deposit and shall be recovered from the running bills. In case of termination of contract, this retention money shall be forfeited and amount necessary to make up this amount shall be recovered from the money due to the successful tenderer under this contract, or any other contract. The successful tenderer can give retention money in the form of a Bank Guarantee from a Nationalised Bank/Scheduled Bank in approved format to the extent of 10% of the total cost of work awarded valid for a period up to Defect Liability Period (DLP) plus one year. Tenderers who have deposited earnest money deposit in Bank Guarantee along

with the tender could get refund of earnest money in bank guarantee after the bank guarantee for the 10% of the contract value is received and accepted by the Company. The retention money in the form of Bank Guarantee will not be accepted in parts.

The successful tenderer shall have to extend the Bank Guarantee period, from time to time at least one month before the expiry of a Bank Guarantee to cover the defects liability period, reckoned from the date of virtual completion. **In case they failed to extend the Bank Guarantee at least one month before its expiry, it shall be considered a breach of contract on the part of the successful tenderer and hence, the Company shall be free to demand the Guarantee money from the Bank.**

18. DEVIATIONS:

The successful tenderer may when authorized and when directed, in writing by the Engineer with the approval of CMD add or omit or vary the works shown upon the drawings, or described in the specifications, or included the bill of quantities but they shall make no addition, omission or variation without such authorization or direction. A verbal authority direction by the Engineer shall, if confirmed by him, in writing within 7 days , be deemed to have been given in writing.

No claim for an extra shall be allowed unless it shall have been executed under the provision of Clause 19 or by the authority of the Engineer with concurrence of the company as there in mentioned. Any such extra if wherein refered to, as an authorize extra shall be goverened by Clause 43. No variation i.e. additions or substitutions shall be vitiate the contract.

19. PRICE FOR DEVIATIONS AND EXTRA ITEMS:

Deviation shall be valued at the net rates contained in the Tenderers original tender or where the same may not apply direct at rates analogous to the prices therein contained. If the altered, additional or substituted work included any class of work for which no rate is specified in the contract, Then the successful tenderer shall within seven days of the date of receipt of the order to carry out the work, inform the Engineer with the copy to CMD, the rate which they intent to charge for such class of work with proper analysis. In the event of his not doing so, within a reasonable time before the commencement of such work, he shall not be entitled to any allowance or payment in respect of any such extra work. When such notice has been duly given, the Engineer with the consent of the Company may agree to such rate but if the Engineer does not agree to this rate, the Engineer may cancel his order to carry out such class of work and arrange for it to be carried out departmentally or through any other agency or in such a manner as he may consider advisable or he may decide that the Successful tenderer shall carry out such items of work and in such case he shall only be entitled to be paid in respect of the work carried out or expenditure incurred by him according to such rate or rates as shall be fixed by the Engineer as full and final and shall be binding on successful bidder.

However, in respect of the rates for extra/new items, if there are any, the opinion of the Engineer as to whether it is an extra item or not, and if so, what rate should be paid shall be final and binding on the successful tenderer and shall be derived from contract items so far as applicable and the rates which cannot be derived from contract items will be fixed as per (i) relevant DSR items as applicable or (ii) on the basis of actual cost of materials and labour, plus 15% as successful tenderers overheads and profits on all trades except on the cost of materials supplied departmentally.

Successful tenderer shall not claim any idle and remobilization charge for interim due to late decision by CMD. Such legitimate interim delays shall however be considered for extension of time if any.

Further more, they shall submit analysis of rates with justifications for claiming extra on any deviation item prior to the probable date of execution of the referred item.

20. COMPLETION TIME:

Time of completion of work will be 12 (twelve) months from the date of issuance of Letter of Intent (LOI).

21. TOOLS, PLANTS & EQUIPMENTS:

- The Contractor shall arrange at his own expense all necessary Tools, Plants & Equipments (hereinafter referred to as T&P) such as DG Set, Welding machine, Crane/ Lifting Equipment of required capacity, Water Tanker, Excavator, Concrete Mini Batching Plant, 10/7 Concrete Mixer Machine, Petrol/ Electric Concrete Vibrators with needles, Cube Testing Machine, Cube Moulds, Sieves for Fine & Coarse Aggregate, Slump Cone, Theodolite, Levelling Instrument etc. along with all other accessories, Operator(s) & Labourers required for execution of the work, will be provided by Contractor at his own cost.
  Lighting DG for area lighting if required (including operator and fuel) will also be provided by Contractor within the finally accepted rate / price.

22. MATERIALS:

The Contractor shall at his own expense, provide all materials required for the work in this Tender Documents.

- All materials to be provided by the Contractor shall be in conformity with the specifications laid down in the contract and the Contractor shall, if requested by the Engineer-in-Charge, furnish proof to the satisfaction of him that the materials so comply.
- The Contractor shall, at his own expense and without delay, supply to the Engineer-in-Charge samples of materials proposed to be used in the works. The Engineer-in-Charge shall within seven days of supply of samples or within such further period as he may require intimate to the Contractor in writing/inform the Contractor whether samples are approved by him or not. If samples are not approved, the Contractor shall forthwith arrange to supply to the Engineer-in-Charge for his approval fresh samples complying with the specification laid down in the Contract.
- The Engineer-in-Charge shall have full powers for removal of any or all the materials brought to site by the Contractor which are not in accordance with the Contract specifications or do not confirm in character or quality to samples approved by him. In case of default on the part of the Contractor in removing rejected materials the Engineer-in-Charge shall be at liberty to have them removed by other means.
- All charges on account of transportation, octroi, GST, Excise and other duties on materials obtained for the works from any source shall be borne by the Contractor.

23. FAULTY MATERIALS AND WORK:

a. The Engineer shall during the progress of the work has power to order in writing from time to time the removal from the work, within such reasonable time or times as may be specified in the order, to any materials and/or workmanship which in the opinion of the Engineer are not in accordance with the specifications or the instructions of the Engineer. The substitution of proper materials or any workmanship and the removal and proper re-execution of any work executed with materials or workmanship not in accordance with the drawings and specifications or instructions shall have to be forthwith carried out by the Successful tenderer at his own cost upon receiving such order. In case of default on the part of the Successful tenderer to carry out such order the CMD shall have the power to employ any other persons to carry out the same and all the expenses consequent thereon or incidental thereto shall be borne by the Successful tenderer and shall be recovered from them by the Company from any money due to or that may become due to the Successful tenderer or from the amount of retention money.

b. Nothing in this clause shall relieve the Successful tenderer from his liability to execute the works in all respect in accordance with those terms and upon and subject to the conditions of this contract or from his liability to make good all defects.

24. ACCESS:

CMD or its representatives shall at all reasonable time have free access to the works and/or to the workshops/ factories or other places where materials are being prepared or constructed for the contract and also to any place where materials are lying or from which they are being obtained and the Successful tenderer shall give every facility to them for inspection, examination and testing of the materials and workmanship. Except the representative of Public Authorities and those mentioned above, no person shall be allowed to the work site at any time without the prior written permission of the Engineer in charge of CMD.

If any work is to be done at a place other than the site of works the Successful tenderer shall obtain the prior written permission of the Engineer in charge for doing so.

25. LABOUR:

The Contractor shall employ labour in sufficient numbers to maintain the required rate of progress and quality to ensure workmanship of the degree specified in the Contract and to the satisfaction of the Engineer–in–Charge. The Contractor shall not employ in connection with the Works any person who has not completed his eighteen years of age.

The Contractor shall furnish to the Engineer-in-Charge at regular intervals as decided by Engineer-in-charge of CMD, a distribution of employees engaged by the agency according to trades. The Contractor shall also submit on the 4th and 19th of every month to the Engineer–in–Charge a true statement showing the accidents that occurred during the previous fortnight showing the circumstances under which they happened and the extent of damage and injury caused by them.

The Contractor shall pay to labour employed by him wages not less than Minimum Wages as defined in the Contract Labour Regulations.

The Contractor shall in respect of labour employed by him comply with or cause to be complied with the Contract Labour Regulations in regard to all matters provided therein.

The Contractor shall comply with the provisions of the payment of Wages Act, 1936, Minimum Wages Act, 1948, Workmen's Compensation Act, 1923, Industrial Disputes Act, 1947, or any modifications thereof or any other law relating thereto and rules made thereunder from time to time.

The Contractor shall be liable to pay his contribution and the employee's contribution to the State Insurance Scheme in respect of all labour employed by him for the execution of the contract, in accordance with the provision of "The Employee's State Insurance Act, 1948" as amended from time to time.

The Engineer–in–Charge shall on a report having been made by an Inspecting Officer as defined in the Contract Labour Regulation have the power to deduct from the money due to the Contractor any sum required or estimated to be required for making good the loss suffered by a worker or workers by reasons of non-fulfilment of the Conditions of the Contract for the benefit of workers, non-payment of wages or of deduction made from his or their wages which are not justified by the terms of the Contract or non-observance of the said Contract Labour Regulations and Acts and Rules framed there under.

In the event of the Contractor committing a default or breach of any of the provisions of the aforesaid Contract Labour Regulations, as amended from time or furnishing any information of submitting or filling any Form / Register / Slip under the provisions of these Regulations which is materially incorrect then on the report of the Inspecting Office as defined in the Contract Labour Regulation, the Contractor shall without prejudice to any other liability pay to the Company a sum as applicable as per prevailing Rules as liquidated damages for every default, breach or furnishing, making, submitting, filling materially incorrect statement as may be fixed by the Engineer–in–Charge & in the event of the Contractor's default continuing in this respect, the liquidated damages may be enhanced for each day of default subject to a maximum percent of the estimated cost of the Works put to tender. The Engineer–in–Charge shall deduct such amount from bills or security deposit of the Contractor and credit the same to the Welfare Fund constituted under Regulations. The decision of the Engineer–in–Charge in this respect shall be final and binding.

The Contractor shall at his own expense comply with or cause to complied with Model Rules for Labour Welfare framed by Government from time to time for the protection of health and for making sanitary arrangements for workers employed directly or indirectly on the Works. In case the Contractor fails to make arrangement as aforesaid, the Engineer–in–Charge shall be entitled to do so and recover the cost thereof from the Contractor.

The Contractor shall at his own expense arrange for the safety provisions as required by the Engineer-in-Charge, in respect of all labour directly or indirectly employed for performance of the Works and shall provide all facilities in connection therewith. In case the Contractor fails to make arrangements and provide necessary facilities as aforesaid, the Engineer–in–Charge shall be entitled to do so and recover the cost thereof from the Contractor.

Failure to comply with Model Rules for Labour Welfare, Safety Code or the provisions relating to report on accidents shall make the Contractor liable to pay to the Company as liquidated damages as applicable as per prevailing Rules for each default or materially incorrect statement. The decision of the Engineer–in–Charge in such matters based on reports from the Inspecting Officers as defined in the Contractor Labour Regulation as appended to these conditions shall be final and binding and deductions for recovery of such liquidated damages may be made from any amount payable to the Contractor.

26. POSSESSION OF SITE BY CONTRACTOR:

- The Contractor shall not be permitted to enter on (other than for inspection purposes) or take possession of the site until instructed to do so by the Engineer – in – Charge in writing. The portion of the site to be occupied by the Contractor shall be defined and / or marked on the site plan, failing which these shall be indicated by the Engineer – in – Charge at Site and the Contractor shall on no account be allowed to extend his operation beyond these areas. In respect of any land allotted to the Contractor for purposes of or in connection with the contract the Contractor shall be licensee subject to the following and such other terms and conditions as may be imposed by the licenser.

  (i) That such use or occupation shall not confer any right or tenancy of the land to the Contractor.

  (ii) That the Contractor shall be liable to vacate the land on demand by the Engineer – in – Charge.

  (iii) That the Contractor shall have no right to any construction over this land without the written permission of the Engineer – in – Charge. In case, he is allowed to construct any structure he shall have to demolish and clear the same before handing over the completed work unless agreed to the contrary.

- The Contractor shall provide if necessary, or if required, on the site, all temporary access there to and shall alter, adopt and maintain the same as required from time to time and shall take up and clear them away as and when no longer required and as and when ordered by the Engineer – in – Charge and make good all damage done to the site at his cost.

27. SETTING OUT WORKS:

The successful tenderer at his own expense shall set out the works and shall be responsible for the true and perfect setting out of the same and for the correctness of the positions, levels, dimensions and alignment of all parts thereof. If at any time any error shall appear during the progress of any part of the work, the Successful tenderer shall at his own expense rectify such error if called upon to the satisfaction of the Engineer.

28. MATERIALS OBTAINED FROM EXCAVATION:

Materials of any kind obtained from excavation on the site shall remain the property of CMD and shall be disposed of as the Engineer – in - Charge may direct.

All fossils, coins, articles of value of antiquity and structures and other remains or things of geological or archaeological interest discovered on the site shall be the absolute property of CMD 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 Engineer-in-Charge with such discovery and carry out the Engineer-in-Charge's directions as to the disposal of the same at the expense of CMD.

29. WATCHING & LIGHTING:

The Contractor shall provide and maintain at his own expense all lights, guards fencing and watching when and where necessary or required by the Engineer–in–Charge for the protection of the Works or for the safety and convenience of these employed on the Works or the public.

30. WORK SUPERVISOR AND FOREMAN:

The Successful tenderer shall keep a qualified and experienced Engineer for supervision of works to ensure best quality work. He shall also give all necessary personal superintendence during the execution of the works and as long thereafter as the Engineer may consider necessary until the expiration of the "Defect Liability Period" stated in Clause 37. The Successful tenderer shall also during the whole time, the works are in progress, employ competent Foreman approved by the Engineer whose qualification must conform to the requirements specified by the Engineer. In special cases, he shall be constantly in attendance of the building while the men are at work". Any directions, explanations, instruction or notices given by the Engineer to such Foreman shall be held to be given to the successful tenderer.

31. INSPECTION AND APPROVAL:

All works embracing more than one process shall be subject to examination and approval at each stage thereof and the Contractor shall give due notice to the Engineer – in – Charge of his authorized representative when each stage is ready. In default of such notice, the Engineer-in-Charge shall be entitled to appraise the quality and extent thereof.

Employer's/ Client's representatives concerned with the Contract shall have powers at any time to inspect and examine any part of the works and the Contractor shall give such facilities as may be required for such inspection and examination.

Company's/ Owner's representatives concerned with the Contract shall have powers at any time to inspect and examine any part of the works and the Contractor shall give such facilities as may be required for such inspection and examination.

32. POWERS OF ENGINEER-IN-CHARGE'S REPRESENTATIVE:

The duties of the representatives of the Engineer–in–Charge, are to watch and supervise the works and to test and examine any materials to be used or workmanship employed in connection with the works. He shall have no authority to order any work involving any extra payment by the Employer nor to make any variation in the works.

- The Engineer–in–Charge may from time to time delegate to his representative any of the powers and authorities vested in the Engineer–in–Charge and shall furnish to the Contractor a copy of all such written delegation of Powers and authorities. Any written instruction or written approval

given by the representative of the Engineer–in–Charge to the Contractor within the terms of such delegation shall bind the Contractor and the Employer as through it had been given by the Engineer–in–Charge.

- Failure of the Representative of the Engineer–in–Charge to disapprove any work or materials shall not prejudice the power of the Engineer–in–Charge thereafter to disapprove such work or materials and to order the pulling down, removal or breaking up thereof.
- If the Contractor is dissatisfied with any decision of the Representative of the Engineer–in–Charge, he shall be entitled to refer the matter to the Engineer–in–Charge who shall thereupon confirm, reverse or vary such decision.

33. REMOVAL OF WORKMEN:

The Contractor shall employ in and about the execution of the works only such persons as are skilled and experienced in their trades and the Engineer-in-Charge shall be at liberty to object to and advise the Contractor to remove from the works any person employed by the Contractor in or about the execution of the works who in the opinion of the Engineer-in-Charge misconducts himself or is incompetent or negligent in the proper performance of his duties and such person shall not be again employed upon the works without written permission of the Engineer-in-Charge.

34. WORK DURING NIGHT OR ON SUNDAYS & HOLIDAYS:

Subject to any provisions to the contrary contained in the Contract, none of the permanent works shall be carried out during night or on Sundays or on authorized Holidays without the permission in writing of the Engineer-in-Charge except when the work is unavoidable or absolutely necessary for the safety of life, property of works in which case the Contractor shall immediately advise the Engineer-in-Charge accordingly.

The Contractor would be required to carry out the work even on Sunday or any other holidays, without conferring any right on the Contractor for claiming for extra payment for working on holidays. The decision of the Engineer-in-charge in this regard will be final and binding on the Contractor. Nothing extra will be paid for doing works on Sunday or any other holidays.

35. COMPLETION CERTIFICATE:

As soon as the work is completed, the Contractor shall give notice of such completion to the Engineer-in-Charge and within a reasonable period of receipt of such notice the Engineer-in- Charge shall inspect the work and shall furnish the Contractor with a certificate of completion indicating (a) the date of completion (b) defects to be rectified by the Contractor and/or (c) items for which payment shall be made at reduced rates. When separate periods of completion have been specified for items or groups of items, the Engineer-in-Charge shall issue separate completion certificates for such item or groups of items.

No certificate of completion shall be issued, nor shall the work be considered to be complete till the Contractor shall have removed from the premises on which the work has been executed all scaffolding, sheds and surplus materials, except such as are required for rectification of defects, rubbish and all huts and sanitary arrangements required for his workmen in the site in connection with the execution of the work, as shall have been erected by the Contractor the workmen and cleaned all dirt from the parts of building(s) in upon or about which the work has been executed or of which he may had possession for the purpose of the execution thereof and cleaned floors, gutters and drains, eased doors and sashes, oiled

locks fastening labelled keys clearly and handed them over to the Engineer-in-Charge or his Representative and made the whole premises fit for immediate occupation or use to the satisfaction of the Engineer-in-Charge.

If the Contractor shall fail to comply with any of the requirements of this conditions as aforesaid, on or before the date of completion of the works, the Engineer-in-Charge may at the expense of the Contractor fulfil such requirements and dispose of the scaffoldings, surplus materials and rubbish etc. as he thinks fit and the Contractor shall have no claim in respect of any such scaffolding or surplus materials except for any sum actually realized by the sale thereof less the cost of fulfilling the requirements and any other amount that may be due from the Contractor. If the expense of fulfilling such requirements is more than the amount realized on such disposal as aforesaid, the Contractor shall forthwith on demand pay such excess to the Company.

- If at any time before completion of the entire work, items or groups of items for which periods of completion have been specified, have been completed, the Engineer-in-Charge with the consent of the Contractor takes possession of any part or parts of the same then notwithstanding anything expressed or implied elsewhere in this Contract :

  (a) Within ten/thirty days of the date of completion of such items or groups of items or possession of the relevant part the Engineer-in-Charge shall issue completion certificate for the relevant part as in condition above provided the Contractor fulfils his obligations under that condition for the relevant part.

  (b) The Defects Liability Period in respect of such items and the relevant part shall be deemed to have commenced from the certified date of completion of such items or the relevant part as the case may be.

36. PRICE ESCALATION:

No escalation shall be payable upto 12 (twelve) months from the date of issuance of LOI and in case of any reason but not due to delay in completion of work by the contractor and if contract duration is extended by the Competent Authority beyond initial completion period, escalation will be payable only for the portion of work executed during such extended period as per instruction of Engineer-in-Charge.

Payments for variation in prices and wages (escalation) will be admissible as per following details.

(i) **Material Escalation**: The increase in price of all materials beyond quotes rates will be compensated by the department as per formula given below:

$Vm = 70/100 \times 0.85v - (C+S) \times (WI - WI_0 / WI_0)$

Where:

Vm - Variation in materials cost i.e. increase or decrease in the amount in rupees to be paid or recovered

V - Value of work done excluding advances on material, if any during the period under reckoning i.e. after expiry of initial completion period i.e. 12 (twelve) months from the date of issuance of L.O.I.

C - Cost of cement used in the work S - Cost of Steel used in the work	Value of (C+S) shall be put in the formula if these materials are issued by CMD. Otherwise if cement and steel are not issued by CMD, the value of (C+S) shall be taken as Zero.

WI - Average All India Wholesale Price Index for all commodities as published in the RBI Bulletin for the period under consideration i.e. after expiry of initial completion period i.e. 12 (twelve) months from the date of issuance of L.O.I.

WI_0 - Average All India Wholesale Price Index for all commodities as published in the RBI Bulletin during the month of opening of tender.

(ii) **Labour Escalation**: Increase in the cost of labour beyond quoted rates will be compensated by the museum/ centre as per formula given below:

$VL = 30/100 \times 0.85v - (C+S) \times (I - I_0 / I_0)$

Where:

VL - Variation in labour cost i.e. increase or decrease in the amount in rupees to be paid or recovered

V, C & S - As stated under (I) above.

I - Average All India Consumer Price Index Number for Industrial Workers declared by Labour Bureau, Government of India, as published in RBI Bulletin during the period under consideration i.e. after expiry of initial completion period i.e. 12 (twelve) months from the date of issuance of L.O.I.

I_0 - Average All India Consumer Price Index Number for Industrial Workers declared by Labour Bureau, Government of India, as published in RBI Bulletin during the month of opening of tender.

No claims for other escalation on any account whatsoever will be entertained.

The amount of escalation will be calculated monthly for the work done in that particular month and will be paid for quarterly. Escalation is not permissible on successful tenderer's overhead and profit that explains the term 0.85V.

Ceiling on amount due to escalation – In no case total amount of escalation, to be paid for the entire work will exceed 20% of the total cost of the work based on the tendered rate.

37. DEFECT LIABILITY PERIOD AND DEFECTS AFTER COMPLETION:

Defect liability period shall be one year from the date of virtual completion of work, as certified by the Company. Any defect, shrinkage or other faults, which may appear within the defect liability period, in the opinion of the Engineer, arising from materials or workmanship not in accordance with the contract or from failure to take due precautions, shall upon the directions in writing of the engineer and within such reasonable time as shall be specified therein be amended and made good by the Successful tenderer at his own cost. In case of default, the Company may employ and pay any other person/persons to amend and make good such defect, shrinkage or other faults and all damage, loss and expenses consequent thereon or incidental thereto shall be made good and borne by the Successful tenderer.

Such damage, loss and expense shall be recoverable from the Successful tenderer by the Company or may be deducted by them from any money due or that may become due to the successful tenderer. The Company may also in lieu of such amendments deduct from any money due to the Successful tenderer, a sum to be determined by the Engineer equivalent to the cost of amending such works, and in the event of the amount retained under Clause 17 (the amount held as retention money) being insufficient, recover the balance from the Successful tenderer, together with expenses the Company may have incurred in connection therewith. The Successful tenderer shall remain liable under the provisions of this clause notwithstanding the signing by the Engineer of any certificate or the passing of any bills.

38. FACILITIES TO OTHER CONTRACTOR:

The Contractor shall, in accordance with the requirements of the Engineer-in-Charge, extend all reasonable facilities to other Contractor engaged contemporaneously on separate contracts in connection with the works.

39. NOTICES TO LOCAL BODIES:

(i) The Contractor shall comply with and give all notice required under any Governmental authority, instrument, rule or order made under any Act of parliament, State laws or any regulation of bye laws of any local authority relating to the works. The Contractor shall before making any variation from the Contract drawing necessitated by such compliance give to the Engineer-in-Charge a written notice giving reasons for the proposed variation and obtain the Engineer-in-Charge's instruction therein.

(ii) The Contractor shall pay and indemnify the Company against any liability in respect of any fees or charges payable under any Act of Parliament, State laws or any Government instrument, rule or order and any regulations or bye-laws of any local authority in respect of works.

40. SUB-CONTRACT:

The Contractor shall not sublet any portion of the contract without the prior written approval of the Accepting Authority.

41. LIABILITY FOR DAMAGE, DEFECTS OF IMPERFECTION AND RECTIFICATION THEREOF:

If the Contractor or his workmen or employees shall injure or destroy any part of the building in which they may be working or any building, road, fence etc. contiguous to the premises on which the work or

any part of it is being executed, or if any damage shall happen to the work while in progress the Contractor shall upon receipt of a notice in writing in that behalf make the same good at his own expenses. If it shall appear to the Engineer – in – Charge or his Representative at any time during construction or reconstruction or prior to the expiration of the Defects Liability Period, that any work has been executed with unsound, imperfect, or unskilled workmanship or that any materials or articles provided by the Contractor for execution of the work are unsound or of a quality inferior to that contract for, or otherwise not in accordance with the Contract, or that any defect, shrinkage or other faults have appeared in the work arising out of defective or improper materials or workmanship, the Contractor shall, upon receipt of a notice in writing in that behalf from the Engineer – in – Charge forthwith rectify or remove and reconstruct the work so specified in whole or part as the case may be and / or remove the materials or article so specified and provide other proper and suitable materials or articles at his own expense, notwithstanding that the same may have been inadvertently passed, certified and paid for and in the event of his failing to do so within the period to be specified by the Engineer – In – Charge in his notice aforesaid, the Engineer – In – Charge may rectify or remove and re-execute the work and / or remove and replace with other materials or articles / complained of, as the case may be, by other means at the risk of the Contractor.

42. MEASUREMENTS:

In case of dispute between the successful tenderer and the Company as to under which item a particular work is to be measured the decision of the Engineer shall be final and binding on both the parties to the contract. If for any items, the mode of measurements is not specified the decision of the Engineer about the mode of measurement shall be final and binding on both the parties to the contract.

43. PREPARATION OF RUNNING AND FINAL BILLS:

The Engineer or his representative shall take measurements in presence of Successful tenderers representative and record them in the Measurement Book from time to time and shall prepare abstract for running and final bill, including recovery statements. The bill abstract shall be prepared on standard CPWD form on the basis of abstract of quantities prepared by the Engineer in triplicate. The Successful tenderer should sign the bill and Measurement Book with the remark **"Measurement and bill accepted",** However, in the final bill, the successful tenderer shall have to certify **"The bill is accepted in full and final settlement of all claims and demands against this work."**

In case a large amount is blocked in the final bill pending technical/audit check, advance up to the extent of 75% of net final bill amount may be paid to the successful tenderer, with the approval of the Engineer at his direction even after the completion date is over.

The recovery from Running Account Bills for the materials issued by the Company shall be made on the basis of the quantity consumed in the work as assessed by the Engineer, giving a due allowance for wastage. The Successful tenderer shall submit once a month a statement showing the materials received, consumed and the balanced carried over the subsequent month so that a watch could be maintained on the material.

Final payment will be made within 03 (three) months on virtual completion of the entire work under the scope of work mentioned in the tender document and on submission of pre-receipted invoice along with all documents pertaining to warranty, test certificate etc. The payment for measurable items will be made

on actual measurement basis (measurement will be taken physically by the Engineer of the Company and the authorised representative of the successful tenderer).

44. TERMS OF PAYMENT:

All payments will be made on actual measurement / work done basis.

45. MODE OF PAYMENT:

All payment shall be made through RTGS/NEFT from Creative Museum Designers, Kolkata office and the Contractor shall submit the following details to the company :

Name of the company	**:**
Name of Bank	**:**
Name of Bank Branch	**:**
City	**:**
Account Number	**:**
Account Type	**:**
IFSC Code of the Bank Branch	**:**
MICR Code of the Bank Branch	**:**

46. RATES AND TAXES/ DUTIES:

Quoted price in the bid shall include all taxes & duties, GST, freight F.O.R. site and transit insurance and related incidentals, labour cess etc. in respect of this contract and no additional claim beyond what has been quoted in the Financial Bid shall be accepted. Accepted tender rates shall not be changed due to changes in wages of labour. **Bidder must submit challan copy of GST as a proof of GST payment.**

The rates quoted by the successful tenderer shall be paid at net rates. He should include in his rates allowance for increase or decrease in the price due to market fluctuation.

The aforesaid rates would be subject to the following deductions as and if applicable at the rates in force at the time the bill is raised:

a. TDS under Income Tax Act.
b. Any other state taxes as applicable, Labour cess etc.
c. The raised bill should clearly and separately mention the following tax(es)
   GST

Nota bene: Tenderer should have obtained registration under the GST Act.

47. LABOUR CESS:

Labour Cess as applicable shall be included in the quoted Price.

48. ROYALTY:

Payment of Royalty will be the responsibility of the Contractor within his quoted price every month the Contractor shall submit Royalty challan issued by the Competent Authority for Stone chips and Sand purchased by the Contractor and used in the job. It is mandatory for the Contractor to submit to the Company Royalty Certificate from the Mining Department before release of final bill payment due to him.

49. INSURANCE FOR DAMAGE TO PERSONS AND PROPERTY:

a. To execute the work, the successful tenderer shall obtain a **Contractors All Risk (CAR) Policy** on contract value awarded to them.

b. The Successful tenderer shall be responsible for all injury to persons, animals or things and for all damages to property, structural and decorative, whether such injury or damage arise from carelessness or accident or in any way connected wherewith. This clause shall be held to include, interalia any damage due to causes as aforesaid to buildings (whether immediately adjacent or otherwise) and to roads, streets, footpaths, bridges or ways as well as all damage caused to the buildings and works forming the subject of this contract by the inclemency of weather. The Successful tenderer indemnifies the Company and holds him harmless in respect of all expenses arising from such injury or damage to persons or property aforesaid and also in respect of any claim made in respect of Injury or damages consequent upon such claim.

c. The successful tenderer shall reinstate all damage of every sort mentioned in this clause, so as to deliver up the whole of the contract works complete and perfect in every respect and so as to make good and otherwise satisfy all claims for damage as aforesaid to the property or third parties.

d. The Successful tenderer also indemnifies the Company against all claim which may be made upon the Company during the currency of this contract by any employee or representative of an Employee of the agency or any sub-agency, employed by him, for any injury to or loss of life or such employees, or for compensation payable under any law for the time being in force to any workman or to the representative of any deceased or incapacitated workmen.

e. The Successful tenderer also indemnifies the Company in respect of any costs, charges and/or expenses, including legal costs as between Solicitor and client, occurring out of any award of compensation and/or damages consequent upon such claims.

f. The Company shall be at liberty and is hereby empowered to deduct the amount of any damages, compensation cost, charges and/or expenses arising or ascertaining from or in respect of any such claim and/or damages as aforesaid from any sum, or sums due to, or become due to the Successful tenderer.

50. WATER, ELECTRICITY AND CEMENT GODOWN:

The successful tenderer shall construct at the site at their own cost temporary cement godown within the mobilisation time as described in relevant Clause, of appropriate size suitable for proper and safe storage of 3 months consumption of cement. Service water shall be provided by CMD without any cost implication. The drinking water is to be arranged by the vendor themselves. Power cannot be provided by CMD for construction. However, commissioning power shall be arranged by CMD. Contractor shall arrange for construction power from available resources at site at their own cost.

51. LAND FOR SITE OFFICE, WORKSHOP & LABOUR COLONY:

CMD will provide land/ space for contractor's temporary office/ godown/ store within project premises, subject to availability. But no land for labour/ worker hutment shall be provided by CMD.

52. ARBITRATION:

In the case of any disputes or differences arising out of or in connection with, or concerning this Agreement, it shall be settled by arbitration. The arbitration shall be conducted by an expert as Arbitrator in the field acceptable to both the parties. In case of disagreement, it shall be through three experts in the field, one to be appointed by each party and the third presiding expert to be jointly appointed by the expert referred to. The arbitration shall be as per the provision of the Arbitration and Conciliation (amendment) Act, 2015 and the decision of the panel so appointed shall be final and binding on both the parties to this Agreement. The place of arbitration shall be normally Kolkata or any other suitable place mutually agreed.

The provisions of the Arbitration and Conciliation Act 2015 or any statutory modification or re-enactment thereof and of the rules made there under for the time being in force shall apply to arbitration proceedings under this clause.

53. JURISDICTION:

In regard to all disputes or claims arising out of the contract of whatever nature, the place of jurisdiction shall be at Kolkata only.

54. OPENING OF WORK:

a. All works under or in course of execution or executed in pursuance of the contract shall at all times be open to the supervision of the Company, Engineer or their representatives.

b. The successful tenderer shall notify the Engineer in writing immediately after the trenches or excavations, as shown in the drawings, are executed or as soon as any ground is cut into which from the unexpected cause, appears to need immediate attention. After notifying the Engineer he shall await instructions which shall be given within seven days of receipt of such notice. If the successful tenderer puts in, any part of the foundations before he has notified the Engineer and received instruction, he shall be liable to reinstate all work that may subsequently at any time, be damaged on account of any defect or insufficient foundations. The Successful tenderer shall at the request of the Engineer, within such time as indicated by the Engineer, shall open up for inspection any other work and should the successful tenderer refuse or neglect to comply with such request, the Company through the Engineer may employ other workmen to open up the same. If the work has been covered up in contravention of Engineer's instruction, or if on being opened up, be found not in accordance

with the drawings and specifications or the instructions of the Engineer, the expenses of opening up and covering it up again, whether done by the Successful tenderer or such other workmen shall be borne by or which may become due to the Successful tenderer or from the amount held as retention money. If the work has not been covered up in contravention of such instructions, and be found in accordance with said drawings and specifications or instructions, the expenses aforesaid shall be borne by the Company and shall be added to the contract sum provided always that in the case of foundations or of any other urgent work so opened up and requiring an immediate attention, the Engineer shall within seven days after receipt of written notice from the Successful tenderer that the work has been so opened, make or cause to make the inspection thereof and at the expiration of such time if such inspection shall not so have been made, the Successful tenderer may cover the same and shall not be required to open it up again, except at the expense of the Company.

55. HEIGHTS:

Successful tenderer's rates shall include the cost of lifting the materials upto all heights given in drawings or as required during execution.

56. SCAFFOLDING:

The successful tenderer shall use external scaffolding to ensure true line in vertical and horizontal planes. Scaffolding required for execution of this work may vary from single floor height to multi floor heights, which may require multiple staging, scaffolding, centering and shuttering. Since the payments will be made to the successful tenderer at net quoted rates, irrespective of the heights involved the tenders must see and study the drawings carefully before tendering their rates. Contractor's quoted rates for concreting item shall deemed to be inclusive of all cost for RCC, Reinforcement steel, scaffolding, centering& shuttering, strutting & propping, labour, supervision etc. as may be required for successful completion of the work. No extra payment will be made for the above mentioned works.

57. SITE CLEARANCE AND CLEAN UP:

The Successful tenderer shall, from time to time clear away all debris and excess materials accumulated at the site.

After all fixtures, equipment and appliances have been installed and commissioned, they shall clean up the same and remove all plaster, paints, stains, stickers and other foreign matter of discolouration leaving the construction in ready to use condition.

On completion of all works, they shall demolish all temporary storages put up by them, remove all surplus materials and leave the site in a broom clean condition.

58. QUANTITY VARIATION:

All the quantities given in schedule of quantities are provisional.

The tenderers shall be deemed to have given Balanced Rates for each item, irrespective of the quantities given. Also irrespective of variation in quantities to any extent either positive or negative, the tenderer shall be paid at acceptable contract rates only. The Company reserves the right to increase or decrease quantities to any extent either positive or negative.

59. AUTHORITIES, NOTICES AND PATENTS:

The successful tenderer shall confirm to the provision of any Act of the Legislature relating to the works, the Regulations and Bye-Laws of any corporation and of any electric and other Companies and/or authorities with whose systems the structure is proposed to be connected, and shall, before making any variation from the drawings or specifications that may be necessitated by so confirming, give to the engineer written notice, specifying the variation proposed to be made and the reason for making it and apply for instruction thereon. If compliance with this clause involves any extra work not included in this contract, he shall specify these items of work and the allowance or extra payment required on their account. In case he shall not, within seven days, received such instructions, shall proceed with the work, conforming to the provision and/or regulations of bye-laws in question.

The amount claimed as an extra or whether there is an extra or not shall be decided by the Engineer and will be subject to arbitration clause is so required.

The successful tenderer give all notices required by the said regulations or bye-laws to be given to any authority and pay to such authority or to any public office all fees that may be properly chargeable in respect of the works and lodge the receipts with the bill.

The successful tenderer shall indemnify the Company against all claims in respect of patent rights, and shall defend all action arising from such claims and shall himself pay all royalties, license fees, damages, cost and charges of all and every short that may be legally incurred in respect thereof.

60. CERTIFICATES AND PAYMENTS:

a. The Engineer may from time to time intimate in writing to the Successful tenderer that he requires the works to be measured and they shall attend or send qualified agent to assist the Engineer or the Engineer's representative in taking such measurements, and calculations and to furnish all particulars or to give all assistance required by the Engineer. Should they not attend or neglect or omit to send such agent then the measurement taken by the Engineer or approved by him shall be taken to be correct measurements of the work unless objected to within one month of their being recorded in the measurement book or books. Such measurements shall be taken in accordance with the mode of measurements mentioned in the specifications.

b. The Successful tenderer or his agents may at the time of measurement take such notes of measurements as they may require.

c. The Engineer or his authorised representative will issue on the basis of necessary measurement interim valuation certificates to the Successful tenderer in respect of items of work, rates for which exist in the priced schedule of quantities or have been subsequently agreed upon between the parties, and shall send the measurement books and the valuation certificates to CMD. The Successful tenderer shall be entitled under these certificates of the Engineer to payments, within 15 days from the date of each certificate, unless objected as provided in sub-clauses (a) & (b) at the rate of maximum 90% (ninety percent) of the value of work so executed and the balance being retained towards retention money. The engineer shall issue such certificates within fifteen days of notice from the Successful tenderer provided measurements have been taken and the value of the work done since last payment exceeds the amount stated in the appendix and not more than one certificate

is required in a fortnight, provided always that the issue by the Engineer of any certificate during the progress of the work or after their completion shall not have any effect as a certificate of satisfaction or relieve the Successful tenderer from his liability under Clauses 37 and 54. Provided all defects are removed and the retention money is not forfeited or has not become liable to be forfeited under this contract, entire amount under retention money shall be refunded without interest after the completion of defect liability period or the final bill is passed for payment whichever is later.

d. All intermediate payments shall be recorded as payments by way of advance against the final payment only and not as payment for work actually done and completed. The final bill shall be submitted by the Successful tenderer within 3 months of the date fixed for completion of the work. The measurement of the work taken by the Engineer or his representatives after one week's notice to the Successful tenderer shall be final and binding on him unless objected to within one month of their being recorded in the measurement books.

e. The Successful tenderer agrees that before final payment shall be made on the contract, he will sign and deliver to the Company either in the measurement books or otherwise as required, a valid release and discharge certificate from any and all claims and demands whatever from the company for all matters arising out of or connected with the contract.

61. TIME AND DAMAGES FOR NON-COMPLETION OF WORK IN TIME:

a. All the construction works shall progress strictly as per the enclosed CPM/PERT/BAR CHART. If however, the Successful tenderer desires some minor modification time and before execution of the agreement indicating the reasons for which changes are required. The Company may after scrutiny, agree to the modifications suggested if the reasons Cited by the successful tenderer are considered valid. The decision of the consideration of the company in this respect will be final and binding. The modifications, if any, are to be incorporated in the CPM/PERT/BAR CHART and this will form a part of the agreement.

b. The starting time specified for carrying out of the work as entered in the CPM/PERT/BAR CHART shall be reckoned from the date of issue of the Letter of Intent. The date of completion or such date as is duly extended under Clause 62 shall be strictly observed by the Successful tenderer. The work shall, throughout the stipulated period of the contract, be proceeded with all diligence (Time being deemed to be the essence of this Contract) by the successful tenderer strictly according to the CPM/PERT/BAR CHART which is a part of this agreement.

c. At any stage during the execution of the work if the work lags behind the target indicated in the CPM/PERT/BAR CHART for reasons directly attributable to the Successful tenderer, he shall be liable to pay as agreed liquidated damages equivalent to half percent of the total cost of work awarded every week for the period the work lags behind the CPM/PERT/BAR CHART subject to a maximum of 10% of the contract value awarded or gross value of work done, whichever is greater.

d. In the event of Successful tenderer's inability to complete the external civil work by the scheduled date of completion, the Company shall have the right to terminate the contract as per Clause 65 or

allow the successful tenderer to continue and complete the work within specific date. In the latter case, during the period of continuation, the successful tenderer shall pay as agreed liquidated damage equivalent to one per cent of the total cost of work awarded for every week that the work remains unfinished subject to a maximum of 10% of the contract value awarded or gross value of work done, whichever is greater.

62. EXTENSION OF TIME:

If the successful tenderer shall desire an extension of time for completion of the work on the grounds of his having been unavoidably hindered in its execution and for reasons not attributable to him on the following grounds:

a. by reason of any exceptionally inclement weather like Cyclone, severe flood etc., normal monsoon shall not be considered a valid reason for extension of time,
b. by reason of proceedings taken or threatened by, or legal disputes with adjoining or neighbouring owners,
c. due to delay in the work of other agencies or tradesman engaged or nominated by the Company: if such delay is directly responsible for delay in execution of this work,
d. by reason of any general strike or lockout affecting the building made, strike or any kind of labour trouble in successful tenderer's own organisation shall not be a valid reason for extension.
e. in the event of delay in execution of work wholly attributable to delay in supply of drawings by Architect or the Company in spite of request from the successful tenderer well in advance, he shall apply in writing to the Engineer within seven days of the date of the hindrance on account of which he desires such extensions as aforesaid and the engineer, with the consent of the Company may if the reasonable ground be shown therefore allow such extension of time, if any, be necessary or proper,
f. in case of the total value of the work exceeds the contract value owing to deviation in quantities or extra items, the successful tenderer will be entitled to ask for extension of time in proportion to the increased value of work.
g. No extension of time shall be given to the successful tenderer for non-supply or delay in supply of of materials/ equipment under his scope & supply.The successful tenderer hereby agrees that extension of time requested for by him and granted by the Company shall be treated as an extension of time allowed to them without any claim for compensation or damages for any reasons whatsoever including those for which the extension is granted.

If the works be delayed by:

a. Force majeure or
b. Abnormally bad weather, or
c. Serious loss or damage by fire, or
d. Civil commotion, local combination of workmen, strike or lock out affecting any of the trades employed on the work, or
e. Delay on the part other Sub-Contractors of tradesman engaged by Company in executing work not forming part of the contract, or
f. Non-availability or break-down of tools & plants to be supplied or supplied by company, or
g. Non-availability stores, which are the responsibility of Company to supply, or

h. Any other cause which in the absolute discretion of Engineer-in-charge is found as beyond the Sub-Contractor's control, then upon the happening of any such event causing delay, the Sub-Contractor shall immediately give notice thereof in writing to the Engineer-in-charge but shall nevertheless use constantly his best Endeavour's to prevent or make good the delay and shall do all that may be reasonably required to the satisfaction of the Engineer-in-charge to proceed with the works.

63. SUSPENSION OF WORK BY THE SUCCESSFUL TENDERER:

If the successful tenderer suspends the works without obtaining extension of time or in the opinion of the Engineer neglects or falls to proceed with due diligence in executing his part of the contract or if he makes default more than once in the manner mentioned in Clause 37 or the Engineer shall have the power to give notice in writing to the successful tenderer requiring that the work be proceeded with reasonable speed and output must be commensurate with the CPM/PERT/BAR CHART. Such notice shall specify the act of default on the part of the successful tenderer. After such notice has been given the Successful tenderer shall not be at liberty to remove from the site of work or from any ground continuous thereto any plant or materials belonging to him which had been placed thereon for the purpose of the work, and the Company shall have a lien upon all such plants and materials to subsist from the date of such notice being given, until the notice have been complied with. Provided always that such lien shall not under any circumstances subsist after the expiration of thirty-one days from the date of such notice being given, unless the Company has entered upon and taken possession of the works and site and of all such plants and materials until the works have been completed under the power hereinafter conferred upon it. If the Company exercises the above power it may engage any other agency to complete the works or finish the works departmentally and exclude the successful tenderer, his agents and servants from entry upon or access to the same except that the successful tenderer or any one person appointed in writing by him and accepted by the Company may have access at all reasonable' times during the progress of works to inspect, survey and measure the works. Such written appointments marked with the Company consent or a copy thereof shall be delivered to the Engineer before the person so appointed comes to the works. The Company shall take such steps as. in the opinion of the Engineer may be reasonable and necessary for completing the works without undue delay & expense, using that purpose the plants and materials above mentioned, in so far as they are suitable and adopted to such use. Upon the completion of the work the Engineer shall certify the amount of expenses properly incurred, consequent on the Incidental to the default of the successful tenderer as aforesaid, in completing the works by other persons. Should the amount so certified as the expenses properly incurred, including the Company overhead if the works were carried out departmentally, be less than the amount which would have been due to the Successful tenderer upon the completion of the works by him, the difference shall be paid to the Successful tenderer by the Company. Should the amount of the former exceed the later, the difference shall be paid by the Successful tenderer to the Company. The Company shall not be liable to make any further payment or compensation to the Successful tenderer for or on account of the proper use of the plants for the completion of the works under provisions hereinbefore contained other than such payment as is included in the contract price. After the works have been so completed by persons other than the successful tenderer under the provisions hereinafter contained, the Company shall give notice to the Successful tenderer of such completion and may require him from time to time, before and after such completion, to remove his plants and likewise all such materials as aforesaid as may not have been used in the completion of the works, from the site. If such plants and materials are not removed

within such reasonable time, the Company may remove and sale the same, holding the proceeds, less the cost of the removal and sale, to the credit of the successful tenderer. The Company shall not be responsible for any loss sustained by the successful tenderer from the sale of plants in the event of the successful tenderer not removing it after notice, or for any damage thereto or deterioration thereof in any event.

64. DETERMINATION OF CONTRACT BY THE CMD:

If the successful tenderer goes into liquidation, whether voluntary or compulsory or shall make an assignment or a composition for the benefit of the greater part, or shall enter into a Deed of Agreement with its creditors or if the Receiver of the Successful tenderer shall be unable, within fourteen days after notice to him requiring him to do so, to show to the reasonable satisfaction of the Company that he is liable to carry out and fulfil the contract and if so required by the Company to give reasonable security therefore or if the successful tenderer shall suffer execution to be issued or shall suffer any payment under this contract to be attached by or on behalf of any of the creditors or the Successful tenderer or shall assign, charge or encumber this charge or encumber this contract thereunder or shall neglect or shall fail to proceed to perform all or any of the act, matters or things by the contract, to be observed and performed by the successful tenderer for three clear days after written notice shall have been given the successful tenderer in manner, matter hereinafter mentioned, requiring the successful tenderer to observer perform the same or shall use improper material or workmanship in carrying on the works or shall in the opinion of the Engineer not exercised such due progress as stipulated in the enclosed CPM/PERT/BAR CHART forming part of this contract which would enable the works to be completed within the time agreed upon or shall abandon the contract, then, and in any of said case the Company may notwithstanding any previous waiver, determine the contract by a notice in writing in which case the retention money (Including the earnest money and the initial security deposit) and whether paid in one sum or deducted by installment shall stand forfeited and be absolutely at the disposal of the Company.The Successful tenderer shall have no claim or compensation for any loss sustained by him by reasons of his having purchased or procured any materials or entered into any engagements or made advances on account of or with a view to the execution of the work or the performance of the contract. The successful tenderer shall not be entitled to recover or be paid any sum for any work actually performed under the contract unless and until the Engineer will have certified in writing the performance of such work and the value of work payable in respect thereof and the successful tenderer shall only be entitled to be paid the value so certified, The certificate of the Engineer shall be based on measurements taken by him or under his supervision and with due notice to the Successful tenderer and on rates in the priced schedule or as subsequently communicated by the Engineer with the approval of the Company, under this agreement except for arithmetical errors, shall be final and conclusive. The Successful tenderer must remove his plant, materials, scaffolding etc. from the site within 10 days (ten days) of the receipt of the notice from the Company after which they will vest in the Company who may dispose them off as per Clause 63 by sale or auction on account of and at the risk of the successful tenderer who will have no claim for loss or compensation on this account.

65. TERMINATION OF CONTRACT BY SUCCESSFUL TENDERER:

If payment of the amount payable by the Company under the certificate of interim payment issued by the Engineer in accordance with Clause 60 shall be in arrears and unpaid for sixty days after notice in

writing requiring payment of the amount shall have been given by the Successful tenderer to the Company in manner hereinafter mentioned or if work be stopped for six months under the order of the Company for any reason not connected with any default on the part of the Successful tenderer or by any injunction or other order of any court of law made for any reasons not connected with any such default on the part of the successful tenderer then and in any of the said cases the successful tenderer shall be at liberty to terminate the contract by notice in writing to the Company and he shall be entitled to recover from the Company payment for all works executed and for useful materials (but not plants) purchased for the purpose of the contract and is brought to the site. In arriving at the amount of such payment, the net rates contained in the successful tenderer's tender shall be followed, or where the same may not apply, rates proportional to the prices therein contained. Rates for materials may be determined by the Engineer on actual vouchers produced by the successful tenderer and/or prevailing market rates at the discretion of the Engineer. The Successful tenderer shall not be entitled to recover or be paid any sum for any work actually performed under the contract, unless and until the Engineer has certified in writing the performance of such work and the value payable in respect thereof and the successful tenderer shall only be entitled, to be paid the value so certified. The certificate of the Engineer shall be based on measurements taken by him or under his supervision after due notice to the successful tenderer and shall be final and conclusive except for arithmetical errors. The successful tenderer must remove his plant, materials, scaffolding etc. from the site within ten days or such time as may be extended by the Company in writing, from the receipt of the notice from the Company after which they will vest in the Company who may dispose them off as per Clause 64 by sale or auction on account of and at the risk of the successful tenderer who will have no claim for loss or compensation on this account.

66. COMPENSATION:

All sums payable by way of compensation or liquidated damage under any of these conditions shall be considered as reasonable compensation to be applied to the use of CMD without reference to the actual loss or damage sustained and whether or not any damage shall have been sustained.

67. DISMISSAL OF WORKMEN ETC.:

The Successful tenderer shall on the request of the Engineer immediately dismiss from the works any person employed thereon who may, in the opinion of the Engineer be unsuitable or incompetent or who may in the opinion of the Company or the Engineer misconduct himself and such person shall not be again employed or allowed on the works without the permission of the Engineer and/or the Company.

68. ASSIGNMENT OR SUBLETTING OR BRIBES:

a. This contract shall not be assigned or sublet without the written approval of the Company. If the Successful tenderer shall assign or sublet this contract, or attempts to do so or become insolvent or commence insolvency proceedings or make any composition with his creditors or attempt to do so, or if any bribe, gratuity, gift, loan, pre-requisite award, reward or advantage pecuniary or otherwise, shall either directly or indirectly be given, promised or offered by the Successful tenderer any of his servants or agents to any officer of the Company or to persons who shall become in any way directly or indirectly interested in the Contract, the Company may thereupon by notice in writing rescind the contract and the retention money of the Successful tenderer shall thereupon stand forfeited and be absolutely at the disposal of the Company, and the same consequences shall ensure as if the contract

had been rescinded under Clause 64 thereof and (in addition) the Successful tenderer shall not be entitled to recover or to be paid for any work therefore actually performed under the contract.

b. The whole of the works including the contract shall be executed by the Successful tenderer and he/they shall not directly or indirectly transfer or assign or underlet the contract or any part, share or interest therein nor shall he take a new partner without the written consent of the Company and no subletting shall relieve the Successful tenderer from the full and entire responsibility of the contract or from active superintendence of the works during the progress.

69. NOTICE:

Notice from the Company, to the Engineer of the Successful tenderer may be served personally or sent by registered post or by email addressed to the office of the Company or the last known place of business of the Engineer or the Successful tenderer.

70. APPOINTMENT OF APPRENTICES AS PER APPRENTICES ACT:

The Successful tenderer shall during the currency of the contract when called upon by the Engineer engage and also ensure engagement by sub-agencies and other employed by the successful tenderer with the works such number of apprentices in categories mentioned below and for such periods as may be required by the Engineer. The Successful tenderer shall train them as required under the Apprentices Act 1961 and the Rules made thereunder and shall be responsible for all obligations of the Company under the said act including the liability to make payments to apprentices as required under the said Act.

(a)	**In Respect of Civil Works**		
(i)	Brick Layer	:	One apprentice for every 7 persons engaged in this category
(ii)	Building Construction	:	One apprentice for every 7 persons engaged in this category
(iii)	Carpenter	:	One apprentice for every 7 persons engaged in this category
(iv)	Surveyor	:	One apprentice for every 14 persons engaged in this category
(b)	**In Respect of Electrical Works**		
	Wireman	:	One apprentice for every 7 persons engaged in this category

The Successful tenderer shall comply with the provision of Apprentices Act 1961 and Rules and Orders issued hereunder from time to time.

If the Successful tenderer fails to do so, his failure will be deemed to be a breach of contract and the Company reserves the right to cancel the contract. The Successful tenderer also shall be liable to any pecuniary liability arising on account of any violation by him of the provisions of the Act.

71. QUALITY MANAGEMENT SYSTEM:

The contractor shall prepare and submit draft Project quality plan/quality assurance plan, based on relevant I.S. Codes, contract specifications etc. as applicable for successful completion of the work, for the Engineers review, comments (if any) and approval within 21 days on award of the contract. The Engineer shall review Project quality plan/ quality assurance plan and provide any comments to the contractor within 14 days after receipt of such draft. Within 7 days after receipt of Engineer's comments the contractor shall implement such comments and resubmit the Project quality plan/ quality assurance plan to the Engineer for approval. These procedures shall repeat till obtaining the approval from the Engineer.

The contractor shall follow and comply with the approved Project quality plan/ quality assurance plan and shall not amend it without prior written consent of the Engineer. The Engineer or his representative at any time during performance of the work, may conduct a compliance audit with respect to the Project quality plan/ quality assurance plan. If such audit demonstrates non-compliance with any aspect of the quality assurance plan, the Engineer may notify the contractor of such non-compliance and the contractor shall promptly undertake appropriate remedial action, at contractors sole risk, cost and expense.

72. NEGOTIATION:

CMD, Kolkata will not enter into any negotiations even with the Lowest Tenderer.

73. AGREEMENT:

The successful Tenderer has to enter into an Agreement with CMD, Kolkata in Nonjudicial Stamp Paper of Rs. 100/- (Rupees Hundred only).

All documents forming the Contract are to be taken as mutually explanatory of one another. In case the bidder requires any clarifications or further information, may contact

Head of Engineering-Civil,
CREATIVE MUSEUM DESIGNERS
NCSM Campus, 33, Block-GN, Building-II
Bidha Nagar, Sector –V, Kolkata – 700091
Phone No. 033 2357 6041
Email:cmd.ncsm.civil@gmail.com

SPECIAL CONDITIONS OF THE CONTRACT (SCC)

1.0 INTRODUCTION:

1.1 These Special Conditions of Contract shall be read in conjunction with the General Conditions of Contract, specifications of works, drawings and any other document forming part of this contract wherever the context so requires.

1.2 Notwithstanding the sub-division of the document into these separate sections and volumes, every part of each shall be deemed to be supplementary of every other part and shall be read with and into the contract so far as it may be practicable to do so.

1.3 The workmanship shall satisfy the relevant Indian Standards, the Technical Specifications contained herein and codes referred to. Where the job specifications stipulate requirements in addition to those jobs contained in the standard codes and specifications, these additional requirements shall also be satisfied. In absence of any standards/ specifications/ codes of practice for detailed specifications covering any part of the work covered in this tender, the instructions/ directions of Engineer-in-charge will be binding on the Contractor.

1.4 Where any portion of the General Conditions of Contract (GCC) is repugnant to or at variance with any provisions of the Special Conditions of Contract, then unless a different intention appears, the provision(s) of the Special Conditions of Contract shall be deemed to override the provision(s) of General Conditions of Contract (GCC) only to the extent that such repugnancies of variations in the Special Conditions of Contract are not possible of being reconciled with the provisions of General Conditions of Contract (GCC).

1.5 Without prejudice to the provisions of the General Conditions of Contract, whenever in the Bidding documents it is mentioned or stated that the Contractor shall perform certain work or provide certain facilities it is understood that the Contractor shall do so at his own cost and the Contract price shall be deemed to have included cost of such performance and/or provision, as the case may be.

1.6 In the absence of any Specifications covering any work(s), the same shall be performed /executed in accordance with standard Engineering Practice as per the instructions/directions of the Engineer-in-Charge, which will be binding on the Contractor

2.0 LOCATION AND ACCESS OF SITE:

The Project Site is located at K D Malaviya National Oil Museum, Khanapara, Guwahati, Assam. The Site is well connected by Rail and Road from other parts of India. Nearest Airport is at Guwahati.

3.0 These 'Technical Specification and Special Conditions' shall be read in conjunction with other provision including General Conditions of the Contract and are supplementary to & complementary with each other. However, in the event of any provisions of General Conditions are repugnant to or at variance with any provisions of 'Technical Specification and Special Conditions', then unless a different intention appears between the two, the provision given in 'Technical Specification and Special Conditions' shall be deemed to over-ride that provision of General Conditions and shall to the extent of such repugnancy or variation prevail & govern the Contract.

4.0 TIME SCHEDULE:

4.1 The work shall be executed strictly as per Time Schedule as provided in Clause 20 of General Conditions of Contract (GCC).

4.2 CONTRACTOR shall furnish a daily report on category wise labour deployed along with the progress of work done on previous day in the proforma prescribed by the Engineer-in-Charge.

5.0 SEQUENCE OF WORK:

Contractor shall plan the sequence of all works so as to achieve the desired progress keeping in mind overall safety and stability at all points of time.

If due to a particular design or specification or availability of machines or any other reason, a particular sequence of operation is demanded by the engineer due to which some interruptions are inherent to any one or more types of work or items of execution, then no claim for such interruption shall be entertained and contractor shall have to follow the sequence as instructed by the engineer.

6.0 PREPARATION OF BID:

Bidder is advised to visit and examine the site and its surrounding and shall familiarize himself of the existing facilities and environment and shall collect all other information which he may require for preparing and submitting the bid and entering into the contract. Claims and objection due to ignorance of existing conditions or inadequacy of information will not be considered after submission of the bid and during implementation.

7.0 SCOPE OF WORK:

7.1 The scope of work in general includes scope of work specified in various Technical Specifications/ sections provided in Part-I (Technical) and Schedule of Quantities & Rates (SOQR) enclosed in the Bidding Document. Further, it includes any other work not specifically mentioned but required to complete the work as per specifications, drawings and instructions of Engineer-in-Charge.

7.2 Scope of work shall be read in conjunction with item description of Schedule of Quantities & Rates (SOQR) and Contractor's scope shall include all activities of work specified in the item description of Schedule of Quantities & Rates (SOQR).

7.3 Rates shall include all cost for the performance of the item considering all parts of the Bidding Document. In case any activity though specifically not covered in description of item under `Schedule of Quantities & Rates (SOQR)' but is required to complete the work which could be reasonably implied/ informed from the content of Bidding Document, the cost for carrying out such activity of work shall be deemed to be included in the item rate.

7.4 The scope of work under fabrication & Erection shall include the following but not limited to these:

a) i) All Transportation including loading & unloading of materials

ii) Structural support, if any.

iii) House keeping

Note : any other items which are not covered above & separately in the Schedule of Quantities & Rates (SOQR) but required to complete the work in all respect as per approved drawing, ITP , procedure, specification, standard are in bidder’s scope. All works required as per drawings, specification and instruction of engineer-in- charge.

b) Carrying out required scaffolding works: wherever required at all level and height for execution of the above works.

c) Returning of all surplus structural steel and all piping and structural scraps from the project premises, as per the instructions of Engineer-in-charge.

d) To deploy skilled, semi-skilled and unskilled personnel in required number as per Scheduled Program so as to complete the work as per overall project schedule.

e) To deploy suitably qualified supervisors in required numbers to assure quality of work to the full satisfaction of KDMNOMT/ CMD.

f) To carry out all repairs arising out of defective works done by the contractor.

g) Cleaning of job sites and transporting all surplus material, debris, scrap, construction equipment etc. as per direction of Engineer-in-charge.

h) Contractor shall be responsible for proper coordination with other agencies operating at the site of work so that work may be carried out concurrently, without any hindrance to others. The Engineer-in-Charge shall resolve disputes, if any, in this regard, and his decision shall be final and binding on the Contractor.

i) All works shall be done to the entire satisfaction of the Engineer-in-Charge. Any work not carried out in accordance with the instructions shall be dismantled and made good without any extra cost and time implication to the KDMNOMT/ CMD.

j) If and when required for the coordination of the works with other agencies involved at site, the Contractor shall within the scope of work, re-route and/or prepare approaches and working areas as may be necessary.

k) The Contractor shall within the scope of work observe in addition to specifications, all national and local laws, ordinances, rules and regulation and requirements pertaining to the work

7.5 The entire work under this specification shall be completed within stipulated period from the date of placement of order. After award of contract, a final program shall be prepared well in advance.

8.0 SITE CLEANING:

1. The Contractor shall clean and keep clean the work site from time to time to the satisfaction of the Engineer- in-Charge for easy access to work site and to ensure safe passage, movement and working.

2. If the work involves dismantling of any existing structure in whole or part, care shall be taken to limit the dismantling up to the exact point and/or lines as directed by the Engineer-in-Charge and any damage caused to the existing structure beyond the said line or point shall be repaired and restored to the original condition at the Contractor's cost and risks to the satisfaction of the Engineer-in-Charge, whose decision shall be final and binding upon the Contractor.

3. The Contractor shall be the custodian of the dismantled materials till the Engineer-in-Charge takes charge thereof.

4. The Contractor shall dispose off the unserviceable materials, debris etc. out of the project premises.

5. The Contractor shall sort out, clear and stack the serviceable materials obtained from the dismantling/ renewal at places as directed by the Engineer-in-Charge.

6. No extra payment shall be paid on this account. The rates quoted in SOQR are deemed to be inclusive of all the costs towards all the above activities as well.

7. All materials shall be stored and stacked properly ensuring that place is properly drained and is free from dirt. It shall be ensured that no damage is caused due to improper stacking.

8. The CMD shall have free access at all times to those parts of Contractor's area of work which are concerned with their works. Also he shall be afforded all reasonable facilities at all stages of preparation, fabrication for satisfying himself that the fabrication is being undertaken in accordance with the provisions of relevant specification.

9.0 SECURITY DEPOSIT/ PERFORMANCE BANK GUARANTEE:

Please refer Clause 17 of General Conditions of Contract (GCC).

10.0 QUOTATION:

10.1 The contractor shall indicate his price as per Scope of Work and SOQR given in Tender Document.

10.2 The enclosed bid documents are deemed to be sufficient for the bidder to assess the nature and quantity of work involved and to quote his prices for the above job. No deviations from the bid documents will be admissible.

11.0 PROGRAMME:

A monthly time bar chart for various activities like supply, fabrication, transportation to site, welding, Installation, Fixing & Laying, Testing & Commissioning etc. giving starting and completion dates of all activities, shall be submitted after awarding of the job for approval of CMD.

12.0 RULES & REGULATIONS OF SAFETY, ELECTRICITY BOARDS ETC.:

The Contractor shall at all times comply with all relevant acts, electricity rules, safety regulations etc. as per statutory regulations of Central / State Government & Plant Authorities.

13.0 EXTRA ITEMS:

Please refer Clause 19 of General Conditions of Contract (GCC).

14.0 Following Points to be considered by the Contractor while quoting his offer

Any additional work, if required, will be undertaken by them after getting instruction in writing from the Engineer-in-Charge. For settlement of their claims on any additional work, the contractor will keep joint record of the measurements of such work duly certified by the Engineer-in-Charge.

15.0 MAINTENANCE & GUARANTEE:

Commencing from the date of issue of final acceptance/completion certificate to the Contractor shall stand guarantee for a period of 12 calendar months, from the date of handing over the total job in all respect to CMD. The Contractor shall replace/rectify all parts/components which become defective due to bad fabrication or due to any act of oversight or omission. All such rectification or replacements of defective workmanship shall be done free of cost by the Contractor.

16.0 RESPONSIBILITY OF CONTRACTOR:

16.1 It shall be the responsibility of the Contractor to obtain the approval for any revision and/or modifications decided by the Contractor from CMD / Engineer-in-Charge before implementation. Also such revisions and/or modifications if accepted/ approved by CMD / Engineer-in-Charge shall be carried out at no extra cost to CMD. Any change required during functional requirements or for efficient running of system, keeping the basic parameters unchanged and which has not been indicated by the Contractor in the data/drawings furnished along with the offer will be carried out by the Contractor at no extra cost to CMD.

16.2 All expenses towards mobilization at site and demobilization of work force, Contractor's materials, clearing the site etc. shall be deemed to be included in the prices quoted and no separate payments on account of such expenses shall be entertained.

17.0 SITE ORGANISATION:

The Contractor shall without prejudice to his overall responsibilities and liabilities to provide adequate qualified and skilled personnel on the work. For site organization and augment the same as decided by the Engineer-in-Charge depending on the exigencies of work. In addition to this Contractor shall deploy Safety Supervisors to ensure safe working conditions at site.

18.0 CONSTRUCTION:

18.1 The Contractor shall within the scope of work observe in addition to specifications, all national and local laws, ordinances, rules and regulation and requirements pertaining to the work.

18.2 Various procedures and methods to be adopted by Contractor during the construction as required in the respective specifications shall be submitted to CMD in due time and well in advance of the specific work for approval.

18.3 The Contractor shall carry out required supervision as per Quality Assurance Plan and furnish all assistance required by CMD in carrying out inspection work. CMD will have authorized representatives present who shall have free access to the work at all times. If an CMD / Engineer-in-Charge or his authorized representative notifies the Contractor's representative of any deficiency in any work or in the supervision thereof, the Contractor shall make every effort to carry out such instructions consistent with best industry practice.

19.0 EMPLOYEES PROVIDENT FUND & EMPLOYEES STATE INSURANCE CORPORATION:

19.1 The Contractor undertakes to discharge his responsibility under the Employees Provident Fund Scheme as an immediate employer, for employees engaged or employed by him for execution of contracted work.

19.2 The Contractor undertakes that all employees, either employed by him, or permitted assigns, would be covered under the above scheme from the date of commencement of work. The Contractor further undertakes to pay employee's contribution as well as employer's contribution at appropriate rate to the office of Regional Provident Fund Commissioner within the stipulated time period for the same.

19.3 The Contractor acknowledges the right of the Company to recover deducts or claims any amount, which the company is required to pay.

19.4 Agency must have individual P.F. & ESIC code, copy of P.F. & ESIC code no allotted to the agency to be furnished by the agency.

19.5 The Contractor shall be liable to pay his contribution and the Employee's contribution to the State Insurance Scheme in respect of all labour employed by him for the execution of the Contract, in accordance with the provision of "The Employee's State Insurance Act, 1948" as amended from time to time. In case the Contractor fails to submit full details of his account of labour employed and the contribution payable, the Engineer-in-Charge shall recover from the running bills of Contractor and amount of contribution as assessed by him. The amount so recovered shall be adjusted against the actual contribution payable for Employees State Insurance.

20.0 MEASUREMENT OF WORK:

Please refer Clause 42 of General Conditions of Contract (GCC).

21.0 BUILDING AND OTHER CONSTRUCTION WORKER'S ACT:

In order to govern welfare and working conditions of labourers engaged in construction activities, the Building and other Construction Workers' (Regulation of Employment and Conditions of Service ''RE & CS'') Act, 1996 came into force. RE & CS Act'1996 is applicable in respect of building and other construction work. The Contractor shall strictly comply with the following provisions pertaining to RE & CS Act'1996.

a. The Contractor must be registered with the concerned authorities under the Building and Other Construction Workers' (RE&CS) Act, 1996 or in case of non-registration; the Contractor should obtain registration within one month of the award of contract.
b. The Contractor shall be responsible to comply with all provisions of the Building and Other Construction Workers' (RE&CS) Act, 1996, the Building and Other construction Workers' Welfare Cess Act, 1996, the Building and other Construction Workers' (RE&CS) Rules, 1998 and the Building and other Construction Workers Welfare Cess Rules, 1998
c. Cess as per the prevailing rate, shall be deducted at source from bills of the Contractor by the Engineer-in-charge of the contract and remitted to the ''Secretary, Building and Other Construction Workers Welfare Board'' of the concerned state. The Contractor shall be responsible to submit final assessment return of the cess amount to the assessing officer after adjusting the cess deducted at source.

22.0 LABOUR RELATIONS:

22.1 In case of labour unrest/ labour dispute arising out of non-implementations of any law the responsibility shall solely lie with the Contractor and he shall remove/ resolve the same satisfactorily at his cost and risk.

22.2 The Contractor shall deploy only duly qualified and competent personnel for carrying out the various jobs as assigned by the Engineer

23.0 EMPLOYMENT OF LOCAL LABOUR:

The Contractor shall ensure that local labour, skilled and/or unskilled, to the extent available shall be employed for this work. In case of non-availability of suitable labour in any category out of the above persons, labour from outside may be employed.

24.0 The Contractor shall not recruit personnel of any category from among those who are already employed by the other agencies working at site but shall make maximum use of local labour available.

i) Contractor's Labourers to leave site on completion of the work.

ii) The labourers of Contractor must leave the location of the Plant/township/project site after the work is tapered off/ completed.

25.0 TESTS AND INSPECTION OF WORKS:

25.1 The Contractor shall carry out the various tests as enumerated in the bidding document and as per direction of Engineer-in-charge either on field concerning the execution of work. All the expenses shall be borne by the Contractor and shall be considered as included in the quoted price. The inspection shall be done by followings:

I. Representative deputed by Engineer-in-charge.

II. Representative deputed by Statutory Authority.

25.2 Contractor shall give prior notice sufficiently ahead of time to the Engineer-in-charge and also to the authorities to conduct Inspection/ to witness such tests.

25.3 The work is subject to inspection at all times by the Engineer-in-charge. The Contractor shall carry out all instructions given during inspection and shall ensure that the work is being carried out according to technical specifications of this bidding document and guidelines of local fire authority. The technical documents that will be furnished to him during performance of work and the relevant codes of practice furnished to him during the performance of the work.

25.4 Any work not conforming to the execution drawings, specifications, guidelines of local fire authority or codes shall be rejected forthwith and the Contractor shall carry out the rectifications at his own cost.

25.5 All results of inspection and test will be recorded in the inspection reports, proforma of which will be approved by the Engineer-in-charge. These reports shall form part of the Completion Documents.

25.6 Inspection and acceptance of the work shall not relieve the Contractor from any of his responsibilities under this contract.

25.7 Cost towards repeat tests and inspection due to failures, repairs etc. for reasons attributable to the Contractor shall be borne by the Contractor.

26.0 FINAL INSPECTION:

After completion of all tests as per specification the whole work will be subject to a final inspection to ensure that job has been completed as per requirement. If any defects noticed in the work are attributable to Contractor these shall be attended by the Contractor at his own cost.

27.0 TEMPORARY WORKS:

All Temporary and ancillary works including enabling works connected with the work shall be responsibility of the Contractor and the price quoted by them for construction shall be deemed to have included the cost of such works, which shall be removed by the Contractor at his cost, immediately after completion of his work.

28.0 SAFETY:

The Contractor shall ensure that the safety requirements are met in respect of men, materials, adjoining structures, equipment etc. and shall be totally responsible in case any mishap occurs due to negligence or otherwise. In this connection the contractor shall strictly adhere to the rules norms and regulations as applicable.

29.0 HEALTH, SAFETY AND ENVIRONMENT (HSE) MANAGEMENT:

During construction the contractor shall strictly follow the safety procedures, precautions & norms as per the safety code. The contractor shall submit safety procedure prior to start of construction activities. The procedure should include safety measures to be taken during construction work, firefighting etc. All workmen, supervisors engaged at site shall be equipped with PPE's (Helmet, Shoes, Safety belts, Goggles, Handgloves, Apron etc.)

All the staff/ workers engaged by the agency should follow COVID appropriate behaviour as per Govt. directive i.e. Wearing Masks, maintaining physical distance & washing hands frequently.

The contractor shall take all possible measures to avoid accidents to the contractor's labourers and shall adopt all safety measures as will be directed by CMD/ Engineer-in-Charge. Contractor shall provide adequate FIRST AID facility at site and also arrange for necessary medical facilities for proper treatment of laborers, if required. Contractor shall ensure & arrange at his own cost fire & safety provisions as per prevailing practice.

30.0 PERSONAL SAFETY:

All necessary personal safety equipments as considered adequate by the Engineer shall be available for use of persons employed at site and maintained in a condition suitable for immediate use and the contractor shall take adequate steps to ensure proper use of PPE's by all the concerned at site.

31.0 TAXES & DUTIES :

Please refer Clause 46 of General Conditions of Contract (GCC).

32.0 MATERIALS AND EQUIPMENT:

All materials and equipment shall conform to the relevant standards and shall be of the approved make and design. The materials and equipment shall conform to relevant Indian Standards. The Contractor shall be responsible for approval of the equipmet, as may be required by the Authority . The Contractor shall be responsible for the safe custody of all the materials and shall insure them against theft, damage by fire, earthquake etc. A list of items of materials and equipment, together with sample of each shall be submitted to the CMD within 10 days of the award of the contract. Any item which is proposed as a substitute, shall be accompanied by all technical detail giving sizes, particulars of materials and the manufacturer's name and shall be submitted along with the tender. At the time of the submission of proposed substitute the Contractor shall state the credit, if any due to the CMD. In the event the substitution is approved, all changes and substitutions shall be requested in writing and approvals obtained in writing from CMD / Engineer-in-Charge. CMD's decision in the matter shall be final.

All materials of the same kind of service shall be identical and made by the same manufacturers. Any deviation to this rule shall be got approved from CMD/ Engineer-in-Charge. Top priority shall be given to the products that have a permanent agent providing spare parts and maintenance facilities in the same city where the project is situated. The make of electrical equipments, components, accessories, etc. has been mentioned in order of priorities. The tenderer has to quote for the first priority as mentioned above after ascertaining that the first preference materials are available. If at a later stage during executing the work, material of the first preference make are not available, the contractor has to get approval from the CMD/ Engineer-in-Charge to use other make of material prior to procurement. Any rate difference for the first preference make and the one approved will be passed on to the CMD.

33.0 MANUFACTURERS:

Where manufacturers have furnished specific instructions relating to the materials used in this job, covering points not specifically mentioned in these documents, these instructions shall be followed in all cases. Where manufacturer's names and/or catalogue numbers are given, this is an indication of the quality, standards and performance required. When interfacing occurs, equipment shall be mutually compatible in all respects.

34.0 TEST CERTIFICATES:

The contractor shall submit test certificates for all the installed equipments at site including all materials etc.

35.0 INSTRUCTION MANUAL:

The contractor shall prepare and produce instruction, Installation, operation and maintenance manuals in English for the use, operation and maintenance of the complete equipment and installations, and submit 3 sets to CMD, at the time of handing over.

36.0 SAMPLES AND CATALOGUES:

The Contractor shall prepare and produce instruction, operation and maintenance manuals in English for use, operation and the maintenance of the supplied equipment and installations, and submit to the Engineer-in-charge in (04) Four copies at the time of handing over. The manual shall generally consist of the following:

a) Description of the Project.
b) Operating instructions.
c) Maintenance instructions including procedures for preventive maintenance.
d) Manufacturers catalogues.
e) Spare parts list.
f) Trouble shooting charts.
g) Drawings.
h) Type and routine test certificates of major items.
i) One (1) set of reproducible 'as built' drawings.

37.0 STRUCTURAL CONSULTANT'S / SANITARY PLUMBING CONSULTANT'S DRAWINGS:

The tender drawings indicate only the general scheme of requirement and the extent of work covered in this contract.It is the Contractor's responsibility to ensure that his work co-ordinates with the work of other agencies.

The contractor shall prepare detailed working drawings in co-ordination with other architectural and services drawing and get these working drawings approved by the CMD/ Structural Consultant/LKB. The approval of such drawings by the CMD/ Structural Consultant/LKB shall be from the point of view of assisting the contractor in co-ordination of services with other agencies and shall not absolve the contractor from his absolute and indivisible responsibility on performance of his installations.

38.0 VENDOR'S SHOP DRAWINGS:

DELETED

39.0 AS BUILT DRAWINGS & DOCUMENTATION:

After completion of work and before issuance of certificate of virtual completion the contractor shall submit to CMD, 03 (three) sets of layout drawing (both in hand & soft drawing) drawn at appropriate scale indicating the complete system ''as installed'' duly approved by CMD/ Structural Consultant/ LKB.

40.0 GUARANTEE & FREE SERVICE:

The work shall be guaranteed for performance for 12 months from the date of satisfactory acceptance and handing over to client in all respects. The guarantee shall be for entire performance of the work and

covering intended functionalities desired for intended purpose of the design. The certificate of completion shall be issued after necessary tests & commissioning in all respects have been carried out to the satisfaction of CMD and the required drawings/ manuals/ as built drawings are submitted. At the close of the work and before issuance of final certificate of virtual completion by CMD, the contractor shall furnish written guarantee indemnifying CMD against defective materials and workmanship for a period of 12 (twelve) calender months after completion and handing over at site. The contractor shall hold himself fully responsible for reinstallation or replacement, free of cost to CMD, in respect to the following:

- Any defective work or material/ equipment supplied by the contractor.
- Any material or equipment damaged or destroyed as a result of defective workmanship by the contractor.
- The contractor shall give 12 (twelve) free services (one at each month) for easy and smooth operation for all equipments and materials supplied and installed by the contractor during the Defect Liability Period (DLP). The contractor shall make good at his own cost and to the satisfaction of CMD, all defects of other faults arising in the opinion of CMD out of bad workmanship or faulty materials not in accordance with the specifications/ drawings.

During guarantee minimum uptime of 95% shall be ensured failing which guarantee period shall deem to be proportionately extended.

41.0 SITE ENGINEER AND SUPERVISOR:

The contractor shall employ a competent fully licensed qualified, full time Engineer (Diploma or Degree)/ Supervisor to direct the work in accordance with the drawings and specifications. The engineer shall be available all times at site to receive instructions from CMD / Engineer-in-Charge, in the day to day activities throughout the duration of contract. The engineer shall correlate the progress of the work in conjunction with all the relevant requirements of the authority. The Engineer coordinates with other services contractor and CMD for any coordination site issues.

42.0 RESTATING & FINISHING OF CIVIL DAMAGES:

For erection/ installation of equipment etc., if any civil structure/ other agency's work is required to be broken, the same shall be done, restated and finished as original by the tenderer without any extra cost.

43.0 COMPLETION PERIOD:

Time allowed for carrying out the work, as mentioned in the GCC, shall be strictly observed by the Contractor. The work shall throughout the stipulated period of the contract be executed with all the diligence and if the contractor fails to complete the work within the specified period, he shall be liable to pay liquidated damages as defined in the contract.

The contractor shall submit a BAR CHART for completion of the work within 15 (fifteen) days on issuance of Letter of Intent (LOI). Such chart shall include all activities like the date of supply of material at site, item wise completion of work etc., and obtain the approval of the client.

CMD may provide storage space within the project premises or in the building if available. However the

responsibility and safety of the materials stored will be with the contractor. No accommodation for contractor's staff, worker, labour etc. will be provided by CMD.

44.0 OTHER ISSUES:

The Contractor shall carry out all the work strictly in accordance with the approved drawing, detailed specifications and instructions of CMD/ Engineer-in-Charge. If in the opinion of the CMD/ Engineer-in-Charge, nominal changes have to be made to suit the site condition and with the prior approval in writing of the Employer, the Contractor shall carry out the same without any extra charge.
The tenderer must obtain for himself on his own responsibility and at his own expense, all the information which may be necessary for the purpose of making a tender and for entering into a contract and must examine the drawings, inspect the site of the work, and acquaint himself with all local conditions, means of access to the work, nature of the work and all matters appertaining thereto. The Employer's decision in such cases shall be final and shall not be open to arbitration.

A Schedule of Probable Quantities in respect of each work and specifications accompany these Special Conditions. The Schedule of Probable Quantities is liable to alteration by omissions, deductions or additions at the discretion of the Employer. Each tender should contain not only the rates but also the value of each item of work entered in a separate column and all the items should be summed up in order to show the aggregate value of the entire tender.

The rates quoted in the tender shall include all charges for scaffoldings, watching and lighting by night as well as day including Sundays and holidays, protection of all other erections, matters or things and the Contractor shall take down and remove any or all such centering, scaffolding etc. as occasion shall require or when ordered so as to do, and fully reinstate and make good all matters and things disturbed during the execution of work and to the satisfaction of CMD/Engineer-in-Charge.

The contractor shall not be entitled to any compensation for any loss suffered by him on account of delays in commencing or executing the work, whatever the cause of delays may be, including delays arising out of modifications to the work entrusted to him or in any sub-contract connected therewith or delays in awarding contracts for other trades of the project or in commencement or completion of such works. The Employer does not accept liability for any sum besides the tender amount, subject to such variations as are provided herein.

The successful tenderer shall carry out all items of work necessary for completion of the job even though such items are not included in the quantities and rates. Schedule of instruction in respect of such additional items and their quantities will be issued in writing by the client.
The successful tenderer must co-operate with the other contractors appointed by CMD so that the work shall proceed smoothly with the least possible delay.

45.0 PRICE ESCALATION:

As per Clause No. 36 of General Conditions of Contract (G.C.C.).

46.0 LAND/ SPACE:

CMD will provide land/ space subject to availability, for contractor's office/go down within project premises. But no land/ space for labour/ worker hutment shall be provided by CMD.

47.0 VARIATIONS TO BE APPROVED BY EMPLOYER:

As per Clause 58 of General Conditions of Contract (GCC).

48.0 CONTRACTOR TO PROVIDE EVERYTHING NECESSARY AT HIS COST:

The Contractor shall provide at his cost, everything necessary for the proper execution of the works according tothe intent and meaning of the Drawings, Bill of quantities and Specifications taken together whether the same may or may not be particularly shown or described therein provided that the same can reasonably be inferred there from, and if the Contractor finds any discrepancy in the Drawings or among the Drawings, Bill of quantities and Specifications, he shall immediately and in writing refer the same to the Employer who shall decide which is to be followed.

49.0 AUTHORITIES, NOTICES AND PATENTS:

The Contractor shall conform to the provisions of any Act of the Legislature relating to the works, and to the regulations and bye-laws of any authority, and of electric supply and other companies and/or authorities with whose systems, the installation is proposed to be connected and shall, before making any variations from the Drawings or Specifications that may be necessitated by so conforming, give to the Employer, written notice, specifying the variation proposed to be made and the reason for making it and apply for instructions thereon. In case the Contractor shall not receive such instructions within ten days, he shall proceed with the work conforming to the provisions, regulations or bye-laws, in question, and any variation so necessitated shall be dealt with the client as required.

The Contractor shall bring to the attention of CMD, all notices required by the said Acts, regulations or bye-laws to be given to any authority and pay to such authority, or to any public office, all fees that may be properly chargeable in respect of the works, and lodge the receipts with CMD.

The Contractor shall indemnify CMD against all claims in respect of rights, and shall defend all actions arising from claims, and shall himself pay all royalties, license fees, damages, cost and charges of all and every sort that may be legally incurred in respect thereof.

50.0 SETTING OUT OF WORKS:

The Contractor shall set out the works and shall be reasonable for the true and perfect setting out of the same and for the correctness of the positions, levels, dimensions, and alignment of all parts thereof. If at any time any error in this respect shall appear during the progress of the works within a period of one year from the completion of the works, the Contractor shall, if so required, at his own expense, rectify such error to the satisfaction of CMD.

51.0 CONTRACTOR'S SUPERINTENDENCE AND REPRESENTATIVE ON THE WORKS:

The Contractor shall give all necessary personal superintendence during the execution of the works, and as long thereafter as the Employer may consider necessary until the expiration of the "Defects Liability Period". The Contractor shall also during the whole time the works are in progress, employ a competent representative who shall be constantly in attendance at the works while the men are at work. Any

directions, explanations, instructions or notices given by CMD to such representative shall be held to be given to the Contractor.

52.0 BILL OF QUANTITIES:

The Bill of Quantities, unless otherwise stated, shall be deemed to have been prepared in accordance with the Standard Method of Measurement.

Any error in description or in quantity or in omission of items from the Bill of quantities shall not vitiate this contract but shall be rectified and the value thereof shall be ascertained, shall be added to, or deducted from, the Contract Amount (as the case may be) provided that no rectification of errors, if any, shall be allowed in the Contractor's Schedule of Rates.

53.0 SUFFICIENCY OF BILL OF QUANTITIES:

The Contractor shall be deemed to have satisfied himself before tendering as to the correctness and sufficiency of the tender for the works and of the prices stated in the Bill of quantities and/or the Schedule of Rates and Prices which rates and prices shall cover all his obligations under the Contract, and all matters and things necessary for the proper completion of the works.

54.0 QUANTITY VARIATION:

Quantity as shown in BOQ is tentative only and may vary up to any extent either positive (+) or negative (-) and for which bidders quoted rate will remain same.

55.0 UNFIXED MATERIALS WHEN TAKEN INTO ACCOUNT TO BE THE PROPERTY OF THE COMPANY:

Where in any Certificate (of which the Contractor has received payment) CMD has included the value of any unfixed materials intended for and/or placed on or adjacent to the works, such materials shall become the property of CMD and they shall not be removed except for use upon the works, without the written authority of CMD. The Contractor shall be liable for any loss of or damage to such materials.

56.0 REMOVAL OF IMPROPER WORK:

CMD shall, during the progress of the works, have power to order in writing from time to time the removal from the works within such reasonable time or times, as may be specified in the order, of any materials which in the opinion of CMD are not in accordance with the Specifications or the instructions of CMD, the substitution of proper materials, and the removal and proper re-execution of any work executed with materials or workmanship not in accordance with the Drawings and Specifications or instruction, and the Contractor shall forthwith carry out such order at his own cost. In case of default on the part of the Contractor to carry out such order, CMD shall have the power to employ and pay the other persons to carry out the same, and all expenses consequent thereon, or incidental thereto shall be borne by the Contractor, or may be deducted by CMD from any moneys due, or that may become due, to the Contractor.

57.0 LABOUR LICENSE:

Contractor will have to obtain labour license for the laborers engaged / to be engaged for their entrusted job from the appropriate authority. Necessary Form V will be issued from CMD office upon receipt of written request from the contractor. Contractor will have to submit the labour license to CMD.

Contrator will have to maintain all records & registers as per requirement of 'Contract Labour Act, 1970' and furnish the documents as required by Labour Enforcement Officer (LEO)/ Assistant Labour Commissioner (ALC) during their inspection. Contractor should also furnish the details to CMD's representative periodically.

Further Contractor will have to provide necessary facilities at site as per 'Contract Labour Act, 1970'.

58.0 CALIBRATION OF INSTRUMENTS AND METERS:

Instruments required for testing shall be furnished by the contractor for testing with initial requirements of Cubes, bricks etc. All the instruments, meters etc. to be used at site and on the system shall have a valid calibration certificate issued by the competent authority. The contractor shall maintain and make available all such calibration certificates.

59.0 HANDING OVER REQUIREMENTS:

The work shall be handed over after satisfactory testing along with following documents.
1. Set of As built drawings, layouts, schedules etc.
2. Test reports and Test certificates
3. Certificate from the contractor that he has cleared the site of all debris and litter caused by him without violating the EHS norms during the construction. However, contractor has also to periodically clear the site from all the debris which is generated during execution of work.
4. Undertaking from the contractor that all the materials supplied by him at site are fully tax paid and shall produce all documentation for satisfaction of CMD.

60.0 STATUTORY APPROVALS & INSPECTION: Not Applicable

~~The contractor shall be fully responsible for meeting all the statutory obligations and local inspectorates wherever applicable to the works carried out by them. The contractor should prepare all working drawings and obtain approval of competent authorities and also have the equipment and installation inspected and got approved by them. All the original receipts of official fees paid and deposits made against the demand in writing from the appropriate authority shall be submitted to CMD.~~

61.0 CARE OF WORKS:

From the commencement to the completion of the works, the Contractor shall take full responsibility for the care thereof and of all Temporary works and in the case any damage, loss or injury shall happen to the works or to any part thereof or to any Temporary works from any cause whatsoever, shall at his own cost, repair and make good the same, so that at completion, the Permanent works shall be in good order and condition and in conformity in every respect with the requirements, of the contract and the CMD's/Engineer-in-Charge's 's instructions.

62.0 NUISANCE:

(i) The Contractor shall not at any time, do, cause or permit any nuisance on the site or do anything which shall cause unnecessary disturbance or inconvenience to CMD, tenants, or occupants of other properties near the site of work and to the public generally.

(ii) The Contractor shall indemnify CMD in respect of all claims, demands, proceedings, damages, costs, charges and expenses whatsoever arising out of or in relation to any such nuisance in so far as the Contractor is responsible thereof.

TECHNICAL SPECIFICATIONS FOR EARTH WORK, CONCRETE WORK, PERIPHERAL ROAD WORK, BRICK WORK, PLASTER AND ALLIED WORKS IN SUB-STRUCTURE & SUPER STRUCTURE

I. GENERAL

Specifications, Scope of Work, Schedule of Rates and drawings for this Tender shall be read in conjunction with each other. In case of conflicts / contradictions amongst them, the clarification shall be obtained from the Engineer – in – Charge / Structural Consultant/ LKB whose decision shall be final & binding. Following procedure shall be followed for the necessary clarification.

A. Item description shall prevail over specifications for item rate tenders when provisions therein are different from those in specifications.
Whenever any requirement is not covered in Item description but are covered in specifications, the specifications shall be followed in addition to the requirements of item description. No extra payment shall be made to the Contractor for executing such item as per specification.

B. Whenever drawings call for requirements different from or additional to those in item description and specification, the decision of the Engineer – in – Charge shall be obtained.
However no extra payment shall be made to the Contractor for executing any work incorporating requirements additional to those in item description and specification but covered in applicable drawings or standards. Where ever references has been made to Indian Standard or any other specifications the same shall mean to refer to the latest specifications irrespective of any particular edition of such specifications being mentioned in the specifications below of Schedule of Quantities.

C. The cost of Cement, Reinforcement steel, structural Steel, Bricks, Coarse and Fine Aggregates, and other requisite materials and labour Charges and other incidental expenses to be needed for the Construction of Store, Site Office etc to be borne by the Contractor.

II. WORKMANSHIP

Workmanship shall be to the satisfaction of the Engineer – in – Charge / Structural Consultant/ LKB. The contractor shall follow the specifications, relevant Codes & Manufacturer's guidelines for achieving desired level of workmanship as per specification & good engineering practice.

Any executed work not conforming to the specification or not to the satisfaction of the Engineer – in – Charge / Structural Consultant/ LKB shall be removed immediately from site and shall be substituted with proper material and or workmanship forthwith.

III. MEASUREMENT

Mode of measurement is generally specified in each specification. Whenever mode of measurement is not specified, IS: 1200 shall be applicable.

IV. MATERIALS

General

(a) All materials shall be best of their kind and shall conform to the latest Indian Standard.

(b) All materials shall be of approved quality as per samples and from origins approved by the Engineer–in-Charge / Structural Consultant/ LKB. The Contractor shall get the materials approved by the Engineer – in – Charge / Structural Consultant/ LKB before ordering & procurement. The Contractor shall furnish necessary certificates etc. as asked by the Engineer – in – Charge. Further to that he shall get the materials tested from approved test house if asked by the Engineer-in-Charge & submit the test certificate at his own cost for which no extra payment shall be made to him.
The Engineer – in – Charge shall have the right to reject all or any of the materials intended to be used and such materials shall be immediately removed from the site by the Contractor at his own cost without any claim for compensation etc. due to such rejection.

(c) A set of specimen samples of all approved materials shall be kept in proper manner at site, cost of which to be borne by the Contractor.

(d) Test reports on each manufactured materials shall include a statement certifying that this material is of the same quality as that proposed for this project. Manufacturer's literature on proprietary materials shall indicate compliance with standards listed here in.

1. Cement:

Unless otherwise specially called for, Cement for RCC and PCC/lean concrete works shall be one of the following:
The type of cement selected shall be appropriate for the intended use.

43 grade ordinary Portland Cement	IS:8112
Portland slag Cement	IS:455
Portland Pozzolana Cement (fly ash based)	IS:1489 (Part-I)
Portland Pozzolana Cement (calcined clay based)	IS:1489 (Part-II)
Sulphate Resisting Portland Cement	IS:12330
High Alumina Cement	IS:6452

Cement shall be further classified according to the compressive strength of cement at the age of 7 days as given in table 4.1.

Table 4.1			
Sample	Strength in N/Sq.mm not less than for		
Age at testing	Grade 33	Grade 43	Grade 53
72 + 1 hr	16	23	27
168 + 2 hrs	22	33	37
672 + 4 hrs	33	43	53

Cement bags must be stored in a water-tight shed having wooden floor or raised platform as approved by the Engineer-in-charge. Cement which is partially set or which is lumpy or caked is to be treated as damaged and shall be removed from the site immediately.

Cement shall be stored in weather-tight buildings, bins or silos, which will exclude moisture and contaminants. Storage of cement at site shall be at contractors expense and risk, in the event of any damage occurring to cement due to faulty storage in Contractor's shed or on account of negligence on his part, such damages shall be the liability of the Contractor.

In case cement is stored and stacked in bags, storing shall be done in weather-tight and properly ventilated structures to prevent absorption of moisture. The bags shall be stacked at least 10 to 20 cm. clear above the floor. A space of 60 cms. all-round should be kept between the exterior walls and the stacks. Cement bags should be placed close together in the stacked to reduce circulation of air as much as possible. Cement bags shall not be stacked more than 10 bags high to avoid lumping under pressure. If the stack is more than 7 bags high, arrange the bags in header and stretcher fashion that is alternatively length-wise and cross-wise so as to tie them together and lessen and danger of toppling over. For extra safety during the monsoon or when it is expected to store the cement for an unusually long period, enclose the stack completely in 700 gauge polythene sheet or any other suitable waterproof material. The flap will close on the top of the stack. Care should be taken that the polythene sheet is not damaged any time during use. Where removing bags from storage should be removed from two or three tiers back rather than all from one tier. If the rows are thus stepped back, there is less chance of over turning them. When removing cement bags for use apply the first in, first out, rule, that is, take the oldest cement out first. Each consignment of cement shall be stacked separately therein to permit easy access for inspection and facilitate removal.

2. M.S. Reinforcement:

All steel bars, sections, plates and other miscellaneous steel materials, etc. shall be free from loose mill scales, dust, loose rust as well as oil, mud, paint or other coatings. The materials, construction, specifications such as dimensions, shape, weight, tolerances, testing etc., for all materials covered under this section, shall conform to respective BIS code.

Steel reinforcement shall be stored in a way as to prevent distortion and corrosion. Bars of different classifications, sizes and lengths shall be stored separately to facilitate issues in such sizes and lengths as to minimize wastage in cutting from standard lengths. High strength deformed (HSD) steel bars of minimum grade Fe500, conforming to IS:1786 shall be used.

3. Structural Steel:

Structural steel sections shall conform to following BIS Codes:

Steel tubes for structural purposes	IS:1161
Mild Steel Tubes, tubular and other wrought steel fittings	IS:1239
Steel for general structure purposes (Grade A)	IS:2062
Hollow steel sections for structural use	IS:4923

4. Miscellaneous Steel Materials:

Miscellaneous Steel materials shall conform to the following BIS Codes:

Expanded Metal Steel Sheets for General purpose	IS:412
Specification for mild steel and medium tensile steel bars and hard drawn steel wire for concrete reinforcement (Grade I) (For mild steel bars of anchor bolts, rungs, metal inserts, grating etc.)	IS:432
Hexagonal head bolts, screws & nuts of product Grade C	IS:1363
Cold formed light gauge structural steel sections	IS:811
Technical supply conditions for threaded steel fasteners	IS:1367
Plain washers	IS:2016
Steel wire ropes for general engineering purposes	IS:2266
Thimbles for wire ropes	IS:2315
Bulldog grips	IS:2361
Mild Steel Tubes, tubular and other wrought steel fillings (For Hand rail tubular sections)	IS:1239
Drop forged sockets for wire ropes for general engineering purposes	IS:2485
Steel chequered plates	IS:3502
Hexagonal bolts and nuts (M42 to M150)	IS:3138

Anchor Bolts:

Materials for Anchor Bolts such as MS bars, washers, nuts, pipe sleeves and plates etc. shall be as per relevant BIS Codes mentioned above under Clause-4.

5. Stone:

All stones used for masonry works shall conform to the requirements of following BIS Codes.

Method of identification of natural building stones	IS:1123
Recommendations for dimensions and workmanship of natural building stones for masonry work	IS:1127
Recommendations for dressing of natural building stones	IS:1129

Stone chips or stone ballast for cement concrete shall be hard, dense, strong, sound, durable, clean and uniform in colour. They shall also be free from veins, adherent coatings, injurious amounts of alkalis, vegetable matters and other deleterious substances such as iron pyrites, coal, lignite, mice, sea shells etc. as far as possible stones from one single quarry shall be used for anyone work. The strength of stones should be adequate to carry the imposed load and shall meet all the requirements of IS:1905, taking into account the appropriate crushing strength of stone and type of the mortar used. The percentage of water absorption, when tested in accordance with IS:1124, shall not exceed 5 percent. The length of the stone shall not exceed 3 times the height. Width of stone on base shall not be less than 150mm and in no case exceed ¾ thickness of the wall. Height of the stone shall not be more than 300 mm.

Gravel, for use as coarse aggregates in cement concrete work must be hard, absolutely free from surface coating and on being broken, the fractured surface must indicate a uniform and fine texture free from laminations or planes or weakness. It shall be thoroughly washed and free from any foreign elements.

Jhama chips for cement concrete work shall be obtained by breaking good quality jhama bats, must be

spongy or with any coating of foreign materials and should be homogeneous in texture. The chips shall be more or less cubicle in shape.
All coarse aggregates for concrete works must be well graded. These shall be screened for removal of dust and if so in the opinion of the Engineer-in-charge, shall be washed at the cost and expenses of the Contractor.
Aggregates stockpiles shall be arranged and used in manner to avoid excessive segregation and to prevent contamination with other sizes of like aggregates. It shall be stacked separately according to nominal sizes of coarse aggregates in stacks of height not exceeding 1.5 metres. Frozen or partially frozen aggregates shall not be used.

6. Coarse aggregates for lime concrete works:
i) Brick aggregates for lime concrete in foundation or flooring shall consist of approved, clean, hard and well-burnt jhama khoa. The khoa be well graded and unless otherwise specified shall pass through 32mm ring.
ii) Brick aggregates for lime terracing work on roof shall consist of khoa broken from first class brick bats and unless otherwise specified shall pass through 25mm ring and be suitably graded.
No jhama khoa should be used in lime terracing work.

7. Surki:
Surki shall be made from well burnt 1st class brick bats, ground to pass through a mesh 2mm, each way, and shall be perfectly clean and free from any foreign matter.

8. Lime:
All lime shall be freshly burnt and slaked and screened before use, the slaking should be done at site of work. Lime for work including roof terracing shall be Brisa, Satna or other approved stone lime.
The specifications of lime as used in construction of building and other structures
a) Quick lime shall mean a Calcined material, the major part of which is calcium oxide in natural association with a relatively small amount of magnesium oxide and capable of slaking with water.
b) Fat lime shall mean the lime which has high calcium oxide content (between 95 to 100 percent) and this is dependent for setting and hardening on absorption of carbon di-oxide from the atmosphere. This is defined as Class-C in IS:712-1973 which is used for finishing coat in plastering, white washing etc. and with addition of pozzolanic materials (surki) for masonry mortar.
c) Hydraulic lime shall mean the lime which contains small quantities of silica and alumina and iron oxide which are in chemical combination with some of the calcium oxide content, giving a putty of mortar that has a property of setting and hardening under water.
d) Hydrated lime shall mean a dry powder resulting from treatment of quick lime with water enough to satisfy its chemical affinity for water under conditions of hydration.

Classification of Lime:
CLASS-A: Eminently hydraulic lime (containing 25% to 30% of clay) used for foundations and other hydraulic structures, shall be supplied as hydrated lime only and should be used particularly in any masonry work below GL. It should be noted that no masonry work below GL should be taken up with the use of any lime, other than specified hydraulic lime. In case of any doubt if any in respect of hydraulic lime being used in work below GL, it is preferable not to use lime mortar at all below GL.
CLASS-C: Fat lime is used mainly for lime punning, white washing and with suitable admixture, such as surki or any other pozzolanic material to produce artificial hydraulic mortar.

9. Sand:
All sand shall be clean sharp and free from clay, loam, organic or any other foreign matter, shall be obtained from approved source. The contractor shall get sample of sand to be used in different kinds of works approved by the Engineer-in-charge before using in the same work. Sand which in the opinion of the Engineer-in-charge dirty, must be washed to his satisfaction at the cost and expenses of the contractor. Fine aggregates shall preferably be stacked in regular stacks on a hard surface or platform so as to prevent contamination with clay, dust, vegetation and other foreign matter. Fine aggregates stacks should be allowed to drain until it has reached a relatively uniform moisture content before it is used.

Coarse Sand:
Shall be either river sand or pit-sand, clan, sharp, strong, angular and composed of hard silicious materials. It shall be obtained from the quarries approved by the Engineer-in-charge/Architects. The sand shall conform to relevant IS Code (IS:383). Fineness modulus shall not be less than 2.5. The maximum quantity of silt shall not exceed 8%.

Fine Sand:
This shall be natural river sand. Fineness modulus shall not be less than 1.0. The maximum quantity of silt shall not exceed 8%. The snad shall conform to relevant IS Specification (IS:383).

10. Stone Dust:
It shall be obtained from crushing hard stones and from quarries approved by the Engineer-in-Charge/Architects. The fineness modulus shall not be less than 1.8. The maximum quantity of silt shall not exceed 8%.

11. Bricks:
Bricks for masonry works shall conform to IS:1077. Physical requirements, quality, dimension, tolerances etc. of common burnt clay building bricks shall conform to the requirements of IS:1077. Bricks shall be hand-moulded or machine-moulded and shall be made from suitable soils. The bricks shall have smooth rectangular faces with sharp corners and shall be well burnt, sound, hard, tough and uniform in colour. These shall be free from cracks, chips, flaws, stone or humps of any kind. Testing of the bricks shall be done as per IS:5454 and IS:3495. Water absorption shall not be more than 20% by its dry weight when soaked in cold water for 24 hours.

12. Hollow (open & closed cavity) Concrete Block:
The hollow (open & closed cavity) concrete blocks shall conform to the following three grades (IS:2185-Part I).
Grade A – These are used as load bearing units and shall have a minimum block density of 1500 Kg/M^3. These shall be manufactured for minimum average compressive strengths of 3.5, 4.5, 5.5 and 7.0 N/mm^2 respectively at 28 days.

Grade B – These are also used as load bearing units and shall have a block density less than 1500 Kg/M^3, but not less than 1000 Kg/M^3. These shall be manufactured for minimum average compressive strength of 2.0, 3.0 and 5.0 N/mm^2 respectively at 28 days.

Grade C – These are used as non-load bearing units and shall have a block density less than 1500 Kg/M^3, but not less than 1000 Kg/M^3. These shall be manufactured for minimum average compressive

strength of 1.5 N/mm^2 respectively at 28 days.

Solid Concrete Blocks

Grade D – The solid concrete blocks are used as load bearing units and shall have a block density not less than 1800 Kg/M^3. These shall be manufactured for minimum average compressive strengths of 4.0 and 5.0 N/mm^2 respectively.

13. Admixtures:

General Requirements For Admixtures:

All concrete admixtures shall comply with the following Indian standards :

Specification for integral cement water proofing compounds	IS:2645
Specification for other admixtures for concrete	IS:9103

In case of non-availability of any IS code for testing and acceptability Criteria, relevant American, British or German Code shall be applicable.

No admixture shall impair the durability of the concrete nor combine with the ingredients to form harmful compounds nor increase the risk of corrosion of reinforcement. Use of admixture shall not reduce the dry density of concrete. Once the proportion of admixtures have been established, strict check shall be maintained not to alter the proportion of ingredients and water-cement ratio of the Design Mix during execution.

The chloride contains in admixtures shall not exceed 2% by mass of the admixture or 0.03% by mass of the cement.

Admixtures to be used in concrete when required or permitted shall conform to the appropriate specification given in the reference publication.

Admixtures used in work shall be of same composition as used in establishing the required concrete proportions.

14. Water Proofing Compounds:

The permeability of the specimen with the admixture shall be less than half of the permeability with a similar specimen without the use of these compounds. These compounds shall be used in such proportion as recommended by manufacturer but in no case it shall exceed 3% by weight of cement.

The initial setting time of the cement with the use of these compounds shall not be less than 30 minutes and final setting time shall not be more than 10 hours. Tests shall be carried out in accordance with IS:4031.

Compressive strength of the specimen at 3 days shall not be less than 160 Kg/cm2 nor 80% of the 3 days compressive strength of mortar cubes prepared with same cement and sand only, whichever is higher. Similarly compressive strength at 7 days shall not be less than 220 Kg/Cm2 nor less than 80 % of the 7 days compressive strength prepared with the same cement and sand only, whichever is higher. The test to determine the compressive strength shall conform to IS:4031.

15. Wood / Timber:

All timbers shall be of best quality well seasoned and / or well treated for preservation and protection against decay etc. it shall be uniform in substance, straight in fibre, free from large or dead knots, sap, flaws, sun-cracks, shakes or blemishes of any kind. Any insect damage or splits across the grain shall not be permissible. The colour of the timber shall be uniform throughout, firm and shining with silky luster when planed and shall not emit dull sound when stuck.

Timber required to be used for form work shall be fairly dry before use. It should maintain its shape during the use and even when it comes into contact with moisture from the concrete.

Storage of wood/Timber shall be as per the requirements of IS:4082.

16. Water:
Water used for mixing and curing shall conform to requirements as specified in IS-456.

17. PVC Pipes:
PVC Pipes shall conform to the requirements of IS:4985.

18. Poly-Sulphide Sealants:

All Poly-sulphide Sealants shall conform to IS:12118. Test conditions and requirements shall be as given in the above referred BIS code.

V. SCOPE OF WORK

All works shall be carried out in proper manner according to the directions of the Engineer-in-charge and to his satisfaction. Unless and otherwise specified in this section or in the description of the item, the cost of all, stages of works mentioned hereunder shall be deemed to have been included in the rates of items provided in the schedule.

1. ANTI-TERMITE TREATMENT:

Prevention of the termite from reaching the super-structure of the building and its contents can be achieved by creating a chemical barrier between the ground, from where the termites come and other contents of the building which may from food for the termites. This is achieved by treating the soil beneath the building and around the foundation with a suitable insecticide.

Materials – Any one of the following chemicals (as specified in water emulsion shall be used.

	Concentration (%)
Dieldrin Emulsifiable concentrates (IS: 1054-1962)	0.5
Aldrin emulsifiable concentrates (IS: 1037-1958)	0.5
Heptachlor emulsifiable concentrates	0.5
Chlordane emulsifiable concentrates	0.5

Chemicals are available in concentrated form in the market and concentration is indicated on the sealed containers. Graduated containers shall be used for dilution of chemicals with water in the required proportion to achieve the desired percentage of concentration.

Chemicals shall be brought to site of work in sealed original containers. The material shall be bought in a time in adequate quantity to suffice for the whole or at least a fort-night's work.

Pre-Construction Chemical Treatment- his is process in which chemical treatment is applied to a building in the early stages of its construction. Hand operated pressure pump shall be used for uniform spraying of the chemical. To have proper check for uniform spraying of chemical, graduated containers shall be used.

Time Of Application – Soil treatment should start when foundation trenches and pits are ready to take mass concrete in foundations, laying of mass concrete should start when the chemicals emulsion has been absorbed by the soil and the surface is quite dry. Treatment should not be carried out when it is raining or soil is wet with rain or sub-soil water. The foregoing applies also in the case of treatment to the filled earth surface within the plinth before laying the sub-grade for the floor.

Disturbance – The treated soil barriers shall be disturbed after they are formed. If by chance, treated soil barriers are disturbed, immediate steps shall be taken to restore by continuity and completeness of the barrier system.

Treatment of Column Pits, Wall Trenches:

a) The bottom surface and the sides (up to a height of about 300mm) of the excavation made for column pits, wall trenches and basements shall be treated with the chemical at the rate of 5 liters per sq m. of the surface area.
b) After the column foundations come up the back fill in immediate contact, with the foundation structure shall be treated at the rate of 15 liters per sq m. of the vertical surface of the sub-structure for each side. If water is used for ramming the earth fill, the chemical treatment shall be carried out after the ramming operation is done by rod ding the earth at 150mm centers close to the wall surface and spraying the chemical with the above does. The earth is usually returned in layers and the treatment shall be carried out in similar stages. The chemical emulsion shall be directed towards the concrete or masonry surface of the columns and walls so that the earth contact with these surface is well treated with the chemical.
c) In the case of R.C.C. framed structures with columns, plinth beams, concrete mix is rich and dense (being 1:2:4 of richer), it is unnecessary to start the treatment from the bottom of column and plinth beams. The treatment shall start at the depth of 500mm below ground level. From this depth the back fill around the columns, beams, shall be treated @ 15 liters/sq m. of the vertical surface. The other details of treatment shall be as laid down in clause (b) above.

Treatment of Top surface of Plinth Filling:

The top surface of the filled earth within plinth walls shall be treated with chemical emulsion at the rate of 4 liters/sq m. of the surface before the sand/sub grade is laid. Holes up to 50 to 75mm deep at 150mm centers both ways shall be made with crow bars on the surface to facilitate saturation of the soil with chemical emulsion.

Treatment of Junction of Wall and Floor:

To achieve continuity of the vertical chemical barriers on inner wall surfaces from the ground level, small channel 30X30mm shall be made at all the junctions of wall and column with floor (before laying the sub-grade) and rod holes made in the channel upon ground level 150mm apart one chemical emulsion poured along the channel @15 liters/sq m. of the vertical wall or column surface so as to soak the soil right to bottom. The soil shall be tamped back into place after this operation.

Treatment of Soil along External Perimeter of Building:

After the building is complete provide holes in the soil with iron rods along the external perimeter of the building at intervals of about 150mm and depth 300mm and filling these holes with chemical emulsion at the rate of 5 liters/m. of perimeter of the external wall.

Treatment of Expansion Joints:

Anti-termite treatment shall be supplemented by treating through the expansion joint after the sub-grade has been laid @ 2 liters per linear meter or expansion joint.

Safety Precautions:

All chemical used for anti-termite treatment are poisonous and hazardous to health. These chemicals can have an adverse effect upon health when absorbed through the skin, in-haled as vapors or spray mists or swallowed. Person using or handling these chemicals should be warned of these dangers and advised that absorption through skin is the most likely source of accidental poisoning. They should be cautioned to observe carefully the safety precautions given below. These chemicals are usually brought to site in the form of emulsifiable concentrator. The containers should be clearly labeled and should be stored carefully so that children and persons cannot get at them. They should be kept securely closed.

Particular care should be taken to prevent skin contact with concentrates. Prolonged exposure to dilute emulsions should also be avoided. Workers should wear clean clothing and should wash thoroughly with soap and water, especially before eating and smoking. In the event of severe contamination, clothing should be removed at once and the skin washed with soap and water. If chemical splash into the eyes they shall be flashed with plenty of soap and water and immediate medical attention should be sought.

The concentrates are oil solution and present a fire hazard owing to the use of petroleum solvents. Flames should not be allowed during mixing.

Care should be taken in the application of chemical to see that they are not allowed to contaminate wells or spring which serve as source of drinking water.

Measurements:

The measurements shall be made in sq m. on the basis of plinth area of the building at floor (GF) only for all operations described above. Nothing extra shall be measured.

2. EARTH WORK:

2.1 Site Clearance:

The site shall be cleared of rubbish of all kinds, rocks, trees dirt and superfluous earth all buds, brush, wood, stumps of trees and saplings, grass and other rank vegetation etc. The serviceable material to be stacked at site in a manner as directed by the Architect/ Engineer-in-charge. All cavities or holes formed shall be filled with good earth well rammed and leveled neatly. Site clearance shall be done for an area measuring seven (7) metres all round the proposed construction. The Contractor shall provide all labour and materials for site clearance at his own cost.

2.2 Profiles:

Shall be with pegs, bamboos, strings or burgees to show the correct formation before the start of the Work and maintained till the completion of the work.

2.3 Bench mark and levels:

The contractor shall lay out one or more permanent bench marks in some central places before start of the Work, from which all important levels, exact bed levels for the excavation will be set. The Contractor shall provide all labour and material for setting levels and profiles at his own cost.

2.4 Leveling site:

The ground levels after site clearance shall be taken before the start of the Work and to be recorded in a level book duly signed by the Contractor and the Engineer – in – Charge /Architect. Similarly final levels shall be taken and recorded in the level book signed by the Contractor and the Engineer – in – Charge /Architect. The quantities shall be computed by averages method. The cross-sections shall be taken at every 15M. apart in both directions in a fairly level ground and in and undulating ground cross-sections shall be taken at closer distances to be decided by the Architect.

In case the earth work is to be paid for filling computed from the cross-sections, the quantity computed from such cross-sections shall be reduced by 1/13 for payment as excavation.

All useful materials such as gravel, stone, relics of antiquity, coins, fossils, etc. met with during excavation shall remain the property of the Employer and shall be handed over to the engineer on behalf of the Employer.

All cutting shall be done from top to bottom, No under-mining shall be permitted. Cutting shall be done to precise levels and any cutting taken deeper shall be made good to the required levels without any extra cost. The final surface shall be neatly dressed.

2.5 Excavation in trenches:

The foundation trenches shall be excavated to the exact width of the lowest step of the foundation or footing as shown on drawing. The sides of the trenches shall be kept vertical and bottom horizontal both transversely and longitudinally as shown on the drawings. Steps shall be squarely benched out as shown on the drawings or as directed by the Engineer – in – Charge / Architect. The excavated earth shall be deposited at least three meter or 1/3rd depth away from the edge of excavation whichever is more. Working space on the outer periphery, if required shall be provided by the Contractor as per IS Code and shall be paid as per actual or as per IS. Code, whichever is less.

2.6 Classification of soils:

If soils of any classification other than specified in the schedule of quantities is met with during excavation, no work shall be done until the decision of the Engineer – in – Charge / Architect as to the classification of soil, level or the strata of different classification and their location is obtained in writing.

The materials to be excavated shall be classified as follows :

a) **Soft, Loose soil:**
Such as vegetative or organic soil, turf, gravel, sand, silt, loam, clay peat etc. which yields to the ordinary application of pick and shovel, or other ordinary digging implements.

b) **Hard dense soil:**
Such as stiff clay, gravel and cobble stone rock fragment usually rounded or semi rounded having maximum diameter between 80 to 300 mm which require the close application of picks or jumpers or scarifiers to loosen.

c) **Soft Disintegrated rock:**
Rock or boulders, which do not require blasting but can be queried or split with crow bars such as laterite and hard Conglomerate.

d) **Hard rock:**
Any rock or boulder which require blasting or chiseling. Where levels for different soil strata cannot be clearly marked and defined the Contractor shall stack different soil of various classification separately for measurement purposes and then disposing off as directed.

The measurement from stacks in case where excavation is of soil, mixed with moorum soft rock and where levels of various strata cannot be fixed, the total quantity shall be computed from the trench measurement and the hard rock measurements of stacks after reducing 50% soft rocks stack measurement reducing 1/7 and that of moorum stack measurement after reducing by 1/13 shall be paid as excavation and deducted from the total quantity computed from trench measurement and the balance shall be paid as ordinary earth or soil excavation.

2.7 Earth filling:

Filling can be in the sides of foundation trenches, under floors and for site formation.

The earth to be used for filling shall be granular fill, free from salt peter, organic or other foreign matter. The space around the foundations in trenches and under floors shall be cleared of all debris, brick pieces

or any other rubbish, surplus mortar falls etc. Filling shall be done in layers not exceeding 150 mm thickness. Each layer shall be well watered and rammed to the satisfaction of the Engineer – in – Charge / Architect. Final surface shall be neatly dressed.

The earth filling shall be computed from levels recorded before start of filling and after completion of fillings. The quantity so computed shall be paid with deduction of 1/13 as mentioned in para 2.4 above for open site formation and without any deduction of 1/13 filling under floors i.e. in confined situation.

2.8 Compaction of Embankments and other areas of Fill:

All materials used in embankments and as filling elsewhere shall be compacted as soon as practicable after deposition. Site trials have to be carried out to determine the state of compaction attained.

The dry density / moisture content, field density and CBR tests shall be carried out using the appropriate methods described in latest IS Code, except that in the case of the CBR tests the test specimen shall be undisturbed samples obtained from the field. The method of obtaining the undistributed samples shall be approved by the Architect / Employer. The Architect / Employer may at his discretion also permit the CBR tests to be carried out in situ provided that the Contractor shall first submit his proposal in writing for the approval of the Architect / Employer.

In the event that the material used fails to attain the required CBR, the Contractor shall either increase his compactive effort or alternatively he may vary his source of material, so that he can demonstrate at the site trials that the required CBR can be obtained.

The Architect / Owner may at any time carry out comparative field density tests on material which he considers has been inadequately compacted. If the test results, when compared with the results of similar tests made on approved work in similar materials show the state of compaction to be inadequate and this is held to be due to failure of the Contractor to comply with the requirements of the Contract the Contractor shall carry out such further work as the Architects / Owner may decide is required to comply with the terms of Contract. If however the Contractor has fully complied with the requirement of the Contract the Architect / Employer will issue a Variation order to cover any necessary remedial works.

2.9 Compaction (Minimum Target Specification):

The moisture content of the in situ material during compaction shall be within +3% of the optimum moisture content determined. Adjust this to enable the required in- situ field densities of the fill material to be obtained consistently. Tests for each layer shall be done and approval shall be obtained by the S.O. prior to placing of the next layer.

Unless otherwise stated the in situ field densities of compacted materials shall not be less than 90% of the maximum dry density.

2.10 Shoring:

(i) For loose earth and when the depth of excavation exceeds 3.0M or as per the Architect / Engineer-in-charge, poling board (vertical members) of 50 to 75mm in thickness and 175 to 225mm in width preferably sal-wood to be placed close together and to be driven about 300mm in ground below the bottom of the trench with intermediate sal-ballah piling of dia not less than 100mm at the rate 900 to 1000mm centre to centre to be placed in between the

vertical surface of the trench and the poling boards and the double struts of sal-ballah of not less than 100mm in dia between two walling (horizontal members) of 250mm in width and 75mm in thickness held horizontally between them.

(ii) For medium clay and when the depth of excavation exceeds 2.0 M but exceeds 3.0 M single struts will be provided and sal-ballah piling may not be placed. Other requirements are to be satisfied as above (i) or as per the direction of the Architect / Engineer-in-charge.

(iii) For stiff clay of dry clay and when excavation is within 2.0M, vertical poling boards will be placed at the rate 600 to 1000 mm apart with or without walling pieces; but single or double strutting will be provided. Other requirements are to be satisfied as per (i) or as per the direction of the Engineer-in-charge.

3 CEMENT CONCRETE WORK:

3.1 Cement Concrete: For foundation shall be mixed in proportions and with ingredients as specified in the schedule of quantities. The concrete shall be mixed in a mechanical mixer. No more concrete shall be mixed than can be consumed within half an hour. It shall be deposited gently in the trenches in horizontal layers not more than 30 cm. thick & rammed and consolidated with steel rammers of 5 to 6 kg. weight. After laying and consolidation is completed watering twice a day for a week from the next day shall be done, measurements shall be done as for the lime concrete.

3.2 Damp Proof Course:

This shall be laid to specified thickness over walls for the full thickness of the super-structure walls. The surface shall be leveled and prepared before laying the cement concrete. Edges of damp proof course shall be straight, even and vertical. Side shuttering shall consist of wooden form and shall be strong and properly fixed so that it does not get disturbed during compaction and the mortar does not leak through. The concrete mix shall be of workable consistency and shall be tamped thoroughly to make a dense mass. When the sides are removed, the surface should come out smooth without any honey-combing. The damp proof course shall be laid continuous and the surface shall be double chequered. Damp proof course shall be cured for at least seven days, after which it shall be allowed to dry. Waterproofing materials of approved quality shall be added to concrete mixture in proportions as per manufacturer's specifications. Polymer based paint may be used under damp proof course as per direction of the Engineer-in-charge / Architect.

4 REINFORCED CEMENT CONCRETE WORK:

4.1 General:

Reinforced cement concrete work may be cast-in-situ or precast as directed. Reinforced cement concrete work shall comprise of the following which may be paid separately or collectively as per description of the item of work (a) Form work (b) Reinforcement (c) Concrete (d) Plastering or other finishing on concrete surface.

All concrete works shall be carried out as per the provisions of IS:456, IS:3370, IS:2974 and other relevant BIS Codes. Concrete mix proportioning and design mix; sampling and strength test of concrete, production and control of concrete, tolerances and placing of reinforcement and for cover; transporting, placing, compacting and curing etc., inspection and testing of structure (including requirement of non-destructive testing) shall be as specified in IS:456.

Continuous concreting shall be for structures supporting dynamic equipment as per the provisions of IS:2974.

The damp proof course shall be laid in two layers of equal thickness.

Form work and stripping of form work shall be as per the provisions of IS:456.

Assembly of reinforcement in RCC structure shall conform to IS:456.
All masonry works shall be carried out as per the provisions of IS:1597/2212/4326 and other relevant BIS Codes.
Fabrication of structural steel works shall be carried out as per the provisions of IS:800/801/802/806 and other relevant BIS Codes. Fabrication shall include cleaning, straightening, cutting, bending, holding, bolting, welding, machining, painting, marking, assembling, erecting, inspecting and testing etc. Welding procedure and welder qualification shall be as per IS:800 and / or referenced BIS codes only.
Erection of all structural steel works including supply of plant & equipment, storing and handling, setting out, field connection, field welding and security during erection shall conform to IS:800/801/802/806.

4.1.1 Scope: This specification coves reinforced cement concrete work both cast-in-situ or precast and related work in sections, form work and reinforcement, special requirements for shell and folded plate construction, architecturally exposed concrete are also included.

4.1.2 Reference Publication: The specifications, standards and codes are made part of this specification. Publication referred to herein shall be the latest editions including all applicable official amendments and revisions. In case of discrepancy, between this specification and those referred to herein, this specification shall govern.

4.1.2.1 Materials:

Cement		
1	IS:269	33 grade ordinary and low heat Portland cement
2	IS:455	Portland slag cement
3	IS:1489 (Part I)	Portland Pozzolana cement (fly ash based)
4	IS:8112	43 grade ordinary Portland cement
5	IS:1489 (Part II)	Portland Pozzolana Cement (Calcinated clay based)
6	IS:12330	Sulphate Resisting Portland cement
7	IS:6452	High Alumina Cement
Testing of Cement		
1	IS:4031	Physical Tests of Hydraulic cement
2	IS:650	Standard sand for testing of cement
Aggregates		
1	IS:383	Coarse and fine aggregates from natural sources for concrete
2	IS:2386	Methods of Test. (Part I to VIII) for aggregates for concrete

Concrete		
1	IS:1199	Methods of sampling and analysis of concrete
2	IS:516	Methods of test for strength of concrete
3	IS:1881(Part VI)	Analysis of hardened concrete
Water		
1	IS:3025	Method of sampling and test for water used in Industry
Steel		
1	IS:432	Mild steel and medium tensile steel bars and hard drawn steel wire for concrete reinforcement
2	IS:1139	Hot rolled mild steel, medium tensile steel and yield strength steel deformed bars for concrete reinforcement
3	IS:1786	Cold twisted steel bars for concrete reinforcement
4	IS:1566	Hard drawn steel wire fabric for concrete Reinforcement Admixtures
Codes of Practice		
1	IS:456/IS:2911(Part I-IV)	Code of practice for plain reinforced concrete piles
2	IS:1200	Method of measurement of building and civil Engineering works

4.1.3 Definitions

i. Nominal Mix Concrete: Concrete in which the determinations of proportion of cement, aggregates and water to attain the required strength is made without any prior concrete mix design, by adopting nominal mix proportion shall be called “Nominal Mix Concrete”.

ii. Design Mix Concrete: Concrete in which the determination of cement, aggregates and water to attain the required strength is made by designing the concrete mix shall be called “Design Mix Concrete”.

iii. Embedded items: All bolts, inserts, sleeves, conduit, fixture and other material placed so as to become anchored in cast-in-place or precast concrete, as indicated and specified elsewhere in the contract documents.

iv. Testing Laboratory: A testing laboratory by the contractor or any specified testing agency to perform testing services required in this section not otherwise assigned, and to perform any other such services requested by the Engineer-in-Charge.

All records and work shall be available for the Owner.

v Concrete Admixtures: For Special purpose admixtures are added to concrete mixes by specific dispensing equivalent furnished to the concrete Producer by the Admixture manufactures.

vi. Free Water Cement Ratio. The total water in a concrete mix consists of water absorbed by aggregates to bring into saturated surface dry condition, and the free water available for the hydration of cement and for the workability of fresh concrete. The free water cement is the ratio by weight of free water to cement in the mix.

4.2 Concrete grades and quality:

4.2.1 Grades: The concrete shall be in grades designated as per Table 4.2

The characteristic strength is defined as the strength of material below which not more than 5 percent of the test results are expected to fall.

Table 4.2 - Grades of Concrete

Grade Designation	Specification Characteristic (Compressive strength at 28 days in N/mm^2)
M-10	10
M-15	15
M-20	20
M-25	25
M-30	30

4.2.2 Workability of Concrete :

The concrete mix proportions chosen shall be such that the concrete is having adequate workability for placing of the concrete and can be properly compacted. The definition of the ranges of workability of concrete as measured by either the slump or V-B Test (IS-1199), and the ranges to be generally adopted for different kinds of work unless specified otherwise are given in Table 4.3 below :

Table – 4.3

Placing Condition	Degree of Workability	Values of Workability
Concreting of Shallow Sections with vibration	Very Low	Slump : 0-10 mm V.B.:12 Sec.
Concreting of lightly reinforced sections with vibration	Low	Slump : 10 – 30 mm V.B.: 6-12 Sec.

Concrete of lightly Reinforced sections without vibration or heavily Reinforced Sections with Vibration.	Medium	Slump : 30- 60 mm VB : 3 – 6 Sec
Concreting of heavily reinforced sections without vibration	High	Slump : 60 – 180 mm V.B.: 0-3 Sec.

4.2.3 Durability:

Unless otherwise specified to ensure durability the concrete shall be proportioned with limitations of minimum cement contents and maximum water cement ratios as given in Table 4.4 below for different conditions of exposure as specified below :

Table – 4.4

Exposure	Minimum cement content in Kg/CuM of fresh Concrete	Maximum free water cement ratio
Mild	250	0.65
Moderate	290	0.55
Severe	360	0.45
Potentially destructive freezing and thawing severe weathering or subject to chemicals (Use air entrainment as per requirement of latest ACI 307).	290	0.53

4.2.3.1 Requirement of concrete exposed to Sulphate attack:

The requirements shall be as given in Appendix A , Table 20 of latest IS : 466.

4.2.4 Proportioning:

The mix proportions shall be selected to ensure that the workability of the fresh concrete is suitable for the conditions of handling and placing, so that after compaction it surrounds all reinforcements and completely fills the form work. When concrete is hardened, it shall have the required strength durability and surface finish.

4.2.4.1 The determination of the proportions of cement aggregates and water to attain the required strength shall be made as follows :

(a) By designing the concrete mix, such shall be called Design Mix Concrete.

(b) By adopting normal concrete mix, such concrete shall be called Nominal Mix Concrete.

4.2.4.2 Design Mix Concrete:

This mix shall be designed to produce the grade of concrete having the required workability characteristic strength not less than the appropriate values given in Table 4.2 . The requirements of minimum cement contents, maximum water cement ratios, entrainment etc. specified from the point of view of achieving durability are also to be adequately considered.

4.2.4.3 Target mean strength of concrete :

The mix design for different grades of concrete shall be done for the following mean strength :

Grade of Concrete	**Target mean cubes strength at 28 days N/mm^2**
M-10	14.0
M-15	20.8
M-20	27.5
M-25	33.7
M-30	39.0

4.2.4.4 Nominal Mix Concrete

Nominal mix concrete may be used for concretes of Grades M – 10 , M- 15 and M-20. the proportions of materials for nominal mix concrete shall be in accordance with Table 4.5.

Table – 4.5

Grade of Concrete	**Total quantity of dry aggregates by mass per 50 Kg of cement to be taken as the sum of the individual masses of fine & course aggregates.**	**Proportion of fine aggregates to course aggregates (by mass)**	**Maximum water cement ration by weight**
(1)	(2)	(3)	(4)
M-10	480	Generally 1:2 but subject to an upper limit of 1:1.5 & a Lower limit of 1:2 .5	0.68

M-15	350	-do-	0.64
M-20	250	-do-	0.60

Notes :

i) The proportions of the fine to coarse aggregates should be adjusted from upper limit to lower limit progressively as the grading of the fine aggregate become finer and the maximum size of coarse aggregate becomes larger. Graded coarse aggregates shall be used for example, for an average grading of fine aggregates (i.e. Zone II of Table 4 of IS-383), the proportions shall be 1:1.5 and 1:2.5 for maximum size of aggregate 10mm, 20 mm and 40 mm respectively.

ii) Normal mix concrete is also to meet the requirements of durability. Hence the maximum water cement ratios as given in Table 4.5 are to be adequately modified as per Table- 4.4 as per the exposure situation.

iii) The mix proportions as given in Table-4.5 are given in component weights. When expressly permitted, the following volumetric mixes may also be used for the respective grades of concrete.

Grades of Concrete	Volumetric Proportion Cement :Coarse Sand : Stone Aggregates	Maximum Water Cement Ratio
M-10	1:3:6	0.56
M-15	1:2:4	0.54
M-20	1:1.5:3	0.46

4.2.5 Sampling and Strength test of concrete:

4.2.5.1 General :

Samples from fresh concrete shall be taken as per IS : 1199 and cubes shall be made, cured and tested at 28 days in accordance with IS : 516.

4.2.5.2 In order to get relatively quicker idea of the quality of concrete, optional tests on beams for modulus of rupture at 72 $\pm$ 2 hours or at 7 days, or compressive strength tests days may be carried out in addition to 28 days compressive strength tests. For this purpose, the values given in Table 4.6 may be taken for general guidance in the case of concrete mix with ordinary Portland cement. In all cases, the 28 days compressive strength specified in Table 4.2 shall alone be the criteria for acceptance or rejection of the concrete.

Table – 4.6

OPTIONAL TEST REQUIREMENTS OF CONCRETE

Grade of Concrete	Compressive strength on 15 cm Cubes Minimum at 7 days	Modulus of Rupture by Beam Test, Minimum at 72 ± 2 hours	Modulus of Rupture by Beam Test, Minimum at 7 days
(1)	(2) in N/mm^2	(3) in N/mm^2	(4) in N/mm^2
M-10	7.0	1.2	1.7
M-15	10.0	1.5	2.1
M-20	13.5	1.7	2.4
M-25	17.0	1.9	2.7
M-30	20.0	2.1	3.0
M-35	23.5	2.3	3.2
M-40	27.0	2.5	3.4

4.2.6 Frequency of Sampling:

4.2.6.1 Sampling Procedure : A random sampling procedure shall be adopted to ensure that each concrete batch shall have a reasonable chance of being tested, that is the sampling should be spread over the entire period of concreting and cover all mixing units.

4.2.6.2 Frequency : One sample shall be taken for every 30 CuM. Concrete or part thereof deposited on any day. Six cubes shall be made for every sample unless otherwise required as under 4.2.7.

4.2.7 Test Specimen : There Test specimens shall be made from each sample for testing at 28 days. Additional cubes may be required for various purposes such as to determine the strength of concrete at 7 days or at the time of striking the form work, or to determine the duration of curing or to check the testing error. Additional cubes may also be required for testing cubes cured by accelerated methods as described in IS-516.

4.2.8 Test Strength of Sample : The test strength of the sample shall be the average of the strength of three specimens. The individual variation should not be more than ±15 percent of the average.

4.2.9 Standard Deviation :

4.2.9.1 Standard Deviation based on Test Results.

(a) Number of test results - The total number of test results required to constitute an acceptable record for calculation of standard deviation shall be not less than 30. Attempts should be made to obtain the 30 test results, as early as possible, when a mix is used for the first time.

(b) Standard deviation to be brought up to date - The calculation of the standard deviation shall be brought up to date after every change of mix design and at least once a month.

4.2.9.2 Determination of Standard Deviation :

a. Concrete of each Grade shall be analysed separately to determine its standard deviation.
b. The standard deviation of concrete of a given Grade shall be calculated using the following formula from the results of individual tests of concrete of that Grade obtained as specified in 4.2.8.

$$\text{Estimated Standard Deviation} = \sqrt{(\Sigma\Delta^2/n-1)}$$

Where, Δ = deviation of the individual test strength from the average strength of a samples, and n=number of sample test results.

n = the number of sample test results.

c. When significant changes are made in the production of concrete batches (for example changes in the materials used, mix design, equipment or technical control), the standard deviation value shall be separately calculated for such batches of concrete.

4.3.9.3 Assumed Standard Deviation- Where sufficient test result for a particular grade of concrete are not available, the value of standard deviation given in Table 4.7 may be assumed

Table – 4.7

ASSUMED STANDARD DEVIATION

Grade of Concrete	Assumed Standard Deviation N/mm^2
M-10	2.3
M-15	3.5
M-20	4.6

M-25	5.3
M-30	6.0
M-35	6.3
M-40	6.6

However, when adequate past records for a similar grade exist and justify to the designer a value of standard deviation different from that shown in Table 4.7, it shall be permissible to use that value.

4.3.10 Acceptance Criteria

4.3.10.1 The concrete shall be deemed to comply with the strength requirements if :

(a) Every sample has a test strength not less than the characteristic value :

or

(b) The strength of one or more sample though less than the characteristic value, is in each case not less than greater of :

(i) The characteristic strength minus 1.35 times the standard deviation; and

(ii) 0.80 time the characteristic strength; and the average strength of all the sample is not less than characteristic strength Plus

1.65 – [1.65/√No. of Samples] times standard deviation

If the average Compressive Strength of the cubes is less than the specified but not less than 85% of the specified of the strength the concrete may be accepted at reduced rates at the discretion of the Engineer – in – charge.

If the average Compressive strength is less than 50% of the specified strength the Engineer – in – charge shall reject & get dismantled the defective portion of the work, represented by the sample along with structurally connected work as considered necessary at the risk & cost of the Contractor.

In both the above case, the Engineer – in – charge if he so decides may order for additional tests like core tests, ultrasonic tests, rebound Hammer test etc. to be carried out. All the changes in the connection with these additional tests shall be borne by the Contractor.

If the results of these tests are satisfactory, the Owner may accept the work at reduced rate.

4.3.10.2 The concrete shall be deemed not to comply with strength requirements if;

(a) The strength of any sample is less than the greater of :

(i) The characteristic strength minus 1.35 times the standard deviation; and

(ii) 0.80 times the characteristic strength : or

(b) The average strength of all the samples is less than the characteristic strength plus

1.65 – [3/√No. of Samples] times standard deviation

4.3.10.3 Concrete which does not meet the strength requirements as specified in 4.3.10.1 but has a strength greater than required by 4.3.10.2 may at the discretion of the designer, be accepted as being structurally adequate without testing.

4.3.10.4 Concrete of each grade shall be assessed separately.

4.3.10.5 Concrete shall be assessed daily for compliance. The contractor shall keep a record at site of all such tests identifying them with the portion of the work to which they relate. This record will be checked by the Architects, from time to time. The said record shall give the following details and shall be initialed by the Architects.

(a) Reference to specific structural member receiving the batch of concrete from which the cubes were cast.
(b) Mark on cubes.

(c) Mix of concrete.

(d) Date and time of casting.

(e) Water cement ratio by weight and slump.

(f) Crushing strength as obtained at the end of 7 days for 3 cubes out of a set of 6 cubes and at the end of 28 days for the remaining 3 cubes.

(g) Laboratory in which tested and reference to test certificates.

(h) The quantity of concrete incorporated in work that is represented by the quantity of concrete of the set of the cubes.

(i) Any other information required by the Architect / Engineer – in – charge.

4.4 Form work :

4.4.1 General :

4.4.1.1 Forms shall be used, wherever necessary to confine the concrete and shape it to the required dimension Forms shall have sufficient strength to withstand the pressure resulting from placement and vibration of the concrete, and shall have sufficient rigidity to maintain specified tolerances.

4.4.1.2 Earth cuts shall not be used as forms for vertical surfaces unless required or permitted.

4.4.1.3 Shop drawings for form work including the location of shoring and reshoring shall be submitted for approval by the Architect.

4.4.2 Materials :

The selection of materials suitable for form work shall be based on economy. Consistent with safety and quality required in the finished work. Form work shall be of timber, plywood, steel, fibre glass, reinforced plastics or any other material as approved by the Architect whose decision in this respect shall be final. Props and shores shall be of steel, timber posts, ballies or any other material as approved by Architect.

4.4.3 Design and installation of formwork :
The design and engineering of the formwork, as well as its construction, shall be the responsibility of the Contractor.

4.4.3.1 The formwork shall be designed for the loads, lateral pressure, and allowable stresses. Design of Recommended Practice for concrete formwork (ACI-347) and for design considerations, wind loads, allowable stresses and other applicable requirements of the controlling local building code. The design shall be submitted to the Owner / Architect for necessary approval & the Contractor shall erect the form work only after getting the approval from the Owner / Architect.

4.4.3.2 Forms shall be sufficiently tight to prevent loss of mortar from the concrete, Chamfer strips shall be placed in corners of forms to produce beveled edges on permanently exposed. Surface interior corners on such surfaces and the edges of formed joints will not required beveling unless required by the contract documents.

4.4.3.3 Where necessary to maintain the specified tolerances, the formwork shall be chambered to compensate for anticipated deflections in the formwork prior to hardening of the concrete.

4.4.3.4 Position means of adjustment (wedges or jacks) of shores and struts shall be provided and all settlement shall be taken up during concrete placing operation. Forms shall be securely braced against lateral deflections.

4.4.3.5 Temporary openings shall be provided at the base of column forms and wall forms and at other points where necessary to facilitate cleaning and observation immediately before concrete is placed.

4.4.3.6 Form ties shall be constructed so that the ends, or end fasteners can be removed without causing appreciable spalling at the faces of the concrete. After the ends or and fasteners of forms ties have been removed, the embedded portion of the ties shall terminate not less than 2 diameters or twice the minimum dimension of the tie from the formed faces of concrete to be permanently exposed to view except that in no case shall this distance be less than 18/20 mm. When the formed face of the concrete is not to be permanently exposed to view, form ties may be cut off flush with the formed surfaces.

4.4.3.7 At construction joints, contact surface of the form sheathing for flush surfaces exposed to view shall overlap the hardened concrete in the previous placement by not more than 25 mm. The forms shall be held against the hardened concrete to prevent offsets or loss or mortar at the construction joint and to maintain a true surface.

4.4.3.8 Wood forms for wall openings shall be constructed to facilitate loosening, if necessary, to counteract swelling of the forms.
Wedges used for final adjustment of forms prior to concrete placement shall be fastened in position after the final check.

4.4.3.9 At construction joints, contact surface of the form sheathing for flush surfaces exposed to view shall overlap the hardened concrete in the previous placement by not more than 25 mm. The forms shall be held against the hardened concrete to prevent offsets or loss or mortar at the construction joint and to maintain a true surface.

4.4.3.10 Wood forms for wall openings shall be constructed to facilitate loosening, if necessary, to counteract swelling of the forms.

4.4.3.11 Wedges used for final adjustment of forms prior to concrete placement shall be fastened in position after the final check.

4.4.3.12 Form work shall be so anchored to shores or other supporting surfaces or members that upward or lateral movement of any part of the formwork system during concrete placement will be prevented.

4.4.3.13 Runways for moving equipments shall be provided with struts or legs and shall be supported directly on the formwork or structural member without resting on the reinforcement steel.

4.4.4 Tolerances

4.4.4.1 Unless otherwise specified by the Architect/Engineer-in-charge, formwork shall be constructed so that the concrete surfaces will conform to the tolerance limits in Table 4.8.

4.4.4.2 The Contractor shall establish to maintain the undisturbed condition until final completion and acceptances of the project Sufficient bench marks to be used for reference purposes to check tolerances.

4.4.4.3 Regardless of the tolerances listed in Table 4.8 no portion of the building shall extend beyond the legal boundary of the project.

Table - 4.8

Tolerance for formed surfaces (applicable only for concrete dimensions not applicable for positioning of vertical reinforcing steel, dowels or embedded items).

(i) Variation from plumb :

(a) In the lines and surfaces of columns, piers, walls and in sharp edges formed at meeting of two surfaces 6 mm per 3.0 M, but not more than 25mm.

(b) For exposed corner columns and other conspicuous lines -

In any 6M height	6 mm
Maximum for entire height	12 mm

(ii) Variation from the level or from the grades indicated on the drawings (after allowing for specified camber).

(a) In slab soffits, ceilings beam soffits, and in horizontal sharp edges formed at meeting of two surfaces, (measured before removal of supporting shores)

(b) For exposed lintels, sills parapets, horizontal grooves and other conspicuous lines.

In any bay or in 6 M length	6 mm
Maximum for entire length	12 mm

(iii) Variation of the linear building lines from established position in plan and related position of columns, wall and partitions.

In any 6 M of length	12 mm
Maximum for entire length	25 mm

(iv) Variation of the sizes and locations of sleeves, openings in walls and floors. - 6 mm

(v) Variation in cross-sectional dimensions of columns and beams and in the thickness of slabs and walls.

Minus	6 mm
Plus	12 mm

(vi) Footings :

(a) Variation in dimension in plan

Minus	12 mm
Plus	50 mm

(b) Misplacement or eccentricity 2% of footing width in the direction of misplacement but not more than 50 mm.

(c) Reduction in thickness Minus -50% of specified thickness subject to a maximum of 50 mm.

(vii) Variation in steps

(a) In a flight of Stair

Rise	3 mm
Tread	5 mm

(b) In consecutive Steps

Rise	1.5 mm
Tread	4 mm

4.4.5 Preparation of form surfaces

4.4.5.1 All surfaces of forms and embedded materials shall be cleaned of any accumulated mortar of grout from previous concreting and of other foreign material before concrete is placed in them.

4.4.5.2 Unless otherwise specified or approved, surfaces of form shall be treated as follows :

(a) Before placing of either the reinforcing steel / or the concrete, the surfaces of the forms shall be covered with an approved coating material that will effectively prevent absorption of moisture and prevent bond with the concrete, and will not stain the concrete surfaces. A field applied from release agent or sealer of approved type or a factory applied non absorptive liner may be used.
(b) Excess form coating material shall not be allowed to stand in puddles in the forms nor shall such coating be allowed to come in contact with hardened concrete against which fresh concrete is to be placed.

4.4.6 Removal of formwork

4.4.6.1 When repair of surface defects or finishing is required at an early age, forms shall be removed as the concrete has hardened sufficient by to resist damages from removal operation.

4.4.6.2 Top forms on sloping surfaces of concrete shall be removed as soon as the concrete has attained sufficient stiffness to prevent sagging. Any needed repairs or treatment required on such sloping surfaces shall be performed at once and be followed by the specified curing.

4.4.6.3 Wood forms for wall openings shall be loosened as soon as this can be accomplished without damage to the concrete.

4.4.6.4 In normal circumstances and where ordinary Portland cement is used, forms may generally be removed after expiry of the following period :

A	Walls, columns and vertical faces of all structural members	24 to 48 hours as may be decided by the Engineer – in Charge
B	Slabs (Props left under)	3 days
C	Beam soffits (props left under)	7 days
D	Removal of Props under slabs:	
	…spanning upto 4.5 M	7 days
	…spanning over 4.5 M	14 days

4.4.6.5 The number of props left under, their sizes and disposition shall be such as to be able to safely carry the full dead load of the slab, beams or arch as the case may be together with any live load likely to occur during curing or further construction.

4.4.7 Re-shoring:

4.4.7.1 When re-shoring is permitted or required, the operations shall be planned in advance and shall be subject to approval. While re-shoring is under way, no live load shall be permitted on the new construction.

4.4.7.2 In no case during re-shoring shall concrete in beam slab, column or any other structural member be subjected to combined dead and construction loads in excess of the loads permitted by the Architect / Engineer – in - charge for the developed concrete strength at the time of re-shoring. Re-shores shall be brightened to carry their required loads without overstressing the construction.

4.4.7.3 Floors supporting shores under newly placed concrete shall have their original supporting shores left in place or shall be re-shored. The re-shoring system shall have capacity sufficient to resist the anticipated loads and in all cases shall have a capacity equal to at least one half of the capacity of the shoring system above. The re-shores shall be located directly under a shore position above unless other locations are permitted.

Before the lifting operation is started the top of concrete in the shuttering shall be leveled and cleared by removing extra deposit of concrete by pointed metal brushes.
From the lower platform any honey combs and bad spots shall be repaired as soon as the concrete comes out of the forms. All the block outs and embedded materials shall be exposed before concrete hardens.

4.4.8 Scaffolding:

The scaffolding must be strong and right stiffened with necessary cross braces and always decked and boarded on the sills with close boarded veiling and swings to prevent any injury to persons or materials. The Contractor shall have to allow other traders to make reasonable use of his scaffolding as and when directed by the Engineer-in-charge.

If for the interest of the work Contractors have to erect scaffolding in other's properties including the local bodies or municipalities or corporations, the arrangement for the same including the cost of licensing fees etc shall have to borne by the Contractor and the Employer / Architect should be kept free from any liability on this account.

4.5 Reinforcement :

4.5.1 Steel reinforcement shall be either mild steel of tested quality conforming to IS:432 or cold worked steel high strength deformed bars as per IS:1786 in strength grade Fe 415 or hot rolled high yield strength steel deformed bars with minimum yield strength of 425 N/mm^2 as per IS:1139 as specified in the drawings. Fabric reinforcement in topping slab or precast concrete units shall be of hard drawn mild steel wire mesh I.R.C weld mesh or other equivalent as approved. Bars shall be free from mill scale, excessive rust, oil or paint.

4.5.2 The Contractor shall submit manufacturer's Test Certificate with every lot of supply of reinforcement steel. In a period of every 3 (three) months the Contractor shall collect samples of reinforcement steel in presence of the representative of the Employer and send to any Government recognized laboratory for testing as per relevant IS Code.

4.5.3 The weight per metre of bars shall be calculated on the basis of the steel weighs - 7.85 gm/cc.

4.5.4 The Contractor shall submit bar bending schedule for the approval of the Architect prior to commencement of fabrication. These will indicate the accurate dimensions and bending of bars as required in the structural drawings. Fabrication shall be accurately done to the dimensions, spacing and minimum cover as shown on structural drawings.

4.5.5 All steel shall be rigidly held in place with 18 gauge annealed steel wire. Cement mortar (1 : 2) cubes, M.S. chairs and spacer bars shall be used in order to ensure accurate positioning of reinforcement.

4.5.6 All joints in mild steel reinforcement up to and including 16 mm dia shall be overlapped. The length of overlap for tension and compression joints shall be in accordance with the IS Code. Joints in mild steel reinforcement above 16 mm diameter may be welded if permitted by the Architects in writing. All joints in deformed bars shall be overlapped strictly in accordance with the IS Code.

4.5.7 Welding of Reinforcement

Reinforcement in structures shall not be welded except where permitted in the Contract. All welding procedures shall be subject to the prior approval of the Architect / Employer in writing.

4.5.8 Cover to Reinforcement :

Care shall be taken to maintain the correct cover to reinforcement. The minimum covers to be provided shall be in accordance with the provisions specified in the structural drawings.

4.6 Joints and Embedded items.

4.6.1 Construction joints :

Construction joints shall be made only where shown on the drawings or approved by the Architects. Such joints shall be kept to the minimum and shall not be located in valleys. The joints shall be at places where the shear force is the minimum and shall be at right angles to the direction of main reinforcement. In case of columns and walls the joint shall be horizontal and 8 to 15 cms below the bottom of the beam or slab coming in to the column or wall head or below the anchor reinforcement of beam and slab coming into the column and wall and the portion of the column or wall between the stopping of level and the top of the slab shall be concreted with the beam or slab.

i) Vertical Joints : At the end of any day's work or run of concrete the concrete should be finished off against temporary shutter stop which should be vertical and securely fixed this stop should removed as early as weather permits.

ii) Horizontal Joints : Horizontal joints should be washed down two hours after casting in the manner described above for vertical joints.

If the concrete has been allowed to harden excessively, surface shall be chipped over its whole surface to depth of at least 10mm and thereafter thoroughly washed. Before fresh concrete is added on the other side of a construction joint, the surface of the old concrete will be thoroughly wetted then covered with a thin layer of cement mortar 1 : 2 by volume.

All construction joint in all concrete floors and wall of basement, water tanks or any other structure in contact with water or earth, shall be provided with approved PVC water stops coated on both sides

with hot asphalt or approved metallic strips. The longitudinal joints in water stops shall be preferably hot welded or overlapped at least 200mm.

4.6.2 Expansion Joint :
Expansion joint shall be provided where required as shown in the drawing or as directed by the Architect. The filler to be used shall be of approved material.

4.6.3 Inserts :
Inserts of any kind like fan hooks, sleeves pipes, bolts and nuts, anchor bolts etc. are to be accurately placed in the concrete (and/or brick work) and concreted over, as and where required and directed. The word insert will mean article like anchors, anchor beams, sleeves, pipes, bolts, nuts etc. and the weight of which does not exceed 100 Kgs/piece.

The contractor shall provide necessary wooden plugs sleeves, etc. for his own works, for which no extra payment shall be made. He will provide if so directed any inserts, wooden plugs, sleeves etc. for other contractors for which he shall be paid but in case where the other contractors provide the inserts, he will take proper measures at his own expense not to disturb their work while concreting.

The required detail for the fan hooks is given in the Architect's drawing.

Conduit and Plumbing pipes: All Electric Conduits and Sanitary Pipes, Water supply pipes and Down pipes that lie within Concrete Slabs, Beams and Columns shall be laid correctly in place as per drawings and Architect's approval shall be obtained before the Casting of Concrete. No cutting of the Structural Concrete will be permitted. All care shall be taken to ensure that conduit pipes are not damaged.

4.7 Production of concrete
4.7.1 General :

To avoid confusion and error in batching, consideration should be given to use the smallest practical number of different concrete mixes on any site or in any one plant.

4.7.1.1 A competent person shall supervise all stages of production of concrete. Preparation of test specimens and site test shall be properly supervised. Above persons placement for particular operation shall be approved by the Owner.

4.7.1.2 The Engineer-in-Charge shall be afforded all reasonable opportunity and facility to inspect the materials and manufacture of concrete and to take any samples or to make any tests. All such inspection, sampling and testing shall be carried out with the minimum of interference with the process of manufacture and delivery.

4.7.2 Ready Mixed Concrete
Except as otherwise provided, ready mixed concrete shall be batched, mixed and transported in accordance with "Specifications for Ready – Mixed Concrete" .

4.7.3 Site Mixed Concrete
4.7.3.1 Batching
(a) In proportioning concrete, the quantity of both cement and aggregate should be determined by mass. Where the mass is determined on the basis of mass of cement per bag, a reasonable number of bags should be weighed periodically to check the net mass. Where the cement is weighed on the site

and not in bags it should be weighed separately from the aggregates. Water should be either measured by volume in calibrated tanks or weighed. Any solid admixture that may be added, may be measured by mass, liquid and paste admixture by volume or mass. Batching plant where used should conform to IS:4925. All measuring equipments should be maintained in a clean serviceable condition, and their accuracy periodically checked.

(b) Except where it can be shown to the satisfaction of the Engineer – in – Charge that supply of properly graded aggregate of uniform quality can be maintained over the period of work, the grading of aggregate should be controlled by obtaining the coarse aggregate in different sizes and blending them in the right proportions when required. The different sizes being stacked in separate stock piles. The materials should be stock – piled for several hours preferably a day before use. The grading of coarse and fine aggregate should be checked as frequently as possible, the frequency for a given job being determined by the Engineer – in – Charge to ensure that the specified grading is maintained.

(c) Volume batching with weight control : Where batching by volume with weight control specified by the Architect all measurements of sand, coarse aggregate and water shall be by the volume and of cement by the bag controlled by regular periodical weighing. In order to ensure correct proportioning following precautions shall be taken :

i) The Contractor shall maintain at site a number of platforms, balances similar to the balances used for weighing luggage at railways platforms, capable of weighing upto 200 Kg. to the nearest 500 grams. The balance shall be used for weighing cement bags and occasional boxes of sand and coarse aggregate as specified below:

ii) The contractor shall provide the mixer operator with two standard measures one of 5 litre and one of 1 litre capacity for measuring the water to be added to the mix.

iii) The quantity of water to be added to the mix shall be approved by the Architect / Engineer – in – Charge and may be adjusted by them as frequently as necessary in order to allow for the moisture content of fine and coarse aggregate and workability desired. On no account shall the Contractor allow more water to be added to the mix than that specified, a mix containing such excess water may be rejected by the Architect / Engineer – in - Charge and not allowed for use in the works.

iv) Sand and coarse aggregate shall be measured by volume. The sizes of measuring boxes or the depth to which they are filled or both shall be adjusted to obtain the correct weight of each material specified by the Architect for that mix.

v) Every fifth or tenth measuring box of sand or of coarse aggregate shall be weighed on the balance to ensure that filling of boxes is being uniformly done. Adjustments shall be made from time to time in the amount of each box filled to take into account variation in moisture content and bulking of sand in accordance with IS-2386 (Part III).

vi) More frequent weighing of boxes, particularly of sand if found to very considerably in moisture content and bulking, may be required by the Architect and shall be done by the Contractor without additional cost.

(d) It is important to maintain the water-cement ratio constant at its correct value. To this end, determination of moisture contents in both fine and coarse aggregates shall be made as frequently as possible, the frequency for a given job being determined by the Engineer-in-Charge according to the

weather conditions. The amount of the added water shall be adjusted to compensate for any observed variations in the moisture contents. For the determination of moisture content in the aggregates IS : 2386 (Part III) may be referred to. To allow for the variation in mass of aggregate due to variation in their moisture content, suitable adjustments in the masses of aggregates shall be made. In the absence of exact data, only in the case of nominal mixes, the amount of surface water may be estimated from the values given in Table 4.9.

Table 4.9 : Surface water carried by Aggregate

Aggregate	Approximate Quantity of Surface Water	
	Percent by Mass	$1/m^2$
Very wet sand	7.5	120
Moderately wet sand	5.0	80
Moist sand	2.5	49
*Moist Gravel or Crushed Rock	1.25 – 2.5	20 - 40
*Coarse the aggregate, less the water it will carry.		

(e) No substitutions in materials used on the work or alterations in the established proportions, except as permitted for accounting bulkage of fine aggregate and moisture contents in the fine and coarse aggregates shall be made without additional tests to show that the quality and strength of concrete are satisfactory.

4.7.4 Mixing :

Concrete shall be mixed in a mechanical mixer. The mixer should comply with IS : 1791. The mixing shall be continued until there is a uniform distribution of the materials and the mass is uniform in colour and consistency. If there is segregation after unloading from the mixer, the concrete should be remixed.

Note : 1. For guidance, the mixing time may be 1.5 to 2 minutes, for hydrophobic cement may be taken as 2.5 to 3 minutes.

Note : 2. In exceptional circumstances such as mechanical breakdown of mixer, work in remote areas or when the quantity of concrete work is very small, hand mixing may be permitted subject to adding 10 percent extra cement. When hand mixing is permitted, it shall be carried out on a water-tight platform and care shall be taken to ensure that mixing is continued until the concrete is uniform in colour and consistency.

4.7.4.1 Workability of the concrete should be controlled by direct measurement of water content. Workability should be checked at frequent intervals (IS:1199).

4.7.4.2 Work in extreme weather conditions : During hot or cold weather, the concreting should be done as per the procedure set out in IS:7861 (Part – I) or IS: 7861 (Part – II).

4.8 Transport and Lacing of Concrete

4.8.1 General

The method of transporting and placing concrete shall be to the approval of the Architect / Employer.

The temperature of concrete at the time of placing shall not exceed 32 degrees Celsius and the Contractor shall submit for the Architect / Employer's approval details of the measures he proposes to take to ensure that this temperature will not be exceeded.

All areas in which concrete is to be placed shall be clean and free from standing water immediately before placing of the concrete, except for concrete placed under water.

Concrete shall not be placed in any part of the structure until the Architect / Employer's approval has been given. If concreting is not started within 24 hours of approval being given, approval shall again be obtained from the Architect / Employer.

Concrete shall be compacted in its final position within 30 minutes of discharge from the mixer, in case of ready mix concrete, unless carried in continuously operating purpose made agitators when the time shall be within 2.5 hours of the introduction of cement of the mix and within 30 minutes of discharge from the agitator.

The placing and compaction of concrete shall be done in such a way as not to cause disturbance to the framework or reinforcement. Where sections of the works are carried out in lifts, the reinforcement projecting above the lift being cast shall be adequately supported so as to prevent movement of the bars during the casting and setting of the concrete.

No concrete shall be placed in flowing water.

4.8.2 Placing of concrete:

Preparation before placing.

Hardened concrete and foreign materials should be removed from the inner surfaces of the conveying equipment.

From work shall have been completed, water shall have been removed, reinforcement shall have been secured in place, expansion joint material, anchors and other embedded items shall have been positioned, and the entire preparation shall have been approved.

Semi-porous sub-grades shall be sprinkled sufficiently to eliminate suction and porous sub grades shall be sealed in an approved manner.

4.8.3 Conveying :

Concrete shall be handled from the mixer to the place of final deposit as rapidly as practicable by methods which will prevent segregation or loss of ingredients and in a manner which will assure that the required quality of the concrete is maintained.

Conveying equipment shall be approved and shall be of size and design such that detectable setting of concrete shall not occur before adjacent concrete is placed. Conveying equipment shall be cleaned

at the end of each operation or work day. Conveying equipment and operation shall conform to the following additional requirements :

(a) Truck mixers, agitators and agitating units and their manner of operation shall conform to the applicable requirements of "Specifications for Ready Mixed Concrete"

(b) Belt conveyors shall be horizontal or at a slope which will not cause excessive segregation or loss of ingredients. Concrete shall be protected against undue drying or rise in temperature. An approved arrangements shall be used at the discharge end to prevent apparent segregation. Mortar shall not be allowed to adhere to the return length of the belt. Long runs shall be discharged into a hopper or through a baffle.

(c) Chutes shall be metal or metal-lined and shall have a slope not exceeding 1 vertical to 2 horizontal and not less than 1 vertical to 3 horizontal. Chutes more than 6 meters long and chutes not meeting the slope requirements may be used provided they discharge into a hopper before distribution.

(d) Pumping or pneumatic conveying equipment shall be of a suitable kind with adequate pumping capacity. Pneumatic placement shall be controlled so that segregation is not apparent in the discharged concrete. The loss of slump in pumping or pneumatic conveying equipment shall no exceed 50 mm.

(e) Concrete shall not be conveyed through pile made of aluminum or aluminum alloy.

4.8.4 Depositing

General :

Concrete shall be deposited continuously, or in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the section. If a section cannot be placed continuously, Construction Joints shall be located as shown in the structural drawings or as approved. Placing shall be carried on at such a rate that concrete which is being integrated with fresh concrete is still plastic. Concrete which has partially hardened or has been contaminated by foreign materials shall not be deposited. Temporary spreaders in forms shall be removed when the concrete placing has reached an elevation tendering their service unnecessary. They may remain embedded in the concrete only if made of metal or concrete and if prior approval has been obtained.

Placing :

Placing of concrete in supported elements shall not be started until the concrete previously placed in columns and walls is no longer plastic and has been in place at least two hours.

Segregation :

Concrete shall be deposited as nearly as practicable in its final position to avoid segregation due to re-handling or following. Concrete shall not be subjected to any procedure which will cause segregation.

Consolidation :

All concrete shall be consolidated by vibration, spading rodding or forking so that the concrete is thoroughly worked around the reinforcement, around embedded items, and into corners of forms, eliminating all air or stone pockets which may cause honey combing, pitting or planes of weakness. Internal vibrators shall have a minimum frequency of 8000 vibrations per minute and sufficient amplitude to consolidate the concrete effectively. They shall be operated by competent workers. Use of vibrator to transport concrete within forms shall not be allowed. vibrators shall be inserted and withdrawn in at points approximately 450 mm apart. At each insertion, the duration shall be sufficient to consolidate the concrete but not sufficient to cause segregation, generally from 5 to 15 seconds. A spare vibrator shall be kept on the job site during all concrete placing operations. Where the concrete is to have an as cast, finish, a full surface of mortar shall be brought against the form by the vibration process, supplemented if necessary by spading to work the coarse aggregate back from the formed surface.

Compaction of Concrete

All concrete shall be compacted to produce a dense homogeneous mass. Unless otherwise agreed by the Architect / Employer, it shall be compacted with the vibrators.

Vibration shall not be applied by way of the reinforcement. Where vibrators of the immersion type are used, contact with reinforcement, formwork and all inserts shall be avoided as far as its practicable.

Concrete shall not be subjected to vibrations between 4 and 24 hours after compaction.

Vibration shall not be used as a means of distributing concrete into position.

4.8.5 Protection.

Unless adequate protection is provided and approval is obtained, concrete shall not be place during rain.

Rainwater shall not be allowed to increase the mixing water nor to damage the surface finish.

Special precautions are to be taken during rainy reason so that freshly placed concrete can be adequately covered and protected by keeping sufficient number of tarpaulins.

4.8.6 Bonding :

When specified, the surface of joints shall be prepared in accordance with one of the methods specified in the section on Joints and embedded items.

The hardened concrete of construction joints and of joints between footings and walls or columns, between walls or columns and beams or floor they support, joints in unexposed walls and all others

not mentioned below shall be dampened (but not saturated) immediately prior to placing of fresh concrete.

The hardened concrete of joints in exposed work, joints in the middle of beams, girders, joints, and slabs, and joints in work designed to contain liquids shall be dampened (but not saturated) and then thoroughly covered with a coat of cement grout of similar proportions to the mortar in the concrete. The grout shall be as thick as possible on vertical surfaces and at least 12mm thick on horizontal surfaces. The fresh concrete shall be placed before the grout has attained its initial set.

Joint receiving an adhesive shall have been prepared and adhesive applied in accordance with the manufacturer's recommendations prior to placing of fresh concrete.

Surfaces of joints which have been treated with a chemical retarder shall have been prepared in accordance with the manufacturer's recommendations prior to placing of fresh concrete.

4.8.7 Concreting under water :

When required or permitted, concrete shall be deposited under water by an approved method in such a way that the fresh concrete enters them as of previously placed concrete from within causing water to be displaced with minimum disturbance at the surface of the concrete.

4.9 Curing and Protection

4.9.1 General :

Immediately after placement, concrete shall be protected from premature drying, excessively hot or cold temperatures, and mechanical, injury, and shall be maintained with minimum moisture loss at a relatively constant temperature for the period necessary for hydration of cement and hardening of the concrete. The materials and methods of curing shall be subject to approval. About 24 hours after laying of concrete, the surface shall be cured by flooding with water of minimum 25mm depth or by conveying with wet absorbent materials. The curing shall be done for a minimum period of 7 days. Over the foundation concrete the masonry work may be started after 48 hours of its laying, but the curing of cement concrete shall be continued along with masonry work for a minimum period of 7 days.

In case of cement concrete used as sub-grade for flooring, the flooring work may be commenced within 48 hours of the laying of the sub-grade. In case it is not possible to do so due to exigencies of work the sub-grade shall be roughened with steel wire brush without disturbing the concrete, wetted with neat cement slurry at the rate of 1.75 kgs of cement per SqM applied to the base before laying floor. The curing to be continued along with the top layer of flooring for a minimum period of 7 days.

4.9.2 Preservation of moisture :

4.9.2.1 For concrete surfaces not in contact with forms, one of the following procedures shall be applied immediately after completion of placement and finishing.

a) Ponding or continuous sprinkling.
b) Applications of absorptive mats or fabric kept continuously wet.

c) Application of sand kept continuously wet.
d) Continuous application of steam (not exceeding 650 C) or mist spray.
e) Application of waterproof sheet materials, conforming to specifications for waterproof sheet materials for curing concrete (ASTMC 171)
f) Application of other moisture retaining covering as approved.
g) Application of a curing compound conforming to specifications for liquid member-forming compounds for curing concrete (ASTM C 309).

The compound shall be applied in accordance with the recommendations of the manufacturer immediately after any water seen which may develop after finishing has disappeared from the concrete surface. It shall not be used on any surface against which additional concrete or other material is to be bonded unless it is proven that the curing compound will not prevent bond, or unless positive measures are taken to remove it completely from areas to receive bonded application.

4.9.3 Moisture loss from surfaces placed against wooden forms or metal forms exposed to heating by the sun shall be minimized by keeping the forms we until they can be safely removed. After form removal the concrete shall be cured until the end of the time prescribed in section 4.9.4 any of the section by one of the methods of section 4.9.2.1.

4.9.4 Curing in accordance with 4.9.2.1 or 4.9.3 shall be continued for at least 7 days in case of all concrete except high early strength concrete for which the period shall be at least 3 days. Alternatively, if tests are made of cylinders kept adjacent to the structure and cured by the same methods, moisture retention measures may be terminated when the average compressive strength has reached 70 percent of the specified strength. If one of the curing procedures of sections 4.9.2.1 (a) through (d) is used initially, it may be replaced by one of the other procedure of section 4.9.2.1 any time after the concrete is 1 day old provided the concrete is not permitted to become surface dry during transition.

4.9.5 Temperature wind and humidity .

Cold weather :

When the mean daily outdoor temperature is less than 5^0 C, the temperature of the concrete shall be maintained between 10^0 C and 21^0 C for the required curing period of Section 4.9.4. When necessary arrangements for heating, covering insulating or housing the concrete work shall be made in advance of placement and shall be adequate to maintain the required temperature without injury due to concentration of heat. Combustion heaters shall not be used during the first 24 hours unless precautions are taken to prevent exposure of the concrete to exhaust gases which contain carbon dioxide.

Hot weather : When necessary, provision of wind breaks, shading for spring, sprinkling, ponding or wet covering with a light coloured material shall be made in advance of placement and such protective measures shall be taken as quickly as concrete hardening and finishing operations will allow.

Rate of temperature change – Changes in temperature of the air immediately adjacent to the concrete during and immediately following the curing period shall be kept as uniform as possible and shall not exceed 3^0 C in any 1 hour or 28^0 C in any 24 hours period.

4.9.6 Protection from mechanical injury – During the curing period the concrete shall be protected from damaging mechanical disturbances, such as load stresses, heavy shock and excessive vibration. All finished construction equipments, materials, or methods, by application of curing procedures, and by rain or running water. Self-Supporting structures shall not be loaded in such a way as to overstress the concrete.

4.10 Finishing of formed surfaces - Unless otherwise specified after removal of forms the surfaces of concrete shall be given one or more of the finishes specified below in locations designated by the contract.

4.10.1 Cement plaster finish - The concrete surface shall be properly roughened immediately after the shuttering is removed taking care to remove any laitance completely without disturbing the concrete. The roughening shall be done by hacking. Before the surface is plastered, it shall be cleaned and wetted so as to give good bond between concrete and plaster. After preparation the exposed formed surface or RCC work shall be plastered with cement mortar 1:3 / 1:4 (1 cement : 3 fine sand / 4 fine sand) or as directed by the Engineer – in - Charge of thickness not less than 6 mm to give a smooth and even surface true to time and form.

4.11 Pre – Cast Concrete

4.11.1 Pre cast Nominal mix concrete.

A General

All pre-cast concrete shall be cast over vibrating tables or by using form vibrators. The concrete mix shall conform in all respect to the IS specifications.

Exposed pre-cast surfaces shall be finished as called for on the drawings or as directed by the Architects. All surfaces coming in contact with in situ concrete shall be wire brushed and hosed down until the aggregate is free from cement slurry. Castellation shall be provided wherever called for. Leaving grouting holes, grooves, inserts projections reinforcement, lifting hooks etc to conform to the erection procedure. All edges and delicate projection likely to be damaged during erection shall be provided by means of wooden cover fillets, until placed in position.

B Pre – cast jail blocks louvers, shelves etc – All Pre-cast jail blocks shall be exactly of the size and pattern shown on the drawings and shall be made face up in the following manner. All units shall be integrally cast, steel formwork shall be used for making jails.

Provided in the formwork as shown in the drawings. Stiff plastic concrete

1: 1.5:3 shall be used with coarse aggregate 12 mm and down Grade.

The pre – cast units shall not be removed from the forms for three days. Pre – cast work shall be cured under cover and shall be kept under water for fifteen days before placing in position. Samples of each part shall be approved by the Architects before proceeding with the work. Units may require wetted before bedding. The concrete base shall be wetted and coated with slurry and minimum of mixing water shall be used in the bedding mortar which shall be Portland cement and sand 1: 3.

4.12 Measurements

4.12.1 Reinforce cement concrete work (Cast – in – Situ).

The consolidated cubical contents of concrete shall be measured in cubic meters nearer to two places of decimal. Concrete laid in excess of sections shown in the drawings or as determined by the Engineer – in – Charge shall not be measured.

The work shall be measured separately under the different categories provided in Schedule of Quantities.

4.12.2 Pre – Cast Work

Same as per R.C.C. in situ work.

RCC pre- cast work shall be measured separately under the different categories specified in the Schedule of Quantities and shall include all modules, finished faces, reinforcement (where provided hoisting and setting in position.)

Pre-cast Jali bocks louvers, shelves etc.

These shall be measured in square meters for their gross dimensional area. The length and breadth shall be measured correct to a cm. The thickness shall not be less than specified.

5. BRICK WORK (Ordinary Brick Work by using Conventional / Modular Bricks).

5.1 The bricks shall conform to the IS specifications.

(a) Mortar : The mortar for brick work shall be as specified.

(b) Construction Details

5.2 Soaking – All bricks shall be immersed in water for two hours before being put into work so that they will be saturated and will not absorb water from the mortar.

5.3 Bats – No bats or cup bricks shall be used in the work unless absolutely necessary around irregular openings or for adjusting the dimensions of different courses and for closer in which case, full bricks shall be laid at corners, the bats being placed in the middle of courses.

5.4 Laying – The bricks shall be laid in mortar to line, level and shapes shown on the plans slightly pressed and thoroughly bedded in mortar and all joints shall be properly flushed and packed with mortar so that they will be completely filled with mortar and no hollows left anywhere. Bricks shall be handled carefully so as not to damage their edge. They should not also be thrown from any heights to the ground and should be put down gently. All courses shall be laid truly horizontal and all vertical joints made truly vertical. Vertical joints in one course and the next below shall not come over one another and shall not normally be nearer than quarter of a brick length. For battered faces bedding shall be at right angles to the face, plugs, frames etc. if any, shall be built in places shown in the plants while laying the courses only and not latter by removal of bricks already laid.

5.5 Bond – Unless otherwise specified, brick work shall be done in English Bond.

5.6 Joints – Joints shall not exceed 10 mm in thickness and this thickness shall be uniform through out. The Joints shall be raked out not less than 15 mm deep when the mortar is green so as to provide

proper key for the plaster or pointing to be done, where plastering and pointing is not required to be done , the joints shall be struck flush and finished at the time of laying. The face of brickwork shall be cleaned on the same day on which brickwork is laid and all mortar dropping removed promptly.

5.7 Uniform Raising : Brick work shall be carried up regularly in all cases where the nature of work will admit, not leaving any part 60 cm. Lower than another. But where building at different levels is necessary, the breaks shall be stepped so as to give later uniform level and effectual bond. Horizontal courses should be to line and level and even and face plumb or to batter as shown on the plan. The rate of laying masonry may be up to a height of 80 cm.if lime mortar is used.

5.8 Scaffolding: Single Scaffolding shall be used. Holes shall be made good by bricks to match the face work when scaffolding is removed.

5.9 Curing : All brick work shall be kept well watered for 14 days after lying.

5.10 Architectural exposed brick work:

Where exposed brick work is specified , the usual specifications for 'Brick Work' as mentioned above will be applicable for 'Exposed brick' , but in addition specially selected brick shall be used for facing, ensuring regular and clean faces of uniform colour. No bricks which are broken, chipped, wrinkled or which have irregular edges or corners, shall be used. Depending on the quality of bricks and if instructed by the Architects, the exposed face of every brick shall be rubbed before laying without any extra charge. Wooden fillets 10 mm thick and 10 mm wide shall be placed at the edge of joints so that no mortar comes on the surface of the bricks and a regular thickness of joints is maintained. The surface shall be rubbed down with brushes or bricks if necessary, and thoroughly washed. No mortar shall be allowed to stick to the surface, which shall be left clean with all joints even and true to straight line. Double scaffolding shall be used in exposed brick work.

5.11 Reinforcement in Half Brick Thick Walls

Half brick thick and brick on edge walls shall be provided with reinforcement consisting of 2 Nos. of 6mm M.S. bars or Hoop iron 25 x 1.6 mm or Chicken Wire Mesh embedded in mortar 15 mm thick at every fourth course and shall be anchored at ends. The cost of M.S. bars or Hoop iron or Chicken Wire Mesh shall be included in the rate for partition walls unless otherwise stated in the Schedule of Quantities.

5.12 Measurements:

(a) Half brick, cavity walls and brick on edge walls shall be measured in SqM. unless otherwise stated in the schedule of quantities.
(b) One or more brick thick wall shall be measured in CuM. The thickness of brick walls in and or more brick thickness shall be measured in multiples of half bricks.

5.13 Brick Drip Course:

It shall be laid above the junction of roof with the wall to shield the cracks at their junction. The upper course of the projecting brick shall be chamfered or rounded off with 7.6 cms. Radius. A transverse drip or throating about 1.3 cm deep shall be cut on the under side of the projecting bricks.

The drip course shall project 11.4 cms. From the face of the wall thereby completely covering the gola and projection beyond it.

Measurement: The drip course shall be measured in running meters correct to a cm and no deduction shall be made from the wall masonry for the bearing portion of drip course.

6. PLASTER WORK

6.1 Workmanship.

6.1.1 Preparation of Background Surface.

The surface shall be cleaned of all dust, loose mortar, droppings, traces of algae, efflorescence and other foreign matter by water or by brushing. Smooth surfaces shall be roughened by wire brushing or hacking for non-hard and hard surfaces respectively. Projections on the surfaces shall be trimmed whenever necessary to get even surfaces. In case of brick / stone masonry work, raking of joints shall be carried out whenever necessary. The masonry shall be allowed to dry out for sufficient period before carrying out the plasterwork. The masonry shall not be soaked but only damped evenly thereafter before applying plaster.

In case of concrete work, projecting blurs of mortars formed due to the gaps of joints in shuttering shall be removed. Such surface shall be scrubbed clean with wire brushes. The surface shall be pock marked with a pointed tool at spacing of not more than 50mm centers, the pocks being made not less than 3mm deep to ensure a proper key for the plaster. The surface shall be washed off and cleaned of all oil, and well wetted before the plaster is applied.

6.1.2 Sequence of Operations.

For External Plaster, the plastering operations shall be started from the top floor and carried downwards. For Internal Plaster, the plastering may be started whenever the building frame, roofing, and brick work are ready.

The surfaces to be plastered shall first be prepared as described in above 'Preparation of background surface' in clause 6.1.1.

The first under layer shall then be applied to ceilings. After the ceiling plaster is complete and scaffolding for the same removed, plastering on wall shall be started.

After a suitable time interval as detailed in various types of plaster, depending upon the type of mortar, the secondary layer if required shall be applied. After a further suitable time interval as detailed under various types of plaster, the finishing coat shall be applied first to ceiling and then to walls.

Plaster of cornices, decorative features, etc shall be completed before the finishing coat is applied. Unless otherwise specified corners and edges shall be rounded off to a radius of 25mm, such rounding off shall be completed along with the finishing coat to prevent any joint marks showing out later.

6.1.3 Scaffolding and Staging.

Double Scaffolding shall be provided for Plaster work having two sets of vertical supports. Before applying plaster to wall faces the joints shall be hacked by hooks. Use of 'Basuli' being prohibited.

6.1.4 Damage Rectification.

Any cracks, damages, any part of work which sounds hollow when tapped or found damaged or defective otherwise shall be cut out in rectangular shape and redone as directed by the Engineer in Charge.

6.1.5 Measurements : As per IS code of practice.

6.2 Plain Cement Plaster.

6.2.1 Preparation if Mortar.

The Mortar of specified mix shall be used as per Schedule of Quantities.

6.2.2 Application of Plaster.

(a) **One Layer Plaster.**

To ensure even thickness and a true surface, plaster about 150mm x 150mm.shall be first applied horizontally and vertically at not more than 2.0 M intervals over the entire surface to serve as gauges. The surface of these gauged areas shall truly in the plane of the finished plaster surface. The mortar shall brought to true surface by working with a wooden straight edge reaching across the gauges with small upward and sideways movements at a time. Finally the surface shall be finished off true with a trowel or wooden float to obtain a smooth texture. Excessive toweling or overworking the float shall be avoided. All corners, arises, edges, angles and junctions shall be truly vertical / horizontal and shall be carefully finished. Rounding or chamfering of corners, arises, junctions shall be carried out with proper templates to the size required.

In suspending the work, 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, clean and wetted before the adjoining area. Plastering work shall be closed on the border of the wall and nearer than 150mm to any corners or arises and shall not be closed on the body of the features such as plaster bands, cornices nor at the corners or arises.

(b) **Two Layer Plaster Work.**

First or Under Layer

The first or under layer of the specified thickness shall be applied as described in Clause No.6.2.2. Before the first coat hardens, surface of it shall be beaten up by edges of wooden tapers and close dents shall be made on the surface. The subsequent coat shall be applied after this coat has been allowed to set for 3 to 5 days depending upon weather conditions. The surface shall not be allowed to dry during this period.

Second of finishing layer

The second layer shall be complete to the specified thickness in the same manner as for first layer.

6.2.3 Curing

Curing shall be started 24 hours after finishing the plaster. The plaster shall be kept wet for a period of 7 days. During this period the plaster shall be suitably protected from all damages at the contractor's expense by such means as approved by the Engineer – in – Charge. The date of execution of plastering shall be marked on the plastering to ensure the proper duration of curing.

6.3 Sand Face Plaster

Preparation of Mortar

The mortar of specified mix shall be used as per the specifications of schedule of quantities.

Application of Plaster

Sand face plaster shall consist of 13 mm thick (1 cement : 4 coarse sand by volume) under layer and 7 mm thick (1 cement : 2 coarse sand by volume) top layer. Application of plaster shall be as described in 'Two Coat Plaster Work' in Clause No.6.2.2(b)

The surface of the sand face plaster shall be finished rough with sponge or as directed by the Engineer – in – Charge.

Curing

Curing shall be described in Clause 6.2.3.

Top Coat : The top coat shall be applied after the under coat has sufficiently set but not dried, and in any case within 48 hours and finished smooth.

The finished surface of the second coat shall be roughened with cork sheet trowels and finished finally with a soft cloth pad to get uniform granular surface.

Measurements : Shall be the same as per IS:1200.

7. ROOF WATERPROOFING

The chemical impregnation process to be applied on the horizontal as well as the vertical surface along the parapet wall up to a height of 300 mm (minimum). The surface must be clean and free from water, dust, dirt to the maximum possible extent. Since the product functions impregnating through the pores of the substance, it is important to allow it to make a free flow favorable condition.

Testing : After 24 hours of completion the job stand pool water 2" depth to be retained on the roof to check any leakage point is found.

Measurement : Shall be taken from the finished work. The length and the breadth shall be measured to a cm.

Guarantee : The Contractor through the specialized agency of sub-contractor shall give a guarantee against any leakage for a period of ten years. Any leakage or defects during this period shall be made good by the Contractor at his own cost in a manner to be decided by the Architect.

8. RAIN WATER PIPES:

The rain water pipes shall be of the materials and of the sizes as specified. All rain water pipes shall have suitable grating as directed at the inlet opening at roof and shall be fitted and fixed in proper position with necessary offsets, clamps, shoe, Y-junctions and other accessories as required and as directed by the Engineer-in-charge / Architect. The pipes are to be fixed to walls in cement mortar (1:4) with necessary clamps, nails, suitable teak wood blocks being fixed on walls to receive the nails. Y-junction shall be used at the top of the pipe and the vertical leg thereof shall be provided with a cowl. All joints are to be properly packed. In case the hole is made much larger than the size of the pipe, cement concrete (1:2:4) shall be used to fill the annular space. The pipes with fittings etc are to be painted with 2 coats of paints as approved by the Engineer-in-charge / Architect.

9. REHABILITATION OF CONCRETE:

For rehabilitation of concrete structures the following essential steps are to be followed:

a) To remove the loose concrete / plaster until hard and sound surface is exposed.
b) To remove all rusts by wire brush or sand blasting.
c) To apply two coats of cement based polymer modified anti-corrosive protecting coating (approved quality, brand)to exposed reinforcement (manufacturer's specifications to be strictly followed).
d) If diameter of the reinforcement bars are reduced by more than 25%, additional bar equivalent to 50% area of the existing bar to be added by lapping / welding as per direction.
e) Either (i) The exposed hard concrete surface is to be saturated with clean water and the bond coat of cement slurry duly admixed with water resistant bonding agent.

   Or (ii) For concrete beam / column if found necessary by the Engineer-in-charge / Architect the surface may be treated by epoxy based reactive agent for jointing fresh concrete with old surface.

   Note: In both the cases manufacturer's specification is to be strictly followed.

f) For slab / chhaja / weatherboard: To fill up the removed part of concrete / plaster with fresh concrete / plaster admixed with the water resistant bonding agent as per manufacturer's specifications within the time the bond coat remains fresh and tacky. The admixed material shall have to be applied within 30 minutes of preparation or as per direction.
   For beams / columns: To fill up the removed part of concrete with fresh concrete with water proofing plasticizing admixture as per manufacturer's specifications.

10. WATER BOUND MACADAM WITH STONE AGGREGATE:

10.1 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.

10.2 Approximate 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 shall be as per table 4.10 for stone aggregate of the size 90 mm to 45 mm. 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 4.11.

Table 4.10					
Coarse Aggregate			Stone Screenings		Binding Material
Classification	Size range	Loose Quantities	Grading/ Classification & Size	Loose Quantity	Quantity
Grading 1	90 mm to 45 mm	1.21 cum to 1.28 cum	Type A 13.2 mm	0.27 cum to 0.30 cum	0.08 cum to 0.10 cum

Note: Net quantity = Loose quantity measured in stacks minus 7.5%.

Table 4.11						
Coarse Aggregate				Stone Screenings		
Classification	Size range	Compacted Thickness	Loose Quantity	Grading Classification & Size	For WBM Sub-base/ Base Course (Loose Quantity)	For WBM surface course (Loose Quantity)
Grading 2	63 - 45 mm	75 mm	0.91 to 0.96 cum	Type A 13.2 mm	0.12 cum to 0.15 cum	0.10 cum to 0.12 cum
Grading 2	63 - 45 mm	75 mm	0.91 to 0.96 cum	Type B 11.2 mm	0.20 cum to 0.22 cum	0.16 cum to 0.18 cum
Grading 3	53 - 22.4 mm	75 mm	0.91 to 0.96 cum	Type C 11.2 mm	0.18 cum to 0.21 cum	0.14 cum to 0.17 cum

Note : 1. The quantity of metal measured in stacks and reduced by 7.5% to calculate net quantity.

2. The above mentioned quantities should be taken as a guide only for estimation of quantities for construction etc.

10.3 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.

10.4 Preparation of Foundation In the case of an existing unsurfaced road, 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 C to the central line of the carriageway before the W.B.M. is laid.

10.5 Provision of Lateral Confinement of Aggregates Before starting with W.B.M. construction, necessary arrangements shall be made for lateral confinement of aggregates. One method is to construct side shoulders in advance to a compacted layer of the W.B.M. coarse (Fig.16.1). Inside edges may be trimmed vertical and the included area cleaned off all spilled materials thereby setting the stage for spreading the coarse aggregate. The practice of laying W.B.M. after excavating a trench section in the finished formation must be completely avoided.

10.6 Spreading Aggregate The coarse aggregate shall be spread uniformly and evenly upon the prepared base in required quantities with a twisting motion to avoid segregation. In no case shall these be dumped in heaps directly on the area where these are to be laid nor shall their hauling over a partly completed base be permitted. The aggregates shall be spread uniformly to proper profile by using templates placed across the road six metres apart. Where specified, approved mechanical devices may be used to spread the aggregates uniformly. The levels along the longitudinal direction upto which the metal shall be laid, shall be first obtained at site to the satisfaction of Engineer-in-Charge, and these shall be adhered to. The surface of the aggregate spread shall be carefully trued up and all high or low spots remedied by removing or adding aggregate as may be required. The W.B.M. sub-base shall be normally constructed in layer of 100 mm compacted thickness and W.B.M. base shall be normally constructed in layers of 75 mm compacted thickness. No segregation of large or fine particles shall be allowed and the coarse aggregate as spread shall be of uniform gradation with no pockets of fine material. The coarse aggregate shall normally not be spread in lengths exceeding three days average work ahead of the rolling and blending of the proceeding section.

10.7 Rolling Immediately following at spreading of the coarse aggregate, it shall be compacted to the full width by rolling with either the three- wheel- power -roller of 8 to 10 tonnes capacity or an equivalent vibratory roller. Initially, light rolling is to be done, which shall be discontinued when the aggregate is partially compacted with sufficient void space in them to permit application of screenings. The rolling shall begin from the edges with the roller running forward and backward and adding the screenings simultaneously until the edges have been firmly compacted. The roller shall then progress gradually from the edges to the centre, parallel to the centre line of the road and overlapping uniformly each preceding rear wheel track by one half width and shall continue until the entire area of the course has been rolled by the rear wheel. Rolling shall continue until the road metal is thoroughly keyed with no creeping of metal ahead of the roller. Only slight sprinkling of water may be done during rolling, if required. On superelevated curves, the rolling shall proceed from the lower edge and progress gradually continuing towards the upper edge of the pavement. Rolling of sub base shall not be done when the sub-grade is soft or yielding or when the rolling causes a wave like motion in the sub-base or sub-grade. When rolling develops irregularities that exceed 12 mm when tested with a three metre straight edge, the irregular surface shall be loosened and then aggregate added to or removed from it as required and the area rolled until it gives a uniform surface conforming to the desired cross-section and grade. The surface shall also be checked transversely by template for camber and any irregularities corrected in the manner described above. In no case shall the use of screenings to make up depressions be permitted.

10.8 Application of Screenings After the coarse aggregate has been lightly rolled to the required true surface, screenings shall be applied gradually over the surface to completely fill the interstices. Dry rolling shall be continued while the screenings are being spread so that the jarring effect of the roller causes them to settle into the voids of the coarse aggregates. The screenings shall not be dumped in piles on the coarse aggregate but shall be spread uniformly in successive thin layers either by the spreading motion of the hand, shovels or a mechanical spreader. The screenings shall be applied at a slow rate (in three or more applications) so as

to ensure filling of all voids. Rolling and brooming shall continue with the spreading of the screenings. Either mechanical brooms or hand brooms or both may be used. In no case shall the screenings be applied, so fast and thick as to form cakes, ridges on the surface making the filling of voids difficult, or to prevent the direct bearing of the roller on the coarse aggregates. The spreading, rolling and brooming of screenings shall be performed on sections which can be completed within one day's operation and shall continue until no more screenings can be forced into the voids of the coarse aggregate. Damp and wet screenings shall not be used under any circumstances.

10.9 Sprinkling and Grouting After spreading the screening and rolling the surface shall be copiously sprinkled with water, swept and rolled. Hand brooms shall be used to sweep the wet screening into the voids and to distribute them evenly. The sprinkling, sweeping and rolling operations shall be continued and additional screenings applied where necessary until the coarse aggregates are well bonded and firmly set for the entire depth and until a grout has been formed of screenings and water that will fill all voids and form a wave of grout ahead of the wheels of the roller. The quantity of water to be used during the construction shall not be excessive so as to cause damage to the sub-base or sub-grade.

10.10 Application of Binding Material After the application of screenings and rolling, a suitable binding material shall be applied at a uniform and slow rate in two or more successive thin layers. After each application of binding material, the surface shall be copiously sprinkled with water and the resulting slurry swept in with hand brooms or mechanical brooms or both so as to fill the voids properly. The surface shall then be rolled by a 8-10 tonne roller, water being applied to the wheels in order to wash down the binding material that may get stuck to the wheels. The spreading of binding material, sprinkling of water, sweeping with brooms and rolling shall continue until the slurry that is formed will, after filling the voids form a wave ahead of wheels of the moving roller.

10.11 Setting and Drying After final compaction of the course, the road shall be allowed to cure overnight. Next morning defective spots shall be filled with screenings or binding material, lightly sprinkled with water, if necessary and rolled. No traffic shall be allowed till the macadam sets.

10.12 Surface Evenness The surface evenness of completed W.B.M. sub -base in the longitudinal and transverse directions shall be as specified in Table 4.12 for sub base with stone aggregate of size 90-45 mm and above.

Table 4.12

Size of Coarse aggregates	Longitudinal profile measured with a 3 metre straight edge			Cross profile
	Maximum permissible undulation	Max. No. of Undulations permitted in any 300 m length exceeding		Max. permissible undulation when measured with a camber template
		15 mm	10 mm	
90 - 45 mm & above	15 mm	_	30	12 mm

The longitudinal profile shall be checked using a 3 meter long straight edge and graduated wedge at the middle of each traffic lane along a line parallel to the Centre line of the road. The transverse

profile shall be checked with adjustable template at intervals of 10 meters. For base with stone aggregate of size 63 to 45 mm and 53 to 22.4 mm surface evenness to be as per Table 4.13.

Table 4.13

Size of Coarse aggregates	Longitudinal profile measured with a 3 metre straight edge			Cross profile
	Maximum permissible undulation	Max. No. of Undulations permitted in any 300 m length exceeding		Max. permissible undulation when measured with a camber template
63 - 45 mm and 53 - 22.4 mm	12 mm	**15 mm**	**10 mm**	
		_	30	8 mm

The longitudinal profile shall be checked with a three metre long straight edge and graduated wedge at the middle of each traffic lane along a line parallel to the centre line of the road. The transverse profile shall be checked with adjustable templates at intervals of 10 metres.

10.13 Rectification of Defective Construction Where the surface irregularity of the W.B.M. sub-base course exceeds the tolerances specified in Table 4.12 or where the course is otherwise defective due to sub grade soil mixing with the aggregates, the layer to its full thickness shall be scarified over the affected area, reshaped with added material or removal and replaced with fresh materials as applicable, and recompacted. The area treated in the aforesaid manner shall not be less than 10 sqm. In no case shall depressions be filled up with screenings and binding materials.

10.14 Meaurements The length and breadth shall be measured to the nearest centimetre. The depth of consolidated layer shall be computed to nearest half centimetre by taking average of depths at the centre and at 30 cm from the left and right edges at a cross section taken at 100 metre interval or less as decided by the Engineer-in-Charge by making small pits. The consolidated cubical contents shall be calculated in cubic metres correct to two places of decimal. The cubical contents shall be compared with net quantity of stone aggregates paid (that is stacked quantity – 7.5%). If the cubical contents are within (±) 5% of the paid net stacked quantity of stone aggregates, the work shall be treated as acceptable. If the cubical contents is short of net stacked quantity by more than 5% then the payment shall be restricted to the quantities derived from cubical content.

10.15 Rate The rate shall include the cost of all labour and materials involved in all the operations described above, except cost of stone aggregate, kankar moorum, screenings and bajri, for which separate payments shall be made. Where W.B.M. is to be laid over an existing road, scarifying and consolidation of the aggregate received from scarifying shall be paid for separately.

TECHNICAL SPECIFICATIONS FOR ELECTRICAL WORK

1.0 SCOPE:

Unless otherwise specified this specification covers the supply of materials, fabrication and erection, testing and commissioning of Electrical equipments, wiring system, light fittings and other associated items required for successful completion of the work. Any equipment, device, component or work not operation shall be included by the Tenderer in his offer. Applicable provisions and conditions of contact shall govern the work under the section.

2.0 GENERAL:

2.1 The power supply system in the building will be made available at 11,000 or 6600 or 415 volts, 50 HZ, 3 phase ¾ wire, earthed neutral from local electric supply authority / owner.

2.2 All supply and installation work shall be carried out as per specification and in accordance with the construction drawings and shall conform to requirements, called for in the Indian Electricity Rules 1956 with its latest amendment, Indian Electricity Acts & all relevant codes and practices issued by the Indian Standard Institution as amended up to date. The work shall also comply with the provisions of the general or local set of legislatures and regulations of any local or other statutory authority which may be applicable.

2.3 The contractor for electrical works must possess valid, electrical Contractors' License endorsed by the Licensing Board, Directorate of Electricity of concerned State Government for the type of work he shall execute.

2.4 The work to be provided for by the Contractor, unless otherwise specified shall include but not limited to the following :

i) Furnish all labour, supervision, services, materials, supports, scaffoldings, construction equipment, tools, plants and transportation etc. required for proper execution of the job as per drawings, specifications and schedule of items.

ii) Not – withstanding the electrical layout shown in the drawing, the contractor shall obtain further approval of the layout at site from the Consultant/Engineer–in–charge before commencement of the work.

iii) Furnish samples for approval including arranging necessary tests of samples, as directed by the Consultant/ Engineer–in–charge in an approval laboratory.

iv) To extend facilities, to the consultant / Engineer – in – charge to inspect work and assist them to obtain samples, if they so desire.

V) Furnish general arrangement drawings so the switch board and other fabrications items which the consultant/ Engineer- in–charge may direct for their approval.

vi) To employ a full time experienced supervisor having electrical supervisor's certificates of competency endorsed by the Licensing Board. Directorate of Electricity of concerned State to supervise the work. The consultant Engineer–in–charge have the right to stop the work if the contractor' supervisor is not present when the work is being carried out.

vii) To keep the appropriate electrical Inspector, supply authority informed as to programme of the work and shall be responsible for ensuring that all work passes their approval.

viii) To provide all incidental items not shown or specified in particular but necessary for proper execution of works in accordance with the drawings, specification and schedule of items.

ix) To maintain the work and keep them maintained till handed over to the owner in proper working condition.

x) Co-ordinate with other agencies for proper execution of the job.

3.0 MATERIALS:

3.1 All materials used in the work shall be of the best quality and generally shall conform to the most recent is specification.

3.2 All materials used shall by new and of quality approved by the Consultancy / Engineer – in - charge.

3.3 Unless otherwise agreed by the Consultant / Engineer – in – charge in writing, the Contractor shall supply materials of the manufacture and type specified.

4.0 SPECIFICATIONS:

4.1 Unless specifically mentioned otherwise, all applicable codes and standards published by the Indian standard Institution and all other such publication as may be published by them after construction work starts, shall govern in respect of design, workmanship, quality and properties of material and method of testing.

5.0 SAFETY:

5.1 All equipments shall be complete with approved safety devices wherever a potential hazard to personnel exists and with provision for safe access of personnel to and around equipment for operation and maintenance functions.

5.2 Special care shall be taken to make enclosed equipment proof against entry of rats, lizards and other creeping reptiles which may create electrical short circuit inside line equipment.

6.0 DRAWINGS:

6.1 On completion of all works the contractor shall furnish three copies of the following as built up drawings to the owner without any extra cost.

i) Writing diagram for final power / lighting distribution showing the rating / size of switchgear, cables, conduit, lighting fixtures and all accessories for individual installation.

ii) Detailed arrangement drawings of the switch board. Complete with dimension in metric units.

iii) Drawings showing the route of conduits and cables with sizes, lengths, sources and destination of all cables with the circuit designation number etc.,

iv) Drawings showing the balancing of phases with connected load in each circuit etc.

v) All other drawings as mentioned elsewhere.

vi) Location of earthing stations route & size of earthing conductor etc.

vii) Location & detail of distribution board, mains, switches, switch gears and other particulars.

7.0 TEST CERTIFICATES AND INSTRUCTIONS:

7.1 Unless specifically mentioned otherwise, the contractor shall furnish in duplicate manufacture's test Certificatewith the delivery of the equipment to the Consultant and instruction in English for operations and maintenance of equipment where required.

8.0 TESTING AND COMMISSIONING:

8.1 Before each test, the contractor shall obtain the permission from the site engineer and all tests shall be conducted in the presence of duly authorized representative. Records of each test shall be prepared immediately after the test and this record shall be signed by Contractor's

representative conducting the test and the site engineer attending the test. Copies of their record in quadruplicate shall be handed over to the Consultant/Engineer–in–charge.
Test should include the following tests also.

i) Installation test.
ii) Polarity test.
iii) Earth continuity test.
iv) Earth resistance test.

8.2 A certificate in quadruplicate shall be furnished by the contractor countersigned by his certified supervisor under whose direct supervision the installation was carried out and the owner's site engineer. This certificate shall be in the prescribed forms in addition to the test certificate required by the local Electric Supply Authorities. Recommended form for completion certificate is given in Appendix "A".

8.3 After the installation is tested and approved by the authorities, the contractor shall provide all assistance to the owner for obtaining the service connection and commissioning the installation at no extra cost.

9.0 COMPLETION OF WORK:

9.1 Each item of the electrical work shall be considered as complete in all respects only after energizing, testing and final commissioning of the complete installation as directed by the Consultant / Engineer – in charge.

9.2 Payment on each item of electrical work shall be made as per measurement and proportionate to the quantum of works completed. In the event of any dispute with regard to the proportion of work completed, the decision of the Consultant / Engineer – in charge shall be final binding to the contractor.

10.0 PREAMBLE TO THE SCHEDULE OF WORK:

10.1 The successful Tenderer shall carefully go through the clauses of invitation to Tender, Specification, Schedule of work and drawings and shall include in his rate any sum he may consider necessary to cover the fulfillment of the various clauses contained therein. Unit prices stated in the schedule of work against the item of work shall be inclusive of all installation accessories and consumables necessary to complete the said work within the completion of the contract. Beyond the unit prices no extra amount will be paid for incidental contingent work and materials.

10.2 The quantities mentioned in the schedule of work are probable quantities and it must be clearly understood that the contract is not a lump sum contract, that the probable quantities, the value of individual items and the aggregate value of the entire tender are only indicative and owner does not in any way assure the Tenderer of guarantee that the actual quantity of work would correspond to the probable quantities in the tender.

10.3 No change in unit rate will be admissible on any variation of quantity.

TECHNICAL SPECIFICATIONS FOR WIRING SYSTEMS

1.0 SCOPE:

This specification covers for supply of materials erection and commissioning of distribution wiring, connecting to distribution boards, cable laying, earthing & miscellaneous items. Applicable provisionsand conditions of contract shall cover the work under the section.

2.0 GENERAL

2.1 Work to be provided for by the contractor, unless otherwise, specified, shall include but not be limited to the following :

i) Furnishing of labour, materials, supports, scaffolding, transportation, etc. required for the work.

ii) To provide all incidental items not shown or specified in particular but reasonably be implied or necessaryfor successful completion of the work in connection with the drawings, specification and schedule of itemitems.

iii) To provide all supervision for proper execution of the work.

2.2 After completion of supply and installation of wiring system and earthing if any defect in the material or workmanship is found by the Consult/Engineer–in–charge, the contractor shall remove the same and supply better and approvedmaterials at his own cost.

2.3 All precaution against theft and fire shall also be taken by the contractor.

2.4

a) The installation shall generally be carried out in conformity to the Indian standards specifications and code of practice for electrical works but where the specifications attached to the tender differ from those specifications, these specifications shall be followed.

b) In case, where the I.S. specifications and these specifications are found wanting, the work shall be carried out as per relevant latest code of practice recommended by B. S. S.

c) In addition, the installation shall comply in all respects with the requirements of Indian Electricity Act, 1956amended upto date and Indian Electricity Rules, 1956 there under and the special requirements, if any, of the State electricity Board / power supply authority.

d) The successful tenderer shall give all notices required by the said act. He shall also undertake to provide testcertificate.

e) All materials and fittings, appliances etc. used in the electrical installation, shall conform to the latest relevant Indian standards Specifications, wherever these exist. In the absence of I. S. specifications, relevant B. S. standard shall be applicable.

f) All cables and flexible cords shall be accompanied by the makers test certificates stating the class and giving the Results of the insulation test.

g) In case of materials for which standard specifications do not exist, approval shall be obtained from the Engineer-in–charge for such material to be used.

h) No wiring shall be laid under the floors unless it is absolutely inescapable. In case this is unavoidable, it should pass through class ‘B’ water tight galvanized iron pipes and not through ordinary conduit. No extra payment shall be made on this account.

i) (i) Point wiring shall consist of branch wiring from final sub-distribution board together with the controlling switch (or push as far as and including the ceiling rose or any other

approved terminations or socket outlet unless specifically mentioned elsewhere in the schedule of quantities.

(ii) A three pin socket outlet point shall include the earth continuity Al/copper conductor of adequate size from the earth pin to the terminal or bus at the final distribution centre.

(iii**)** Wiring shall be done in "looping system" and phase or live conductor shall be looped at switch box and neutral conductor can be looped from light, fan or socket outlets.

j) **(i)** In estimating the current to be carried by any conductor, incandescent lamps, shall be rated at100 watts, the ceiling fans shall be rated at 80 watts, table fans and ordinary socket points at 60 watts,fluorescent lamps of 4 feet at 50 watts and 2 feet at 25 watts and power socketoutlets at 1300watts unless the actual values are specified.

(ii) Lights, fans and 5-A socket outlets may be worked out on common circuit. Such sub-circuits to average of 8 points or more if specified in schedule of quantities or shall generally connected layout drawings. Loads shall be restricted accordingly to wires/MCB or fuses or circuits. Number of socket outlets shall not be more than two per circuits generally for 5A sockets.

(iii) As regards power sub-circuits, the outlet shall be provided accordingly to the load design for these circuits, but in no case shall there be more than two outlets on each circuit.

k) The rates for wiring light, fan and all plug points given in the schedule of work attached with the render, shall be irrespective of the length of point. Circuit wiring of these points shall also form part of the point rate if not separately mentioned in the schedule of quantities/BOQ.

l) **(i)** The contractor shall prepare fabrication and detailed working drawings and obtain the approval of the Engineer-in-charge. All works shall be carried out only on approval of these drawings. However, approval of the drawings does not relieve the contractor of his responsibilities to meet with the intent of the specifications.

(ii) The contractor shall also submit completelayout drawings to the Engineer-in-charge on completion of the work.

The rate quoted by the contractor shall be inclusive of this work. These drawings must give the following information:

(iii) Runs of the conduit, diameters of conduit, number wires containing in conduit and size wires for point wiring.

(iv) Location of all distribution board, main switches and junction and pull boxes and fuses.

(v) Complete schematic diagram of the installation.

(vi) Location of the earthing stations.

m) Position of lighting Distribution and Switch gears:

(i) The recommended position of the lighting points, control switches, distribution boards and switch boards and switch gears as shown on the layout drawings are indicative only.

(ii) Should there be any discrepancy on incomplete description, ambiguity or omission in the drawings and other documents, whether original or supplementary forming the contract, the tenderer shall immediately on discovering the same, draw attention of the engineer-in-charge.

(iii) Before commencement of work, the exact final positions of all points switch boxes and the distribution boards shall be ascertained by the tenderer from the Engineer-in-charge's representative.

n) SAMPLES

The contractor shall submit 2 sets of samples of accessories and apparatus, proposed to 'use' in the installation to the Engineer-in-charge, for approval. Drawing or samples as required shall be submitted by thecontractor and this specification shall not be departed from without the written permission/instruction from the Engineer-in-charge. The verbal approval given by the Engineer-in-charge to any drawings or sample samples submitted by the contractor shall in no way exonerate the contractors form their liability to carryout the work in accordance with the terms of the contract.

3.0 MATERIALS

All materials used in the work shall be of best quality and generally conforming to the is specifications.

3.1 WIRING SYSTEM

3.1.1 The electric load of all lights, power outlet,etc. shall be balanced across the three phases.

3.1.2 A power circuit shall always be originated from a sub distribution fuse/MCB board and the same run in a separate conduit.

3.1.3 Insulated or covered earthing conductors where used shall have green insulation braiding or covering as appropriate Under no circumstances shall the colour green be used for other than conductor In addition where it is required that cables of different colours be used for identification purposes; the following system shall be employed. Red or any colour other than (black or green) for outer phase or switch wire – Black : for middle wire or neutral.

3.1.4 Unless otherwise mentioned in the schedule of quantities, single way porcelain/Bakelite terminal connector with nickel plated brass inserts and screws to suit the conductor size shall be used for intermediate wiring join is injunction and in switchboards.

3.1.5 Distribution wiring in conduit to light, fan, plug points etc. shall be done in looping in system. In this system no joints or connections shall be made anywhere of the system except at terminating points such as at terminals of switches, ceiling roses, etc. and in case of sockets outlets at the socket terminals. Intermediate wiring joints injunction boxes will not be permitted.

3.1.6 Where surface type wiring system on T.W. batten is specified only one T.W. connector board for some light and fan points may be used near the switch board in a suitable location. Intermediate wiring joints in connectorboards morethat what specified above for the same light and fan points will not be permitted. No connector board shall be used near distribution fuse board.

3.2 CONDUIT WIRING:

3.2.1 Metal conduit shall be conforming to I S. 1653-1972 or B. S. 31 and finished with galvanised or stove enameled surface.

All conduit accessories shall be conforming to IS : 2667-1976 and the treated type. Conduit less than 19 mm in diameter shall not be used. All conduits shall be of 16 gauge upto 30 mm and 14 gauge above 30mm size.

3.2.2 The conduit for each circuit shall be erected complete with necessary bushes before drawing in of any wire T. W. spacer of 10 mm thick shall be used between the conduit saddle and fixing surface. The saddle shall be fixed at an interval of not more than 750 mm apart for vertical run and 600 mm apart for horizontal run.

3.2.3 The joints in conduit shall be made by means of screwed couplers and screwed accessories only to ensure electrical continuity throughout; all pipes after cutting, the threading shall be carefully reamed out with special reamer to remove any burr and teen painted immediately

with an anti corrosive preservative after removing all traces of oil or grease. Junction boxes shall be provided with gasketted covers to render them dust and damp proof. The conduit accessories having pull outlets for conductors shall only be used in all conduits installation.

3.2.4 Where specified, PVC. conduit conforming to 152509-1973, 2419-1976 and shall be used.. The thickness of p. v. c. conduit of 2mm thick shall be adequate to withstand mechanical injuries. Where necessary p. v. c. accessories conforming to IS standards shall be used along with P. V. C. conduit.

3.2.5 All metal conduit system shall be effectively earthed by means of suitable earthing conductors and the resistance from any point to earth should not be more than 1Ohm.

3.2.6 After installation of conduit pipes and fittings are completed in all respects, the exposed outer surfaces of the conduit.

Conduit and accessories shall be painted with two coats of approved enamel paints or aluminum paint over a coat of red oxide as required to match surrounding wall finishing. To protect against rust the bare thread portion shall be painted with anti corrosive preservative.

3.3 CONCEALED WIRING :

3.3.1 Unless otherwise mentioned in the schedule of quantities non-rigid non metallic (PVC) conduit conforming to IS 6946 and non rigid metallic (PVC) conduit accessories conforming to latest IS : shall be used for above type wiring. Conduit less than 20 mm in diameter shall not be used.

3.3.2 The conduit shall be installed during building construction and must be buried in roof slabs and walls in such a manner that the cables can be drawn in any time after the completion of the building. Cable pull-in-box shall be installed wherever necessary. The chase in the wall shall be filled up neatly after erection of conduit and brought to the original finish of the wall.

3.3.3 The concealed type switch boards and cable pull-in-box shall be 2 mm thick M. S. sheet constructed with 3 mm thick decorative top cover of Hylam make. Chromium plated brass screws and cups shall be used for fixing the cover on the M.S. box. The said boxes shall have minimum depths of 75 mm for switch board and 65 mm for cable pull-in boxand shall be provided with a threaded bolt of size 15 x 5 mm welded to the M. S. box and washer and nut for earthing attachment.

Modular switching shall have cover plates & inner plates.

3.4 CABLES/WIRES

3.4.1 Unless otherwise mentioned in the schedule of quantities, only single core PVC/Polyethylene insulated and PVC sheathed cable consisting of single/multi strand copper/aluminum conductor and of approved manufactures conforming to relevant IS Code shall be used for wiring in conduit system.

3.4.2 The maximum number of wires drawn in one conduit shall be greater than the recommended number given in the table below and shall conform to IS : 732-1963.

3.5 CONDUCTOR SIZE

3.5.1 Wiring shall be carried out with following sizes of wires.

i)	Light, fan E. fan, bell	1.5 Sq. mm
ii)	6A Socket	1.5 Sq. mm
iii)	Light circuit	2.5 Sq. mm
iv)	Power Socket	4.00 Sq. mm

3.5.2 Where wires pass through walls/floors these shall be protected from mechanical injury by means of rigid steel conduit . The end of the conduit shall by neatly bushed with Bakelite.The conduit shall extend 1.5 M. above the floors and flush with the ceilings or walls.

3.6 WIRING OF DISTRIBUTION BOARDS

3.6.1 The cables and wires shall be connected to the terminal only by soldered or crimped lugs, unless the terminal is of such form that it is possible to securely clamp them without cutting away of cable strands.

3.6.2 All bare conductors shall be rigidly fixed in such a manner that a clearance of at least 25 mm is maintained between conductors & material other than insulating material.

3.7 CABLE & CABLE LAYING

3.7.1 Type & Quality of Cables

Cables used in this project shall be X.L. P. E. insulated & PVC sheathed armoured to relevant IS standard and of adequate voltage grade. (where specifically mentioned as PVC and A cable). The conductor of cable shall, wherever possible comprise of standard wires of aluminum or copper (as specified).

3.7.2 Handling of Cables

It shall be ensured that both ends of the cables are properly sealed to prevent ingress/absorption of moisture by the insulation. When cable drums have to be moved over short distances, they should be rolled in the direction of thearrow marked on the drum.
While removing cables, the drums shall be properly mounted on jacks or in a cable wheel or any other suitable device, making sure that the spindle, jacket are strong enough to take the weight of the drum.

3.7.3 Defective cables

Cables with kinks and straightened kinks or with similar apparent defects like detective armouring etc. shall not be installed.

3.7.4 Bending Radius

Cables shall not be bent sharp to a small radius. The minimum safe bending radius for all types of PVC cables shall be taken as shall be taken as 1.2 times the overall diameter of the cable.
Whereverpracticable larger radius shall be adopted.

3.7.5 Length of cables

All cables shall be laid in one length, no straight through joint shall be permitted. Before cutting the cables, the requisite length between terminals (including extra length required at loops) shall be carefully measured.

3.7.6 Stripping of outer covering

While cutting and stripping the outer covering (i.e. sheathing) of the cable, care shall be taken that the sharp edge the cutting instrument does not cut or damage the inner insulation of the conductor.

The protecting outer covering of the cable shall be stripped off near the connecting terminal, the protective covering being maintained upto apoint as close as possible to the connecting terminal.

3.8. CABLE LAID IN TRENCHES

3.8.1 Cables shall be laid generally in accordance with Indian standard Code of Practice.

3.8.2 Size of trench

Unlessotherwise mentioned in the schedule of quantities, the minimum width and average depth of trench for laying a single cable in ground shall be 460 mm and 760 mm respectively. Where more than one cable are to be laid in the same trench in horizontal formation, the width of trench shall be increased such that interaxialspacing betweenthe cables(except otherwise specified) shall be 300 mm. there shall be a clearance of at least 150 mm between axis of the end cables and the sides of the trench.

3.8.3 Excavation of trench & preparation of bed.

The trench shall be excavated in reasonably straight lines, where there is a change in direction, suitable curvature shall be provided. Where gradients and changes in depth are unavoidable, these shall be gradual.

Adequate precautions shall be taken during excavation not to damage any existing cables, pipes or similar installation in the proposed route. Where bricks, tiles or protective covers or bare cables are encountered, further excavation shall not be carried out without the approval of the consultant/Engineer-in-charge.

The bottom of the trench shall be level across the width and free from stone, brick bats, etc. The trench shall be then provided with a cushion of fine sand, the thickness of the cushion being not less than 8cms.

3.8.4 Laying of Cables

The cable shall be pulled over rollers in the prepared bed of the trench, steadily & uniformly without jerks and strains.The entire length of cable shall, as far as possible be laid in one operation. However, where this is not possible, the remainder of the cable may be shifted from position by 'Flanking'. i.e. by making one long loop in the reverse direction.

After the cable has been uncoiled and laid into the trench over the roller, the cable shall be lifted slightly over the rollers, beginning from one end, by helpers standing about 10 meters apart, and drawn straight. The cable shall then be taken off the rollers by additional helpers standing about 10 meters apart, and drawn straight. The cable shall then be taken off the rollers by additional helpers lifting the cable and then laid in a reasonably straight line, after the rollers in the trench have been removed.

For short runs of the cables of sizes not larger than 50 Sqmm and not more than 1.1 KV grade, any other suitable method or direct handling and laying can be adopted with the prior approval of the consultant/Engineer-in-charge.

The cable length shall be measured after the cables have been initially straightened and the cores have been satisfactorily tested for continuity and insulation resistance.

The end of all cables shall be sealed. For P. V. C. and A cables, suitable moisture seal tape shall be used for this purpose.

3.8.5 Surplus cable

At the time original installation, approximately 1 meter of surplus cable (in the form of a loop or otherwise) shall be left at each entry or exit of the cable at a pole or at the pillar box, or near any terminal as may be directed by the Consultant /
Engineer-in-charge.

3.8.6 Protective Cover (of bricks)

Except where otherwise directed by the Consultant/Engineer-in-charge. The cable (for the entire length of trench) shall be protected by a layer of bricks laid flat on top & sides of the covering of

sand. This brick protection shall cover all the cables in the trench (single cable or multiple cable in horizontal formation). In case of a single cable, the brick protection shall consist of one brick flat (with the length along the width of the trench) and supported on two lines of bricks –on-edge, one on each side of the cable (with the length of the bricks along the length of the trench).
For multiple cables in horizontal formation, in addition to the two outer lines of brick-on-edge, there should be additional lines in between adjacent cables. The top cover of brick flat shall extend to cover all the cables., each brick being supported on the lines of brick-on-edge.

3.8.7 Back –filling of trench

The remaining portion of the trench shall be back filled with riddled soil obtained from the excavation. This shall be done in layer not exceeding 30cms each and duly compacted to the satisfaction of the consultant/Engineer-in-charge surplus soil of excavation shall be removed or disposed of as per direction of the consultant/Engineer-in-charge.

3.8.8 Cables laid through pipes

Where cables pass through pipes, wooden bushes shall be provided at the ends, when these pass through floors or walls the cable shall be sealed in a manner approved by the consultant/Engineer-in-charge.

3.8.9 Cable Trays

The cable trays shall be ladder/perforated type and bends/curvature shall be smooth and suitable for bending the largest cable running the tray. The cable trays shall be suitably installed on the building structure with adequate support. Unless otherwise specified in the schedule of quantities. The trays shall be painted with corrosive resistant paint and finished with enamel paint of approved shade.

3.9.0 Cable Route Marker

3.9.1 Cable route markers shall provide along cable route & location approved by the Consultant/Engineer-in-charge and generally at interval not exceeding 50 meters. These shall be cement concrete (1:2:4) 600 x 300mm in size shall be laid flat and centered over the cables if otherwise specifically not mentioned in the schedule of quantities.

3.9.2 All materials like sand, bricks, clamps & route markers etc. shall be supplied by the contractor. The erection of cable rate
shall be inclusive of all these items.

3.10 While crossing driveways cables shall be laid through G. I. pipe/R. C. C. Hume Pipe.

3.11 Cables to be used shall be of I. C. C./C. C. I./Universal/Nicco make or as per approved list.

3.12 Cables Termination

3.12.1 All the Cables shall be terminated to the switch fuse terminals, bus bars, etc. by means of suitable sizes crimped type or soldering type cable (Copper) socket/lugs/ferrules. However, when pinching the smaller size conductor directly in the terminal bore of the switches, the individual strands shall be fanned out and cleaned surface shall be coated with a thin layer of oxide inhabiting grease. The conductor shall be tightened fully to the terminal bore but over tightening shall be avoided.

3.12.2 For connecting to bus bars etc. brass or cadmium plated nuts/bolts and washers shall be used. Suitable measure shall be taken to avoid heating due bi-metal ling contracts.

3.13.0 Earthing

All exposed metal parts of the electrical equipment shall be connected to earth electrodes by not less than two separate and distinct earth connection in accordance with Indian Electricity Rules, and the relevant Indian code of Practice for earthing 3043-1966.

3.13.1 Earth Electrode

Unless specifically mentioned the earth electrode shall be G I npipe ‘B’ class having 50 mminternal diameter 3 meters long in one single piece with holes 12 mm dia on all sides at 150 mm centre, upto a minimum height of 2.5 m from bottom and two holes 15 mm dia at 100 mm from the top end to

receive a 76 mm (3”) long G. I. bolt, double nuts, washers and complete with wire mesh funnel. No joints will be allowed in the earth electrode. The electrode shall be driven at least 2 meters clear from masonry structure 3 meter in general. A masonry inspection pit of size 600 mm x 300 mm and 450 mm deep shall be built with 125 mm thick, cement mortar(6 : 1) brick work both inside and outside plastered 20 mm thick and neat cement 1.5 mm thick, inside top and outside around the top of the earth pipe, so that the top of the G. I. Pipe is 250 mm below the finished ground level and the opening on top shall be provided with C> I. manhole with C. I. cover flushed with the outside finished ground level.

3.13.2 Earth Bus and earth lead

The earth bus bars shall be cf heavily galvanized M. S. flat of cross section 32 mm x 6 mm having adequate number of drilled holes with 10 mm galvanized steel bolts, plates and spring washers for securely connecting the earth leads and the continuity conductor. The earth lead for each electrode shall be 7/14 S. W. G. stranded or 6 S. W. G. solid G. T. wire connected securely to the earth electrode and earth bus bar. The earth shall be mechanically protected with a continuous length 15 mm dia G. I. Pipe (class B) right from the electrode to the earth bus bar and the pipe shall be finished with bituminous compound.

The earth lead wire and the earthing conductors wire shall be terminated at both ends with cable sockets by a soldering and then connected to the earth bus bar. The lugs shall be tinned at the point of connection to the equipment and special care shall be taken to ensure a permanent low resistance contact to iron or steel. The earth resistance from any point of the earthing system should not be more than one ohm.

4.0 Workmanship & Installation Work

The workmanship shall be of good commercial quality and all supply materials and installation work shall be completed to the full satisfaction of the Consultant/Engineer-in-charge.

5.0 Contractors Rates to Include

5.1 Apart from other factors mentioned elsewhere in this contract, the rates for the above shall include the following.

a) All labour, materials tools and construction equipment required for proper execution of job.

b) scaffolding including erection and removal.

c) Making good of all damaged civil work if any.

5.2 Method of Measurement

5.2.1 all stove enameled black m. s. conduit, G. I. conduit/pipe, rigid/non-rigid P. V. C. conduit shall be measured for net length as laid or fixed over all fittings, bends, elbow, tees, etc. shall not be paid separately.

TECHNICAL SPECIFICATIONS FOR LIGHTNING PROTECTIVE SYSTEM

1.0 SCOPE

This specification covers for supply of materials, fabrication and erection of lighting protective system. Applicable provisions and conditions of contract shall govern the work under the section.

2.0 GENERAL

2.1 Works to be provided for by the contractor, unless otherwise specified shall include but not to be limited to the followings :

i) Furnishing of labour, materials, supports, scaffolds, transportation etc. required for the work.

ii) To provide all incidental items not shown or specified in particular but reasonably be implied or necessary for successful completion of the work in connection with drawings, specification, schedule of items and IS codes.

iii) To provide all supervision for proper execution of the work.

iv) Entire work shall be carried out as per IS 2309 of latest revision.

2.2 After completion of supply and installation of lighting protective system, it any defect in the material or workmanship is found by the consultant/Engineer-in-charge the contractor shall remove the same and supply better and approved materials at his own cost, to the satisfaction of the consultant/Engineer-in-charge.

2.3 All precaution against theft and fire shall also be taken by the contractor.

3.0 MATERIALS

All materials used for lightning conductors, down conductors, earth termination net work etc. of the protective system shall be reliably resistant to corrosion or be adequately protected against corrosion and generally conforming to IS : 2309 of latest revision.

The entire lightning protective system should be mechanically strong to withstand the mechanical forces produced in case of a lightning stroke.

3.1 HORIZONTAL AIR TERMINATION CONDUCTOR

Each horizontal air termination conductor shall be suitably clamped on parapet wall. The conductor shall be exposed to atmosphere.

3.2 DOWN CONDUCTOR

Down conductors shall the most direct path connecting the horizontal air-termination conductor and the earth termination i.e. the ground electrode avoiding sharp bends, upturns and kinks. Joints shall be as far as possible to avoid conductors.

3.3 JOINTS

The joints in the lightning protective system shall be avoided as far as possible . There shall be no joints in the down conductor below ground level. Where joints are necessary they shall be mechanically and electrifically effective and shall be so made as to exclude moisture completely. The joints may be welded. Riveted or bolted as mentioned in the schedule of work with overlapping joints the length of the overlap shall not be less than 50 mm for all types of conductor. Contract surface shall first be cleaned and then inhibited from oxidation with a suitable con-corrosive compound. Strips shall be tinned, soldered, welded or brazed and at least double riveted.

Bolted joints shall only be used on test points or on bends to existing metal. For rust protection the welded joints shall be then painted with red lead and aluminum paint.

3.4 TESTING POINTS

Each down conductor shall be provided with a testing point in a position convenient for testing but un accessible for

interference. No connection, other than one direct to an earth electrode shall be made below a testing point.

3.5 EARTH TERMINATION

Each down conductor shall have an independent earth termination and arrangement of isolation for testing purposes. The earth termination shall be located as close as is practicable to the down conductor system and with other termination of the conductor system and with other buried metal services and earth terminations shall be made with G. I. tape laid directly at an average depth of 700 mm below ground for the purpose of equalizing the potential distribution in the ground.

3.6 EARTH ELECTORDE

Earth electrodes shall be constructed and installed as specified in schedule of quantities. The pipe/plate electrode shall be driven into the ground as close as practicable but outside the circumference of the structure. Earth pits meant for lightning protection should not be connected to Earth pits for other system.

3.7 FIXING OF CONDUCTOR

Unless otherwise mentioned in the schedule of quantities the wall shall drilled and plugged with teakwood pins of not less than 50 mm long by 25 mm square inner and 19 mm square outer surface. The void shall be finished according to the nature of wall surface with cement plaster.

Conductors shall be then securely attached to the building to be protected by galvanized steel fasteners of 2 mm thick which shall be substantial in construction and wooden screws and approved by the Consultant/Engineer-in-charge.

4.0 EARTH RESISTANCE

Properly made earth connections are essential for effective functioning of a lightning protective system and every effort shall be made to provide sample contact with the earth so that the earth resistance can be kept as low as possible.

The whole of the lightning protective system shall have a combined resistance to earth not exceeding 5 ohm. In case of non availability of proper Earth resistance due to bad soil additional electrodes may be provided.

5.0 WORKMANSHIP & INSTALLATION WORK

The workmanship shall be of first class and all supply materials & installation work shall be completed to the full satisfaction of the Consultant/Engineer-in-charge.

6.0 CONTRACTORS RATE TO INCLUDE

6.1 Apart from other factors mentioned elsewhere in this contract, the rates for the above shall include for the following

i) All labour, materials tools and construction equipment required for proper execution of the job.:

ii) Scaffolding including erection and removal.

iii) Making good of all damaged civil work, if any.

iv) Making 3 (three) copies of “As Built” Drawings of the final installation showing location of Earth pits with inter connections, Air terminations, Roof conductors, down conductor, test links etc. for submission to owner/statutory Bodies etc.

6.2 METHOD OF MEASUREMENT

6.2.1 All G. I. tape shall be measured net length as laid or fixed.

6.2.2 Unless otherwise mentioned in the schedule of quantities, measurement will be on net quantities of work produced. In the event of any dispute with regard to the measurement of work executed, the decision of theConsultant/Engineer-in-charge shall be final, and binding to the Contractor.

TECHNICAL SPECIFICATION FOR GENERAL ELECTRICAL

1.0 SCOPE

Unless otherwise specified this specification covers for supply of materials., fabrication, erection, testing and commissioning of switch boards, distribution fuse boards, distributions fuse boards, meter board, lightning equipments, switches, socket outlets and miscellaneous items applicable provisions and conduit of contract shall govern the work under the section.

2.1GENERAL

The contractor shall submit manufacturer's test certificate for switch boards, switch fuse units Meters, porcelain rewirable fuse units, miniature circuit breaker and isolating switches & M. C. C. BS.

2.2 After completion of supply and installation work of the electrical equipment if any defect in the material or workmanship is found by the consultant/Engineer-in-charge, the contractor shall remove the same and supply better and approved materials at his own cost.

2.3 All precaution against theft and fire shall also be taken by the contractor.

2.4 The contractor shall provide complete supervision for proper execution of the work.

3.0 MATERIAL

3.1 SWITCH BOARD

3.1.1 The switch board shall be totally enclosed tropicalised, vermin proof, metal clad, floor or wall mounting pattern as the case may be. It shall comprise a suitable length of bus bar chamber with bushers of appropriate current rating, mounted on floor stands of convenient height or wall straps. It shall include the requisite number of incoming and outgoing fuse switch or switch fuse units. Unless otherwise mentioned in the schedule of quantities, the minimum depth of the bys bar chamber shall be 150 mm.

3.1.2 The switch fuse units shall be mounted both above and below the bus bar chamber to make up a compact switchboard. The riser connection from the units to the bus bars for rating above 100amps shall be of proper copper or aluminum bars of adequate section which shall be suitable insulated at the point of entry into the busbar chamber. For rating below 100amps. PVC cable tails of appropriate size with tinned copper terminating socket may be used. An insulating barrier should be interposed between the unit and the bus bar chamber and where riser connections pass through the barrier, rubber/PVC bush should be provided. All the riser and the bus bars should be clearly marked with an appropriate colour code to enable immediate identification of the phases and neutral, The floor stands or wall brackets shall have sufficient mechanical strength to carry the weight of the entire switch board safely. The height of the floor stands shall be such that the maximum operating height of the top mounted switch fuse units on the panel shall not exceed 2000 mm.

3.1.3 The bus bar chamber shall be of 2 mm thick sheet steel construction, fabricated with four steel angles, arranged in box form. It shall be provided with detachable front and rear covers fitted with dust proof gaskets secured by sufficient number of bolts to ensure that these covers dust tight and vermin proof. The bus bars shall be so arranged that they are easily accessible. The bus bars shall be of hard drawn high conductivity copper or electrolytic purity aluminum having uniform cross section throughout the length.

3.1.4 The continuous current carrying capacity shall be as specified with neutral bar having 60% of the full load rating of the phase bus bars. In no case rating of the bus bars shall be less than the incoming switch. The size of the bus bars shall be so selected so that the current density in each bus bars does not exceed 900 Amp square inch for copper (1.5/Sq mm) and 600 amps per square inch for aluminum (1a/sq mm). Bus bars shall be designed to withstand a through fault current of 50 KA symmetrical for at least 1 sec. and mounted on supports constructed from a suitable insulting

materials, such as Permali,hylam etc. The supports should be sufficiently close and robust to prevent bus bar sag, to permit effectively withstand electro mechanical stresses in the event of a short circuit.

3.2 INSTRUMENTS

3.2.1 The measuring instruments shall comply with IS : 1248 in all respects.

3.2.2 Moving iron, square, flush mounting type instruments shall be used for measuring A. C. Voltage and currents.

3.2.3 The instruments shall normally be mounted on the hinged door of an all welded fabricated sheet steel housing of rigid construction to allow easy access to small wirings. All potential circuits shall be protected by H. R. C. type fuse links complying with IS : 2280. The fuses shall be mounted near the tap off point from the main connections so that a fault in the instrument wiring does not affect the main supply. Small wiring shall be of 660 volt grade single core fire resistant PVC cable with copper conductor having minimum size 2.5 sq. mm. These shall be colour coded for easy identification of circuits. The instruments shall be of automatic electric / G. E. C. / Crompton or equivalent make acceptable to the consultant/Engineer-in-charge.

3.3 SWITCH FUSE UNITS/FUSE SWITCH UNITS.

3.3.1 The switch fuse units shall comply with IS : 4047 and IS: 4064 in all respects.

3.3.2 The switch fuse units shall be of double iron clad type robust in design having guick make guick break mechanism suitable for load break duty and provided with neutral link where specified. These shall have rust proof C. I. / sheet steel enclosure with fully interlocked covers and be suitable for wall/basbar mounting.

3.4 DISTRIBUTION FUSH BOARDS

3.4.1 The distribution fuse boards shall comply with I. S. 2675 and B. S. 214 in all respects.

3.4.2 The distribution fuse board shall be housed in a dust and vermin proof metallic enclosure fabricated from 2 mm thick all welded sheet steel suitable for wall/column mounting and complete with a door of rigid construction fitted with dust protecting gasket, and robust fasteners. The enclosure shall have suitable provision for fixing fuse fittings and neutral bar on a high grade rigid insulating support. The fuse fittings shall be connected by a tinted copper busbar. Each fuse bank shall be provided with cable socket for the incoming cable. The socket shall be situated centrally and must be covered by an insulting shroud for safety. Phase separation barriers made out of arch resistant materials shall be provided between the fuse banks. All bare current carrying parts shall be protected with a Bakelite sheet of 3.5 mm thick to prevent accidental contact.

3.4.3 In case of concealed system, the boxes are to be flushed with the wall and the cover shall be made from 5 mm thick acrylic sheet or 3 mm thick decorative white top Bakelite/electrical switch board cover of Hylam make.

3.4.4 The sheet steel parts shall undergo a rigorous rust proofing process comprising alkaline degreasing., descaling in dilute sulphuric acid cold rinsing and a recognized phosphating process. The steel work shall then receive two coats of corrosion resistant primer paint final painting.

3.5 METER BOARD

Unless otherwise mentioned in the schedule of quantities the meter board shall house KWHR meter in a dust and vermin proof metallic enclosure fabricated from 2 mm thick all welded sheet suitable for wall mounting. The door shall be secured by fasteners, enabling dust protecting gasket to be compressed easily. The K. W. Hr. meter shall be of G. E. C./Universal or equivalent make and the same shall be mounted on a rigid insulating support,. There must be a viewing aperture on the M. S. door covered with a 2 mm thick clear acrylic sheet for easy meter reading and it shall be possible to seal the enclosure against unauthorized opening.

3.6 FUSE CUT OUTS

3.6.1 The fuse cut outs shall be totally enclosed, metal clad suitable for mounting on flat vertical surface and shall be provided with a screwed top cover. It shall be possible to seal the enclosure against unauthorized opening.

3.7 CONTACTOR & PUSH BUTTON UNITS.

3.7.1 The contactor units shall comply with IS 2959 in all respects.

3.7.2 The main/contactor units shall be of robust design having double break bounce free type contacts and pressure type terminal clamps. The contacts shall be made of anti-weld-silver cadmium oxide. The coil shall be vacuum impregnated, baked with inter layer paper insulation and finally mounted in hard resign.

3.7.3 The contractor and push-botton units shall be of Larsen & Toubro/E. E. Siemens and out of list & approved makes.

3.8 LIGHTING EQUIPMENT

3.8.1 The luminaries for fluorescent lamps shall be shop assembled, fully wired and suitable for 1 No. 4 ft. tube or 2 Nos. 4 ft. tubes as the case may be. The salient features of these luminaries are basic channels/rails, 240 volt ballast with copper winding wire, spring loaded bi-pin type lamp holders, glow type starters and con-reflectors and/or decorative covers shall be supplied as specified in the schedule of quantities.

3.8.2 The luminaries for incandescent lamps shall be as specified in the schedule of quantities and approved by the Consultant/Engineer-in-charge before the same is used.

3.8.3 The incandescent bulk head type fittings shall be with cast aluminum alloy body, finished stove enameled silver grey outside, white inside, with front glass, wire guard, tropicalised gasket, B. C. Lamp holder end suitable for use with 100 watt G. L. S. lamp. The fittings shall have tapped 19 mm E. T. for conduit entry.

3.8.4 The high bay luminaries for sodium/mercury vapour lamps shall be integral type unit having a spun aluminum canister at the tops for housing control gear, terminal block for the remaining supply, earthing terminal and suspension arrangement.

The luminaries shall have reflectors of spun anodized aluminium with a specular finished and suitable for used with 250/400 watt HPSV/HPMV lamp as the case may be.

3.8.5 The post-top lantern type luminaries shall have a dia-cast aluminium electrical Unit/honsing with provision for pipe entry from below, a canopy made of spun aluminium and an opal white acrylic diffuser resistant to Ultraviolet radiation and heat.

The luminaire shall be rain proof, insect tight and fully wired upto the terminal block and suitable for use with 80/125 watt HPMV or 100 watt G. L. S. Lamp as specified in the schedule of quantities.

3.8.6 The flood lighting lumainaires shall have a rugged constructions housing made of cast aluminium alloy of low copper content for corrosion resistance, highly polished and anodized aluminium reflector for beam control, a heat resistant front glass with gasket and a terminal block. To facilitate aiming and fixing bracket shall be provided on the housing. The luminaire shall be rain proof, and suitable for use with 1000 W tungsten halogen lamp or 250/400 watt HPSV lamp as specified in the schedule of quantities.

3.8.7 The lomainaires shall be shop assembled, wired and suitable for suitable wattage mentioned is BOQ, the lumainairs to be made not of CRCA/ns sheet powder coated with aluminum reflectors of shape & size as per manufacture design.

3.8.8 The ballasts for fluorescent tube shall conform to IS : 1534 (part – i) 1977 and the same for high intensity discharge lamps shall conform to IS : 6616 and these shall be high grade synthetic enameled copper winding wires, quality grade insulation materials, good quality low hysteresis loss electrical stampings and complete until should have polyester filling.

The ballasts shall be suitable for use on single phase 240 volts 50 Hz. A. C. system and of G. E. C./Philips make.

3.8.9 The capacitors shall comply with IS : 1569 and be hermetically sealed type.

3.9 CEILING FANS AND REGULATORS.

The ceiling fans and regulators shall conform to IS : 374-1966. The fans shall have totally enclosed capacitor start and run motors suitable for operation on 230/240 volt, single phase, 50HZ A. C. system. The regulator shall have an 'ON' – 'OFF' position next to the lowest speed contact and shall be provided with atleast five running positions.

3.10 EXHAUST FANS

The exhaust fans shall conform to IS : 2312 and suitable for operations on 230/240 volt single phase. 50 HZ, A. C. system. The fans shall be ring mounted type designed to give maximum air volume charges under free air flow conditions.

3.11 SWITCHES

Light and fan switches shall be rated for 5 amp 250 volt and of modular type and suitable for flush mounting on sheet steel board or seasoned teakwood board of double panel construction. The switches shall be out of list of approved makes acceptable to the consultant/Engineer-in-charge. For surface mounting these shall be of robust design, tumbler type and of Ellora or equivalent make. The switches shall comply with relevant I. S. S.

3.12 SOCKET OUTLET & PLUG

These shall be of 3 pin type and of rating 5 Amps (for light) and 15 Amps (for power). Each socket outlet shall be complete with controlling switch and plug top. Protective fuse links shall be provided with 15 Amps socket outlet. The socket outlet shall be modular /type and of anchor or equivalent make acceptable to the Consultant/Engineer-in-charge.

3.13 FEEDER PILLAR

3.13.1 The feeder pillar shall be of the floor mounting type, totally enclosed and weather proof. The cubicle shall be fabricated out of heavy gauge sheet of thickness not less than 10 gauge with suitable side frames and 12 gauge stiffners.

3.13.2 Hinged doers of not less than 3 mm thick shall be provided at the front and rear of the cubicle to provide access for installations, operations tests and inspection. All doors shall also be fitted with suitable locking arrangement to prevent un-anthorised opening. The cubicle shall be designed for mounting over cement concrete plinth by the roadside and shall be of substantial construction capable of withstanding the vibration normally experienced due to vehicular traffic.

3.13.3 The sheet steel materials used in the construction of the cubicle undergo a rigorous rust proofing process comprising of alkaline degreasing descaling in dilute sulphuric acid, cold rinsing and a recognized phosphating process. After metal treatment, the interior of the cubicle shall be painted with two coats of air drying red lead primer following by two coats of air drying anti-corrosive paint. The exterior of the cubicle shall be painted with two coats of stoving red oxide primer followed by two coats of aluminum finishing paint.

3.13.4 Ventilation louvers in the form of finely divided wire mesh shall be provided on the two sides to ensure natural ventilations.

3.14 LOOP-IN JUNCTION BOX

These junction boxes shall be drip-proof type and dust and vermin proof construction fabricated from 2 mm thick sheet steel having internal dimensions of 200 x 150 x 100 mm depth for single phase distribution system. These shall have molded Bakelite base connector block with anti vibration nickel plated brass terminals of suitable size and rating and a porcelain fuse fittings.

3.15 NAME PLATE DESIGNATION

All switch boards/panel boards/D. B./sub. D. B. etc. shall be complete with suitable engraved designation levels made out of black plastic with white inscriptions.

3.16 PAINTING

All the steel materials used in the construction of the switch board/panels/Feeder/D. B. S./Sub. D. B. S. etc. shall undergo a rigorous rust proofing process comprising alkaline degreasing, de-scaling in dilute sulphuric acid cold rinsing and a recognized phosphating process. The steel work shall then receive two coats of high corrosion resistant primer paint and finished by application of synthetic enamel paint of shade battle ship grey or any other colour shade acceptable to the Consultant/Engineer-in-charge.

4.0 MANUFACTURER'S DRAWING

4.1 The successful tenderer shall submit for approval general arrangement and dimension drawings for power and lighting distribution board, motor control centre, bus-duct arrangement, miniature circuit breaker board, inter locked switch socket outlets, clock switch, control panel. TPN power cable junction box and cable rack etc. as required in three sets before commencing manufacturing.

5.0 WORKMANSHIP AND INSTALLATION WORK

The workmanship shall be of good commercial quality and all supply material and installation work shall becompleted to the full satisfaction of the Consultant/Engineer-in-charge.

6.0 CONTRACTORS RATE TO INCLUDE

6.1 Apart from other factors mentioned elsewhere in this contract, the rates for the above shall include for the following :

- All labour, materials, tools and construction equipment required for fabricating and fixing of above stated items.
- Scaffolding including erection and removal.
- Making good of all damages. Civil work if any.

6.2 METHOD OF MEASUREMENT

Unless otherwise mentioned in the schedule of quantities, measurement will be on net quantities of work produced. In the event of any dispute with regard to the measurement of work executed, the decision of the Consultant/Engineer-in-charge shall be final, and binding to the contractor.

ADDITIONAL SPECIFICATIONS FOR ELECTRICAL WORKS

1. The wiring etc. shall be carried out as specified in BOQ.
2. Minimum, size of conducts used shall be 20 mm dia, 1.6 mm thick PVC if not otherwise mentioned in BOQ..
3. All wiring for Lights/fans/Exhaust fans/Call bell/5A Plug Points/15a plug Points/20A Metal Clad Points, fire detection and Alarm System and Sub-Mains wiring shall be 1100 Volts Grade Copper wires FRLS grade of capacity as required in BOQ.
4. All wiring for light / power etc. shall be ferrule numbered by PVC ferrule.3
5. All wiring for Telephones, Intercoms and Data shall be provided with numbered ferrule for identification.
6. Contractors will be required to submit shop drawing and as built drawings after the completion of work in the manner the work is done.
7. All PVC Aluminium/Copper Armoured cables shall be XLPE, 1100 Volts grade and shall bear marking for cable sizes and feeder section on aluminium strip clamps embossed and filled with paint of minium 12 mm character.
8. All MCBs used shall be of Minimum 10KA fault rating.
9. All Switches and Sockets shall be grid plate type modular with their respective boxes.
10. All Panels, Switch Boards and Distribution Boards shall be Powder Coated in required shade after all standard treatment on CRCA Sheet steel.
11. All wiring shall be carried out with specified sizes of wires along with Green Color insulated earth wire.
12. All MCCB used shall have minimum fault rating of 25 KA and variable current setting from front panel.
13. All External Lighting GI Poles & Junction Boxes shall be painted in required shade.
14. The Planting depth plus 300 mm of GI Poles shall be painted with epoxy based paint for rust proofing.
15. Quantities are tentative may vary as per site requirement. No. extra claim in this regard shall be admissible. Quantities executed at site shall only be paid.
16. Some of the old items like Smoke Detector if compatible shall have to be installed by the Contractor on fixing rates. Quantities may vary accordingly vary.
17. Contractor will ascertain the quantities himself before purchase of materials. Any extra materials purchase by him which are not installed at site shall not be admissible for payment.
18. Any co-ordination required for getting power from client shall have to be done by the contractor and execution will have to be accordingly.
19. Shop drawings will have to be submitted by the Contractor for main panel/ Distribution Boards. Final Layout Plans etc. before final fabrication / procurements.

LIST OF APPROVED MAKES / AGENCIES.

The Employer / Engineer-in-charge reserves the right to select any of the brands indicated in the list of approved make The tenderer shallquote his rates on the basis of the price of best quality and grade of product of the brand / make stipulated in the item of works as described in both specification as well as in the list of approved make whwre ever Brand/Model names are specified. The Contractor cannot claim any thing extra if the owner changes the brand but wit the list of approved make.

CIVIL WORKS:

SR. NO.	DESCRIPTION	MAKE
1	Grey Cement.	ACC / L&T / ULTRATECH
2	White Cement.	J.K. / BIRLA / L&T
3	Concrete Additive.	SIKA / FOSROC / BASF / ARDEX ENDURA
4	Roof and Underground Waterproofing treatment.	INDIA WATERPROOFING CO / HINDUSTAN WATERPROOFING CO / OVERSEAS WATERPROOFING CO / STRUCTURAL WATERPROOFING CO / CICO / SIKA
5	Reinforcement Steel	TATA / SAIL
6	MS Pipes / Sq Bars.	TATA / NEZONE.
7	Plywood / Soft Board / Block Board.	KITPLY / CENTURY / GREENPLY.
8	Paint.	ICI / ASIAN PAINTS / BERGER PAINTS / NEROLAC
9	Adhesive for Wood Work	DUNLOP / FEVICOL / VAMICOL
10	Aluminium Doors, Windows, Curtain walls / Structural Glazing Fabricators..	AJIT INDIA / SP FABRICATORS / AGV / SUPER ALUMINIUM
11	Extruded Sections of Aluminium.	HINDALCO / NARMADA
12	Flush Door Shutters.	DURO / ANCHOR / ALPRO
13	Fire Retardant Plywood.	AEROPLY / GREEN
14	Hardware & Patch Fittings	DORMA / DORSET / GODREJ
15	Locks.	GODREJ / HAFFELE
16	Glass (Float).	MODIGUARD / ASHAHI
17	Glazed Tiles.	JOHNSON / KAJARIA / BELL / SOMANI / PILINGTON / NITCO
18	Floor & Wall tiles	KAJARIA / NITCO / RESTILE
19	Non-Metallic hardner Compound.	FOSROC / STP / ASHFORD / SWC
20	Dash Fasteners	HILTI OR EQIVALENT APPROVED BRAND
21	Textured Paint.	SPECTRUM / TERRACO / DUROSHIELD
22	Exterior Paint.	ICI / BERGER / ASIAN PAINTS
23	Silicone Sealants	UNIVERSAL SILICON (DOW CORNING) / GE SILICONES
24	Polysulphide Sealant	PIDILITE / CHOKSEY / SIKA / BASF
25	Polyurethene Sealant	CHOKSEY / PIDILITE
26	False Ceiling	ARMSTRONG / INDIA GYPSUM / EVEREST ASBESTOS

INTERNAL ELECTRICAL INSTALLATION WORKS.

SR. NO.	DESCRIPTION	MAKE
1	Manufacturers of L.T. Panels	PCE Electro Controls / ABAK / Popular Switchgear / VIVID Electronics / C&S
2	Cables	Finolex / Gloster
3	Cable Sockets / Lugs	Dowells / Jain
4	Copper wires	Finolex / RR Kabel
5	Telephone wires & Cables	Delton / Motwane / ITL
6	L.T. Switchgear (with HRC fusegear)	GE / Siemens/ L & T
7	HRC Fuse Base & Carriers	English Electric / Kaycee / Essen
8	Selector Switches	L & T / Kaycee / Siemens /Micron
9	L.T. Change Over Switches	Siemens / L & T / GE
10	SFUs / FSUs / Fuse-Gear (HRC) /HRC fuses	L & T / Siemens / GE / EE
11	MCBs/ ELCBs	Siemens / MDS (Lexic) / L&T (Hager)
12	Ammeter/Voltmeter/P.F. Meter (Analog) Digital / Electronic Type	Automatic Electric / Rishabh / L&T / SIEMENS / ENERECON
13	Indicating Lamps 22.5mm dia. (LED type)	Teknic / Siemens / L & T / BCH / Binay / Essen Deinki
14	L.T. Power Capacitors & APFC Panel	Universal / Siemens / L & T / Crompton Greaves / Voltas / Ducati / Asian
15	APFC Relay	Enercon / L&T / DUCATI / AVOMEC / SYNTRON
16	Connectors/ Terminal Blocks	Elmex / Essen / APP
17	Moulded Case Circuit Breakers	ABB / L & T / Siemens / Schneider / GE
18	PVC Insulated Cu. Wires(incl. Panel Wires & Flexibles)	Finolex / RR Kable
19	PVC conduit and accessories	Precision / AKG / Shakti
20	PVC casing-capping(Trunking)	Precision / Presto-Plast
21	PVC Pipes	Supreme / Prince
22	Modular Switches / Sockets	Anchor(Roma) / North West / Crabtree / Legrand
23	Intelligent Digital Panel Meters	L&T / Rishabh/ AE / Enercon / Secure / Krykard / Neptune Ducati
24	Hot Dip G.I. Conduit	BEC / VIMCO / AKG
25	MS conduit pipes & accessories	ICI / BEC / NIC / National / Swastic
26	Steel Structureal Membars	Jindal / Tata / Sail / Jindal
27	G. I. Pipes	Jindal / Tata / Zeneith
28	Ceiling/Bracket/Exhaust Fan	Crompton Greaves / GEC / Polar / Usha / Havels
29	Air Circulators & Exhaust Fans	Crompton / Almonard / Havels
30	Black Enamelled M.S. Conduit	BEC / NIC/ VIMCO / AKG / BENCO / Supreme
31	Isolators	Siemens / L&T / GE
32	Current Transformers & Potential transformers	A.E./ Indcoil / Kappa / Power Pack / Perfect / Kapco
33	Cable Glands	Comet / Braco/ Jainco
34	Ceiling Rose & Batten Holder	M.K. Electric/ CrabTree/ Northwest / Anchor
35	Cable Tray	Profab / Indiana / Checkstorage
36	Light fittings	Philips / Crompton / GE
37	Lamps, Tubelights & CFLs	Philips / Crompton / GE
38	Fire Extinguishers	Firex / Cease Fire / Vijay
39	Hylam sheets	Bakelite Hylam

NOTE : The above is an indicative list. Other equivalent makes with BIS mark may be used subject to prior approval of the competent authority. All other items not covered above shall be as per samples approved by the the Engineer.

'ANNEXURE - D''

SCHEDULE OF QUANTITIES & RATES (SOQR)

Sl.No.	Description	Unit	Qty.	Rate	Amount
1	Earth work in excavation by mechanical means (Hydraulic excavator) / manual means in foundation trenches/ pit including dressing of sides and ramming of bottoms, lift upto 1.5M including getting out the excavated soil and disposal of surplus excavated soil at any place within the project premises as directed EIC. (Plinth area measurement to be followed for payment)				
a)	All kinds of soil.	CuM	4000	₹ 260.30	₹ 10,41,200.00
2	- do - as above item no-1, but from (-) 1.5M to (-) 3.0M				
a)	All kinds of soil.	CuM	800	₹ 387.10	₹ 3,09,680.00
3	- do - as above item no-1, but from (-) 3.0M to (-) 4.5M				
a)	All kinds of soil.	CuM	400	₹ 513.90	₹ 2,05,560.00
4	- do - as above item no-1, but from (-) 4.5M to (-) 6.0M				
a)	All kinds of soil.	CuM	275	₹ 640.70	₹ 1,76,192.50
5	Close timber shoring over areas including strutting, propping, bracing, tying and packing cavities (wherever required) etc. complete. (Measurements to be taken of the face area timbered).				
a)	Depth not exceeding 1.5 m	SqM	100	₹ 125.80	₹ 12,580.00
b)	Depth exceeding 1.5 m but not exceeding 3 m	SqM	50	₹ 144.10	₹ 7,205.00
c)	Depth exceeding 3 m but not exceeding 4.5 m	SqM	50	₹ 163.15	₹ 8,157.50
6	Open timber shoring over areas including strutting, propping, bracing, tying etc. complete. (Measurements to be taken of the face area timbered).				
a)	Depth not exceeding 1.5 m	SqM	100	₹ 44.85	₹ 4,485.00
b)	Depth exceeding 1.5 m but not exceeding 3 m	SqM	50	₹ 54.95	₹ 2,747.50
c)	Depth exceeding 3 m but not exceeding 4.5 m	SqM	50	₹ 71.30	₹ 3,565.00
7	Filling available excavated earth (excluding rock) in plinth/ pit in layers not exceeding 20 cm in depth, consolidating each deposited layer by ramming and watering, as directed EIC	CuM	5100	₹ 196.00	₹ 9,99,600.00
8	Providing & laying in position cement concrete of specified grade including the cost of shuttering and centring, excluding the cost of reinfrorcement steel (if required). All works at any level.				
a)	1:4:8 (1 part of cement, 4 parts of coarse sand & 8 parts of graded stone aggregate of 40 mm nominal size).	CuM	70	₹ 6,812.00	₹ 4,76,840.00
9	Providing & laying damp - proof course 40 mm thick with cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 12.5 mm nominal size)	SqM	5	₹ 410.85	₹ 2,054.25
10	Providing & laying in position machine batched, machine mixed & machine vibrated **Design Mix cement concrete of Grade-M25 with OPC/PPC/PSC** for reinforced cement concrete work including lifting / pumping of concrete to site of laying but excluding the cost of centring, shuttering, & reinforcement, but including admixtures in recommended proportions as per IS: 9103 to accelerate, retard setting of concrete, improve workability without impairing strength & durability as per direction of Enginner - in - Charge. Minimum cement content shall be not less than 330Kgs of cement per CuM of concrete. (Design mix to be submitted by the contractor & shall be approved by the Engineer-in-charge / Consultant. (More over as per test if extra cement is used, no additional payment shall be made for this account. The Contractor should make provision for the same in the rate).				

a)	All works up to plinth level.	CuM	540	₹ 9,504.75	₹ 51,32,565.00
b)	All works above plinth level.	CuM	200	₹ 9,860.40	₹ 19,72,080.00
11	Centering and shuttering in all shape as per drawing / direction including strutting, propping etc. and removal of form for all heights up to 3.5 M and striking out after completion of works.				
a)	Foundations, footings, bases of columns, etc. for mass concrete	SqM	300	₹ 392.15	₹ 1,17,645.00
b)	Lintels, beams, plinth beams, girders, bressumers and cantilever.	SqM	350	₹ 736.40	₹ 2,57,740.00
c)	Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.	SqM	2400	₹ 842.50	₹ 20,22,000.00
d)	Suspended floors, roofs, landings, balconies and access platform including sides of slabs.	SqM	450	₹ 927.25	₹ 4,17,262.50
e)	Columns, Pillars, Piers, Abutments, Posts and Struts	SqM	150	₹ 961.30	₹ 1,44,195.00
12	Steel reinforcement in all R.C.C. work placed in form work as per drawing including cutting, bending, binding, assembling & placing. The measurement shall be as per standard sectional weight of reinforcement actually used in the work & computed as per standard sectional weight of reinforcement bars. Binding wires shall not be accounted for while calculating steel reinforecement. (Thermo-mechanically Treated bars, Fe 500 or more).	M.T.	55	₹ 1,07,850.00	₹ 59,31,750.00
13	First class brick masonry work in sub-structure using cement mortar (1:6), laid true to line & level, cured complete including cutting grooves wherever necessary.	CuM	70	₹ 7,132.25	₹ 4,99,257.50
14	First class brick masonry work in super-structure at any level using cement mortar (1:6), laid true to line & level, cured complete with chicken wire mesh at the junction of RCC columns, beams and slab including hacking the RCC surface with cement slurry & cutting grooves in the existing brick masonry work wherever necessary.	CuM	55	₹ 9,105.95	₹ 5,00,827.25
15	Half brick masonry in cement mortar 1:4 (1 cement :4 coarse sand) with common burnt clay F.P.S. (non modular) bricks of class designation 7.5 in superstructure above plinth level (at any level).	SqM	20	₹ 1,123.80	₹ 22,476.00
16	Extra over above item no- 15 for providing and placing in position 2 Nos 6mm dia. M.S. bars at every third course of half brick masonry.	SqM	20	₹ 104.80	₹ 2,096.00
17	6mm thick cement plaster to R.C.C. surfaces in 1:3 cement mortar (with fine sand) laid in line & level, cured, complete.	SqM	220	₹ 300.45	₹ 66,099.00
18	15mm thick plaster in 1:6 cement mortar (coarse sand) true to line & level, cured, complete in fair side of wall.	SqM	750	₹ 383.00	₹ 2,87,250.00
19	20mm thick cement plaster in 1:6 (1 cement : 6 coarse sand) to external surfaces laid, true to line & level, cured, complete to rough side of wall.	SqM	250	₹ 450.00	₹ 1,12,500.00
20	Providing and laying minimum 1mm thick punning in line and level with putty of 'Birla white' or of approved equivalent make complete inclusive of surface preparation as necessary.	SqM	870	₹ 156.05	₹ 1,35,763.50

21	Applying Interior grade Acrylic Primer of approved quality and brand on plastered or cencrete surface old or new surface to receive Distemper/ Acrylic emulsion paint including scraping and preparing the surface throughly, complete as per manufacturer's specification and as per direction of the EIC.	SqM	120	₹ 73.95	₹ 8,874.00
22	Painting with Interior grade paint of approved brand and manufacture of required colour to given an even shade. Two or more coats.				
a)	Acrylic Emulsion Paint.	SqM	120	₹ 142.80	₹ 17,136.00
23	Finishing walls with textured exterior paint of required shade: New work (Two or more coats applied @ 3.28 ltr/10 sqm) over and including priming coat of exterior primer applied @ 2.20kg/10 sqm. (All of approved make & quality).	SqM	80	₹ 223.60	₹ 17,888.00
24	Providing and applying priming coat:				
a)	With ready mixed pink or Grey primer of approved brand and manufacture on wood work (hard and soft wood).	SqM	10	₹ 70.35	₹ 703.50
b)	With ready mixed red oxide zinc chromate primer of approved brand and manufacture on steel galvanised iron/steel works.	SqM	R.O.	₹ 67.40	₹ 0.00
25	Two or more coats of french polishing including a coat of wood filler complete.	SqM	5	₹ 446.25	₹ 2,231.25
26	40mm thick Cement concrete flooring 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate,10mm down) finished with a floating coat of neat cement including cement slurry, but exceeding the cost of nosing of steps etc. complete with applying non-metallic hardener of approved make and quality in proportion as per manufacturer's specifications.	SqM	70	₹ 614.20	₹ 42,994.00
27	Providing and laying polished 10mm thick premium quality double charged 100% vitrified floor tiles 600mm x 600mm or as approved by EIC (thickness to be specified by the manufacturer) with water absorption's less than 0.08% and conforming to IS:15622 of approved make in all colours and shades laid on 20 mm thick cement mortar 1:4 (1 cement : 4 coarse sand) including grouting the joints with white cement and matching pigments etc complete. (All of approved make, quality & colour).	SqM	40	₹ 1,453.65	₹ 58,146.00
28	Providing wooden (Sal wood) frames / sub-frames as per approved design to door openings, wrought framed and fixed in position with drilling/cleaning hole and fixing appropriate length of ETA Approved HRD C 10 anchor (HILTI) or approved equivalent make suitable for fastenings both on concrete & masonry/aerated blocks for fixing door frames / sub-frames as per manufacturer's specifications complete. Rate should inclue the cost of providing and applying a coat of solignum or any approved equivalent wood preservative to the sides of the frames abutting wall.	CuM	0.2	₹ 1,16,520.30	₹ 23,304.06
29	Providing and fixing ISI marked factory made 35mm thick flush door a shutters non-decorative type, core of block board construction with grain of 1st class hard wood and well matched commercial 3 ply veneering with vertical grains or cross bands and face veneers on both faces of shutters. (Rate should include the cost of providing and fixing 4no 125mm S.S (Satin finish) Butt Hinges with washer plates of approved make & quality for each shutter).	SqM	10	₹ 2,392.65	₹ 23,926.50
30	Extra over above item no-29 for providing and fixing flush door shutters with 4mm thick decorative teak veneering. (On one side).	SqM	5	₹ 478.00	₹ 2,390.00
31	Providing & fixing in position wooden (2nd class teak wood) moulded beading (50 x 20mm) to door frames with iron screws, plugs and a priming coat on unexposed surface etc complete.	R.M.	55	₹ 271.75	₹ 14,946.25

32	Providing and fixing stainless steel (satin finish) heavy quality Tower Bolts:				
a)	250mm x 10mm	Each	4	₹ 83.90	₹ 335.60
33	Providing and fixing bright finished brass hanging type floor door stopper with necessary screws, etc. complete.	Each	6	₹ 121.65	₹ 729.90
34	Providing and fixing aluminium die cast body tubular type Universal Hydraulic Door Closer (having brand logo with ISI, IS : 3564, embossed on the body, door weight upto 35 kg and door width upto 700 mm), with necessary accessories and screws etc. complete.	Each	6	₹ 1,124.85	₹ 6,749.10
35	Providing and fixing chromium plated brass 100 mm mortice latch and lock with 6 levers and a pair of lever handles of approved quality with necessary screws etc. complete. All of approved make & quality.	Each	4	₹ 998.35	₹ 3,993.40
36	Providing and fixing aluminium sliding door bolts (300x16 mm), ISI marked anodised (anodic coating not less than grade AC 10 as per IS : 1868), transparent or dyed to required colour or shade, with nuts and screws etc. complete.	Each	4	₹ 303.25	₹ 1,213.00
37	Providing and fixing aluminium work for doors, windows, ventilators etc with anodised (Minimum anodic coating of grade AC 25, Bronze or of approved shade) extruded built up standard tubular sections and other sections (Z) of approved make conforming to IS: 733 and IS: 1285, fixing with dash fasteners of required dia and size, including necessary filling up the gaps at junctions, i.e. at top, bottom and sides with required EPDM rubber/neoprene gasket etc. Aluminium sections shall be smooth, rust free, straight, mitred and jointed mechanically wherever required including cleat angle, Aluminium snap beading for glazing / paneling, C.P. brass / stainless steel screws, all complete as per architectural drawings and the directions of Engineer-in-charge. (Glazing, paneling and dash fasteners to be paid for separately) :				
a)	Fixed Portions.	Kg	5	₹ 495.05	₹ 2,475.25
b)	For shutters of doors, windows & ventilators including providing and fixing hinges/ pivots and making provision for fixing of fittings wherever required including the cost of EPDM rubber / neoprene gaskets, stainless steel (SS 304 grade) adjustable friction windows stays of approved quality with necessary stainless steel screws etc, aluminium tubular handle bar 32mm outer dia, 3.0mm thick & 2100 mm long with SS screws etc all complete as per direction of the Engineer-in-charge. (Cost of Handles, Locks shall be paid extra).	Kg	35	₹ 598.60	₹ 20,951.00
c)	Providing and fixing glazing with float glass panes of 5.0 mm thickness (Bronze or of approved colour). in aluminium door, window, ventilator shutters and partitions etc. with EPDM rubber / neoprene gasket etc all necessary accessories complete as per the architectural drawings and the directions of Engineer-in-charge.	SqM	5	₹ 1,505.25	₹ 7,526.25
38	Filling the gap in between aluminium frame & adjacent RCC/ Brick/Stone work by providing weather silicon sealant over backer rod of approved quality as per architectural drawings and direction of Engineer-in-charge complete. (Upto 5mm depth and 5mm width).	R.M	23	₹ 96.75	₹ 2,213.75
39	Providing and fixing double action hydraulic floor spring of approved brand and manufacture conforming to IS : 6315, having brand logo embossed on the body / plate with double spring mechanism and door weight upto 125 kg, for doors, including cost of cutting floors, embedding in floors as required and making good the same matching to the existing floor finishing and cover plates with brass pivot and single piece M.S. sheet outer box with slide plate etc. complete as per the direction of Engineer-in-charge. (With stainless steel cover plate minimum 1.25 mm thickness).	Each	3	₹ 2,823.85	₹ 8,471.55
40	Providing and fixing stainless steel (SS 304 grade) adjustable friction windows stays of approved quality with necessary stainless steel screws etc. to the side hung windows as per direction of Engineer-in-charge complete.				
a)	205 X 19 mm	Each	6	₹ 344.30	₹ 2,065.80
b)	255 X 19 mm	Each	2	₹ 387.00	₹ 774.00
c)	355 X 19 mm	Each	2	₹ 325.80	₹ 651.60

d)	510 X 19 mm	Each	1	₹ 802.40	₹ 802.40
e)	710 X 19 mm each	Each	R.O.	₹ 1,478.15	₹ 0.00
41	Providing and fixing aluminium tubular handle bar 32 mm outer dia, 3.0 mm thick & 2100 mm long with SS screws etc .complete as per direction of Engineer-in-Charge. (Anodized (AC 15) aluminium tubular handle bar).	Each	R.O.	₹ 575.75	₹ 0.00
42	Providing and fixing 100mm brass locks (best make of approved quality) for aluminium doors including necessary cutting and making good etc. complete.	Each	R.O.	₹ 528.85	₹ 0.00
43	Providing and fixing aluminium casement windows fastener of required length for aluminium windows with necessary screws etc. complete. (Anodized (AC 15) aluminium).	Each	50	₹ 89.40	₹ 4,470.00
44	Providing and fixing UPVC down take pipes of approved make and quality inclusive of bend, shoes complete with clamps at 600 mm intervals complete. (Type- A, IS: 13592).				
	100 mm dia	R.M	20	₹ 236.35	₹ 4,727.00
45	Supplying and fixing of following sizes of heavy duty rigid PVC conduit including 14SWG G.I pull wire, accessories, junction boxes mostly laid in R.C. slab and partly concealing of conduit in brickwall including cutting of brickwall and making good the damages or above the false ceiling				
a)	40 mm dia	R.M	20	₹ 130.00	₹ 2,600.00
b)	25 mm dia	R.M	80	₹ 90.00	₹ 7,200.00
46	Grading roof surface for water proofing treatment with Screed concrete (1:2:4) complete as per direction.	CuM	15	₹ 8,042.30	₹ 1,20,634.50
47	Providing and applying integral crystalline slurry of hydrophillic in nature for water proofing treatment to the RCC structures like retaining walls of the basement , water tanks, roof slabs, podiums, reservoir, sewage & water treatment plant, tunnels/ subway and bridge deck etc., prepared by mixing in the ratio of 5:2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3:1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e. by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50 mm. The work shall be carried out all complete as per specification and the direction of the Engineer-in-Charge.				
a)	For vertical surface two coats @ 0.70 kg per sqm per coat	SqM	670	₹ 472.90	₹ 3,16,843.00
b)	For horizontal surface one coat @ 1.10 kg per sqm per coat	SqM	230	₹ 362.80	₹ 83,444.00
48	Precast cement concrete tiles 22 mm thic, jointed with neat cement slurry mixed with pigment to match the shade of tiles, including rubbing and cleaning etc. complete, on 20 mm thick bed of cement mortar 1:4 (1 cement : 4 coarse sand). Light shade pigment using white cement	SqM	25	₹ 1,402.00	₹ 35,050.00

49	Making plinth protection 50 mm thick of cement concrete 1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size) over 75 mm bed of dry brick ballast 40 mm nominal size well rammed and consolidated and grouted with fine sand including finishing the top smooth.	SqM	10	₹ 749.30	₹ 7,493.00
50	Supplying and fixing metal box of following sizes (nominal size) on surface or in recess with suitable size of phenolic laminated sheet cover in front including painting etc. as required.				
a)	150 mm x 75 mm x 60 mm deep	Each	8	₹ 216.00	₹ 1,728.00
b)	250 mm x 300 mm x 100 mm deep	Each	R.O.	₹ 653.00	₹ 0.00
51	**Point Wiring including concealed PVC Conduiting:** **Concealed power point wiring with PVC insulated & unsheathed single core stranded copper FR wires** Supply & fixing of power point wiring with 1.1 KV Grade unsheathed FR PVC insulated multi strand copper conductor wires of following sizes in 25 mm dia. bore rigid PVC conduit including S&F of PVC Conduit, bends, junction boxes & required accessories, mostly laid in RCC slab and partly concealing of conduit in brick wall including cutting of brick wall and making good the damages, making connections, testing etc. as required.				
a)	Power point wiring from MCB SDB to 16/6A Socket outlet with 2 Nos. 1Cx4.0 Sqmm. + 1 No. 1Cx4.0 Sqmm, rate being inclusive of concealed PVC conduiting with bends, junction boxes etc. as required. (two plug sockets to be connected in one circuit.)	RM	20	₹ 334.00	₹ 6,680.00
b)	Power point wiring from 16/6A socket outlet to the adjacent 16/6A socket outlet with 2 nos 1Cx2.5 Sqmm + 1 no 1Cx2.5 Sqmm. Rate inclusive of concealed PVC conduiting, bends, junction boxes etc. as required.	RM	20	₹ 275.00	₹ 5,500.00
52	**Point Wiring in PVC conduit with Modular type switch:** LIGHT, FAN & 6A 5 Pin socket outlet. POINT WIRING (Concealed) Type): Supply & providing point wiring from switch board to individual light, fan and 6A plug socket point with 1.1 KV grade 3-single core 1.5sqmm. multi strand copper conductor unsheathed FR PVC insulated wires in min. 20 mm dia boreheavy gauge rigid PVC conduit mostly laid in R.C. slab and partly concealing of conduit in brick wall including cutting of brick wall and making good the damages. Supply and fixing of 16 SWG thick M.S. junction box, M.S. circular boxes with modular type switch, modular plate, suitable GI box, plug socket, board, switches, plug/socket cover plate, fan hooks etc. making connections, testing etc. as required.				
a)	Light point wiring, one light controlled by one modular switch	Each	15	₹ 1,221.00	₹ 18,315.00
53	Supply and fixing of distribution circuit wiring with single core 1100 volt grade FR PVC insulated unsheathed multistrand copper wires in heavy gauge rigid PVC conduit including S&F of PVC conduit, bends, junction boxes & required accessories, mostly laid in R.C. slab and partly concealing of conduit in brick wall including cutting of brick wall and making good the damages.				
a)	2 x 1 x 2.5 sqmm.(Cu) + 1 x 1C x 2.5 sqmm. (Cu) in 25 mm dia Rigid PVC conduit. From SDB to switch Board.	RM	30	₹ 369.00	₹ 11,070.00
54	Supplying of following light fixtures complete with true-lite lamps, electronic ballast, lamp holder etc. duly wired complete for use on 240 V single phase 50 Hz AC supply including all fixing accessories such as suspension rods/ mounting brackets etc. as required				
a)	1x18W LED TUBE Light (1200 mm long) string or pipe suspended mounted lighting fixture.	Each	5	₹ 1,115.00	₹ 5,575.00
55	Supply of ceiling fan 1200 mm sweep BEE 5 star rated complete with double ball bearing, motor blades, down rods, canopy, capacitor etc.	Each	2	₹ 1,932.00	₹ 3,864.00
56	Supplying and fixing stepped type electronic fan regulator on existing modular plate switch box including connections but excluding modular plate etc. as required.	Each	2	₹ 284.00	₹ 568.00

57	Supplying and fixing following way, horizontal type TPN, sheet steel, MCB distribution board, 415 volts, on surface/recess, complete with tinned copper bus bar, neutral bus bar, earth bar, din bar, inter-connections, powder painted including earthing etc. as required but without MCB/RCCB/Isolator				
a)	12 way Double Door (IP 42/43)	Each	1	₹ 2,315.00	₹ 2,315.00
58	Supplying and fixing following rating, four pole, (TP&N), 415 volts, residual current circuit breaker (RCCB), having a sensitivity of up to 300 milli amps in the existing MCB DB enclosure complete with connections, testing and commissioning etc. as required.				
a)	25 amps	Each	1	₹ 2,586.00	₹ 2,586.00
b)	40 amps	Each	1	₹ 3,188.00	₹ 3,188.00
c)	63 amps	Each	1	₹ 2,872.00	₹ 2,872.00
59	Supplying and fixing 240/415 V MCB of Breaking capacity 10 Ka & C characteristics on din rail of existing DBs and necessary connection (For lighting circuits)				
a)	Single pole (5-32 amps)	Each	10	₹ 256.00	₹ 2,560.00
60	Preparation and consolidation of sub grade with power road roller of 8 to 12 tonne capacity after excavating earth to an average of 22.5 cm depth, dressing to camber and consolidating with road roller including making good the undulations etc. and re-rolling the sub grade and disposal of surplus earthwith lead upto 50 metres.	SqM	3000	₹ 218.90	₹ 6,56,700.00
61	Providing, laying, spreading and compacting graded stone aggregate (size range 53 mm to 0.075 mm) to WBM specifications in uniform thickness, hand picking, rolling with 3 wheeled road/ vibratory roller 8-10 tonne capacity in stages to proper grade and camber, applying and brooming requisite type of screening/ binding materials to fill up interstices of coarse aggregate, watering and compacting to the required density.	CuM	1200	₹ 1,046.95	₹ 12,56,340.00
Total (including GST)					**₹ 2,37,05,188**

''ANNEXURE – E''

SUMMARY OF PRICE

Sl. No.	Description	Amount/ Remarks
A	Total Estimated Cost for the Work as per SOQR (including GST)	
B	Percentage above / below / at par on total estimated cost as stated above (A) , applicable uniformly on all items of SOQR	In figure (+) / (-) / at par ……..% In word…….Percent
Total Quoted Price including GST (in figures) =		Rs.
Total Quoted Price including GST (in words) =		Rupees

Note:

1.The bidders shall quote percentage above / below / at par under Sl. B as above, maximum upto two decimal places.

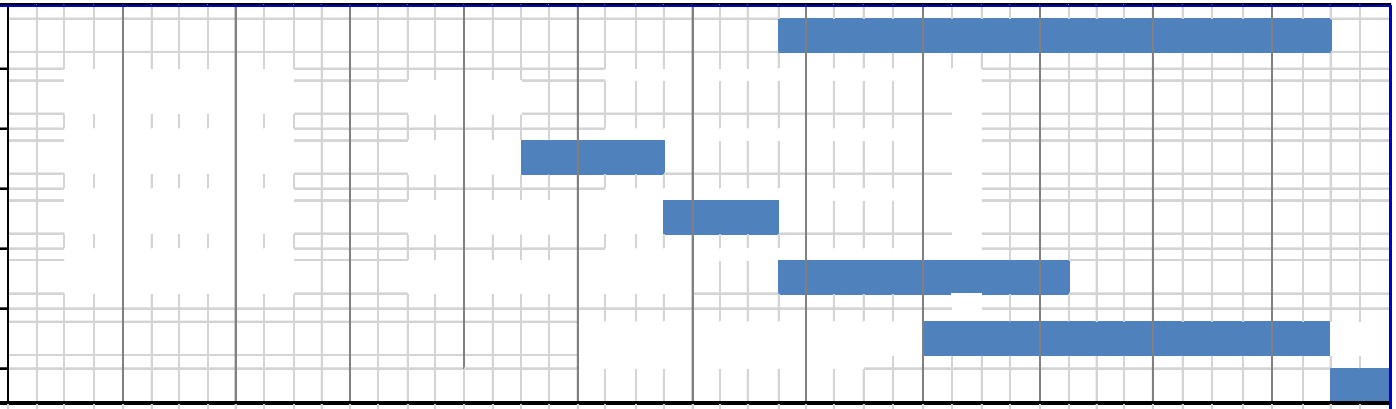
2.If the percentage is not quoted in Sl. B above or 'NIL' is not indicated, it shall be considered 'NIL' for price evaluation / award.

3.Bidders to strike out (+) or (-) above, as applicable.

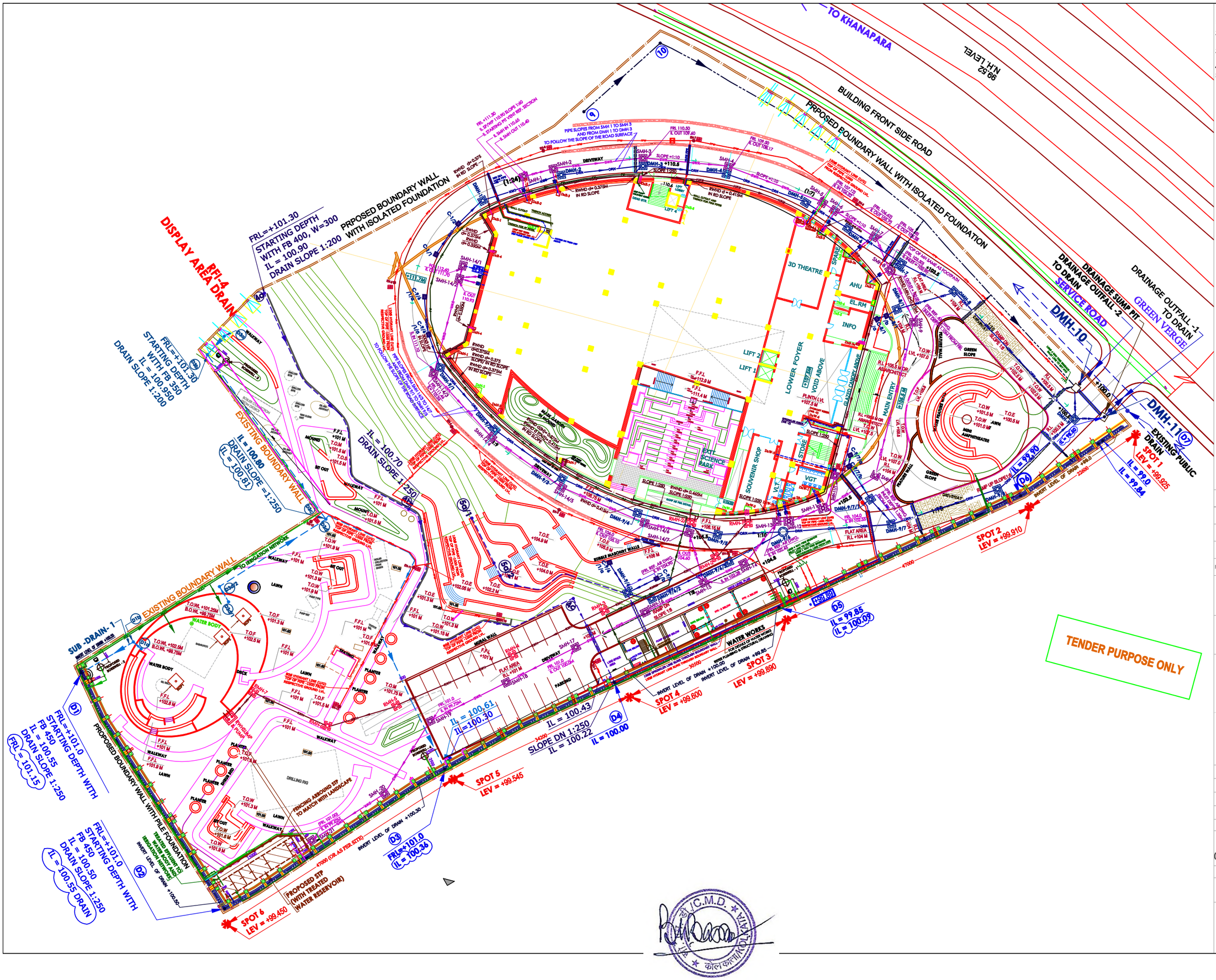
(Signed & Stamped by the Bidder)

BAR CHART FOR EXTERNAL CIVIL WORKS AT K D MALAVIYA NATIONAL OIL MUSEUMS

Project Task Information		Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
Sl. No.	Project Task												
1	Mobilization (men, materials, site office, temporay road, equiment etc)												
2	**Substructure for Under Ground Water Tank**												
a	Excavation,Foundation work upto PL												
b	Backfilling												
3	**Super-structure for Under Ground Water Tank**												
a	Concreting (Column, beam ,roof)												
b	Masonary & associated work												
c	Internal plastering & finishing works												
d	External plastering & finishing works												
e	Water proofing and related works												
4	**Retaining Wall**												
a	Excavation												
b	Backfilling												
c	Concreting												
d	Plastering works												
5	**Peripheral Roads**												
a	Land development works including dressing, earth cutting, filling, ramming, box cutting, compacting base & WBM etc.												
6	**Security Room**												
a	Excavation												
b	Backfilling												
c	Concreting (Column, beam, roof)												
d	Masonary & associated work												
e	Internal plastering & finishing works												
f	External plastering & finishing works												
g	Fixing of door, windows and related works												
h	Tiles works												
i	Internal & external painting and finishing work												

7	**Internal Electrical works in Securing Room**	
8	**Parking Area & Drainage Works**	
a	Excavation	
b	Backfilling	
c	Concreting	
d	Masonary & associated work	
9	**Site Clearance**	

Note: This is indicative bar chart only. Successful vendor shall prepare their own bar chart for completion of work within the stipulated time as per tender conditions.



NOTES:-

1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE SPECIFIED.
2. INPUT DRG.NO :
   TD - LP - 101, REVISION R0.
3. MINOR MODIFICATIONS MAY BE CARRIED OUT AT SITE TO SUIT SITE CONDITION.
4. ALL PIPE SIZES ARE IN mm & NOMINAL DIA ONLY.
5. UNLESS STATED OTHERWISE THE FOLLOWING NORMS SHOULD BE FOLLOWED :
   - 5.1 DEPTH OF THE PIPES FROM FGL.
     - WATER SUPPLY PIPES : 0.75 M FROM FGL.
     - FIRE FIGHTING PIPES : 1.00 M FROM FGL.

LEGEND:-

- STORM WATER DRAINAGE LINE.
- SEWERAGE LINE.
- RAIN WATER HARVESTING LINE.
- FILTER WATER SUPPLY LINE (FROM WTP).
- TREATED EFFLUENT WATER (FROM STP).
- RAW WATER SUPPLY LINE (FROM BOREWELL).
- FIRE HYDRANT LINE.
- FIRE SPRINKLER LINE.
- CROSS DRAIN.
- ROAD / GROUND SLOPE.
- FLOW DIRECTION OF SERVICE LINE.
- GULLY PIT 300 X 300
- CATCH PIT 550 X 450
- GREASE TRAP
- MANHOLE CHAMBER 800 X 900
- MANHOLE CHAMBER 1200 X 900
- 1200 DIA MANHOLE
- HYDRANT VALVE.
- 4 WAY FIRE BRIGADE INLET.
- HOSE BOX.
- GATE VALVE WITH VALVE CHEMBER.
- HUME PIPE.
- CONTROL PANEL.

REV MKD	DATE	DESCRIPTION	DEALT	CHKD	APVD

NAME OF OWNER
CREATIVE MUSEUM DESIGNERS
NATIONAL COUNCIL OF SCIENCE MUSEUMS
MINISTRY OF CULTURE ::: GOVERNMENT OF INDIA

PROJECT NAME
K D MALAVIYA NATIONAL OIL MUSEUM AT GUWAHATI : ASSAM

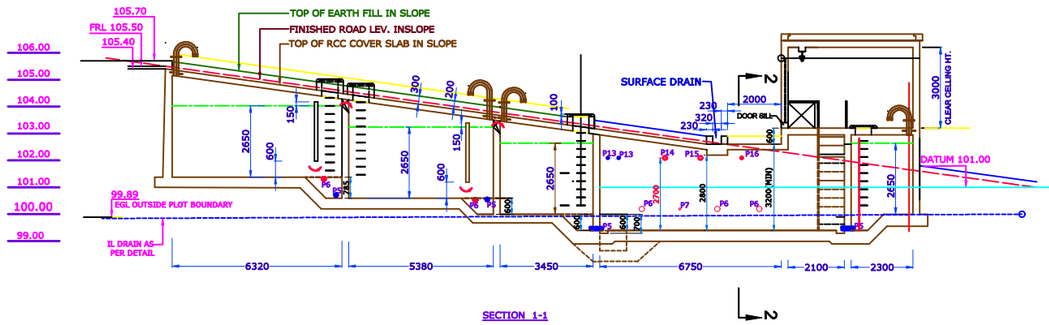
ARCHITECT INDRANIL SEN
ARCHITECTURE INTERIOR URBANISM LIFESTYLE
E-MAIL - indranilsen.net@gmail.com :: WEBSITE - arindranilsen.in

PLB & FF CONSULTANT
LALIT KUMAR BOSE
46/A, S. N. Roy Road, Kolkata-700038
E-MAIL - lalit267.bose@gmail.com :: (M) -9903111760

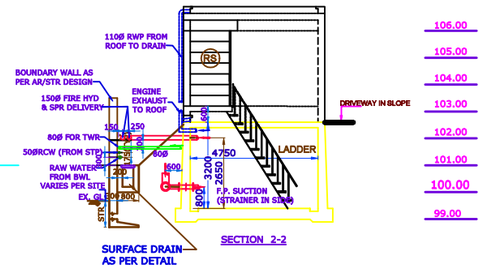
PLUMBING (CS)	FOR TENDER
DEALT : A. GHOSH	SCALE : 1 : 300
CHECKED : L.K.BOSE	SIZE : A1
APPROVED : L.K.BOSE	DATE : 30.07.2022
JOB NUMBER :	DRG CODE : OMG - 30001
FILE NAME : LKB-OMG/MB-PLB - 0001- mp csd	

DRAWING TITLE
MASTER PLAN
(COMBINED PLUMBING AND FIREFIGHTING LAYOUT)

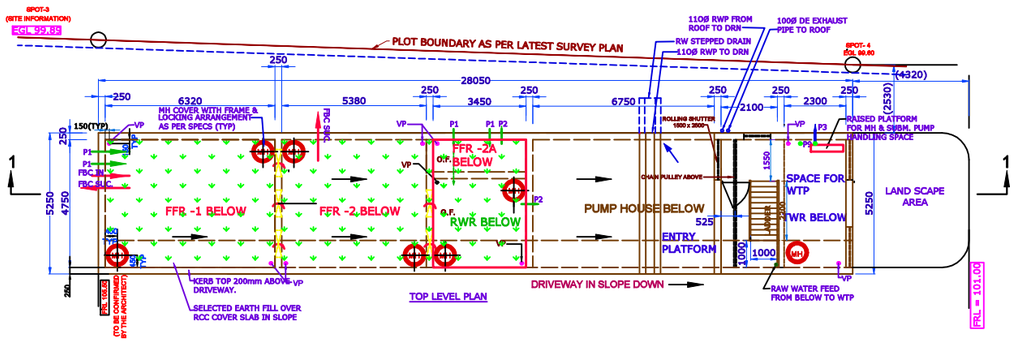
DRAWING NUMBER	REVISION
LKB - OMG / MB-PLB - 0001	T0



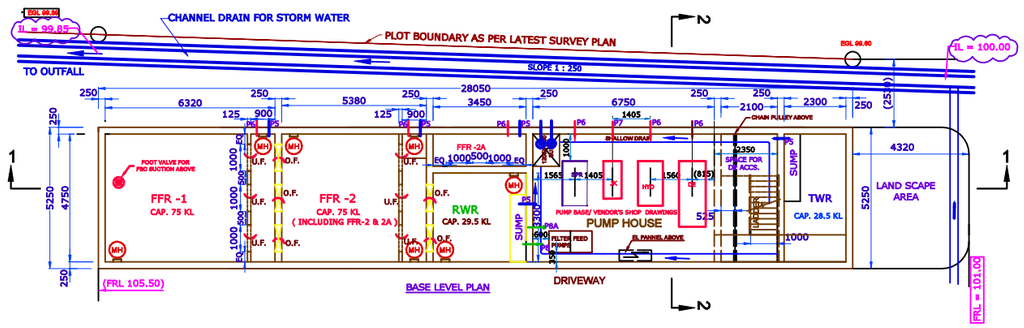
SECTION 1-1



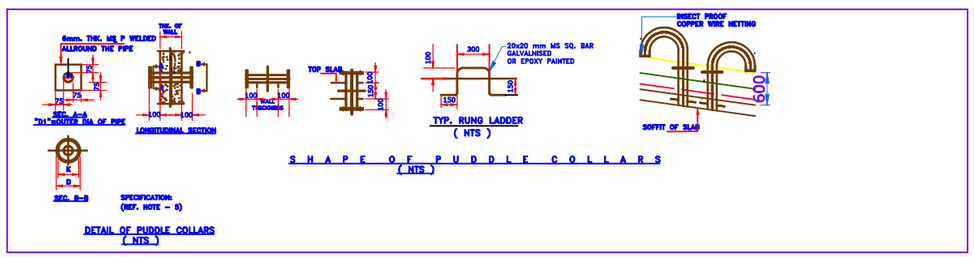
SECTION 2-2



TOP LEVEL PLAN



BASE LEVEL PLAN



TENDER PURPOSE ONLY

SCHEDULE OF PUDDLE COLLARS

MK	NO. OFF	DIA (mm)	LOCATION	PURPOSE	INVERT / BOTTOM LEVEL
P1	2	100	FFR-1 WALL	INLETS	INVERT LEVEL 100mm AWL
	2		RWR, FFR-2A WALL		
P2	1	150	FFR-2A WALL	OVERFLOW	INVERT LEVEL 25mm AWL
	1		RWR WALL		
P3	1	100	TWR WALL	OVERFLOW	25mm AWL
P4	6	100	FFR TOP SLAB	TOP VENT	BOTTOM FLUSH WITH TOP SLAB
	2		RWR TOP SLAB		
	2		TWR TOP SLAB		
P5	5	100	FFRs,RWR & TWR SIDE WALLS	WASHOUT IN SUMPS	100mm BELOW BED LEVEL
P6	3	200	FFR-1,FFR-2, 2A	FF PUMP SUCTIONS	REF. DETAILS
	3	200	PH WALL		
P7	1	80	PH WALL	FF JOCKEY SUCTION	REF. DETAILS
P8	1	80	PH / RWR WALL	FILTER FEED SUCTION	REF. DETAILS
P8A	2	80	ON PH / RWR WALL	RAW WATER SPARE DELIVERY	ONE END PLUGED REF. DETAILS
P9	1	100	TWR COVER SLAB	FILTERED WATER INLET	SOFFIT OF SLAB
P10	1	80	TWR WALL	FILTERED WATER DELIV.	100mm ABOVE TWL
P11	2	150	FFR1 & FFR2 WALL	FBC INLET	REF. DETAILS
P12	1	150	FFR1 WALL	FBC SUCTION OUTLET	REF. DETAILS
P13	2	50	PH WALL	SUMP PUMP DELIVERY	REF. DETAILS
P14	1	150	PH WALL	SPR DELIVERY MAIN	REF. DETAILS
P15	1	150	PH WALL	HYD DELIVERY MAIN	REF. DETAILS
P16	1	200	PH WALL	DE EXHAUST	REF. DETAILS

NOTES:-

1. ALL DIMENSONS ARE IN mm UNLESS OTHERWISE SPECIFIED.
2. INPUT DOCUMENT / DRAWINGS
2.1 DESIGN BASIS REPORT (DBR) OF PLB & FF WORKS WITH FIRE RESERVOIR CAPACITY OF 150 Cum.
2.2 SITE PLANS OF ARCHITECT / LANDSCAPE ARCHITECT.
3. SURFACE FINISHINGS & WATER PROOFING SHALL BE DONE AS PER CIVIL WORKS SPECIFICATIONS.
4. MINOR ADJUSTMENT IN MEASURMENTS OF WATER STORAGE TANKS, & ENTRANCE AREA MAY BE DONE TO SUIT ARCHITECTURAL & STRUCTURAL DESIGN, WITHOUT ALTERING THE WATER STORAGE CAPACITIES.
5. SPECIFICATION OF PUDDLE COLLARS:

PIPES OUT OF MS HEAVY GRADE AS PER IS:1239 UP TO 150 MM DIA AND IS: 3589 ABOVE 200 MM DIA WITH 6.35 MM WALL THICKNESS.

FLANGES: IS 6392 (TABLE-5 & TABLE-9).
D= Flange Dia.
K= PITCH CIRCLE DIA.
NUTS & BOLTS: MS IS 1364.
WELDING:IS 816,OR AS PER CIVIL WORK SPECIFICATION.
FINISHING: TWO COATS OF EPOXY PRIMER & TWO COATS OF EPOXY FINISHING.

LEGEND

T1 / T2 / T3	THICKNESS OF BASE SLAB WALL AND COVER SLAB AS PER STRUCTURAL DESIGN
TWL	TOP OF WATER LEVEL
FFR-1	FIRE FIGHTING RESERVOIRS
RWR	RAW WATER RESERVOIRS
TWR	TREATED (FILTERED) WATER RESERVOIR
O.F	OVERFLOW
U.F.	UNDERFLOW
AWL	ABOVE TOP WATER LEVEL
PH	PUMP HOUSE

REV MKD	DATE	DESCRIPTION	DEALT	CHKD	APVD
P1	22 MAR 2022	I.L.s DRAIN MATCHED WITH SKETCH SHEET LP-SK-101MAILED ON 17.03.2022	S.S.	A.G.	L.K.B

NAME OF OWNER
CREATIVE MUSEUM DESIGNERS
NATIONAL COUNCIL OF SCIENCE MUSEUMS
MINISTRY OF CULTURE ::: GOVERNMENT OF INDIA

PROJECT NAME
K D MALAVIYA NATIONAL OIL MUSEUM AT GUWAHATI : ASSAM

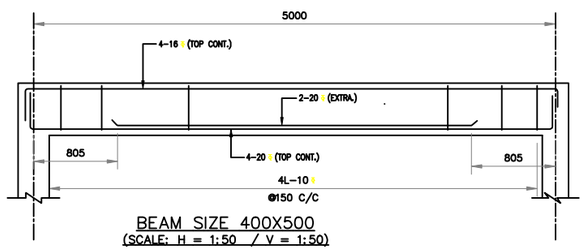
ARCHITECT
INDRANIL SEN
ARCHITECTURE INTERIOR URBANISM LIFESTYLE
E-MAIL - indranilsen.net@gmail.com : WEBSITE - anindranilsen.in

PLB & FF CONSULTANT
LALIT KUMAR BOSE
46/A, S. N. Roy Road, Kolkata-700038
E-MAIL - lalit267.bose@gmail.com : (M) - 9903111760

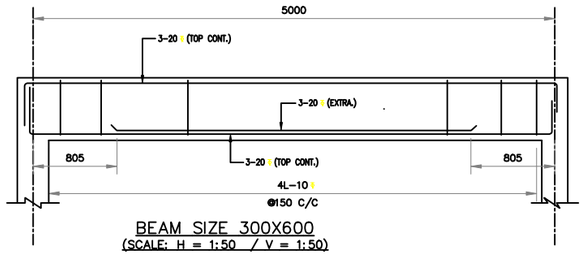
PLUMBING (WS)	FOR DESIGN DEVELOPMENT
DEALT : BS / KM	SCALE : 1: 100
CHECKED : L.K.BOSE	SIZE : A1
APPROVED : L.K.BOSE	DATE : 29.11.2021
JOB NUMBER :	DRG CODE : OMG-30032
FILE NAME : LKB-OMG/MB-PLB - 0032 - ws det wwks	

DRAWING TITLE
WATER WORKS
CIVIL PROFILE & PUDDLE COLLARS

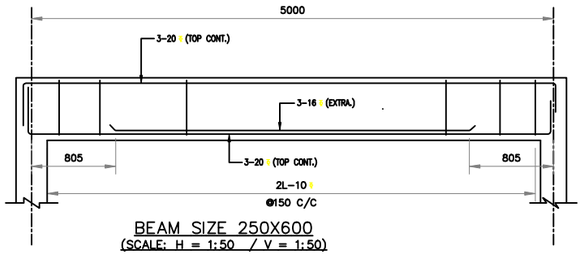
DRAWING NUMBER	REVISION
LKB - OMG / MB - PLB - 0032	P0



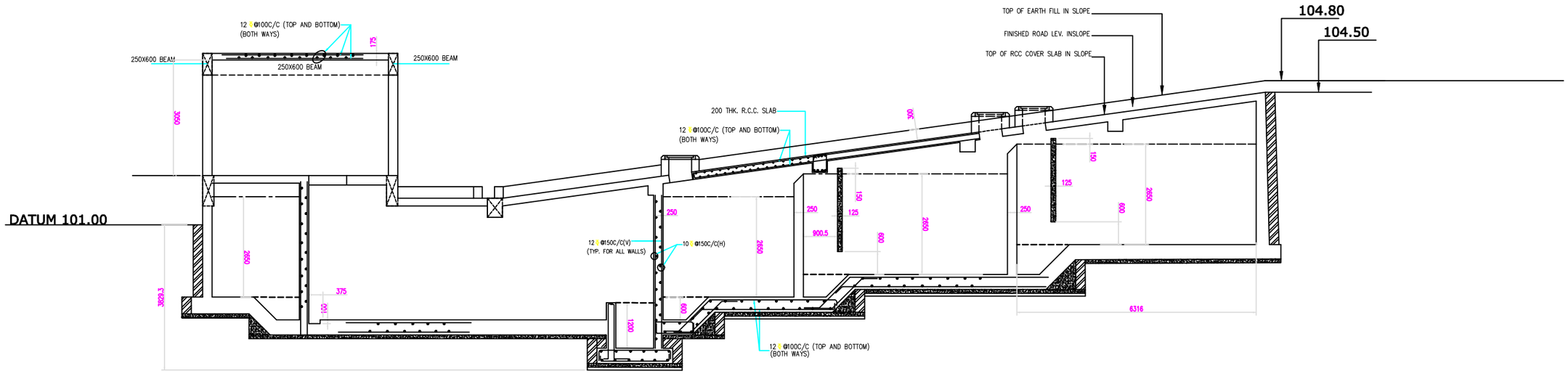
BEAM SIZE 400X500
(SCALE: H = 1:50 / V = 1:50)



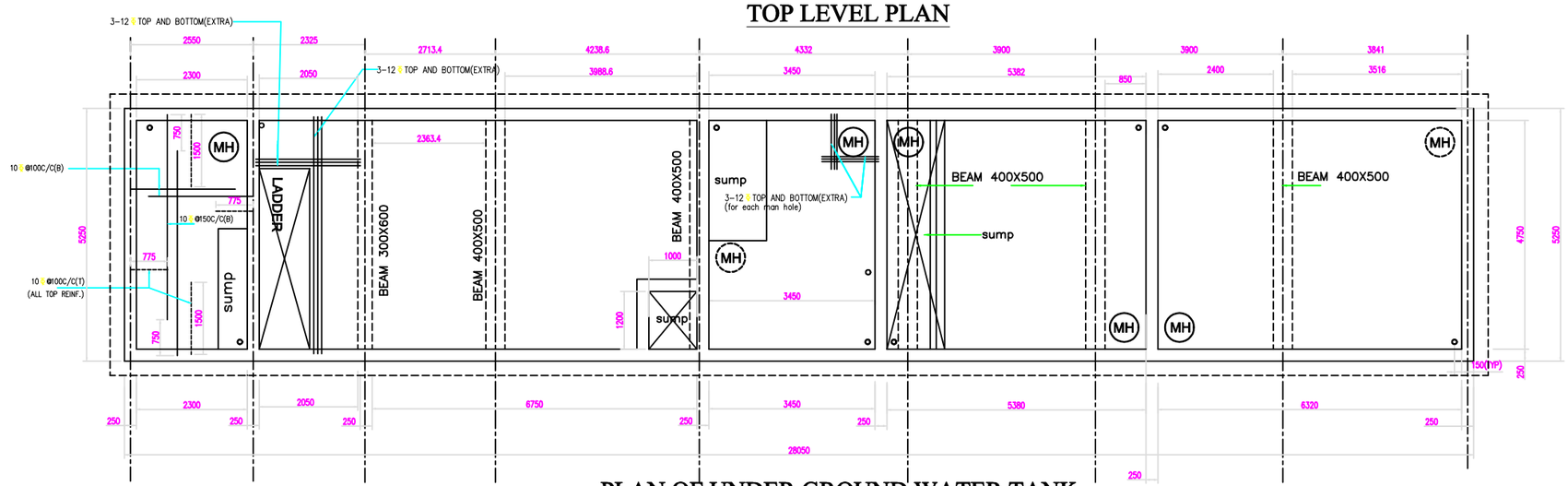
BEAM SIZE 300X600
(SCALE: H = 1:50 / V = 1:50)



BEAM SIZE 250X600
(SCALE: H = 1:50 / V = 1:50)



SECTION 1-1



TOP LEVEL PLAN

PLAN OF UNDER GROUND WATER TANK

TENDER PURPOSE ONLY

ARCHITECTS
KOTHARI & ASSOCIATES
ARCHITECTS, ENGINEERS & TOWNPLANNERS
14B CAMAC STREET , KOLKATA–17
PHONE: 2281–4350, 2281–4276
EMAIL: kothari_associates_kolkata@airtelmail.in

PROJECT

PROPOSED BUILDING FOR
K D MALAVIYA NATIONAL OIL MUSEUM
AT GUWAHATI, ASSAM.

TITLE
UNDER GROUND WATER RESERVOIR
DETAIL

SCALE:–
DATE:– 08.04.2022