PART - I

NATIONAL LAW UNIVERSITY,ODISHA
KATHAJODI CAMPUS, NARAJ
CUTTACK

TENDER DOCUMENT FOR CIVIL AND EXTERNAL DEVELOPMENT WORK FOR NATIONAL LAW UNIVERSITY CAMPUS WORKS

NAME OF THE WORK	**:**	**CIVIL AND EXTERNAL DEVELOPMENT WORK OF NATIONAL LAW UNIVERSITY CAMPUS:**
PLACE OF SUBMISSION OF THE TENDER PAPER	**:**	**At the office of the Vice Chancellor National Law University Odisha . At- Naraj, Cuttack - 753015, Odisha**

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CIVIL, EXTERNAL DEVELOPMENT AND FIREFIGHTING WORK FOR NATIONAL LAW UNIVERSITY CAMPUS WORKS

INDEX

CONTRACT DATA

A. GENERAL INFORMATIONS

Sl. No.	Item	Details
1.	Name of the work	Civil and External development works for National Law University, Odisha.
2.	Employer	National Law University, Odisha (NLUO)
3.	Employer's Representative	PMC / Project Management Consultant (PMC)

B. BID INFORMATION

Sl. No.	**Item**	**Details**
1.	Intended completion period / Time period assigned for Completion.	9(Nine) English calendar months.
2.	Last Date and time of submission of BID	Date : 09.12.2016
		Time: 3 : 00 P.M. (15 : 00 hrs).
3.	Cost of Bid Documents	
	i. Bank draft amount	Rs. 10,500 00 . 00 (Rupees Ten thousand five Only)
	ii. In Favor of	The Registrar, National Law University, Odisha, Naraj, Cuttack-753015, Odisha
	iii. Payable at	Cuttack
4	BID Security	
	i. Amount	Rs. 29,00,000 . 00 (Rupees Twenty Nine Lakhs Only)
	ii. In favor of	The Registrar, National Law University, Odisha, Naraj, Cuttack-753015, Odisha
	iii. Payable at	Cuttack
5.	Pre-Bid Meeting	Date: 02.12.2016 at NLUO at 3 : 30 PM.
6.	BID validity period	4 (Four) months from the opening of price bid.
7.	Currency of Contract	Indian National Rupee
8.	Language of Contract	English

NOTICE INVITING TENDER

National Law University Odisha invites sealed tenders from the contractors on item rate basis for Civil and External development works of proposed National Law University Campus at Naraj, Cuttack, ODISHA, details of tenders are as under.

a.	Name of the work	:	Civil and External development work of National Law University ,Odisha Campus
b.	Time allowed for completion	:	9 Months for the total works from the date of issue of LOI.

Brief division of work will be done as follows

Time period to be fixed 9 (Nine) months, which includes the following the Part (A) and Part (B) work with operational from the date of execution of work as per the following

Part (A) to be completed by 4 (four) Month from the date of issue of LOI.

PART –A

(a) Library building Civil, P.H. Electrical and Firefighting work.

PART –B

(I) All External Development :

(a) Road Rain water, Drainage etc.
(b) Boundary wall
(c) Site development
(d) Recharge Pit
(e) Watch Tower.
(f) Fire Fighting UG sump & pump room.
(g) Domestic and treated water supply
(h) Bore well.
(i) Landscaping
(j) O.H.T, cum pump house
(k) Rain water collection room
(l) Ext. sewerage system
(m) U.G.R (125 Cum with pump house 4nos)
(n) U.G.R (150 Cum with pump house)
(o) External electrical work
(p) Fire fighting system.

Part (B) Balance construction which includes second and third floor to be completed and operational in all respect on or before 270 days (9 months) from the issue of LOI / work order.

c.	Earnest money deposit	:	Rs29,00,000.00(Rupees Twenty Nine lakhs)
d.	Security deposit	:	5% of the contract value

e.	Sale of tender document date	:	19.11.2016
f.	Cost of Tender document	:	Rs 10,500.00 (Rupees Ten thousand five hundred only)
g.	Last date & time of receipt of tender	:	09.12.2016 at 3:00 P.M.
h.	Pre bid meeting		02.12.2016 At NLUO, Naraj Site at 3:30 P.M.
i.	Address at which the tenders are to be submitted	:	The Vice Chancellor National Law University ODISHA . Naraj, Cuttack - 753015, ODISHA
j.	Date & time of opening tenders:		09.12.2016 at 4 : 00 P.M (16 : 00 Hrs)
k.	Place of opening tenders:		At the office of The Vice Chancellor National Law University Odisha . Naraj, Cuttack - 753015, ODISHA.
l.	Validity of offer:		4 (Four) months from the opening of price bid.
m.	Liquidated Damages.		0.5% of the estimated contract value shown in the tender per week subject to a maximum of 5% of the accepted tender amount.

In case the date of opening of tenders is declared as a holiday , the tenders will be opened on the next working day at the same time.

National Law University Odisha has the right to accept/ reject any / all tenders without assigning any reasons.

For and behalf of National Law University Odisha .

n. Technical Bid Criteria

Contractors who successfully executed similar works may apply on or before ….., 03:00P.M. their tender can only be opened.

1. Basic criteria for pre-qualification of contractors/Firms:

    a. Intending contractors/firms should have minimum 7 years experience in the construction field.

    b. Intending contractors/firms should have successfully completed one similar type of works in for Government/PSUs/ CPWD/PWD (State), reputed corporate etc. during last seven years.

c. Intending contractors/firms should have successfully completed similar type of works previous day of last date of submission of tender, under as on for Government/PSUs/ CPWD/PWD (State)/ corporate etc. during last 5 (five) years.

i. Three similar works each costing not less than Rs. 12.00 Crores in last five years

ii. Two similar works each costing not less than Rs18.00 Crores in last five years.

iii. One similar works costing not less than Rs 24.00 Crores in last five years.

Similar work means: Civil, P.H, Electrical, External development and Firefighting work etc.

d. Intending contractors/firms should be financially capable and should submit solvency certificate for an amount of Rs. 1.00 Crore from any Nationalized Bank.

e. Annual turnover of the renderer during last three financial year (2013-14,2014-15,2015-16 should be at least Rs. 30.00 Crores in one of the year or the total turnover last three financial year as mentioned should be minimum Rs. 60. 00 Crores.

f. Intending contractors/firms should be financially capable and should submit solvency certificate for an amount of Rs. 1 crores from any Nationalized Bank.

g. Intending contractors/firms must have sufficient experienced personnel, technical knowhow, establishment, plant/equipment to complete the project well in time.

2. The interested Contractors/firms may apply in the prescribed format (as per Annexure-I)
The eligible Contractors/firms may obtain prescribed format from

a. Office of The Vice Chancellor, National Law University Odisha, Naraj, Cuttack - 753015, ODISHA (from 10 AM to 5 PM from Monday to Friday and 10 AM to 2 PM on Saturday).

The prescribed format duly filled in with all necessary particulars as stated in the prescribed format along with attested copies of certificates/credentials regarding jobs undertaken at various organizations should be submitted in a sealed cover super scribing "Pre-qualification of Contractors for civil and external development work at NLUO" at the following address on or before 09.12.2016 by 03:00PM **The Vice Chancellor, National Law University Odisha. Naraj, Cuttack - 753015, ODISHA.**

3. Selection will be made based on particulars and documents furnished by the applicant as required and satisfactory verification carried out by the PMC / NLUO. Incomplete information in the application will lead to summary rejection. If any information furnished by the applicant is found incorrect at a

later stage, they shall be liable to be debarred from tendering/taking up the work. NLUO reserves the right to verify the particulars furnished by the applicant independently.

4. **The successful bidder after qualifying the technical bid (Envelope-A) are requested to come up with a Power Point Presentation upon their credibility & on their successfully similar executed works etc. on dtd. 10.12.2016 at 11.00 A.M. at NLUO Campus**

5. For any other clarifications, intending agencies may contact at The Vice Chancellor above mentioned address before the last date of submission during working hours as mentioned above.

6. Incomplete applications and applications not filled properly with requisite details are liable for rejection and NLUO will not entertain any further communication in such cases.

7. The NLUO reserves the right to accept or reject any or all applications without assigning any reasons whatsoever.

8. Pre-bid meeting with all contractors shall be held at NLUO site Office at Cuttack, seven days from issue of publication i.e. on dt 02.12.2016 at 03:30 PM at NLUO site office at Cuttack, wherein contractors can clarify any doubts /discrepancies in documents Tendered drawings , and indicate only missing or any item taken extra in the description of item, Tendered drawings or any details conveying different meaning at different places, other missing details or any missing item in Tendered drawings/ Specifications / Conditions. All queries needs to be put up in writing to the " The Vice Chancellor, NLUO, Cuttack within 7 days from the date of issue of this document. No further clarifications shall be given by NLUO and contractor shall not claim any extra payment in future. Also contractor shall not be entitled for any claim on such issues at later date.

   All the queries should be brought out during the Pre-bid meeting only in writing.
   All the queries shall deliberated and corrective action if any shall be taken during the Pre- Bid meeting.

9. No interest shall be paid on Earnest Money Deposit and Retention money or any other securities.

10. Amendment of Bidding Documents:
    i. Any addendum thus issued shall be part of the bidding documents and shall be notified in the website www.nluo.ac.in.
11. All pages of tender document should be signed by Contractor, NLUO, PMC

The Vice Chancellor
National Law University Odisha.
Naraj, Cuttack - 753015, Odisha

TENDERS SHOULD BE SUBMITTED AS FOLLOWS :

1. Tenders are to be submitted on the printed forms issued by us. The Contractor should quote the rates in figures as well as in words. Special care should be taken to write the rates in figures only in such a way that interpolation is not possible. The total amount should be written both in figures and in words . In case of figures, the words . “Rs” should be written before the figure of rupees and words “p” after the decimal figures e.g. Rs. 2.15 “p” and incase of words, the words the word “Rupees” should precede and the word “Paise” should be written at the end, Unless the rate is in whole rupees and followed by the words “only” it should invariably be upto two decimal places . While quoting the rate in schedule of quantities , the words “Only” should be written closely following the amount and it should not be written in the next line. The amount of each item shall be worked out and the requisite total shall be given. All corrections shall be attested by the initials of the Tenderers . In case of any discrepancy / difference, the rate quoted in words in the original copy of the tender and the amount derived there from shall prevail and be binding . If the rates in words are not written, the Tender will be rejected.

2. ENVELOPE MARKED “PART-A”

   Envelope marked “PART-A” shall contain the following Documents :

   a. Forwarding letter along with the organization profile.

   b. Earnest money deposit furnished in the form of Crossed demand Draft / Banker’s cheque drawn in favour of “ The Registrar, NATIONAL LAW UNIVERSITY ODISHA ” and payable at Cuttack for the amount indicated in the Notice Inviting Tender.

   c. Latest photocopies of upto date Income Tax and Sales tax Clearance and turn over Certificate.

   d. Completion certificate towards similar type of works executed.

   e. Copy of Firm / Company registration certificate, PAN Number, Tin Number, PF Number, Service tax certificate.

   f. Intending contractors/firms should be financially capable and should submit solvency certificate for an amount of Rs. 1 crores from any Nationalized Bank, (Validity – 1 year).

   g. The term and conditions which are of commercial and technical nature if any that the tenderer wishes to stipulate.

   h. Organizational man power and equipment detail.

   i. Any other papers the tenderer wishes to submit.

j. Note : All the document shall be annexed as per the above mentioned order.

k. All document shall be signed and stamp.

l. All the above mentioned original document shall be produce at the time of technical bid verification.

Note : All the document shall be annexed as per the above mentioned order.
All document shall be signed and stamp.
All the above mentioned original document shall be produce at the time of technical bid verification.

3. ENVELOPE MARKED "PART-B"
Envelope marked" PART-B" shall contain the Priced Tender Volume in duplicate –Marked "ORIGINAL" & "DUPLICATE", on the body of the tender paper issued in which case the tender may be liable for rejection.

4. ENVELOPE MARKED "PART-C".

Envelope marked No-PART"A" & "B" shall be put in large envelope of adequate size marked "PART-C" which shall be properly sealed. This envelope, which shall be, endorsed on the outside face "TENDER OF CIVIL AND EXTERNAL DEVELOPMENT WORK FOR NATIONAL LAW UNIVERSITY CAMPUS WORKS AT NARAJ, CUTTACK, ODISHA FOR NATIONAL LAW UNIVERSITY ODISHA ".

Outer envelope (Marked "PART-C") containing the separate tender documents as mentioned herein above shall be opened in the office of the Vice Chancellor, National Law University Odisha , Naraj, Cuttack - 753008, Odisha. at 09.12.2016, at 16.00 hrs in the presence of the representatives of the Architect and of those tenderers who chose to remain present.

Envelope "PART-A" containing earnest money deposit shall be opened first and if the Earnest money deposit is not found as prescribed the tender shall be rejected and other sealed envelope will be returned unopened to the representatives of the concerned tender if present. Then the covering letter without mentioning the tender amount arrived from the quoted rates and other documents as specified herein above will then scrutinized and comments/conditions which has financial implication will be evaluated by the Architect / the Employer may discuss comments / conditions with the tenderers .

Envelope "PART-B" containing the priced tender volumes in original and duplicate will be opened on the same day i.e., on 09.12.2016 at 16.00 hrs.

The acceptance of the tender will be made by the N.L.U.O who does not bind himself to accept the lowest or any other tender or part thereof. No reasons will be furnished for acceptance and rejection of the tender.

FOR AND ON BEHALF OF
NATIONAL LAW UNIVERSITY ODISHA ,
NARAJ, CUTTACK, ODISHA

1.0 **Scope of work.**

Sealed tenders are invited by "National Law University Campus at Naraj, Cuttack, ODISHA, for Civil and External development works of for National Law University Odisha Campus Works at Naraj, Cuttack ODISHA.

1.1 Site & location.

The proposed work is to be carried out at Naraj, Cuttack, ODISHA .

2.0 **Tender Document.**

2.1. The work has to be carried out strictly according to the conditions stipulated in the tender consisting the following documents and the most workman like manner.

Instruction to tenderers.
General condition of contract.
Special Condition of Contract.
Technical Specifications.
Additional specification.
Tendered drawings.
Price Bid.

2.2. The above documents shall be taken as complementary & mutually explanatory of one another but in case of ambiguities or discrepancies , shall take precedence in the order given below.

a) Price Bid.
b) Additional Specifications.
c) Technical Specifications.
d) Tendered drawings.
e) Special Condition of Contract.
f) General Condition of Contract.
g) Instruction to Tenderers.

1.3. Complete set of tender document including Tendered drawings can be obtained in person from the National Law University Campus at Naraj, Cuttack, ODISHA, for Civil and External development works for National Law University Campus Works at Naraj, Cuttack ODISHA , between 10.00 to 17.00 hrs. on any day except holiday during the period mentioned in the Notice Inviting Tender on payment of Rs. 10,500.00 by means of demand draft drawn in favor of "The Registrar, National Law University ODISHA" Naraj, Cuttack, ODISHA.

1.4. The tender documents are not transferable.

3.0 Site Visit.

The Tenderer must obtain himself on his own responsibility and his own expenses all the information and data which may be required for the purpose of filling his tender document and enter into a contract for the satisfactory performance of the

work. The tenderer is requested satisfy himself regarding the availability of water, power, transport and communication facilities, the character quality and the site quantity of materials, labour, the law & order situation, climatic conditions local authorities requirement, traffic regulations etc.

4.0 Scope of Demolition work

a. The contractor shall undertake demolition of the building under supervision of the PMC/N.L.U.O's representatives without causing damage to neighboring structure, public utilities, lives and properties of the neighbors, persons engaged in supervision and demolition of work. The owner will not be held liable for any willful damage and loss caused to lives and properties as mentioned above and the contractor shall remain liable to indemnify on account of any loss and damages.

b. The contractor shall engage only skilled persons and supervisor who are conversant with demolition procedure, practice and safety rules.

c. The contractor shall arrange for disposal of the demolished materials from site in an organized and systematic manner without causing hindrance to N.L.U.O premises/ public and traffic.

d. Any precious material, item of antique nature found in the process of demolition shall be returned to the owner, should in the opinion of the owner the material so retrieved are of adequate significance and value.

e. The contractor shall pay the net salvage value to owner on account of demolition work in the form of a bank draft / bank Guarantee issued from a nationalized bank during the executive of the contract agreement.

f. The demolition shall include the removal of all structures upto bottom of foundation including taking our foundation and refilling the same with consolidated earth and leveling the site as directed by the consultant.

g. Articles of the following nature are considered to be the property of the NLUO and shall not be within the scope of the contract and shall not be taken away by the contractor.

Tube well with hand pump
Electrical accessories with fans, lights etc.
Loose furniture made of timber or steel, work station, partitions etc.
Trees and plantations

h. All buildings and structures including services over ground and under ground related to the building and structures inclusive of foundations within the area to be cleared except those mentioned as stated above shall be dismantled and removed away from the site. Simultaneously with dismantling, all debris are to be removed from the site in, conformity with the local bye laws and municipality regulation.

i. Any services running through the site but serving other areas / sites shall be diverted by the NLUO prior to handling over the site or on receipt of intimation from the contractor during dismantling of existing structure. The diverted services should in no way be disturbed. If any disruptions of the services occur due to

activities of the contractor, it will have to be restored by the contractor forthwith at their own cost.

j. a: The contractor shall not be allowed to use any area outside the area to be cleared for stacking of materials or any other purpose, whatsoever.

b: Salvaged materials shall not be stored on the site except upon the specific approval of the PMC/NLUO.

The work of dismantling and removal of dismantled materials must be done in such a way so as to cause no damage to any neighboring structures, properties or disturbance to public. The contractor must take all precautions, necessary for the safety of public and properties around the area and against injury to or loss of life to his workmen. Any such damage or loss shall be the Contractor's liability.

k. STANDARD SPECIFICATIONS:

i. The demolition work should be carried out as per I.S. Code of Practice No. 4130:1967 (Safety Code of Demolition of Buildings).

ii. The contractor shall provide all necessary plants and materials, labour, transport etc. required for complete the proposed demolition and removal of the materials.

iii. The contractor shall obtain necessary permission from the Municipality and/or any other authority that may be required for demolition of the structures etc. Necessary fees if required shall be paid by the Contractor and no separate payment on this account will be made to him.

iv. The contractor shall provide in suitable places substandard barriers in boarding and such additional safeguards that may be required to protect the

public from injury or damage of any kind due to the work under this contract and shall maintain such protection until the completion of this work. He shall arrange to pay all Municipal fees and other legal charges that may have to be paid and keep the NLUO free from any liability in this respect.

v. No encroachment of roads will be allowed for storing dismantled materials to avoid inconvenience of operation of the N.L.U.O activity, vehicular traffic and pedestrians.

vi. Shelter or stay for the labourers has to be arranged by the Contractor.

The tenderer will be fully responsible for considering the financial effect of any or all the factors while submitting the tender.

5.0. Earnest Money.

5.1. The tenderers are requested to submit the earnest money of Rs. 29,00,000.00 in the form of Demand draft drawn in favor of " The Registrar, National Law University ODISHA, payable at Cuttack.

5.2. EMD in any other form other than as specified above will not be accepted. Tender not accompanied by the EMD is liable to be rejected.

5.3. No interest will be paid on the EMD.

5.4. EMD of unsuccessful tenderers will be refunded with in 30 days of award of contract.

5.5. EMD of successful tenderer will be retained as a part of security deposit.

6.0. Initial Security Deposit.

The successful tenderer will have to submit a sum of equivalent 1% of the contract value less EMD by means of D/D drawn in favor of " The Registrar, National Law University ODISHA payable at Cuttack within a period of 15 days of the acceptance of tender.

7.0. Security Deposit.

7.1. Total security deposit shall be 5% of the contract value. Out of this 2% of contract value is in the form of initial security deposit which includes the EMD. Balance 3% shall be deducted from the running account bill of the work at the rate of 5% of the respective running account bill i.e. deduction from each running bill account will be 5% till total 5% of contract value is reached. 50% of the total security shall be paid to the contractor on the basis of PMC certifying the virtual completion. The Balance 50% would be paid to the contractor after the defect liability period as specified in the contract.

7.2. No interest shall be paid to the amount retained by the N.L.U.O as Security Deposit.

8.0. Signing of the Contract Document.

The Successful tenderer shall be bound to implement the contract by signing an agreement and condition of contract attached herewith within 30 days from the receipt of intimation of acceptance of his tender by the N.L.U.O. However, the written acceptance of the tender by the N.L.U.O will constitute a binding agreement between the N.L.U.O and successful tenderer whether such formal agreement is subsequently entered into or not.

9.0 Validity of Tender.

Tender shall remain valid and open for acceptance for a period of Two (2) months from the date of opening of price bid. If the tenderer withdraws his/her offer during the validity period or makes modifications in his/her original offer which are not acceptable to the N.L.U.O without prejudice to any other right or remedy the N.L.U.O shall be at liberty to forfeit the EMD.

10.0. Liquidated Damage.

The liquidated damages shall be 0.5% per week subject to a maximum of 5% of contract value.

11.0 INTERIM PENALTY

11.1 The time allowed for carrying out the work as entered in the tender shall be strictly observed by the Contractor and shall be deemed to be of the essence of the contract on the part of the contractor and shall be reckoned from the 10th day after the date on which the order to commence the work is issued to the Contractor.

11.2 The work shall throughout the stipulated period of the contract be proceeded with all due diligence. Before commencing the work, the Contractor shall submit a detailed programme of work prepared in accordance with the aforesaid time schedule (Bar Chart), to the PMC, NLUO for approval. Upon NLUO's acceptance of the same, the Contractor shall proceed with the work with all the diligence and regularity. the work programme shall be verified on the first working day of each month by the Project Director, and in case it is not adhered to in any item of work stated therein, or the agreed programme remains uncommented, incomplete, or delayed, the Contactor shall be liable to pay compensation for interim delay, an amount of. Rs. 10,000.00 per day of default during the first 15 days and there after the penalty will be Rs. 25,000.00 per day. The interim penalty is refunded on making good the delay.

12.3 This amount shall be recovered from each interim bill of the Contractor, the deductions thus made being refunded only upon the Contractor making good the delay to bring the work in agreement with the detailed programme of work. However, if in the opinion of the NLUO, the delay (in any particular item of work in the whole) is of a minor nature only, and occurring due to reason beyond control, the amount so being withheld may be waived by NLUO at his sole discretion. Provided always that the entire amount withheld shall stand forfeited if the entire project is not completed by the due date or extended date of completion.

12.0. Rate and Prices.

12.1. **This is item rate tender.**

12.1.1. The tenderers shall quote their rates for individual items both. If no rate is quoted for a particular item the contractor shall not be paid for that item when it is executed. The total amount must be written both in words and figures.

The amount of each item shall be calculated and the requisite total is given. In case of discrepancy between the unit rate & the total amount calculated from multiplication of unit rate and the quantity the unit rate quoted will govern and the amount will be corrected.

12.1.2. The tenderers need not quote their rates for which no quantities have been given. In case the tenderers quote their rates for such items those rates will be ignored and will not be considered during execution.

12.1.3. The tenderers should not change the units as specified in the tender. If any unit is changed the tenders would be evaluated as per the original unit & the contractor would be paid accordingly.

The tenderer should not change or modify or delete the description of the item. If any discrepancy is observed he should immediately bring to the knowledge of the PMC/ N.L.U.O.

12.1.4. Each page of the BOQ shall be signed by the authorized person and cutting or overwriting shall be duly attested by him.

12.1.5. Each page shall be totaled and the grand total shall be given.

12.1.6. The rate quoted shall be firm and shall include all costs, allowances, taxes, levies.

SUBMISSION OF DOCUMENTS BEFORE COMMENCE MENT OF WORK

12.1.7 Before commencement of work the contractor shall submit the following documents-

(a) Performance Bank Guarantee
(b) Copy of the valid labour license.
(c) Copy of labour cess registration under building & other construction workers welfare Cess Act,1996.
(d) Copy of the ST/WCT/TOT/VAT Registration number along with the copy of document.
(e) Copy of EPF Code no./Regd no.
(f) Contractors all risk policy/Erection all Risk Policy
(g) Insurance under Workmen Compensation Act
(h) Copy of Service Tax Registration No.
(i) Copy of ESIC registration as applicable

The release of first Payment(Running Bill or any other Advance Except Mobilization Advance) shall be subject to submission of above mentioned Documents.

CHECK LIST

Sl No.	Particulars	Reference to DTCN Clause No.	Whether furnished		Reference to page No.
			Yes	No	
1	Cost of tender paper. Rs. ……..Odisha VAT) Rs. 500.00 Separatly	Sect -2, 2.3			
2	EMD	Sec- 2, 5			
3	Copy of valid registration certificate	Sect – 2, 12.1.7			
4	Copy of valid VAT (Odisha VAT) clearance certificate	Sect – 1, 0			
5	Copy of PAN card				
6	Work experience: List of project under execution / executed that are similar in nature to the work				
7	M.O.U (Memorandum of Understanding duly notarized) with eligible registered electrical contractor having valid H.T / L.T license.				
8	Qualification of key personnel engaged.	Sec – 5, 48.0			
9	List of plants and equipments	Requirement			
i	Water Tanker				
ii	Truck & Tipper				
iii	Welding Machine				
iv	Generator				
v	Mini Batcher				
vi	5 Ton Capacity winch Machine				
vii	Concrete Vibrator : Needle and Plate Type				
viii	Complete staging, shuttering, centering arrangement				

ANNEXURE -I

PARTICULARS OF THE FORM TO BE FURNISHED FOR THE PURPOSE OF PRE-QUALIFICATION OF CONTRACTORS/FIRMS.

1) Name of the Organization

2) Address

3) Year of Establishment

4) Status of the firm
(Whether Company/Firm/Proprietary)

5) Name of Directors/Partners/Proprietor.

i)

ii)

iii)

6) Whether registered with Registrar Companies/
Registrar of Firms. If so, mention number and date.

7) a) Name and address of Bankers.

i) ii)

iii) iv)

b) Enclose Solvency Certificate from the Bankers.

c) Furnish the details of NPA or dispute with Bankers, if any.

8) Whether registered for sales tax purposes. If so, mention number and date. Furnish also copies of sales tax clearance certificate.

9) Whether an assessee of Income Tax. If so, mention permanent account number.

10) Furnish copies of audited Balance Sheet and Profit & Loss Account (Audited) for the last three years i.e., as on
31.03.16-
31.03.15 -
31.03.14-

11) If you are registered in the panel of other Organizations/Statutory Bodies, such as CPWD, PWD.MES, Banks etc., furnish their names, category and date of registration.

i) ii)

iii) iv)

v) vi)

12) Detailed description and value of works done during last 7 years (As per proforma – 1 in a separate sheet)

13) Specify turnover in last 3 years. In Rs. Lakhs

2015-16
2014-15
2013-14

14) Furnish the names with address of three responsible persons who will be in a position to certify about the quality as well as past performance of your organization.

i)

ii)

15) Furnish the details of the litigation, if any, with the employers.

16) Other relevant information (As per proforma – 2 & 3)

It is certified that the information furnished is authentic. We understand that the Bank reserves the right to reject any or all applications without assigning any reasons thereof.

Date: Signature of the applicant)

Including title & capacity
In which application is made with seal.

Place:

Note: Where copies are required to be furnished these is to certified copies preferably by the concerned agencies or a Government Officer.

Enclosure to Annexure I

PROFORMA – 1
PARTICULARS IN RESPECT OF WORKS EXECUTED DURING LAST 7 YEARS (See the note below)

Sl No	Name of work/Project with Address	Short Description of work Executed	Name & Address of Owner	Value of Work Executed	Stipulated time of Completion With date of commencement	Actual time of Completion with date of completion	Name of PMC/ Consulting Engineer with Phone & Mobile no.
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**

Note: Attested copies of work completion certificates issued by the employer to be enclosed for verification by the NLUO.

Name and Signature with Seal

PROFORMA – 2

KEY PERSONNEL PERMANENTLY EMPLOYED.

Sl No.	Name	Designation	Qualification	Experience	Years With the Firm	Any other
1	**2**	**3**	**4**	**5**	**6**	**7**

PROFORMA – 3

OTHER RELEVANT INFORMATION

SL. No.	Particulars

i) WORK FORCE

Permanently Employed No. Any other Years with the firm.

a) Masons.
b) Civil Engineers.
c) Mechanics.
d) Electricians
e) Mate/Helpers
f) Others.

ii) WORKSHOP FACILITIES.

Location	Land Area	Type of Structure	Type of Facilities.
a)			
b)			

iii) LIST OF MAJOR CONSTRUCTIONAL EQUIPMENT IN POSSESSION OF THE FIRM. (Please furnish in detail)

Name and Signature with Seal

ARTICLES OF AGREEMENT

(Subject to Approval by NLUO)

This agreement is made on the _____ day of _____2016 between "NATIONAL LAW UNIVERSITY ODISHA" represented by its REGISTRAR _____ (hereinafter called "NLUO") which expression shall include their representatives, executors, administrators and assignees of the ONE PART AND M/s _____ a Company registered under Companies Act of 1956 having its registered office at _____ represented by its _____(herein called "THE CONTRACTOR") which expression shall include his/their heirs principle partners, executors, administrators and assignees of the OTHER PART.

WHEREAS NLUO is desirous of constructing NLUO Project at Naraj, Cuttack-753015, ODISHA and has caused Tendered drawings, Specifications, terms and conditions, Description of works , etc. describing the work to be done.

AND WHEREAS the said Tendered drawings, specifications, terms & conditions, , Description of works etc. have been signed by or on behalf of the parties here to.

AND WHEREAS THE CONTRACTOR has agreed and accepted to execute upon and subject to the conditions set forth herein and to the conditions set forth in contract conditions all of which are collectively (hereinafter referred to as "The said Conditions"), the works shown upon the said Tendered drawings and described in the said specifications therein amounting to the sum of Rs._____ (Rupees _____) or such other sum as shall become payable hereunder (hereinafter referred as The Said Contract Amount).

AND WHEREAS THE CONTRACTOR has deposited Rs. _____ (Rupees _____) as Earnest Money for the Proposed Civil and External development works for NLUO, to be retained with NLUO for the due performance of this Agreement.

NOW IT IS HEREBY AGREED AS FOLLOWS:

1. In consideration of the lump sum of Rs. _____ (Rupees _____) to be paid at the time and in the manner set forth in said conditions THE CONTRACTOR will upon and subject to the said conditions execute and complete the works shown upon the said Tendered drawings and such further detailed Tendered drawings as may be furnished to them by NLUO and described in the said specifications and the said Description of works including rectification of any defect therein inconformity in all respect with the provision of the contract.

2. NLUO shall pay to THE CONTRACTOR the said Contract amount of Rs._____ (Rupees _____) or such other sum as shall become payable at the time and the manner hereinafter specified in the said conditions as authorized by NLUO.

3. The said Tendered drawings, Description of works and conditions of contract and other documents herein mentioned shall form the basis of this

CONTRACT , and the decision of the said NLUO as mentioned in the conditions of contract in reference to all matters of dispute as to the materials, workmanship, the intended or interpretation of the clause of this Agreement, or any other document attached hereto shall be final and binding.

4. The following documents shall be deemed to form and be read and construed as an integral part of the Agreement. (Viz)

(i) This form of Agreement.
(ii) Letter of Intent _____dt. _____
(iii) Tender schedule, Notice Inviting Tender, Form of Tender, Conditions of Contract, Specifications and Tender Tendered drawings.
(iv) Following Correspondence.
(a) _____
(b) _____

and the parties hereto will respectively abide by and submit themselves to the Conditions and stipulations and perform the agreements on their parts respectively in such conditions, specifications.

5. NLUO AND THE CONTRACTOR bind themselves, their partners, and successors in interest, executors, administrators and assigns of administers and assigns of such other party in respect of all covenants of this Agreement.

6. The said contract comprise the works above mentioned and all subsidiary works connected therewith within the same site, as may be ordered to be done from time to time by the said NLUO even though such works may not be shown on the Tendered drawings or described in the said specifications or the Description of works but may be fairly intended for Successful completion & functioning of the project. No escalation is payable in the total project. Abnormal increase in the cost of materials or abnormal delay in completion of the project shall not be compensated for by escalation. It is explicitly instructed that the Civil Contractor shall provide for all necessary assistances as supply of tools, machinery, scaffolding materials to all and such other agencies directly engaged by NLUO in time for the execution and completion of the Works.

7. NLUO reserves to himself the right of altering the Tendered drawings and nature of work and of adding to or omitting any items of work or of having portions of
the same carried out departmentally or otherwise be carried out without prejudice to this contract and the contractors shall not be entitled to any remuneration or compensation on such work. NLUO reserves the Option of supplying Cement, Steel, finishing materials like Tiles, factory fabricated Windows with grills and glass and such other materials/ items as preferred by NLUO at the appropriate time at the agreed rate and deduct it from the contract value. The contractor shall not have any right to object to same.

8. The contractor shall not assign, sublet or transfer his/their interest in this agreement without the written consent of NLUO.

9. The contractor shall afford every reasonable facility to the representatives of the said NLUO for inspection, checking or otherwise to the site to enable them to find out the actual carrying out of all works in the manner laid down in the said conditions.

10. If the Contractor shall fail to comply with any of his obligations hereunder or shall he wind-up or his business shall be dissolved or any receiver is appointed or any attachment is made in respect of any of his properties or the Contractor shall otherwise fail or neglect to complete the said work within the stipulated period, then or on the happening of any such event the "NLUO" shall be entitled to cancel this Contract and to get the unfinished work done at the cost & risk of the Contractor by a third party & if NLUO suffers any Losses in this regard NLUO shall look to the contractor for the same viz., payment or reimbursement to such losses. The decision of the said NLUO in regard to the quantum of such losses will be final and binding on parties hereto. Upon such termination of this Contract or there shall be adjustment of any payment made to the Contractor by NLUO the Contractor shall, if required refund any such amounts to NLUO.

11. Time shall be considered as the essence of this CONTRACT and THE CONTRACTOR hereby agrees to commence the work in accordance with the said conditions and to complete the entire and all the works connected thereto or as ordered from time to time within the time period stipulated herein and to execute the same diligently and consistently throughout the entire time period so specified and the Contractor shall strictly adhere to the detailed programme for completion of work.

12. All disputes arising out of or in any way connected with this agreement shall be deemed to have arisen in Cuttack and only the courts of Cuttack shall have jurisdiction to determine the same.

13. All payments by NLUO under CONTRACT will be made at NLUO, Office of "The Registrar" NLUO . The Contractor is required to open a Bank account in the same bank as of NLUO for timely payments.

14. It is the responsibility of the contractor to ensure timely depositing of sales tax on work contract tax as per the prevailing rate during the tenure of contract period. The contractor shall be responsible for any delayed/partial payment of WCT, VAT, service Tax and all other taxes as required under statute and other prevailing laws.

15. As per Service Tax rules, applicable on construction, Service Tax is to be paid by the service provider (the contractor in this case). As per section of the Central Exercise act 1944, as extended to Service Tax, every person making Service Tax payments, shall be presumed to have passed on the incidence of such tax to client, availing the taxable service. Accordingly Service Tax incidence. % (Prevailing rates) has been passed. This statutory liability will be deposited by us along with each RA Bill and challan shall

be submitted to NLUO on before submitting next bill, In case Service Tax rate is reduced / scrap than Service Tax loaded in the lump-sum contract value shall be reimbursed to NLUO.

16. Contractor shall provide the vouchers for full quantity of any of the material brought for the project whenever asked by NLUO and be inclusive of Service tax and VAT in the rates.

17. The contractor will carry out the testing of any of the materials at his own cost from a recognized laboratory as approved by NLUO as per the relevant IS Codes before it is used in the work.

18. As per Terms & Condition of Contract no decreases or increase in Cement & Steel price/cost shall be considered by NLUO, subject to fulfillment of contractor condition. Necessary deduction towards Income tax & WCT shall be deducted and deposited. The effect of this has been loaded in contract value and no additional amount/claim is payable by NLUO.

19. All parts of this contract have been read to us and fully understood by us. As witness thereof the parties hereto have hereunto set their hands the day and year first above written.

Signed by the said NLUO: _____

In the presence of witness:

Name: _____ Name: _____

Occupation : _____ Occupation : _____

Address : _____ Address : _____

Signed by the said CONTRACTOR : _____

In the presence of witness:

Name: _____ Name: _____

Occupation : _____ Occupation : _____

Address : _____ Address : _____

FORM OF TENDER

To

The Vice Chancellor
National Law University ODISHA ,
Naraj, Cuttack - 753015, ODISHA.

Sub : Tender for Civil and External development work for National Law University Campus at Naraj, Cuttack, ODISHA.

Dear Sir,

I/We, have seen the site, read and examined and clearly understood the content in the following documents related to the Civil and External development works for National Law University Campus Works for National Law University Odisha at CUTTACK, ODISHA.

a) Notice Inviting Tender.

b) Instruction to the Tenderers.

c) Articles of Agreement.

d) General conditions of contract.

e) Special conditions of contract.

f) Particulars specifications and special clauses forming part of schedule of quantities.

g) Tendered drawings.

h) Modifications/Amendments to the tender documents if any.

I/We hereby tender for execution of the works referred to in the aforesaid document upon the terms and conditions contained or referred to there in and in accordance in all respects with the specifications, designs, Tendered drawings and other relevant details at the rates quoted in Bill of Quantity and within the period of completion as stipulated in schedule.

In consideration of I/We being invited to tender, I/We agree to keep the tender open for acceptance for 2 months from the due date of submission there of and not to make any modifications in its terms and conditions which are not acceptable. A sum of Rs----------
----------is hereby forwarded in the form of demand draft No. ---------- -----dt.---------- issued by ----------
-------(name of Bank) as
earnest money in favor of National Law University ODISHA which amount is not to bear any
interest. If I/We fail to keep the tender open as aforesaid or make any modifications in the terms and conditions of the tender which are not acceptable to National Law University

ODISHA , I/We agree that National Law University ODISHA shall without prejudice to any other right or remedy be at liberty to forfeit the said earnest money absolutely. Should this tender be accepted, I/We hereby agree to abide by and fulfill all the terms and conditions and provisions of the aforesaid documents.

If after the tender is accepted, I/We fail the commence the execution the works as provided for in the terms and conditions of contract. I/We agree that National Law University ODISHA shall without prejudice to any of their rights and remedies, be at liberty to forfeit the said earnest money absolutely.

Witness---------- signature in the capacity of ----------
date ---------- Duly authorize to sign the tender on behalf of ----------
----
Address----------

Time ----------
Dated----------
Telephone No.----------
----------.

(Seal)

Tender submitted on ---------- Before ----------
--P.M.

"ANNEXURE-A."

FORMAT OF GUARANTEE TO BE EXECUTED BY THE FIRM / CONTRACTOR IN RESPECT OF THE WORK OF PRE - CONSTRUCTION ANTI -TERMITE TREATMENT.

This agreement made this ..... day of ..... Two thousand ten ..... Between National Law University ODISHA , Constituted under the Govt. of ODISHA Act - 4 of 2008. having its head office at Naraj, Cuttack - 753015, ODISHA, of the one part. (Herein after called "the NLUO").

WHEREAS THIS AGREEEMENT is supplementary to a contractor (hereinafter called the contract dated ..... / ..... / 201..... and made between the NLUO of the one part and the Guarantor of the other part) where by firm/Contractor interalia undertook to render the buildings/structures completely free from any infestation of termites. And whereas the Guarantors agreed to give guarantee to the effect that the said buildings/structures shall remain free from any infestation of termites for a minimum period of ten years from the date of completion of pre-construction anti-termite treatment carried out as per the relevant I.S. Code

Now the Guarantor hereby agree to make good all defects and render the buildings / structures free from any infection of termites, during this period of guarantee and to the satisfaction work at his own cost, and within one week from the date of issue of notice from the NLUO, calling upon him to rectify the defects. In case the guarantor fails to commence the work as per above notice and the work is got done through some other contractor. That if the Guarantor fails to execute the pre-construction anti-termite treatment or commits breach there under than the Guarantor will indemnify the principal and his successors against all loss, damage cost, expense or otherwise which may be incurred by him by any reason of any default on the part of the guarantor in performance and observance of this agreement. As to the amount of loss and / or damage and/or cost incurred by the NLUO the decision of the NLUO will be final and binding.

In witness whereof these presents have been executed by the obligator ---------- ---------- and by ---------- and for on behalf of the NLUO on the day, month and year first above written.

Signed, and delivered by ---------- (N.L.U.O) by the hand of Shri ---------- in the presence of ----------
---Signed and delivered by the hand of ----------
(Contractor) in the presence of ----------

"ANNEXURE-B"

FORMAT OF GUARANTEE TO BE EXECUTED BY THE FIRM/ CONTRCTOR IN RESPECT OF THE WORK OF WATER PROOFING TREATMENT.

This agreement made this ..... day of ..... Two thousand ten ..... Between National Law University ODISHA , Constituted under the Govt. of ODISHA Act - 4 of 2008. having its head office at Naraj, Cuttack - 753015, ODISHA. of the one part. (Herein after called "the NLUO").

WHEREAS THIS AGREEMENT is supplementary to a contract (hereinafter called the contract dated ----/----/ 201… and other part) where by firm / Contractor interalia under took that the basement with retaining walls, roofs, stair roof, underground reservoir, overhead reservoir and sunken floors of the NLUO's Building shall be in water proof condition for a period of ten (10) years viz. from dated of handing over of the completed works to the National Law University ODISHA and whereas the Guarantors agree to give guarantee to the effect that the said buildings / structures shall remain free from any leakage / seepage for a minimum period of ten (10) years from the date of handing over of the building.

Now the Guarantor hereby agree to make good all defects and render the building / structures free from any leakage / seepage, during this period of guarantee and to the satisfaction of the NLUO. The guarantor also agrees to take up such rectification work at his own cost, and within one week from the date of issue of notice from the NLUO, calling upon him to rectify the defects. The decision of the NLUO as to the cost payable by the guarantor will be final and binding in case the guarantor fails to commence the work as per above notice and the work is got done through some other contractor. That if the Guarantor fails to execute the water proofing works or commits breach there under then the Guarantor will indemnify the principal and his successors against all loss, damage cause, expense or otherwise which may be incurred by him any reason of any default on the part of the guarantor in performance and observance of this agreement. As to the amount of loss and or damage and/ or cost incurred by the NLUO the decision of the NLUO will be final and binding.

In witness whereof these presents have been executed by the obligator ---------- and by ---------- and for on behalf of the NLUO on the day, month and year first above written.

Signed, and delivered by National Law University ODISHA by the hands of Shri---------- ---------- in the presence of ----------Signed, and delivered by National Law University ODISHA by the hands of Shri / M/s.---------- (Contractor) in the presence of ----------

GENERAL RULES AND INSTRUCTIONS FOR THE GUIDANCE OF TENDERERS.

1. Tenders are hereby invited on behalf of National Law University ODISHA , Cuttack for the Civil, external development and firefighting work for National Law University Campus Works at Naraj, Cuttack, ODISHA.

2. Contract documents consisting of the plans, complete specifications, the schedule of quantities of the various classes of work to be done, and the set of conditions of contract to be complied with by the person whose tenders may be accepted, which will also be found in the form of tenders is to be duly signed. The site for the work is available for inspection with the prior permission of PMC/ NLUO.

3. Tenders for Civil and External development works sealed cover, with written "TENDER OF CIVIL AND EXTERNAL DEVELOPMENT WORK FOR NATIONAL LAW UNIVERSITY CAMPUS AT NARAJ, CUTTACK, ODISHA. FOR NATIONAL LAW UNIVERSITY ODISHA " written on the envelopes will be received by The Vice Chancellor National Law University ODISHA , at Naraj, Cuttack - 753015, ODISHA. up to 09.12.2016 by 03.00PM. and will be opened by him in his office at 04:00 PM on the same day.

4. Tenders are to be on the prescribed tender documents which can be obtained from the office of National Law University ODISHA , at Naraj, Cuttack - 753015, ODISHA on payment of Rs. 10,500.00 only in form of DD in favor of Registrar National Law University ODISHA payable at Cuttack.
   In case the said papers are downloaded from NLUO website then the amount of Rs. 10,500.00 only will be paid at the time of submission of the tender document.
   The time allowed for the carrying out of the work will be 9 months from the date of receipt of LOI.

5. The contractors should quote in figures as well as in words the rate, and amount tendered by them. The amount for each item should be worked out and the requisite totals given.

   (a) When there is a difference between the rates in figures and in words the rate which corresponds to the amounts worked out by the contractor, shall be taken as correct figure.
   (b) When the amount of any item is not worked out by the contractor or it does not correspond with the rate written either in figures or in words, then the rate quoted by the contractors in works shall be taken as correct.
   (c) When the rate quoted by the contractor in figures and in words tallies but the amount is not worked out correctly, rate quoted by the contractor shall be taken as correct and not the amount.

6. When a contractor signs a tender in an Indian Language the tendered amount and the total tendered should also be written in the same language. In the case of illiterate contractors the rates or the amounts tendered should be attested by a witness.

7. The last date of Issue of tender form will be on 07.12.2016.

8. Earnest money Rs. 29,00,000.00/- (Rupees Twenty Nine lakhs only) in form DD(Demand draft) of as mentioned herein before in favor of "The Registrar, National Law University ODISHA must accompany each tender and each tender is to be in a sealed cover super scribed" Tender for Construction of National Law University Campus Works at CUTTACK " and addressed to The Vice Chancellor, National Law University ODISHA , at Naraj, Cuttack - 753015, ODISHA.

9. The contractor, whose tender is accepted will be required to furnish by way of security deposit for the due fulfillment of his contract, such sum as will amount.

Initial Security Deposit : The amount of Initial security deposit shall be 1% of accepted tender amount including EMD. The initial security deposit is to be paid by the contractor to the N.L.U.O within 12 (Twelve) days of intimation to him of the acceptance of tender. The initial security deposit will be kept in the N.L.U.O account & refunded to the contractor any interest along with retention money as stipulated in the contract.

From each running bill an amount at the rate of 5% of the Work done value of the running bill shall be recovered as retention money , till the total retention amount including the EMD & ISD amounts already with the N.L.U.O become 5% of the value of the contract amount. This amount is called as Total Security Deposit-which consists of Three components:

A] EMD- Earnest Money Deposits.
B] ISD-Initial Security Deposits.
C] RM-Retention Money.

The total security deposit will be kept with the N.L.U.O. 50% of the total security deposit amount shall be refunded without interest to the contractor on issue of virtual completion certificate by the PMC/ N.L.U.O & the contractor's removal of his materials, equipment, labour force, temporary sheds, stores, site office etc.

The remaining 50% of the total security deposit may be refunded 15 days after the end of defect liability period (i.e. 6 months), provided the contractor has carried out all the works & attended to rectification of all defects in accordance with the conditions of the contract.

The Security Deposit shall be collected as detailed in clause No. 1 of the General Conditions of the contract.

The EMD of the contractor whose tender is accepted, shall be forfeited in full in case he does not remit the initial Security Deposit within the stipulated period or start the work by the stipulated date mentioned in the award letter.

10. The acceptance of a tender will rest with the N.L.U.O only which does not bind itself to accept the lowest tender, and reserves to itself the authority to reject any or all of the tenders received without the assignment of a reason. All tenders in which any of the prescribed conditions are not fulfilled or are incomplete in any respect are liable to be rejected.

11. Canvassing in connection with tenders is strictly prohibited and the tenders submitted by the contractors who resorts to canvassing will be liable to rejection.

12. All rates shall be quoted on the proper form of the tender alone.

13. An item rate tender containing percentage below/above will be summarily rejected.
14. On acceptance of the tender, the name of the accredited representative(s) of the contractor who would be responsible for taking instructions from the NLUO/PMCs shall be communicated to the NLUO with in 7 (seven) days of acceptance. The accredited person duly qualified engineer.

15. Special care should be taken to write the rates in figures as well as in words and the amounts in figures only, in such a way that interpolation is not possible. The total amount must be written both in figures and in words. In case of figures, the words "Rs." should be written before the figure of rupees and works "p" after the decimal should preceded and the word "Paise" should be written at the end", unless the rate is in whole rupees and followed by the words "only", it should invariably be up to two decimal places, While quoting the rate in schedule of quantities, the work "only "should be written closely following the amount and it should not be written in the next line.

16. The N.L.U.O does not bind itself to accept the lowest or any tender and reserves to itself the right of accepting the whole or any part of the tender and the tenderer shall be bound to perform the same at the rate quoted.

17. Sales tax, service tax or any other tax etc on materials or on finished works like work's contract tax, Turn-over Tax, etc. in respect of this contract shall be payable by the contractor and the N.L.U.O will not entertain any claim whatsoever in this respect.

18. The Contractor shall give a list of his relatives if any working with the N.L.U.O along with their designations and addresses.

19. No employee from the date of the N.L.U.O is allowed to work as a contractor for a period of two years of his retirement from N.L.U.O service, without the previous permission of the N.L.U.O. This contract is liable to be cancelled if either the contractor or any of his employee is found at the N.L.U.O as aforesaid before submission of the tender or engagement in the contractor’s service.

20. The tender for works shall remain open for acceptance for a period of 4 (four) months from the date of opening of tenders. If any tenderer withdraws his tender before the date prior of, then N.L.U.O shall be at liberty to forfeit Earnest Money paid along with the tender.

21. The tender for the work shall not witnessed by contractor or contractors who himself/ themselves has/have tendered or who may and had/have tendered for the same work. Failure to observe this condition would tender of the contractor tendering as well as witnessing the tender liable to summary rejection.

22. It will be obligatory on the part of the tenderer to tender and sign the tender documents for all the component parts and that, after the work is awarded, he will

have to enter into an agreement for which component with the competent authority in the N.L.U.O.

23. The tenderer, apart from being a competent contractor must associate himself with agencies of the appropriate class who are eligible to tender for (i) Electrical (ii) Sanitary and Water supply installations and (iii) Horticulture.

The Vice Chancellor

National Law University ODISHA .
Naraj, Cuttack - 753015, ODISHA

APPENDIX

1.	Name of work	:	Civil, external development and firefighting work for National Law University Campus at Naraj for National Law University ODISHA .
2.	Location	:	At: Naraj, Cuttack, ODISHA
3.	Scope of work	:	As above and further detailed in the General Conditions of contract.
4.	Defects Liability Period	:	12 (Twelve) months from issuing of date of completion certificate.
5.	Date of Commencement	:	Fifteen days from the date of issue of work order or the date of handing over site, which ever is later.
6.	Time of completion	:	9 months for the total work.

Brief division of work will be done as follows

Time period to be fixed 9 (Nine) months, which includes the following the Part (A) and Part (B) work with operational from the date of execution of work as per the following

Part (A) to be completed by 3 (three) Month from the date of issue of LOI.

PART –A

(b) Library building Civil, P.H. Electrical and Firefighting work

PART –B

(I) All External Development :

(a) Road Rain water, Drainage etc.
(b) Boundary wall
(c) Site development
(d) Recharge Pit
(e) Watch Tower.
(f) Fire Fighting UG sump & pump room.
(g) Domestic and treated water supply
(h) Bore well.
(i) Landscaping
(j) O.H.T, cum pump house
(k) Rain water collection room
(l) Ext. sewerage system
(m) U.G.R (125 Cum with pump house 4nos)
(n) U.G.R (150 Cum with pump house)
(o) External electrical work
(p) Fire fighting system.

Part (B) to be completed by 9 (Nine) months from the date of issue of LOI.

7.	Liquidated damages	:	0.5% of the accepted tender amount per week subject to a ceiling of 5% of the accepted tender amount.
8.	Value of works for Interim certificate:		minimum of one bill in every fortnight.
9.	Period of honoring Certificate	:	a) 15 (fifteen) days for R.A. Bills from the date of receipt of certificate from the PMC/PMC.
10.	Total Security Deposit	:	5% of the gross value of work done & claimed in each bill provided the total security deposit i.e. ISD+ retention money shall both together not exceeding 5% of the contract value or 5% of final bill whichever is more.
11.	Initial Security Deposit: including		1% of the accepted tender amount EMD.

GENERAL CONDITIONS OF CONTRACT.

1.0. **Definitions:**
"Contract means the documents forming the tender and the acceptance thereof and the formal agreement executed between National Law University ODISHA (client) and the contractor, together with the documents referred therein including these conditions , the specifications, designs, Tendered drawings & instructions issued from time to time by the PMC/ N.L.U.O and all these documents taken together shall be deemed to form one contract and shall be complementary to one another.

1.1. In the contract the following expression shall, unless the context otherwise requires, have the meaning hereby respectively assigned to them.

1.1.1 "N.L.U.O" shall mean National Law University ODISHA (client) having it's office at Naraj, Cuttack - 753015, ODISHA. & includes the client's representatives, successors & assigns.

1.1.1(a). "PMC/ Consultant" shall mean "M/s. RATH ARCHITECTONIC", Plot No. 104, Madhuaudan Nagar, Unit-IV, Bhubaneswar-751001.

1.1.1(b). "PMC" shall mean "M/s. RATH ARCHITECTONIC", Plot No. 104, Madhusudan Nagar, Unit-IV, Bhubaneswar-751001.

1.1.2. "PROJECT DIRECTOR" shall mean an Engineer appointed by the N.L.U.O as their representative to give instructions to the contractor.

1.1.3. "The Contractor" shall mean the individual or firm or company whether incorporated or not, undertaking the works and shall include legal representative of such individual.

1.1.4. 'Engineer In Charge' shall mean the representative of the PMC/consultant.

1.1.5. 'Tendered drawings' shall mean the Tendered drawings prepared by the PMCs and then issued by the Engineer and referred to in the specifications and any modifications of such Tendered drawings as may be issued by the Engineer from time to time 'Contract value shall mean the value of the entire work as stipulated in the letter of acceptance of tender subject to such additions thereto or deductions there from as may be made under the provision herein after contained.

1.1.6. 'Specifications' shall mean the specifications referred to in the tender and any modifications thereof as may time to time be furnished or approved by the PMC consultant "Month" means calendar month.

1.1.7. "Week" means seven consecutive days.

1.1.8. "Day" means a calendar day beginning and ending at 00Hrs and 24 Hrs respectively.

DEFECT LIABILITY PERIOD

1.1.9. The Defect Liability Period shall commence from the date of virtual completion as mentioned in the Certificate of Virtual Completion issued by NLUO. The duration of the Defect Liability Period shall be one years after the date of issue of virtual

completion certificate by NLUO to the Contractor. i.e. (one year after all the works as per the scope of work including completion of all buildings, external development works are complete.

CLAUSE

1.0. Total Security Deposit

Total Security deposit comprises of
Earnest money deposit
Initial Security deposit
Retention Money.

a) Earnest money Deposit

The tenderer shall furnish EMD of Rs. 29,00,000.00 in the form of Demand Draft drawn in favor of "The Registrar, National Law University ODISHA. No tenders shall be considered unless the EMD is so deposited in the required form. No interest shall be paid on this EMD. The EMD of the unsuccessful tenderer shall be refunded soon after the decision to award the contract is taken without interest. The EMD shall stand absolutely forfeited if the tenderer revokes his tender at any time the period when he is required to keep his tender open acceptance by the NLUO or after it is accepted by the NLUO the contractor fails to enter into a formal agreement or fails to pay the initial security deposit as stipulated or fails to commence the commence the work within the stipulated time.

b) Initial Security Deposit (ISD)

The amount of ISD shall be 1% of accepted value of tender including the EMD in the form of D/D drawn on any scheduled Bank and shall be deposited within 15 (fifteen) days from the date of acceptance of tender.

c) Retention Money

Besides the ISD as deposited by the contractor in the above said manner the retention money shall be deducted from the running account bill at the rate of 5% of the gross value of work done by the contractor and claimed in each bill provided the total security deposit i.e. The ISD plus Retention Money shall both together not exceed 5% of the contract value ,50% of the total security deposit shall be refunded to the contractor without any interest on issue of Virtual Completion certificate by the PMC/consultant.

The balance 50% of the total security deposit shall be refunded to the contractors without interest within fifteen days after the end of defects liability period provided the contractor has satisfactorily attended to all defects in accordance with the conditions of contract including site clearance.

2.0 Language

The language in which the contract documents shall be drawn shall be in English.

3.0 **Errors, omissions and discrepancies**

In case of errors, omissions and/ or disagreements between written and scaled dimensions on the Tendered drawings or between the Tendered drawings and specifications etc., apply in the following order.

i) Between scaled and written dimension (or description) on a drawing, the latter shall be adopted.

ii) Between the written or shown description or dimensions in the Tendered drawings and the corresponding one in the specification the former shall be taken as correct.

iii) Between written description of the item in the specifications and descriptions in bills of quantities of the same item, the former shall be adopted.

a) In case of difference between rates written in figures and words, the rate in words shall prevail.

b) between the duplicate / subsequent copies of the tender, the original tender shall be taken as correct.

4.0 Scope of work

The contractor shall carryout complete and maintain the said work in every respect in strict accordance with this contract and with the decision to the satisfaction of the N.L.U.O to be communicated through the PMC/ Consultant at the directions of the N.L.U.O from time to time issue further Tendered drawings and / or written instructions, details directions and explanations which are hereafter collectively referred to as PMC's / consultant's instructions in regard to the variation or modification of the design, quality or quantity of work or the addition or omission or substitution of any work. Any discrepancy in the Tendered drawings or between the BOQ and / or Tendered drawings and / or specifications. The removal from the site of any material brought thereon buy the contractor and any substitution of any other materials therefore the removal and / or re-execution of any work executed by him. The dismissal from the work of any person employed / engaged there upon.

5.0 i) Letter of Acceptance

Within the validity period of the tender the N.L.U.O shall issue a letter of acceptance either directly or through the PMC by registered post or otherwise depositing at the address of the contractor as given in the tender to enter into a Contract for the execution of the work as per the terms of the tender. The letter of acceptance shall constitute a binding contract between the NLUO and the contractor.

ii) Contract Agreement

On receipt of intimation of the acceptance of tender from the NLUO/ PMC the successful tenderer shall be bound to implement the contract and within fifteen days thereof he shall sign an agreement in non judicial stamp paper of appropriate value.

6.0 Ownership of Tendered drawings

All Tendered drawings, specifications and copies thereof furnished by the NLUO through its consultant / PMC are the properties of the NATIONAL LAW UNIVERSITY, ODISHA. They are not to be used for any work.

7.0 Detailed Tendered drawings and instructions

The NLUO through its consultants/PMC shall furnish with reasonable promptness additional instructions by means of Tendered drawings or otherwise for the proper execution of the work. All such Tendered drawings and instructions shall be consistent with the contract documents, true developments thereof and reasonably inferable there from. The work shall be executed in conformity therewith and the contractor prepare a detailed programme schedule indicating therein the date of start and completion of various activities on receipt of the work order and submit the same to the NLUO through the consultant /PMC.

7.1 Copies of agreement

Two copies of agreement duly signed by both the parties with the Tendered drawings shall be handed over the contractors.

8.0 Liquidated damages:

If the contractor fails to maintain the progress required to complete the work and clear the site including vacating their office on or before the contracted or extended date or completion without justification in support of the cause of delay or

a. Delay in completion.
b. The defect which suppose to be rectified as per the advice of National Law University ODISHA / Project Management Consultant within the stipulated period.
c. Non specified material.
d. Payment of labour & statutory uses. and he may be called upon without prejudice to any other right of remedy available under the law to the NLUO on account of such breach to pay a liquidated damages at the rate of 0.5% of the contract value which subject to a maximum of 5% of the contract value.

9.0 Materials, Appliances and Employees

Unless or otherwise specified the contractor shall provide and pay for all materials, labour, water, power, tools, equipment transportation safety measure and any other facilities that are required for the satisfactory execution ad completion of the work. Unless otherwise specified all materials shall be new and both workmanship and materials shall be best quality. The Contractor shall at all times enforce strict discipline and good order among his employees and shall not employ on the work any unfit person of anyone not skilled in the work assigned to him. Workman whose work or behavior is found to be unsatisfactory by the NLUO/PMC/ PMC he shall be removed from the site immediately.

10.0. Permits, Laws & Regulations:

Permits & Licenses required for the execution of the work shall be obtained by the contractor at his own expense. The contractor shall give notices & comply with the regulations, laws, ordinances rules, applicable to the contract. If the contractor observes any discrepancy between the Tendered drawings and specifications, he shall promptly notify the NLUO in writing under intimation of the PMC/ Consultant. If the contractor performs any act, which is against the law , rules & regulations he shall meet all the costs arising there from and shall indemnify the NLUO any legal action arising there from. Labour licenses and they should have P.F No. of their employee which will submitted to NLUO.

11.0 Setting Out Work:

The contractor shall set out the work 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 and get it approved by the PMC/ Consultant before proceeding with the work. If at any time any error in this respect shall appear during the progress of the works, irrespective of the fact that the layout had been approved by the PMC/ Consultant the contractor shall be responsible for the same and shall at his own expenses rectify such error, if so, required to satisfaction of the NATIONAL LAW UNIVERSITY, ODISHA.

12.0. Protection of works and Property:

The contractor shall continuously maintain adequate protection. Of all his work from damage and shall protect the NATIONAL LAW UNIVERSITY, ODISHA's properties from injury or loss arising in connection with contract. He shall make good any such damage, injury, loss, except due to causes beyond his control and due to his fault or negligence.

He shall take adequate care and steps for protection of the adjacent properties. The contractor shall take all precautions for safety and protections of his employees on the

works and shall comply with all applicable provisions of government & local bodies safety laws & building codes to prevent accidents, or injuries to persons or property on , about or adjacent to this place of work. The contractor shall take insurance covers as per clause 24.0 at his own cost. The policy may taken in joint names of contractor and the NLUO and the original policy may be lodged with the NATIONAL LAW UNIVERSITY, ODISHA.

13.0 Inspection of work:

The NATIONAL LAW UNIVERSITY, ODISHA/ PMC/ Consultant or their representatives shall at all reasonable times have free access to the work site and/or to the workshop, factories or other places where materials are lying or from where they are obtained and the contractor shall give every facility to the NATIONAL LAW UNIVERSITY, ODISHA, PMC / Consultant and their representatives necessary for inspection & examination and test of the materials an workmanship. No person unless authorized by the NATIONAL LAW UNIVERSITY, ODISHA/PMC/Consultant except the representative of Public authorities shall be allowed on the work at any time. The proposed work either during its construction stage or its completion can also be inspected by the Chief Technical Examiner's Organization a wing of Central Vigilance Commission.

14.0. Assignment & Subletting

The whole of work included in the contract shall be executed by the contractor and he shall not directly entrust and engage or indirectly transfer, assign or underlet the contract any part or share thereof or interest therein without the written consent of the NLUO through the PMC and no undertaking shall relieve the Contractor from the responsibility of the contractor from active superintendence of the work during it's progress.

15.0. Quality of Material, Workmanship & Test

All materials and workmanship shall be the best of respective kinds described in the contract and in accordance with PMC / Consultant. The PMC / Consultant instructions and shall be subject from time to time to such tests as the PMC / Consultant may direct at the places of manufacture or fabrication or on the site or an approved testing laboratory. The contractor shall provide such assistance, instruments, machinery, labour and materials as are normally required for examining measuring sampling and testing any material or part of work before incorporation in the work for testing as may be selected and required by the PMC / Consultant.

ii) Samples

All samples of adequate numbers, size, shades & pattern as per specifications shall be supplied by the contractor without any extra charges. If certain items proposed to be used

are of such nature that samples cannot be presented or prepared at the site detailed literature/ test certificate of the same shall be provided to the satisfaction of the PMC/ Consultant. Before submitting their sample / literature the contractor shall satisfy himself that the material / equipment for which he is submitting the sample/ literature meet with the requirement of tender specification. Only when the samples are approved in writing by the PMC/ consultant the contractor shall proceed with the procurement and installation of the particular material / equipment. The approved samples shall be signed by the PMC/ Consultant for inspection / comparison at any time. The PMC/ Consultant shall take reasonable time to approve the samples for reasons of its not meeting the specifications or other discrepancies inadequacy in furnishing samples of best qualities from various manufacturers and such other aspects causing delay on the approval of the materials / equipment etc. shall be to the account of the contractor.

iii) Cost of tests

The cost of making any test shall be borne entirely by the contractor if such tests is required be done or any provided specification or in BOQ.

iv) Cost of tests not provided for

If any test is ordered by the PMC/ Consultant which is either

a) If so intended by or provided for or (in the cases above mentioned) is not so particularized , or though so intended or provided for but ordered by the PMC / PMC to be carried out by; an independent person at any place other than the site or the place of manufacture or fabrication of the materials tested or any Government / approved laboratory, then the cost of such test shall be borne by the contractor.

16.0 Obtaining information related to execution of work

No claim by the contractor for additional payment shall be entertained which is consequent upon failure on his part to obtain correct information as to any matter affecting the execution of the work not any or the obtaining incorrect information or the failure to obtain correct information relieve him from any risks or from the entire responsibility for the fulfillment of contract.

17.0 Contractor's superintendence

The contractor shall give necessary personal superintendence during the execution of the works and as long, thereafter, as the PMC/ Consultant may consider necessary until the expiry of the defects liability period, stated hereto.

18.0 Quantities

The bill of quantities (BOQ) unless or otherwise stated shall be deemed to have been prepared in accordance with the Indian Standard Method of Measurements and
quantities. The rate quoted shall remain valid for variation of quantity against individual item to any extent subject to maximum variation of the contract value by 25%. All the amount paid under clause 19,20 hereof as well as amounts of prime cost and provisional sums, if any, shall be excluded.

ii) Variation exceeding 25%

The items of works executed in relation to variation exceeding 25% shall be paid on the basis of provisions of clause 21 (e) thereof.

19.0 Works to be measured

The PMC/ Consultant may from time to time intimate to; the contractor that he required the work to be measured and the contractor shall forthwith attend or send a qualified representative to assist the PMC in taking such measurements and calculation and to furnish all particulars or to give all assistance required by any of them. Such measurements shall be taken in accordance with the Mode of measurements detailed in the specifications. The representative of the PMC / Consultant shall take joint measurements with the contractor's representative and the measurements shall be entered in the measurement book. The contractor or his authorized shall sign all the pages of the measurement book in which the measurements have been recorded in token of his acceptance. All the corrections shall be duly attested by both representatives. No over writings shall be made I the M book should the contractor not attend or neglect or omit to depute his representative to take measurements them the measurements recorded by the representative of the PMC/ Consultant shall be final. All authorized extra work;

omissions and all variations made shall be included final. All authorized extra work; omissions and all variations made shall be included in such measurement.

20.0 Variations

No alteration, omission or variation ordered in writing by the PMC/ Consultant shall vitiate the contract. In case the NLUO/ PMC thinks proper at any time during the progress of works to make any alteration in, or additions to or omissions from the works or any alteration in the kind or quality of the materials to be used therein, the PMC/ NLUO shall give notice thereof in writing to the contractor or shall confirm in writing within seven days of giving such oral instructions the contractor shall alter to, add to, or omit from as the case may be in accordance with such notice, but the contractor shall not do any work extra to or make any alterations or additions to or omissions from the works or any deviation from any of the provisions of the contract, stipulations, specifications or contract drawing without previous consent in writing of the PMC/ NLUO and the value of such extras, alterations, additions or omissions shall in all cases be determined by the PMC/ NLUO and the same shall be added to or deducted from the contract value, as the case may be.

21.0 Valuation of Variations

No claim for an extra shall be allowed unless it shall have been executed under the authority of the PMC/ Consultant with the concurrence of the NLUO as herein mentioned. Any such extra is herein referred to as authorized extra and shall be made in accordance with the following provisions.

a) (i) The net rates or prices in the contract shall determine the valuation of the extra work where such extra work is of similar character and executed under similar conditions as the work priced herein.

(ii) Rates for all items, wherever possible should be derived out of the rates given in the priced BOQ.

b) The net prices of the original tender shall determine the value of the items omitted, provided if omissions do not vary the conditions under which any remaining items of works are carried out, otherwise the prices for the same shall be valued under sub-clause (C) hereunder.

c) Where the extra works are not of similar character and / or executed under similar conditions as aforesaid or where the omissions vary the conditions under which any remaining items of works are carried out, then the contractor shall within 7 days of the receipt of the letter of acceptance inform the PMC/ Consultant of the rate which he intends to charge for such items of work, duly supported by analysis of the rate of rates claimed and the PMC / consultant shall fix such rate or prices as in the circumstances in his opinion are reasonable and proper, based on the market rate.

d) Where extra work cannot be properly measured or valued the contractor shall be allowed day work prices at the net rates stated in the tender of the BOQ or, if not, so stated then in accordance with the local day work rates and wages for the district provided that in either case, vouchers specifying the daily time (and if required by the PMC/ Consultant) the workman's name and materials employed be delivered for verifications to the PMC/ Consultant at or before the end of the week following that in which the work has been executed.

e) It if further clarified that for all such authorized extra items where rates cannot be derived from the tender ,the Contractor shall submit rates duly supported by rate analysis as per OPWD worked on the "market rate basis" for material, labour, hire / running charges of equipment and wastages etc. plus 15% towards establishment charges, contractor's overheads and profit. Such items shall not be eligible for escalation.

21.1 Certification of Final bill:

The agency shall submit the following documents :

a. As built drawings
b. Warranty, literature, test certificate and all other related document for equipment and other building materials are used before going for joint inspection and final measurement for the purpose of handing over to NLUO.

22.0 Final Measurement

The measurement and valuation in respect of the contract shall be completed within six months of the virtual completion of the work.

23.0 Virtual completion certificate (VCC)

On successful completion of entire works covered by the contract to the full satisfaction of the NATIONAL LAW UNIVERSITY, ODISHA, the contractor shall ensure that the following works have been completed to the satisfaction of the NLUO .

a) clear the site of all scaffolding, wiring, pipes, surplus materials, contractor's labour, equipment and machinery.

b) Demolish, dismantle and remove the contractor's site office, temporary works, structures including labour sheds/camps and constructions and other items and things whatsoever brought upon or erected at the site or any land allotted to the contractor by the NLUO and not incorporated in the permanent works.

c) Remove all rubbish, debris etc, from the site and the land allotted to the contractor by the NLUO and shall clear, level and dress, compact the site as required by the NATIONAL LAW UNIVERSITY, ODISHA.

d) Shall put the NLUO in undisputed custody and possession of the site and all land allotted by the NATIONAL LAW UNIVERSITY, ODISHA.

e) Shall hand over the work in a peaceful manner to the NATIONAL LAW UNIVERSITY, ODISHA.

f) All defects / imperfections have been attended and rectified as pointed out by the NLUO to the full satisfaction of NATIONAL LAW UNIVERSITY, ODISHA.

Upon the satisfactory fulfillment by the contractor as stated above, the contractor shall be entitled to apply to the PMC is satisfied of the completion of the work. Relative to which the completion certificate has been sought, the PMC shall within fourteen (14) days of the receipt of the application for virtual completion certificate, issue a VCC in respect of the work for which the VCC has been applied.

This issuance of VCC shall be without prejudice to the NATIONAL LAW UNIVERSITY, ODISHA's rights and contractor's liabilities under the contract including the contractor's liability for defects liability period nor shall the issuance of VCC in respect of the works or work at any site be construed as a waiver of any right or claim of the NLUO against the

contractor in respect of works or works at the site and in respect of which the VCC

has been issued.

23.1 Work by other agencies

The NLUO/ PMC/ Consultant reserves the rights to use premises and any portion of the site for execution of any work not included in the scope of this contract which it may desire to have carried out by other persons simultaneously and the contractor shall not only allow but also extend reasonable facilities for the execution of such work. The contractor however shall not be required to provided any plant or material for the execution of such work except by special arrangement with the NATIONAL LAW UNIVERSITY, ODISHA. Such work shall be carried out in such manner as not to impede the progress of the works included in the contract.

24.0 Insurance of works

24.1 Without limiting his obligations and responsibilities under the contract the contractor shall insure the insurance is being covered in the joint names of the NLUO and the contractor against all loss of damages from whatever cause arising other than the excepted risks, for which he is responsible under the terms of contract and in such a

manner that the NLUO and contractor are covered for the period stipulated and are also covered during the period of maintenance for loss or damage arising fro a clause, occurring prior to the commencement of the period of maintenance and for any loss or damage occasioned by the contractor in the course of any operations carried out by him for the purpose of complying with his obligations under clause.

a) The works for the time being executed to the estimated current Contract value thereof, or such additional sum as may be specified together with the materials for incorporation in the works at their replacement value.

b) The constructional plant and other things brought on to the site by the contractor to the replacement value of such constructional plant and other things.

c) Such insurance shall be effected with an insurer and in terms approved by the NLUO which approval shall not be unreasonably withheld and the contractor shall whenever required produce to the PMC/ Consultant the police if insurance and the receipts for payment of the current premiums.

24.2 Damage to persons and property

The contractor shall, except if and so far as the contract provides otherwise indemnify the NLUO against all losses and claims in respect of injuries or damages to any person or material or physical damage to any property whatsoever which may arise out of or in consequence of the execution and maintenance of the works and against all claims proceedings, damages, costs, charges and expenses whatsoever in respect of or in relation thereto except any compensation of damages for or with respect to :

a) The permanent use or occupation of land by or any part thereof.

b) The right of NLUO to execute the works or any part thereof on, over, under, in or through any lands.

c) Injuries or damages to persons or properties which are unavoidable result of the execution or maintenance of the works in accordance with the contract.

d) Injuries or damage to persons or property resulting from any act or neglect of the NLUO their agents, employees or other contractors not being employed by the contractor or for or in respect of any clams, proceedings, damages, costs, charges and expenses in respect thereof or in relation thereto or where the injury or damage was contributed to by the contractor, his servants or agents such part of the

compensation as may be just and equitable having regard to the extent of the responsibility of the NATIONAL LAW UNIVERSITY,ODISHA, employees, or agents or other contractors for the damage of injury.

24.3 Contractor to indemnify NLUO

The contractor shall indemnify the NLUO against all claims, proceedings, damages cost, charges and expenses in respect of the matters referred to the provision sub-clause 24.2 of this clause.

24.4 Contractor's superintendence

The contractor shall fully indemnify and keep indemnified the NLUO against any action, claim or proceeding relating to infringement or use of any patent or design or any alleged patent or design rights and shall pay any royalties which may be payable in respect of any article or part thereof included in the contract. In the event of any claim made under of action brought against NLUO in respect of such matters as aforesaid the contractor shall be immediately notified thereof and the contractor shall be at liberty, at his own expenses to settle any dispute or to conduct any litigation that may arise there from, provided that the contractor shall not be liable to indemnify the NLUO if the infringement of the patent or design or any

alleged patent or design right is the direct result of an order passed by the Consultant/ PMC in this behalf.

24.5 Third Party Insurance

24.5.1 Before commencing the execution of the work the contractor but without limiting his obligations and responsibilities under clauses 24.0 of GCC shall insure against his liability for any material or physical damage, loss, or injury which may occur to any property including that of NATIONAL LAW UNIVERSITY, ODISHA, or to any person, including any employee of the NATIONAL LAW UNIVERSITY, ODISHA, by or arising out of the execution of the works or in the carrying out of the contract, otherwise than due to the mattes referred to in the provision to clause 24.0 thereof.

24.5.2 Minimum amount of Third Party Insurance

Such insurance shall be effected with an insurer and in terms approved by the NLUO which approval shall not be reasonably withheld and for at least the amount stated below. The contractor shall, whenever required produce to the PMC/ Consultant the policy or polices of insurance cover and receipts for payment of the current premiums.

The minimum insurance cover for physical property, injury, and death is Rs. 5.0 lakhs per occurrence with the number of occurrences limited to four. After each occurrence contractor will pay additional premium necessary to make insurance valid for four occurrences always.

25.6 Accident or Injury to workman:

25.6.1 The NLUO shall not be liable for in respect of any damages or compensation payable at law respect or in consequence of any accident or injury or any workmen or other person in the employment of the contractor or any sub-contractor, save and except an accident or injury resulting from any act or default of the NLUO against all such damages and compensation, save and expect as aforesaid, and against all such damages and compensation, save and except as aforesaid, and against all claims, proceedings, costs, charges and expenses whatsoever in respect thereof in relation thereto.

25.6.2. Insurance against accidents etc. to workmen

The contractor shall insure against such liability with an insurer approved by the NLUO during the whole of the time that any persons are employed by him on the work and shall, when required, produce to the PMC/ Consultant

such police of insurance and receipt for payment of the current premium. Provided always that, in respect of any persons employed by any sub-contractor the contractor's obligation to insure as aforesaid under this sub-clause shall be satisfied if the sub contractor shall have insured against the liability in respect of such be persons in such manner that NLUO is indemnified under the policy but the contractor shall require

such require sub-contractor to produce to the PMC/ Consultant when such policy of insurance and the receipt for the payment of the current premium.

25.6.3 Remedy on contractor's failure to insure:

If the contractor fails to effect and keep in force the insurance referred to above or any other insurance which he may be required to effect under the terms of contract, then and in any such case the NLUO may effect and keep in force any such insurance and pay such premium or premiums as may be necessary for that purpose and from time to time deduct the amount so paid by the NLUO as aforesaid from any amount due or which may become due to the contractor, or recover the same as debt from the contractor.

25.6.4 Without prejudice to the others rights of the NLUO against contractors. In respect of such default, the NLUO shall be entitled to deduced from any sums payable to the contractor the amount of any damages costs, charges and other expenses paid by the NLUO and which are payable by the contractors under this clause. The contractor shall upon settlement by the Insurer of any claim made against the insurer pursuant to a policy taken under this clause, proceed with due diligence to rebuild or repair the works destroyed or damaged, In this event all the monies received from the Insurer in respect of such damage shall be paid to the contractor and the Contractor shall not be entitled to any further payment in respect of the expenditure incurred for rebuilding or repairing of the materials or goods destroyed or damaged.

26.0 Commencement of Works:

The date of commencement of the work will be reckoned as the date of handing over site by joint signature of contractor, PMC & NLUO or fifteen days from the date of issue of letter of acceptance of the tender by the NLUO whichever is later.

27.0 Time for completion

Time is essence of the contract and shall be strictly observed by the contractor. The entire work shall be complete within a period of …… calendar months from the date of commencement. If required in the contract or as directed by the PMC / consultant. The contractor shall complete certain portions of work before completion of the entire work. However the completion date shall be reckoned as the date by which the whole work is completed as per the terms of the contract.

28.0 Extension of time

If, in the opinion of the PMC /consultant, the work be delayed for reasons beyond the control of the contractor, the PMC/ Consultant may submit a recommendation to the NLUO to grant a fair and reasonable extension of time for completion of work as per the terms of contract. If the contractor needs an extension of time for the completion of work or if completion of work is likely to be delayed for any reasons beyond the due date of completion as stipulated in the contract, the contractor shall apply to the NLUO through the PMC /consultant in writing at least 21 Days before the expiry of the scheduled time and while applying for extension of time he shall furnish the reasons in detail and his justification if any, for the delays The PMC/ PMC shall submit their recommendations to the NLUO in the prescribed format for granting extension of time. While granting extension of time the contractor shall be informed the period extended time which will qualify for levy of liquidated damages. For the balance period in excess of original stipulated period and duly sanctioned extension of time by the NLUO the provision of liquidated damages as stated under clause 8 shall become applicable. Further the

contract shall remain in force even for the period beyond the date of completion irrespective whether the extension is granted or not.

9.0 Rate of progress

The entire of the material, plant and labour to be provided by the contractor. The mode, manner and speed of execution and maintenance of the works are to be of a kind and conducted in a manner to the satisfaction of the PMC should the rate of a progress of the work or any part thereof be at any time be in the opinion of the PMC too slow to ensure the completion of the whole of the work by the prescribed time or extended time for completion the PMC shall thereupon take such steps as considered necessary by the PMC, to expedite progress so as to complete the works by the prescribed time or extended time. Such communications from the PMC neither shall

relieve the contractor from fulfilling obligations under the contract not he will be entitle to raise any claims arising out of such directions.

30.0 Work during nights and holidays

Subject to any provision to the contrary contained in the contract no permanent work shall save as herein provided be carried on during the night or on holidays without the permission in writing of the PMC/ Consultant, save when the work is unavoidable or absolutely necessary for the saving of a life or property or for the safety of the work in which case the contractor shall immediately advise the PMC/ Consultant. However the provisions of the clause shall not be applicable in the case of any work which becomes essential to carry by rotary or double shifts in order to achieve the progress and quality of the works being technically required / continued with the prior approval of the PMC/ Consultant at no extra cost to the NATIONAL LAW UNIVERSITY, ODISHA.

All work at night after obtaining approval from competent authorities shall be carried out without unreasonable noise an disturbance.

31.0 No compensation or restrictions of work

If at any time after acceptance of the tender NLUO shall decide to abandon or reduce the scope of work for any reason whatsoever and hence not required the whole or any part of the work to be carried out. The PMC/PMC/ shall give notice in writing to that effect to the contractor and the contractor shall act accordingly. In the matter. The contractor shall have no claim to any payment of compensation or otherwise whatsoever, on account of any profit or advantage which he might have derived from the execution of the work fully but which he did not derive in consequence of the foreclosure of the whole or part of the work.

Provided that the contractor shall be paid the charges on the cartage only of materials actually and confide brought to the site of the work by the contractor and rendered surplus as a result of the abandonment, curtailment of the work or any portion thereof and then taken back by the contractor, provided however that the PMC / Consultant shall have in such cases the option of taking over all or any such materials at their purchase price or a local current rate whichever is less.

"In case of such stores credit shall be given to him at the rates not exceeding those at which were originally issued to the contractor after taking into consideration and deduction for claims on account of any

deterioration or damage while in the custody of the contractor and in this respect the decision of PMC / Consultant shall be final.

32.0 Suspension of work

i) The contractor shall, on receipt of the order in writing of the PMC/ Consultant (whose decision shall be final and binding on the contractor) suspend the progress of works or any part thereof for such time and in such manner as PMC/ Consultant may consider necessary so; as not to cause any damage or injury to the work already done or endanger the safety thereof for any of following reasons.

a) On account any default on the part of the contractor, or

b) For proper execution of the works or part thereof for reasons other than the default of the contractor, or

c) for safety of the works or part thereof.

The contractor shall, during such suspension properly protect and secure the works to the extent necessary and carry out the instructions given in that behalf by the PMC/ Consultant.

ii) If the suspension is ordered for reasons b) and c) in sub – Para I) above:

The contractor shall be entitles to an extension of time equal to the period of every such suspension. No compensation whatsoever shall be paid on this account.

33.0 Action when the whole security deposit is forfeited

In any case in which under any clause or clauses of this contract, the Contractor by the PMC/ Consultant shall have the power to adopt any of the following course as they may deem best suited to the interest of the NATIONAL LAW UNIVERSITY, ODISHA.

a) To rescind the contract (of which rescission notice in writing to the contractor by the PMC/ Consultant shall be conclusive evidence) and in which case the security deposit of the contractor shall be forfeited

and be absolutely at the disposal of NATIONAL LAW UNIVERSITY, ODISHA.

b) To employ labour paid by the NLUO and to supply materials to carry out the work, or any part of the work, debiting the contractor with the cost of the labour and materials (the cost of such labour and materials as worked out

by the PMC/ Consultant shall be final and conclusive against the contractor) and crediting him with the value of the work done, in all respects in the same manner and at the same manner and at the same rates as if it had been carried ;out by the contractor under the terms of this contract the certificate of PMC/ Consultant as to the value of work done shall be final and conclusive against the contractor.

c) To measure up the work of the contractor, and to take such part thereof as shall be unexecuted, out of his hands, and to give it to another contractor to complete in which case any expenses which may be incurred in excess of the sum which would have been paid to the original contractor, if the whole work had been executed by him (of the amount of which excess the certificates in writing of the PMC/ Consultant shall be final and conclusive) shall be borne by original contractor and may be deducted from any money due to him by NLUO under the contract or otherwise, or from his security deposit o the proceed of sale thereof, or sufficient part thereof.

In the event of any of above courses being adopted by the NLUO the contractor shall have no claim to compensation for any loss sustained

by him by reasons of his having purchased or procured any material or entered into any engagements or make any advances on account of, or with a view to the execution of the work or the performance of the contract and in case the contract shall be rescind under the provision aforesaid, the contractor shall not be entitled to recover or to be paid any sum or any work thereto for actually performed under this contract, unless, and until the PMC/ Consultant will have certified in writing the performance of such work and the value payable in respect thereof, and he shall only be entitled to be paid the value so certified.

34.0 NLUO has right to terminate the contract

If the contractor being an individual or a firm commit any ‘Act of insolvency’ or shall be adjusted an insolvent or being an incorporated company shall have an order for compulsory winding up voluntarily or subject to the supervision of Govt. and of the Official Assignee of the liquidator in such acts of insolvency of winding up shall be unable within seven days after notice to him to do so, to show to the reasonable satisfaction of the PMC / Consultant that he is able to carry out and fulfill the contract, and to give security therefore if so required by the PMC / Consultant.

Or, if the contractor (whether an individual firm or incorporated company) 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 of the contractor.

Or, shall assign or sublet this contract without the consent in writing of the NLUO through the PMC / consultant or shall charge or encumber this contract or any payment due to which may become due to the contractor there under :

(a) has abandoned the contract; Or

(b) has failed to commence the work, or has without any lawful excuse under these conditions suspended the progress of the works for 14 (fourteen) days after receiving from the NLUO through the PMC / Consultant written notice to proceed, or

(c) has failed to proceed with the works with such diligence and failed to make such due progress as would enable the works to be completed within the time agreed upon. Or has failed to remove materials from the site or to pull down and replace work with in seven days after written notice from the NLUO through PMC that the said materials were condemned and reject by the PMC under these conditions. Or has neglected or failed persistently to observe and perform all or any of the acts, matters or things by this contract to be observed and performed by the contractor for seven days after written notice shall have been given to the contactor to observe or perform the same or has to the detriment of good workmanship or in defiance of the NLUO‘s or PMC

Consultant’s instruction to the contrary subject any part of the contract. Then and in any of said cases the NLUO and or the PMC/ consultant , may not withstanding any previous waiver, after giving seven days notice in writing to the contractor determine the contract, but without thereby affecting the powers of the NLUO or the PMC/ consultant or the obligation and liabilities of the contractor the whole of which shall continue in force as fully as if the contract had not been so determined and as if the works subsequently had been executed by or on behalf of the contractor. And further the NLUO through the PMC/ Consultant their agents or employees may enter upon and take possession of the work and all plants, tools, scaffoldings, materials, sheds, machineries lying upon the premises or on the adjoining lands or roads use the same by means of their own employees or workmen in carrying on and completing the work or by engaging any other contractor or persons to complete the work and the contractor shall not in any was interrupt or do any act, matter or thing to prevent or hinder such other contractor or other persons employed for completing and finishing or using the materials and plants for the work.

When the works shall be completed or as soon thereafter as convenient the NLUO or the PMC/ consultant shall give a notice in writing to the contractor to remove his surplus materials and plants and should the contractor fail to do so within 14 days after receipt thereof by him the NLUO sell the same by public auction after due publication, and shall adjust the amount realized by such auction. The contractor shall have no right to question any of the act of the NLUO incidental to the sale of the materials etc.

35.0 Certificate of Payment

The contractor shall be entitled under the certificates to be issued by the PMC/NLUO to the contractor within 10 working days from the date of certificate to the payment from NLUO from time to time . The NLUO shall recover the statutory recoveries other dues including the retention amount from the certificate of payment.

The scrutiny commit can verify as and when required after verify by PMC.

Provided always that the issue of any certificate by the PMC/ consultant during the progress of works or completion shall not have effect as certificate of satisfaction or relive the contractor from his liability under clause.

The PMC/Consultant shall have power to withhold the certificate if the work or any part thereof is not carried out to their satisfaction.

The PMC/ Consultant may be any certificate make any correction required in previous certificate.

The NLUO shall modify the certificate of payment as issued by the PMC/ consultant from time to time while making the payment.

The contractor shall submit interim bills only after taking actual measurement and properly recorded in the measurement Book.

The contractor shall not submit interim bills when the approximate value of work done by him less than **75 lacs** and the minimum interval between two such bills shall be 15 days or less.

The final bill may be submitted by contractor within a period of one month from the date of virtual completion and PMC/ Consultant shall issue the certificate of payment within a period of two months. The NLUO shall pay the amount within a period of three months from the date of issue of certificate provided there is no dispute in respect of rates and quantities.

The contractor shall submit the interim bills in the prescribed format with all details.

36.0 PAYMENT TERMS & CONDITIONS :

Upto 85% of the total R.A. Bill submitted may be paid within 9 (nine) working days from the date of submission of R.A. Bills subject to the approval of PMC & PD jointly. The balance payment deducting the necessary statutory dues shall be paid only after complete verification of Bill by National Law University ODISHA / Project Management Consultant.

37.0 MOBILISATION :

Mobilization advance will be paid up to 10% of the contract value against the submission of bank guarantee from a nationalized bank as per the Performa enclosed. The format of getting this payment as mentioned which signed and duly confirm from any Nationalized Bank. The mobilization advance shall be recovered in prorate basis from each running bill when the work done value reaches 15% of the contract value and up to 85% of the contract value.

38.0 PERFORMANCE GUARANTEE :

The performance guarantee is 10% of the total contractor value which is submitted in form of Bank Guarantee from a Nationalized Bank. Which is valid for 12 (twelve) months beyond the completion period which will be submitted with in the 15 days from the date of agreement as per the Performa enclosed.

38.1 SECURED ADVANCE:

Interest free secured advance of 75% (seventy-five percent) of the purchase price of the materials required for incorporation in the permanent works and brought to site shall be paid to the contractor on all non-perishable, non-fragile and non-combustible materials as per OPWD norms, on request by the contractor and accompanied by—(i) an indemnity bond fully covering the advance and (ii) account of all such materials duly signed by him and certified by PMC in the prescribed proforma along with (iii) insurance cover for the materials against theft, fire, damages and losses of any kind, (iv) documents evidencing purchase of the said materials, and (iv) authenticated copy of Stock Register for Secured Advance maintained under Clause-44 of G.C.C.

The contractor shall make all necessary arrangements for safe storing of the said materials at the site of the work at his cost and risk in a suitable godown, constructed by him at his cost free of all expenses to NLUO, securing the said materials against any possible damages and/or losses due to sun, rain, dampness, fire, theft, etc.

Such secured advance may be paid on items of perishable and fragile nature stored at site of the work for incorporation in the permanent works by the contractor upon approval by PMC and on submission of comprehensive insurance cover for the full cost of such materials along with all other documents, as aforesaid.

No secured advance shall, however, be paid on items which, in the opinion of PMC, are high risk materials such as ordinary glass, sand, petrol, diesel, lubricant, etc.

Secured advance paid shall be recovered in full from the amount due to the contractor against next RA Bill and without prejudice to the right of NLUO to recover any unrecovered amount of this advance from the contractor from any other amount due to it or from any other source.

39.0 **Settlement of disputes and Arbitration.**

m. Except where otherwise provided in the contract all questions and disputes relating to own connection with the interpretation, execution or

enforcement of the contract shall be refer to arbitration, abolition and conciliation Act 1996 .

ii thing whatsoever in any way arising out of or relating to the contract, designs, Tendered drawings, specifications, estimates, instructions orders or these conditions or otherwise concerning the work or the execution or failure to execute the same whether arising during the progress of the work or after the cancellation, termination, completion or abandonment thereof shall be dealt with as mentioned hereinafter.

If the contractor considers that he is entitled to any extra payment or compensation in respect of the works over and above the amounts admitted as payable by the PMC or incase the contractor wants to dispute the validity of any deductions or recoveries made or proposed to be made from the contract or raise any dispute, the contractor shall forthwith give notice in writing of his claim, or dispute to the **Vice Chancellor,** National Law University ODISHA, Naraj, Cuttack - 753015, ODISHA and endorse a

copy of the same to the PMC, within 30 (thirty) days from the date of disallowance thereof or the date of deduction or recovery. The said notice shall give full particulars of the claim, grounds on which it is based and detailed calculations of the amount claimed and contractor shall not be entitled to raise any claim nor shall the N.L.U.O be any way liable in respect of any claim by the contractor unless notice of such claim shall have been given by the contractor to the **Vice Chancellor,** National Law University ODISHA, Naraj, Cuttack - 753015, ODISHA in the manner and within the time as aforesaid. The contractor shall be deemed to have waved and extinguished all his rights in respect of any claim not notified to the **Vice Chancellor,** National Law University ODISHA, Naraj, Cuttack - 753015, ODISHA in writing in the manner and within the time aforesaid.

ii) Except where the decision has become final, binding and conclusive in terms of the contract, all disputes or differences arising out of the notified claims of the contractor as aforesaid and all claims of the N.L.U.O shall be referred for adjudication through arbitration by the Sole Arbitrator appointed by the **Vice Chancellor,** National Law University ODISHA, Naraj, Cuttack - 753015, ODISHA. It will also be no objection to any such appointment that the arbitrator so appointed is a N.L.U.O Officer and that he had to deal with the matters to which the Contract relates in the course of his duties as N.L.U.O Officer. If the arbitrator so appointed is unable or unwilling to act or resigns his appointment or vacates his office due to any reason whatsoever another sole arbitrator shall be appointed in the manner aforesaid by the said, **Vice Chancellor,** National Law University Odisha, Naraj, Cuttack - 753015, ODISHA. Such person shall be entitled to proceed with the reference from the stage at which it was left by his predecessor.

It is a term of this contract that the party invoking arbitration shall give a list of disputes with amounts claimed in respect of each disputes with amounts claimed in respect of each dispute along with the notice for appointment of arbitrator.

It is also a term of this contract that no person other than a person appointed by such National Law University Odisha, Naraj, Cuttack - 753015, ODISHA as aforesaid should act as arbitrator.

The conciliation and arbitration shall be conducted in accordance with the provisions of the arbitration & Conciliation Act 1996 or any statutory modification or reenactment thereof and the rules made thereunder.

It is also a term of the contract that the arbitrator shall be deemed to have entered on the reference on the date he issues notice to both the parties calling them to submit their statement of claims and counter statement of claims. The venue of the arbitration shall

be such place as may be fixed by the arbitrator in his sole discretion. The fees, if any, of the arbitrator shall , if required to be paid

before the award is made and published, be paid half and half by each of the parties. The cost of the reference and of the award (including the fees, if any of the arbitrator) shall be in the discretion of the arbitrator who may direct to any by whom and in what manner, such costs or any part thereof, shall be paid and fix or settle the amount of costs to be so paid.

40.0 Water Supply

The contractor shall make his own arrangement for water required for the work and nothing extra will be paid for the same. This will be subject to the following conditions.

(i)That the water used by the contractor shall be fit for construction purposes to the satisfaction of the PMC/ Consultant.

(ii) The contractor shall make alternative arrangement for the supply of water if the arrangement made by the contractor for the procurement of water in the opinion of the PMC/ consultant is unsatisfactory.

40.1 The contractor shall construct temporary well/ tube well in NLUO land for taking water for construction purposes only after obtaining permission in writing from the NATIONAL LAW UNIVERSITY,ODISHA. The contractor has to make his own arrangement for drawing & distributing the water at his own cost. He has to make necessary arrangements to avoid any accidents or damages caused due to construction and subsequent maintenance of the wells. He has to obtain necessary approval from local authorities, if required, at his own cost. He shall restore the ground to its original condition after wells are dismantled on completion of work. Or and over the well to the NLUO without any compensation as directed by the PMC/consultant.

41.0 Power Supply

The contractor shall make his own arrangements for power and supply / distribution system for driving plant or machinery for the work and for lighting purpose at his own cost, The cost of running and maintenance of the plants are to included in his tender prices. He shall pay all fees

and charges required for the power supply and include the same in his tendered rates and hold the owner free from all such costs. He has to obtain necessary approval from the appropriate authorities, if required.

42.0 Treasure trove etc.

Any treasure trove, coin or object antique, which may be found on the site, shall be the property of NLUO and shall be handed over to the N.L.U.O immediately.

43.0 Method of measurement

Unless otherwise mentioned in the schedule of quantities or in mode of measurement, the measurement will be on the net quantities or work produced in accordance with up to date. Rules laid down by the Bureau of Indian Standards. In the event any dispute / disagreement the decision of the PMC/ Consultant shall be final and binding on the contractor.

44.0 Maintenance of registers

The contractor shall maintain the following registers as per the enclosed Performa at site of work and should produce the same for inspection of NLUO/ PMC consultant whenever desired by them. The contractor shall also maintain the records / registers as required by the local authorities /Govt. from time to time.

i) Register for cement / paint / lead / specific materials.

ii) Register for steel

iii) Register for secured advance

iv) Register for bulkage of sand

v) Register for silt test

vi) Register for sieve analysis for fine aggregate

vii) Register for sieve analysis for course aggregate

viii) Register for slump test

ix) Register for concrete cube test

x) Register for hindrance to work

xi) Register for consumption of cement

xii) Register for running account bill

xiii) Register for labour

45.0 Price Variation Adjustment (P.V.A.)

No price variation shall be considered within the Contract Period or within the Extended contract period.

1. Immediately on award of contract, the contractor shall register with the appropriate authority obtain Sales Tax Registration No. and produce the details thereof to the N.L.U.O within 30 days of the award of the work and in no case later than the submission of his first running bill.

2. The successful tenderes may also note that the N.L.U.O reserves the right to deduct Sales Tax on works contract applicable and to be levied under relevant Act, from the bills and amount due to them from N.L.U.O and remit the same directly to the Government in case they are not submitting the proof / evidence of having paid the Sales Tax on work executed under this contract.

46.0 Force Majeure

46.1 Neither contractor nor NLUO shall be considered in default in performance of their obligations if such performance is prevented or delayed by events such as but not to war, hostilities revolution, riots, civil commotion, strikes, lockout, conflagration, epidemics, accidents, fire, storms, floods, droughts, earthquakes or ordinances or any act of god or for any other cause beyond the reasonable control of the party affected or prevented or delayed. However a notice is required to be given within 30 days from the happening of the event with complete details, to the other party to the contract, if it is not possible to serve a notice; within the shortest possible period without delay.

46.2 As soon as the cause of force majeure has been removed the party whose ability to perform its obligations has been affected, shall notify the other of such cessation and the actual delay incurred in such affected activity adducing necessary evidence in support thereof.

46.3 From the date of occurrence of a case of force majeure obligations of the party affected shall be suspended during the continuance of any inability so caused. With the cause itself and inability resulting there from having been remove, the agreed time of completion of the respective obligations under

this agreement shall stand extended by a period equal to the period of delay occasioned by such events.

46.4 Should one or both parties be prevented from fulfilling the contractual obligations by a state of force majeure lasting to a period of 6 months

or more the two parties shall each other to decide regarding the future execution of this agreement.

47.0 Local laws, Acts, Regulations:

The contractor shall strictly adhere to all prevailing labour laws inclusive of contract labour (regulation and abolition act of 1970) and other safety regulations. The contractor shall company with the provision of all labour legislation including the latest requirements of all the Acts, laws any other regulations that are applicable to the execution of the project.

i) Minimum wages Act 1948 (Amended)

ii) Payment of wages Act 1936 (Amended)

iii) Workmen's compensation Act 1923 (Amended)

iv) Contract labour regulation and abolition act 1970 and central rules 1971 (Amended)

v) Apprentice act 1961 (Amended)

vi) Industrial employment (standing order) Act 1946 (Amended)

vii) Personal injuries (Compensation insurance) act 1963 and other modifications

viii) Employees' provident fund and miscellaneous provisions Act 1952 and amended thereof.

ix) Shop and establishment act.

x) Shop and establishment act.

xi) Royalty shall be charged as applicable by Govt. of Odisha.

xii) Any other act or enactment relating thereto and rules framed there under from time to time.

48.0 Supply of man power for supervision of the Project.

The contractor shall ensure the supply of the manpower with required qualification for this project. These engineer and supervisor will look after day to day activities of work. They will also maintained the required documents to be submitted to PMC on regular basic and endorse it.

MINIMUM REQUIREMENT OF TECHNICALREPRESENTATIVE FROM THE CONTRACTOR SIDE.

Sl. No.	Minimum Qualification of technical representative	Discipline	Designation	Minimum Experience	Minimum
1	Degree	Civil	Project Manager	15 Years	1 No.
2	Degree	Civil	Sr. Engineer	10 Years	2 Nos.
3.	Diploma	Civil	Billing Engineer	8 Years	2 Nos.
4.	Diploma	Civil	Quality Control Engineer	8 Years	2 Nos.
5.	Diploma	Civil	Safety Engineer	6 Years	1 Nos.
6.	Supervision Staff	Civil, Electrical, P.H and Drainage work.		5 Years	6 Nos.

49.0 Accidents.

The contractor shall immediately on occurrence of any accident at or about the site or in connection with the execution of the work report such accident to the PMC/ Consultant& NLUO. The contractor shall also such report immediately to the competent authority whenever such report is required to be lodged by the law and take appropriate actions thereof.

50.0 Idle Labour.

Whatever the reasons may be, no claim for idle labour, additional establishment cost of hire & labour charges of tools and plants would be entertained under any circumstances.

51.0 **EXTRA ITEMS, VARIATIONS, THEIR VALUATION AND CLAIMS**

51.1 If any item is ordered on the Contractor by NLUO which is neither in the tender document, Description of works in the Schedule, specifications, it shall be treated as extra item. The Contractor shall carry out and complete the said work on prior approval from the NLUO/ PMC in every respect to the satisfaction of NLUO. The rates of extra items shall be derived on the following basis of precedence:

(i) OPWD /CPWD Procedure and market rate of materials(including carriage), labour,

(ii) As per the market rates evaluated by NLUO.

Extra items on market rates will be applicable only when certificate is issued by PMC/ Project Director .The rates for extra item will be finalized before execution of the item.

SPECIAL CONDITIONS OF CONTRACT

Scope of work

1.0 The scope of work is to carry out all works in connections with Civil and External development works for for National Law University Campus at Naraj, Cuttack, ODISHA.

2.0 Address of site

The site is located at Naraj, Cuttack, ODISHA.

3.0 Dimensions and levels

All dimensions and levels shown on the drawing shall be verified by the contractor on the site and he will be held responsible for the accuracy and maintenance of all the dimensions and the levels. Figured dimensions are in all cases to accepted and no dimension shall be scaled. Large scale details shall take precedence over small-scale Tendered drawings. In case of discrepancy the contractor shall ask for clarification from the PMC/ Consultant before proceeding with the work.

4.0 Notice of operation

The contractor shall not carryout any important operation without the Consent in writhing from the PMC/ Consultant.

5.0 Consultant records

The contractor shall keep and provide to the PMC/ Consultant full and accurate records of the dimensions and positions of all new work and any other information necessary to prepare complete drawing recording details of the work as constructed.

6.0 Safety of adjacent structures and trees

The contractor shall provide and erect to the approval of the PMC/ Consultant such supports as may be required to protect effectively all structures and protective guards to trees which may be endangered by the execution of the works or otherwise take such permanent measures as may be required by the PMC to protect the trees and structures.

7.0 Temporary works

Before any temporary works are commenced the contractor shall submit at least 7 days in advance to the PMC /consultant for approval complete Tendered drawings of all temporary works he may require for the execution of the works. The contractor shall carry out the modifications relating to strength, if required by the PMC/ Consultant

may require in accordance with the conditions of contract at his own cost. The contractor shall be solely responsible for the stability and safety of all temporary works and unfinished works and for the quality of the permanent works resulting from the arrangement eventually adopted for their execution.

8.0 Temporary roads

The contractor shall provide access roads to the site from the nearest main road at no extra cost and as directed by the PMC/ Consultant. The contractor shall also responsible for proper maintenance of this access road and would take all care to see that existing services, if any, are maintained in working order at his own cost. The laying and maintaining the temporary roads within the site area shall be the contractor's responsibility and the contractor shall take such measures that necessary and as directed by the PMC/ Consultant.

9.0 Water, power and other facilities

a) The rate quoted by the contractor shall include all expenses that are required for providing all the water required for the work and the contractor shall make his own arrangements for the supply of good quality water suitable for the construction and good quality drinking water for their workers. If necessary the contractor has to sink a tube well / open well and bring water by means of tankers at his own cost for the purpose. The NLUO will not be liable to pay any charges in connection with the above.

a) The rate quote in the tender shall include the expenses for obtaining and maintaining power connections and shall pay for the consumptions charges.

b) The contractors for other trades directly appointed by the NLUO shall be entitled to take power and water connections from the temporary water and power supply obtained by the contractor. However the concerned contractor shall make their own arrangements to draw the supply and pay directly the actual consumption charges at mutually agreed rates between them. All municipal charges for drainage and water connection for construction purposes shall be borne by the contractor and charges payable for permanent

connections, if any, shall be initially paid by the contractor and the NLUO will reimburse the amount on production of receipts.

a) The NLUO as well as the PMC/ Consultant shall give all possible assistance to the contractors to obtain the requisite.

b) Permission from the various authorities, but the responsibility for obtaining the same in time shall be of the contractor.

10.0 Office accommodation

a) The contractor shall provide and maintain all necessary offices, workshops, stores, shelters, sanitary facilities, canteens and other temporary structures for themselves in connection with the work at the site at their own cost after getting the approval from the PMC/ Consultant.

b) **SITE OFFICE**

The contractor shall provide at his own cost simple water tight separate fully furnished office accommodation of appropriate size , fitted with all the necessary infrastructure and all necessary facilities for PMC/Consultants' Office Staff. . The accommodation shall be well lit, ventilated and provided with windows doors with a locking facility, suitable partitions, and drinking water and toilet facilities. The accommodation shall be sufficiently large to accommodate of PMC/Consultants' Office staff and shall be suitably provided and furnished with air conditioner, writing tables, a lap top computer, a PC , a printer, drawing board, chairs, steel almirahs, stools, drawers for drawings, rack boards on walls for displaying drawings and programs, telephone, electric light, fans, etc., as required. The contractor shall provide the 10 digital camera of 10 mega-pixels of during the execution of the contract. All the above facilities shall be returned back to the contractor on the completion of defect liability period The Contractor shall also maintain at his own cost the office in good hygienic condition and provide facilities for having the office cleaned daily. Separate fully furnished accommodation as stated above shall also be provided for the Project Director. This accommodation shall be provided during and up to defect liability period also.

c) All temporary buildings and facilities as mentioned above shall be removed on completion of the work or at any other earlier date as directed by the PMC/ Consultant.

All the expenses for obtaining statutory approvals and maintenance of the above facilities as well as running expense shall be borne the contractor at no extra cost. It is also the responsibility of the contractor to obtain statutory approvals for providing the above facilities.

11.0 Facilities for contractor's employees

The contractor shall make his own arrangement for the housing and welfare of his staff and workmen including adequate drinking water facilities. The contractor shall also make she arrangements at his own cost for transport where necessary for his staff and workmen to and from site of work at his own cost.

12.0 Lighting of works

The contractor shall at all times provide adequate and approved lighting as required for the proper execution and supervision and inspection of work.

13.0 Fire fighting arrangements

i) The contactor shall provide suitable arrangement for firefighting at his own cost. For this purpose he shall provide requisite number of fire extinguishers

and adequate number of buckets, some of which are to be always kept filled with sand and some with water. These equipments shall be provided at suitable prominent and easily accessible places and shall be properly maintained.

ii) Any deficiency in the fire safety or unsafe conditions shall be corrected by the contractor at his own cost and to the approval of the relevant authorities. The contractor shall make the following arrangements at his own cost but limited to the following.

a) Proper handling, storage and disposal of combustible materials and waste.
b) Work operations which can create fire hazards.
c) Access for firefighting equipments.
d) type, number and location of containers for the removal of surplus materials and rubbish.
e) Type, size, number and location of fire extinguishers or other firefighting equipment.
f) General housekeeping.

14.0 Site order book

A site order book shall be maintained at site for the purpose immediate verification of between the NLUO/PMC /PMC. Any communication relating to the works may be conveyed through. Records in the site order book. Such a communication from one party to the other shall be deemed to have been adequately served in terms of contract. Each site order book shall have machine numbered pages in triplicate and shall carefully maintained and preserved by the contractor and shall be made available to the PMC/ Consultant as and when demanded. Any instruction which the PMC/ Consultant may like to issue to the contractor or the contractor may like to bring to the PMC/ Consultant two copies of such instructions shall be taken from the site order book and one copy will be handed over to the party against proper acknowledgment and the second copy will be retained for their record.

15.0 Temporary fencing / barricading

The contractor shall provide and maintain a suitable temporary fencing / barricading and gates at his cost to adequately enclose all boundaries of the site for the protection of the public and for the proper execution and security of the work and in accordance with the requirement of the PMC/

Consultant and regulations of local authorities. These shall be altered, relocated and adopted from time to tome as necessary and removed on completion of the work.

16.0 Site meetings

Site meetings will be held to review the progress and quality evaluation. The contractor shall depute a senior representative along with the site representative and other staff of approved sub-contractors and supplies as required to the site meetings and ensure all follow up actions. Any additional review meetings shall he held if required by the PMC/ Consultant.

17.0 Disposal of refuse

The contractor shall cart away all debris, refuse etc. arising from the work from the site and deposit the same as directed by the PMC/ Consultant at his own cost. It is the responsibility of the contractor to obtain from the local authorities concerned to the effect that all rubbish arising out of contractor's activities at the construction site or any other off-site activities borrow pits has been properly disposed off.

18.0 Contractor to verify site measurement

The contractor shall check and verify all site measurement whenever requested by other specialists contractors or other sub contractors to enable them to prepare their own shop Tendered drawings and pass on the information with sufficient promptness as will not in any way delay the works.

19.0 Displaying the name of the work

The contractor shall put up a name board of suitable size as directed by the PMC/ Consultant indicating therein the name of the project and other details as given by the PMC/ Consultant at his own cost and remove the same on completion of work.

20.0 Bar bending schedule

The contractor shall prepare a detailed bar bending schedule for all reinforced concrete works and got them approved by the PMC/ Consultant well in advance.

21.0 As built Tendered drawings

i) For the Tendered drawings issued to the contractor by the PMC. The PMC/ Consultant will issue two sets of Tendered drawings to the Contractor for the items for which some changes have been made. From the approved Tendered drawings as instructed by the NLUO/ PMC. The contractor will make the changes made on these copies and return these copies to the PMC/ Consultant for their approval. In case any revision is required or the corrections are not properly marked the PMC/ Consultant will point out the discrepancies to the contractor. The contractor will have to incorporate these corrections and / or attend to discrepancies either on the copies as directed by the PMC/ Consultant and resubmit to his for approval. The PMC/ Consultant will return one copy duly approved by him.

ii) For the drawing prepared by the contractor.

The contractor will modify the drawing prepared by him wherever the changes are made by the NLUO/ PMC/ Consultant. And submit two copies of such modified drawing to the PMC/ Consultant for approval. The PMC/ Consultant will return one copy of the approved drawing to the contractor.

If the contractor found any doubt in the drawing they must inform the Engineer in Charge within three days from the date of submission of Tendered drawings otherwise it will not consider as a reason of delay of work for Tendered drawings.

22.0 Approved make

The contractor shall provide all materials from the list of approved makes and ISI marked at his own cost and also appoint the specialized agency for the waterproofing, anti-termite, aluminium doors and windows and any other item as specified in the tender . The PMC/ Consultant may approve any make / agency within the approved as given at the time of tender list as given in the tender after inspection of the sample / mock up.

23.0 Procurement of materials

The contractor shall make his own arrangements to procure all required materials and ISI marked for the work. All wastages and losses in weight shall be to the contractor's account.

24.0 Excise duty, taxes, levies etc.

The contractor shall pay and be responsible for payment of all taxes, duties, levies, royalties, fees, cess or charges in respect of the works

including but not limited to sales tax, tax on works contract excise duty, and octroi, payable in respect of materials, equipment plant and other things required for the contact. All of the aforesaid taxes, duties, levies, fees and charges shall be to the contractor's account and the NLUO shall not be required to pay any additional or extra amount on this account. Variation of taxes, duties, fees levies etc if any, till completion of work shall be deemed to be included in the quoted rates and no extra amount on this account. Variation of taxes, duties, levies etc, if any, till completion of work shall be deemed to be included in the quoted rates and no extra claim on this account will in any case be entertained. If a new tax or duty or levy or cess or royalty or octroi is imposed under as statue or law during the currency of contract the same shall be borne by the contractor.

25.0 Acceptance of tender

The NLUO shall have the right to reject any or all tenders without assigning any reason. They are not to bound to accept the lowest or any tender and the tenderer or tenderers shall have no right to question the act of the NATIONAL LAW UNIVERSITY, Odisha. However adequate transparency would be maintained by the NATIONAL LAW UNIVERSITY, Odisha.

SAFETY CODE

1. First aid appliances including adequate supply of sterilized dressing and cotton wool shall be kept in a readily accessible place.

2. An injured person shall be taken to a public hospital without loss of time in cases where the injury necessitates hospitalization.

3. Suitable and strong scaffolds should be provided for workmen for all works that cannot safely be done from the ground .

4. No portable single ladder shall be over 8 meters in length. The width between the side rails shall not be less than 30 cm. (clear) and at the distance between two adjacent rungs shall not be more than 30 cm. When a ladder is used an extra mazdoor shall be engaged for holding ladder.

5. The excavated material shall not be placed within 1.5 meters of the edge of the trench or half of the depth of trench whichever is more. All trenches and excavations shall be provided with necessary fencing and lighting.

6. Every opening in the floor of a building or in a working platform be provided with suitable means to prevent the fall of persons or materials by providing suitable fencing or failing whose minimum height shall be one metre.

7. No floor , roof or other part of the structure shall be so overloaded with debris or materials as to render it unsafe.

8. Workers employed on mixing and handling material such as asphalt , cement mortar or concrete and lime mortar shall be provided with protective footwear and rubber hand-gloves.

9. Those engaged in welding works shall be provided with welder’s protective eye shields and gloves.

10. i) No paint containing lead or lead products shall be used except in the form of paste or readymade paint.

    ii) Suitable facemasks, should be supplied for use be the workers when the paint is applied in the form of spray or surface having lead paint dry rubbed and scrapped.

11. Overall shall be supplied by the contractor to the painters and adequate facilities shall be provided to enable the working painters to wash during the periods of cessation of work.

12. Housing machines and tackle used in the works, including their attachments, anchorage and supports shall be in perfect condition

13. The ropes used in hoisting or lowering material or as a means of suspension shall be of durable quality and adequate strength and free from defects.

N.L.U.O'S UNIVERSITY CAMPUS WORK PROJECTS - MAINTENANCE OF RECORDS

A. Registers at the site office of the N.L.U.O's Engineer :

1. Drawing register.
2. Hindrance Register.
3. Concrete cube Test Register.
4. File and Register for extra / variation items.
5. Materials tests Register and file.
6. Site Order Book (triplicate).
7. Site visit & Instructions Register.
8. Certified true copies of the contracts.

MOBILISATION ADVANCE

At the request of the Contractor mobilization advance to a maximum of 10.0 % (Ten Percent) of the contract amount against Bank Guarantee from a Nationalized Bank shall be paid by NLUO . This shall be paid in two equal installments against equivalent Bank Guarantee . The First Installment of mobilization advance of 5 % (five percent) of contract value shall be paid at the time of award of work and on certification of proper and satisfactory mobilization at site. Balance mobilization advance of 5% (five percent) of contracts value against Bank Guarantee bonds from Nationalized Bank shall be payable after submitting the 1st RA bill. However the first installment of mobilization advance will be release on the finalization of bar chart duly approved by NLUO and signed by the

Contractor, and Project Director, receipt of certificate from Project Director and PMC/ PMC regarding satisfactory mobilization at site.

RECOVERY OF MOBILISATION ADVANCE

i) Initial mobilization advance shall be recovered from the RA bills In Pro-rata basis when the work done value reaches 15% of the contract value till the work done value reaches 85% of the contract value.

ROFORMA OF LETTER OF ACCEPTANCE OF TENDER

REGISTERED A.D.

To,
M/s …….
…….
Dear Sirs,

NAME OF THE WORK

Please refer to your letter No. _____ dated _____ on the captioned subject. We are pleased to inform that your tender for the above mentioned work has been accepted by our clients NLUO at the rates quoted by you for a total cost of Rs._____(Rupees _____)

In this connection, it may please be noted that the following letters will form part of the contract document:

i) Your letter No. _____ dated _____ addressed to _____
ii)
iii)
You are requested to all on us to execute the formal agreement within 15 days from the date of receipt of the LOA or the date of handing over the site whichever is later.

You are requested to submit Initial Security Deposit of Rs._____ by means of DD drawn in favour NLUO within a period of _____
You are also requested to start the work at once in consultation with _____.
Please note that the time allowed for completion of work is _____ months, which shall be reckoned from 15th day of receipt of this letter or date of handing over the site whichever is later.

Please note that time will be the essence of the contract.

You are further requested to take out necessary insurance covers, indemnity bonds, labour permissions at your cost in terms of clause _____ and _____ conditions of the contract.

Please acknowledge receipt of this letter.
PMCs

COPY to Vice Chancellor of NLUO , for information.

Place :…….
Date :……..

LETTER OF GUARANTEE FOR MOBILISATION ADVANCE
(TO BE STAMPED AS A SECURITY BOND)

The Vice Chancellor
National Law University ODISHA .
Naraj, Cuttack - 753015, ODISHA

Dear Sir,

N.L.U.O's Proposed National Law University Campus Works at Naraj, Cuttack.

WHEREAS

(1) You have awarded a contract for civil work in respect of the construction of your N.L.U.O's own National Law University Campus Works at Naraj, Cuttack to our constituents _____a Company / firm having its registered office/office at _____ (hereinafter referred to as "the Contractors", which expression shall include its successors and assigns) in terms of which the National Law University ODISHA has agreed to advance to the contractors a sum of Rs. _____ (Rupees _____ only) as and by way of mobilization advance in order to enable them for making arrangements for producing necessary materials for the construction work and for tools, plant, equipment, etc.

(2) The Contractors have vide their letter dated _____ requested the National Law University ODISHA to grant them a sum of Rs. _____ (Rupees _____ only) as and by way of mobilization advance which the National Law University ODISHA has agreed to grant subject to the terms and conditions as set out in their letter No. _____ dated _____.

(3) One of the terms of the said letter dated _____ requires the Contractors to furnish bank guarantee satisfactory to the National Law University ODISHA to secure the said advance.

(4) It is agreed by and between the parties to the said contract that the said bank guarantee may be furnished by us.

NOW THEREFORE THIS LETTER OF GUARANTEE WITNESSES that in consideration of the National Law University ODISHA on our request agreeing to advance a sum of Rs. _____ (Rupees _____ only) as a and by way of mobilization advance s

subject to the terms and conditions as set out in the National Law University ODISHA 's letter

No. _____ dated _____ addressed to the Contractor, we the (Name of bank) hereby agree and undertake to the National Law University ODISHA as follows:

(i) that the Contractors shall duly perform and discharge their obligations under the said contract to the full satisfaction of the National Law University ODISHA and that they shall utilize the said mobilization advance exclusively for the purpose of making preliminary construction of the aforesaid project for the National Law University ODISHA at Naraj, Cuttack and for no other purpose.

(ii) that in case the Contractors do not repay principal amount or pay the interest on said advance on the due dates or do not present their Running Bills for payment to the National Law University ODISHA so that the National Law University ODISHA is not in a position to adjust the said advance from out of the bills payable to the contractors or the contractors fail to repay the said advance or pay interest thereon or any part thereof on due dates or on demand, by the National Law University ODISHA or on the occurrence of any of the events specified in the said contract that may lead to the termination of the contract, we the (Name of the bank) hereby guarantee and undertake to pay to the National Law University ODISHA on demand without demur the said sum of Rs._____ (Rupees _____ only) or such unadjusted portion thereof together with interest @ _____ % per annum accrued due thereon within a period of one week from the date of receipt of the demand from the National Law University ODISHA .

(iii) that any statement made by the National Law University ODISHA and the amount mentioned in the demand notice given to us shall not be called in question by us and shall be a conclusive proof regarding the amount that is payable by us under this guarantee and that we shall not demand any proof thereof.

(iv) that we will make the payment pursuant to the demand notice issued by the National Law University ODISHA , notwithstanding any dispute that may exist or arise between the National Law University ODISHA and the Contractors or any other person.

(v) that this guarantee shall not be revoked by us without prior consent in writing of the National Law University ODISHA .

WE HEREBY FURTHER AGREE THAT:

(a) any forbearance, act or omission on the part of the National Law University ODISHA in enforcing any of the conditions of the said contract or granting of any time or the showing of any indulgence by the National Law University ODISHA to contractors in respect of the completion of the building or any other matter in connection therewith shall not discharge us

(b) in any way and our obligations under this guarantee shall be discharged only by payment in full of the sums guaranteed hereunder.

(c) Our liability under these presents shall not exceed the sum of Rs. _____ (Rupees _____ only) and interest @ _____% per annum accruing due thereon.

(d) Our liability under this guarantee shall not be affected by any infirmity or irregularity on the part of the contractors in entering into the said contract or by the dissolution or change in the constitution of the contractor firm.

(e) Our liability under these presents will terminate on the issue of the Virtual

Completion Certificate by the PMCs/N.L.U.O pursuant to the said contract and unless a claim, suit or action is filed against us within 6 months thereafter all the rights of the National Law University ODISHA against us under this guarantee shall be

forfeited and we shall be released and discharged from all our obligations and liabilities hereunder.

Yours faithfully,

For and on behalf of

(National Law University ODISHA)

(Authorized Official)

N.B.: This guarantee will require stamp duty as applicable in the state, where it is executed and shall be signed by the official whose signature and authority shall be verified.

BANK GUARANTEE FOR PERFORMANCE

Whereas the NATIONAL LAW UNIVERSITY ODISHA, CUTTACK (hereinafter called NLUO which expression shall include its successors and assigns) having awarded a work order/contract/supply order No……., ……. dated …… & …… (hereinafter called the contract) to …….(hereinafter called the contractor/supplier) at a total price of Rs…… subject to the terms and conditions contained in the contract.

WHEREAS, the terms and conditions of the contract require the contractor (Contractor) to furnish a bank guarantee for Rs……. (Rupees …… only) being 10% of the total value of the contract for proper execution and due fulfillment of the terms and conditions contained in the contract.

We, ……(Nationalized "Bank") having our registered office at ……..do hereby unconditionally and irrevocably undertake to pay to NLUO immediately on demand in writing and without protest/or demur the amount mentioned in the guarantee. Any such demand made by NLUO on the bank shall be final and conclusive. However, the Bank's liability under this guarantee shall be limited to Rs……. in the aggregate and the bank hereby agrees to the following terms and conditions:-

i) This guarantee shall be continuing guarantee and irrevocable for all claims of NLUO as specified above and shall be valid during the period specified for the performance of the contract including the period of maintenance/warranty i.e. up to …….

ii) We, the said bank further agree with NLUO that NLUO shall have the fullest liberty without our consent and without affecting in any manner our obligations and liabilities hereunder to vary any of the terms and conditions of the said contract or to extend time for performance of contract by the contractor from time to time or to postpone for any time or from time to time any of the powers exercisable by NLUO against the contractor/supplier under the contract and forbear or enforce any of the terms and conditions relating to the said contract and we shall not be relieved from our liability by reason of any such variations or extension being granted to the contractor or for any forbearance, act or omission on the part of NLUO or any indulgence by NLUO to the contractor or by any such matter or thing whatsoever, which under the law relating to the sureties would, but for this provision, have effect of so relieving us.

iii) This guarantee/undertaking shall be in addition to any other guarantee or security whatsoever NLUO may now or at anytime have in relation to the performance of the works/equipment and the company shall have full re-course to or enforce this security in
preference to any other security or guarantee which the NLUO may have or obtained and there shall be no forbearance on the part of the NLUO in enforcing or requiring enforcement of any other security which shall have the effect of releasing

the Bank from its full liability. It shall not be necessary for NLUO to proceed against the said contractor/supplier before proceeding against the Bank.

iv) This guarantee/undertaking shall not be determined or affected by the liquidation or winding up, dissolution or change of constitution or insolvency of the supplier/contractor, but shall in all respects and for all purposes be binding and operative until payment of all moneys payable to NLUO in terms thereof are paid by the Bank.

v) The Bank hereby waives all rights at any time inconsistent with the terms of this Guarantee and the obligations of the bank in terms hereof, shall not be otherwise affected or suspended by reason of any dispute or disputes having been raised by the supplier/contractor (whether or not pending before any Arbitrator, Tribunal or Court) or any denial of liability by the supplier/contractor stopping or preventing or purporting to stop or prevent any payment by the Bank to NLUO in terms hereof.

We, the said Bank, lastly undertake not to revoke this guarantee during its currency except with the previous consent of NLUO in writing. Unless a claim is made in writing within sixty days after the date of expiry of this guarantee i.e. ……., we shall be relieved from all liabilities under this guarantee thereafter.

Notwithstanding anything contained herein:

1. Our liability under this Bank guarantee shall not exceed ……. ((Rupees …… only).
2. This Bank Guarantee shall be valid up to …… and we are liable to pay the guaranteed amount or any part thereof under this Bank Guarantee only if you serve upon us a written claim or demand on or before …….. (including claim period).

Signed this …… day of ……. at……

WITNESS

For and on behalf of Bank

Signature & Seal

PROFORMA OF MONTHLY PROGRESS REPORT

Name of work :
Progress report for the month :
Report No. :

Sr. No	Description	Details of location where work is done	Approximate quantity executed
A.	**General Building Work:**		
	1. Foundation work 2. Reinforcement fabrication 3. Shuttering work 4. Reinforced cement concrete 5. Masonry work 6. Wood work 7. Plastering work 8. Flooring work 9. Glazing work 10. Roof treatment work 11. Painting work		
B.	PEST CONTROL TREATMENT		
C.	SECURITY EQUIPMENT WORK		
D.	SANITARY AND PLUMBING WORK:		
	1. Water supply 2. Drainage work 3. Fittings and fixtures		
E.	ELECTRICAL INSTALLATION WORK		
F.	AIRCONDITIONING WORK		
G.	OTHER TRADES		

RECEIPT OF MATERIALS AT SITE

Sl No.	Description	Opening balance	Receipt during month	Consumption during month	Closing balance	Total quantity received till date
1.	Cement (M.T)					
2.	Mild Steel M.T)					
3.	Tor Steel (M.T)					
4.	Coarse aggregate (cu.mt.)					
5.	Fine aggregate (cum)					
6.	Teak wood (cum)					
7.	Bricks (Nos.)					
8.	Tiles (Nos.)					

Sl No.	Description of work	Date of commencement	Due date of completion	Percentage progress achieved.
1. 2. 3. 4. 5. 6. 7.	General Building Works. Security equipment work. Pest control treatment work. Sanitary & Plumbing work. Electrical work. Air conditioning work. Other works.			

PROFORMA OF CONCRETE CUBE TEST REPORT

1. Name of the Project_____

2. Name of the Contractor_____

Sr. No.	Date of casting	Identification Mark and location in which the representative concrete is placed	Mix proportion	Date of testing	Crushing strength as on the date of test
1	2	3	4	5	6

Crushing strength as on the 28^{th} day	Average crushing strength (Average of 3 companion cubes) as on the 28^{th} day	Remarks	Signature of the site Engineer
7	8	9	10

PROFORMA OF MEASUREMENT BOOK

1st page:

NATIONAL LAW UNIVERSITY ODISHA
…….office,

Measurement Book No.
(Pages 1 to …….)

This book is issued to Shri…….

Signature of Vice Chancellor , NLUO

Certified that this book contains……pages

Signature of the official
To whom the book is issued

MEASUREMENT BOOK **PAGES NOS. 1 TO ……**

Item No.	Description	Measurements. No.L B D/H	Quantity	Remarks

Engineer NLUO . PMC/Consultant. Contractor

Checking/Test checking Engineer Date of checking/Test checking

NOTE:
Checking and test checking pertains to items wherever initialed.

I - RUNNING A/C BILL

i) Name of Contractor/Agency :

ii) Name of work :

iii) Sr. No. of this bill :

iv) No. and date of previous bill :

v) Reference to Agreement No. :

vi) Date of written order to commerce :

vii) Date of completion as per agreement :

Sr no.	Item Description	Unit	Rate (Rs.)	As per tender Qty. Amount (Rs.)
1	2	3	4	5

Upto previous R/A Bill Qt. Amount (Rs.)	Upto date (Gross) Qty. Amount (Rs.)	Present Bill Qty. Amount (Rs.)	Remark
6	7	8	9

Note: 1) If part rate is allowed for any item, it should be indicated with reasons for allowing such a rate.

2. If adhoc payment is made, it should be mentioned specifically.

Net value since previous bill

3 NOS OF FORMAT FOR SUBMISSION OF R.A BILL

ANNEXURE – I

DEVIATION APPROVAL FORMA									
Name of the Project:									
W.O/ LOI No. & Date:-									
Sl. No	**DESCRIPTION OF ITEM**	**QTY AS PER BOQ**	**QTY AS EXECUTED AS ON DATE**	**DEVIATED QT**	**REASON FOR DEVIATION**	**DOCUMENTS/ CORRESPONDANCE / DIRECTIONS APPROVAL BY PMC/NLUO**	**VERFICATION & CERTIFICATION**	**APPROVAL /SIGNATURE BY NLUO IF NOT ALRADY OBTAINED**	**REMARKS**

ANNEXURE – II

EXTRA ITEM APPROVAL FORMAT								
Name of the Project:								
W.O/ LOI No. & Date:-								
Sl. No	**DESCRIPTION OF EXTRA ITEM**	**QTY AS EXECUTED AS ON DATE**	**RATE**	**SUBMISSION OF RATE ANALYSIS**	**VERFICATION AND CERTIFICATION OF RATE ANALYSIS**	**REASON FOR EXTRA ITEMS**	**APPROVAL/SIGNATURE BY NLUO IF NOT ALRADY OBTAINEDOBTAINED**	**REMARKS**

ANNEXURE – III

DRAWING TRACKING FORMAT								
Name of the Project:								
W.O/ LOI No. & Date:-								
SL. NO	**B.O.Q. ITEM**	**QTY DEVIATION/EXTRA ITEM**	**REASON FOR DEVIATION /EXTRA ITEM**	**G.F.C. DRAWING NO**	**REVISION OF DRAWING WITH DWG NO**	**REASON FOR DRAWING REVISION**	**APPROVAL/SIGNATURE BY NLUO IF NOT ALREADY OBTAINED**	**REMARKS**

Note: All the running bill shall be submitted along with the formats as annexed – I, II and III duly seal and sing. NLUO forward the R.A bill to PMC for verification, PMC shall verify the R.A bills forward by NLUO. NLUO shall give technical/ administrative approval before on verify / certify format.

C E R T I F I C A T E

The measurements on the basis of which the above entries for the Running Bill No.____ were made have been taken jointly on _____ and are recorded at pages_____to _____of measurement book No._____.

_____	_____	_____
Signature and date of Contractor	Signature and date of PMC's	Signature and date of site engineer.

The work recorded in the above-mentioned measurements has been done at the site satisfactorily as per tender Tendered drawings, conditions and specifications.

PMC/Consultant. N.L.U.O's Engineer

II -ACCOUNT OF SECURED ADVANCE, IF ADMISSIBLE ON MATERIALS HELD AT SITE BY THE CONTRACTOR

No.	Item	Quantity	Unit	Amount	Remarks
1	2	3	4	5	7

Total value of materials at site	
Secured Advance @ …….% of above value	B
CERTIFIED (I) That the materials mentioned above have actually been brought by the contractor to the site of the work and no advance on any quantity of any of this item is outstanding on their security, (ii) that the materials are of imperishable nature and are all required by the contractor for use in the work in connection with the items for which rates of finished work have been agreed up on.	

Dated signature of Site Engineer NLUO Preparing the bill

Designation_____

Dated signature of N.L.U.O's PMCs

(Name of the PMCs)

Dated signature of Contractor.

PROFORMA OF UNDERTAKING IN CONNECTION WITH PAYMENT OF ADVANCE ON MATERIALS BROUGHT BY THE CONTRACTOR TO THE SITE

The undertaking made this …….day of ……2016……between the National Law University ODISHA ,……and having its ……Office at ……(hereinafter called the NLUO) of the one part and ……..(Hereinafter called the contractors of the other part.)

The NLUO and the Contractors have entered into an Agreement date…….hereinafter called as the said agreement and in terms of Clause No…….of the conditions in the agreement, the NLUO has agreed that the Contractors will be paid an advance of 75% of the cost of non-perishable building materials brought by the Contractor to the site for consumption in the works at the discretion of the NLUO.

The Contractors have applied to the NLUO that they be allowed advance on the security of materials absolutely belonging to them and brought by them to the site of work. The NLUO has agreed to do so on the terms and conditions hereinafter set out.

Now this letter of Undertaking witnesses that in consideration of the side agreement and in consideration of the amount paid/payable to the Contractors by the NLUO and/or any further advances as may be made to the contractors as aforesaid, the Contractors hereby agree with the NLUO and undertake as under

i) The amount advanced by the NLUO to the Contractors as aforesaid and all or any further sum or sums advanced as aforesaid shall be employed by the Contractors in or towards expediting the execution of the said works and for no other purpose whatsoever

ii) That the materials which have been offered to and accepted by the NLUO as security are absolutely the Contractor's own property and free from encumbrances of any kind and the Contractor will not make any application for or receive a further advance on the security of materials which are not absolutely his own property and free from encumbrances of any kind and the Contractors indemnify the NLUO against all claims to any materials in respect of which an advance has been made to them as aforesaid.

iii) That the materials on the security of which any further advance or advances may hereafter be made as aforesaid (hereinafter called the said materials) shall be used by the Contractors solely in the execution of the said works in accordance with the directions of Vice Chancellor, NLUO of the NLUO and in accordance with the terms of the said agreement.

iv) That the contractors shall take at their own cost all the necessary and adequate arrangement for the proper watch, safe custody and protection against all risks of the said

materials and that until used in construction as aforesaid. The said materials shall remain at the site of the said works in the Contractor's custody and on their own responsibility and shall at all times be open to Inspection to the NLUO's Engineers or any officer authorized by the NLUO. In the event of the materials or any part thereof being stolen destroyed or damaged, the Contractor will further replace the same with other materials of like quality or repair and make good the same as required by the NLUO.

v) That the said materials shall not any account be removed from the site of the said works except with the written permission of the Vice Chancellor, NLUO the NLUO.

v) That the advances shall be repayable in full when or before the Contractors receive payment from the NLUO of the price payable to them for the said works under the terms and the provisions of the said agreement provided that if any intermediate payments are made to the Contractors on account of work done, then on occasion of each such payment, the NLUO will be at liberty to make as recovery from the Contractor's bill for such payment by deducting there from the value of the said materials then actually used in the construction and in respect of which recovery has not been made deviously, the value for this purpose being determined in respect of each description of materials as the rates at which the amounts of the advances made under these presents were calculated.

vi) That if the contractors shall at any time make any default in the performance or observance in any respect of any of the terms and provisions of the said agreement or of these presents, the total amount of advance or advances that may still be owing to the NLUO, shall immediately, on the happening of such default, be repayable by the Contractors to the NLUO together with interest thereon at 12% per annum from the date or respective dates of such advance or advances to the date of repayment and with all costs, charges, damages and expenses incurred by the NLUO in or for the recovery thereof or the enforcement of this security or otherwise by reason of the default of the Contractors and the contractors hereby covenant and agree with the NLUO to repay and pay the same respectively to him accordingly.

vii) That the contractors hereby charge all the said materials with the repayment to the NLUO of the sum or sums advanced as aforesaid and all costs, charges, damages and expenses payable under these presents PROVIDED ALWAYS and it is hereby agreed and declared that notwithstanding anything in the said agreement and without prejudice to the powers contained therein if and whenever the covenant for payment and repayment hereinabove contained shall become enforceable and the money owing shall not be p aid in accordance therewith, the NLUO may at any time thereafter adopt all or any of the following courses as he may deem best:

a) Seize and utilize the said materials or any part thereof in the completion of the said works on behalf of the contractors in accordance with the provisions in that behalf contained in the said agreement debiting the contractor with the actual cost of such completion and the amount due in respect of advances under these presents and crediting the Contractors with the value of work done as if he had carried it out in accordance with the said agreement and at the

rates thereby provided. If the balance is against the Contractors, they are bound to pay the same to the NLUO on demand.

b) Remove and sell by public auction the seized materials or any part thereof and out of the moneys arising from the sale, retain all the sums aforesaid repayable or payable to the NLUO under these presents and pay over the surplus (if any) to the Contractor.

c) Deduct all or any part of the money owing out of the Security Deposits or any sum due to the Contractor under the said agreements

viii) That except in the event of such default on the part of the contractors as aforesaid, no interest shall be payable on the said advance.

ix) That in the event on any conflict between the provisions of these presents and the said agreement, the provisions of these presents shall prevail and in the event of any dispute or difference arising over the construction of effect of these presents the settlement of which has not been herein before expressly provided for the same shall be referred to the officer-in-charge, NLUO, whose decision shall be final and no appeal shall lie against his decision before any court, arbitrator or authority.

x) The provision of this undertaking shall be deemed to be supplemental to the said agreement.

IN WITNESS WHEREOF the Contractors have set their hands to these presents the day and year first hereinabove written.

Signed, sealed and delivered by the said contractors in the presence of

Witness: Signature

Name

Address

Witness: Signature

Name

Address

IV. MEMORANDUM FOR PAYMENT

R.A BILL No. _____

1.	Total amount due since previous bill (D) (A+B)*	Rs._____	
2.	P.V.A. on account of escalation in price of steel, cement and other materials and labour as detailed in separate statements enclosed	Rs._____	
3.	DEDUCTIONS:		
(i)	Secured advance paid in the previous R.A. bill	Rs._____	
(ii)	Retention money on value of works as per accepted tenders : upto date amount	Rs._____	
	Less : Already recovered	(-) Rs._____	
	Balance to be recovered	Rs._____	Rs._____
(iii	Mobilization advance, if any		
(a)	Outstanding amount (Principal + interest) as on date	Rs._____	
(b)	To be recovered in this bill	Rs._____	
(iv)	Any other departmental material cost to be recovered as per contract, if any	Rs._____	
(v)	Any other departmental service charges to be recovered if any, as per contract (water, power etc.) Enclose statement	Rs._____	
	Total deduction as per contractor	Rs._____	(-) Rs._____
	Net amount payable as per contract (E-F)	Rs._____ (G)	

(Rupees …….) in words

The bill amounting to …… (both figures and words) has been scrutinized by me after due test check of the measurement of works as required and is recommended for payment.

Dated signature of N.L.U.O's Engineer

In charge of the project

STATUTORY DEDUCTIONS:

1.	Total amount due (E)	Rs._____
2.	Less : Income Tax payable	Rs._____
	NET PAYABLE :	Rs._____

The figure given in the Memorandum for Payment has been verified and the bill passed for payment ……..
(words and figures).

Date : ……..

Signature of NLUO Officer

*For A & B refer Running Bill.

PROFORMA OF SITE ORDER BOOK

Name of the work _____

Date of Commencement _____

Sr. No.	Remarks/ Instructions of the Site Engineer/ PMC	Dated Initials of Site Engineer/ PMC	Initials of the Contractor for having received the instructions	Action taken with date	Dated initials of the Site Engineer	Remarks of the PMCs PMC/NLUO Officials
1.	2.	3.	4.	5.	6.	7.

PROFORMA FOR APPLICATION BY CONTRACTOR FOR EXTENSION OF TIME

1. Name of the Contractor
2. Name of the work as given in the agreement
3. Agreement WO
4. Tender amount
5. Date of commencement of work
6. Period allowed for completion of work
7. Date of completion as per agreement
8. Period for which extension of time has been given

		Date	**Month**	**Year**
a)	1st extension vide N.L.U.O's Letter No.			
b)	2nd extension vide N.L.U.O's Letter No.			
c)	3rd extension vide N.L.U.O's Letter No.			

9. Reasons for which extensions have been previously given (copies of the previous applications should be attached)

10. Period for which extension is applied for and the reasons thereof including hindrances, time for extra work assigned, if any etc.

Signature of Contractor

PROFORMA OF HINDERANCE REGISTER

Name of work	:	Date of state of work	:
Name of contractor	:	Period of completion	:
Agreement No.	:	Date of completion	:

Sr. No.	Nature of hindrance	Date of occurrence of hindrance	Date of which hindrance was removed	Period of hindrance	Signature SE / PE	Remarks
1.	2.	3.	4.	5.	6.	7.

SE = Site Engineer/ NLUO

PE = Project Engineer (PMC/ PMC)

TECHNICAL SPECIFICATION OF MATERIALS

1. Materials shall be of the approved quality best obtainable. A list of materials of approved brand and manufacturer is indicated in the annexure. Testing of materials of approved brand may have to be done at the discretion of Architect & NLUO.
   In case, some reason or other materials are required to be obtained from any manufacturer other than those listed, then prior approval from Architects will be necessary supported by relevant test certificates qualifying the required standard. Further tests as directed by the N.L.U.O's Engineer shall also be carried out by the Contractor at their own cost, if required.
2. Sample of all materials shall be got approved by Employee/Architect before placing order & the approved sample shall be carefully preserved in an appropriate manner at the site office for verification from time to time.
3. For standard bought out item, the size manufactured by the firms listed shall prevail when there is discrepancy in the size mentioned in the schedule without any financial adjustment.
4. Materials shall be tested in any approved Testing laboratory conforming to the requirements and frequency indicated in the list of "Mandatory Tests". The test certificate in original shall be submitted to the Site Engineer and entire charges connected with testing including charges for requested tests if ordered shall be borne by the Contractor.
5. It shall be obligatory for the Contractor to furnish certificate, from manufacturer or the material supplier, that the work has been carried out by using their material and as per their recommendations.
6. All materials supplied by the NLUO/ any other specialist firms shall be properly stored and the Contractor shall be responsible for its safe custody until they are required on the works and till the completion of work.
7. All equipment & facilities for carrying out field tests on materials shall be provided by the Contractor without any extra cost .

8. EARTH FILLING:

8.1 shall be selected earth suitable for filling as approved by the Architect/NLUO and preferable free from building rubbish or organic decomposed material. They shall be obtained either from excavation or brought from outside, as specified in the schedule of items.
Black Cotton soil shall not be used for filling.

8.2 CEMENT :

Cement shall comply in every respect with the requirements of the latest publication of I.S. 269 / I.S.455. The use of cement other than ordinary Portland cement / Blast furnace slag cement may be allowed with prior approval of Architect & Employee if not mentioned in the approved list of materials. * (Not less than 43 grade of approved make)
The weight of cement shall be taken as 1440 kg per cum (90 Lbs / cft) cement shall be measured by weight and in whole bags and each undisturbed and sealed 50 kg Bag being considered equivalent to 35 liters (1.2cft.) in volume. Care should be taken to see that each bag contains full quantity of cement. When part bag is required cement shall be taken by weight or measured in measuring boxes.

No other make of cement but that approved by the N.L.U.O's Engineer/Architect will be allowed on works. Test certificates to show that cement is fully complying the specifications shall be submitted by the Contractor to the N.L.U.O's Engineer / Architect. Not withstanding this cement brought on site shall be retested in an approved testing laboratory every 30 M.T. or part thereof to ensure quality of materials used. In case manufactures test certificate is not submitted the frequency of test shall be reduced to 30 M.T. or part thereof Cement ordered for retesting shall not be used for any work pending results of retest.

Cement shall be restored in order to prevent deterioration by dampness or intrusion of foreign matters. It shall be stored in such a way as to allow the removal & used. Cement deteriorated & / or clodded shall not be used on work but shall be removed at once from the site. However, the N.L.U.O's Engineer/Architect whose decision in this regard shall be final and binding shall determine slowing use of warehouse set cement. The site Engineer at site will maintain cement register.

8.4 FINE AGGREGATE :

Sand shall be from natural source or crushed stone screenings, if allowed chemically inert, clear, hard, durable and well graded and free from excessive dirterious materials. The silt content shall be within 8%. If it excess washing shall be done in an approved manner to bring it within allowable limit. Sand will be used as per relevant I.S. specification.

The fine aggregate shall be stacked carefully on a clean hard dry surface so that it will not mixed up with deleterious foreign materials. If such a surface is not available a platform of planks or corrugated torn sheets or brick floor or a thin layer of lean concrete shall be prepared.

8.5 COARSE AGGREGATE:

shall consist of crushed or broken stone 95% of which shall be retained on 4.75mm IS test Sieve. It shall be obtained from crushing Granite, Quartzite, Trap, Basalt or similar approved stones. Coarse aggregate shall be chemically inert when mixed with cement and shall be roughly cubical in shape and free from soft friable, thin laminated or flaky pieces.

8.6 STEEL REINFORCEMENT :
MILD STEEL BARS

Mild steel reinforcement bar shall conform to I.S. 226-1962 "Standard quality " or I.S. 432-1966 Grade. Other qualities of Steel shall not be accepted.

8.7 HIGH STRENGTH DEFORMED BARS :

Where of deformed high strength reinforcement bars are specified, the contractor use one of the following :

a. "Tor steel" as per I.S. 1786-1956
b. For a total requirement of less than 10 Mt. Steel may be obtained from recognized dealers with prior approval of Architect. It will be the sole responsibility of the Contractor shall try to obtain test certificate from the manufacturers. Over and above the Contractor at his own cost shall arrange to

get materials tested from any recognized govt. laboratory to ensure & satisfy the Architect/ Owner regarding compliance of the materials to relevant Indian standard Codes. Sources of supply once approved by the

Architect/Owner shall not be changed without their prior consent. Tests to be conducted as per list of mandatory tests.

8.8 BRICKS :

The Bricks shall be class designation of 75 kg/cm^2 of regular and uniform size, shape and color, uniformly well burnt throughout but not over burnt. They shall be free from cracks or other flaws.
They shall show a fine grained, uniform homogenous and dense texture on facture and be free from lumps of lime laminations, cracks, air holes, soluble salts causing efflorescence or other defects which may in any way impair their strength, durability, appearance usefulness for the purpose intended. They shall not have any part under burnt. They shall not break even thrown on the ground on their flat face in a saturated condition from a height of 600cm.
The size of brick shall (250mm x 125 x 75mm) or (230mm x 115mm x 65mm) only. Tolerance on dimensions up to (+ or -) 8 % shall be permitted.
After immersion in water, absorption by weight shall not exceed 20 percent of the dry weight of the brick when tested according to I.S. No -1077-1970.
The brick shall have a minimum average compressive strength of 75 kg/cm^2 as specified in the nomenclature of the item.
The bricks to be used for the work shall be approved by the Owner/ Architects before hand.

8.9 WATER :

Water for mixing Cement/lime/ Surkhi mortar or concrete shall not be salty or brackish and shall be clean, reasonable clean and free from objectionable quantities of slit traces of oil, acid and injurious alkali, salts, organic matter and other deleterious materials which will either weaken the mortar or concrete on cause efflorescence or attack the steel in reinforced cement concrete water shall be obtained from sources approved by the Architect portable water is generally considered satisfactory for mixing and curing concrete, mortar, masonry etc. Where water other than Municipal source is used this shall be tested in an approved testing laboratory to establish its suitability. All charges connected herewith shall be borne by the Contractor.

8.10 TIMBER :

Unless otherwise specified, timber for carpentry / joinery works of all description shall be Sal / Piasal or equivalent hard wood, seasoned naturally or artificially as indicated in Schedule. These shall be free from knots, shakes, fissure, flaws, sub-cracks and other defects to a reasonable extend. Architect's decision in this regard is final and binding. The moisture content for timber will be used as per relevant I.S. specification normally should not exceed for the following limits :-

i) Timber for frames : 12%
ii) Timber for Planking/Shutters etc. : 8%

In measuring cross-sectional dimensions of timber or the frames/ shutters styles, rails or a panel members, tolerances up to 1.5mm shall be allowed for each planed surface.
All fully fabricated timber shall be seasoned at site of work for a period of not less than two months to allow for any shrinkage that may take place unless sit kiln seasoned.

The decision regarding acceptance/ rejection of material on the basis of aforesaid norms lies with the Architect/ Owner which is final and binding on the Contractor.

8.11 FLUSH DOORS :

All flush doors shall be I.S.I. stamped (confirming to IS-2202, Pt-1) and obtained from approved manufacturer as listed shall be solid core exterior grade unless otherwise specified.

8.12 ALUMINIUM DOORS/WINDOWS :

Aluminum doors and windows shall be obtained from approved manufacturer. Aluminum sections for fabricating frame work doors, windows, jallies, etc. shall be of extruded sections conforming to I.S 1948, 1949 or latest edition or as per drawings or as manufacturer by Indian Aluminum co. Ltd. or approved equivalent. The alloy used shall conform to I.S designation H.E. 9 WP of I.S. 733.

8.13 FLOOR TILES :

Plain cement tiles, chequered tiles. mosaic tiles, terrazzo tiles shall be compacted by mechanical vibrator and hydraulically pressed and shall be of choice shade & shall have desired pattern of chip distribution. The size and thickness of tiles shall be as approved by the N.L.U.O's Engineer. For neutral shade tiles, gray cement shall be used.

8.14 CERAMIC TILES :

White or colored Ceramic tiles shall be obtained from an approved manufacturer and shall be flat an true to shape. The tiles shall be free from cracks, crazing, spots, chipped edges and liners. The Glazing and color shall be uniform shade and unless otherwise specified the tile shall be as per manufacturer's specification.

8.15 MARBLE :

Marble slabs for flooring, dado veneering etc shall be of the kinds specialized in the item such as white of pink Makrana, Chittor black . Bhansalana black, jaisalmer baroda green; atiaalka (pepsu) gray etc. Marble from which the homogenous in texture. free from cracks decay weathering and flaws .Before starting the work the contractor shall be get the sample of marble slab approved by the architect and NLUO .
The Slabs shall be machine polished.

8.16 KOTA /GRANITE :

shall be of selected, qualified ,hard, sound, dense , homogenous texture ,free from cracks, decay weathering and flaw stone slabs shall be approved by the Architect and NLUO. They shall be machine polished where specified and shall conform to the required sizes . Thickness shall be as specified item .

8.17 GLAZING :

Glass used for glazing shall be sheet glazier unless otherwise specified clear or obscured as directed by the architect /NLUO of best approved quality ,free from flaws speck, bubbles and shall be 2.9mm thick up to 0.6 x 0.60 m size it shall be 5.5mm thick unless otherwise specified in the schedule of quantities.

8.18 P.V.C RAIN WATER PIPES :

Pipes and fitting as per UPVC (working pressure 4 Kg. per sqcm) rain water pipes confirming to IS : 4985 including jointing with seal ring conforming to IS : 5382 leaving 10 mm gap for thermal expansion

8.19 PAINTS :

Distemper and cement primer, oil paint, enamel paint, plastic emulsion paint , anti-corrosive primer , read lead water proof, cement paint shall be from an approved manufacture as listed Ready mixed paint shall be from an approved a manufacture with out any admixture shall be used expect for addition of thinner if recommended by the manufacturer.

8.20 CEMENT ADMIXTURES :

Cement admixture are to be obtained from manufacture with the explicit approval of the architect the use admixture contain calcium chloride, fluorides, nitrates and sulphates is prohibited The architect's decision as regards use of admixture of admixture is final and binding

8.21 HARDWARE FITING :

The hardware fitting iron or aluminum /brass shall be obtained from approved manufacturer and invariable is ISI stamped the M.S. iron fitting are to be oxidized & aluminum fittings anodized in natural color mat satin finish even if not otherwise specified.

8.22 POLYSULPHIDE SEALANT :

Polysulphide sealant should be obtained from approved manufacture as listed .

8.23 MORTAR

Cement mortar to be prepared in accordance with IS:2250. It shall be made of cement and sharp coarse sand and shall be made in small quantities so as to be used within 30 minutes. The cement and sand in the required proportion., and classification shall be first mixed dry thoroughly and then water added and mixed to a sufficiently thick consistency as required by the Engineer. No left over mortar shall be used. Mortar which has partially set shall not be retempered by mixing additional material or water.

The unit of measurement for cement shall be of a bag of cement weighing 50 Kg. and shall be taken as 0.035 cu.m. Other ingredients in specified proportion shall be measured in boxes of 25 x 35 x 40 cm size. Sand shall be measured on the basis of dry volume. In case of damp sand, its quantities shall be increased suitably to allow for bulkage

8.24 SAND

This shall be dry coarse sand of approved quality conforming to IS:383. 100% of the sand shall pass through I.S. sieve No. 240 and not more than 15% to 35% through Sieve No.30. Sand shall have a fineness modulus between 2.1 to 2. Sand shall be clean angular free from dust, clay or any other impurities. Percentage of clay or total impurities shall not be more than 5% by weight.

Sand for use in masonry mortar shall conform to IS:2116 including grading. Sand for use in plaster shall conform to IS:1542 including grading

SECTION - I
EARTH WORK

1.1 GENERAL :

The excavation will generally refer to open excavation of foundation area wet or dry in all sorts of soils at any depth, unless otherwise specified except hard rocks for which separate provisions are made.

1.2 EXAMINE THE SITE :

The Contractor shall visit and ascertain the nature of the ground to be excavated and the work to be done and shall accept all responsibility for the cost of the work involved.

1.3 SETTING OUT :

The Contractor shall clear the entire site of jungles, bushes, grass, vegetation growth & trees & generally level the site and set out the center line of the building or other involved works & get the same approved from Owner/ Architect. It shall be the responsibility of the Contractor to install substantial references marks, bench marks etc. and maintain them as long as required by the Owner /Architect. The Contractor shall assume full responsibility for proper setting out, alignment, elevation and dimension of each and all parts of the works.

1.4 GROUND LEVEL AND SITE LEVEL :

Before starting the excavation the existing ground level of the entire plot shall be taken by the Contractor in consultation with the Owner/Architect and a proper record of these levels kept, which the Contractor & the NLUO/Architect shall jointly sign.

1.5 Excavation

Excavation shall be carried out in any type of soil met at the site for items and to the lines, levels and contours as directed by the Engineer

Excavated materials shall not be deposited within 1.5M from edge of the excavation.

Suitable type of shoring and strutting, wherever necessary, shall be provided to avoid any collapse of earth or cutting in slope as per site requirement and as directed by the Engineer.

Pits shall not be excavated to final founding level unless concreting work is imminent. Last 15 cms. shall be excavated prior to providing, blinding layer with lean concrete (M5, unless otherwise specified in drawing). The contractor shall not undertake any concreting in foundation until the excavated pit is approved by the Engineer.

If any bottom of excavation is left exposed and has become deleteriously affected by atmosphere or water, it shall be dewatered and excavated to sound base, and shall be filled up to the required level with lean concrete of grade M-15 at the cost of Contractor. Similarly excess excavation than the required level also to be filled up with lean concrete at the cost of Contractor.

Any obstacle, encountered during excavation shall be reported to the Engineer and shall be dealt as directed. Removal of buried piping or cables shall not be done without prior permission of Engineer and contractor shall provide all measures to protect such lines. Cost of such protective measures are deemed to have been included in the unit rates for excavation.
The contractor shall take adequate protective measures to ensure that the excavation operations do not damage the adjoining structures or dislocate underground services.
Excavated material shall be deposited within radius of 50M or as specified in the item of work. Selected excavated material, on approval by Engineer shall be back-filled in layers of maximum 15 cms. Watering, compacting shall be done as specified in method of backfilling.
The Contractor shall arrange to cut or transplant any trees coming in the alignment of the excavation or other work after obtaining prior approval and complying with all requirements of the concerned authority and remove the same wherever required. Unless otherwise stated no separate payment shall be made for the same.
The Contractor shall provide suitable drainage arrangements to prevent surface water entering foundation pits. The contractor shall engage pumps or other approved means to keep excavation free of water.

In cases, where during excavation, side slips occur, for reasons not attributable to the Contractor or in cases of pumping out water accumulated due to unforeseen reasons like watermains / drains broken accidentally by other agencies, springs etc., suitable payment shall be made separately at the rates mutually agreed.
Lowering of water table by well point system or other such special measures shall be paid separately against relevant item in the B.O.Q. or by mutual agreement.

1.6 SOIL CLASSIFICATION FOR PURPOSE OF MEASUREMENT AND PAYMENT

All materials to be excavated shall be classified by Engineer, into one of the following classes and shall be paid for at the rate approved for that particular class of material. No distinction shall be made whether the material is dry, moist or wet. The decision of Engineer regarding the classification of the material shall be final and binding on Contractor and not be a subject matter of any appeal or arbitration.
Any earth work shall be classified under any of the following categories; in accordance with IS-1200 part I.

a. **Ordinary soils**

These shall include all kinds of soils containing kankar, sand, silt, hard and soft murrum and/or shingle, gravel, clay, loam, peat, ash, shale, etc.. which can generally be excavated by spade, pick axes and shovel, and which is not classified under "soft and decomposed" and "hard rock" defined below. This shall also include embedded rock, rubble not longer than 500 mm in one direction and not more than 300 mm in the other two directions. Removal of such ordinary soils by mechanical excavators, shovels, draglines etc. shall be payable at the rate for 'Ordinary soils'.

b. **Soft and Decomposed Rock**

This shall include rock, boulders, slag, chalk, slate, hard mieacschist, laterite and all other materials which in the opinion of Engineer is rock, but does not need blasting and could be removed with picks, hammer, crow bars, wedges and pneumatic breaking equipment. The mere fact that Contractor resorts to blasting for reasons of his own, shall not qualify for classification under 'hard rock'. This shall also include excavation in macadam and tarred roads and pavements. This shall also include rock boulders longer than 500 mm in one direction and not more than 500 mm in any one of the other two directions.

Hard Rock

This shall include all rock occurring in large continuous masses, which cannot be removed except by blasting for loosening it. Hardened varieties of rock with or without veins and secondary minerals, which, in the opinion of engineer require blasting shall be considered as hard rock. Boulders of rock occurring in such sizes and not classified under (a) and (b) above shall also be classified as hard rock. This will also include reinforced cement concrete (reinforcement to be cut through, but not separated from concrete).

1.6 EXCAVATION AND PREPARATION OF FOUNDATION FOR CONCRETE, OTHER HARD ROCK :

Excavation shall include removal of all materials of whatever nature, including moorum, soft rock, boulders, old foundations, concrete, asphalt or paved surface etc. at all depths & whether wet for dry necessary the construction of foundation & sub-structure including mass excavation for under ground reservoir, cess pits, septic tanks etc. where applicable exactly in accordance with lines, levels, grades and curves shown in the drawings or as directed by the Owner/Architect, he shall at his own expenses till the extra depth or width in cement concrete in proportion as directed by the Owner/Architect but in no case with concrete of mix leaner than (1:4:8) cement concrete.

The Contractor shall report to the Owner/Architect when the excavations are ready to receive concrete. No concrete shall be placed in foundations until the contractor has obtained Owner/Architect approval. In case, the excavation is done through different strata of soil and if the same is payable as per provision in the Schedule of Quantities the contractor shall get the dimensions of the strata decided by the Owner/Architect for payment. if no specific provisions is made in the Schedule of Quantities it will be presumed that excavation shall be in all types of strata & the contractor's rate shall cover for the same which are treated as a single entity.

After the excavation is passed by the Owner / Architect & before laying the concrete, the Contractor shall get the depth & dimensions of excavation levels, and nature of strata (As applicable as per Schedule of Quantities) like hard rock, soft rock etc.) measurement recorded from the Owner/Architect.

1.7 EXCAVATION IN HARD ROCK :

Rock which is in solid beds, which can only be removed whether by blasting or by wedging or chiseling shall be treated as hard rock. A boulder or detached rock measuring one cubic meter or more shall also be treated as hard rock if the same cannot be removed with blasting. wedging or chiseling.
Where hard rock is met with and blasting operations as considered necessary, the Contractor shall intimate about the same to the Architect.
The Contractor shall obtain license from District Public Authorities for carrying out blasting work as well as for obtaining, transporting and steering explosives as per "explosives Rules 1940" or amended. He shall purchase the explosives, fuses detonators, etc., only from a licensed dealer. He shall maintain the account of explosive etc. purchase and used by him. He shall be responsible for safe custody and a proper accounting of explosive materials. The Architect shall have access to check to store of explosives and accounts thereof .
Blasting shall normally be done with gun power, Dynamite, Gelatin or any other high explosive shall only be used in special cases with written permission of the Architect and District/Public authorities concerned under the "Explosive Rules"

Blasting operations shall be carried out under supervision of a responsible representative of the Contractor during hours to be approved in writing by the Architect/District Authorities. The representative shall be conversant with the rules of blasting .
Proper precautions for safety of persons shall be taken red flag shall be prominently displayed around the area to be blasted and all people work except those actually light fuses shall be withdrawn to a safe distance of not less than 10 meters from the blast. Blasting shall not be done within 100 meters of an existing masonry or any other kind of structure unless special precautions are taken by heavy blanketing.
Where blasting is not practicable or prohibited, excavation shall be done by wedging or chiseling and it shall be restricted to the quantity required to enable the necessary foundations, etc., to be put in. In case the dimension of trenches, exceed those shown in drawings or as directed by dimension of trenches, exceed those shown in drawings or as directed by the Architect, the excess quantity shall not be paid for. The item also covers bailing out sub-solid or rain water including pumping at any stage of the work, shoring, strutting etc.

1.8 SHORING :

The sides of the excavation, if required, should be protected by shoring in such a way as is necessary to secure them from failing in and the shoring shall be maintained in position a long as necessary. The Contractor shall be responsible for the proper design of the shoring to hold the sides of the excavation in position and ensuring safety and injury to persons and properties etc. The shoring shall be removed as directed after the items for which it is required are completed

1.9 PROTECTION:

If instructed by the Owner/Architect all foundation pits and similar excavations shall be strong fenced and marked with red lights at bring in charge of watchman to avoid accidents, adequate protective measures shall be taken to see that the excavation does not affect or damage adjoining structures. All measures required for the safety or the excavations, the Contractor at his own cost shall take the people working in and near the foundation trenches and people in the vicinity. The

Contractor will be entirely responsible for any injury or damage to property caused by his negligence or accident due to his constructional operations.

1.10 STACKING OF EXCAVATED MATERIALS :

All materials excavated will remain to property of the Owner. The excavated materials at first instance shall be stored as directed by the Architect/Owner and stacked appropriately by the sides of trenches in conformity with standard safety codes before they are disposed off and leveled within the site at locations directed by the Architect/Owner. Materials suitable and useful for back filling or leveling of the plot or other use shall be stacked in convenient places in such a way so as not to obstruct free movement of man, animals encroach on the area required for constructional purposes. The cost on account of disposal within the site will not be additionally paid for.

1.10 BACKFILLING :

All shoring and form work shall be removed after their necessity ceases & trash of any sorts shall be cleaned out from the excavation shall be refilled to the original surface with approved excavated materials in a layers 25.00cm, in thickness watered & rammed with iron and wooden rammers weighing 7-8 kg., with a base of 20cm.square or 20cm. diameter. The filling shall be done after concrete or masonry is fully set and done in such a way as not to cause undue thrust on any part of the structure where suitable excavated materials is to be used for refilling it shall be brought from the place where it is temporarily stacked and used in refilling.
No excavation of foundation shall be filled or covered up until all measurements of excavations, masonry concrete and other works below ground level are jointly recorded. Black cotton soil shall not be used for backfilling or in plinth filling.

1.11 DEWATERING :

Rate for excavation shall include bailing or pumping out water which may accumulate in the excavation during the progress of work whether from seepage , springs, rain or any other means. Pumping out water shall be done in such approved manner as to preclude the possibility of any damage to the foundation trench concrete or masonry or any damage to the foundation trench concrete or masonry or any adjacent structure. When water is met in foundation trenches of in tank excavations, when water is met in foundation trenches of in tank excavations, pumping out water shall be from auxiliary pit of adequate size dug slightly outside the building excavations. The depth of auxiliary pit shall be refilled with approved excavated materials after the dewatering is over.
The excavation shall be kept free from water:

a. During inspection and measurement.
b. When concrete and/or masonry are in progress and till they come above the natural water level and
c. Till the Owner/Architect consider that the concrete mortar is sufficiently set.

1.12 SURPULS EXCAVATED MATERIALS :

All excavated materials certified as surplus and not useful shall be removed by the Contractor confirming to local civic regulations from the site in an approved

manner at locations to be arrange made by him and shall be paid as a separate item as in schedule of quantities.

The Contractor shall only undertake the item of removal of surplus excavated materials when specific instruction in this regard has been obtained from the NLUO/ Architect.

SECTION -II
PLAIN AND REINFORCED CEMENT CONCRETE

Plain and reinforced cement concrete :

The provisions for Indian Standards for Plain and Reinforced concrete, mild steel, hot rolled deformed bars, cold twisted bars etc. to be used reinforcement, cement of different qualities, coarse and fine aggregates, water to be used in concrete and other Indian Standards specifications should be generally applicable except where they are varied by the requirements of these specifications. It shall be the intent o f these specifications to ensure that all concrete placed at various locations of the job should be durable, should wear and practically impervious to water. It should free from defects like cracking, honey combing etc.

The Contractor under the Supervision of an Engineer shall carry out all concrete work.

I.S. code under reference should mean the latest code together with amendments in circulations at the time of awards of the contract.

1.1 INGREDIENTS TO BE USED IN CONCRETE AND REINFORCED CONCRETE WORK :

Ingredients to be used in concrete should confirm to the specifications as indicated under "Technical Specification for materials" given earlier.
As regards admixture, this may be used with prior approval of PMC/ Consultant.

1.2 MIX PROPORTION : (Normal Volumetric mix)

The mix proportions shall be selected to ensure that 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 .
The determination of the proportions of cement aggregates and water to attain the required strength shall be made as follows for volumetric mix :-

1.2.1 TABLE - "A" :

GRADES OF CONCRETE :	Compressive strength of 15cm Cube.	
	Kg/Cm^2 7 day	Kg/cm^2 28days
1:1:2	210	315
1:1.5:3	175	265
1:2:4:	140	210

1.2.2. VOLUMETRIC MIX CONCRETE :

Volumetric mix concrete may be used for concrete of grades 1:1:2, 1:1.5:3, 1:2:4. The Proportion of materials for volumetric mix concrete shall be in accordance with Table "B".

The Proportions of fine to coarse aggregates should be adjusted from upon limit to lower limit progressively as the grading of the fine aggregates become finer and the maximum size of coarse aggregates become larger. Graded coarse aggregate shall be used .

The cement content in the mix specified in Table "B" of any volumetric mix be proportionately increased to overcome the difficulties of placement & compaction, so that the water cement ratio as specified is not changed.

In the case of vibrated concrete, the limit specified may be suitable reduced to avoid segregation.

The quantity of water used in the reinforced concrete work should be sufficient, but not more than sufficient to produce a dense concrete of adequate workability for it purpose, which will surround and properly grip all the reinforcement. Workability of concrete should be controlled by maintaining a water content that is found to give a concrete which is just sufficiently wet to be placed and compacted without difficulty with the means available.

TABLE "B" PROPORTIONS FOR VOLUMATRIC MIX CONCRETE :

Grade of Concrete	Total quantity of dry Aggregate by mass per 100kg of cement. cement to be taken as the sum of the individual masses of fine and Coarse aggregate (in cum.).	Proportion of Fine aggregate to coarse aggregate(By volume)	Quantity water per 100kg of (Maximum) litres.
1	2	3	4
1:5:10	0.70	Generally 1:2 but subjected to an upper of 1:1.5 and lower limit 1:2.5 on approval of site Engineer/Architect.	120
1:4:8	0.53		90
1:3:6	0.40		68
1:2:4	0.24		64
1:1.5:3	0.22		60

1.3 MIXING :

Concrete shall be mixed in a mechanical mixer. The mixer should comply with I.S. 1791. The mixing shall be continue until there is a uniform in color and consistency. If there is a segregation after unloading from the mixer the concrete should be one and half to two minutes generally. In exceptional circumstances such a mechanical breakdown of mixer, or when the quantity of concrete is very small, hand mixing may be permitted, subject to adding 10% extra cement. When hand mixing is permitted, it should 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 color and consistency.

1.3.1 Workability of concrete should be controlled by direct measurement of water content and it should be checked at frequent intervals, of nominal mix workability measured by slump test may have the values given in Table D.

TABLE "D"

Sl.No	Type of work	When Vibrated
1.	Mass concrete in R.C.C. foundation footings retaining walls and road slabs.	2.5 cms. (1")
2.	Beams, slabs, columns with simple reinforce cement	2.5 cms to 5 cms (1" to 2")
3.	Tees section with congested reinforcement	5 cms to 10 cms

Note : should conditions governing slump and workability change pointing to advisability of increased slumps, this shall be done by decreasing the amount of aggregate and not by increasing the amount of water.

1.4

1.4.1 TRANSPORTING :

Concrete shall be transported from the mixer to the form work as rapidly as possible by methods which prevent the segregation of loss of any of the ingredient and maintain the required workability in no case more than 30 minutes shall elapse between mixing and consolidation in its position. During hot and cold weather ,concrete shall be transporting in deep containers other suitable method to reduce the loss of water by evaporation in hot weather and hat loss in cold weather may also be adopted.

1.4.2 PLACING :

The concrete shall be deposited as nearly as practicable in its final position to avoid re-handling The concrete shall be placed and compacted before setting. Commences and should not be subsequently disturbed method of placing should not be to preclude segregation care should be taken to avoid displacement of reinforcement or movement

of form work .Concrete shall not be drooped into position from a height greater than 2.0 meter

1.4.3 COMPACTION :

Concrete should be thoroughly compacted and fully worked around the reinforcement embedded fixtures into corners of the form work mechanical vibrators should general be used as per I.S –2505, I.S- 2514 and I.S-4656 over vibration or vibration of very wet mixes is harmful and should be avoid under vibration is harm full .
When the vibration is to be applied external the design of form work and the disposition of vibrators should receive special consideration to ensure efficient compaction and surface blemishes .
Beams and columns shall be vibrated using immersion vibrators then section like walls of water tanks, chajjas aprons etc. should be vibrated using surface vibrators it is better to vibrate in smaller intervals for short period of time rather than at wider intervals for longer periods of time the vibrator shall be used only to aid compaction and not push concrete laterally in the forms .

1.4.4 CONSTRUCTION JOINT :

Construction joints shall in general conform to the relevant clauses of IS:456.

When the placing of concrete is interrupted and a construction joint is formed, provision shall be made for interlocking with the succeeding layer by the embedment or saturated wooden blocks or strips, smoothened on four sides to facilitate their removal. Prior to the next pour the wooden pieces shall be loosened and removed in such a manner as to avoid damage to the concrete.
Such construction joints, if the contractor feels are necessary, shall be approved by the Engineer and shall be so located and formed as to least impair the strength and the appearance of the structure.
They shall be made in the positions as specified or as approved. Such joints shall be truly vertical or horizontal as the case may be except that in an inclined or curved member the joints shall be strictly at right angles to the axis of the member.

Construction joints shall be rebated to an approved profile and an approved water stop shall be placed in the joints when specified.

Construction joints shall be made horizontally in the foundations and 75 mm below the lowest beams soffit at the head of columns. Concrete in the ribs and slab of small tee and other beams shall be placed in one operation but for large beams concrete in the rib upto a level 25mm below the slab, soffit shall be placed first. Concrete in haunches or splays on beams.
or braces and concrete in the head of adjoining position of the column shall be placed at the same time and at junction of walls and slabs shall be placed at the same time as that in the slab. Construction joints in slab and beams shall be located at one third span and keyed and dowelled as specified.

1.4.4A. Cold Joint

An advancing face of a concrete pour, which could not be covered by fresh concrete before expiry of initial setting time (due to an unscheduled stoppage or delay on account of breakdown in plant, inclement weather, low rate of placement or any other reason), is called a cold joint. The Contractor should always remain vigilant to avoid cold joints.
If, however, a cold joint is formed due to unavoidable reasons, the following procedure shall be adopted for treating it:-

a) If concrete is so green that it can be removed manually and if vibrators can penetrate the surface without much effort, fresh concrete can be placed directly against the old surface. The old concrete should be covered by fresh concrete as quickly as possible and the joint thoroughly and systematically vibrated.

b) In case concrete has hardened a bit more than (a) but can still be easily removed by a light hand pick, the surface will be raked thoroughly and the loose concrete removed completely without disturbing the rest of the concrete in depth. A rich mortar layer 12 mm in thickness, will be placed on the cold joint fresh concrete shall be placed on the mortar layer and the joint will be thoroughly and systematically vibrated penetrating the vibrator deep into the old layer of concrete.

c) In case the concrete at the joint has become so stiff that it cannot be remoulded and mortar or slurry does not rise in spite of extensive vibration, the joint will be left to harden for at least 12-24 hrs. It will then be treated as a regular construction joint, after cutting the concrete to required shape and preparing the surface.

1.4.5 <u>PROTRECTION OF CONCRETE & CURING</u> :

Newly placed concrete shall be protect by approved means from rain, sun and dries, winds. Exposed faces of concrete shall kept continuously in a damp or wet conditional by ponding or by covering with a layer of wet sacking canvas hessian or similar absorbent material and kept constantly wet for at least 10 to 15 days (10 days in winter or concrete mere spring of water vertical surface shall not be allowed approved curing compounds may be used in lieu of moist curing with the permission of the Architect /Consultant. Such compound shall be applied of all exposed surface of the concrete as soon as possible after the concrete placed below ground shall be protected from failing earth during and after placing .Approved means shall be taken to protect immature concrete from damage by debris excessive loading, vibration, abrasion delectation grounds water mixing with earth or other material floatation and other influence that may in pair the strength and durability of concrete horizontal surface that may impair the strength and durability of concrete means of bund

1.4.6 Precast Concrete

1.4.6.1 All provisions, not specifically excluded and not in conflict with provisions of Section
2: Concrete and Formwork, Section: 4 Reinforcement and Section 7: Structural Steelwork shall apply to precast concrete.

1.4.6.2 All precast units shall be cast on suitable bed or platform with firm foundation and
free from wind. Contractor shall be responsible for the accuracy of the level or shape of the bed or platform.

1.4.6.3 Embedments

Contractor shall not do concreting unless Electrical conduits, pipes, fixtures etc. wherever required, are laid by the concerned agency. Embedded items shall be placed and maintained in correct position while concreting. Embedded items shall be properly anchored to develop required strength.

1.4.6.4 Striking Forms

Side shutters shall not be struck in less than 16 hours after depositing concrete and no precast unit shall be lifted until the concrete reaches a strength of at least twice the stress to which the concrete may be subjected to at the time of lifting.

1.4.6.5 Curing

All precast work shall be protected from the direct rays of the sun for at least 7 days after casting and during that period each unit shall be kept constantly watered or preferably completed immersed in water if the size of the unit so permits.

1.4.6.6 Expansion and Isolation Joints

Expansion and isolation joints in concrete structures shall be provided at specific places as per details indicated on the drawings. The materials and types of joints shall be as specified herein after, if not, otherwise mentioned in the drawings.
In case of liquid retaining structures, additional precautions shall be taken to prevent leakage of liquids as may be specified on the drawings or as directed by the Engineer. All materials are to be procured from reliable manufactures and must have the approval of the Engineer. Where it is the responsibility of the Contractor to supply the material, the Engineer may demand test certificates for the materials and/or instruct the Contractor to get them tested in an approved laboratory free of cost to the Owner. Joints shall be formed true to line, level, shape, dimension and quality as per drawings and specifications.
Prior approval of the method of forming the joints should be obtained from the Engineer before starting the work.

1.4.6.7 Bitumen Board/Expanded Polystyrene Board.

Bitumen impregnated fibre board of approved manufacturer as per IS:1838 may be used as fillers for expansion joints. It must be durable and waterproof. It shall be compressible and possess a high degree of rebound. The dimensions of the board should be equal to that of the joint being formed. It should, preferably be manufactured in one piece, matching the dimension of the joint and not prepared by cutting to size smaller pieces from larger boards at site. At the exposed end, the joint shall be sealed with approved sealing compound to a depth of atleast 25mm after application of an approved primer. The sealing compound and the primer shall be applied as specified by the manufacturer.

1.4.6.8 Metal Sealing Strips / water stops

Metal sealing strips shall be either G.I, Aluminium or Copper and formed. straight, U shaped, Z shaped or any other shape and of thickness as indicated in the drawing and schedule of items and/or as instructed by the Engineer.

The transverse joints will be gas welded using brass rods and approved flux and will be tested by an approved method to establish that it is leakproof, longer lap lengths and different method of brazing which will render it leakproof, will be adopted by the contractor without any additional cost to the Owner.

The edges shall be neatly crimped and bent to ensure proper bond with the concrete.

a) **G.I Strips**

G.I strip shall be minimum 1.5mm thick and 150 mm in width unless specified otherwise. The standard of Galvanizing shall be as per relevant India Standards for heavy duty work. At the joints, the overlapping should be for a minimum length of 50mm.

b) Aluminium strips shall be minimum 18 SWG thick and 300 mm wide unless specified otherwise and shall conform to IS:737 of 19000 grade or 31000 grade (Designation as per IS:6051). A minimum lap of 50mm length is required at the joints.

1.4.6.9 Non-metallic Sealing Strips / water stops

These will be normally in rubber or P.V.C can be of shape having any combination of the following features:-

a) Plain

b) Central bulb

c) Dumb-bell or flattened ends

d) Ribbed and Corrugated Wings

e) V shaped

As these types of seals can be easily handled in very large lengths unlike metal strips, transverse joints will be allowed only under unavoidable circumstances and with the specific approval of the Engineer. The method of forming these joints, laps etc. shall be as specified by the Manufacturer and/or as approved by the Engineer taking particular care to match the central bulbs and the edges accurately

1.4.6.10 Installation & Jointing Techniques of non metallic sealing strips.

One of the main advantages of PVC water-stops is that they can be installed very easily. The jointing can be carried out by simple heat fusion/welding process. The installation consists of embedding one half of he water-stop across its width in concrete leaving the second half open. After completion of the first half, the concrete would be poured and the second half would also be embedded leaving the centre bulb free for expansion and contraction.

It is important that during pouring of concrete the water-stops should not be deformed due to impact. The concrete should be properly vibrated so that it develops intimate contact with the water-stops Care should be taken so as not to reduce effective cross section of the water-stops.

It is necessary that PVC water-stops are placed near the centre of the concrete walls. During installation, PVC water-stops are often required to be jointed. there are essentially two types of joints :

1) Straight Joints

2) Mitred Joints

Straight joints are very simple and can easily be carried out at the site.

Fabrication of PVC water-stops can be carried out by means of simple tools. they are:

1. Hand saw or sharp knife for cutting.

2. Heating source like blow lamp or any other means.

3. A metal strip plate of suitable width and about 500 - 600 mm length with simple holding device like a wooden handle.

4. Metal or wooden templates with suitable marking/grooves for 45 Deg.C and 90 deg.C angle cuttings.

The following jointing method is recommended :

1. Water-stops are cut by means of cutting device. Clean cuts provide the best results.

2. The metal strip is heated to about 200 Deg.C which would be adequate to melt the water-stops material. The strip should not be overheated so as to prevent charring of PVC material.

3. Two ends of PVC water-stops to be joined are pressed uniformly against the hot metal strip. When sufficient fusing of PVC is attained, the metal strip removed and both the ends are pressed together. It is necessary to ensure that the entire cross section is uniformly heated and fused. It also essential to attain alignments of the complete cross section and particularly of centre bulbs both the ends are well pressed until the joint cools down to ambient temperature.

4. The metal strip should be cleaned by means of wire brush and cotton waste before the next welding is carried out

1.5 FACILITES FOR PREPRATION AND TESTING OF AT SITE :

In order to exercise the required degree of consultant control over the concrete material and their preparation the contactor is expected to set up and maintain at his own expense a testing laboratory at site. He shall apparatus required for sensitive testing of concrete materials and in particulars he is to have the following equipment in the site laboratory :-

i. concrete testing machine of capacity 60t/100t
ii. A set of standard sieves and sieves vibrator
iii. Measuring cylinder adequate number of cubes and cylinder moulds and slump cones.
iv vibrating table
v. weight balance
vi. weighing balance.
vii. oven and other apparatus for drying aggregate
vii. Vicat's apparatus.
viii. Curing tanks for cubes

1.6 SAMPLES, TESTING AND ACCPETANCE OF CONCRETE :

Samples from fresh concrete shall be taken as per I.S.1199 and cubes shall be made cured and tested at 7 days and 28 days in accordance with IS- 516.

Test shall be conducted for compressive strength on 15 cm x 15cm x15cm cubes of concrete for concrete .companion specimen shall be cast from a signal batch of concrete & shall be of the same age at the same time of testing ,in all be compressive strength specified in table alone be the criteria for accepting for acceptance or rejection of the concrete.

1.6.1 Six test specimen shall be made from testing three at 7days and three at 28 days the specimen shall be tested as per I.S 516 the samples tested at its laboratory generally but may be tested in any other test house /laboratory of Govt recognized institute also.

1.6.2 Concrete of each grade shall be assessed separately and shall be assessed daily for compliance concrete is liable to be rejected if it is porous or honey -combed .its placing has been interrupted with out providing a proper construction joint the reinforcement has been displaced beyond the tolerance specified or construction tolerance have not been met However ,the hardened may be accepted after carrying out suitable remedial measure to minimum to the satisfaction of the Engineer -in charge.

1.6.3 If nominal mix concrete made in accordance with the aggregate cement prop. given for a particular grade does not yield specified strength , such concrete shall be classified to nearest to the appropriate lower grade .Nominal mix concrete proportioned for a given grade shall not lower be placed in higher grade than the minimum specified.

1.6.4 If the deficiency in the opinion of the Architect /consultant is such as to necessitate removal of the concrete from the structure. Then on being so directed by the Architect /NLUO the contractor at his own expense shall remove and replace by the concrete of specified strength.

1.6.5 However when the strength is so deficient as to call for removal, Architect /NLUO before ordering removal provided the contractor agree ,may direct for "load tests" or standard tests which shall be carried out by the contractor at his own cost in the manner as will be directed by the Architect /consultant and if the result is such that on all consideration the can be retained then it may be accept at adequate.

STANDARD OF ACCEPTANCE :

Seven days test :

The average compressive strength of the three specimens tested at seven days shall satisfy the specified strengths given in Table A, for the appropriate mix. As a guidance the difference between the maximum and the minimum strength of the three specimens shall not exceed 15% of the average strength. In case seven days result is not satisfactory all further work structurally interlinked with the concrete represented by the samples shall be stopped unless otherwise decided by Engineer.

Twenty eight days test :

Acceptance criteria of twenty eight days shall be as follows:

a) If the average compressive strength of three cubes is more than the compressive strength indicated in Table A, the concrete shall be accepted at full rates.
b) If the average compressive strength of three cubes is less than the specified but not less than 85% of the specified strength. the concrete may be accepted at reduced rate or prorate basis up to 80% of original rate of items.
c) If the average compressive strength of three cubes is less than 85% of the specified strength, Architect/site Engineer shall reject and get dismantled and defective portion of the work represented by the sample along with the structurally connected work as considered necessary at the risk and cost of the Contractor.

In case of (b) and (c) above , Architect/ Site Engineer, If he so decides may order the additional tests like fore test, ultrasonic test, rebound hammer test, load test of structure of part of structure etc. to be carried out. All the charges in connection with these additional tests shall be borne by the contractor if on the basis of these additional tests the Architect/site Engineer is satisfied about he structural adequacy of the concrete, he may accept the work at reduced rates.

CONCRETE ORDERED TO BE DISMANTLED

Where the Architect / Site Engineer does not accept the poor or defective concrete the contractor at his expense will dismantle the portion of structure and reconstruct the same to the Architect / Site Engineer's satisfaction. Concrete thus dismantled will not be measured and paid for . The additional work if and required to be carried out for re-concreting. shall be to the contractor's account.

QUANTITY OF DEFECTIVE CONCRETE REPRESENTED BY CUBES

In all cases of defective concrete as revealed by works test cubes strength failing below the specified strength. the quantity of concrete thus affected and represented by the cubes shall be decided by the Architect/Site Engineer whose decision shall be final and binding on the contractor.

HONEY COMB IN.

a) Where honey combed surfaces are noticed in the concrete the contractor shall not patch up the same until examined by the N.L.U.O's Engineer and decision

given regarding the acceptance with rectification of rejection of the same. If contractor with rectification or rejection of the same. If contractor patches up such defects without the knowledge of the N.L.U.O's Engineer, the N.L.U.O's Engineer will be at liberty to order demolition of the concerned concrete members to the extent be considers necessary. In such case, the contractor at his expense, shall reconstruct demolished work. demolished work shall not be measured and paid for.

b) If in the opinion of the N.L.U.O's Engineer the honey combing is harmful to the structure and where so directed by the Architect /Site Engineer, the full structural members affected by dismantled and reconstructed to Architect/Site Engineer's approval at Contractor's expense. The demolished concrete will not be measured and paid for .

CONCRETING UNDER SPECIAL CONDITIONS :-

The specifications and references given in I.S.456-2000. for concreting in extreme weather condition under water concreting, concrete in sea water, concrete in aggressive soil and water should be adhered to.

2.0 The form work shall conform to the shape, lines and dimensions as shown on the plans and be so constructed as to remain sufficiently rigid during the placing and compacting of the concrete and shall be sufficiently water tight to prevent loss of cement slurry from the concrete. If directed be the Architect/NLUO, building paper or polythene sheets shall be used by the Contractor to ensure water tightness without additional costs to the NLUO. Form work or centering shall be constructed on wet concrete and laborers without deflection and retain its form during laying, ramming and setting of concrete. Timber used shall be properly seasoned so as to prevent wrapping when wetted.

All props either timber or steel shall be straight and or full height and no joints shall be allowed. Props shall be braced with wooden battens and where additional staging is necessary extra care should be taken to use bigger diameter props with bracing at a 4 or 5 levels. All props shall be supported on sole plates and double wedges. At the time of removing props, wedges shall be gently cased off and not knocked out :-

All rubbish, chippings, shavings and saw dust shall be removed from the interior of the forms before the concrete shall be cleaned and thoroughly wetted or treated if considered necessary, with non sticking mineral oil or any other approved materials. Care shall be taken that oil or such approved materials is kept out of contract with the reinforcement.

All form work shall be removed without shock or vibration and shall be ceased off caref1ully in order to allow the structure to take up its load gradually. Forms shall not be disturbed until concrete has adequately hardened to take the superimposed load.

3.1 CLEANING OF REINFORCEMENT :-

Before steel reinforcement is placed in position, the surface of the reinforcement shall be cleaned of rust, dust, grease and any other objectionable substances.

3.2 BAR BENDING SCHEDULE OF REINFORCEMENT :-

On receipt of structural drawing Contractor shall prepare bar bending schedule of reinforcement and shall be got approved by the NLUO/Architect.

3.3 CUTTING OF REINFORCEMENT :-

Before Steel reinforcement bars are cut, the contractor shall study the lengths of bars required as per drawing and shall carry out cutting only to suit the sizes required as per drawings.

3.4 PLACING AND SECURITY :-

Reinforcement bars shall be accurately placed & secured in position and firmly supported or wedged by pre-cast concrete blocks of suitable thickness, at sufficiently close intervals that they will not sag between the supports or get displaced during the placing of concrete or any other operation of the work. It is most important to maintain reinforcement in its correct position without displacement and to maintain the correct specified cover. The Contractor shall be responsible for all costs for rectification required in case the bars are displaced out of their correct position.

3.5 BINDING WIRE :-

The reinforcement shall securely bond where ever cross or when ever required for with 18 gauge soft annealed steel wire.

3.6 WELDING:-

Welding of bars shall not be carried out unless specifically authorized in writing by the NLUO/Architect as per I.S. code of practice in place of splicing. How ever no extra payment shall be allowed for the same.

3.7 BEND ETC:-

Bends , cranks etc., in steel reinforcement shall be carefully for made. Care being taken to keep bends out of winding, otherwise all rods shall be truly straight. If any bend shows signs of or site minimum radius of nine times diameter of the bar shall be used unless otherwise specified in the drawings. However in respect of standard hooks the radius of bend shall be two times the diameter of bar. Heating of reinforcement of bars to facilitate bending will not be permitted. The bars shall always be bend cold. In case of mild steel reinforcement bars of larger sizes where colds bending is not possible they may be bend by heating with written permission of the NLUO/Architect. Bar when bent shall not be heated beyond very red colour and after bending shall be allowed to cool slowly without quenching. The bars damaged or weakened in any way in bending shall not be used on the work. High strength deformed bars shall in no case be heated to facilitate bending cranking.

3.8 INSPECTION OF REINFORCEMENT :-

No concreting shall be commenced until the NLUO/Architect have inspected the reinforcement in position and until their approval have been obtained. A notice of at least 72 hours shall be given to the NLUO/Architect by the contractor for inspection of reinforcement. If in the opinion of the NLUO/Architect any materials is

incorrectly spaced, bend or otherwise defective. The contractor shall immediately remove such materials from the site and replace with new and rectify any other defects in accordance with the instruction of the NLUO/Architect and to their entire satisfaction.

3.9 STOCK PILING OF STEEL :-

Reinforcement steel required shall be stock pilled well in advance of need in the work. The Contractor shall stockpile advance of need in the work. The contractor shall stockpile 1/3rd requirement within15 days of commencement 2/3rd requirement at 1/4th contract time and full requirement a 1/2 contract time.

3.10 COVER FOR REINFORCEMNT :-

Cover shall be measured from the outer surface of main reinforcement. Cover shall be as follows.:-

a. At each end of a reinforcing bar 25 mm or twice the diameter of such rod or bar whichever is greater.
b. For longitudinal reinforcing bar in beam 25mm or the diameter of such rod or bar whichever is greater.
c. For tensile, compressive shear or other reinforcement in a slab 13 mm or the diameter of such reinforcement whichever a greater.
d. For reinforcement in any other member such as a lintel, chajja, canopy 13 mm or the diameter of such reinforcements whichever is greater.
e. For main reinforcement in isolated footings (side a bottom) clear cover shall be 50mm.
f. For column bars clear cover shall be 40 mm, unless otherwise specified in drawing.
g. For bars in slabs of strips footings and mat foundation clear cover shall be 50mm. Beam bars shall be placed over slab in the case of beam & slab type foundation
h. For any other types. covers as specified in I.S. 456 shall be provided.

3.11 FORM WORK :-

MATERIALS AND DESIGN:-

a. The from work shall be of timber or plywood or steel. If any particular material or materials be specified in the Schedule of quantities for form work such particularly specified material or materials shall be used in work. The form work shall be so constructed as to remain sufficiently rigid during placing of the concrete and shall be sufficiently tight to prevent, loss of liquid from the concrete. The forms shall have sufficient strength and rigidity to hold concrete and withstand the pressure of ramming and vibration without excessive deflection of the prescribed lines and more so when the concrete is vibrated. The surface of the forms in contact with concrete shall be clean, rigid, watertight and smooth. Suitable devices shall be used to hold corners, adjacent ends and edges of panels of other forms together in accurate alignment.
   If steel formwork is used the slab shuttering to be done with steel plates made out of 2mm sheets with pressed flanges and stiffener with standard shuttering

made in 60mm width and 115, 100,90,80cm lengths with adjusters made in 40, 25 cm widths and 115, 90,80,60cm lengths.

If tubular telescopic steel props are used then all steel scaffold tubes are to be of 40mm nominal bore mild steel continuous weld. props must be braced in both directions by tube and right angle couplers at approximately 250mm above prop nut when extended beyond 3.6m. All scaffolds fittings conform to I.S.2750:1968.

Timber shuttering :-

If timber is used it shall not be less than 30mm thick fixed on to rigid supporting materials and scaffolding.
If shuttering plywood is used it should conform to IS-4990-1993. The plywood may be fixed on to a timber frame or straight on to the rigid supporting materials and scaffolding. The minimum thickness for straight surface should be 9mm and for curved surfaces, minimum 6mm thick.

b. The form work shall conform to the shape, lines and dimensions to suit the RCC members as shown on drawings and to be so constructed. Form work shall be adequately designed to support the full weight of workers, fresh placed concrete without yielding settlement or deflection and to ensure good and truly aligned concrete finished in accordance with the construction drawings. A camber in all directions of 6mm for every 5m span in all slab and beam centering shall be given to allow for a unavoidable sagging due to compression or other causes.

c. The form work shall be so designed that the sides of the beams shall be first struck leaving the soffit of beams and the supporting props in position. Props shall be designed to allow accurate adjustment and to permit of their being struck without jarring the concrete.

d. Temporary opening shall be provided at the base of column form and at other points where necessary to facilitate cleaning and observation immediately before concrete is deposited.

e. Vertical shuttering : The vertical shuttering shall be carried down to such solid surface as is sufficiently strong to afford adequate support and shall remain in position until the newly constructed work is about to support itself. Props shall be securely braced against lateral deflection. Where timber props are used like bullies, they shall be of a minimum diameter of 10cm. and shall be straight and adequately strong. The spacing of such struts shall be designed to carry loads imposed on it without undue deflection of the members supported by the props. The spacing of props shall be approved by the site Engineer and any alterations suggested by him shall be carried out at contractor's expense. Bracing shall be provided as directed without extra cost. Contractor shall allow in his rates providing props and struts for any height shown in the working drawings issued to contractor from time to time.

3.12 WATER TIGHTNESS :

It is the contractor's responsibility to ensure that the forms are checked for water tightness just before concreting operation starts and to make good any deficiencies.

3.13 CLEANING AND TREATMENT OF FORMS:

All rubbish, particularly chippings, shavings and sawdust shall be removed from the interior of the forms before the concrete is placed and the form work in contract with the concrete shall be cleaned and thoroughly wetted or treated with an approved composition. Care shall be taken that such approved composition is kept out of contract with the reinforcement.

3.14 STRIPPING :

Forms shall left in place until their removal is authorized by the site Engineer and shall then be removed with care so as to avoid injury to concrete. In no circumstances shall forms be struck until the concrete reaches a strength of at least twice the stress to which concrete may be subjected at the time of striking. The strength referred to shall be that of concrete using the same cement and aggregates with the same proportions, and cured under conditions of temperature and moisture similar to those existing on the work where possible, the form work shall be left longer, as it would assist the curing.

3.15 STRIPPING TIME :

In normal circumstances (generally where temperatures are above 20° C) and where ordinary cement is used , forms shall be struck after expiry of the following periods given in table VI.

TABLE-VI

	LOCATION	Striking time in days for Ordinary pozzolana/ Portland cement
a.	Vertical sides of walls, slabs , beams and columns	24
b.	Bottoms of slabs up to 4.5m span	7-14
c.	Bottoms of slabs above 4.5m span, bottoms of beams up to 6m span rib bottoms up to 6m span	14-21
d.	Bottoms of beams over 6m span and arch rib bottoms above 6m span	21-30

Note 1: In case the shuttering for the part of the structure is supported or suspended from the shuttering of the concrete member already cast then the shuttering of the concrete member (already cast) supporting the new shuttering shall not be removed until the concrete of the supported /suspended member is matured.

Note 2: Special care shall be taken while striking of the shuttering for (i) canopies (ii) chajja (ii) cantilever slabs and beams and (iv) retaining walls, so as to ensure stability of these structural elements. Relevant notes given in the structural drawings in this connection shall be strictly followed.

3.16 FORM WORK IN LIFTS FOR CONTINUOUS SURFACES :

Where forms for continuous surface are placed in successive units (as for example in columns or walls), the forms shall fit tightly over the completed surfaces so as to prevent leakage or mortar from the concrete and do maintain accurate alignment of the surface.

3.17 PROCEDURE FOR REMOVING THE FORM WORK :

All form work shall be removed without such shock or vibration as would damaged the reinforced concrete. Before the soffit and struts are removed, the concrete surface shall be exposed where necessary in order to ascertains that the concrete has sufficiently hardened. Proper precautions shall be taken to allow for the decrease in the rate of hardening that occurs with all cements in the cold weather. For cantilevers props shall be removed from the tip towards support. Special notes given in relevant structural drawing shall be strictly adhered to in order of avoid mishaps.

3.18 TOLERANCES :

The following shall be the maximum permissible tolerances :-

a. On general setting out dimensions up to 4m length, a tolerance up to 3mm will be allowed.

b. On lengths or more than 4m tolerance of not more than 5mm will be allowed.

c. On the cross sectional dimensions of columns, beams, slabs, facia, chajja, mullions, grilles, fins, louvers and such other members tolerance of more than 2mm will not be allowed.

d. the top surface of concrete floor slab shall be within 4mm of the level and line shown on the drawings.

e. Column and walls and other vertical members shall not be more than 3mm out of plumb in their storey height and not more than 6mm out of plumb in their full height.

If the work is not carried out within the tolerances set out above in (a) to (e), the cost of all rectification measures or dismantling and reconstructing as decided by the Site Engineer shall be borne by the contractor. In case work is dismantled, the same shall not be measured and paid for.1

SECTION -III
BRICK MASONRY

1.0 BRICK WORK :

1.1 GENERAL :

All brick work should be carried out as shown on the drawings with set backs, projections, curvatures, cuttings etc. No additional cost for use of cut bricks shall be allowed. Wherever the proportion of cement mortar has not been specifically mentioned, cement mortar in the proportion of (1:6) shall be used. Flat brick shall be provided wherever required without any extra cost. Brick work shall be kept wet while in progress till mortar has properly set. On holidays or when work is stopped the top of all unfinished masonry shall be kept wet. Should the mortar become dry, white or powdery, for want or curing, work shall be pulled down and rebuilt at the contractor's expenses.

1.2 BRICK MASONRY :

a. SOAKING :

Bricks required for masonry shall be thoroughly soaked in clean water before use for at least six hours until air bubbles cease to come out. The practice of dipping the bricks in water just before use shall not be allowed. The soaked bricks shall be kept on wooden planks or brick platform to avoid earth being smeared on them

b. BATS :

No bats or out bricks shall be used in the work unless absolutely necessary around irregular openings or for adjusting the dimensions of different course and for closures, in which case full bricks shall be laid at corners, the bats being placed on the middle of the courses.

c. LAYING :

Brick work shall be laid in English Bond unless otherwise specified. Half or cut bricks shall not be used except where needed to complete the bond. Each course shall be perfectly straight horizontally and transversely. The walls shall be taken up truly plumb; if battered, the batter is to be truly maintained. The level of the brick work in vertical walls shall be checked up at every one metre interval.

Bricks shall be laid with frogs upward. While laying, bricks shall be thoroughly bedded and flushed in mortar and tapped into position with a wooden mallet and the superfluous mortar removed.

Walls of all structures shall be carried up regularly in all cases, leaving no part, one metre lower than another. If this cannot be adhered to the brick work shall be racked back at an angle not more than 45°, so as to maintain a uniform and effectual bond, but racking back should not start within 60 cm of a corner.

Partially or totally set exposed surface of the masonry shall be cleaned, roughened and lightly wetted so as to obtain the best possible bond with new work. All loose bricks and mortar shall be removed. All masonry walls shall be bonded. Each course at corners and intersections and shall be bonded or anchored to connecting work.

No deductions or additions in measurement shall be made on any account for the following :

a) ends of dissimilar materials(i.e joints, beams, lintels, posts,girders, rafters, trusses, corbels, steps etc.) upto 500 sq.cm. in section and

b) opening upto 0.1 sq.m in section. However, full deduction from masonry work shall be made for notches kept in the wall for pipeline.

At all angles forming the junction of any two walls, the brick shall, at each alternate course, be carried into each of the respective walls so as to thoroughly unite the work. The brick work shall not be raised more than 14 courses per day.
All iron fixtures, pipes, conduits, drains, sleeves, bolts, hold fasts for doors and windows etc. which are required to be built in walls, shall be embedded in cement mortar or cement concrete as specified as the work proceeds.
All uneven, irregular and disturbed brick work shall be pulled down and rebuilt with fresh bricks at the contractor's expenses.

d. JOINTS :

Thickness of joints shall be restricted to 6mm in first class brick work and 10mm in second class brick work (unless any wider vertical joints upto 13mm are necessary to give the required thickness of the wall).

All bed joints shall be normal to the pressure acting upto them i.e. horizontal in vertical walls, radial in arches and at right angles to the face in battered relating walls. The vertical joints in alternate course shall come directly one over the other and shall be truly vertical. Care shall be taken that all joints are fully mortared (proportion as specified Schedule of Items) well flushed up and in case where no pointing is to be done neatly struck as the work proceeds. The joints in faces which are to plastered or pointed shall be squarely raked out to a depth of 12 mm while the mortar is still green. The raked joint shall be well brushed to remove the loose particles. At the junction of concrete and masonry wall, G.I. Chicken wire mesh, 150 mm wide and 22 SWG shall be provided, prior to plastering. After the work, the faces of brick work shall be cleaned with wire brush so as to remove any splashes of mortar during the course of raising the brick work

e. UNIFORM FACING :

Brick work shall be carried up regularly in all cases where the nature of work will admit, not leaving any part 60mm. lower than another but where building at different levels is necessary the bricks shall be stepped so as to give later at uniform level & effectional bond. Horizontal courses should be to line and level, and face plumb or to latter as shown on the plan.

f. SCAFFOLDING :

The scaffolding must be strong and rigid, stiffened with necessary cross bearers and always checked and beared on the sills which closed board ceilings and swings to prevent and injury of persons or materials. The Contractor shall have to allow other trades to make reasonable use of his scaffolding as directed by the NLUO/Architect, if for the interest of work the contractor have to erect scaffolding in the other properties including local bodies. Corporation, the arrangement fro the same including the cost of

licensing fees etc., shall to be borne by ht e contractor and the NLUO should be kept free form any liability on this account. But log holes shall be made good by bricks to match the face work when out logs are removed after ensuring that the holes behind are solidly filled in with (1:4:8) cement concrete.

All brick works shall be kept will watered for 14 days after laying If white pozzolana cement issued for mortar the curing shall be extended by one week at contractor's expenses.

2.0 HALF BRICK WORK :

The mortar for half brick thick walls shall be as specified. For half brick thick long walls 2 nos. 6mm dia mild steel bars shall be provided every third course according to standard practice. M.S. bars shall be paid extra.

3.0 BRICK FLAT SOLING :

For soling, the bricks shall be picked of approved, sound, hard, durable, dense, free from soft spots, cracks, decay and other defects. Brick bat shall not be used. All necessary trimming or filling for laying of the soling in line and required grade shall be done . The sub-grade shall be marked by stacking and strings for required depth for laying of soling. The cushioning as well as filling of joints shall be done with local sand.

The bricks shall be laid on flat (Unless otherwise specified) touching each other. Brick shall be laid in parallel rows breaking bond or in herring bond pattern as directed and firmly embedded true to line and filled with local sand. The joint should not be less that 12mm.

SECTION -IV
PLASTERING

1 Scaffolding for carryout plastering work shall be double scaffolding having two sets of vertical supports so that the scaffolding is independent of the walls.

2 **Preparing of surface**

The surface to be plastered shall be thoroughly cleaned so that it is free from dust, dirt, salts, etc. The joints of masonry work shall be raked out to the depth of atleast 12 mm. Cement concrete surfaces shall be cleaned with wire brush. The surface in both cases shall be washed properly and kept wet for 4 hours before plastering is commerced.

3 **Mortar**

Cement and sand shall be thoroughly mixed in the proportion specified and water shall be added to form an easily workable paste. In no case shall mortar which has been allowed to stand for more than an hour after mixing to be used.

4 **Application of Plaster**

Plaster, when more than 12 mm thick, shall be applied in two coats a base coat followed by the finishing coat. Thickness of the base coat shall be sufficient to fill up all unevenness in the surface, no single coat, however, shall exceed 12 mm in thickness. The lower coat shall be thicker than the upper coat, the overall thickness of the coats shall not be less than the minimum thickness shown on the drawings. The undercoat shall be allowed to dry and shrink before applying the second coat of plaster. The undercoat shall be scratched or roughened before it is fully hardened to form a mechanical key. The method of application shall be 'thrown on' rather than 'applied by trowel'.

The entire plastering job inside and outside shall be a thoroughly sound and workmanlike job. All corners and angles shall be true to plumb or level. All plane surface shall be levelled or plumbed and shall contact a 3 m straight edge in its entire length with not more than 3 mm variation either way.

The plastering shall start from top and gradually worked down towards floor. It shall not, at any place, be thinner than specified. To ensure even thickness, plaster in about 15 cm wide strip shall be first applied horizontally and vertically at not more than 2 meter interval over the entire surface to serve as gauge. The surface of these gauged areas shall be truly in the plumb and plane of finished plaster surface. The mortar shall then be applied on the wall or other surface between the gauges and finished even. All corners shall be rounded to a radius of 12 mm unless otherwise specified. Rounding or chamfering corners, junctions etc. where required shall be done without extra payment. The contractor shall not be paid for any extra thickness of plaster than as specified.

In case of sand-faced and rough cast plaster, specific instructions in the specification of the same shall be followed for coats and finishing

techniques. In case of neat cement and neeru finish plaster specific instructions in the specification of the same shall be followed.

Any cracks which appear in the surface and all portions which sound hollow when tapped or are found to be soft or other defects shall be cut out in rectangular shape and redone as directed to match smooth and even with the original surface.

5 **Curing**

Curing shall start 24 hours after the plaster is laid. It shall be kept wet for 7 days. During this period it shall be suitably protected from all damages at the contractor's expense as directed.

6 **13 mm Neeru Cement Finished Plaster in CM as** specified

Plaster shall be smooth finished with neat cement slurry.

7 **13mm Neeru Plaster in CM 1:4**

After completion of plaster for the panel in hand. Neeru shall be applied as given below:

7.1 Preparation

Fat lime of best quality shall be slaked and mixed with sufficient water to form a thick paste. It shall then be passed through a fine 3 mm mesh to remove all unslaked particles and foreign matter and allowed to mellow under water for atleast 10 days. The surplus water on top shall then be allowed to run off and the top layer of lime formed into putty shall be skimmed off and well mixed sand and jute. The proportion of sand shall be of 1 cu.m. fine washed sand (passing through I.S. sieve No.60) to 4 cu.m. of lime putty. The jute shall be finely chopped and shall be used in the proportion of 1 kg. per cu.m. of mortar.

7.2 The mixture shall be properly ground to fine paste between two stones or in a mill. The 'neeru' thus prepared shall be kept moist until used and no more than what can be consumed in 15 days shall be prepared at a time.

7.3 The 'Neeru' as prepared above shall be applied to the prepared surface with a steel trowel to a thickness not exceeding 3 mm and rubbed and polished to perfectly smooth and even finish working from top to bottom. While trowelling is going on, soap stone powder contained in thin muslim bags shall be dusted over the surface and worked in.

7.4 Ready mix Neeru, if used, shall be obtained from approved manufacturer. A sample plaster finish shall be carried out at site and approved by Engineer prior to ordering the material at site.

Manufacturer's instructions shall be followed in the sample as well as in the actual work.

8. **13 mm Water-proof Plaster in CM 1:4**

Water proof-cement plaster shall be specified herein before for cement plaster work except for the following.
In the preparation of cement and sand mortar, cement shall be mixed with 2% approved waterproofing compound or as per manufacturer's instructions and as directly by the Engineer.

9. **20 mm Sand-face Plaster**

Sand face plaster shall consist of two layers. The first layer shall be generally 12 mm average thick cement plaster with cement sand of 1:4 mix (1 cement : 4 sand) and shall be rough finished carried out by wire brush scarifying on wet plaster. Over this a second layer, average 8 mm thick, of cement sand plaster in the proportion of 1:2 mix shall be applied. The second layer of plaster shall be laid only after the first layer has sufficiently dried. The surface of the sand face plaster shall be finished rough with sponge or as directed by the Engineer.

10. **Rough Cast Cement Plaster**

The cement shall be thoroughly mixed with sand and gravel in the proportion of 1 cement : 2 sand : 1 aggregate. The gravel shall be of a size passing through 6 mm mesh but retained completely on 2 mm mesh. The constituents shall be thoroughly mixed dry until the mix is homogeneous. Water shall then be added gradually to the required extent and the material turned over sufficiently to give a homogeneous mass of uniform colour. Mortar shall be applied to the wall in 2 coats with force to a thickness of 20 mm and finished to a uniform surface. No more mortar shall be prepared than can be used up with half an hour.

11. **POINTING**

11.1 **Scope**

Work includes providing, mixing CM 1:3 and applying cement pointing on masonry surfaces indicated in the item, including all materials, labour, plants, tools, equipment, scaffolding racking etc. required to complete the job in all respects.

11.2 **Type of pointing**

Pointing shall be of the type specified such as "flush", "recessed" (weathered, keyed, ruled etc.), "tuck" etc.

11.3 **Preparation of surface**

All joints in masonry shall be raked out at least 12 mm deep when the mortar is firm but not wet. The joints shall be brushed clean of dust with wire brush and wetted thoroughly for 6 hours before pointing is commenced.

11.4 **Application & Finishing**

The mortar shall be pressed into raked out joints with a point trowel and finished either flush, sunk or raised according to type of pointing specified in the drawings or as directed. The superfluous mortar shall be cut off from the edges of the lines and the surfaces of masonry shall be cleaned of all mortar. Finish shall be free of slick spots, cut faces and other blemishes.
Finished work of pointing shall be to exact size and shape stipulated with edges straight, neat and clean. No smearing of cement mortar shall be allowed and the entire work shall be carried out in most workmanlike manner.

12. **Drip Mould**

Drip mould shall be provided on underside and not more than 50 mm from outer edge in chajjas and projection of roof slab and at places indicated by the Engineer and shall be of minimum 10 mm in depth and 20 mm in width and well rounded from either in plaster or concrete while casing. It shall be neat finished. The size and shape shall have to be approved by the Engineer.

13. **Damp Proof Course**

Unless otherwise specified Damp-proof course shall be 40 mm thick 'artificial stone' in proportion 1:1V23 cement, sand, stone chips (10 mm down) with admixture of a waterproofing compound as approved by the Engineer.

SECTION -V
FLOOR FINISHING

1.0 TERRAZO (MARBLE CHIPS) FLOORING LAID IN SITU :

1.1. GENERAL :

The thickness of the under layer shall be measured with a permissible tolerance of + /- 3mm. The thickness of top layer after polishing shall be measured with a tolerance of + / -1.5mm.

1.2 UNDER LAYER :

Cement concrete of specified mix shall be used. The panels shall be of uniform size, and unless otherwise directed, generally not exceeding 1.5 sqm. in area & 1.2 meter in length for inside situations. In exposed situation the length of any side of the panel shall preferable be not more that 1.25 meters or as directed. Cement slurry @ 2 Kg. per Sqm. shall be applied before laying of under layer over the cement concrete / R.C.C. surface.

1.3 STRIP FIXING :

Glass strips or aluminum strips as given in the schedule shall be fixed with their top at proper levels.

1.4 TOP LAYER.

Mortar : The mix for terrazzo topping consist of grey cement with or without pigment, marble power, marble aggregate (marble chips) & water. The cement & marble powder shall be mixed in the prop. of 3 (Three) parts of cement power mix, the proportion of aggregate by volume shall be as follows :

Size of Aggregate	Proportion of Aggregates to binding mix.
For predominantly grade ,0.00 and 1	2.00 parts
For predominantly grade, 2 and 2	1.75 parts
For predominantly grade,4 and 5	1.75 parts

Grade No.	Size of aggregate of top layer in mm.	Minimum thickness
00	1-2	6
0	1-4	9
1	4-7	9
2	7-10	12

where aggregate of size larger than 10 mm are used the minimum thickness of topping shall not be less than 1.5 times the maximum size of the chips. Where large chips such as 20mm or 25mm are used they shall be used only with a flat shape and bedded on the flat face so as to keep the maximum thickness of wearing layer. Before starting the work, the Contractor shall get the sample of marble chips approved by the Architects. The cement to be used shall be ordinary grey cement. White cement, colored cement or cement with admixture of coloring matter of approved quality in the ratio to get the required shade as ordered by the Architect. Coloring matter of approved quality in the ratio specified shall be mixed dry thoroughly with the cement & marble powder and then marble chips added & mixed as specified above. The full quantity of dry mixture of mortar required for a room shall be prepared in a lot in order to ensure and protect from moisture. The dry mortar shall be mixed with water in the usual way as and when sufficient water to make it workable.

The terrazzo topping shall be laid while the under layer is still plastic, but has hardened sufficiently to prevent cement from rising to the surface. This is normally achieved between 18 to 24 hours after the under layer has been laid. A cement slurry preferable of the same color as the topping shall be brushed on the surface immediately before laying is commenced. It shall be laid to a uniform thickness slightly more than that specified in order to get the specified finished thickness after rubbing. The surface of the top layer shall be trowelled over, pressed and brought true to required level by a straight edge and steel floats in such a manner that the maximum amount of marble chips come up and are spread uniformly over the surface.

1.5 POLISHING, CURING AND FINISHING :

Polishing shall be done by machine. About 36 hours after laying the top layer, the surface shall be watered and ground evenly with machine fitted with special rapid cutting grit blocks (carborundum stone) of coarse grade (No. 60) till the marble chips are evenly exposed and the floor is smooth. After the first grinding, the surface shall be thoroughly washed to remove all grinding mud and covered with a grout of cement of/and coloring matter in same mix and proportion as the topping in order to fill any pin holes that appear. The surface shall be allowed to cure for 5 to 7 days & then ground with machine fitted with fine grit blocks (No. 120). The surface is cleaned and repaired as before and allowed to cure again for 3 to 50 days. Finally

the third grinding shall be done with machine fitted with fines grade grit blocks (No. 320) to get even and smooth surface without pin holes, The finished surface should show the marble chips evenly exposed.
Where use of machine for polishing is not feasible or possible, rubbing and polishing shall be done by hand, in the same manner as specified for machine polishing except that carborandum stone of coarse grade (No. 60) shall be used for the 1st rubbing stone of medium grade (No. 80) for second rubbing and stone of fine grade (No. 120) for final rubbing and polishing.
After the final polish either by hand, oxalic acid shall be dusted over the surface @ 33 gm per square meter sprinkled with water and rubbed hard with a namdah block (Pad of woolen rags). The following day. the floor shall be wiped with a moist rag & dried with a soft cloth and finished clean.
Curing shall be done by suitable means, such as laying moist sawdust or ponding water.

1.6 PRECAUTIONS :

Flooring in lavatories and bathrooms shall be laid after fixing of water closet and squatting pans & floor traps. Traps shall be plugged, while laying the floors opened after floors are cured and cleaned. Any damage done to W.C.'s squatting pans and flow traps during the execution of work shall be made good by the Contractor.
During cold weather, concreting shall not be done when the temperature falls below four degree centigrade. The concrete placed shall be protected against frost by suitable coverings. Concrete placed shall be protected against frost by suitable coverings. Concrete damaged by frost shall be removed and work redone. During hot weather, precautions shall not exceed Thirty Eight degree centigrade. No concreting shall be laid within half an hour of the closing time or the day. Unless permitted by the Engineer-in-charge.
The floor shall be protected from any damage during the execution of work.

2.0 CERAMIC TILES FLOORING :

2.1 PREPARATION OF SURFACE AND LAYING :

Sub-grade concrete or the R.C.C. slab on which the tiles are to be laid shall be cleaned, wetted and mopped. The bedding for the tile shall be with cement mortar 1:3 (1 cement : 3 coarse sand) or as specified in the specification. The average thickness of the bedding shall be 20mm while the thickness under portion of the tiles shall not be less than 12mm.
Mortar shall be spread, temped and corrected to proper levels and allowed to harden sufficiently to offer a fairly rigid cushion for the tiles to be set to enable the mason to place wooden plank across and squat on it.
Over this mortar bedding neat grey cement slurry of honey like consistency shall be spread at the rate of 3.3 kg. of cement per square meter over such and area as soaked in water washed clean and shall be fixed in this grout one after another, each tiles gently being tapped with a wooden mallet till it is properly bedded and in level with the adjoining tiles. The joint shall be kept as thin as possible and in straight lines or to suit the required pattern.
The surface of flooring during laying shall be frequently checked with a straight edge about 2m. long, so as to obtain a true surface with there required slops.
Where full size tiles cannot be fixed these shall be cut (Sawn) to the required size, and their edge rubbed smooth to ensure straight and true joints.

Tiles which are fixed in the floor adjoining the wall shall enter not less than 10mm. under plaster, skirting or dado.
After tiles have been laid surplus cement grout shall be cleaned off.
Painting and Polishing :- The joints shall be cleaned off the grey cement grout with wire brush or trowel to a depth of 2mm to 3mm and all dust and loose mortar removed. Joints shall then be flush pointed with white cement added with pigment if required to match the color of tiles. The floor shall be washed and finished clean. The finished floor shall not sound hollow when tapped with a wooden mallet.

3.0 CERAMIC TILES IN SKIRTING AND DADO :-

3.1 PREPARATION OF SURFACES :-

The joints shall be raked out to a depth of at least 15mm in masonry walls, while the masonry is being laid. In case of concrete walls, the surfaces shall be hipped and roughened with wire brushes. The surface shall be cleaned thoroughly, washed with water and kept wet before skirting work is commenced.

3.2 LAYING :-

12mm. thick plaster of cement mortar 1:3 (1 cement : 3 coarse sand) of mix as specified shall be applied and allowed to harden. The plaster shall be roughened with wire brushes or by scratching diagonally closed intervals.
The tiles should be soaked in water, washed clean and a coat of cement slurry applied liberally at the back of tiles and set in the bedding mortar. The tiles shall be tamped and corrected to proper plane and lines. The tiles shall be set in the required pattern and butt jointed. The joints shall be as fine as possible. Top of skirting of dado shall be truly horizontal and joints vertical except where otherwise indicated.
Skirting & dado shall rest on the top of the flooring, Where full size tiles cannot be fixed these shall be cut (Sawn) to the required size and their edges rubbed smooth.

3.3 CURING AND FINISHING :

The joints shall be cleaned off the grey cement grout with wire brush or trowel to a depth of 2mm to 3mm & all dust & loose removed. Joints shall then be flush pointed with white cement added with pigments if required to match the color of tiles. The surfaces shall then be kept wet for seven days. After curing the surface shall be washed and finished clean. The finished work shall not sound hollow when tapped with a wooden mallet.

4.0 ARTIFICIAL STONE FLORING :

Selection of materials, methods of mixing, placing and compacting shall generally conform to the specification under plain and reinforced cement concrete described earlier. A stiff mix consistent with workability shall be used.

4.1 PREPARATION OF SURFACE :

Before the operation for laying topping is started the surface of base concrete shall be thoroughly cleaned of all dirt, loose particles, caked mortar, droppings and laitance of any by scrubbing with coir or steel wire brush where the concrete has

hardened so much that roughening of surface by wire brush is not possible, the surface shall be roughened by chipping or hacking at close intervals. The surface shall then be cleaned with water & kept for 12 hours and surplus water shall be removed by mopping before the topping is laid.

4.2 LAYING :

The screed strips shall be fixed over the base concrete dividing it into suitable panels. Before placing the concrete for topping, neat cement slurry shall be thoroughly brushed into the prepared surface of the base concrete just ahead of the finish. Concrete of specified proportion and thickness shall be laid in alternate panels to required level and shape and thoroughly tamped.

4.3 FINISHING THE SURFACE :

After the concrete has been fully compacted it shall be finished by toweling or floating with neat cement rendering Finishing operations shall start shortly after the compaction of concrete and the surfaces shall be trowelled three times at intervals so as to produce a uniform and hard surface. The satisfactory resistance of floor to wear depends largely upon the care with trowelling is carried out. The time interval allowed between successive trowelling is very important. Immediately trowelling shall be done to give a level surface. Excessive trowelling in the earlier stages shall be avoided as this tends to brings a layer rich in cement to line surface. Some time after the first trowelling, the duration depending upon the temperature, atmospheric conditions and the of cement used, the surface shall be retrowelled to close any pores in the surface and to bring to surface shall be retrowelled to close any pores in the surface and to bring to surface and to scrap off any excess water in concrete or laitance. No dry cement shall be used directly on the surface to absorb moistures or to stiffen the mix. The final trowelling shall be done well before the concrete has become too hard but at such a time that considerable pressure is required to make any impression on the surface if directly by the Architect approved minerals pigment shall be added to the rendering to give desired color and shade to the flooring at no extra cost.

5.0 MARBLE STONE FLOORING :

5.1 DRESSING OF SLABS :

Every stone shall be hand/machine cut to the required size and shape, fine chisel dressed on all sides of the stone shall be fully in contact with it. The top surface shall also be fine chisel dressed to remove all waviness. The sides and top surface of slabs shall be machine rubbed or table rubbed with coarse sand before paying. All angles and edges of the marble slab shall be true, square and free from chipping and the surface shall be true and plane.

The thickness of the slabs shall be as specified in the description of the item, Tolerance of +/-2mm. shall be allowed.

5.2 LAYING :

The sub-grade concrete or the R.C.C. slab on which the slabs are to be laid shall be cleaned, wetted & mopped. The bedding for the slabs shall be with cement mortar 1:4 (1 cement :4 coarse sand).

The averages thickness of the bedding mortar under the slab shall not be less than 20mm.

The slabs shall be laid in the following manner :-

Mortar of the specified mix shall be spread the area of each slab, roughly to the average thickness specified in the item. The slab shall be washed clean before laying. It shall be laid on top, pressed, trapped with wooden mallet and brought to level with the adjoining slabs. It shall be lifted and laid aside. The top surface of the mortar is allowed to harden bit and cement slurry of honey like consistency cement per sqm. The edges of the slab already paved shall be buttered with grey or white cement with or without admixture of pigment to match the shade of the paved, shall then be lowered gently back in position and tapped with wooden mallet till it is properly bedded in a joint as possible. Subsequent slabs shall be laid in the same manner. After each slab has been laid, surplus cement or the surface of the slabs shall be cleaned off. The flooring shall be cured for a minimum period of seven days. The surface of the flooring as laid shall be true to levels and slopes as instructed by the Architect/ Owner.
The slabs shall be matched as shown in drawings or as instructed by the Architect/Owner. Slabs which are fixed in the floor adjoining the wall shall enter not less than 12 mm. under the plaster, skirting or dado, The junction between wall plaster and floor shall be finished neatly and without variness.

5.3 POLISHING AND FINISHING :-

Slight unevenness at the meeting edges of slabs shall then be removed by fine chiseling and finished in the same manner as specified in Para 7.3 above.

6.0 MARBLE STONE IN SKIRTING, DADO, RISERS STEPS ETC.

6.1 PREPARATION OF SURFACE :-

The masonry joints shall be raked or concrete surfaces hacked and roughened. If considered necessary , the wall surface shall be cut uniformly to the requisite depth so that the skirting face shall have the projection from the finished face of wall as shown in drawings or as required by the Architect/ Owner. No additional cost on this account shall be paid.

6.2 LAYING :

The risers of steps and skirting shall be set in grey or white cement admixed with or without pigment to match the shade of the stone as specified in the description of the item with the line of the slab of such a distance from the wall that the average width or the gap shall be 20mm. and at no place the width shall be less than 15mm. If necessary, the slab shall be held in position by temporary M.S. hooks fixed in to the wall at intervals. The skirting or riser face shall be checked for plane and plumb and corrected . The skirting shall thus be left to harden then the rear of the skirting or riser slab shall be packed with cement mortar 1:3 (1 cement : 3 coarse sand) or other mixed as specified in the description of the item. The fixing hooks shall be removed after the mortar filling the gap has acquired sufficient strength.

The joints shall be as fine as possible . The top line of skirting and risers shall be truly horizontal and joints truly vertical, except where otherwise indicated.

The risers and skirting slab shall be matched as shown in drawing or as instructed by the Architect/ Owner.

6.3 CURING. POLISHING AND FINISHING :

It shall be as specified in Para 8.3 as far possible except that cement slurry with or without pigment shall not be applied on the surface and polishing shall be done with hand. The face and lop skirting shall be polished.

SECTION -VI
EXTERNAL AND INTERNAL PAINTING WORKS

1.0 WHITE WASHING WITH LIME :-

1.1 SCAFOLDING :

Wherever scaffolding is necessary, it shall be erected on double supports tied together by horizontal pieces, which scaffolding planks shall be fixed. No. M.S. tube shall rest on or touch the surface which is being white washed. For all exposed brick work or tile work, double scaffolding having two sets of vertical supports shall be provided. The supports shall be sound and strong, tied together with horizontal pieces over which scaffolding planks shall be fixed.

Note: In case of special type of brick work, scaffolding shall be got approved from Architect/ Owner in advance.
Where ladders are used, pieces of old gunny bags shall be tied on their tops to avoid damage or scratches to walls.
For white washing the ceiling , proper stage scaffolding shall be erected.

1.2 PREPARATION OF SURFACE :

Before new work is white washed the surface shall be thoroughly brushed free from mortar droppings & foreign mater.
In the case of old work, all loose pieces & scales shall be scrapped of and holes in plasters as well as patches of less than 50.00 sqm. area shall be filled up with mortar of the same mix. Where so specifically ordered by the Architect/ Owner, the entire surface of old white wash shall be thoroughly removed by scrapping and this shall be paid for separately.

1.3. PREPARATION OF LIME WASH :

The wash shall be prepared from good quality fresh stone white lime The lime shall be thoroughly slaked on the spot, mixed and stirred with sufficient water to make a thin cream. This shall be allowed to stand for a period of 24 hours and then shall be screened through a clean coarse cloth. 40gm. of gum dissolved in hot water, shall be added to each 10 cubic decimeter of the cream. The approximate quantity of water to be added in making the cream will be 5 liter of water to one kg. of lime.
Indigo (Neel) up to 3gm, per kg. of lime dissolved in water shall be added and wash stirred well. Water shall then be added at the rate of about 5 liters per kg. of lime to produce a milky solution. In case of lime wash on the surface finished with lime punning, no Indigo (Neel) should be used unless otherwise directed by the Architect.

1.4 APPLICATION :

The white wash shall be applied with moon brush to the specified number of coats. The operation of each coat shall consist of a stock of the brush given from the top downwards, another from the bottom upward over the first stroke, and similarly one stroke horizontally from the right & another from the left before it dries.
Each coat shall be allowed to dry before the next one is applied. Further each coat shall be inspected and approved by the Architect / Owner before

the subsequent coat is applied. No portion of the surface shall be left out initially to be patched up later on.

For new work, three or more coats shall be applied till the surface presents a smooth & uniform finish through which the plaster does not show. The finished dry surface shall not show signs of cracking and peeling nor shall it come off readily on the hand when rubbed.

For old work, after the surface has been prepared as described, in Para 1.2 and a coat of white wash shall be applied over the patches and repairs. Then a single coat or two more coats of whit e wash as stipulated in the description of the item shall be applied over the entire surface. The whit e washed surface should present a uniform finish through which the plaster patches do not appear. The washing on ceiling should be done prior to that on walls.

1.5 PROTECTIVE MEASURES :

Doors, windows, floors, articles of furniture etc., & such other parts of the building not to be white washed shall be protected from being splashed upon. Splashing and froopings, if any, shall be removed by the contractor at his own cost and the surfaces cleaned. Damages if any to furniture of fittings and fixtures shall be recoverable from the Contractor.

2.0 CEMENT PAINT :

2.1 PREPARATION OF SURFACE :

For new working the surface shall be carefully cleaned of all mortar dropping, dirt, algae, grease and other foreign matter by brushing & washing. The surface shall be thoroughly wetted with clean water before the cement paint is applied.

In the case of old work, all loose pieces and scales, shall be cleaned of all dirt, dust, algae, oil etc. by brushing and washing. pitting in plaster shall be made good and coat of water proof cement paint shall be applied over patches after wetting them thoroughly.

2.2 PREPATION OF MIX :

Cement paint shall be mixed in such quantities as can be used up within an hour of its mixing as otherwise the mixture will set & thicken, affecting flow and finish.

Cement paint shall be mixed with water in two stages. The first stage comprise of 2 parts of cement paint and 1 part of water stained thoroughly and allowed to stand for five minutes. Care should be taken to add the cement paint gradually to the water and not vice- versa. The second stage shall comprise of adding further one part of water to the mix and stirring thoroughly to obtain a liquid of workable and uniform consistency. In all cases the manufacturer's instructions shall be followed meticulously.

The lids of cement paint drums shall be kept tightly closed when not in use, as by exposure to atmosphere the cement paint rapidly becomes air set due to its hygroscopic qualities.

The solution shall be applied on the clean and wetted surface with brushes or spraying machine. The solution shall be kept well stirred during the period of application . It shall be applied on the surface which is on the shady side of the building so that the direct heat of the sun of the surface is avoided. The

method of apply of the second or subsequent coats, the surface of the specification. The completed surface shall be watered after the day's work.

The second coat shall be applied after the first coat has been set for at least 24 hours. Before application of the second or subsequent coats, the surface of the previous coat shall not be wetted.

For new work, the surface shall be painted with three or more coats of water proof cement paint as found necessary to get a uniform shade.

For old work, the treatment shall be with one or more coats as found necessary to get a uniform shade.

Water cement paint shall not be applied on surfaces already treated with white wash, color wash, distemper dry oil bound, varnishes, paints, etc., It shall not be applied on gypsum, wood and metal surfaces.

The specifications in respect of scaffolding, protective measures, measurements and rate shall be as described under white washing with lime.

3.0 PAINTING :

Approved paints, oil or varnishes shall be brought to the site of work by the Contractor in their original containers in sealed condition. The materials shall be brought in at a time in adequate quantities to suffice fro the whole work or at least a fortnight's work. The empties shall not be removed from the site of work, till the relevant item of work has been completed and permission obtained from the Architect/NLUO.

Oil bound Washable Distemper.

3.1 **Material**

Material for oil bound distemper shall be of approved make and manufacturer. A sealed tin ready mixed distemper of selected make shall be opened in presence of Engineer.

3.2 **Surface Preparation.**

This includes scraping uneven surface, damaged plaster, etc. with carborundum papers of suitable number till hard, clean surface is obtained. This is to be repeated till the work is approved by the Engineer. Putty shall be used to cover holes and unevenness on the surface.

3.3 **Preparation and application of Putty.**

Putty will be prepared as under. It shall be prepared from English whiting chalk, linseed oil, white zinc and plater of paris in the prop. of 7:1:2:1. However, exact proportion shall be decided as per site condition. Water, if required, can be added as per the instructions and requirements to have proper consistency and stickness. Putty should be smooth and free from any coarse ingredient, etc.

Application of putty should be started only after approval of surface area by the Engineer. It should be applied on the whole surface to make the surface smooth. No lumps should be allowed to dry completely.

After drying, the surface should be scraped with sand/emery paper till smooth surface is obtained.

If no proper smoothness is obtained again apply primer, putty, etc. and repeat the process as mentioned above, till the surface is perfect smooth as per instructions.

After application of first coat of putty, the surface shall be allowed to dry for 24 hours. sand papering shall then be done to give smooth surface.
Subsequent applications of putty and sand papering shall be done till the Engineer is satisfied about final surface, which should be absolutely even, levelled and smooth.

3.4 **Primer application**

Primer should be a cement primer, or as per manufacturer's specification (manufacturer same as that of distemper). These tins should be opened in presence of the Engineer. Before applying primer on the surface, its consistency must be approved by the Engineer and shall be same as specified by the manufacturer. Primer should be applied with smooth brushes on surface to cover entire surface properly. There should be no brush marks, stripes, etc. when applied on the surface. This surface should be allowed to dry at least for 24 hours before next application.

3.5 On the surface so prepared, two coats of oil bound distemper of selected shade shall be applied only after inspection by the Engineer. A horizontal and vertical travel of brush together will be considered as one coat of paint. Each coat of paint shall be applied only after inspection of Engineer. No brush marks shall be visible on the surface at the end of final coat. Final surface shall be smooth, even or roller finish and uniform in colour and texture.

3.6 Acrylic Emulsion Paint

Paint shall be of approved quality and shades

Surface preparation, primer and putty application shall be as per clause 3.2, 3.3, 3.4.

Two coats of Acrylic emulsion paints shall be applied as per manufacturer's specification.

The surface on finishing shall present a flat velvety smooth finish.

3.7 Synthetic Enamel Painting

Surface preparation shall be by hand cleaning. Primer shall be zinc cromate or zinc phosphate (pigmented in alkyed or phenolic medium of approved make, British or Asian Paints) of minimum 38 microns dry film thickness. The coats of synthetic enamel paint of approved make, British Luxol-3 or Asian apcolite, of total 100 microns DFT shall be applied as directed by the Engineer.

4.1 COMMERCIAL WORK :

Painting shall not be started until the Architect/ Owner has inspected the items of work to be painted , satisfied himself about their proper quality and given his approval to commence the painting work. Painting of external surface should not be done in adverse weather conditions like hail storm and dust storm.

Painting except the priming coat, shall generally be taken in and after practically finishing all other builders work. The rooms should be thoroughly swept out and the entire building cleaned up at least one day in advance of the painting work being started.

4.2 PREPARATION OF SURFACE :

The surface shall be thoroughly cleaned and dusted . All rust, dirt, scales, smoke and grease shall be thoroughly removed before painting is started. The prepared surface shall have received the approval of the Architect /Owner after inspection, before painting is commenced.

4.3 APPLICATION :

Before pouring into smaller container for use, the paint shall be stirred thoroughly in the containers. When applying also, the paint shall be continuously stirred in the smaller container so that its consistency is kept uniform.

If for any reasons , thinning is necessary in case of ready mixed paint, the brand of thinner recommended by the manufacturer or as instructed by the Architects/ NLUO shall be used.

The painting shall be laid on evenly and smoothly by means of crossing and smoothly by means of crossing and laying off , the latter in the direction of the grain of wood. The crossing & laying of consists of covering the area over with paint, brushing the surface hard for the first time over and ten brushing alternately in opposite direction, two or three times and then finally brushing lightly in a direction at right angles to the same. In this process, no brush marks shall be left after laying off is finished. The full process of crossing and laying off will constitute one coat. Where so stipulated the painting shall be done by spraying. Spray machine used may be (a) high pressure (small air aperture) type (b) a low pressure (large air aperture) type, depending on the nature and location of work to be carried out. Skilled and experienced workmen shall be employed for this class of work. Paints used shall be brought to the requisite consistency by adding a suitable thinner.

Spraying should be done only when dry condition prevails. Each coat shall be allowed to dry thoroughly and rubbed smooth before the next coat is applied. This should be facilitated by through ventilation. Each coat except the last coat, shall be lightly rubbed with sand paper or with pumice stone and cleaned off dust before the next coat is laid.

No left over paint shall be put back into the stock tins. When not in use the container shall be kept properly closed.

No hair marks from the brush or clogging of paint puddles in the corners of panes, angles of moldings etc., shall be left on the work.

In painting doors and windows, the putty round, the glass panes must also be painted, but care must be taken to see that no paint stains etc. are left on the glass top of shutters and surfaces in similar hidden location shall not be left out in paint.

In painting steel work, special care shall be taken while painting over bolts, nuts, rivets, overlaps etc.

The additional specifications for primer & other coats of paints shall be as according to the detailed specifications under the respective headings.

4.4 BRUSHES AND CONTAINERS :

After work, the brushes shall be completely of paint and linseed oil rinsing with turpentine. A brush in which paint has dried up is ruined and shall on no account be

used for painting work. The containers when not in use, shall be kept closed and free from air so that paint does thicken and also shall be kept safe from dust , When the paint has been used, the containers shall be washed with turpentine and wiped dry with soft clean cloth, so that they are clean, and can be used again.

5.0 PRIMING COAT ON WOOD, IRON OR PLASTERED SURFACE :

5.1 PREPARATION OF SURFACE :

i. WOODEN SURFACE

The wood work to be painted shall be dry and free from moisture. The surface shall be thoroughly cleaned. All unevenness shall be rubbed down smooth with sand paper and shall be well ducted, Knots, if any, shall be covered with preparation of red lead made by grinding red lead in water and filled materials with same shade as paint shall be used where specified .

The surface treated for knotting shall be dry before painting is applied. After the priming coat is applied, the holes and indentations on the surface shall be stopped with glaziers putty or wood putty. The primer shall be prepared on site or shall be of approved brand and manufacture as specified in the item. Paint shall be anti-corrosive bitumastic paints, aluminum paint or other types of a paint as specified in the description of the item. Stopping shall not be done before the priming coat is applied as the wood will absorb the oil in the stopping and then latter is therefore liable to crack.

ii. IRON AND STEEL SURFACE :

All rust and scales shall be removed by scrapping or by brushing with steel wire brushes. Hard skin of oxide formed on the surface of wrought iron during rolling which become loose by rusting, shall be removed.

All dust and dirt shall be thoroughly wiped away from the surface.

If the surface is wet, it shall be dried before priming coat is undertaken

iii. OKASTERED SURFACE :

The surface shall ordinarily not be painted until it has dried completely. Trial patches of primer shall be laid at intervals and where drying is satisfactory, painting shall then be taken in hand. Before primer is applied, holes and undulations, shall be filled up with plaster of Paris and rubbed smooth.

5.2 APPLICATION :

The primer shall be applied with brush, worked well in to the surface and spread even smooth. The painting shall be done by brushing and laying off as described in cement paint above.

6.0 Painting with ready mixed paint/synthetic enamel paint :

6.1 Painting on new surface :

The surface, which has not been painted earlier, or the paint has been removed by paint remover, burning, caustic soda etc., shall be considered to the new surfaces.

6.2 PREPARATION OF SURFACE :

i. WOOD WORK :

The surface shall be cleaned and all unevenness removed as specified in wooden surface. Knots if visible shall be covered with a preparation of red lead. Holes, and indentations of the surface shall be filled in with glazier's putty and rubbed smooth before painting is done. The surface should be thoroughly dry before painting.

ii. IRON AND STEEL WORK :

The priming coat shall have dried up completely before painting is started. Rust & scaling shall be carefully removed by scrapping or by brushing with steel wire brushes. All dust and dirt shall be carefully & thoroughly wiped away.

iii. PLASTERED SURFACE :

The priming coat shall have dried up completely before painting is started. All dust or dirt that has settled on the priming coat shall be thoroughly wiped away before painting is started.

6.2 APPLICATION :

The specification described in cement paint shall hold good as far as applicable. The number of coats to be applied will be as stipulated in the item. The painted surface shall present a uniform appearance and glossy/mat finish as described in schedule of quantities free from streaks , blisters etc.

6.4 PAINTING AN OLD SURFACE :

The surface which has been painted earlier shall be considered to be old surface.

6.5 PREPARATION OF SURFACE :

i. WOOD WORK :

If the old paint is sound and firm and its removal is considered necessary the surface shall be rubbed down with pumice stone after it has been cleaned of all smoke and grease by washing with lime and rinsing with water and drying. All dust and loose pint shall be completely removed. The surface shall then be washed with soap and water.

If the old painted surface is blistered or flaked badly, paint shall be completely removed with the application of a paint remove following the specification of the manufacturer. The paint remover shall be of a brand and manufacturer approved by the Architect / Owner. It shall be free from alkaline matter and non caustic so that it can be handled by workmen without injury. It shall be of non flammable quality as far as possible and such removal shall be paid for separately. Holes and cracks if any shall be stopped with glazier's putty or

wood putty. Further the painting itself shall be treated as on new surface and paid for accordingly.

ii. IRON AND STEEL WORK :

If the old paint is sound and firm and its removal is considered unnecessary, it shall be rubbed with wire brushes and any loosened paint taken off. All dust shall be thoroughly wiped away. This surface shall then be wiped finally with mineral turpentine to remove grease and perspiration of hand marks etc., and then allowed to dry.
If the old painted surface is in bad condition and blistered and flaked, the old paint shall be completely removed and the surface prepared as described in above . Such removal shall be paid for separately. The painting including the priming coat shall be treated as on new work and paid for accordingly.

7.0 FRENCH SPIRIT POLISHING :

Pure cello varying from pale orange to lemon yellow colour free from resin or dirt shall be dissolved in methylated spirit at the rate of 140 gm. of shellac to 1 liter of spirit. Suitable pigment shall be added to get the required shade.

7.1 POLISHING NEW SURFACES :

Preparation of surface - The surface shall be cleaned. All unevenness shall be rubbed down smooth with sand paper and well dusted. Knots if visible shall be covered with a preparation of red lead and glue sized and used hot. Holes and indentations of the surface shall be sloped with glaziers putty. The surface shall be then given a coat of wood filler made by ming whiting (Ground Chalk in methylated spirit at the rates of 1.5 kg. of whiting per liter of spirit). The surface shall again be rubbed down perfectly smooth with glass paper and wiped clean.

7.2 APPLIACATION :

The number of coats of polish to be applied shall be as decided by the Architect to get the desired finish. A pad of woolen cloth covered by the fine cloth shall be used to apply the polish. The pad shall be moisture with the polish and rubbed hard on the wood, in a series of overlapping circles applying the mixture sparingly but uniformly over the entire area to give an even level surface. A trace of linseed oil on the face of the pad facilitates this operation. The surface shall be all owed to dry and the pad shall be covered with a fresh piece of clean fine cotton cloth slightly damped with methylated spirit and rubbed lightly and quickly with circular motions. The finished surface shall have a uniform texture.

SECTION -VII
CARPENTARY AND JOINERY WORKS

1.0 GENERAL :

Arrangement for procurement of timber section shall be made with the receipt of order of facilitate natural air seasoning at site.
The Contractor shall invariably submit test certificate in cases where seasoned and treated timber have been specified. Arrangements for test check at site for random samples shall be made by the contractor.
No timber material shall be painted till such time it has been approved by the Architect/NLUO. A coat of primer shall immediately be applied on receipt of approval from the Architect/ NLUO. The final painting shall be done as indicted in the schedule or as directed by the Architect/NLUO, when all other works are generally completed and Architect/NLUO has given approval to proceed with final painting.
If after finishing and erection of wood work any undue shrinkage or cracks due to bed workmanship or material is found, the contractor shall remove the same & supply better and approved materials at his own cost.
All wood savings, cuttings and other rubbish shall be removed and the site left clear as the work progress. All precautions against fire shall also be taken by the contractor.

2.0 WORKMANSHIP :

2.1 FRAME :

The workmanship shall be first class and to the approval of the Architect/NLUO . Scantlings and boarding shall accurately be sawn and shall be of the required width and thickness with allowable tolerance. All carpenter's work shall be wrought (Planed) except where otherwise described. The workmanship and joinery shall be accurately set out in strict accordance with the drawings and shall be framed together and securely fixed in approved manner with properly made joints. All work is to be properly tennoned, shouldered, wedged, pinned, bided, etc. and properly glued with approved quality adhesive to the satisfaction of the Architect/Owner.
All wedges of timber frames shall be protected from being damaged during construction by providing rough timber casing securely fixed and other adequate protective measures.
Door/ Windows frames shall have cut rebates. Planted rebates unless shown in drawing shall not be permitted.
All fully fabricated timber shall be air- seasoned at site for about two months to allow for any shrinkage that may take place. As such it is desirable that the fabrication of frames is started with the commencement of the project work.
The faces of frames or any timber coming in contact with masonry or concrete or embedded in ground shall be treated with hot tar primer or crested before they are placed in position.
No frames shall be painted until it is inspected by the Architect/NLUO and passed. Immediately after it is passed it shall be given a coat of primer. the final

painting or polishing shall be done only when advised by the Architect/NLUO.

2.1.1 WPC (WOOD PLASIC COMPOSITE) CHOWKATH FITTING

WPC (WOOD PLASIC COMPOSITE) CHOWKATH of 50 mm x 125 mm (after moulding) well blend beautifully WPC chowkath in door & window opening area the wall side surface of WPC chowkath, 150 mm anchor fashner , screw, cutting the holes, filling the cutting holes in cement concrete (1:2:4) .

2.2 ANCHOR FASTNER

Three anchor fastner shall be fixed to each post of the door frame . The M.S. anchor shall be of 150 mm or as required at site and shall be fixed to the frames by means of screws and not nails . The other end of the anchor fastner shall be fixed into jambs with [1:2:4] P.C.C. of dimensions as directed. Ends of anchor fastnerwill be fish tailed. Corner straps of M.S. sheets shall be provided and fixed on corners with screws.

Whenever asked for metal fastener or bolts as directed shall be used for rough ground, framing, hangers etc.

The rates quoted for wood work and joinery shall include the cost for all types of anchor fastner directed (Horns for frames shall be cut and shall not be used as anchor fastner) cement grouting and fixing to frame work with screws etc. all materials, wastages , labour, T&P hoisting and fixing in position at all heights and depths, providing two coats of creosote /so lignum air seasoning of wood.

2.3 FLUSH DOOR

Providing and fixing ISI marked 35 mm thick flush door shutters decorative type, core of block board construction with frame of 1st class hard wood and well matched commercial board shutters with ISI marked Stainless Steel butt hinges with necessary screws etc. all complete. The door shall be finished with approved shade enamel paint of two coats over a coat of primer. 4 mm thick teak wood leaping shall be provided periphery of the door with teak wood beading design and including all fittings etc. complete

2.4 Providing, fitting and fixing of M.S.door as per approved design with all fitting fixture including two coats of approved coloured enamel paint over a coat of primer etc. all complete and as per the direction of Engineer-in-charge.

2.5 SHUTTERS :

Shutters shall be planned at site to match the finished dimension between rebates of frames leaving and uniform gap of not more than 3mm. between the frame and the shutter end. shutters shall be hung by screws, as per drawing and specification and properly threaded in. The finished work shall be true to plumb and true to shape. The shutters. shall be so fixed, that while closing , the left hand leaf of the shutters is closed first and the right hand leaf of the shutter overlaps on the left hand leaf by minimum 20mm.

SECTION -VIII
SPECIFICATION FOR WATER PROOFING.

1.0 DAMP PROOF COURSE (D.P.C.) :

D.P.C. shall be of thickness as shown in drawing or in the bill of quantities. Unless otherwise mentioned, prop, shall be 1 part of cement, 2 parts of sand, 4 parts of aggregate mixed with approved water proofing compound @ 3% by weight of cement or as per manufacturer specification. Before laying the concrete, the top surface of the wall shall be thoroughly cleaned of all dirt and loose particles, mortar dropping and laitance of any, scrubbing with coir or steel wire brush or by hacking, if necessary, The surface is then thoroughly wetted and the concrete is placed. The concrete shall be laid in every case the full width of the plinth or as shown in drawing. The top surface shall be kept rubbed or rough or double chequered for adhesion of mortar for brick work over D.P.C. On top of D.P.C. bitumen painting is to be done as per I.S. specification.

1.1 METHOD OF MEASUREMENT :

D.P.C. shall be measured net in square meter.

2.0 CEMENT BASED WATER PROOFING :

MATERIAL :

Water proofing compound confirming to I.S. 2645 shall be used only as per enlisted/ approved manufactured.

2.2 PROPORTION, MIXING AND WORKMANSHIP :

The surface shall be well cleaned by water before the treatment. Then a slurry coat of neat cement using 2.75 Kg./Sqm of cement admixed as per manufacturer's instructions will be grouted water proofing compound conforming to IS: 2645 over the RCC slab.

The cement concrete shall be laid using broken bricks/brick bats 25mm to 100mm size with 50% of cement mortar 1:5 (1 cement : 5 coarse sand) admixed with approved water proofing compound conforming to IS :2645 to required slope and treated similarly the adjoining walls up to 300mm height including rounding of junctions of wall and slabs, in the form of ghoondies at rain water pipe.

After two days of proper curing apply a second coat of cement slurry admixed with approved water proofing compound conforming to IS : 2445.

The surface will be finished with 20mm thick joint less cement mortar of mix 1:4 (1cement : 4coarse sand) admixed with approved water proofing compound conforming to IS : 2645 and finally finished the surface with trowel with neat cement slurry and false thread marking of 300x300mm square.

The whole area so finished shall be flooded with water for a minimum period of two weeks for curing and for final test.

The average thickness of the treatment shall be 120 mm and the minimum thickness near khurra /rain water outlets shall be not less than 65mm.

SECTION -IX

METAL DOORS, WINDOWS AND VARIOUS STEEL WORKS.

1. GRILLS AND RAILINGS :

The grills and railings for windows, verandah & balcony etc., shall be of mild steel. The design of grills/railings and shape and sizes of various a component shall be according to the drawings.

The edge angles and corners shall be cleaned and true to shape. The joints, if possible shall be mechanically inter locked and neatly spot welded in such a way that the grills is rigid. Grinding of the joins to achieve at neat regular finish shall be done. The grills shall be fixed to true plumb line and level as per drawings. Grills etc. shall be painted with one coat of approved primer before they are fixed. The final painting shall be done only after obtaining approval the Architect/Consultant.

2. Aluminum sections for fabricating fame work door, windows, jallies, etc, shall be of extruded sections conforming to I.S 1948, 1949 or latest edition or as per drawing or as manufactured by Indian Aluminum Co. Ltd. or approved equivalent. The alloy used shall conform to I.S. designation H.E. WP I.S. 733.

GENERAL DEVELOPMENT AND ROAD WORK.

1.0 **CONCRETE ROAD :**

Specifications for aggregate cement and concreting shall be as Specified in the section under "Materials"

Before concreting the surface shall be checked for the given profile. Wooden forms equal to the depth of roads of road slab thickness shall be erected to correct line and level and held by stakes driven two takes being placed at each joint. Forms should be supported, strengthened or braced, wherever necessary so that they are able to prevent & resist deformation under pressure of concrete or impact of tamping or vibrating, Working faces of all forms shall be thoroughly cleaned and billed before use and forms which are use more than once, shall be carefully examined and true if necessary before reuse,

Sub-grade shall be properly moistened before any concrete is deposited on it, care being taken to see that there are no standing pools of water. It may be advisable to have the sub-grade watered 12 to 24 hours in advance of placing concrete. Concrete shall be laid in alternate bays not exceeding 30sqm.

Concrete shall be deposited on sub-grade for the entire width of the slab and shall be kept sufficiently above the level of forms so that when tamped, it shall become a level mass.

Reinforcement if specified shall be placed in correct position before commencing concreting.

The concrete shall be brought to the specified contour by means of heavy screed or tamper fitted or tampered handles weighing not less than 10 Kg./meter and not less than 7.5cm wide or surface vibrator if directed by drawn with at sawing motion in combination with a series of lefts and ropes. At transverse joint tamper shall be drawn not closer than one meter towards the joint and thrown. Surplus concrete shall then be taken up with shovels and thrown a head of the joint. Immediately after screeding or tamping has been completed the surface shall be inspected for high and low spots and any needed correction made by adding or removing concrete. The entire surface shall then be floated with handed floats one meter long and 7.5cm. wide and this operation must be performed from bridges provided across the slab. The surface shall be roughened by brooming. The longitudinal & transverse edge of the slabs shall be properly formed with suitable tools and the same should be rounded to 10mm radius.

The finished surface of the slab must conform to the grade, alignment and contours as directed and cured for 14 days. After curing periods is over the joints shall be filled up with approved bitumastic filler. Unless otherwise specified, the rate shall include filling of joints as specified.

Expansion joints shall be provided as per drawings/direction of the Architect/Owner.

NLUO whose duty will be to supervise all stages of designing the mix preparation and placing of concrete. All cubes shall be made & site tests carried out under his direct supervision in the presence of Architect/ NLUO /Owner / Consultant.

TECHINAL SPECIFIANTIONS
FOR
ANTI-TERMITE SOIL TREATMENT WORK

Anti termite soil treatment to the following :-

1.1 **CHEMICALS :**

The treatment of theses shall be carried out by applying one of the following chemicals at not less than the designated concentration :

CHEMICALS CONCENTRATION
Chloropyriphos 20% E.C. 1%
Endosulfan 0.5%

The tender shall clearly indicate along with the quotation the chemical he proposed to use. A daunt record shall be maintained by the Contractor indicating the amount of work done and the quantity of chemical consumed for the work. This record shall be the property of the NLUO.

1.2 METHOD OF APPLICATION

(1) TREATMENT FOR MASONARY FOUNDATION AND BASEMENT

The bottom surface and sides (Up to a height of 30cm from the bottom) of the excavations made for masonry foundations and basements shall be treated with the chemical emulsion mentioned above at 5 Liters. Per sqm of surface area.

(**2) TREATMENT TO BACKFILL EARTH :**

After the masonry foundation and retaining walls of the basement come up the backfill in immediate contact with the foundation structure shall be treated with the chemical emulsion at the rate of 7.5 Liters. per sqm of the vertical surface of the sub-structure r for each side. The earth is usually returned in layers & the treatment shall be carried out in similar stages.

(3) TREATMENT FOR R.C.C. FOUNDATION & BASEMENT :

In the case of R.C.C. foundation (1:2:4) mix or richer, the treatment shall start at a depth of 50cm below the ground level except when ground level is raised or lowered by filling or cutting after the foundations have been cast. In such case the depth of 50cms shall be determined from the new soil level resulting from filling or cutting mentioned above and soil in immediate contract with the vertical surface of R.C.C. foundations. From this depth the backfill around the columns, beams and R.C.C. basement walls shall be treated at the rate of 7.5 liters per sqm.

(4) TREATMENT OF TOP SURFACE OF ALINTH FILLING

The top surface of the consolidated earth within the walls shall be treated with the chemical emulsion at the rate of 5 ltrs., per sqm , of the surface before the sand bed or sub grade is laid. If the filled earth bas been well rammed and the surface does not allow the emulsion to seep through, holes up to 50 to 75 mm deep at 150mm center as both ways may be made with 12mm dia M.S. rod on the surface facilitate absorption of the emulsion.

(5) TREATMENT AT JUNCTION OF WALLS & FLOOR :

A small channel 3x3 cm., shall be made at all the junctions of walls and columns with the floor (Before laying the sub grade) & rod holes made in the channel up to ground level 15 cm apart the rod moved backward and forward to break up the earth & chemical emulsion poured along the channel at the rate of 7.5 liters., per sqm., of the vertical wall or column surface of the sub-structure so as to soak the soil right to the bottom.

(6) TREATMENT OT SOIL ALONG EXTERNAL PERIMETER OF BUILDING :

After the building is complete the earth along the external perimeter of the building should be redden at intervals of 15 cm & to a depth of 300 cm. The rods should be moved backward and forward parallel to the wall to break up the earth and chemical emulsion poured along the wall at the rate of 7.5 Liters. per sqm. of vertical surfaces. After the treatment the earth should be tamped back into place .

(7) TREATMENT OF SOIL SURROUNDING PIPES WASTES AND CONDUITS :

When pipes, wastes and conduits enter the soil inside the area of the foundation, the soil surrounding the point of entry must be loosened around each such pipe waste or conduits for a distance of 15cm and up to a depth of 7.5 mm before the treatment is commenced. When they enter the soil external to the foundations, they shall be similarly treated unless they stand clear of t he walls of the building by about 7.5cm for a distance of over 30cm.

(8) SPRAYING EQUIPMENT :

A pressure pump shall be used to carry out spraying operations to facilitate proper penetration of chemicals into the earth.

1.3 GUARANTEE :10 YEARS

In the unlikely even of any treatment becoming unnecessary subsequently during the guarantee period, required inspection and treatment shall be carried out free of cost.

1.4 INSTRUCTIONS OT CONTRACTOR FOR QUOTING RATES. :

The tenderer should include in his rates given in schedule of Quantities in sq. meter area all the stages of treatment to bottom foundation, sides of trenches, underside of the floor, underside/ damp proof course, in the outer face of external wall up to window sill level, door and window frames to ground floor area, which comes in contact wit the brick wall and finally the trenches treatment all found the buildings as per detailed specifications mentioned above. Where the rates of application of the insecticide has not been specified clearly the rates shall be the guarantee period no trouble may arise. Payment will be made on the plinth area measurement and the rates for the same should include all the stages of work as mentioned above and no extra on this account will be entertained.

SECTION - XII
PILE WORK

1 MATERIALS :

1.1 Cement :

The cement used shall conform to the requirements of IS : 269-1976, IS : 455-1976, IS : 8041-19788, IS : 6909-1973 or IS : 1489-1976.

1.2 Steel :

Reinforcement steel shall conform to IS : 1139-1966 or IS : 1786-1979 or IS : 226-1975. The stresses allowed in steel should conform to IS : 456-2000.

1.2.1 For under-reamed board compaction piles, the reinforcement cage shall be prepared by welding the hoop bars to withstand the stresses during compaction process.

2 Concrete :

2.1 Materials and methods of manufacture for cement concrete shall in general be in accordance with the method of concreting under the conditions of pile installation.

2.2 Consistency of concrete fore cast in situ piles shall be suitable to the method of installation of piles. Concrete shall be so designed or chosen as to have homogeneous mix having a flow able character consistent with the method of concreting under the given conditions of pile installation. In achieving these results minor deviations in the mix proportions used in structural concrete may be necessary.

2.3 Slump of concrete shall range between 100 mm to 150 mm for concreting in water-free unlined boreholes. For concreting by tremie, a slump of 150 mm to 200 mm shall be used.

2.4 In case of tremie concreting for piles of smaller diameter and depth of up to 10m, the minimum cement content should be 350 Kg/m^3 of concrete. For piles of large diameter and / or deeper piles, the minimum cement content should be 400 kg/m^3 of concrete. For design purpose, the strength of concrete mix may be taken equivalent M_{20}, for concrete with cement content of 350 kg/m^3 and 400 kg/m^3. Where concrete of higher strength is needed, richer concrete mix with higher cement content may be designed. In case of piles subsequently exposed to free water or in case of piles where concreting is done under water or drilling mud using methods other than the tremie, 10 percent extra cement over that required for the design grade of concrete at the specified slump shall be used subject to the minimum quantities of cement specified above.

2.5 For the concrete, water and aggregates specifications laid down in IS : 456-2000 shall be followed in general. Natural rounded shingle of appropriate size may also be used as coarse aggregate. It helps to give high slump with less water cement

ratio. For tremie concreting aggregates having nominal size more that 20 mm should not be used.

2.6 The concrete for piles in aggressive surroundings due to presence of sulphates, etc., should have a concrete mix of appropriate type of cement in suitable proportion.

2.6.1 If the concentration of sulphates (measured as SO_3) exceeds one percent in soil or 2 500 parts per million (ppm) in water a mix using 400 kg/m^3 of sulphate resisting Portland cement should be used. For soils with 0.5 to 1 percent of sulphates or ground water with 1 200 to 2 500 ppm, the mix should have 330 kg/m^3 of sulphate resisting Portland cement. For concentrations lesser than above concrete mix with 330 kg/m^3 ordinary Portland cement or 310 kg/m^3 sulphate resisting should be used. In place of ordinary Portland cement, pozzolana cement / blast furnace slag cement may be used.

2.6.2 Concentration of sulphates up to 0-2 percent in soil and 300 ppm in water may be inconsequential.

2.7 For bored compaction piles rapid hardening cement (see 13.1.1) shall not be used. To facilitate construction, admixtures for retarding the setting of concrete may be used.

3.0 EQUIPMENT AND ACCESSORIES :

3.1 The selection of equipment and accessories will depend upon the type of under-reamed piles, site conditions and nature of strata. Also it will depend on economic considerations and availability of manually or power operated equipment.

3.2 A typical list of equipment for manual construction is given in Appendix D.

3.3 Bore holes may be made by earth augers. In case of manual boring, an auger boring guide shall be sued to keep the bores vertical or to the desired inclination and in position.

After the bore is made to the required depth, enlarging of the base shall be carried out by means of an under-reaming tool.

3.4 In ground with high water table having unstable pile bores, boring and under-reaming may be carried out using a suitable drilling mud. General guidelines for bentonite drilling mud are given in Appendix E. In normally met soil strata, drilling mud can be poured from top while boring and under-reaming can be done by normal spiral earth auger and under-reamer. The level of drilling mud should always be about one meter above water table or the level at which caving in occurs. In case of very unstable strata with excessive caving in, continuous circulation of drilling mud using suitable pumping equipment and ripod, etc. along with modified auger and under-reamer may be used.

3.5 Sometimes permeable strata overlying a rim clayey stratum may be cased and normal boring and under-reaming operation may be carried out in clayey stratum.

3.6 To avoid irregular shape and widening of bore hole in very loose strata at top, a casing pipe of suitable length may be used temporarily during boring and concreting.

3.7 For improved control over the inclination of batter piles, a tripod hoist with fixed pully should be used for lowering in of under-reaming tools.

3.8 For placing the concrete in bore holes full of drilling mud or subsoil water, tremie pipe of not less than 150 mm diameter with flap valve at the bottom should be used.

3.9 For batter under-reamed piles, the reinforcement cage should be placed guiding it by a chute or any other suitable method. If concreting is not done by tremie, it should be done by chute.

3.10 In under-reamed compaction piles, suitable devices should be used for guiding the movement of drop weight and specified core assembly for its vertical driving. For operating the drop weights of adequate capacity, suitable winch with hoisting attachment should be used.

4.0 CONSTRUCTION :

4.1 Under-reamed piles may be constructed by selecting suitable installation techniques at a given site depending on subsoil strata conditions and type of under-reamed pile and number of bulbs.

4.2 In construction with the equipment given in 6, initially boring guide is fixed with its lower frame levelled for making desired angular adjustment for piles at batter. Boring is done up to required depth and under-reaming is completed.

4.2.1 In order to achieve proper under-reamed bulb, the depth of bore hole should be checked before starting under-reaming. It should also be checked during under-reaming and any extra soil at the bottom of bore hole reamed by auger before reinserting the under-reaming tool.

4.2.2 The completion of desired under-reamed bulb is ascertained by (a) the vertical movement of the handle, and (b) when no further soil is cut.

4.2.3 In double or multi-under-reamed piles, boring is first completed to the depth required for the first (top) under-ream only and after completing the under-reaming, boring is extended further for the second under-ream and the process is repeated.

4.3 Control of Alignment :

The piles shall be installed as correctly as possible at the correct location and truly vertical (or at the specified batter).Grate care shall be exercised in respect of single pile or piles in two-pile groups under a column. As a guide, for vertical piles a deviation of 1.5 percent and for raker piles a deviation of 4 percent shall not normally be exceeded. In special cases, a closer tolerance may be necessary. Piles shall not deiate more than 75 mm or one quarter the stem diameter, whichever is less (75 mm or D/10 whichever is more in case of piles having diameter more than 600 mm) from the designed position at the working level. In the case of single pile under a column, the positional deviation should not be more that 50 mm or one quarter of the stem diameter whichever is less (100 mm in case of piles having diameter more than 600 mm). For piles where cut-off is at substantial depths, the

design should provide for the worst combination of the above tolerances in position and inclination.

In case of piles deviating beyond these limits, corrective measures where necessary may be taken in the form of increasing pile size, provision of extra reinforcement in the pile, redesign of pile cap and pile ties. If the resulting eccentricity cannot be taken care of by the above measures, the piles should be replaced or supplemented by one or more additional piles.

NOTE : In case of raker piles up to a rake of 1 in 6, there may be no reduction in the capacity of the pile unless otherwise stated.

4.4 Concreting shall be done as soon as possible after completing the pile bore. The bore hole full of drilling mud should not be left unconcreted for more than 12 to 24 hours depending upon the stability of bore hole.

15.5 For placing concrete in pile bores, a funnel should be used and method of concreting should be such that the entire volume of the pile bore is filled up without the formations of voids and / or mixing of soil and drilling fluid in the concrete.

15.5.1 In empty bore holes for under-reamed piles a small quantity of concrete is pourd to give about a 100 mm layer of concrete at the bottom. Reinforcement is lowered next and positioned correctly. Then concrete is poured to fill up the bore hole. Care should be taken that soil is not scrapped from sides if rodding is done for compaction. Vibrators shall not be used.

15.5.2 If the water is confined up to the bucket length portion at the toe and seepage is low, the water should be bailed out and concreting should be done as in 15.5.1.

15.5.3 In case the pile bore is stabilized with drilling mud or by maintaining water head within the bore hole, the bottom of bore hole shall be carefully cleaned by flushing it with fresh drilling mud, and pile bore will be checked for its depth immediately before concreting.

Concreting shall be done by tremie method. The tremie should have a valve at its bottom and lowered with its valve closed at the start and filled up with concrete. The valve is then opened to permit the flow of concrete which permits the upwards displacement of drilling mud. The pouring should be continuous and tremie is gradually lifted up such that the tremie pipe opening remains always in the concrete. If the final stage the quantity of concrete in tremie should be enough so that on final withdrawal some concrete spills over the ground.

NOTES :

1. The concrete should be coherent, rich in cement (not less than 350 kgf/m^3) and of slump not less than 150 mm.

2. The tremie pipe should always penetrate well into the concrete with an adequate margin of safety against accidental withdrawal of the pipe is surged to discharge the concrete.
3. The pile should be concreted wholly by tremie and the method of deposition should not be changed part way up the pile, to prevent the laitance from being entrapped within the pile.

4. All tremie tubes should be scrupulously cleaned before and after use.

5. Normally concreting of the piles should be uninterrupted. In the exceptional case of interruption of concreting, but which can be resumed within 1 or 2 hours, the tremie shall not be taken out of the concrete. Instead it shall be raised and lowered slowly, from time to time to prevent the concrete around the tremie from setting. Concreting should be resumed by introducing a little richer concrete with a slump of about 200 mm for easy displacement of the partly set concrete. If the concreting cannot be resumed before final set-up of concrete already placed, the pile so cast may be rejected, or used with modifications.

6. In case of withdrawal of tremie o0ut of the concrete, either accidentally or to remove a choke in the tremie, the tremie may be re-introduced in a manner to prevent impregnation of laitance or scum lying on the top of the concrete already deposited in the bore.

15.5.4 In inclined piles, the concreting should be done through achute or by tremie method.

15.5.5 For under-reamed bore compaction piles, the pile bore is first filled up without placing any reinforcement. Concreting is done as in 15.5.1 depending upon situation. Soon after the specified core assembly shall be driven and extra concrete shall be poured in simultaneously to keep the level of concrete up to ground level. If hollow driving pipe is used in core assembly, the pipe shall be withdrawn after filling it with fresh concrete which will be left behind.

NOTE : In under-reamed bored compaction pile, concreting should be uninterrupted and notes (5) and (6) under clause 15.5.3.

15.5.6 The top of concrete in a pile shall be brought above the cut-off level to permit removal of all laitance and weak concrete before capping and to ensure good concrete at the cut-off level for proper embedment into the pile cap.

15.5.7 Where cut-off level is less than 1.5 metre below working level, concrete shall be cast to a minimum of 300 mm above cut-off level. For each additional 0.3 m increase in cut-off level below working level, additional coverage of 50 mm minimum shall be allowed. Higher allowance may be necessary depending on the length of the pile. When concrete is placed by tremie method, it shall be cast to the piling platform level to permit overflow of concrete for visual inspection or to a minimum of one metre above cut-off level. In the circumstance where cut-off level is below ground water, the need to maintain a pressure on the unset concrete equal to or greater than water pressure should be observed and accordingly length of extra concrete above cut-off level shall be determined.

15.5.8 **Defective Pile :** In case, defective piles are formed, they shall be removed or left in place whichever is convenient without affecting performance of the adjacent piles or the cap as a whole. Additional piles shall be provided to replace them as directed.

15.5.9 Any deviation from the designed location alignment or load capacity of any pile shall be noted and adequate measures taken well before the concreting of the pile cap and plinth beam if the deviations are beyond the permissible limit.

APPENDIX - D

REQIPMENT FOR UNDER-REAMED PILES (MANUAL CONSTRUCTION)

D-1 EQUIPMENT

D-1.1 Normally the following equipment will be required in manual operation :

(a) An auger
(b) An under-reamed
(c) A boring guide ; and
(d) Accessories like spare extensions, cutting tool, concreting funnel, etc.

D-1.1.1 For the piles of size larger than 30 cm and for larger depths additional equipment required will be a portable tripod hoist with a manually operated which.

D-1.1.2 For piles in high ground water table and unstable soil conditions, boring and under-reaming, shall be carried out with bentonite slurry using suitable equipment. Tremie pipe shall be used for concreting.

D-1.1.3 The additional equipment normally required for under-reamed compaction pile are the following :

(a) Drop weight for driving the core assembly, and
(b) Pipe or solid core.

APPENDIX - E

BASIC PROPERTIES OF DRILLING MUD (BENTONITE)

E-1 PROPERTIES :

E-1.1 The bentonite suspension used in bore holes is basically a clay of montmorillonite group having exchangeable sodium cations. Because of the presence of medium cations, bentonite on dispersion will break down into small plate like particles having a negative charge on the surfaces and positive charge on the edges. When the dispersion is left to stand un-disturbed, the particles become oriented building up a mechanical structure of its own, the mechanical structure held by electrical bonds is observable as a jelly like mass or jell material. When the jell is agitated, the weak electrical bonds are broken and the dispersion becomes fluid.

E-2 FUNCTIONS :

E.2.1 The action of bentonite in stabilizing the sides of bore holes primarily due to the thixotropic property of bentonite suspensions. The thixotropic property of bentonite suspension permits the material to have the consistency of a fluid when introduced into the excavation and when undisturbed forms a jelly which when agitated becomes a fluid again.

E-2.2 In the case of a granular soil, the bentonite suspension penetrates into the sides under positive pressure and after a while forms a jelly. The bentonite suspension gets deposited on the sides of the hole and makes the surface impervious and imparts a plastering effect. In impervious clay, the bentonite does not penetrate into the soil, but deposits only a this film on the surface of the hole. Under such conditions, stability is derived from the hydro-static head of the suspension.

E-3 SPECIFICATION :

E-3.1 The bentonite suspension used for piling work shall satisfy the following requirements :

(a) The liquid limit of bentonite when tested in accordance with IS : 2720) (Part V) - 1965 shall be more than 300 percent and less the 450 percent.

(b) The sand content of the bentonite powder shall not be greater than 7 percent.

NOTE : The purpose of limiting the sand content is mainly to control and reduce the wear and tear of the pumping equipment.

(c) Bentonite solution should be made by mixing it with fresh water using pump for circulation. The relative density of the bentonite solution should be between 1.034 and 1.10.

(d) The differential free swell shall be more than 540 percent.

F-1 : LOAD TEST ON PILES

F-1 These would be conducted on piles on completion of 28 days after casting.
Two types of namely initial and routine tests, for each type of loading viz. Vertical, horizontal (lateral) pull out, are performed on piles.

F-1.1 **:Initial Tests**

This test shall be performed to confirm the design load calculations and to provide guidelines for setting up the limits of acceptance for routine tests**.** It also gives an idea of the suitability of the piling system.

Initial test on pile are to be carried out at one or more location depending on the No. of piles required.

Load applied for the initial (cyclic) load test shall be 2.5 times the safe carrying capacity of the pile.

Loading for initial tests shall be conducted as per IS-2911 part IV.

F-1.2 : **Routine Tests**

Selection of piles for the Routine test shall be done by the Engineer subject to a maximum of ½% of total No. piles required. The No. of tests may be increased to 2% depending on the nature / type of structure.

The test load applied shall be 1.5 times the safe carrying capacity of the pile.

The maintained load method as per IS-2911(part IV) 1985 shall be followed for loading for the Routine Tests.

This test will be performed for the following purposes:

a) To ensure the safe load capacity of piles.
b) Diction of any unusual performance contrary to the findings of the initial test.

F-1.3: **The tests shall be performed at the cut- off level only**

F-1.4: The contractor shall submit a detailed report for the test result in duplicate to client/ consultant.

F-1.5: **Vertical; Load Tests**

This test will be carried out as stipulated in IS-2911 (PART iv) 1995.

Pile Head: The pile shall be chipped off till sound concrete is met wherever applicable. The reinforcement shall be cut and head leveled with plaster of Paris. A bearing plate with a hole shall be placed on the head for the jack to rest.

Reaction: Kent ledge shall be suitably designed to get the desire reaction on the piles. Anchor piles (if required) shall be placed at a centre distance of 3 time the pile diameter subject to a minimum distance of 2 M.

Settlement: 2 dial gauged for a single pile and 4 dial gauges for a group of piles with 0.01 mm sensitivity shall be used. They shall be positioned at equal distance around the piles on datum bars resting on immovable supports at a distance of 3 D (min. of 1.5 m) where D is the diameter of pile or circumscribing circle for non- circular piles.

Application of load: It shall be applied as specified depending on the type of test (routine/ initial). Each load shall be maintained till the rate of displacement of the pile top is either 0.1 mm in the first 30minutes or 0.2 mm in the first one hour or 2 hours whichever occurs first. The next increment in the load shall be applied on achieving the aforesaid criterion.

The test load shall be maintained for 24 hours.

Initial Test: The safe load on a single pile shall be the least of the following:

(i) $2/3^{rd}$ of the final load at which the total displacement attains a value of 12 mm unless otherwise required in a given case on the basis of nature and type of structure in which case, the safe load should be corresponding to the stated total displacement permissible.

(ii) 50% of the final load at which the total displacement equals 10% of the pile diameter in case of uniform diameter piles or 7.5 % of the bulb diameter in case of under reamed piles.

Routine Tests - Acceptance

The maximum settlement at test load should not exceed 12 mm.

F-1.6 **Lateral Load Test**:

The jack should be placed horizontally, between two piles. The load on the jack shall be the same on both the piles. The load will be applied in increments of 20% of the estimated safe load and at the cut off level. The load will be increased after the rate of displacement is nearer to 0.1 mm per 30minutes. If the cut-off level is approachable, one dial gauge exactly at the cut – off level shall measure the displacement. In case the cut-off level is not approachable, 2 dial gauges 30cms. Apart vertically, shall be set up and the lateral displacement of the cut –off level calculated by similar triangles.

The safe load on the pile shall be the least of the following:

a) 50% of the final load at which the total displacement increases to 12 mm.
b) Final load at which the total displacement corresponds to 5 mm.

F-1.7 **Pull out Tests**

A suitable set up shall be designed to provide an uplift force to the piles. The load increments and the consequent displacements shall be as per the case of a vertical load test.

The safe load shall be the least of the following:

a) $2/3^{rd}$ of the load at which the total displacement is 12 mm or the load corresponding to a specified permissible lift.
b) Half of the load at which the load displacement curve shows a clear break.

SECTION - XIII

BRIEF TECHNICAL SPECIFICATION FOR ROAD WORKS AS PER MORT&H GUIDELINES (FOURTH REVISION)

1. CLEARING AND GRUBBING (MORT&H CLAUSE NO. 201)

This work shall consist of cutting, removing and disposing of all materials such as trees, bushes, shrubs, stumps, roots, weeds, top organic soil not exceeding 150 mm in thickness, rubbish etc., which in the opinion of the Engineer-in-Charge are unsuitable for use in the works from the area of road land containing road embankment, drains, cross drainage works/structures and such other areas as may be specified on the drawings or by the engineers. It shall include necessary excavation, back filling of pile resulting from uprooting of trees and stumps to required compaction, handling, salvaging and disposal of cleaned materials, clearing and grubbing shall be performed in advance of earthwork operations.

Measurement for Payment

Clearing and grubbing for road embankments, drain and cross drainage structures shall be measured on **area basis in terms of hectares**. Clearing and grubbing of borrow areas shall be deemed to be a part of works preparatory to embankment construction. No separate payment shall be made for the same. Cutting of trees up to 300 mm in girth including removal of stumps and roots and trimming of branches of trees of extending above the roadway shall be considered incidental to the clearing & grubbing work.

For cutting of trees, the girth shall be measured at a height of 1 m above ground level or at the top of the stump if the height of the stump is less than one meter. The cutting of trees measured in **numbers** as given below :

(i) Above 300 mm to 600 mm girth
(ii) Above 600 mm to 900 mm girth
(iii) Above 900 mm to 1800 mm girth
(iv) Above 1800 mm girth

2. ROADWAY EXCAVATION OF DRAIN (MORT&H CLAUSE NO. 301 TO 304)

The work shall consists of excavation, removal and disposal of all materials necessary for construction of road ways, side drains and waterways as per line, grade and cross-section shown in the drawings or as indicated by the Engineer-in-Charge. The work include the hauling & staking of or hauling to sites of embankment and subgrade construction, also disposable of unsuitable cut material, trimming and finishing of the road to specified dimensions.

All the materials involved in excavation shall be classified as

a. Ordinary Soil
b. Soft Rock and
c. Hard Rock

a. Ordinary Soil

This shall mean removal of top soil, turf, sand, silt, loam, clay, mud, peat, black cotton soil, soft shale or loose moorum, a mixture if these and all similar materials which needs ordinary application of pick, spade or shovel and ordinary digging equipment. Removal of gravel or any other material having dimension in any direction not exceeding 75 mm shall be covered under soil.

b. Soft Rock (Not Requiring Blasting)

This shall include

(i) Rock type such as laterite, shales and conglomerates, varieties of lime stone etc. which may require crow bars also requiring blasting in dry condition but when wet, becomes soft and manageable by means other than blasting.

(ii) Macadam surfaces such as water bound and bituminous/tar bound, soling of roads, paths etc., hard core, compact moorum or stablised soil which require grafting tools or pick or both and shovel, gravel and cobble stone having maximum dimension in any one direction between 75 mm and 300mm.

(iii) Lime concrete, stone masonry in lime mortars and brick work in lime/cement mortar below ground level, RCC work broken by crow bars etc.

(iv) Boulders which do not require blasting having maximum dimension in any direction of more than 300 mm found lying loose on surface or embedded in river bed, soil etc.

c. Hard Rock (Requiring Blasting)

This shall comprise

(i) Any rock or cement concrete, which require use of mechanical plant and / or blasting if required.

(ii) Reinforced concrete below ground level.

(iii) Boulders requiring blasting.

d. Hard Rock (Blasting Prohibited)

Hard rock which needs blasting but due to other reason blasting prohibited, excavation has to be carried out but chiseling, wedging or any other agreed method.

e. Marshy Soil

This shall include soils like soft clays and peats, excavated below the original ground level of marshal and swamps and soil excavated from other areas requiring continuous pumping or boiling of water.

The classification of excavation shall be decided by the Engineer and decision shall be final and binding on contractor.

If the hard rock encountered in road excavation them it shall be removed up to formation level or otherwise as per drawings. However unstable shales or other unsuitable materials encountered at the formation level, these shall be removed to the extent of 500 m below formation level or as required. Rocks and large boulders which are likely to cause differential settlement and also local problem should be removed to the extent of 500 mm below the formation level in full width including drains and cut through the side drains.

Dewatering

If the water encountered during the excavation, the same shall be dewatered by any suitable methods and the work place shall be kept dry at the time of working. The cost of the same is included in his price.

Disposal of Excavated Materials

All the suitable excavated materials shall be used in the embankment land scapping etc. Other unsuitable material are to be disposed at a distance of about 1000 m including all lifts with no extra cost.

Measurement of Payment

Excavation of roadway material shall be measured by taking cross section at suitable intervals in the original position before work starts and after its completion and computing the **volumes in Cum**.

3. CONSTRUCTION OF EMBANKMENTWITH APPROVED MATERIAL (MORT&H CLAUSE NO. 305) WITH ALL LEADS & LIFTS

This specification shall apply to the construction of embankment, subgrade, earthen shoulder and miscellaneous back fill etc. All the work shall be true to line, grade and as per drawings.

Materials and General Requirements

The materials such as earth, moorum, gravel, a mixture of all these shall be free of logs, stumps, roots, rubbish or any other ingredient likely to detoriate or affect the stability of the embankment.

The size of the course material in the mixture of earth shall ordinarily not exceed 75 mm when being placed on embankment and 50 mm when placed in the subgrade.

Density Requirement of Embankment and Subgrade Materials

Sl. No.	TYPE OF WORK	Maximum Laboratory Dry Unit Weight when Tested as

		per IS:2720 (Part –8)
1.	Embankment upto 3 m height not subject to extensive flooding.	Not less than 15.2 kN/Cu.m
2.	Embankment exceeding 3 m height or Embankmen tof any height subject to long period in undulation.	Not less than 16.0 kN/Cu.m
3.	Subgrade and earthen shoulder / verger / backfill	Not less than 17.5 kN/Cu.m

The material to be used in subgrade should also satisfy design CBR at the dry unit weight.

General Requirement

Before the work starts, the borrow area to be designated by the client. In case any borrow area is not designated earlier, time to time clearance to be obtained from all the statutory bodies by the contractor. Borrow pit along the road is discouraged. If permitted these shall not be dug continuously. Ridge of not less then 8 m width should be left at interval of not exceeding 300 m.

The contractor shall obtain representative sample from each of the identified borrow areas and have these tested in approved laboratory.

Compaction Requirement for Embankmentand Subgrade Construction

Sl. No.	TYPE OF WORK/MATERIAL	Relative compaction as % of Maximum Laboratory Dry Density as per IS:2720 (Part 8)
1.	Embankment	Not less than 95
2.	Subgrade and earthen shoulders	Not less than 97
3.	Expensive Clay a. Sub-grade and 500 m portion just below the subgrade. b. Remaining portion of embankment	Not allowed Not less than 90

The contractor shall submit the following to the approval of engineer before commencement of work.

(i) The value of maximum dry density and optimum moisture content in accordance with IS 2720 (Part 7) or (Part 8) as the case may be.

(ii) A graph of density plotted against moisture content from which each of the values in (i) above maximum dry density and optimum moisture content were determined.

(iii) The dry density - moisture content - CBR relationship for light, intermediate and heavy comparative effects for each of the earth fill materials he intends to use.

Once the above information is approved, it shall form the basis for compaction.

Construction Operation

The Embankment/ subgrade shall be built sufficient wider than the design dimension so that surplus materials may be trimmed, ensuring desired density is available in the Embankment slope. Where necessary, the original ground may be levelled to facilitate placement of 1st layer of embankment, mixed with water and then compacted by rolling so as to achieve minimum dry density.

In case when the difference between the subgrade level (top of the subgrade on which pavement rests) and ground level less than 500 mm and the ground does not have 97 percent compaction with respect to dry density, the ground shall be loosened up to a level of 500 mm below subgrade level, watered and compacted to get not less than 97 % compaction.

The Embankment& sub-grade material shall be spread in layers of uniform thickness not exceeding 200mm compacted thickness over the entire width by mechanical means. Successive layers shall not be placed unless the previous layer thoroughly compacted.

Moisture content of each layer of soil shall be checked in accordance to IS 2720 (pt-2), shall be adjusted after allowing evaporation losses.

The compaction shall be done with the layers of vibratory rollers of 80KN to 100KN static weight with plain or pad foot drum (or) heavy pneumatic tyred roller.

When any soft areas occurred in embankment/sub-grade shoulder the some shall be compacted further to active required compaction. Inspite of that the specified compaction not achieved. The contractor shall remove the soft material and filled with approved material with the satisfaction of Engineer without extra cost. The surface of the embankment/subgrade shall be maintained all the times free from water logging/pounding.

Earth work for widening existing road embankment.

When the existing Embankment is widened and its slopes are steeper than 1:4, continuos horizontal benches, each at least 300mm wide shall be cut into the old surface ensuring good bond with the fresh earth. The material obtained from cutting the benching can be used in Embankment construction.

Earthwork over existing road surface :

Embankment is placed over an existing road surface, the work shall be carried out as indicated below :

i) If the existing road surface is of granular or bituminous type and lies within 1m of the near subgrade land the same shall be scarified to a depth of 50mm or more if specified so as to provide ample bond between old and new materials ensuring at least 500mm portion below the top of new subgrade level is compacted to the desired density.

ii) If the existing road surface is of cement concrete type and lies within 1m of the road new subgrade level the same shall be removed completely.

iii) If the level difference between the existing road surface and new formation level is more than 1m the existing surface shall be permitted to stay in place without any modification.

Measurement of payment :

Earth Embankment/ subgrade construction shall be measured separately by taking cross-sections at intervals in the original position before work starts and after its completion and computing the **volumes in Cu.m** by method of average end areas.

4. GRANULAR SUBBASE (MORT&H CLAUSE 401)

The work shall consists of laying & compacting well graded material on prepared subgrade in accordance with the requirements of these specifications. The material shall be laid in one or more layers as lower sub-base and upper sub-base.

Materials :

The materials shall be natural sand, moorum, gravel, crushed stone or combination these of depending up on grading required. The material shall be free from organic or other deleterious constituents. Materials like crushed slag, crushed concrete, brick metal & kankar may be allowed only with specific approval of Engineer.

Grading for coarse graded Granualr sub-base Materials :

IS SIEVE DESIGNATION	Percent by weight passing the IS sieve		
	Grading-I	**Grading-II**	**Grading-III**
75.0 MM	100	-	-
53.0 MM	-	100	-
26.5 MM	55-75	50-80	100
9.5 MM	-	-	-
4.75 MM	10-35	15-30	25-45
2.36 mm	-	-	-
0.425 MM	-	-	-
0.075 MM	<10	<10	<10
CBR VALUE (MINIMUM)	**30**	**25**	**20**

The material passing 425 micron (0.425mm) sieve for all the gradings when tested according to IS : 2720 (Part-5) shall have liquid limit and plasticity index not more than 25 and 6% respectively.

When the sub-base materials consist of combination of materials mentioned, mixing shall be done mechanically by the mix-in-place method. Manual mixing is permitted only width of laying is not adequate for mech. operations.

For a compacted single layer upto 225mm the compaction shall be done with the help of vibratory roller. The rolling shall be done from edge to center of the road. Each parts of the roller shall uniformly over lays not less than 1/3 of the track made in the preceding pass. The speed of the roller shall not exceed 5km/hr.

Measurement for Payments :

Granular sub-base shall be measured as finished work in position **in Cu.m.**

5. CONSTRUCTION OF WATER BOUND MACADAM (MORT&H CLAUSE 404)

This work shall consist of clean, crushed aggregates mechanically interlocked by rolling and bonding together with screening binding material where necessary and water laid on properly prepared sub-grade/sub-base/base of existing pavement.

Materials

Coarse aggregates : This shall be either crushed or broken stone, crushed slag etc.

Physical requirements of coarse aggregate for Water Bound Macadam for sub-base/base course :

SL.N	TEST	Test Method	Requirements
1.	LOS ANGELES ABRASION VALUE* (OR) AGGREGATE IMPACT VALUE	IS: 2386 PT (4) IS :2386 pt (4) or IS : 5640 pt (1)**	40% max 30% max
2.	***COMBINED FLAKINESS AND ELONGATION INDICES (TOTAL)	IS : 2386 PT (1)	30 % max

* Aggregate may satisfy either of the two requirements

** Aggregate like brick metal, kankar, laterite etc. which get softened in presence of water shall be tested for impact value under wet conditions in accordance with IS:5640.

*** The requirement of flakiness index and elongation index shall be enforced only in the case of crushed broken stone and crushed slag.

Grading Requirements of coarse Aggregates :

GRADING	SIZE RANGE	IS Sieve Designation	Percentage by wt. Passing the IS Sieve
II	63 MM TO 45 MM	90.0 mm	100
		63.0 mm	90-100
		53.0 mm	25-75
		45.0 mm	0-15
		22.4 mm	0-5
III	53 MM TO 22.4 MM	63.0 mm	100
		53.0 mm	95-100
		45.0 mm	65-90
		22.4 mm	0 – 10
		11.2 mm	0 – 5

The compacted layer thickness for grade II & III shall be 75mm.

SCREENINGS

The screenings to fill voids in the coarse aggregate shall generally consists of the same materials as the coarse aggregate.

GRADING FOR SCREENINGS

GRADING Classification	**SIZE OF SCRENING**	**IS Sieve Designation**	**Percentage by wt. Passing the IS Sieve**
'B'	**11.2MM**	11.20 mm	100
		5.60 mm	90-100
		180 micron	15-35

Approximate quantities of coarse aggregate and screenings required for 75mm compacted thickness of WBM coarse for 10m squire areas.

Classification	**Size/ Range**	**Compacted thickness**	**Loose Qty.**	**SCREENING**	
				Grading Classification	**For WBM (Loose Qty.)**
Grade-II	63mm to 45mm	75mm	0.91 to 1.07 m^3	Type B 11.2 mm	0.2 to 0.22 Cu.m
Grade-III	53mm to 22.4mm	75mm	-do-	-do-	0.18 to 0.21 Cu.m

Building Materials :

Building material as a filler materials having a Plasticity Index (PI) value less than 6 as per ID 2720 (Pt -5).

The quantity of binding materials for a compacted thickness of 75mm will be 0.06-0.09mm cub/10 Sq.m.

Spreading coarse aggregates :

The coarse aggregate shall be spread uniformly and evenly upon the prepared sub-grade /
sub-base / base to proper profile by using templates placed across the road about 6.0m apart.

Rolling :

Immediately following the separating of the coarse aggregate rolling shall be done with three wheeled power rollers of 80 to 100kn capacity. Rolling shall be stopped when aggregate are partially compacted. Screenings are spread to fill the voids within the aggregate.

Application of binding materials :

After the application of screenings binding materials shall be spread and rolled with water. The rolling operation shall continue until the resulting slurry after filling of voids.

6. WET MIX MACADAM (SUB-BASE) MORT&H CLAUSE NO. 406)

This work shall consist of laying and compacting clean, crushed, graded aggregate granular material with water to a dense mass on a prepared subgrade / sub-base or existing pavement as the case may be. The material shall be laid in one or more layers as necessary to lines, grades and cross section drawings.

The thickness of a single compacted wet mix macadam layer shall not be less than 75 mm. When vibrating or other approved types of compacting equipment are used, the compacted depth of a single layer of the sub-base course may be increased to 200 mm.

Materials

Coarse aggregate shall be stone crushed. The aggregate shall conform to the physical requirement as given below

Grading Requirements of Aggregates for Wet Mix Macadam

IS Sieve Designation	PERCENT BY WEIGHT PASSING THE IS SIEVE
53.0 mm	100
45.0 mm	95 – 100
26.5 mm	-
22.4 mm	60 – 80
11.2 mm	40 – 60
04.75 mm	25 – 40
02.36 mm	15 – 30
600 micron	8 – 22
75 micron	0 – 8

Materials finer than 425 micron shall have plasticity Index (PI) not exceeding 6 (six).

Physical Requirement of Coarse Aggregate for Wet Mix Macadam

Test	TEST METHOD	REQUIREMENTS
1. * Los Angeles Abrasion Value (or) Aggregate Impact Value	IS : 2386 PT – 4 IS : 2386 Pt – 4 or IS : 5640	40 PERCENT (MAX.) 30 percent (Max)
2. Combined flakiness and elongation indices (Total)	IS : 2386 PT – 1	** 30 percent (Max.)

* Aggregate may satisfy requirement of either of the two tests.

** To determine this combined proportion, the flaky stone from a representative sample should first be separated out. Flakiness index is weight of flaky stone metal divided by weight of stone samples. Only the elongated particle be separated out from the remaining (non-flaky) stone metal. Elongation index is weight of elongated particles divided by total non-flaky particles. The value of flakiness index and elongation index so found are added up.

If the water absorption value of the coarse aggregate is grater then 2 %, the soundness test shall be carried out on the material delivered to site as per IS:2386 (Pt-5).

Construction Operation

Wet mix shall be prepared in on approved mixing plant of suitable capacity having provision of controlled addition of water and forced / positive mixing arrangement like pug mill or pan type mixer of concrete batching plant.

Optimum moisture for mixing shall be determined and accordance with IS:2720 (Pt-8)
while adding water, due allowance should be made for evaporation.

Immediately after mixing, the aggregate shall be spread uniformly and evenly upon the prepared sub-grade.

The mix may be spread either by a paver finisher or motor grader. After the mix has been laid to the required thickness grade and cross fall/can be the same shall be uniformly compacted, to the full depth with suitable roller. The compaction shall be done up to 200mm thick with vibrating roller. The speed of the roller shall not exceed 5KMPH.

Rolling shall be continued with the density achieved is at least 98% of the maximum dry density for the material as determined by the method outlined in IS : 2720 (Pt-8).

After final compaction of wet mix macadam the road shall be allowed to dry for 24 hours. Preferably no vehicular traffic of any kind should be allowed to the finished wet mix macadam surface till it has dried and the wearing course laid.

Measurement

Wet mix macadam shall be measured as finished work in position in **Cu.m**

7. CONSTRUCTION OF SHOULDERS, ISLANDS, & MEDIAN (CLAUSE 407 OF MORT&H.)

The work shall consist of constructing shoulder (hard/paved/earthen) on either side of the pavement.

Materials

Shoulder on either side of the road may be of selected earth/granular material.

Construction Operations :

The sequence of operations shall be such that the construction of panel shoulder is done in layers each matching the thickness of adjoining pavement layer. Only after a layer of pavement and corresponding layer in paved and earth shoulder portion have been laid and compacted, the construction of next layer of pavement & shoulder shall be taken up.

Where the materials in adjacent layers are different, these shall be laid together and the pavement layer shall be compacted first. The corresponding layer in paved shoulder portion shall be compacted, therefore, which shall be followed by compaction of earth shoulder layer. Under no circumstances, box cutting shall be done for construction of shoulders.

Measurements

i. for excavation in **Cu.m**.
ii. for earthwork/granular fill in **Cu.m**.

SECTION – XIV

TECHNICAL SPECIFICATION FOR ELECTRICAL WIRING

1. GENERAL REQUIREMENTS :

The installation shall generally be carried out in conforming with the requirements of the Indian Electricity Act, 1910 as amended up to date and the Indian Electricity Rules, 1965 framed there under, the relevant regulation of the Electric Supply Authority concerned, and also with the specifications laid down in the Indian Standard I.S. 732-1963 Code of practice (revised for Electrical Wiring Installations (system voltage not exceeding 650 volts) and I.S. 2309-1962 Code of

Practice for the protection of buildings and Allied Structure against Lighting and IS 3043 - Indian Code of practice for Earthling. The wiring shall also be according to the specifications of P.W.D. of the Local Government.

2. MATERIALS :

All materials, fittings, appliances, used in electrical installations, shall conform to Indian Standard Specifications wherever these exist. A list of approved materials is attached afterwards. Materials not included in the list shall be got approved by the Architects / Engineer-in-charge / Owner prior to actual use.

3. MAIN SWITCH GEAR :

Iron clad switch fuse and isolator units should conform to B.S. 861 (I.S. 2510-1954). The quick made and break mechanism shall be self interlocked with the cover. In “Off” position there must be two breaks per pole.

Main switch gear shall be properly earthed with two numbers conductors if M.V. and one number of L.V.

4. BUSBAR CHAMBER (BBC) :

This shall be totally enclosed, metal clad type fabricated from rust proofed 14 SWG sheet steel on angle iron frame and provided with sheet or cast iron cover and undrilled detachable and plates, suitable for mounting angle iron floor stand and painted with high quality enamel paint. G.I. bolts and nuts shall be used for assembly with suitable packing materials to ensure dust proof finish. Meters shall be provided on suitable sheet steel boxes. Switch shall be provided with cable and boxes as required.

The depth of B.B.C. shall be 150 mm (minimum). Minimum clearance of phase bars to earth shall be 25 mm and between bus bars shall be minimum 32 mm.

H.C. (High Conductivity) copper busbars properly tinned are to be rated at 1000 amps. per sq. in and aluminum bus bars (wrought aluminum alloy strip) conforming to relevant I.S. specification at 800 amps per sq. in.

Neutral Busbars are to be rated to carry 60% of phase current. These shall be carried on glazed porcelain supports of proper diselectric and mechanical strength and shall be appropriately colour coded for identification of phase.

Lettering shall be done for identification of switches as directed. The contractor shall submit fully dimensioned drawing of the board with the physical position of the switches and other components to the Architects for their approval before the same is fabricated.

There shall be two numbers of Earth Terminals Suitable Danger Board shall be provided.

5. INTERCONNECTION B.B.C. & SWITCH FUSE, METERS :

For ratings above 150 Amps these shall consist of insulated copper strips to adequate section. For ratings below 150 Amps PVC copper cable tails of appropriate size, terminating in tinned copper sockets may be used. The above are to be enclosed either in sheet metal trunking or conduits so that no part is exposed.

6. DISTRIBUTION BOARDS :

These totally enclosed metal clad type Distribution Boards with hinged lids shall be in accordance with I.S. 2147-1952 and 2675-1966 and B.S. 214 and shall be welded construction and fabricated from rust proofed sheet steel and finished with anticorrosive stove enamel paint and have provision for fixing on wall and having earthing terminals. Main Power DB shall be free standing floor mounting type and branch DB shall be wall mounting type.

Power Distribution Boards (400 volts TPN) shall be constructed from 14 SWG sheet steel and Branch Distribution Board (230 volts SPN from 16 SWG sheet steel).

The minimum ratings of phase and neutral busbars shall be 67% of the total ratings of fuse ways. Above 32 Amps Neutral Busbars may be half the size of the phase Bus Bars.

The fuses shall be mounted on glazed porcelain supports of proper dielectric and mechanical strength. TPN suits should have phase separation barriers between fuse N.L.U.Os.

Cables shall be connected to a terminal by crimped lugs.

Where two or more B.D.B.'s feeding low voltage circuits are fed from different phases of a medium voltage supply there B.D.B.'s shall be installed atleast two metres apart.

All three phase power distribution boards shall be properly earthed with two number 10 S.W.G. galvanized iron wires and provided with suitable Danger Boards. All SPN B.D.B.'s shall be properly earthed with one number 10 SWG galvanized iron wire each.

Branch DB (LDB) :

- The incomer to the LDB shall be terminated in a suitable rated TB (not directly on ELCB/MCB).
- The size of the DB shall have space for comfortable accommodate all MSBs, ELCB, TB and have space for minimum 2 nos of spare MCBs.
- All MCB shall be min 9KA rating and 'C' curve type.

7. **SWITCHES** :

All switches for lights, fans and plug points shall be Modular type switches, unless specified otherwise.

8. **CABLES AND CONDUCTORS** :

All cables shall conform to relevant Indian Standard. Conductors of all cables except for flexible cables, shall be of aluminium, unless specified otherwise. All LT cable shall be FRLS type PVC insulated and 1000 V grade.

9. **FLEXIBLE CABLES** :

Conductors of flexible cables shall be of PVC insulated FRLS copper the minimum size of core acceptable is 1.5 sqm. (other than telephone cable). The

maximum weight to which the following twin flexible cords may be subjected are as follows :

Twin 16 / 0.20 mm	:	3.3 Ibs (1.5 Kgs.)
Twin 23 / 0.0076 inch	:	5.0 Ibs (2.3 Kgs.)

10. **INSTALLATION OF MAIN SWITCH BOARDS, BDB'S MAINS, SUBMAINS, DISTRIBUTION WIRING TO INDIVIDUAL POINTS** :

The exact positions of all main switch boards, BDB's and all funds of mains and sub-mains, and distribution wirings to individual points including the exact position of all light fittings and switch boards shall be first marked on the buildings and shall be approved by the Engineer in charge before actual commencement of the work.

The D.B.'s shall be generally be installed at a height of 2.13 m (7 ft) from floor level.

11. **INSTALLATION OF SWITCH BOARDS** :

These shall be installed at a height of 1.3 mtrs. (4' - 3") and above the floor level.

12. **INSTALLATION OF CEILING FANS** :

Unless otherwise specified all ceiling fans shall be hung not less than 2.75 M (9 ft.) above floor. The suspension and clamp shall be painted with approved paint without involving extra cost.

13. **INSTALLATION OF FLUORESCENT LIGHT FITTINGS** :

Where these are suspended from ceiling by two down rods, or fixed to ceiling / beam directly, atleast one fixing to the ceiling / beam shall be made with Mechanical / Metal fasteners. Electrical drill only shall be used while making holes for the fasteners which shall be capable of sustaining at least 11 kg. of dead weight.

The down rods and accessories shall be painted with approved paint without involving extra cost.

Unless otherwise specified these should be suspended 2.60 m (8'-6") above the floor.

The Fluorescent light point/ Ceiling fan point and exhaust fan point shall be terminated in a ceiling rose and at the time of equipment/ fitting installation it is to be connected with the ceiling rose. The connection (supply and erection) is in the scope of contractor installing the light/fan fittings.

14. **INSTALLATION OF EXHAUST FANS** :

Exhaust fans shall be fitted by means of rag bolts embedded in the wall. The required holes in the wall shall be made and finished neatly with cement plaster and brought to the original finish of the wall. All exhaust fan shall be fitted with with GI Louvers at the outer side.

15. **INSTALLATION OF SOCKET OUTLETS** :

No socket outlet shall be provided in the bath room at the height less than 130 cms. (4'-3") from the floor.

No switches shall be provided inside the bath rooms, unless approved by the Engineer in charge.

Socket outlet at locations other than bath rooms shall be either 25 cm (10") or 130 cms (4'-3") from the floor.

16. **INSTALLATION OF ELECTRIC MOTORS** :

Electric Motors shall be earthed with 2 numbers of earthing in opposite side. Earth flat is to be brought near the equipment and then connected by wire rope socketed at the ends.

17. **TESTING OF INSTALLATION** :

Before a completed installation or an addition to an existing installation is put into service, the following tests shall be carried out by the contractor in presence of the Engineer-in-charge.

(a) Polarity of switches :

It must be ensured by test that all single pole switches have been fitted on the live side of the circuits they control.

(b) Insulation test :

(i) By applying a 500 volt megger between earth and the whole system of conductors or any section thereof, with all fuses in place and all switches closed, all lamps in position or both poles of installation otherwise electrically connected together. The result in meghom shall not be less than 50 devided by the number of points on the circuit, and should not be less than 1 meghom.

(ii) Between all conductors connected to one phase and all conductors connected to the neutral or to the other phase conductors of the supply after removing all metallic connections between the two poles of the installation and switches on all switches. The insulation resistance shall be as in (I) above.

(c) Earth Continuity Test :

The earth continuity conductor including metal conduits, and metal sheaths of cables in all cases shall be tested for electrical continuity. Electrical resistance of the above along with the earthing leas cut excluding any resistance of earth leakage circuit breaker, measured from the connection with the earth electrode to any point in the earth continuity conductor in the completed installation shall not exceed one ohm.

(d) Earth Resistance Test :

To ensure effectiveness of installation earth, the value of earth resistance shall within 5 0hm for installation capacity upto 5 KW and one ohm for installation of higher capacity.

18. The completed work will be taken over only if the result obtained in above tests are within the limits mentioned above and in accordance with I.E. Rules.

On completion of the installation work, a certificate shall be furnished by the contractor, countersigned by the certified supervisor under whose direct supervision the installation was carried out. This certificate shall be in a prescribed form as required by the local Electric Supply Authority.

19. **SPECIAL SPECIFICATIONS** :

(a) Before fixing all switches, fittings etc. should be produced before Engineer in Charge and get approved.

(b) All metal switch boards and switch / regulator boxes to be used in work shall be painted with two coats of anti rust primer (red oxide paint) prior to erection. After erection they shall be again painted with two coats of enamel paint of approved quality.

(c) Before execution of any portion of conduit work for wiring neat proper layout should be made out by the contractor and got approved from the Engineer-in-charge. For this purpose contractor is advised to get acquainted with the layout drawings of the Consultant / Architect.

(d) While laying the conduits for concealed wiring in the ceiling or in the beams and columns and before casting the contractor must ensure that all the inlets and both ends of the conduits are plugged by means of dead end socket so that no foreign matter can enter the conduits and choke them.

(e) Damage to any fitting during erection and before handing over the installation by contractor shall be set right or replaced by the contractor at his own cost.

(f) Caution Board or proper size wherever required, shall be provided, as per I.E.E. regulations for which no extra payment will be admissible.

(g) Any repairs done to wall etc. should match with the surrounding surface otherwise same will be got done through Building Contractor at the cost of the Electrical Contractor.

(h) Earthing installation shall be done in the presence of Engineer-in-charge or his representative.

(i) The installation should not be enertized without adequate earthing.

(j) The I.C. switches and Distribution Fuse Boards shall be provided with neat lettering in block letters with paint for identification of the I.C. switches and for the points connected to each fuse way of the D.B.’s for which no extra payment will be admissible.

(k) Completion Drawings.

The contractor shall be required to submit along with Final bill, the under noted drawings on tracing papers, along with three copies of Ammonia print each.

(l) Plan (as per structural drawing) of each floor (not less than 1 : 100 metric scale) showing :

(i) Locations of Main Switch Board, Distribution boards (with the circuit numbers controlled by them).

(ii) The runs of mains and sub-mains.

(iii) Location of lights, fans wall sockets, other power consuming devices together with type of fittings and fixtures including circuit numbers.

(iv) Position of lighting conductors and route of running conductor.

(v) Position of Earthing Stations for light and power and Lighting conductor installation.

and giving the following informations on the plans :

(a) Name of work with job no. Accepted Tender No.

(b) Date of completion.

(c) Name of the place.

(d) Name and signature of the Contractor.

(e) Scale of Drawings.

2. Schematic line layout diagram of each floor showing (i) layout and connections of Main and Sub-board, B.D.B. having descriptions of the size, capacity, type and their numbers the system and the source of supply, (ii) Location, size, type, length of main and sub main cables (iii) Loading of each B.D.B indications of phases, Departmental mark in each B.D.B. and switchgear.

The drawings shall be very neatly drawn and submitted properly without folding them.

3. Cable route should be marked on site plan with measurements from permanent structures.

TECHNICAL SPECIFICATION FOR CONDUIT WIRING SYSTEM

1. Type and size of conduit :

All conduit pipe shall be screwed type, solid drawn or welded and with black stove enameled surface or galvanised and of thickness conforming to IS : 9537 part II of 1981 (or latest revision) in all respects. The conduits are to be free from burrs and internal roughness. No conduits less than 20 mm in dia shall be used, unless specified.

2. Accessories :

Only screwed type of accessories are to be used.

3. Conduit Joints :

The conduit shall be properly earthed. In long distance straight runs of conduit either inspection type screwed couplers are to be provided at reasonable intervals on running threads with couplers and jamnuts. Threads on conduit pipes in all cases shall be between 13 mm to 27 mm long sufficient to accommodate pipes to full threaded portion of couplers or accessories. Cut end of conduit pipes shall have no sharp edges or any burrs left to avoid damage to insulation of conductor while pulling them through such pipes.

4. Protection against dampness and rust :

In order to minimize condensation and sweating inside the tube, all outlets of pipes system shall be properly drained and ventilated, but in such a manner as to prevent entry to insects inside the conduit.

To protect against rust the outer surface of the conduit and accessories shall be painted and the bare thread portion is to be portions with anti corrosive preservative.

5. Fixing of Conduits :

conduits pipes shall be fixed by heavy gauge saddles and h.w. or metal bars, secured to wall / ceiling by screws driven into wood plugs or rawl plug or phil plugs at an interval or not more than 76 cm apart for vertical run and 60 cm apart for horizontal run, but on other side of couplers or bend or similar fitting saddles shall be fixed at distance of 30 cm from the center of such fittings. The minimum thickness for saddles shall be 24 SWG, for conduits upto 25 mm dia and 20 SWG for larger sizes.

6. Bends in conduits :

All necessary bends in the system including diversion shall be done bending the pipes, or by inserting suitable inspection type bends, elbows or similar fittings, or by fixing cast iron inspection boxes whichever is most suitable.

7. Outlets :

All outlets for fittings, switches etc. shall be fixed on boxes of suitable metal for either surface mounting system or flush mounting system. In case of cast iron boxes the wall thickness shall be at least 3 mm and in case of welded mild steel sheet box of wall thickness shall not be less than 16 gauge. Except where otherwise stated 3 mm thick insulated laminated sheets shall be fixed on the front with screws. Where conduits are terminated. Special care shall be taken in employing double jamnuts, special care shall be taken in employed double jamnuts, for securely fixing conduits to outlets so as to prevent any possibility of damages to cables when drawn.

8. Cables to be used :

Unless stated otherwise only single core PVC insulated cables of approved manufacturers shall be used for wiring in conduit shall not be greater than maximum set out in Table II of Indian Standard (I.S. 732-1963) code or practice (revised) for electrical wiring installation (system voltage not exceeding 650 volts).

9. Looping in system :

Distribution wiring in conduit to light, fan plug points etc. shall be done in looping 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 socket outlets at the socket terminals.

10. Earthing continuity wires :

All three pin 5 Amps plug points and metallic fan regulator cover should be provided with earthing attachment by No. 14 S.W.G. wires, unless specified otherwise.

Three pin 15 Amp power plug point should be provided with earthing attachment by No. 14 SWG G.I. wire, unless specified otherwise.

For conduits and accessories for distribution wiring should be provided with earthing attachment by number 14 SWG G.I. wire, unless specified otherwise.

For looping earthing G.I. wire shall be run conduits being fixed with saddles, this wire shall not be normally visible after installation when run with the conduit. Where the wire has to be ;taken without ;the conduits this will be fixed with “U” nails at 2’-0” intervals.

11. Painting :

Conduit and all conduit fittings and accessories shall be painted with two coats matt paint. Painting of conduits shall be done to harmonize with colour bearing surface, i.e. wall, joints, trusses etc. after installation and as approved by the Engineer-in-charge.

TECHNICAL SPECIFICATION FOR CONCEALED CONDUIT WIRING SYSTEM

1. Concealed conduit wiring system shall comply with all requirements for surface conduit wiring system as specified above and in addition conform to the requirements specified below :

2. Making of Chase :

   The chase in the wall shall be neatly made and be of ample dimensions to permit the conduit to be fixed in the manner desired.

3. Fixing of Conduit in Chase :

   The conduit pipes shall be fixed by means of staples, J-Hooks or by means of saddles not more than 60 cm apart. Fixing of standard bends or elbows shall be avoided as far as pipes with a long radius which will permit easy drawing in of conductor. All threaded joints of metallic conduits shall be treated with some approved preservative to secure protection against rust.

4. Inspection Boxes :

   Suitable inspection boxes shall be provided when necessary to permit periodical inspection and to facilitate removal of wires. These shall be mounted flush with wall.

5. Types of accessories to be used :

   All outlets such as switches, socket outlets, shall be flush mounting type with cast iron or M.S. boxes with a cover of approved insulating materials. The switches and other outlets shall be mounted inside such boxes as would be approved. The metal box shall be efficiently earthed with conduit by means of earthing attachment with No. 14 SWG G.I. wire, running inside the conduit.

6. Conduits :

   (i) Steel-Black enameled screw type M.S. conduits with thickness conforming to IS : 9537 part II or 1981 (or latest revision)

   (ii) PVC / Polythene-Medium gauge pipes of reputed make having 3 mm wall thickness shall be used.

   For roof slabs - These shall be prelaid during casting of floor / roof slab. No. of wires drawn through the same shall not exceed the number of specified I.S. code.

   For vertical drops in wall to switch boards-Minimum size shall be 13 mm bore through which not more 2 Nos. 1/1-40 and G.I. earth wire shall be drawn.

(iii) Maximum capacity of conduits for drawing in of PVC insulated cables shall be as follows :

650 / 1100 V PVC	In 20 mm dia.	In 25 mm dia.

Copper wire.	Conduits.	Conduits.
1.5 Sqm.	4 Nos.	10 Nos.
2.5 Sqm.	4 Nos.	10 Nos.
4.0 Sqm.	3 Nos.	8 Nos.
6.0 Sqm.	2 Nos.	6 Nos.
10 Sqm.	-	4 Nos.
16 Sqm.	-	2 Nos.

7. Fish wire - 18 SWG G.I. wire shall be used and it shall protrude the conduit ends by 9 inches.

8. Conduit laying in floor / roof slabs before casting :

PVC / Ploythene / G.I. conduit shall be laid straight as far as practicable and properly placed including binding with the steel reinforcement rods with 22 SWG G.I. wire so that proper positions of conduits are maintained.

While laying the conduits for concealed wiring in the ceiling or in the beams and columns and before casting, the contractor shall ensure that both ends of the conduit are plugged by means of dead-end socket or otherwise so that any foreign matter cannot enter the conduit and choke them.

All precaution must be taken while laying the conduits on the slabs, R.C. walls, columns etc. and the contractor shall rectify at his own cost if any defects are found during process of drawing cables through the concealed prelaid conduits.

Each PVC / Polythene conduit shall be provided with protruding length of not less than 9 inches on free end of the conduits.

There shall be no intermediate joints in one straight run of conduit.

All ceiling outlets shall be terminated in a round C.I. / G.I. circular box / deep box to suit standard size ceiling rose or / and rectangular C.I. / M.S. junction box or fan hook box as the case may be.

It will be mandatory for the contractor to get the layouts approved by the Engineer-in-charge / Architect when the conduits are laid and bound to steel reinforcement rods, before he can release the work for casting of floor / roof.

9. Connector Boxes, Draw-in-Boxes, junction Boxes :

These shall be constructed from 16 SWG M.S. sheet and have M.S. cover. Minimum size for connector boxes in 6” x 4” and for Draw in Boxes 4” x 4”.

10. Fan Hook Boxes :

These shall be 100 mm (4”) dia x 75 mm (3”) deep, constructed from 16 SWG M.S. sheet, and provided with one 12 mm dia M.S. rod 300 mm (12” long).

11. Painting :

outside of wall switch boards, connector boxes and draw-in-boxes and other C.I. / M.S. accessories shall be painted with two coats of anti-rust paint in addition to other painting instruction given elsewhere.

TECHNICAL SPECIFICATION FOR CABLE INSTALLATIONS

1. General :

All HV cables (upto 33 KV earthed system) shall be XLPE insulated aluminium conductor cable conforming to I.S. 692 and I.S. 7098 respectively.

All medium voltage and Low Voltage PVC insulated FRLS type and armoured / unarmoured cables shall conform to I.S. 1554 Part-I-1964 and of 1100 volt grade.

Old and used cables must not be used for installation. Only one make of cable shall be used. All cables brought to site must be tested and got approved by the Engineer-in-charge before these can be laid. The cables shall be dispatched to site on wooden drums with ends sealed. Exact lengths shall be determined by the Contractor after measurement at site.

The underground installation of cables shall be generally conforming to I.S. 1255-1967, Code of practice for installation and maintenance of underground cables (upto including 33 KV).

2. Laying of cables :

(a) Direct in Ground :

Trenches shall be 750 mm deep (minimum) for LT cables and 1.2 M (4'-0") deep minimum for HT Cables from ground level and trenching work shall including all pumping and bailing out water. These trenches shall be wide enough to accommodate all the cables with brick separations as per the requirements specified in the relevant I.S.

When more than one multicore cable is to be laid in the same trench, a minimum horizontal interaxial spacing between cables will be as per relevant I.S.

After excavation of the trench of proper size, the bottom of the trench shall be dressed and leveled and filled with 75 mm layer of fine sand. The cable shall then be laid with bricks on both sides of the cable continuously. After having the space within the bricks, filled and packed upto a level of 75 mm (3") above top of cable with fine sand, the top layer of bricks shall be placed side by side in continuous series as protective cover. Total No. of bricks required being 16 per metre run. The remainder of the trench shall be filled with riddles soil, well rammed and watered to a level of 75 mm (3'-0") above surrounding ground level. The ground

level surface of the whole trench route shall be restored properly after completion of cable laying.

(b) Inside Building :
Cables shall be laid on walls / ceilings / structure, unless specified otherwise with M.S. brackets and suitable clamps or over claw type aluminium cleats fixed on M.S. brackets, spaced not more than 450 mm apart. G.I. Bolts of suitable sizes are to be grouted on the wall properly for fixing the brackets.

(c) Minimum bending radius permissible in 120 for MV cables and 20d for HV cables. At joints and terminations the individuals core of multicore cables should

never be bent so that the radius is less than 15 times the diameters over the insulation.

No cable jointing is allowed between two terminals points.

3. Cable Jointing :

All cable joints shall be carried out by experiences and Licensed jointers under strict supervision. Electro plated brass cable glands, aluminium / tinned copper cable sockets and approved jointing materials must be used. The price for cable jointing and finishing the ends of the cable shall include all materials and shall also provide for tools and plants for the work. The cable accessories and other associated materials shall conform to Indian Standard Specification where applicable. Proper earthing of cable glands and armoured shall be included in the job.

4. Testing of Cables :

All cables shall be tested for insulation resistance with megger - 5000 V constant pressure meter insulation tester for HT cables and 1000 V constant pressure megger for LV cables, before installation.

After installation and end termination, cables shall be again subjected to the above test. Insulation value for HT Cables shall not be less than 100 mega ohms and for MV Cables 1.0 mega ohm.

After laying and jointing, the HV cables shall be subjected to high voltage pressure test before commissioning the test voltage being as specified in I.S. 1225-1967 or latest.

5. Testing of Installation :

Before the completed installation is put into service or handed over to owner, the installation is to be subjected to the above tests to the satisfaction of the Engineer-in-charge. The completed work will be taken over only if the results are acceptable to the Architects / Owner.

TECHNICAL SPECIFICATION FOR EARTHING INSTALLATION

The installation shall generally conform to I.S. 3043-Indian Standard Code of practice for Earthing, as amended upto date.

1. Earthing Electrode :

The earthing electrode shall be galvanized steel pipe of class B medium quality 50 mm (2") dia bore and 3.04 M (10") long. A hole shall be provided at 100 mm (4") from the top end to receive a 13 mm (1/2") dia galvanised bolt and the bottom end shall be chisel cut for easy penetration into soil.

A suitable trench shall be excavated about 0.45 M (1"-6") deep and the pipe electrode driven to an average depth of 3.35 M (1"-0") below ground level. The top end of the electrode shall be at an average depth of 3.30 M (1") below the ground surface.
Alternate layers of Charcoal or Salt and coke to be provided for Electrode as per I.S. code of Practice unless specified otherwise.

One No. SWG G.I. wire (unless otherwise specified) shall be connected securely on the properly cleaned surface at the top end of pipe electrode by means of a 100 mm (4") long x 13 mm (1/2") dia G.I. bolt nut and double washers. The earth lead conductor shall be protected mechanically be means of a continuous length of G.I. pipe (Class A) having 13 mm (1/2") inside diameter upto a height of 0.60 M (2') above ground and the same shall be completely filled with bitumen compound and topped upto overflowing.

2. Masonry Inspection Pit :

The inspection pit for the earth station shall be approx 0.56 M x 0.56 M (1'-10" x 1'-10") outside dimensions and approx. 0.45 M (1'-6") deep when completed, having 5" thick cement brick work with 1st class bricks in cement mortar (6 : 1) both inside and outside plastering 19 mm (3 / 4") thick and neatly cemented 1.60 mm (1 / 16") thick, both inside, outside and top. The opening on top shall be provided with a C.I. ring with lockable cover fixed flush with ground surface.

All the excavations shall be duly back filled, dressed and rammed.

3. Locations for Earth Electrodes :

Electrodes shall be buried at least 2 M (6'-6") away from the building pole or object to be earthed. However, earthing electrodes for L.C. installations should be as clode to the down conductors as possible.

Electrodes when installed in parallel, shall not be placed less than 2 M (6"-6") apart and preferably placed at distances greater then twice their lengths.

4. Earth Busbar :

(a) Galvanised M.S. Flat :

The Busbar shall be of suitable size and length, as specified in the Schedule of items, heavily galvanized and having adequate number of drilled and tapped holes 30 mm apart, completed with G.I. bolts, nuts, washers for securely connecting the earth leads and earth continuity conductors. The busbar shall be fixed on wall, having clearance of 6 mm from wall with spacing insulators with at least the numbers 13 mm (1/2') G.I. rag bolts spaced about 0.46 M (1'6") apart.

(b) Copper Flats :

To be used, as specified, in the Schedule of Items, where earthing requirement are more stringent. Brass bolts, nuts washers shall be used for connections.

5. Value of Earth Resistance :

In case of installations where the load does not exceed 5 K.W. the resistance to earth shall on no account exceed 5 Ohm for other cases the resistance shall not exceed 1 ohm.

For sub-station, the value is 1 ohm.

For L.C. installations the value is 1 ohm.

TECHNICAL SPECIFATION FOR L.C. INSTALLATION

Specifications :

The installation shall conform to I.S. : 2309-1969 as amended upto date.

1. Conductor for L.C. System :

It shall be well galvanized No. 7 / 8 SWG G.I. stranded wire galvanizing conforming to B.S. 728 / 1961) unless specified otherwise. The conductor shall be well annealed and flexible. There shall be no joints in any conductor between terminal ends.

2. Air Terminals :

Air Terminal shall be single prong type constructed of 15 mm N.B. (Class-B) medium quality G.I. pipe 30 cm long with a screwed G.I. solid conical cap 100 mm long (overall) on top and shall have a screwed galvanized M.S. flange 75 mm dia x 6 mm thick at bottom end and shall be grouted on the parapet roof, etc. with rag bolts in cement mortar unless specified otherwise.

3. Conductor on Parapet :

The conductor shall be coursed along ridges, parapets, edges of the flat roof, over flat roof where necessary in such a way as to joint each air terminals to the rest. The conductors shall be fixed securely with proper saddles spaced not more than 2 ft. (0.6 M) apart.

4. Vertical Down Conductors :

The Conductors, direct from test point shall be connected to parapet conductors or air terminals and shall be coursed through shortest possible routes without abrupt turns or kinks. While passing through cornices, these shall pass through G.I. pipe (Class-B) having adequate bore. There conductor shall be fixed securely with proper saddles spaced not more than 2’ ft. (0.6 M) apart.

5. Protection Against Damage and Corrosion :

No upturns are permitted and any bend necessary shall have a permissible radius. The end of G.I. pipe protections on wall shall be properly sealed with bitumen compound to prevent corrosion.

6. Metallic objects near conductors :

The conductors shall be so laid as to maintain a separation distance exceeding 2 metre (6’-6”) between (a) any electric conductor running in parallel, (b) metallic objects, viz. iron girders, water tanks, iron stair case, water / gas pipes inside or by the side of the building.

All the external metallic objects viz. water tanks, gutters, rain water down pipes, water mains, etc. shall be bonded to the nearest conductor by means of a short tail.

7. Joints and Bonds :

All joints between conductors shall be made after cleaning and timing the ends of conductors to be joined, binding them together for about 100 mm (4'-0") with No. 14 SWG G.I. wire and then welding. Joint between Air Terminals and conductors shall be made with proper lugs duly fixed to conductors and bolts, nuts washers etc.

Bonding shall be as short as possible. All joints and Bends are to be mechanically and electrically sound.

8. Earth Station :

Similar to installation earths as specified elsewhere. Minimum number of earth station is two.

9. Installation Tests :

After completion of works the ohmic resistance of L.C. installation complete with air terminals (without earth connection) shall be measured from the highest point and this shall be a fraction of one ohm.

The resistance to each of individual earth stations shall be tested by earth testing megger and must not exceed 1.0 ohms.

The above tests shall be made in the presence of the representative of the Engineer-in-charge / Architects and the results recorded.

10. Completion Drawings :

This shall be submitted along with the final bill.

TECHNICAL SPECIFICATION FOR TELEPHONE WIRING

1. The telephone cabling installation work is to be carried out following the systems and the norms followed / desired by the statutory bodies and the standard codes and practices as applicable for the particular installation.

   The entire wiring of telephone installations is to be carried out in such a manner that there should not be any harm or interference to the system due to laying of electrical conduits laid side-by-side or cross wise. Approved quality and make of the cables shall be taken so that accidental higher voltage dose not occurs to the terminals appliances/equipment.

   Telephone wiring for the building is to be carried out mostly in concealed manner. The trunking shall be laid as per sketch at with cut-out at top regular intervals, not exceeding 3 meter at locations indicated in the drawing. Tee junction and right angle bends, etc. shall be provided as per sketch where necessary. 6mm thick chequered aluminum sheet cover shall be provided at all the cut-outs, tee-junction and right angle bends which will have to match with the ultimate floor finish. The trunking shall be provided with 18 SWG G.I. fish wire to enable the contractor draw the wiring cables for telephone connections shall be terminated to ceiling roses / telephone socket outlets / M.S. junction boxes as required for telephone wire terminals and these shall be fixed on nearest wall / columns after taking out from the trunking / junction box cover plate as desired.

2. Pairs of 0.51 mm dia PVC insulated and sheathed twin twisted flexible tinned copper conductor cable is to be drawn and laid in prelaid aluminium box trunking with cover in floor from CT box to each telephone terminal / ceiling roses etc.

No wooden material shall be used. The wiring of Telephone cable shall be done in concealed PVC conduit, separate from electrical conduit.

SECTION -XV
STANDARD SPECIFICATION

All work under this contract shall be carried out in accordance either the technical specification given in the documents if any part of the specification is not given in this document and the latest issue of the Indian Standard Specification applicable to the particular class of work. If Indian standard specification are not formulated for any particular materials of work, the relevant British Standard Specification shall apply. Relevant issue I.S. Specification shall be applicable to the particular work have been described along with the specification for the respective works. In case of any confusion or dispute regarding the meaning and interpretation of any specification for the respective works. the decision of the NLUO/ Architect shall be final and binding on the contractor.

EXTERNAL ELECTRICAL WORKS

TECHNICAL SPECIFICATION FOR STREET LIGHT POLES

G.I. Tubular octagonal street light poles of 9 mtr. Long shall be of 200 mm dia 4.85 mm thick, not bolted with base plate of size 300 mm x 300 mm x 6 mm thick at the bottom of the pole. The pole gradually tapered from 200 mm to 40 mm dia approx. or as pre required size and 1500 mm long, G.I. pipe shall be 120° with the horizontal axis for fixing of light fitting.

As far as possible, poles shall be fixed 1500 mm away from the road edge. The poles foundation shall be buried from 1 / 5^{th} to 1 / 6^{th} of its length depending upon soil conditions.

Concrete platform shall be provided for base plate of pole. Before erecting the pole, the platform shall be compacted from side with soil.

All fittings shall be permanently and effectively earthed. For this purpose, a continuous earth wire shall be provided or armour of the cable shall be used for the same and securely fastened to each pole through its junction box which is electrically continuous and securely fastened to each pole and connected with earth minimum at three points in every K.M.

The earth wire duly protected in G.I. pipe shall run 450 mm below ground level from earth electrode (which shall be 1.5 mt. away from pole) and then run either through G.I. pipe or sufficiently strong muff covering along with pole vertically upto junction box. In junction box, the earth shall be so fixed with thimbles through screws that screw is screwed to both junction box and the pole. In case of unarmoured cable, he earth wire shall be of minimum 4 mm dia G.I. wire and fixed of junction box as above.

TECHNICAL SPECIFICATION FOR COMPOUND LIGHTING

1. Tabular M S Pole :

The pole shall be as specified in the Schedule of Items. It shall be complete with sole plate and cap, if required and shall have drilled holes of proper size at requisite places for earthing.

The pole shall be treated internally, as well as externally upto a height of 12ft from butt end with special bituminous preservative solutions, the remainder of the outside being painted with one coat of Red Oxide primer if required.

2. Erection of M S pole :

The hole made in the ground for single pole is to be approximately 1.85 mtr. deep. A precast base block (450 x 450 x 150 mm thick) is to be properly placed at the bottom of the duly rammed hole and the pole, painted with a fresh coat of black anticorrosive paint at the butt end upto a height of 12ft and complete with slow plate and cap is to be erected, plumbed and lined up properly. The cable looping box of dimension as specified elsewhere, and polythene pipe / pipes also of specified dimension for cables entry into the cable looping box from underground are to be fixed in specified position at this stage.

The C.C. foundation (1:3:6) of dimension 450 x 450 x 1500 deep shall then be cast using timber shuttering. The concrete mixture, after pouring into position shall be well spread and compacted by ramming. The shuttering shall not be removed within 48 hours after casting. Concrete work shall be properly cured after removal of shuttering and the excavated area around the foundation shall be back filled with earth duly rammed using water and consolidated in layer not exceeding 150 mm at a time upto the required level of ground surface.

Cement concrete muffing (1:3:6) of specified dimension shall be cast at the base of the pole upto the specified height above ground level and it shall accommodate the cable looping box. The muffing shall be finished with neat cement plastering of 3 mm thickness after the concrete work has properly set.

The pole shall be plumbed before and after the concrete work.

3. Painting :

The pole shall be painted, after installation with one coat of primer and two coats of ready mixed anti-corrosive aluminium paint after preparation of surface by sand papering, cleaning, etc. for receiving fresh coat of paint, including numbering poles.

4. Materials for C.C. work foundation etc.

(a) Jhama chips shall be obtained by breaking good quality jhama bats and shall not be spongy or with any coating of foreign materials. These shall be of sizes ¾” for base block and 1 ¼” ½” (3/4cm) for foundation works. These shall be screened for removal of dust.

(b) Sand shall be coarse, sharp and free from clay, loan any other foreign materials and shall be obtained from approved source.

(c) Cement No. cement expect from approved source shall be used. Cement damaged by water or otherwise shall not be used.

(d) Paint-shall be of approved brand and quality and should be brought to site in original sealed container-under no circumstances shall the paint be diluted with linseed oil or otherwise.

FEEDER PILLAR

1. The fabrication will be done out of 2 mm thick CRCA sheet with double door and inbuilt locking arrangement.
2. All connections (Incoming and outgoing) will be taken out in cable alley with suitable rated solid copper conductor.
3. The feeder pillar will have to be supplied with suitable pedestal (MS angle iron frame of MS channel base for grouting in the RCC and proper gland at the bottom).
4. The depth of the feeder pillar has been considered as 400 mm.
5. The Bus Bars made of hard drawn Tinned copper are fitted on insulated DMC supports.
6. Sizes and arrangement are suggestive. Exact size and arrangement will be decided as per requirement.
7. The feeder pillar should be provided will terminal blocks for incoming & outgoing cables. From MCCB to terminal block wiring will be done with copper conductor / suitable cable. Incoming / outgoing U.G. cable will be terminated in terminal block. This will very much reduce congestion of cables.
8. All dimensions in mm.

CABLE WORKS

1.00 SCOPE :

The intent of this specification is to define the requirements for the supply, installation, testing and commissioning of the cabling system.

2.00 STANDARDS :

2.01 The work shall be carried out in the best workmanship manner in conformity with this specification, the relevant specification / codes of practice of the Indian Standards Institution, approved drawings and the instruction issued by the Engineer-in-charge or his authorized representative, from time to time.

2.02 In addition to the standards mentioned in 2.01, all works shall also conform to the requirement of the following :

(a) Indian Electricity Act and Rules framed thereunder.

(b) F ire Insurance Regulations.

(c) Regulations laid down by the Chief Electrical Inspector of the State / State Electricity Board.

(d) Regulations laid down by the Factory Inspector of the State.

(e) Any other regulations laid down by the local authorities.

3.00 EQUIPMENT SPECIFICATIONS :

All materials, fittings and appliances to be supplied by the sub-contractor shall be of the best quality and shall conform to the specification given hereunder. The equipment shall be manufactured in accordance with current Indian Standard specifications wherever they exist or with the B.S. or NEMA specifications, if no such ISS are available. In the absence of any specification the materials shall be approved by the Owner or his authorized representative.

All similar materials and removable parts shall be uniform and interchangeable with one another.

3.01 POWER CABLES :

Power cables for use on 415 volt system shall be of 1100 volt grade, aluminium conductor, PVC insulated, PVC sheathed single wire armoured and overall PVC sheathed. Power cables for 11 KV system shall be aluminium conductor, PVC insulated, PVC sheathed, single wire armoured and overall PVC sheathed.

Power cables for 33 KV system shall be aluminium conductor, PILC, steel tape armoured and overall PVC sheathed.

All cables conform to the relevant sections of IS : 1554 Part I and II.

Unarmoured cables will be used wherever specified on the cable schedule.

Sizes of 1100 Volt grade cables used for motor feeders shall be as per Table 1.

3.02 CONTROL CABLES :

Control cables shall be 1100 volt grade, 2.5 mm² copper conductor, PVC insulated, PVC sheathed, single wire armoured with an overall PVC sheath, as per IS : 1554. Unarmoured cables shall be used wherever specified on the cable schedule.

3.03 CABLE TRAYS :

Cable trays shall be fabricated as per detailed drawings. After fabrication, all metal surfaces shall be cleaned free of mill scale and rust, degreased, given one coat of redoxide primer and finished with one coat of bituminous aluminium paint. After complete erection, the cable trays and supports shall be finally finished with a second coat of bituminous aluminium paint.

3.04 CONNECTORS :

Cable terminations shall be made with orimped type solderless lugs of M/s. Dowells make or approved equivalent.

3.05 CABLE IDENTIFICATION :

Cable numbers shall be of self sticking type and of approved make for individual cores, and 2 mm thick lead strap for overall cable.

3.06 CABLE GLANDS :

Cable glands shall be double compression type of alunmunium, type ‘H.W.’ of M/s. Power Engg. Co. (Bombay) make or approved equivalent.

4.00 CABLE LAYING :

4.01 Cable network shall include power, control and lighting cables, which shall be laid in trenches, cable trays or conduits as detailed in the relevant drawings and cable schedules. Fabrication and erection supports of cable trays / as required shall be the responsibility of the sub-contractor. Cable routing given on the layout drawings shall be checked in the field to avoid interference with structures, piping or air-conditioning duct and minor adjustments shall be done to suit the field conditions wherever deemed necessary without any extra cost.

4.02 High voltage, medium voltage and other control cables shall be separated from each other by adequate spacing or running through independent pipes.

4.03 All cable routes shall be carefully measured and cables cut to the required lengths, leaving sufficient length for the final connection of the cable to the terminals of the equipment. The various cable lengths cut from the cable reels shall be carefully selected to prevent undue wastage of cables. The quantity indicated in the cable schedule is only approximate. The contractor shall ascertain the exact

requirement of cable for a particular feeder by measuring at sita and avoiding interference with structure, foundation, pipe line or any other works.

4.04 Cables as far as possible shall be laid in complete, unout lengths from one termination to the other.

Straight through joints if required shall be made by using epoxy resin type troplin jointing kit.

4.05 Cables shall be neatly arranged in the trenches / trays in such a manner so that ODISHA-crossing is avoided and final take off to the motor switchgear is facilitated. Arrangement of cables within the trenches / trays shall be the responsibility of the sub-contractor.

4.06 All cables will be identified close to their termination point by cable numbers as per cable schedule. Cable numbers will be punched on lead straps (2 mm thick) securely fastened to the cable and wrapped round it.

Each underground cable shall be provided with identity tags of lead securely fastened every 3 OM of its underground length with atleast one tag at each end before the cable enters the ground.

In the unpaved areas, cable trenches shall be identified by means of markers as per standard drawing. These posts shall be placed at location changes in the direction of cables and at intervals of not more than 50 M, and at cable point locations.

4.07 All temporary ends of cables must be protected against dirt and moisture to prevent damage to the insulation. For this purpose, ends of all PVC insulated cables shall be taped with an approved PVC or rubber insulating tape. Use of fabrication type or other fabric type tape is no permitted. Lead sheathed cables shall be plumbed with lead alloy.

4.08 R.C.C. cable trenches with removable cover as shown on the drawings will be provided by the Owner. Medium voltage cables shall be laid in 3 or 4 tiers in these trenches as indicated on the sectional drawings. Concrete cable trenches shall be filled with sand where specified to avoid accumulation of hazardous gas…… RCC covers of trenches in process areas shall be effectively sealed to avoid ingress of chemicals etc.

Cables shall be handled carefully during installation to prevent mechanical injury to the cables. Ends of cables leaving trenches shall be coiled and provided with a protective pipe or cover.

4.09 Directly buried cables shall be laid underground in excavated cable trenches where specified on layout drawings. Trenches shall be of sufficient depth and width for accommodation of all cables correctly spaced and arranged with a view of he dissipation and economy of design.

Depth of burying shall allow minimum 500 mm soil cover for low voltage and 900 mm for 11,000 Volt cables.

Cables shall be laid in trenches at depth as shown in the drawing. Before cables are placed the trench bottom shall be filled with a layer of sand. This sand shall be leveled and the cables laid over it. The cables shall be covered with 150 mm of sand on top of the largest diameter cable, and sand shall be lightly pressed. A protective covering of 75 mm thick second class red bricks shall then be laid flat. The reminder of the trench shall then be back filled with soil, rammed and leveled.

As each row of cables is laid in place and before covering with sand every cable shall be given an insulation test in the presence of Engineer-in-charge / Owner. Any cable which proves defective shall be replaced before the next group of cables are laid.

All wall openings shall be effectively sealed after installation of cables to avoid leakage of water.

4.10 Where cables rise from trenches to motor, push button lighting panels etc., they shall be taken in G.I. pipes for mechanical protection upto a minimum of 300 mm above grade or as shown in the diagram.

Cable ends shall be carefully pulled through the conduits, to prevent damage to the cable. Where required, approved cable lubricant shall be used for this purpose. Where cable enters conduit the cable should be bent in large radius. Radius shall not be less than the recommended bending radius of the cables specified by the manufacturer.

Following guide of the pipe fill shall be used for sizing the pipe size :

(a)	1 cable in pipe	-	53% full
(b)	2 cables in pipe	-	31% full
(c)	3 or more cables	-	43% full
(d)	Multiple cables	-	40% full

After the cables are installed and all testing is complete, conduit ends above grade shall be plugged with a suitable weatherproof plastic compound / “PUTTI”, for sealing purposes.

4.11 Where cables pass through foundation walls or other underground structures, the necessary ducts or openings will be provided in advance for the same. However, should it become necessary to out holes in existing foundations or structures the electrical contractor shall determine their location and obtain approval of the Engineer-in-charge before cutting is done.

4.12 At road crossing and other places where cables enter pipe sleeves adequate bed of sand shall be given so that the cables do not slack and get damaged by pipe ends after back filling.

High voltage cables shall be taken through individual pipe sleeves.

4.13 Where joints or tape are required to be made in the wiring, suitable junction boxes or tap boxes shall be provided each equipped with the necessary cable glands. The individual conductors shall be joined by means of solder-less

connections supplied integrally and mounted in the box on suitable insulating supports or supplied separately and insulated.

4.14 Drum number of each cable from which it is taken shall be recorded along with the cable number in the cable schedule.

4.15 Cables installed above grade shall be run in trays, exposed on walls, ceilings or structures and shall be run parallel or at right angles to beams, walls or columns.

Cables shall be so routed that they will not be subjected to head from adjacent hot piping or vessels.

4.16 Individual cables or small groups which run along structures may be directly attached to the structures by saddles or clamps.

They shall be rigidly supported on structural steel and masonry, individually or in groups as required, using individual cast or malleable iron galvanized clips. If drilling of steel must be resorted to, approval must be secured and steel must be drilled where the minimum weakening of the structure will result.

Cables shall be supported so as to prevent unsightly sagging. In general distance between supports shall be approximately 500 mm to 500 mm for cables upto 25 mm diameter and maximum 1000 mm for cables larger than 25 mm dia.

4.17 Cable trays and supporting steel shall be painted before laying of cables. The painting shall be done with one coat of red lead paint and two coats of bituminous aluminium paint.

5.00 TERMINATION :

5.01 All PVC cables upto 1.1 KV grade shall be terminated at the equipments by means of double compression type cable glands of aluminium. Cable glands to be supplied by the sub-contractor should be preferably M/s. Power Engg. Co. (Bombay) make or approved equivalent. They shall have a screwed nipple with conduit electrical thread and check nut.

5.02 Power cables shall be identified with red, yellow and blue PVC tapes. Where copper to aluminium connections are made, necessary bimetallic washers shall be used. For trip circuit identification additional red ferrules shall be used only in the particular cores of control cables at the termination points in the switchgear / control panels and control switches.

5.03 In case of control cables all cores shall be identified at both ends by their wire numbers by means of PVC ferrules, or self sticking cable markers. Wire numbers shall be as per schematic / connection drawing. Bidders shall have the samles of PVC ferrules / cable markers approved before starting the work.

5.04 Where threaded cable gland is screwed into threaded opening of different size, suitable galvanized threaded reducing bushing shall be used of approved type.

Sub-contractor shall drill holes for fixing glands wherever necessary. Gland plate shall be of nonmagnetic materials / aluminium sheet in case of single core cables.

5.05 The cables shall be taken through glands inside the panels or any other electrical equipment such as motors. The individual cores shall then be dressed and taken along the cable ways (if provided) or shall be fixed to the panels with polytheylene straps. Only control cables of single strand and lighting cables may be directly terminated on to the terminals.

In case of termination of cables at the bottom of a panel over a cable trench having no access from the bottom a close fit hole should be drilled in the bottom plate for all the cable in one line, then bottom plate should be split in two parts along the centre line of holes. After installation of bottom plate and cables it should be sealed with cold setting compound. Cables shall be clamped over the open armouring and connected to earth bus.

5.06 Cables leads shall be terminated at the equipment terminals, by means of crimped type solderless connectors as manufactured by M/s. Dowell Electro work or approved equivalent.

Crimping shall be done by hand crimping / hydraulically operated tool and conducting jelly shall be applied on the conductor. Insulation of the leads should be removed immediately before the crimping. Conductors surface shall be cleaned and shall not be left open.

6.00 TESTING :

6.01 Before energizing, the insulation resistance of every circuit shall be measured from phase to phase and from phase to ground. This requires 3 measurements if one side is grounded and 6 measurements for 3 phase circuits.

6.02 Where splices or terminations are required in circuits rated above 600 volts, measure insulation resistance of each length of cable before splicing and / or terminating. Repeat measurements after splices and / or terminations are complete.

6.03 Measure the insulation resistance of directly buried cable circuits before cable trenches are back filled. Repeat measurement after back filling.

6.4 D.C. High voltage test shall be made after installation on the following :

(1) All 1100 volts grade cables in which straight through joints have been made.

(2) All cables above 1100 Volt grade. For record purposes test data shall include the measured values of leakage current verses time.

The D.C. High voltage test shall be performed as detailed below :

Cables shall be installed in final position with all the straight through joints complete.

Terminations shall be kept unfinished so that motors switchgear, transformer etc. are not subjected to test voltage.

The test voltage and duration shall be as per relevant codes and practices of Indian Standard Institution.

6.05 PROFORMA FOR TESTING CABLES :

DATE OF TEST

(a) Cable No. …….

(b) Drum No. from which cable taken : ……

(c) Cable from …….. to : ……..

(d) Length of run of this cable …… metre.

(e) Insulation resistance test :

(i) Between core - 1 to earth …… M

(ii) Between core - 2 to earth …… M

(iii) Between core - 3 to earth ……. M

(iv) Between core - 1 to core - 2 …….. M

(v) Between core - 2 to core - 3 …….. M

(vi) Between core - 3 to core - 1 …….. M

(f) High voltage test Voltage Duration

TECHNICAL SPECIFICATION FOR EARTHING INSTALLATION

The installation shall generally conform to I.S. 3043-Indian Standard Code of practice for Earthing, as amended upto date.

1. Earthing Electrode :

The earthing electrode shall be galvanized steel pipe of class B medium quality 60 mm dia bore and 3.0 M long. A hole shall be provided at 100 mm (4”) from the top end to receive a 13 mm (1/2”) dia galvanished bolt and the bottom end shall be chisel cut for easy penetration into soil.

Alternate layers of Charcoal or Salt and coke to be provided for Electrode as per I.S. code of Practice unless specified otherwise.

One No. SWG G.I. wire (unless otherwise specified) shall be connected securely on the properly cleaned surface at the top end of pipe electrode by means of a 100 mm (4") long x 13 mm (1/2") dia G.I. bolt nut and double washers. The earth lead conductor shall be protected mechanically be means of a continuous length of G.I. pipe (Class A) having 13 mm (1/2") inside diameter upto a height of 0.60 M (2') above ground and the same shall be completely filled with bitumen compound and topped upto overflowing.

2. Masonry Inspection Pit :

The inspection pit for the earth station shall be approx 0.56 M x 0.56 M (1'-10" x 1'-10") outside dimensions and approx. 0.45 M (1'-6") deep when completed, having 5" thick cement brick work with 1st class bricks in cement mortar (6 : 1) both inside and outside plastering 19 mm (3 / 4") thick and neatly cemented 1.60 mm (1 / 16") thick, both inside, outside and top. The opening on top shall be provided with a C.I. ring with lockable cover fixed flush with ground surface.

All the excavations shall be duly back filled, dressed and rammed.

3. Locations for Earth Electrodes :

Electrodes shall be buried at least 2 M (6'-6") away from the building pole or object to be earthed. However, earthing electrodes for L.C. installations should be as clode to the down conductors as possible.

Electrodes when installed in parallel, shall not be placed less than 2 M (6"-6") apart and preferably placed at distances greater then twice their lengths.

4. Earth Busbar :

(a) Galvanised M.S. Flat :

The Busbar shall be of suitable size and length, as specified in the Schedule of items, heavily galvanized and having adequate number of drilled and tapped holes 30 mm apart, completed with G.I. bolts, nuts, washers for securely connecting the earth leads and earth continuity conductors. The busbar shall be fixed on wall, having clearance of 6 mm from wall with spacing insulators with at least the numbers 13 mm (1/2') G.I. rag bolts spaced about 0.46 M (1'6") apart.

(b) Copper Flats :
To be used, as specified, in the Schedule of Items, where earthing requirement are more stringent. Brass bolts, nuts washers shall be used for connections.

5. Value of Earth Resistance :

Incase of installations where the load does not exceed 5 K.W. the resistance to earth shall on no account exceed 5 K.W. the resistance shall not exceed 1 ohm.

For sub-station, the value is 1 ohm.
For L.C. installations the value is 1 ohm.

TECHNICAL SPECIFICATION FOR OUTDOOR TYPE POWER DISTRIBUTION BOARD

Supply of Outdoor type, Self Standing, Floor mounted, Lockable, Gasketed, vermin proof Feeder Pillars made out of 2 mm thick MS sheet steel (with MS Angle Frame for strength), Rain Protected through canopy (3 mm thick sheet steel), duly painted with two coats of Red-Oxide & two coats of Grey enamel paint having 3 mm thick removable, bottom entry gland plate confirming IP-51.

1. 3 Ph, 4 wire Aluminium Bus Bars of sufficient rating shall be charged from Incoming SFU with FR PVC insulated multi-strand, flexible annealed copper conductor wires, ECKO / FINOLEX / HAVELLS / L&T make of suitable size. The Aluminium bus bars shall be mounted on suitable support insulators. Bus bars shall be insulated with heat shrinkable sleeves.

2. Incoming to SFU shall be taken from Aluminium Bus-Bars with multi-strand, FR-PVC insulated annealed copper conductor wires (ECKO / FINOLEX / HAVELLS / L&T) of suitable rating.

3. Wiring form outgoing SFU's shall be done through HR-PVC insulated, multi-strand, tinned copper conductor wires of suitable size up to coloured terminal connectors (Elmex / Essen / Connect well make). 10% extra connectors are to be provided and mounted on the rail.

4. All the wires shall be terminated with proper size of copper lugs having colour coded PVC sleeves.

5. Feeder pillar shall have an Earthing Bus of sufficient rating. Feeder Pillar shall have provision of earthing at 02 points with minimum 10 mm stud. Continuity of earthing to doors shall be done through flexible copper braided conductor.

6. Panel shall have sturdy & fine wire-mesh for Air Natural cooling.

7. Panel shall be provided with minimum two number 1-bolts for lifting of the Panel.

8. Panel shall have hinged type, lockable front doors with pad locking facility.

9. Panel shall have enough space for termination of one number incoming armoured, HR-PVC insulated, Aluminium conductor cable of suitable size and 5/3 + 3 Number out going through armoured, HR-PVC insulated Aluminium conductor cable of suitable size through double compression cable glands.

10. Panel shall have suitable Panel Illumination Lamp having control through separate MCB.

11. Drawing shall be got approved before manufacturing.

12. Vendor to give BOQ, GA Drawing (showing dimensions) of the panel offered indicating catalogue number of each component offered.

TECHNICAL SPECIFICATION FOR SANITARY AND PLUMBING WORKS

The following specifications are to be read in conjunction with the details given in the schedule of quantities.

1.0 Standard Specifications : All works under this contract shall be carried out in accordance with the technical specifications & the latest issue of the Indian standard Specifications applicable to the particular class of work. If Indian Standards are to not formulated for any particular material of work, the relevant British Standards shall apply, Relevant issues of I.S. Specifications applicable to the particular work have been described along with the specification for the respective works . In case of any confusion or dispute regarding the meaning and interpretation of any specification for the respective works. In case of any confusion or dispute regarding the meaning and interpretation of any specification for the respective works, the decision of the Owner/Architects shall be final and binding on the Contractors.

2.0 General Specification fro water supply. Sanitary Installations, sewerage & Drawing works.

a. Execution through licensed Sanitary contractors Firm.
All water supply, sanitary installations, sewerage & drainage works shall be executed through licensed sanitary contractors. Particulars of the firm viz. Name & address of the firm. registration & license no etc. (Issued by the authorities) shall be furnished along with the tender.)
b. Complying with by-laws etc. of local Authorities.
All water supply, Sanitary installations, sewerage & drainage works shall be carried out by skilled and licensed plumbers/ technicians in a workman like manner complying in all respects with the relevant by-laws of the Municipal or of the local Authorities under whose jurisdiction the work has be executed.

c. Contractor's responsibility for sanction from local authorities.
For the works undertake by him & works dependent on his work, the contractor shall prepare plans / drawings and get it sanctioned from the Municipal or other Govt. Authorities as may be required by law, the contractor shall include the cost for the same in his tender rates unless otherwise specified in the tender Items.

d. Contractor's responsibility to ensure continuance of existing services.
During execution of the new works , the Contractor should ensure that the existing services (viz. water supply, sewer, drain Lines etc.) are not disrupted in any way & in case it happens accidentally the services shall be restored immediately at contractor's cost.
However, when in the opinion of the Architects/NLUO, it is imperative to locally divert/ Disconnect for a short time/reconnect the existing lines, it shall be done by the Contractor as directed by the Architect/NLUO. Payment for the necessary pipe lines would be made as per tender items, however all other costs including temerity measures shall be borne by the contractor.

3.0 Documents to be enclosed along with the final bill :

3.1 Completion Dressings : On completion of all works under his contract, the contractor shall prepare & submit (At his own cost) 3 sets (1. Blue print or Drawing on treating cloth & 2. Ammonia prints of each drawing) of completion drawings, showing the entire system of water supply, sanitary installations, drainage & sewerage disposal incorporating up to date changes (If any) at site in all the works mentioned above & permanent structures, roads, pathways, boundary lines etc.

The following drawing (In scales as instructed by the Architects) shall be prepared and submitted to the Architects along with the contractor's final bill :

The following drawings (In scales as instructed by the Architects) shall be prepared and submitted to the Architects along with the Contractor's final bill.

a. Site layout (Sewerage & Drainage Lines)

b. Any other drawings as required any instructed to be done by the Architects.

3.2 List of materials / installations handed over : on completion of works in all respects and satisfactory testing , the contractor shall prepare & submit a list , along with the final bill of all materials / installations handed over to the authorized representative of owner.

3.3 Transfer of Manufacture's guarantee : When manufacturers guarantee period for any material/ installation expired at a letter date then that of the expiry date of the defect liability period of the contractor, the contractor shall transfer the guarantee in the name of the owner this transfer should be made at the item of submitting the contractor's bill for release of retention money.

4.0 Cement : The cement must be kept in dry place under cover, Samples of cement may be taken by the Architects/Owner from time to time for testing at any approved laboratory whose reports shall be accepted by both parties.

5.0 Sand : Sand is to be clean, coarse and sharp and is to be washed, if so directed.

6.0 Aggregate : The aggregate for the reinforced cement concrete work shall be stone chips or broken gravel of approved quality which will pass through 12mm. mesh but be retained on 6mm mesh.

The aggregate for the support or drain pipes, manhole chambers etc. shall be of stone chips of 20mm & down size.

7.0 Concrete : For reinforced cement concrete work the cement, sand and aggregate shall be in the proportion of (1:2:4) for foundation work, the mix will be in the proportion of (1:3:6) whenever reinforced cement concrete (RC.C.) is mentioned in schedule of quantities, it shall mean inclusive of cost of steel reinforcement bars, providing & removing shuttering etc. all complete.

8.0 Bricks : Bricks shall be of the best quality will burnt sound, hard & giving clear ringing tone of sound when struck against each other and well shaped bricks having crushing strength so kg/sq. cm. unless stated otherwise in the respective schedule of items of standard dimensions and to be soaked for at least six hours in water before use.

9.0 Brick work : The brick work shall be in English bond, and shall be laid in cement sand mortar in the proportion of (1:6), if not mentioned otherwise. Where corbelling is necessary, projection in each course shall not exceed (2 1/4") 57mm. All brick work must be kept wet till the mortar will fully set.

10.0 Soling : For soling, the bricks shall be having crushing strength 75 kg/sq. cm., bricks laid flat, the joints being well packed with loose sand.

11.0 a) Excavation general : Excavation shall generally form part of the item under the schedule and shall not be paid for separately unless otherwise specified in the schedule of quantities. It includes excavation in all kinds of soil including shoring and bailing out water where necessary and refilling the excavated trenches, in 15 cm layers properly rammed and watered and neatly dressed at top. If the excavation is done to dimensions greater than those shown on the drawings or as directed by the Architect /NLUO, the excess depth shall be made good at the cost of the contractor. The excavation work should be done in a manner that does not in any way endanger the stability of the adjacent buildings or other structure or services. Where any road. Pavement of crossing are cut these shall be restored to their original conditions at no extra cost. Moreover after completion of the work the contractor shall have to dress the site including disposal of the surplus earth at their own cost as directed by the Architect/NLUO.

b. Trenches, General : The width of the bed of trenches shall be the exact width as show on the drawings or as specified.

In the firm soil , the sides of trenches shall be kept vertical up to a depth of 1.82 meter and for a greater depth, the trench shall be widened be allowing steps of 45cm (1'-6") on either side after every 1.82 M depth from bottom so as to give side slopes of (1/4" to 1") 6 mm to 25mm. Where the soil is soft, loose or slushy the width of steps shall be suitably increased as directed by the Architect/NLUO. It shall be the responsibility of the contractor to take complete instructions in writing from Architect/ Employee regarding the stepping, sloping or shoring to be done for excavation in trenches deeper than 1.83 M for firm sill or any depth for soft, loose of slushy soil.

The bed of the trenches shall be made level and firm by watering and ramming. Any soft or defective spots that are found shall be filled with concrete of the same proportion as specified or as may be directed by the Architect/Owner.

12.0 **Sanitary Installation:**

a. Indian Type W.C. Pan : The W.C. pan shall be of white vitreous China of specified size and pattern wash down type unless otherwise specified. It shall be of back flush inlet type. The pan shall be of approved best quality and shall bear the mark of the Manufacturer. The pan shall be provided with a 100 mm C.I. "P' or 'S' trap as specified in the item with minimum 50 mm seal.

b. Fixing : The W.C. pan shall be sunk or raise from the general floor as specified, but its surrounding floor shall be sloped towards the pan. Care shall be taken so that the pan is not damaged in the process of fixing ; if damaged in any way, it shall be replaced immediately. It shall be fixed in a proper cement concrete base of [1:3:6] proportion taking care that the cushion is uniform and even without having any hollows between the concrete base and pan.

The joint between the pan and the trap shall be made with cement mortar [1:2] with jute hessian gasket soaked in coal tar and shall be leak proof.

13.0 **European type W.C.**

a. European type W.C. pan shall be readily flushed . of wash down type, shall bear the mark of an approved firm and shall be of best quality. The closet shall be of vitreous china ware having integrated trap 'p' or 's' type with or without vent hole right or left as directed.

b. Seat :The seat with lid shall be of solid white plastic or approved colour or as specified with rubber buffers and shall be fixed in position by using chromium plated (C.P.) brass hinges and screws.

14.0 **Urinal :**

a) Lipped Front Urinal : The urinal shall be of flat back lipped front basin of required dimensions of white vitreous chinaware of an approved make as specified . It shall be fixed in position by using rawl plugs embedded in the wall with screws of proper size or fixed as per approved Manufacturer's specification. Each urinal shall be connected to a 32 mm N.B. PVC waste pipe with clamps which shall discharge into a channel or floor trap, or as specified.

b. Painting : The inside of the invisible portions of the fittings and brackets connected with urinal basin shall be painted with approved bituminous paint and outside of the brackets, etc. shall be painted with a priming coat of red oxide to give an even shade to match the colour of surrounding walls. The cost of such painting shall be included in the rate quoted for the concerned tender items.

15.0 **Flushing System**

a) Only where specifically instructed for E.P.W.C.s and ODISHA type I.P.W.C.s, low level type flushing cistern to be provided and shall be of white vitreous chinaware of approved make, 10 liters capacity with internal fittings, brackets and C.P. 40mm flush pipe & bend with rubber packing , brass C.P. handle etc. The low level type flushing cistern shall be connected with the W.C. pan by means of 40mm dia C.P. flush bend with rubber packing. The inlet pipes shall be connected with brass C.P. heavy connector of required length with both ends C.P. nuts & washers.

16.0 **Wash Hand Basin**

a) Wash Hand Basin : The basins shall be of white vitreous china of approved pattern. The size of the basin shall be as specified. The basins shall be of approved quality and make.

b) Fittings : Each wash hand basin shall be provided with pillar tap as specified, having a centered tap hole with C.P. protruded nose pillar cock heavy type. This must be included with 32 mm dia C.P. basin waste, C.P. Bottle trap & concealed G.I. waste pipes (Or heavy PVC waster pipe of required length with C.P. brass couplings) as stated in the respective Schedule of items.

c) Fixing : The circular basins shall be supported on counter top and the rectangular basins shall be supported on a pair of C.I. concealed type brackets embedded in wall or fixed in position by means of wooden cleats and screws as required.

d) The waste pipes shall discharge into the floor trap inlet or as specified.

17.0 **Sinks :**

a) Sinks : The sink with drain board shall be of best quality stainless steel, make of approved quality & brand . The size of the sink shall be as specified. The sink shall be of approved quality.

b) Fixing : The sink shall be supported on M.S. fabricated on C.I. cantilever bracket to match with sink profile. Embedded or fixed into position by

means of wooden cleats and screws or embedded in wall with concrete as per site condition. The brackets shall be painted with approved shade and colour to match with the surrounding finish.

c) The G.I. waste pipe shall discharge into floor trap inlet or as specified.

18.0 **Toilet Requisites :**

a) Mirrors : The piece glass mirrors shall of approved make glass as specified. The size and shape of the mirror shall be as specified. It shall be mounted on the asbestos sheet and shall be fixed in position by means of C.P. brass dome shaped screws over rubber washers and rawl plug firmly embedded in wall .

The plate glass mirrors of suitable shapes & size as per detailed drawings shall be provided with accessories for round counter type basins.

b) Water connection : water connection to flushing cistern, wash hand basins shall be by means of white PVC connector or C.P. connector with stop cock as specified in the respective items.

c) Shelf : Unless otherwise specified the shelf shall be of porcelain of approved quality & design. The size of the shelf shall be as specified. The brackets shall be fixed to the wall with C.P. brass screw to wooden plug firmly embedded in the wall.

d) Urinal Partition : Unless otherwise specified partition for urinal shall be shape out of 20mm thick x 900 mm white marble. Fixing shall be done by inserting the portion approx 75mm inside wall & grouting the same in cement concrete (1:3:6). All the exposed surfaces & edges shall be properly ground to shape and polished. Joint with wall to be finished with white cement.

e) Towel Rail : The towel rails with bracket of brass C.P. or anodized aluminum as stated in Schedule of Items shall be of approved shape and design. The size of the rail shall be of approved shape and design. The size of rail shall be of approved shape and design. The size of the rail shall be as specified. The brackets shall be fixed by means of C.P. brass screws or Rawl plug firmly embedded in wall.

f) Paper Holder :- The paper holder shall be for white vitreous chinaware of recessed type & the rate shall include chase cutting of walls, setting in cement sand mortar & making good the all round joint with white cement.

19.0 **uPVC(SWR). soil , waste and vent Pipes and fittings**:

a) **uPVC Pipes and fittings**: The **uPVC** pipe and fittings should be of I.S.I marked pipes & fittings conforming to I.S 13592 -1992 Type A of latest editions, of approved quality. The pipes shall be free from cracks and other flaws. The interior of pipes and fittings shall be clean and smooth and painted inside with approved anti-corrosive paint.

Nominal mass : The nominal mass and thickness of pipes are given below along with Tolerance acceptable as per I.S. norms :

Normal outside diameter	**Tolerance on outside diameter**	**Wall thickness type - a**	
		MIN	**MAX**
75	+0.3	1.8	2.2
110	+0.4	2.2	2.7

160	+0.5	3.2	3.8

b) **Fixing :** The pipes and fittings shall be fixed to walls by using proper clamps. The pipes shall be fixed perfectly vertical or in a line as directed. All soil pipes shall be carried up above the roof and shall have uP.V.C vent cowl. Where pipes are laid along walls, the uP.V.C pipes are to be fixed 25mm away from the wall surface. Fabricated M.S. flat with G.I. clamps and necessary nuts and bolts are to be used for this purpose may be used only on specific instructions of of Architects / NLUO, where diversions are to be provided. Payment for such fabricated M.S. clamps /hangers shall be made separately as per Schedule of items.

The access door fittings shall be of proper design so as not to from any cavities in which fill may accumulate. Doors shall be provided with brass bolts & rubber insertions connections between main pipe and the branch pipes shall be mad by using trenches and bends invariable with access doors for cleaning.

In this method, instead of forming a socket on one pipe and spigot on other, an injection moulded socket fitting or coupler is used, with a provision to take in the pipes at both ends. After properly cleaning ends of both the pipes the solvent cements are applied on the surfaces to be jointed and the joint ismade at ambient temperature. Injection moulded fittings only shall be used in preference to fabricated fittings. Only solvent recommended by the manufacturers of the pipes shall be used and full load on the joints applied only after 24 hours. The pipe shall be cut perpendicular to the axis of the pipe length with a metal cutting saw. Pipe ends have to be beveled slightly with abeveling tool (Remer) at an angle of about 30 degree. The total length of insertion socket (injection moulded socket or couplet) shall be marked on the pipe and checked how far the pipe end could be inserted into the fitting socket. Attempt shall be made to push the pipe to marked distance, if not possible it shall at least be pushed for 2/3 of this distance.Dust, oil, water grease etc. shall be wiped out with a dry cloth from thesurface. Further the grease should be thoroughly removed with a suitable solvent, such as methylene chloride or as an alternative the outside surface of the pipe and the inside of the fitting may be roughened with emery paper. Generous coatings of solvent cement shall be evenly applied on the inside of the fittings around the circumference of the full length of insertion and on the outside of the pipe end up to the marked line with a brush of suitable dimension. The pipe shall be pushed into the fitting socket and held for 2minutes as otherwise the pipe may come out of the fitting due to the slippery quality of cement and the tapering inside bore of the fitting. The surplus cement on the pipe surfaces shall be wiped out. If the solvent cement has proper and pipe will come out of the fitting. In summer months joints shall be made preferably early in the morning or in the evening when surrounding environment is cooler. This will prevent joint from pulling apart when the pipe cools off at night. Heat application method for jointing shall not be allowed.

c) **Flanged Joints :**

For jointing uPVC pipes particularly of larger size to valves and vessels and larger size metal pipes where the tensile strength is required the joint

is made by the compression of a gasket or ring seal in the face of CI flange. Flanges solvent welded to the uPVC pipes shall be supplied by the manufacturers.

d) **Rubber Ring Joints :**

Rubber ring joints can provide a watertight seal but do resist pull. As such these may be used only as repairs collar and for jointing pipes larger than 110mm. Such joints may be provided on pipes, which are buried in the ground and supported throughout on bedding so that they are not subject to movement and longitudinal pull. The material of rubber ring shall conform to IS : 5382-1985, where aggressive soil are met with, synthetic rubbers perform better for jointing. The ring shall be housed in a groove formed in plastic or metallic housing. The ring shape and the method of compressing the ring vary considerably in different type of joints. Most joints often require the application of lubricating paste, which shall be procured from the manufacturer of PVC pipes.

e) **Mode of Measurements :**

The length shall be measured in running metre correct to a cm for the finished work which shall I include uPVC fittings such as bends, tees, elbows, reducer, crosses, plugs, sockets, nipples and nuts, but exclude, taps, valves, etc. All pipes and fittings shall be classified according to their outside diameter. Reducer shall be measured along with the larger diameter pipe. As far as jointing is concerned even though explained in foregoing paras the jointing of pipes shall be carried out as per the code of practice.

f) Testing : Prior to testing ,safety precautions should be instituted to protect personal and property in case of test failure.Conduct pressure test with water ,do not use air or other gases for pressure testing . The piping system should be adequately anchored to limit movement.Water under pressure experts thrust forces in piping systems. Thrust blocking should be provided at changes of direction,change in size and at dead ends.Tables for initial set and cure times before pressure testing should be preffered.The piping systems should be slowly filled with water, taking care to prevent surge and air entrapment. The flow velocity should not exceed 1feet per second.All trapped air must be slowly realeased.Vents must be provided at all high points of the piping system.All valves and air relief mechanisms should be opened so that the air can be vented while the system is extremely dangerous and it must be slowly and completely vented prior to testing.The piping system can be pressurized to 125% of its designed working pressure.However care must be taken to ensure the pressure does not exceed the working pressure of the lowest rated component in the System(valves,unions,flanges,treaded parts etc).The pressure test should not exceed one hour.Any leaking joint or pipe must be cut out and replaced and the line recharged and retested using the same procedure.

g) uP.V.C pipe:uP.V.C pipes shall conform to I.S 13592 Type A with solvent cement joints . The main uP.V.C pipes shall be of 110mmdia O.D.as specified

20.0. PIPING MATERIALS

20.4 Installing of Pipes

- Fit the welding machine with the dies of required pipe and fittings diameter to be processed and connect with plug to the 230 V power supply socket. Wait until thermostat light on the machine goes off, indicating that welding machine has reached the working temperature (260^0 C).

- Cut the pipe at right angles to axis. In order to avoid the errors in defining the distances and direction of the fittings, one may use a pencil for markings.

- Push the end of the pipe and simultaneously the fitting without turning them up to the marked welding depth into tools. It is important to observe the heating times of assembly parts.

- After stipulated heating time, quick remove pipe & fitting from the welding dies. Join them immediately and without turning, until the marked welding depth of pipe is covered by the PP-R fitting.

- After heating the joining parts don't push them vigorously. At the stage of joining, it is possible to effect the rotation of maximum 10^0 to 15^0 in order to perform coaxial correction.

20.5 Fixing Ferrules

For fixing ferrule, the empty main shall be drilled and tapped at 4-5° to the vertical and the ferrule screwed in. The ferrule must be so fitted that no portion of the shank shall be left projecting within the main into which it is fitted.

20.6 Cutting Chases in Masonry Walls

The chases up to 7.5 x 7.5 cm shall be made in the walls for housing GI pipes etc. These shall be provided in correct positions as shown in the drawings or directed by the Architects. Chases shall be made by chiselling out the masonry to proper line and depth. After GI pipes etc are fixed in chases, the chases shall be filled with cement mortar 1:2:4 or as specified may be made flush with the masonry surface. The concrete surface shall be roughened with wire brush to provide a key for plastering.

20.7 Water Fittings

Unless otherwise specified, all gunmetal fittings such as gate, globe, check & safety valves shall be fitted in pipe line in a proper workman like manner. Necessary unions shall be provided on both ends of the valves for easy replacement. The joints between fittings and pipes shall be leak-proof when tested to a pressure of 2.5 times of working pressure. The defective fittings and joints shall be replaced or redone.

20.8 **Making water connection**

A pit of suitable dimension shall be dug at the point where the connection is to be made with main line and earth removed up to 150 mm below the main. The flow of water in main shall be disconnected by operating the nearest sluice valve on the main. The main shall be drilled and slopped at 45° to the vertical and the ferrule of required size shall be screwed in. The ferrule shall be fitted in a manner so that no portion of projection of the shank shall be left projecting within the main into which it is fitted. Ferrule shall be non-ferrous material with a C.I bell mouth cover and shall be of nominal bore as required.

20.9 INTERNAL WATER SUPPLY, PLUMBING

GENERAL

1 The scope of internal water supply, plumbing shall consist of provisioning and fixing of the following for each dwelling unit of each block.

a) CPVC Pipe (10Kg/sqcm) with fitting and valves for water supply

2 The entire work shall be carried out by licensed plumber**.**

WATER SUPPLY

3 Scope of Internal water supply will include as under :-

a) All CPVC pipes (10Kg/sqcm) and fittings including valves etc. of sizes and as per layout and details shown on Tendered drawings.

MATERIALS

4 All CPVC Pipes shall be ISI Marked of approved make of 10Kg/sqcm.pressure.

5 All CPVC fittings shall be of approved make.

6 Valves shall be of approved brand.

LAYING , FIXING AND FITTING OF CPVC PIPES

7 All pipes below ground shall be laid in trenches and shall have minimum cover of 600 mm.

8 In the concealed portion of plumbing no joints shall be provided in the pipe lines except in the fittings i.e. bends, elbows, tees and nipples where required.

9 Unions : Contractor shall provide adequate number of unions on all pipes to enable dismantling later. Unions shall be provided near each valve, stop cock or check valve, and on straight runs as necessary at appropriate locations as approved by PMC/NLUO.

10 Puddle Flanges : Puddle flanges shall be provided to all connections i.e. inlet, outlet, overflow and scour of the overhead tank wherever required.

11 Approval Of Layout Of Pipes And Position Of Fixtures At Site : The contractor shall mark the location of all fixtures and fittings and layout of pipes on the walls/ floor/ ground at site and take approval of PMC/NLUO before commencement of cutting chases for Pipes.

MISCELLANEOUS

CPVC GRATING OVER OVERFLOW CHANNEL:

a) CPVC grating to be provided on overflow channel shall be removal type and made out of solid CPVC bars of size 10mm x 18mm. The width of the grating shall be 300mm.

One sample piece of grating shall be got approved from the PMC/NLUO before bulk supply order is placed.

20.9 **Installation of Water Meter and Stop Cock**

The G.I lines shall be cut to the required lengths at the position where the meter and stop cock are required to be fixed. Then end of the pipe shall be threaded. The meter and stop cock shall be fixed in a position by means of connecting pipes, GI jam nut and socket etc. The stopcock shall be fixed near the inlet of the water meter. The paper disc inserter in the ripples of the meter shall be removed. And the meter is installed exactly horizontal or vertical in the flow line in the direction shown by the arrow on the body of the meter. Care shall be taken that the factory seal of the meter is not disturbed. Wherever the meter shall be fixed to a newly fitted pipe line, the pipe line shall have to be completely washed before fitting the meter.

20.10 **Connections to RCC Water Tanks**

The contractor shall provide all inlets, outlets, washouts, vents, ball cocks, overflows control valves and all such other piping connections including level indicator / controller to water storage tanks as called for. All pipes crossing through RCC work shall have puddle flanges fabricated with MS/GI pipes of required size and length and welded to 6mm thick MS plate. All puddle flanges must be fixed in true alignment and level to ensure further connection in proper order.

Suitable float controls of an approved make, securely fixed to the tank, independent of the inlet pipe and set in a position such that water inlet into the tank is cut off when filled up to the water line. The water level in the tanks shall be of adjusted to 25mm below the lip of the overflow pipe. Full way gate valves of an approved make shall be provided as near the tank as practicable on every outlet pipe from the storage tank except the overflow pipe. Overflow and vent pipes shall terminate with mosquito proof coupling.

The overflow pipe shall be so placed to allow the discharge of water being readily seen. The overflow pipe shall be of size as indicated. A stop valve shall also be provided in the inlet water connection to the tank. The outlet pipes shall be fixed

approximately 75mm above the bottom of the tank towards which the floor of the tank is sloping to enable the tank to be emptied for cleaning.

20.11. **Disinfection of piping system and Storage Tanks**

Before commissioning the water supply system, the contractor shall arrange to disinfect the entire system as described in the succeeding paragraph.

The water storage tanks and pipes shall first be filled with water and thoroughly flushed out. The storage tanks shall be filled with water again and disinfecting chemical containing chlorine shall be added gradually while tanks are being filled to ensure thorough mixing. Sufficient chemical shall be used to give water a dose of 50 parts of chlorine to one million parts of water. If ordinary bleaching powder is used, the proportions will be 150 gms of powder to 1000 liters of water. The powder shall be mixed with water in the storage tank. If a proprietary brand of chemical is used, the proportions shall be specified by the makers. When the storage tank is full, the supply shall be stopped and all the taps on the distributing pipes are opened successively. Each tap shall be closed when the water discharged begins to smell of chlorine. The storage tank shall then be filled up with water from supply pipe and added with more disinfecting chemical in the recommended proportions. The storage tank and pipe shall then remain charged at least for three hours. Finally the tank and pipes shall be thoroughly flushed out before any water is used for domestic purpose.

20.12 **Shifting of Excavated Surplus Material**

Contractor shall make his own arrangement to shift the surplus excavated material within the site limits as directed by Engineer-in-charge.

20.13 **Testing**

a) All water supply system shall be tested to hydrostatic pressure test of at least two and half time the maximum pressure but not less than 7.5 Kg/Sq Cm. for a period of not less than 24 hours. All leaks and defects in joints revealed during the testing shall be rectified and got approved at site.

b) Piping required subsequent to the above pressure test shall be retested in the same manner.

c) System may be tested in sections and such sections shall be entirely retested on completion.

d) The Contractor shall make sure that proper noiseless circulation of fluid is achieved through the entire piping network of the system concerned. In case of improper circulation, the contractor shall rectify the defective connections. He shall bear all expenses for carrying out the above rectifications including the tearing up and refinishing of floors and walls as required.

21.0 INTERNAL WATER SUPPLY SYSTEM:

Supplying, laying, jointing, testing &commissioning approved make chlorinated Polyvinyl Chloride (CPVC) pipes of approved make as per IS: 15778 & ASTM-D 2846, GRADE SDR 13.5(CLASS-2)., having thermal stability for hot & cold water supply, including all CPVC plain & brass threaded fittings i/c fixing the pipe with clamps at 1.00 m spacing malleable fittings viz., tees, elbows, flanges, unions etc.,including cutting threading, fixing in/on walls, below ceilings, under floor etc., as per drawings. The quoted rate shall include necessary earthwork, chasing in walls, making bores in walls, foundations and slabs and making good the chased surfaces and bores in CM 1:4.

Supplying, installing and testing approved make **GM/Brass ball valves** conforming to IS 1703 with unions etc., complete .

25 mm nominal bore
32 mm nominal bore
40 mm nominal bore
50 mm nominal bore
63 mm nominal bore

Providing and fixings Union of approved quality (screwed end)

25 mm nominal bore
32 mm nominal bore
40 mm nominal bore
50 mm nominal bore
63 mm nominal bore

22.0 RAIN WATER SPOUT AND PIPES

Providing and fixing on wall face unplasticised PVC (working pressure 4 Kg. per sqcm) rain water pipes confirming to IS : 4985 including jointing with seal ring conforming to IS : 5382 leaving 10 mm gap for thermal expansion.

Single socketed pipes
110 mm diameter

Providing and fixing on wall face unplasticised - PVC moulded fittings / accessories forunplasticised - Rigid PVC rain water pipes conforming to IS : 13592 Type A including jointing with seal ring conforming to IS : 5382 leaving 10 mm gap for thermal expansion

110 mm bend with door
110 mm plain bend

110 mm shoe

Providing and fixing unplasticised-PVC brackets of approved design to unplasticised-PVC rain water

By means of nuts and bolts hard wood plugs, screwed with M.S. screws of required length including cutting

brickwork and fixing in cement mortar 1:4 (1 cement : 4 coarse sand) and making good the wall etc. complete.

110 mm diameter

23.0 **Galvanized Iron pipes**

a) Fittings : The pipes shall be of galvanized (As per I.S. 4736 of latest edition) steel, screwed and socketed and shall conform to I.S. 1239 (Part-I) of latest edition. The fittings shall be of malleable cast iron (Galvanized) with ISI mark up to 100mm nominal bore. For pipes above 100 mm N.B., welded steel fittings (Galvanized) may be used. Unless otherwise specified thread shall be screws taper thread and sockets parallel thread and each tube shall be laid beveled sufficiently to prevent damage to the leading thread.

Nominal Bore.	weight of Pipe in Kg/mtr		
	Light	Medium	Heavy
15mm	0.96	1.23	1.46
20mm	1.42	1.59	1.91
25mm	2.03	2.46	2.99
32mm	2.61	3.17	3.87
40mm	3.29	3.65	4.47
50mm	4.18	5.17	6.24

b) Laying & Fixing : Where pipes have to be cut or rethreaded. ends shall be carefully filled out so that no obstruction to bore is offered.

In jointing the pipes, the inside of the socket and the screws end of the pipes shall be rubbed over with white lead and few turns of hemp yarn wrapped round the screwed end of the pipe which shall then be screwed home to the socket with a pipe wench. Care must be taken that all pipes and fittings are kept at all times free from dust and dirt during fixing . Any threads exposed after jointing shall be pined.

c) All cutting holes, chases , trenches etc, at any place necessary in connection with the work as per items of this tender any subsequent mending damages are to be included in the rates and not paid extra unless other -wise specified.

Internal work : Internal G.I. pipes and fittings inside the duct walls shall be generally fixed on walls by means of standard pattern holder bat clamps keeping the pipe 20mm clear of the wall every where or concealed where required a s directed. If G.I. pipes and fittings of inside wall are to be concealed , if shall be by chasing floors and walls as directed. where it is imperative to fix the pipe inside toilers , kitchen, pantries, in front of a house or any conspicuous position, where it looks unsightly, chasing to be adopted. The holder bat clamps shall be fixed

at a distance not exceeding 3.00 meter apart for vertical pipes & 1.50 meters for horizontal pipe s which are to be secured to walls by hooks. The valves shall be fitted with a union. In long length run of a pipe at least in every 3.00 meters apart there shall be a long screw/union.

All pipes and fittings shall be fixed truly vertical and horizontal or as directed by the Architects,/Owner.

d) **External work :** For external work G.I. pipes and fittings shall be laid in trenches. The width of the trench shall be of minimum width required for the work. The pipe s laid underground shall not be less than 60cm from the ground level. They shall be surrounded on all sides by sand of approved quality. The work of excavation and refilling shall be done in accordance with the general specification for earth work.

e) **Painting :** All internal G.I. pipes and fittings shall be painted with 2 coats of oil paint of approved quality manufacture, colour and shade. The cost of such paintings shall be included in the contractor's rate. All pipes and fittings in external work shall be painted with 3 coats of anti-corrosive Bitumastic paint. Unless otherwise specified all concealed pipes and fittings shall be painted with 3 coats of Bitumastic anticorrosive paint.

f) **Testing :** After installation (But before covering up where needed) all G.I. pipes, and fittings shall be tested by Hydraulic pressure machine to a pressure of 7 kg. per sq. cm. All lead joints must be mad e leak proof by tightening or re-doing at contractor's expense and the pipe line must be retested to the above pressure.

24.0 **Brass or C.P. on Brass water Fittings (As specified in respective schedule of items):**

All fittings shall be of standard Manufacture and shall in all respect comply with the Indian standard specifications. The brass fittings shall be fixed in pipe line in workman like manner . Care must be taken to see that joints between fittings are made leak proof . The fittings and joints shall be tested to a pressure of 7 kg. per 80cm unless otherwise specified. The defective fittings and the joints shall be repaired, redone or replaced at the contractor's expenses.

24.1 **Bib cock :** The bib cock shall be of horizontal inlet & free outlet of specified quality of screw down a pattern of the size as specified. The closing device shall work by means of disc carrying a renewable non-metallic washer which shuts against water pressure on a seating at right angles to the axis of threaded spindle which operates it. The handle (Head) shall be of approved design & shape. The cock shall open in anti-clockwise direction. The cock shall be polished bright (For brass) and chrome plated on brass (For C.P.) . Minimum weight shall be 0.40 kg. for 15mm size bib cock.

24.2 **Stop Cock :** The stop cock shall be plain or angular type as per it's place of installation & of specified quality opening anti clockwise & of screw down pattern of the size as specified. Other specifications shall be as per the specification of Bib cock above .

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25.0 **Manholes, Gully Chambers etc. :**

a) Size of Manhole : The size specified shall be the internal size of the manhole. The work shall be done strictly as per drawing and specification. The following specifications shall be adopted.

b) Excavation : The manhole shall be excavated true to dimensions and levels shown on he plan or as directed by the Architect/Owner.

c) Brick work : The brick work shall be with bricks having crushing strength 75/sq. cm brick in cement mortar 1:4 . It shall be 250 mm thick or as instructed by the architect/ NLUO.

d) All angles shall be rounded 7.5 cm radius and all rendered internal surfaces should be hard impervious finish obtained by using a steel trowel. The external troe joints of the masonry shall be finished smooth.

e.) In wt ground 20mm thick cement plaster of the above specifications shall be done on he outside surface of the walls also. this plaster shall be water proofed with addition of 1 kg. of acco proof to 50 kg (1 bag) of cement or with addition to any other equal and approved waterproofing compound. The plastering shall be done up to 30cm above the set soil lines.

f) Channel and Benching : Channels shall be semi-circular in the bottom half and of diameter equal to the sewer. Above the horizontal diameter, the sides shall be extended vertically to the same level as the crown of the outgoing pipe and the top edge shall be suitable rounded off. The branch channels shall also be similarly constructed with respect to the benching but at their junction with the main channel on appropriate single suitably rounded off in the direction of flow in the main channel.

The channel and benching shall be done in cement concrete (1:2:4) rising at a slope of 1 in 6 from the edges of channel. The channels at the bottom of the chamber shall be plastered with cement mortar 1:4 (1 cement :4 coarse sand) and steel trowelled smooth.

g) R.C.C. Work : R.C.C. work for slabs etc. shall be in cement concrete 1:2:4 with steel reinforcement as per detail drawings.

h) Plain Concrete : If used for fixing manhole covers, shall be of the above specifications.

i) Foot Rests : These shall be of M.S. square rods 20 x 20 mm or as specified and shall be galvanized or painted with coal tap these shall be embedded in cement concrete (1:2:4) at least (9) 23 cm. while the brick work is in progress. These shall be fixed 30 cm, apart vertically and staggered laterally and shall not reject more than 11 cm from the wall.

j) Manhole covers and frames : All covers shall be of heavy type. these shall be non -locking or locking type as specified and capable of easy opening and closing . These shall ordinarily be gas and water tight, These shall be soluble water seal type manhole cover and frame. the covers as specified in schedule of Quantities, C.I Surface box for air valves, sluice valves, peet valves etc. shall be of sufficient dimensions to suit the sizes of these fittings and shall be of heavy pattern when fitted in level to heavy traffic and shall be of standard design or as directed by the Architect/NLUO.

k) The frame of manhole cover shall be embedded firmly in the R.C.C. slab or plain concrete as the case may be on the top of the masonry.

l) When the manhole is built on the foot path , this shall be provided with 45cm internal diameter or as specified heavy type C.I . cover, of 56cm internal dia or as specified. When it is built the metalled width of the road under traffic, it shall be provided with approx 22" (560mm) internal diameter heavy type C.I . cover.

m) Painting : All C. I. / M.S. fittings like Manhole covers & frames, gratings, footrests etc, shall be painted with two or more coats of Bitumastic paint & it's rate shall be included in the rate of the Manholes, Gully chambers etc.

26.0 Types of Manholes

26.1 Manhole up to 0.75 Meter Depth : This shall be 0.9M x 0.8 M size (Internal dimension) unless otherwise shown in drawings instructed per site conditions.

a) Thickness of brick wall-250mm
b) Cement brick work - (1:4)
c) Plaster : Plaster on inside surface of walls, bottom & part of outside surface of walls and on RCC cover slabs shall be done as per drawings and directions.
d) Bed concrete (1:4:8)-150 mm thick with stone chips.
e) Brick flat soling - 75mm thick.

26.2 Depth of Manhole above 0.75 M up to 1.5 M : This shall be of 1.2 M x 1.2 M (internal) size unless otherwise shown in drawings or instructed as per site conditions.

Details same as that in item No 28.1 above.

26.3 Depth of Manhole above 1.5 M : This shall be of 1.2 M x 1.2 M (Internal) size or as specified.

a) Thickness of brick wall
   i) 250 mm up to 1.5 M from finished G.L.
   ii) 375 mm below 1.5 M from finished G.L.

Cement brick work plastering and Brick Flat Soling same as in Item 27.1 above.

27.0 **C.I Manhole Cover and Frame**

C.I (cast iron) frames and covers of the specified size and duty shall be embedded in reinforced cement concrete slab 1:2:4 (1 cement: 2 coarse sand: 4 graded stone aggregate 20mm nominal size) 15cm thick. Reinforcement shall consist of 12mm dia. M.S. bars of 15cm centre to centre.

Duty of Manholes covers & frame :

All manhole cover & frame shall be S.F.R. concrete conforming to IS specification. Manholes covers shall be as follows unless otherwise specified:

a) In the shaft or green area - Light duty
b) In pavement where only pedestrian traffic is allowed - Light duty/Medium duty
c) In road - Heavy duty

28.0 The C.I Manhole Cover and Frame shall conform to IS:1726 and the grade and types have been specified . The cover and frames shall be cleanly cast and they shall be free from air and sand holes and from cold shuts. They shall be neatly dressed and carefully trimmed. All castings shall be free from voids whether due to shrinkage, gas inclusion or other causes. Covers shall have a raised checkered design on the top surface to provide an adequate non-slip grip.

The sizes of covers specified shall be taken as the clear internal dimensions of the frame.

The covers and frames shall be coated with a black bituminous composition. The coating shall be smooth and tenacious. It shall not flow when exposed to a temperature of 63° C and shall not brittle as to chip off at a temperature of 0° C.

Thickness of bed concrete (1:4:8)- 225 mm with stone chips.

29.0 Prior approval of Sample Materials /Works : Samples and all materials & works shall be approved by the Architects/NLUO before the contractor undertakes any major procurement of materials or proceeds with the works concerned. The quantum of materials/works for approval of samples shall be decided by the Architect/NLUO & no extra payment shall be made to the contractor for sample materials procurement/or works & replacement of materials altering or redoing of works as required and instructed by the Architects/NLUO.

The typical approved sample material for each work shall be kept in the office of the NLUO/Architects at site until the satisfactory completion of the works. The materials supplied and installed at site shall be of the same quality & size as of the approved samples, otherwise they shall be rejected.

The decision of the Owner/Architects or their authorized representatives of whether a materials compares well with he approved sample shall be final and binding on contractor. The same principal shall be applicable to sample work approved & further works done at site.

30.0 Cleaning & disinfections of the supply system, water storage tanks and down take distribution pipes : All water mains , communication pipes, service and distribution pipes used for water for domestic purpose should be thoroughly and efficiently disinfected before being taken into use and allows after every major repair. The method and disinfections shall be subject to the approval or the Owner/Architects.

The water storage tanks (underground and Overhead) & pipes shall first be filled with water & thoroughly flushed out. The storage tanks shall ten be filled with water again and disinfecting chemical containing chlorine added gradually while the tanks are being filled, to ensure thorough mixing, sufficient chemical shall be used to five water a dose of 50 parts of chlorine to one million parts of water. If power to 1000 Liter of water . The power shall be mixed with water to a creamy consistency before being added to the water in the storage tank. If proprietary brand of chemical is used, the proportions shall be as specified by the markers, When the storage tank is full, the supply shall be topped and all the taps on the distribution pipes opened successively , working progressively away from the storage tank. Each tap shall be closed when the water discharge begins to smell of chlorine. The storage tank shall then be topped up with water from the supply pipe and with more disinfecting chemical in the recommended proportions. The storage tank & pipes shall then remain charged at least for three hours. Finally , the tank and pipes shall be thoroughly flushed out before any water is used for domestic purpose.

31.0 Cleaning & disinfections of the supply system, water storage tanks and down take distribution pipes : All water mains , communication pipes, service and distribution pipes used for water for domestic purpose should be thoroughly and efficiently disinfected before being taken into use and allows after every major repair. The method and disinfections shall be subject to the approval or the Owner/Consultants.

32.0 The water storage tanks (underground and Overhead) & pipes shall first be filled with water & thoroughly flushed out. The storage tanks shall ten be filled with water again and disinfecting chemical containing chlorine added gradually while the tanks are being filled, to ensure thorough mixing, sufficient chemical shall be used to five water a dose of 50 parts of chlorine to one million parts of water. If power to 1000 Liter of water . The power shall be mixed with water to a creamy consistency before being added to the water in the storage tank. If proprietary brand of chemical is used, the proportions shall be as specified by the markers, When the storage tank is full, the supply shall be topped and all the taps on the distribution pipes opened successively , working progressively away from the storage tank. Each tap shall be closed when the water discharge begins to smell of chlorine. The storage tank shall then be topped up with water from the supply pipe and with more disinfecting chemical in the recommended proportions. The storage tank & pipes shall then remain charged at least for three hours. Finally, the tank and pipes shall be thoroughly flushed out before any water is used for domestic purpose.

TECHNICAL SPECIFICATION FOR EXTERNAL DRAINAGE & SEWERAGE DISPOSAL

1. GENERAL SCHEME

The contractor shall install a drainage system to effectively collect, drain and dispose all soil and waste water from various parts of the buildings, appurtenances and equipment. The piping system shall finally terminate and discharge into the Sewerage Treatment Plant and then into the City sewer manhole. The piping work mainly consists of laying of UPVC pipes, as called for on the drawings. All piping shall be installed at depth greater than 60 cm below finished ground level. The disposal system shall include construction of gully traps, manholes, intercepting chambers as indicated. The piping system shall be vented suitably at the starting point of all branch drains, main drains, the highest/lowest point of drain and at intervals as shown. All ventilating arrangements shall be un obstructive and concealed. The work shall be executed strictly in accordance with IS:1742. The sewage system shall be subject to smoke test for its soundness as directed by the Project Director. Wherever the sewerage pipes run above water supply lines, same shall be completely encased in cement concrete 1:2:4 all round with the prior approval of the Project Director.

2. LAYING AND JOINTING OF PIPES

2.1 General

All the material shall be new of best quality conforming to specifications and subject to the approval of the Architects. Drainage lines shall be laid to the required gradients and profiles. All drainage work shall be done in accordance with the local municipal by-laws.

Contractor shall obtain necessary approval and permission for the drainage system from the municipal or any other competent authority. Location of all manholes, catch basins etc. shall be confirmed by the Project Director before the

actual execution of work at site. All work shall be executed as directed by the Project Director.

2.2 Alignment and Grade

The sewer and storm water drainage pipe/drains shall be carefully laid to levels and gradients shown in the plans and sections but subject to modifications as shall be ordered by the Project Director from time to time to meet the requirements of the works. Great care shall be taken to prevent sand etc. from entering the pipes. The pipes between two manholes shall be laid truly in straight lines without vertical or horizontal undulations. The body of the pipes shall rest on an even bed in the trench for its length and places shall be excavated to receive collar for the purpose of jointing. No deviations from the lines, depths of cuttings or gradients as called for on the drawings shall be permitted without the written approval of the Project Director. All pipes shall be laid at least 60cms below the finished ground level or as called for on the drawings.

2.3 Setting out Trenches

The contractor shall set out all trenches, manholes, chambers and such other works to true grades and alignments as called for. He shall provide the necessary instruments for setting out and verification for the same. All trenches shall be laid to true grade and in straight lines and as shown on the drawings. The trenches shall be laid to proper levels by the assistance of boning rods and sight rails which shall be fixed at intervals not exceeding 10 meters or as directed by the Architect.

2.4 Trench Excavation

The trenches for the pipes shall be excavated with bottoms formed to level and gradients as shown on the drawings or as directed by the Project Director. In soft and filled in ground, the Project Director may require the trenches to be excavated to a greater depth then the shown on the drawings and to fill up such additional excavation with concrete (1:4:8) consolidated to bring the excavation to the required levels as shown on the drawings.

All excavations shall be properly protected where necessary by suitable timbering, piling and sheeting as approved by the Project Director. All timbering and sheeting when withdrawn shall be done gradually to avoid falls. All cavities shall be adequately filled and consolidated. No blasting shall be allowed without prior approval in writing from the Project Director. It shall be carried out under thorough and competent supervision, with the written permission of the appropriate authorities taking full precautions connected with the blasting operations. All excavated earth shall be kept clear of the trenches to a distance equal to 75 cms.

2.5 Obstruction of Roads

The contractor shall not occupy or obstruct by his operation more than one half of the width of any road or street and sufficient space shall then be left for public and private transit. He shall remove the materials excavated and bring them back

again when the trench is required to be refilled. The contractor shall obtain the consent of the Project Director in writing before closing any road to vehicular traffic and the foot walks must be clear at all times.

2.6 **Protection of Pipes etc.**

All pipes, water mains, cables etc. met in the course of excavation shall be carefully protected and supported. Care shall be taken not to disturb the cables, the removal of which shall be arranged by the contractor with the written consent from the Owner.

2.7 **Trench Back Filling**

Refilling of the trenches shall not be commenced until the length of pipes therein has been tested and approved. All timbering which may be withdrawn safely shall be removed as filling proceeds. Where the pipes are unprotected by concreted hunching, selected fine material shall be carefully hand-packed around the lower half of the pipes so as to buttress them to the sides of the trench.

The refilling shall then be continued to 150mm over the top of the pipe using selected fine hand packed material, watered and rammed on both sides of the pipes with a wooden hammer. The process of filling and tamping shall proceed evenly in layers not exceeding 150mm thickness, each layer being watered and consolidated so as to maintain an equal pressure on both sides of the pipe line. In gardens and fields the top solid and turf if any, shall be carefully replaced.

2.8 **Contractor to ensure Settlement and Damages**

The contractor shall at his own costs and expenses, make good promptly during the whole period for the works in hand if any settlement occurs in the surfaces of roads, beams, footpaths, gardens, open spaces etc. in the public or private areas caused by his trenches or by his other excavations and he shall be liable for any accident caused thereby. He shall also, at his own expense and charges, repair (and make good) any damage done to building and other property. If in the opinion of the Project Director he fails to make good such works with all practicable despatch, the Project Director shall be at his liberty to get the work done by other means and the expenses thereof shall be paid by the contractor or deducted from any money that may be or become due to him or recovered from him by any other manner according to the laws of land.

The contractor shall at his own costs and charges provide places for disposal of all surplus materials not required to be used on the works. As each trench is refilled, surplus soil shall be immediately removed, the surface shall be properly restored and roadways and sides shall be left clear.

2.9 **Removal of water from Sewer, trench etc**

The contractor shall at all times during the progress of work keep the excavations free from water which shall be disposed by him in a manner as will neither cause injury to the public health nor to the public or private property nor to the work

completed or in progress nor to the surface of any road or streets, nor cause any interference with the use of the same by the public.

If any excavation is carried out at any point or points to a greater width of the specified cross section of the sewer with its cover, the full width of the trench shall be filled with concrete by the contractor at his own expense and charges to the requirements of the Project Director.

2.10 Route Markers

Markers indicating the particular service shall be provided along with the routes of pipe trenches. Markers shall be of mild steel indicating the type of service installed and the direction of flow painted on it. The markers shall be set firmly in a concrete base and installed at all corner and turning points. Over straight runs, markers shall be spaced centre to centre at 50 meter centre (generally).

2.11 Laying and jointing of UPVC PIPES

Soil, waste & vent pipes in shafts under the floors shall consist of UPVC pipes as described earlier. Waste pipes from bottle trap to floor/urinal traps for wash basin, urinal and sink shall also be of UPVC pipes and fittings.

All Horizontal pipes running below the slab and along the ceiling, shall be fixed on structural adjustable clamps, strudy hangers of the design as called for in the drawings. The pipes shall be laid in uniform slope and proper levels. All vertical pipes shall be truly vertical fixed by means of stout clamps in two sections, bolted together, built into the walls, wedged and neatly jointed. The branch pipes shall be connected to the stack at the same angle as that of fittings. All connections between soil, waste and ventilating pipes and branch pipes shall be made by using pipe fittings with inspection doors for cleaning. Pipes shall be fixed in a manner as to provide easy accessibility for repair and maintenance and shall not cause obstruction in shafts. Where the horizontal run off the pipe is long or where the pipes cross over building expansion joints etc. suitable allowance shall be provided for any movements in the pipes by means of expansion joint etc. such that any such movement does not damage the installation in any way.

Before jointing, the interior of the socket and exterior of the spigots shall be thoroughly cleaned and dried. The spigot end shall be inserted into the socket right up to the back of the socket and carefully. The jointed pipe line shall be at required levels and alignment.
No pipe/ joint shall be covered till the pipe line has been tested & approved (written) by the owner's site Engineer.
Before the appliances are connected all opening of pipes shall be inspected and tested. All opening of pipes shall be sealed with plugs and water test in small sections of pipes shall be carried out.

After installation of all the appliances, discharge test shall be conducted individually and collectively. Obstruction in any of the pipe lines shall be traced and whole system is examined for hydraulic performance, including the retention of any adequate water seal in each trap. Any defect revealed by the tests shall be made good and the tests are repeated until a satisfactory result is obtained.

2.0 GULLY PIT :

To be the standard size 1.06 m x 0.63 m and to be built in cement mortar 1:3 or 3:1 as specified in strict accordance with drawings. The internal sides and floor are to be finished with 12mm cement plaster to be fitted with a 150 mm uP.V.C. overflow pipe with hinged cover and handle 0.90x 45 C.I. Gully grid of the standard weight 15 cm syphone. The gully grid and frame are to be of 166 kg.

2.1 **S.W. Gully Trap**

Gully trap shall be stoneware conforming to IS:651. These shall be sound and free from visible defects such as fire cracks, or hair cracks. The glaze of the traps shall be free from cracks. They shall give a sharp clear note when struck with light hammer. There shall be no broken blisters. Each gully trap shall have one CI grating of square size corresponding to the dimensions of inlet of gully trap. It will also have a water tight C.I cover with frame inside dimensions 300 x 300mm the cover weighing not less than 4.5 kg and the frame not less than 2.7kg. The grating cover and frame shall be of good casting and shall have truly square machined seating faces.

Fixing of S.W. Gully Trap

The excavation for gully traps shall be done true to dimensions and levels as indicated on plans or as directed by the Project Director /Consultant / Architect. The gully traps shall be fixed on cement concrete foundation 65cm square and not less than 10cm thick. The mix for the concrete will be 1:4:8. The jointing of gully outlet to the branch drain shall be done similar to the jointing of S.W. Pipes described earlier. After fixing and testing gully and branch drain, a brick work of specified class in cement mortar 1:5 shall be built with a half brick masonry work round the gully trap from the top of the bed concrete upto ground level. The space between the chamber and trap shall be filled in with cement concrete 1:3:6. The upper portion of the chamber i.e. above the top level of the trap shall be plastered inside the cement mortar 1:3 finish with a floating coat of neat cement. The corners and bottom of the chamber shall be rounded off so as to slope towards the grating.

C.I cover with frame 300 x 300 mm (inside) shall then be fixed on the top of the brick masonry with cement concrete 1:2:4 and rendered smooth. The finished top cover shall be so as to prevent the surface water from entering the gully trap.

MODE OF MEASUREMENT

The method of measurement for various item in the tender shall be generally in accordance with the latest ISI : 1200 code , if not stated otherwise in this tender documents.

1.0 EXCAVATION :

a Footings. : Area of excavation for footing shall be measured equally to the area of the lowest concrete course as shown on the drawing -Depth shall be

measured vertically from ground level to bottom of concrete course or dry rubble packing or brick flat soling as the case may be.

b. Plinth Beams : Depth of excavation for plinth beam shall be measured from ground level up to bottom of beam and width equal to width of beam. If a leveling course is ordered. It shall be measured up to the bottom of the leveling course.

c. Where the excavations is made in trenches, measurements for cutting shall be taken by means of taps and staff and after completion of work and total quantity of excavation computed from these levels in manner approved by the architect/NLUO.

d. Where excavation is made for leveling the site ,levels shall be taken before start and after completion of work and work and total quantity of excavation computed from these levels in manner approved by the Architect.

e. Where soil including soft rock are mixed hard rock after excavation shall be stacked separately. Measurement of the entire excavation shall be taken as indicated above. Excavation of hard rock shall be measured from stacks of excavated hard rock and reduced by 40% for bulk age and voids. The quantity so arrived at shall be paid for under hard rock. The quantity so arrived at shall be paid as soil including and quantity payable under hard rock shall be paid as soil including soft rock.

f. Any additional excavation required for working space from work showing, planning, dewatering etc, shall not be measured for separately. Rates quoted for excavation shall include all these factors and filling back the trenches with available soil.

2.0 EARTH FILLING

To open spaces: Filling shall be measured from cross sections of embankment, levels of which are recorded by means of levels before start of work and after completion of work. When it is not possible to measure filling from cross sections, it may be measured from loose stack of lorry measurements with previous written permission from the N.L.U.O's Engineer and 20% deduction shall be made from the measured quantity to arrived at the net quantity payable.

3.0 CEMENT CONCRETE (PLAIN AND REINFORCED)

Cement concrete in P.C.C. items shall be measured excluding reinforcement and plaster thickness but including hire charges of centering and shuttering all equipments, curing, stacking and fair finishing. Reinforcement and plate shall be measured and paid separately .

Items like R.C.C precast jalli ,R.C.C. pipes and other such items which are normally manufactured in factories as well as those items which have been specifically mentioned in schedule of quantities shall be measured inclusive of reinforcement.

No deduction will be made for opening up to 0.1sq. and no extra labour for forming such opening or voids shall be paid,

Columns shall be measured from the top of the footing & shall be measured through. Including flare of the column in case of flat slab construction.

Beams shall be measured from face to face of columns/beams and shall include haunches if any. The depth of the beam (other than draft foundation beams) shall be measured from top of the slab to bottom of the beam.

In case of combined footings and raft foundation. The exposed portion of beam rib shall be measured as beam and the remaining portion measured in footings/raft slab.

Slab (Other than an raft foundation) shall be measured in bays (Clear of beam) either deduction for column portion.

Staircase : Measurements shall be in cum staircase comprising of step soffit slab .Landing slab shall be measured and paid under this item, side parapet walls., Railings finishing of risers & trades M.S. reinforcement and plastering etc. shall be paid separately under respective terms**.**

4.0 REINFORCEMENT :

Shall be measured in lengths of bars as actually placed subject to more of required as per structural drawings in position weight calculated actual or as per standard tables which ever is less with 3 places of decimals. No allowance being made in the weight for rolling margin. Wastage and binding wire shall not be measured. Authorized overlaps and spacers shall only be measured.

5.0 BRICK WORK

Except walls of half brick thickness or less. All brick work and be measured in cubic meters stating thickness.

THCIKNESS OF WALL :

Brick walls up to & including three (3) bricks in thickness shall be measured in multiples of half brick which shall deemed to be inclusive of the mortar joints.Where fractions of half brick occur to architectural or other reasons. The measurement shall be taken as full given brick.

For walling which is more than three bricks in thickness the actual thickness of wall shall be measured to the nearest centimeter.

DEDUCTION

No deduction or additions shall be made on any account for :-

i. Ends of dissimilar materials (i.e., joists, beams, lintels, lofts, girders, rafter, purlin, trusses, corbels, steps etc) up to 500 square centimeters in section.
ii. Opening up to 0.1 sqm in section.
iii. Walls plates lead plates and bearing of slabs, chajja & the like when the thickness does not exceed 10.00 cm. and the bearing does not extend over the full width of the wall.

6.0 WOOD WORK :

All wood work shall be measured net as fixed. No extra measurement will be given for shape , joints, splayed, meeting styles of doors and windows and shall be measured unit of square meter.

Area over one face inclusive of exposed frame thickness excluding width of cover mould shall be measure in case of doors, windows and ventilators when frames are included in the item. Portions embedded, in masonry or in flooring shall not be measured. Where frames are measured separately. It shall be measured for finished dimension. No allowance shall be made for wastage and for dimension supplied beyond those specified. Length of piece

shall be measured overall nearest to cm. so as to include protections for tennons. Scarves or mitres, width and thickness shall be measured to the nearest mm. cubical contents shall be worked out in units of 10 cubic decimeter in whole numbers.

In case of moldings, rounding, rebates, circular and varying sections. The sectional area of the pieces shall be taken as the area of the least square or rectangle from which such a section can out.

7.0 STEEL/ ALUMIUM DOORS WINDOWS VENTILATORS LOUVERS :

Clear area over one face inclusive of exposed frame shall be measured. Anchor fastner or portions embedded in masonry or flooring shall not be measured. All composite units shall be measured as fixed. Extra for side hung, top hung & center hung portions shall be measured from outside or the casement frames.

8.0 COLLAPSIBLE GATE :

The height of the gate shall be measured as the length of the double channels and breadth from outside to outside of the end fixed double channels in open portion of the gate.

9.0 FLOORING , SKIRTING , DADO :

Flooring shall be measured from skirting to skirting and where the wall surfaces are plastered or provided with dado it shall be measured from plaster to plaster or from dado to dado respectively.

10.0 PLASTERING AND POINTING. :

All plastering and pointing work shall be measured in square meters unless otherwise described, deductions will be made in accordance of IS- 1200.

11.0 PAINTING, WHITE WASHING COLOUR WASHING AND DISTEMPERING :

All painting work shall be measured in square meters.
Net area of the surface painted shall be measured. Deductions shall be made in accordance of IS-1200.

EXTERNAL DEVELOPMENT WORKS
TECHNICAL SPECIFICATION FOR EXTERNAL WATER SUPPLY AND DRAINAGE.

Excavation in all types of soil for laying water supply pipes upto 100mm dia. including forming bottom surface to required level, refilling selected excavated earth around the pipe in layers 150mm thick, watering, consolidating and disposing off the surplus earth within the site as directed by the engineer with a lead of **aproximately 500M** complete.

Supplying, fixing and testing inlet, outlet, vent and overflow pipes, fittings with C.I frame and cover to overhead water tank and under ground water tank complete with step irons as shown on the drawings etc., complete, accessories comprising of the following :

Construction of valve chamber with 230mm best quality TM bricks in CM 1:4 over a bed of 100 mm thick P.C.C.(1:4:8), internal walls plastered smooth in CM 1:3 and external walls plasered rough with sponge finish including curing with all necessary leads and lift and providing heavy duty cast iron cover with frame with locking arrangement ect. complete including Heavy duty cast iron cover of size 600*600 (weight 11Kgs.) For valves up to 80 mm dia Size 0.6mx0.6mx1M (clear dimension)
Providing and fixing Unplasticised polyvinyl chloride (uPVC) pipes, supplying including all uPVC plain &brass threaded fittings , this included jointing of pipes & and fitting with one step solvent cement , trenching , refilling & testing of joints complete as per direction of the Engineer-in-charge

32mm nominal dia pipes.
40mm nominal dia pipes.
50mm nominal dia pipes.
80mm nominal dia pipes.
100 mm nominal dia pipes.
150 mm nominal dia pipes.
200 mm nominal dia pipes.

Supplying and fixing in position approved make **C.I non-return valve** conforming to IS 778 with unions etc.,complete.
a) 40 mm dia
b) 50 mm dia
c) 65 mm dia
a) 75 mm dia
b) 80 mm dia
c) 100 mm dia
d)150 mm dia.
e) 100 mm dia.

Supplying, installing and commissioning approved make CI flanged brass `Y' strainer with necessary nuts and bolts, neoprene rubber gaskets, flanges, etc.., complete.

a) 80mm dia.
b) 50mm dia.

Providing, fixing, jointing and testing in position flowguard u**PVC with sch 80 pipes & fittings,** UV stabilized, confirming to ASTM D 1785 & ASTM D 2467 suitable for **cold water supply** in exposed works complete with all necessary fittings i.e. elbows, tees, bends, couplers, reducers, unions, plugs, clamps including jointing the pipe and fitings by solvent cement over primer coat as per ASTM D 2564 including proper support and clamped complete as required included threaded fittings with or without brass inserts including building expansion loop wherever pipe crosses exp joint, as required by the Engg-in-charge for proper completion of the work.

32mm nominal dia pipes.
40mm nominal dia pipes.
50mm nominal dia pipes.
65mm nominal dia pipes.
80mm nominal dia pipes.
100 mm nominal dia pipes.
150 mm nominal dia pipes.
200 mm nominal dia pipes.

RISING MAINS FROM BORE WELL TO U.G.R.

Excavating trenches upto 1.5 meter depth in all kind of soil of required width for pipes. including excavation for sockets and dressing of sides ramming of bottoms including getting out the excavated soil & then returning the soil as required, in layers not exceeding 20 cm in depth including consolidating each deposited layer by ramming, watering, etc & disposing of surplus excavated soil as directed within a lead of 50m or as directed at site by Engg-in-charge.

Pipes etc from 80 mm and above but not exceeding 300 mm dia.

Supply, laying, jointing, testing and commissioning of ISI marked u**P.V.C. pipes** (80 SCH) as per IS : 4984, including transportation upto the site, jointing by butt fusion / electro fusion welding, providing and fixing all fittings i.e. bends, tees, couplers, junctions, tapers, reducers, adopters, end caps, flanges with nut and bolts for fixing of appurtenances complete in all respects.

160 mm. OD.
210 mm. OD

Supply, fixing in position, testing ISI marked cast iron double flanged **sluice valves** as per IS:14846-2000, (PN 10) with SS stem, bolts, nuts, 3 mm thick rubber gaskets including transporting to worksite, Complete as per drawings & directions of the Engineer-in-charge.

160 mm. OD.
210 mm. OD

Providing **Precast Cement Concrete / C.I Valve Chamber cover and frame** conforming to IS : 12592-2002., The concrete mix should be not less than M 30.

Heavy duty, HD-20 grade designation - 600x600 mm internal size.

TECHNICAL SPECIFICATION FOR SEWERAGE AND DRAINAGE

Excavating trenches in all kind of soil of required width for pipes including excavation for sockets and dressing of sides, ramming of bottoms, including getting out the excavated soil & then returning the soil as required, in layers not exceeding 20 cm in depth including consolidating each deposited layer by ramming, watering, etc & disposing of surplus excavated soil as directed within a lead of 50m.

up to 1.50 m depth
Pipes 80 mm to 300 mm diameter

Supplying, fixing and testing **uPVC soil, waste and vent pipes** (SWR) confirming to IS13592 : 1990, type B with rubber ring (confirming to IS 5382)with solvent joint inclusive of all necessary specials like bends, tees, offsets, doorbends, junctions, screw type caps with rubber rings for cleanout pipe ends, etc., suspended under floor slabs/fixed on walls or on pipe racks in shafts. All suspenders, saddles, pipe packs are to be quoted separately under relevant items.

a) 160mm dia
b) 200mm dia
c) 250mm dia
d) 315mm dia

Encasing of uPVC pipe with sand bed of 150mm thick all round wherever required. The scope of work excludes the cost of pipes.

a) 160mm dia
b) 200mm dia
b) 250mm dia
c)

Providing and laying non-pressure NP2 class (light duty) R.C.C. pipes with collars jointed with stiff mixture of cement mortar in the proportion of 1:2 (1 cement : 2 fine sand) and encasing with cement concrete 1:5:10 (1 cement : 5 coarse sand : 10 graded stone aggregate 40 mm nominal size) alround R.C.C. pipes including bed concrete including testing of joints etc. complete.

(i) 150 mm dia R.C.C. Hume Pipe

(ii) 200 mm dia R.C.C. Hume Pipe

(iii) 250 mm dia R.C.C. Hume Pipe

(iv) 1400 mm dia R.C.C. Hume Pipe

Supplying, fixing and testing square-mouth S.W. gully trap grade 'A' complete with C.I. Grating brick masonry chamber with bricks of class designation 45 and water tight C.I. cover with frame of 300 x 300 mm size (inside) the weight of cover to be not less than 4.50 kg and frame to be not less than 2.70 kg as per design. outlet set in 75mm thick PCC 1:4:8 bed, 115mm thick masonry chamber in CM 1:4, internal and external plastering 12mm thick in CM 1:6, supply and fixing 300mm x 300mm size CI frame and cover, jointing to drain in CM 1:1, excavating, refilling and ramming etc., complete.

Construction of **inspection chamber** with 230mm best quality approved Table Moulded bricks in CM 1:4 over a bed of 100mm thick PCC 1:4:8, internal wall surfaces plastered in CM 1:3 and external wall surfaces with CM 1:3 with sponge finish, benching and channelling in PCC 1:4:8. Supplying and fixing C.I frame & cover of size suitable for a clear internal size of chamber of 450 x 450mm (weight 182 Kgs.) and fixing MS Steps in position. The quoted rate shall also include necessary excavation and back filling. Clear internal size of the chamber 600 x 850mm maximum

depth not exceeding 450mm.

Construction of **manhole** with best quality, approved table moulded bricks in CM 1:6 over a bed of 250mm thick PCC 1:4:8, walls plastered smooth inside in CM 1:3 and outside with CM 1:3 with sponge finish, benching and channeling in PCC 1:2:4. supplying and fixing MS steps as per drawing for maintenance. The manhole shall be provided with medium duty C.I frame and cover of weight 182 Kgs. Circular 500mm dia. Clear opening etc., complete. The quoted rate shall also include for necessary excavation, refilling, disposing off surplus earth with in a lead of 300M etc., complete.

Providing **Precast Cement Concrete / C.I Manhole cover and frame** conforming to IS : 12592-2002., The concrete mix should be not less than M 30.

Gully Trap cover / frame - 300 x 300 mm internal size.
C.I. cover with frame of 300 x 300 mm size (inside) the weight of cover to be not less than 4.50 kg and frame to be not less than 2.70 kg as per design..

Providing **Precast Cement Concrete / C.I grating with frame** conforming to IS : 12592-2002. The concrete mix should be not less than M 30.
Medium duty, MD-10 grade designation - 500x450 mm internal size.

TECHNICAL SPECIFICATION FOR BOUNDARY WALL

Earth work in excavation for foundation trenches pits etc. in required width and depth upto 1.5 m including disposal of excavated earth, lead upto 50 m and lift upto 1.5 m, disposed earth to be leveled and neatly dressed.

All kinds of soil

Disposal of excavated soil upto 200 m from excavated position, spreading the soil and leveled etc. all complete.

Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundations etc. In layers not exceeding 20 cm in depth: consolidating each deposited layer by ramming and watering lead upto 50 m and lift upto 1.5 m.

Supplying and filling in plinth and excavated area with sweet fine sand in layers not exceeding 20 cm in depth under floors including, watering, ramming consolidating and dressing complete.

CEMENT CONCRETE (CAST-IN-SITU)

Providing and laying in position cement concrete of specified grade excluding the cost of centring and shuttering - All work upto plinth level.

1:4:8 (1 cement : 4 coarse sand : 8 graded crusher broken granite stone aggregate 40 mm nominal size).

PILE WORK

Boring, providing and installing cast in situ single under reamed piles of specified diameter and length below pile cap in M 30 cement concrete, to carry a safe working load not less than specified, excluding the cost of steel reinforcement but including the cost of boring with bentonite solution and the length of the pile to be embedded in pile cap.

300 mm dia. Piles

Extra Bulb for boring, providing and installing cast in situ double under reamed piles, instead of single under ream of specified diameter and length. (Only the quantity of extra bulbs are to be paid).

CAST-IN-SITU R.C.C.

Providing and laying in position specified grade of reinforced cement concrete excluding the cost of centring, shuttering, finishing and reinforcement-All height

1:2.4 (1 cement : 2 coarse sand : 4 graded crusher broken granite stone aggregate 20 mm nominal size).

FORM WORK

Centring and shuttering including strutting, propping etc. and removal of form for :

Foundations, footings, columns, plinth beam & cooping etc. for mass concrete.

Providing of steel reinforcement for R.C.C. work including straightening, cutting, bending, placing in position and binding with 18 to 20 gauge binding wire etc. all complete. as per direction of Engineer-in-charge.

Tor steel

BRICK WORK SUPERSTRUCTURE

Providing K.B. brick works (of 50 Kg. / sqcm) in cement mortar 1:6 in superstructure.

250 mm thick
CEMENT PLASTER (IN COARSE SAND)

16 mm thick cement plaster in cement mortar (1:6) smooth for inside surface of the wall after racking out the joints including watering and curing with cost etc. all complete and as per direction of Engineer-in-charge.

12 mm thick cement plaster in cement mortar (1:6) smooth for inside surface of the wall after racking out the joints including watering and curing with cost etc. all complete and as per direction of Engineer-in-charge.

Providing & applying of weathercoat paint into the outer surface of the wall including cost of all materials etc. all complete and as per direction of Engineer-in-charge.

New work (Two or more coats)

Supplying and fixing at site Angle iron post & strut of required size including bottom to be split and bent at right angle in opposite direction for 10 cm length and drilling holes upto 10 mm dia.etc. complete.

Fencing with angle iron post placed at required distance embedded in cement concrete blocks, every 15th post, last but one end post and corner post shall be strutted on both sides and end post on one side only and provided with horizontal line and two diagonals interwoven with horizontal wires, of barbed wire 9.38 kg per 100m (minimum) between the two posts fitted and fixed with G.l. staples, turn buckless etc. complete. (Cost of posts, struts, earth work and concrete work to be paid for separately):- payment to be made per metre cost of total length of barbed wire used as per direction of the Engineer-in-Charge/ Consultant.

With G.I barbed wire
Supplying and fixing turn buckles and straining bolts for barbed wire fencing and razor cut fencing etc. complete and including cost of all materials, labour, conveyance, loading and unloading., taxes, royalties, scaffolding, sundries, tools and plants, etc., as per the direction of the Engineer-in-charge
Providing and constructing razor cut fencing above boundary wall as shown in the lay out drawing, with details drawings .

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TECHNICAL SPECIFICATIONS FOR BARBED WIRE FENCING

Earth work in excavation for foundation trenches pits etc. in required width and depth upto 1.5 m including disposal of excavated earth, lead upto 50 m and lift upto 1.5 m, disposed earth to be leveled and neatly dressed.

All kinds of soil

Supplying and filling in plinth and excavated area with sweet fine sand in layers not exceeding 20 cm in depth under floors including, watering, ramming consolidating and dressing complete.

CEMENT CONCRETE (CAST-IN-SITU)

Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work upto plinth level.

1:4:8 (1 cement : 4 coarse sand : 8 graded crusher broken granite stone aggregate 40 mm nominal size).

1:2.4 (1 cement : 2 coarse sand : 4 graded crusher broken granite stone aggregate 20 mm nominal size).

Supplying and fixing at site Angle iron post & strut of required size including bottom to be split and bent at right angle in opposite direction for 10 cm length and drilling holes upto 10 mm dia.etc. complete.

Fencing with angle iron post placed at required distance embedded in cement concrete blocks, every 15th post, last but one end post and corner post shall be strutted on both sides and end post on one side only and provided with horizontal line and two diagonals interwoven with horizontal wires, of barbed wire 9.38 kg per 100m (minimum) between the two posts fitted and fixed with G.l. staples, turn buckless etc. complete. (Cost of posts, struts, earth work and concrete work to be paid for separately):- payment to be made per metre cost of total length of barbed wire used as per direction of the Engineer-in-Charge/ Consultant.

With G.I barbed wire

TECHNICAL SPECIFICATION FOR SITE DEVELOPMENT

Filling the specified areas upto a depth of 5mtr with filling sand in layers not exceeding 0.3mtr in depth., well watered, compacted, dressed and leveled by mechanical means to proper gradient including cost of all materials, labour, conveyance, loading and unloading, taxes, royalities, sundries, tools and plants, etc., complete as per the direction of the Engineer-in-charge.

Filling the specified areas upto a depth of 0.5mtr with good earth in layers over the areas filled with filling sand well watered, compacted, dressed and leveled to proper gradient including cost of all materials, labour, conveyance, loading and unloading, taxes, royalities, sundries, tools and plants, etc., complete as per the direction of the Engineer-in-charge.

TECHNICAL SPECIFICATION FOR LANDSCAPING WORKS

1. Supplying and stacking of good earth at site including royality and carriage upto 1 km.

2. Supplying and stacking at site dump manure from approved source including carriage up to 1km (manure measured in stacks will be reduced by 8% for payment) etc., complete as as directed by the PMC.
   Screened through sieve of 15mm designation 16mm.

3. Uprooting weeds from the trenched area after 10 - 15 days of its flooding with water including disposal of uprooted vegetation.

4. Fine dressing the ground

5. Spreading of manure or / and good earth in required thickness (cost of manure or / and good earth to be paid separately).

6. Mixing earth and manure in proportion specified or directed.

7. Grassing with Jaysia Japanica (Carpet Grass) / Barbuda Selection - I grass including watering and maintenance of the lawn for 30 days or more till the grass form a thick lawn free from weeds and fit for moving including supplying good earth if needed.etc., complete .

8. Uprooting rank vegetation and weeds by digging the area to a depth of 30 cm removing all weeds and other growth with roots by forking repeatedly, breaking clods, rough dressing, flooding with water, uprooting fresh growths after 10 to 15 days and then fine dressing for planting new grass, including disposal of all rubbish with all leads and lifts.

9. Spreading of sludge, dump manure or/and good etc., complete .

10. Uprooting rank vegetation and weeds by digging the area to a depth of 60 cm removing ail weeds and other growth with roots by forking repeatedly, breaking clods, rough dressing, flooding with water, uprooting fresh growths after 10 to 15 days and then fine dressing for planting new grass, including disposal of all rubbish with leads and lifts.etc., complete .

11.Grassing with ‘Doob' grass including watering and maintenance of the lawn for 30 days or more till the grass forms a thick lawn free from weeds and fit for mowing Including supplying good earth If needed (the good earth shall be paid for separately).etc., complete. Name of the grass selection -01,Mexican,Barbuda & jaysia japanica.
In rows 7.5 cm apart in either direction.

12.Digging holes In ordinary soil and refilling the same with the excavated earth mixed with, manure or sludge in the ratio of 2.1 by volume (2 parts of stacked volume of earth after reduction by 20%: 1 part of stacked volume of manure after reduction by 8%) flooding with water, dressing including removal of rubbish and surplus earth, If any with all leads and lifts (cost of manure, sludge or extra good earth if needed to be paid for separately.

Holes minimum 1.2m to 1.5m dia & min 1.2m to 1.5m deep as per the size of the plant.

13.Digging holes in ordinary soil and refilling the same with the excavated earth mixed with manure or sludge in the ratio 2:1 by volume (2 parts of stacked volume of earth after reduction by 20%: 1 part of stacked volume of manure after reduction by 8%) flooding with water, dressing including removal of rubbish and surplus earth, if any with all leads and lifts (cost of manure, **sludge** or extra good earth if needed to be paid for separately) etc., complete ..

14. Holes 60 cm to 75 cm dia, and minimum 60 cm to 75 cm deep as per the size of the plant.

Supply and planting best quality container grown healthy trees of 3mtr. minimum height, (25 mm caliper dia. minimum) of species as specified. AH trees to be approved before planting. Inclusive of maintenance as specified for one year after planting, (as per schedule plant) etc., complete . Name of Plants:-Bottle Palm, Foxtail Palm, Ficus Golden, Ficus Elastica, Ficus Benjamina,Ficus Panda

15.Supply of planting best quality Pot-Grown healthy shrubs minimum 750 mm (13 mm caliper dia. minimum) tall species specified, inclusive of creosote treated bamboo stake 2m long and preparation aid cultivation of shrub beds as specified. Ail plants to be approved before planting. Inclusive of Maintenance as specified for one year after * planting, (as per Schedule Plant) etc.,..

Name of Plants:-Champa, Jashmine, Tikoma, Musunda, Ixora, Habiscus, Verigated, Tagar, Malli, Heena, Lolina

16..Supply and planting best quality Pot-Grown healthy Ground cover plant (Hedge) minimum of 300 mm stem of species specified, inclusive of preparation and cultivation of beds as specified. All plants to be approved before planting. Inclusive of maintenance as specified for one year after planting. (As per Schedule Plant, including pits and plantation) etc., complete . Name of Plants:- White Mini Tagar, Golden Dorenta, White Dorenta,Aclifa, Verbina, Lantena, Altenthra.

17.Providing of decorative hedges, decorative plants and perennial at suitable places .etc., complete. Furcuria, Cycus, Arceria, Silver Oak, Ficus Starlight, Golden bottle bush. (All are healthy & bushy)

18Supplying , fitting and fixing of Flexible water sprinkler & popup made by rain bird –Equivalent for grass lawn at an interval of 30’ -0’ in both the direction(5’-0’)shall be circular of the water sprinkler etc with flexible hose pipe 33Mtr. (33mtr & dia is 1” make oriplast) etc., .

19Supplying and planting of Saiberian grass colour of green,white, golden at an interval of 1'-0" in both the direction (0'-6") as per the drawing .

20.Supply and fixing of Granite / FRP pot of height of 1'-0" to 3'-0" in appropriate place of the landscaped area .

21.Supply and fixing of Granite / FRP pot of height of 7'-0" in appropriate place of the landscaped area .

22. Supply and fixing of dancing statue in appropriate place of the landscaped area .

Height of the statue 2 '- 0"

Height of the Statue 4'-0"

Height of the Statue 6'-0"

23. Supplying, providing and making of pathway side trees of Chinees Debdaru / Groping Debdaru / Caltris / Juniperus / Thuja at site.

13. Supplying and laying of white pebbles of sizes 1” and 2' in the appropriate places of the landscaped area as mentioned in the drawing or as directed by the PMC.

(a) Holes 1.2 m dia and 1.2 m deep
(b) Holes 60 cm dia, and 60 cm deep

TECHNICAL SPECIFICATIONS FOR CONSTRUCTION OF U.G.R.

All Kinds of Soil including removal of existing platform, flooring, foundation / footing of structures from 0 to 4.0m depth

Filling available excavated earth (excluding rock, black cotton clayey soil) in trenches, plinth, sides of foundations etc. in layers not exceeding 20 cm in depth: consolidating each deposited layer by ramming and watering in all leads and lifts

Disposal of surplus earth up to all leads as directed by the Architect/Project Director including spreading the earth in the land fill and dressing neatly either within the Site or outside the compound.

Supplying and filling with fine river sand under footings, floors including, watering, ramming consolidating and dressing complete.

Supplying, Diluting and injecting chemical emulsion for PRE-CONSTRUCTIONAL anti-termite treatment and creating a continuous chemical barrier under and all-round the column pits, wall trenches, basement excavation, top surface of plinth filling, junction of wall and floor, along the external perimeter of building, expansion joints, over the top surface of consolidated earth surroundings of pipes and conduits etc. complete as per specifications

Chloropyriphos emulsi-fiable concentrates 20%.

Providing and laying in position cement concrete of specified grade, including the cost of centering and shuttering. All work up to plinth level.

1:5:10 (1 cement: 5 coarse sand: 10 graded stone aggregate 40 mm nominal size). (under the footings as matt concrete)

Providing and laying in position machine batched, machine mixed and machine vibrated nominal mix cement concrete of specified grade for reinforced cement concrete structural elements including the cost of centering, shuttering, hacking the exposed surface wherever required to receive plaster, finishing and admixtures in recommended proportions (as per IS: 9103) to accelerate, retard setting of concrete improve workability without impairing strength and durability as per directions of Project Director/Architect. but excluding the cost of reinforcement **M-25 grade reinforced cement concre**te.

In Raft Slab for the foundation

Side retaining walls

Roof slab and beams

Reinforcement for R.C.C. work including transporting, decoiling, straightening, cutting bending, placing in position and binding all complete at all levels and in all R.C.C. items with 18 gauge binding wire and cover blocks.
Thermo mechanically treated bars. Grade Fe 500 High Yield strength deformed bars confirming to IS1786.

PILE WORK
Boring, providing and installing cast in situ double under reamed piles of specified diametre

and length below pile cap in M 30 cement concrete, to carry a safe working load not less than specified, excluding the cost of steel reinfrement but including the cost of boring with bentonite solution and the length of the pile to be embedded in pile cap.

300 mm dia. Piles

Brick work with bricks of class designation 75 in superstructure in cement mortar 1:6 (1 cement : 6 coarse sand) above plinth level up to forth floor, lift machine room level including square or rectangular pillars, including raking out of joints, scaffolding, watering, curing etc; all complete.

Construction of brick steps with of well burnt bricks of class 75 with cement mortar 1:3 including of chipping cutting and shaping the bricks to the necessary shape and size as required and finishing the same with rough cement slurry coat for receiving the finishing tile above and side of steps.

1500mm width (150mmx300mm)

Supplying, fabricating and **erecting steel gate of standard M.S.** angles, tees, flats, tubular sections, bars as per detailed drawing including all standard fixtures such as hold fast, washers, M.S rods, flap locking arrangement, stoppers, gusset plate, L bolts 300mm long, roller and guides including applying a coat of primer

Providing and laying broom finished 75 mm thick cement concrete flooring 1:2;4 (1 cement:2 coarse sand:4 graded stone aggregate 12.5 mm nominal size), nosing and 40 x 4 mm PVC strips etc. **complete**

Supplying & Providing UPVC sliding window with single glazing & fly proof mesh shutters out of unplasticised poly vinyl chloride (UPVC) profiles having a nominal outer wall thickness of 2.5mm with outer frames of 60 x 52mm minimum sizes & shutter frame of 35 x 75mm sizes (minimum) having fusion welded corners with 1mm thk structural reinforcement hot dip galvanized to a thickness of 125 GSM with gaskets out of Ethylene Propylene Diameter (EPDM). The fly proof shutter shall be mounted on the same frames with SS mesh of grade 304

Applying three or more coats of white washing with lime to given an even shade for **ceiling, pump room and other Rooms,** wherever necessary.

Providing and laying water proofing treatment to vertical surfaces of the U.G. Sump consisting of the following operations.

RCC surface to be cleared of all dirt, loose material and kept dry and holes/cracks to be repaired with cement putty using bonding agent of approved manufacturers. The prepared surface shall be coated with two coats of acrylic polymer modified cementations (PMC) slurry coating up to the finished floor level. The second coat shall be applied after the first coat has dried.

Applying one coat of acrylic polymer modified cement brush topping over PMC slurry coating after the last PMC slurry coat has dried.

Providing a protective layer over the treated surface by laying 20 mm thick cement plaster

1:4 (1 cement:4 coarse sand) mixed with approved water proofing compound when the treatment sets dry.

Providing and laying integral cement based water proofing treatment including preparation of surfaces as required for treatment of **roofs and terraces** consisting of the following operations:

Lime concrete terracing on roofs, average thickness 10cm laid to fall with 25mm nominal size brick aggregate and 50% lime mortar 1:2(1 lime putty :2 surkhi) rammed and finished with gur and belgiri treatment complete and covered with fly pressed fully burnt clay tiles of 20mm thick nominal thickness and approved size grouted with cement mortar 1:3 (1 cement : 3 Fine sand) mixed with 2% integral water proofing compound by weight of cement, over 12mm layer of cement mortar 1:3 (1 cement : 3 fine sand) and finished neat with proper pointing.

Providing and laying integral cement based treatment for water proofing on horizontal surface of **Under Ground Sump and Water Treatment Plant as under**

Over the top of lean concrete under the RCC matt slab and column footings (vertical as well as horizontal surface) one coat of 20 mm thick base plaster in cement mortar 1:3 (1 cement: 3 sand, 50% fine sand and 50% coarse sand) when the surface is still green with approved make integral water proofing compound shall be provided @ 0.2% by weight of cement and cured for 2 to 3 days of finishing.

Thereafter two coats of two component polymer modified heavy duty cementations coating (Acrylic reinforced cementations flexible water proof coating) shall be applied @ 2 Kg per sqm or as per manufacturers specification and as approved by Architect/Project Director. This compound shall be applied over properly rendered and pre wetted surface, while not having stagnated water.

After a minimum period of 24 hours the coating shall be covered with another 15 mm thick cement plaster in Cement mortar 1:4 (1cement :4 sand: 50% fine sand and 50% coarse sand) with approved integral water proofing compound confirming to IS: 2645 @ 0.2% by weight of cement and cured for 2 to 3 days after one day of finishing.

Placing and fixing 12 mm N.B.M.S. threaded nozzles of 75 mm length with dummy rod for maintaining the hold up to required depth in an approximate grid pattern at a spacing not exceeding 1.5 m c/c on the entire raft prior to or during concreting. Similar threaded nozzles along with dummy rod shall also be fixed at a regular intervals not exceeding 1.5 mt. apart along with construction joints. Similar nozzles les shall also be post fixed at critical points as per manufacturer's requirements and directions of Architect/Project Director by drilling or making holes.

Injection of approved water proof grouting compound admixed with cement slurry through nozzles under pressure by pump. The grout should flow through all pores and voids thereby sealing them. The nozzles shall be sealed off after injection operation is over with pozzolith 100 HE admixed with cement.

Providing and laying integral cement based treatment for water proofing on vertical surface of basement, underground water tank, swimming Pool etc. and horizontal & vertical surface of over head tank as under

The construction joints in the walls and slab shall be provided and fixed with water swelling water bar (swelling gasket) of size 20 mm x 10mm in between the joints throughout its entire length or as per approved manufacturers specification and approved by Architect/Project Director .

`After proper curing of the RCC, the outer surface shall be coated with 2 coats of two component approved polymer modified heavy duty cementations coating (Acrylic reinforced cementations flexible water proof coating) to form a coating of 1.5 mm thickness. Compound shall be applied over pre wetted surface.

Thereafter the coating shall be covered with 12 mm thick plaster in cement mortar 1:4 (1cement:4 sand: 50% fine sand and 50% coarse sand) mixed with approved integral water proofing compound confirming to IS: 2645 @ 0.2% by weight of cement and finished with a coat of neat cement slurry.

Providing and placing in position suitable P.V.C water stops conforming to I.S 12200 of 'Deep-Jyoti' or approved equivalent for constructions / expansion joints between two R.C.C members and fixed to the reinforcement with binding wire before pouring concrete etc. complete Serrated with central bulb (225mm wide, 8 -11mm thick)

Providing and fixing in the tank with rust proof brackets, factory made aluminum ladder 450mm wide out of, 'C' shaped side member 67x31x3.2mm and treads 63mm wide 2mm thick at 300ctoc with rubber buffers at top and bottom of side member etc. complete.

HYDROPNEUMATIC BOOSTER PUMP: Supplying and commissioning of hydropneumatic pump as per reuirement.

TECHNICAL SPECIFICATION FOR RAIN WATER HARVESTING

Providing Rain water Harvesting sumps at locations as shown in the drawing, Standard Construction Practices as per the stipulations of the Government and Authorities pertaining to the Rain Water Harvesting Systems shall be Strictly followed and to be included in the Total Contract , though it may not be explicitly shown in the Documents.

TECHNICAL SPECIFICATION FOR OVER HEAD TANK CUM PUMP HOUSE

1 **M.S. GRILL**

Providing, fitting and fixing of M.S. grill as per approved design with two coats of approved coloured enamel paint over a coat of primer etc. all complete and as per the direction of Engineer-in-charge.

2 **VENTILATOR :**

Providing, fitting and fixing of ventilator grill shall be made out of 6 mm wire netting with 25 mm x 25 mm x 6 mm M.S. angle, which shall be finished with approved shade powder coating, so that a layer of 15 micron can be formed in a smooth finish. The entire process shall be carried out in hot finish in appropriate temperature to obtain the necessary finish etc. all complete and as per the direction of Engineer-in-charge.

3 Providing, fixing of G.I. railing made with 40 mm dia G.I. pipe as per design including two coats of approved coloured enamel paint over a coat of primer etc. all complete and as per the direction of Engineer-in-charge.

4 Providing, fitting & fixing of one set of water level indicator consisting of copper / polythene float guide pulleys, nylon chord and enamel coated guage calibrated to indicate depth of water in meter or equivalent amount of water in kiloliters etc. all complete and as per the direction of Engineer-in-charge.

5 Providing, fitting & fixing of a lightening arrestor of copper shall be provided on the roof of the tank as per IS : 2309. The top of the lightening arrestor shall be above the highest point of the roof. The arrestor shall be suitably earthed with aluminium tape conductor etc. all complete and as per the direction of Engineer-in-charge.

6 **CEMENT PLASTER (IN COARSE SAND)**

(a) Providing & applying in line level 16 mm thick cement plaster in cement mortar (1:4) smooth for inside surface of the wall after racking out the joints including watering and curing with cost etc. all complete and as per direction of Engineer-in-charge.

(b) 12 mm thick cement plaster two coats in cement mortar (1:4) finished smooth for exterior surface of the walls after racking out the joints including watering and curing with cost etc. all complete and as per direction of Engineer-in-charge.

(c) Providing 6 mm thick cement plaster in cement mortar (1:4) for ceiling including all materials, labours, T&P etc. all complete and as per direction of Engineer-in-charge.

(d) Forming groove of uniform size from 12 x 12 mm and upto 25 x 15 mm in plastered surface as per approved pattern using wooden battens, nailed to the under layer including removal of wooden battens, repairs to the edges of plaster panel and finishing the groove complete as per specifications and direction of the Engineer-in-Charge.

14 **PAINTING WORKS :**

(a) Providing & applying two coats of cement paint into the outer surface of the wall including cost of all materials etc. all complete and as per direction of Engineer-in-charge.

New work (Three or more coats)

(b) Providing and applying three coats white washing with 1st class lime including providing a mixing neel & glue surface cleaning etc. complete.

(c) Providing & applying of synthetic enamel paint of approved brand and manufacture of required colour to give an even shade over a coat of primer.

Two or more coats on new work over an under coat of suitable shade with ordinary paint of approved brand and manufacture.

20 **WATER PROOFING WORK FOR DOME :**

(a) Providing and laying water proofing treatment inside dome etc., by applying cement slurry mixed with Armourcrete of M/s The Structural Water Proofing Company Pvt. Ltd. or Tapecrete of M/s CICO Engg. Service consisting of applying :

(i) First layer of slurry of cement @ 0.488 kg / sqm mixed with Armourcrete or Tapecrete @ 0.253 kg / sqm. This layer will be allowed to air cure for 4 hours.

(ii) Second layer of slurry of cement @ 0.242 kg / sqm mixed with Armourcrete or Tapecrete @ 0.126 kg / sqm. This layer will be allowed to air cure for 4 hours followed with water curing for 48 hours.

The rate includes preparation of surface, treatment and sealing of all joints, corners, junctions of pipes and masonary with polymer mixed slurry.

21 Providing 12 mm thick cement plaster in cement mortar (1:3) finished smooth with a floating coat of neat cement on walls and bed concrete etc. all complete and as per direction of Engineer-in-charge for all heights.

22 Providing and applying a coat of epoxy paint inside surface of the walls & floors of the tank etc. all complete and as per direction of Engineer-in-charge.

23 **M.S. LADDERS :**

Providing, fitting & fixing of M.S. ladders from ground level to staging height & top of staging of the tank provided with steel ladder along with hand rails made of series of M.S. steel bars. The steel ladders shall be study and should be fastend and anchored to the concrete by means of anticorrosive inserts and bolts.

Providing, fitting & fixing of M.S. ladders for lift machine room of building provided with steel ladder along with hand rails made of series of M.S. steel bars. The steel ladders shall be study and should be fastend and anchored to the concrete by means of anticorrosive inserts and bolts.

24 **WATER PROOFING WORK FOR ROOF SLAB :**

(a) Providing and laying water proofing treatment on roofs of slabs by applying cement slurry mixed with Armourcrete of M/s The Structural Water Proofing Company Pvt. Ltd. or Tapecrete of M/s CICO Engg. Service consisting of applying :

(i)

after surface preparation, first layer of slurry of cement @ 0.488 kg / sqm mixed with Armourcrete or Tapecrete @ 0.253 kg / sqm.

(ii) laying second layer of fibre glass cloth manufactured by M/s The Structural Water Proofing Company Pvt. Ltd. when the first layer is still gree. Overlaps of joints of fibre cloth should not be less than 10 cm.

(iii)

third layer of 1.5 mm thickness consisting of slurry of cement @ 1.289 kg / sqm mixed with Armourcrete or Tapecrete @ 0.670 kg / sqm and coarse sand @ 1.289 kg / sqm. This will be allowed to air cure for 4 hours followed by water curing for 48 hours.

The entire treatment will be taken upto 30 cm on parapet wall and tucked into groove in parapet all around.

(b) Providing of roof grading of screed concrete using water proofing compound in the proportion of 0.5% by weight confirming to IS : 2645 / 79 of approved brand including the cost of all materials, labour, T&P etc. all compelte and as per direction of Engineer-in-charge.

Cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded crusher broken granite stone aggregate 20 mm nominal size).

(c) Providing gola 75 x 75 mm in cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 stone aggregate 10 mm and down gauge) including finishing with cement mortar 1 : 3 (1 cement : 3 fine sand) as per standard design.
In 75 x 75 mm deep chase

25 **RAIN WATER SPOUT AND PIPES**

(a) Providing and fixing on wall face unplasticised PVC (working pressure 6 Kg. per sqcm) rain water pipes confirming to IS : 4985 including jointing with seal ring conforming to IS : 5382 leaving 10 mm gap for thermal expansion.

Single socketed pipes
150 mm diameter.

(b) Providing and fixing on wall face unplasticised - PVC moulded fittings / accessories for unplasticised - Rigid PVC rain water pipes conforming to IS : 13592 Type A including jointing with seal ring conforming to IS : 5382 leaving 10 mm gap for thermal expansion.

(i) 150 mm bend

(ii) 150 mm shoe

(c) Providing and fixing unplasticised-PVC pipe clips of approved design to unplasticised-PVC rain water pipes by means of 50 x 50 x 50 mm hard wood plugs, screwed with M.S. screws of required length including cutting brick work and fixing in cement mortar 1:4 (1 cement : 4 coarse sand) and making good the wall etc. complete.

26. Providing and laying S & S Centrifugally cast (Spun) / Ductile Iron pipes conforming to IS : 8329.

(i) 150 mm dia Ductile Iron Class K-7 pipes.

(ii) 200 mm dia Ductile Iron Class K-7 pipes.

27. Providing flanged joints to double flanged C.I. / D.I. pipes and specials including testing of joints.

(i) 150 mm diameter pipes.

(ii) 200 mm diameter pipes.

28 Providing & laying C.I. Standard specials such as tees, bends, collars tapers and caps etc., suitable for flanged jointing as per IS : 1538.

* Upto 300 mm dia

(i) Tees

(ii) Bends

(iii) Collars

(iv) Tapers / Reducers

(v) Caps

(vi) Flange socket

(vii) Flange pivot

29 Providing and fixing C.I. sluice valve (with cap) complete with bolts, nuts, rubber insertions etc. all complete.

(i) 200 mm diameter (Class-II)

(ii) 150 mm diameter (Class-II)

30 Construction of brick masonry suport 600 mm x 600 mm with brick foundation, brick superstructure, plastering, earth work excvation, P.C.C. etc. all complete.

31 Providing and fixing C.I. Scour valve (with cap) complete with bolts, nuts, rubber insertions etc. all complete.

32 Providing and fixing C.I. Non return valve (with cap) complete with bolts, nuts, rubber insertions etc. all complete.

33 Providing, fitting & fixing of C.I. lockable hinged type manhole covers 500 mm dia each 50 kg. waight with frame and cover fixed at suitable places in the roof of the tank etc. all complete as per direction of Engineer-in-charge.
Providing fixing of C.I man hole cover with frame of 450mmdia (minimum wt. 182kg) .

TECHNICAL SPECIFICATION OF FIRE FIGHTING WORK

SCOPE

Scope of technical specifications hereinafter laid out shall cover hydrant system – Down comer and allied works.

A. Codes and reference standards referred to in the Contract shall be understood to form part of the Contract.

B. Alternative reference standard produced by different standards authorities may be specified in a section. Standards of any of the specified authorities may be acceptable; however, materials specified in the section shall be incorporated in the works from only one of the specified standards authority to ensure capability in the performance of the materials.

C. The Contractor shall be responsible for adherence to reference standard requirements by Sub Contractors and Suppliers.

D. Where edition date is not specified, consider that reference to manufacturer's and published codes, standards and specifications are made to the latest edition (revision or amendment) approved by the issuing organization current at the date of submission of the tender.

E. The specified reference standards are Indian Standard Codes and are intended to establish the quality of materials and workmanship required for the works. Reference standards published in other countries may, in the sole judgment of the Owner‟s Consultant, also be accepted provided that the Contractor furnishes sufficient data for the Owner‟s Consultant to determine if the quality of materials and workmanship atleast equals or exceeds all tests prescribed by the specified reference Indian Standard Codes.

Such other reference standards published by the following will be considered:

BSI British Standard Institute

AFNOR Association Francaise de Normalizations (French Standard)

DIN Deutsche Industries Normal (German Standards)

ANSI American National Standard Institute

ASTM American Society for Testing and Materials

F. Reference standards and specifications are quoted in the specification to establish minimum standards. Works or quality of performance characteristics that exceeds these minimum standards will be considered to confirm. Should regulatory requirements or the Contract conflict with specified reference standards or specifications, the more stringent in each case shall be adopted.

G. Where reference is made to manufacturer's directions, institutions or specifications, they shall include full information on storing, handling, preparing, mixing, installing, erection, applying or other matters concerning the materials pertinent to their use in the works and their relationship to materials with which they are incorporated.

H. Obtain copies of codes, applying to the work, manufacturer's directions and standards referred to in the Contract within 90 days of signing the Contract.

I. Submit a copy of each code, reference standard and specifications and manufacturer's directions, instructions and specification to the Owner's authorized representative.

LIST OF CODES (INDIAN STANDARD CODES)

Standard specifications, associations and regulatory bodies are generally referred to throughout the specifications by their abbreviated designations.

The material workmanship shall be in accordance with the requirement of the appropriate IS code wherever applicable together with any building regulations or bye-laws governing the works.

The following list is included for guidance only and the omission of any IS codes from the list does not relieve the Contractor from compliance therewith. The more important codes, Standard and Publication applicable to this section are listed hereinafter

SECTION – II

CODES AND STANDARDS

The Fire protection system for NATIONAL LAW UNIVERSITY shall be designed and installed as per this tender specification, tender drawings and the following codes and standards:

National Building Code (NBC) of India 2005, Part – 4, Fire and Life safety.

IS 3844 - Code of practice for installation and maintenance of internal fire hydrants and hose reels on premises.

IS 2189 – Code of practice for selection, installation and maintenance of automatic fire detection and alarm system.

IS 2190 – Code of practice for selection, installation and maintenance of portable first aid fire extinguishers.

Codes of practice for fire safety of building (general) IS:1648 firefighting equipment and its maintenance

Other applicable IS Codes and specifications related to fire safety of buildings and materials to be used for fire protection systems.

APPLICABLE CODES AND STANDARDS

Unless specifically mentioned otherwise and notwithstanding the codes mentioned all the applicable Codes and Standards published by the Bureau of Indian Standards and their subsequent revision / BS Standards shall govern in respect of design, workmanship, quality and properties of materials and method of testing; standards listed below shall be applicable, in particular:

IS-1239 / IS 3589	:	Specification for MS / GI Pipes
API 600 / BS 5163	:	Specifications for Gun Metal gate, globe & IS778/780/2906 check Valves for water supply.
IS-800	:	Specifications for Structural steel
IS-814	:	Specifications for covered electrodes for metal arc welding of structural steel.
BS-5155	:	Specifications for C.I.butterfly valve.
IS-4927	:	Specifications for Canvas Hose Pipes.
IS-903	:	Specifications for Branch pipes Fire hose couplings and auxiliary equipments
IS-5290	:	Specifications for hydrant landing valves.

IS-1200	:	Method of measuring of building & civil Engineering Works (water supply, plumbing drain & sanitary fittings)
IS-4853 steel	:	Recommended practice for radiographic inspection of fusion welded butt joints in pipes.
IS-636	:	Synthetic, jacketed hose pipes.
IS-2198	:	Control Panels.
IS-2159	:	Hot dip galvanizing of iron and steel
IS-5	:	Specification for painting
IS 9137	:	Specification for horizontal end suction centrifugal pump
BS-1965 Part I	:	Specification for butt-welded Pipe Fittings.
IS 8423	:	Controlled percolating hose for fire fighting.
IS 2871	:	Branch pipe, universal for fire fighting purposes.
IS 884	:	First aid hose reel for fire fighting
IS 937 for	:	Specification for washers for water fittings fire fighting system.
IS 9972	:	Specification for automatic sprinkler heads.
IS 2171	:	Dry chemical powder type Fire extinguishers
IS 940	:	Water type CO2 Fire extinguishers
IS 2878	:	Carbon – di – oxide type Fire extinguishers
IS-2175	:	Detectors
IS-694	:	Copper wire
IS-9968 (Pt-1)	:	Rubber Insulated Braided Wire
IS-1554 (Pt-1)	:	PVC Insulated Cables

SECTION – III

1.0 GENERAL REQUIREMENTS

1. Fire suppression works specified in the tender shall be executed in accordance with the rules and regulations of the local fire authority and that of the various IS/BIS codes of practice and handbooks.
2. All materials to be used on this works shall be new of best quality and shall bear Bureau of Indian Standards valid certification stamped, marked or cast on the material in an approved manner. Materials manufactured by firm of repute and approved by Project Manager shall only be used.
3. It is the responsibility of the Contractor to ensure the competence of design to meet the above requirement.
4. Each item of work shall be complete with all such accessories which are required to complete the item and put it in perfect working condition whether specially mentioned in the specifications, drawings and/or schedule of quantities or not.
5. Quantities in the tender document are based on the tender drawings.
6. Contractors are invited to highlight any aspects of the Contract document that may need revision or reconsideration before the work is started. He must furnish details of such revision/variations if any, to the Project Manager.
7. Contractor, who is awarded this work, shall furnish detailed drawings and design calculations for submission and approval.

2.0 SYSTEM DESIGN

Down comer with landing hydrant valves and hose reel drums, fire extinguishers and signage have been proposed for this building. Provision of heat and smoke detectors, call boxes and other devices are incorporated under passive fire safety measures and are included in this tender.

a. A Terrace water storage tank having water storage capacity of approximately 5 Cum. has been provided.
b. The Fire fighting System shall comprise the Fire Hydrants System with fire terrace booster pump.
c. Fire Hydrant System consists, internal landing valves and the hose reels at landings.
d. The Hydrant System under normal conditions shall be pressurized by means of the electric motor driven booster Pump.
e. The piping and valve connections shall be done so that the water from the discharge of the pump is connected to hydrant system piping.
f. The starting and the Booster pump shall be automatic based on the pressure switches at preset low pressure.
g. The Pump shall be stopped only manually.
h. Contractor shall ensure Hydro Testing for the complete system.

SECTION IV
TECHNICAL SPECIFICATIONS FOR FIRE PROTECTION WORKS

1. GENERAL REQUIREMENTS

1.1All materials shall be new of the best quality conforming to the specifications and subject to the approval of the Project Manager.

1.2 Pipes and fittings shall be fixed truly vertical, horizontal or in slopes as required in a neat workmanlike manner.
1.3 Pipes shall be fixed in a manner as to provide easy accessibility for maintenance and shall not cause obstruction in shafts, passages etc.
1.4 Pipes shall be securely fixed to walls and ceilings by suitable clamps at intervals specified. Only approved type of anchor fasteners shall be used for RCC ceilings and walls.
1.5 Valves and other appurtenances shall be so located that they are easily accessible for operations, repairs, and maintenance.

2. PIPE WORKS

2.1 PIPES

All pipes within and outside the building in exposed location, shafts, buried under ground or floors shall be MS pipes of following specifications:
A. Pipe 150mm dia and below IS:1239 heavy class

B. Pipe 200mm dia and above IS:3589 (of thickness specified)

2.2 PIPE FITTINGS

2.2.1 Pipe fittings mean tees, elbows, couplings, flanges, reducers and all such connecting devices that are required to complete the piping work and make connections with branch lines in such a manner that the piping system functions in the best manner with provision to dismount disconnect for repairs and maintenance in its totality.

2.2.2 Forged steel fittings shall be of approved type with "V" groove for welded joints. Forged steel fittings shall be used for pipes of 50 mm dia & below. Fabricated fittings shall not be permitted for pipes diameters 50 mm and below.

2.2.3Fabricated fittings 50mm dia or lesser dia. shall not be permitted except under express and written instruction of the Project Manager and after settlement in the variation of rates in the forged and fabricated fitting.

2.2.4 When allowed to be used, fabricated fittings shall be fabricated, welded as approved by Project Manager.

2.3 JOINING

2.3.1 WELDED JOINGS:

All welding shall be carried out in proper manners and should be followed out in proper manners and should be followed the welding specification.

All pipe edges shall be bevel finished to a clean edge by an electric grider. A requisite gap determined by the thickness of the weld electrode shall be given between the joints before start the welding work.

Welding electrode shall be of approved make of grade and type as suitable for the job. This shall be approved by the project in charge before start of work.

Joint shall be given a first weld in the full width on the full dia of the pipe. Welding shall be carried out vertically from the surface.

After application of the 1st coat of the joint shall be cleaned and then another layer of welding shall be take place.

2.3.2 WELDED JOINGS:

Flanged joints shall be provided on:

For jointing all types of valves, appurtenances and connections with other type of pipes to water tanks and other places necessary and required as good for engineering practice.

Flange shall be as per IS with appropriate number of galvanized nuts and bolts, 3mm insertion rubber gasket.

2.4 PIPE INSTALLATION & SUPPORT

Pipe supports shall be hung by means of expandable anchor fasteners of approved make and design.

The hangers and clamps shall be fastened by means of nuts and bolts. The size/diameter of the anchor fastener and the clamp shall be suitable to carry the weight of water filled pipes and dead load normally encountered.

Piping shall be properly supported on, or suspended from, on stands, clamps, hangers as specified and as required.

Pipe work and fittings shall be supported by hangers or brackets so as to permit free expansion and contraction. All accessories and ancillaries of support system such as brackets, saddles, clamps, hangers etc. shall be hot dip galvanized

Further to permit free movement of common piping, support shall be form a common hanger bar, fabricated from galvanized steel sections.

Pipe hangers shall be provided at the following maximum spacing : Pipe Dia (mm) Hanger Rod Dia (mm) Spacing between Supports (m)

Pipe Dia (mm)	**Hanger Rod Dia (mm)**	**Spacing between Supports (m)**
Up to 25	10	3.0
32 to 50	10	3.0
65 to 80	10	3.0
80 to 100	10	3.0
125 to 150	12	4.0
200 to 300	12	4.0

The end of the steel rods shall be threaded and not welded to the threaded blot.

2.5 EXCAVATION

Excavation for pipelines shall be in open trenches to levels and grades shown on the drawings or as required at site. Pipelines shall be buried to a minimum depth of 1 meter or as directed by the Project Manager.

On completion of testing and pipe protection work, trenches shall be refilled with excavated earth in 20cms layers and consolidated. Contractor shall dispose off all surplus earth within a lead of 50m.

2.6 ANCHOR THRUST BLOCK

Contractor shall provide suitably designed anchor blocks in cement concrete to encounter excess thrust due to water hammer and high pressure.

Thrust block shall be provided at all bends and tees and such other location as determined by the Project Manager.

Exact location, design, size and mix of the concrete block shall be got approved by the Project Manager.

2.7 PIPE PROTECTION

2.7.1 PIPE PAINTING

All pipes above ground and in exposed locations shall be painted with one Coat of red oxide primer and two or more coats of synthetic enamel paint of approved shade and quality.

2.7.2 UNDERGROUND PIPE PROTECTION

Pipes and fittings buried underground shall be provided with one layer of corrosion protection tape based on coal tar.

Specifications for protective tape shall conform to IS standards IS : 10221 with 4mm thick.

Pypkote shall be spiral wooded on the pipe with over lap of 15mm

2.8 VALVES

2.8.1 GENERAL REQUIREMENTS

All valves shall carry BIS certification mark and shall be of makes approved by the Project Manager before they are allowed to be used on work.

Gunmetal ball valves and butterfly valves will be used for branch connections in sprinkler and hydrant line and as directed by the Project Manager.

Butterfly valves will also be used on suction & delivery of pumps, connection to water tanks and such other locations or as directed by the Project Manager.

2.8.2 GUNMETAL VALVES / BALL VALVES

Valves 50mm dia & below shall be heavy gunmetal ball valves conforming to with female screwed ends and operating levers. Valves shall be of approved make.

2.8.3 BUTTERFLY VALVES

Butterfly valves shall be cast iron body conforming to relevant BS / IS specification with following details:

Disc shall be SG iron to BS 2789, Gr 420/12 with nylon coating

The shaft shall be AISI 410 with PTFE coated.

The seat shall be drip tight constructed by bonding resilient elastomers Black nitrile / EPDM

2.8.4 NON – RETURN VALVES

Non-return valves will be used at locations to allow flow only in one direction and prevent flow in the opposite direction.

NRVs shall be as per API 6D, SGI body with EPDM or Nitrile seat.

2.8.5 AIR RELEASE VALVES

Air release valves shall be provided at suitable points in the piping system to enable expelling entrapped air when filling or allowing intake of air when emptying the system. Air release valves shall be installed at locations approved by the Project Manager.

Air release valve shall be 25mm dia, screwed inlet, cast iron or gunmetal, single acting or spring loaded for pipelines up to 200mm dia.

2.8.6 DRAIN VALVES

Provide drain valves at low points and other location in the system to enable draining out of the entire or a part of the systems for repairs and maintenance.

Drain valves shall be of size shown on the drawings and shall be discharged over a drain with an air-gap of at least 50mm by means of a pipeline. No system drain shall be connected directly to a manhole or underground drain out of sight. Pipes for drains shall be of the same specifications as those used for the main pipelines.

2.9 PRESSURE GAUGE

Pressure gauge shall be gunmetal bourden type with gunmetal isolation cock and copper „U‟ tube, taping and connecting pipe and nipple. The gauge shall be installed at appropriate level and height for easy reading.

2.10 INTERNAL HYDRANT (LANDING VALVE)

The assembly of the internal hydrants shall be one or two single headed hydrant valves conforming to IS:5290. Hydrant valves shall be mounted on 80 or 100 mm dia branch outlet pipes. The branch outlet will have flanged or welded connection in which the orifice flanges will be inserted. A 25mm connection to the hose reel to be provided.

Instantaneous outlets for fire hydrants shall conform to IS:903 of standard pattern approved and suitable for fire brigade hoses.

2.11 FIRE BRIGADE CONNECTIONS

Fire brigade connection are provided to enable the local fire brigade to pump water into the system with the help of its own pumps to meet emergencies due to the failure of the captive system of the project. It also enables to pump water from other sources into the Owner’s fire reserve tank for extended operation.

2.12 FIRE HOSE

Each internal and external fire hydrant shall be provided with requisite number of fire

hoses as specified below.
Fire hoses shall be 15m long, reinforced rubberised, fabric lined conforming to IS:636 type A with a pair of gunmetal (one male and one female) instantaneous type coupling conforming to IS:903. The coupling shall be machine wound to the fire hose with GI wire.

2.13 BRANCH PIPE, NOZZLE & FIRE AXE

Branch pipe and nozzle shall be of gunmetal with 63mm inlet conforming to IS:903 with a 16mm dia outlet nozzle.
Steel fireman‟s axe with insulated handle.

2.14 FIRST AID HOSE REELS

Each fire hydrant station shall be provided with a first aid hose reel conforming to IS:884. Each hose reel shall consist of the reel, stop valve, hose reel tubing, hose guide, fixing brackets and nozzle. All the components of the hose reel shall conform to relevant Indian Standards.

2.15 FIRE HOSE CABINETS

Fire hose cabinets (FHC) for fire hydrant stations and for external fire hydrant shall be as per the local fire codes. Hose cabinets shall be fabricated from MS sections and 16 gauge MS sheet of fully welded construction. Sizes of the FHC shall be as given in the Schedule Of Quantities.
The FHC will be painted with synthetic enamel paint of approved colour onther inside surface. The outer surface in contact with masonry shall be painted with primer and finish with two coats of enamel paint of fire red colour.
The FHC will be provided with steel panel door. The design of the door shall be as per Architect‟s design and as directed by the Project Manager.
The FHC will have the legend “FIRE HOSE” painted prominently.

2.16 FIRE HYDRANT STATIONS

Each fire hydrant station shall be located in a fire hose cabinet of size mentioned in the Schedule Of Quantities. Each station shall contain:
Single one or two landing valves, assembly with outlet, orifice flanged connection, pressure gauge and accessories.
Required lengths of 15m long RRL hoses with male and female couplings,branch pipe and nozzle properly mounted in the fire hose cabinet.

Fire hose reel with rubber hose and nozzle.
Fireman‟s insulated axe
Space for atleast two fire extinguishers.
Electrical signboard with illumination from emergency power supplies on top.

2.17 MEASUREMENT

All items to be measured include:
All equipment and accessories supplied by the manufacturer as a part of the original equipment whether it is described in the tender document or shown on the tender or Contractor’s approved shop drawing or not, if such equipment and accessories are an

essential and inherent part of the system.
Rates quoted deem to include all items described in the schedule of quantities and the specifications read with Contractor's approved shop drawings.

PIPE WORK

Mild steel Galvanized pipes shall be measured per linear meter of the finished length and shall include all fittings, flanges, welding, jointing, clamps for fixing to walls or hangers, anchor fasteners and testing complete in all respects.

PIPE COATING

Coating of external pipe for pipe protection shall be measured as per the measurement of the pipe mentioned in the para above.

PIPE SUPPORTS

All fabricated structural pipe support systems shall be measured per Kg. weight and shall include painting and fixing.

VALVES ETC.

Gunmetal, cast iron sluice valves, butterfly valves, check valves, air valves, pressure gauges, vibration eliminators, suction strainers etc. shall be measured by numbers.

FIRE EQUIPMENT

Fire hydrant, hose reels, fire brigade connections, fire axe, RRL hoses with couplings shall be measured by number. Orifice flanges shall be considered as a part of landing valve and no separate payment for the same shall be admissible.

FIRE CABINETS

Fire hose boxes specified shall be measured by number.

SECTION VI:

2.18 FIRE PUMPS & ALLIED EQUIPMENT

2.18.1 SCOPE OF WORK

Work under this section consists of furnishing all labour, materials, equipment and appliances necessary and required to supply install and commission the fire pumps and accessories as described hereinafter and given in the Schedule of Quantities.
Without restricting to the generally of the foregoing, the pumps and ancillary equipment shall include the following:
Electrically operated Booster pump with motor, base plates and accessories.
Pressure gauges with isolation valves and piping bleed and block valves.
M.S Galvanized pipes, valves, suction strainers, suction and delivery headers and accessories.

Foundations and foundation bolts.

GENERAL REQUIREMENTS

Pumps shall be installed true to level on suitable concrete foundations. Base plate shall be firmly fixed by foundation bolts properly grouted in the concrete foundations.

Pumps and motors shall be truly aligned by suitable instruments.

All pump connections, shall be standard flanged type with appropriate number of bolts. In case of nonstandard flanges companion flanges shall be provided with the pumps.

Manufacturer's instructions regarding installation connections and commissioning shall be followed with respect to all pumps and accessories.

Each pump shall be provided with a 100 mm dia. pressure gauge, isolation cock and connecting piping, bleed and block valve.

2.18.2 FIRE AND BOOSTE PUMPS

Pumping sets shall be single stage horizontal centrifugal single outlet with cast iron body and bronze / Stainless steel dynamically balanced impellers. Connecting shaft shall be stainless steel with bronze / SS sleeve and grease lubricated bearings.
Pumps shall be provided with approved type of mechanical seals /Gland packing.

2.18.3 MOTORS FOR ELECTRIC DRIVEN PUMPS

Electrically driven pumps shall be provided with totally enclosed fan cooled induction motors. For fire pumps, the motors should be rated not to draw starting current more than 3 times normal running current.
Motors for fire protection pumps shall be designed for continuous full load duty and shall be design proven in similar service.
Motors shall be suitable for 415 volts, 3 Phase,50 cycles A.C supply and shall be designed for 33o C ambient temperature. Motors shall conform to IS: 325.
Motors shall be designed for auto start system.
Motors shall be capable of handling the required starting torque of the pumps. Contractor shall provide heating arrangements for the main fire pump motorto ensure that motor windings shall remain dry.

2.18.4 CABLES TRAYS

Contractor shall provide M.S. slotted cables trays at locations as shown on the drawings and of sizes as given in the Schedule of Quantities.
Cable trays shall be supported from the bottom of the slab at intervals of 60 cms at both ends
Cost of clips, bolts, nuts, supports rods and any other materials required to fix the trays in proper manner shall be included in the rate for trays.
Cables trays shall be of approved makes.

2.18.5 EARTHING

All equipment installed by the Contractor shall be suitably earthed by making proper

connection by means of G.I. wires to the main earthing system laid by the electrical Contractors.

2.18.6 MOTOR CONTROL CENTRE

Switchboard cubicles of approved type shall be fabricated from 14 gauge M.S. sheet with dust and vermin proof construction. It shall be painted with stove enameled paint of approved make and shade. It shall be fitted with suitable etched plastic identification plates for each motor. The cubicle shall comprise of the following:
Incoming main switch fuse unit of required capacity.
Isolation switch fuse unit, one for each motor.
Fully automatic DOL/Star Delta starters suitable for motor H.P. with push buttons; one for each motor and on/off indicating neon lamps.
Single phasing preventer of appropriate rating for each motor.
Panel type ampere meters; one for each motor.
Panel type voltmeter on incoming main with rotary selector switch to read voltage between phase to neutral and phase to phase.
Neon phase indicating lamps on the incoming main.
Rotary switch for manual or auto operation for each pump.
All switch gears and accessories shall be of approved make.
Switchboard cubicles shall be floor or wall mounted type as recommended by manufacturers.

2.18.7 **MEASUREMENTS**

Fire pumps shall be measured by numbers and shall include all items as given in the specifications and schedule of quantities.
Earthling station, sluice valve, non return valves, vibration eliminators and suction strainer shall be measured by numbers and shall include all items as given in the Schedule of Quantities and Specifications.
Pump headers, power cables, earth wire and tape, slotted cable trays shall be measured per linear meter and shall include all items given in the specifications and Schedule of Quantities.

MODEL RULES FOR THE PROTECTION OF HEALTH AND SANITARY ARRANGEMENTS OR WORKERS

1.0 APPLICATION:

These rules shall apply to all Construction of National Law University Campus Works in charge of the Proposed University Campus at Naraj, Cuttack for National Law University ORISSA .

2.0 DEFINITION:

a. Work place means a place at which, at an average 50 workers are employed in connection with construction work.

b. Large work place means a place at which an average 500 or more workers are employed in connection with the construction work.

3.0 FIRST AID.

a. At every work place, there shall be maintained in readily accessible place first aid appliance including an adequate supply of sterilized dressings and sterilized cotton wool. The appliance shall be kept in good order and in large work place they shall be placed under the charge of a responsible a person who shall be readily available during working hours.

b. At large work place, where hospital facilities are not available within easy distance of the works, first aid posts shall be established and run by trained compound.

c. Where large work place are remote from regular hospitals an indoor ward shall be provided with one bed for every 250 employees.

d. Where large work place are situated in cities, towns in their suburbs and no beds are considered necessary owing to the proximity of city or town hospitals, suitable transport shall be provided to facility removal of urgent cases to the hospitals. At other works places, some conveyance facilities such as a car, shall be kept readily available to take inquired person or persons suddenly taken to the nearest hospital.

4.0 DRINKING WATER :

a. In every place there shall be provided & maintained at suitable places easily accessible to labour, sufficient supply of cold water fit for drinking.

b. where drinking water is obtained from an intermittent public water supply, which work place shall be provided with storage where such drinking water shall be stored.

c. Every water supply of storage shall be at a distance of not less than 15m from any latrine, drain or other source of pollution. Where water has to be drawn from an existing well which is within the proximity of latrine, drain or any other source of pollution, the well shall be properly chlorinated before water is drawn from it for drinking . All such wells shall be entirely closed in and be provided with trap door which shall be dust and water proof.

d. A reliable pump shall be fitted to each covered well, the trap door shall be kept locked and opened only for cleaning or inspection which shall be done at least once a month

5.0 WASHING AND BATH PLACES.

a. Adequate washing and bathing places shall be provided separately for men and women.

b. Such places shall be kept in clean & drained condition.

6.0 SCALE OF ACCOMODATIONIN LATRINES AND URINALS.

There shall be provided within the precincts of every work place latrines and urinals and an accessible place, and the accommodation, separately for each of them shall not be less than the following scale :

		No of Seats.
a.	Where the number of persons does not exceed 50	2
b.	Where the number of persons does exceed 50 but dose not exceed 100	3
c.	For every additional 10	3 per 100

In particular case the Engineer who have the power to vary the scale where necessary.

7.0 LARTINES AND URINALS FOR WOMEN:

If women are employed separate latrines and urinals screened from those men and marked in the vernacular in conspicuous letters "For Women Only" shall be provided on the scale laid in Rule 6. Those for men shall be similarly marked "For men Only" a poster showing the figure of a man or a woman shall also be exhibited at the entrance of latrines for the " respective sex". There shall be adequate supply of water close to the urinals and latrines.

8.0 LATRINES AND URINALS:

All latrines shall be provided with septic tanks or leach pits in case of small units. All the latrines shall be kept in good sanitary conditions.

9.0 CONSTRUCTION OF LATRINES :

The inside walls shall be constructed of masonry of some suitable heat resisting non-absorbent materials and shall be cement washed inside & outside at lest once a year. The dates of cement washing shall be noted in a register maintained for this purpose and kept available for inspection. Latrines will not be of a standard low than bore hole system and should have thatched roofs.

10.0 DISPOSAL FOR EXCRETA :

Unless otherwise arrange for by the local sanitary authority arrangements for proper disposal of excreta shall be made by septic tank or leach pit duly approved by the engineer and in conformity with the requirements of local public health authorities.

11.0 PROVISIONS OF SHELTER DURING REST :

At every work place there shall be provided free of cost two suitable sheds one for meals and the other for rest separately for men and less than 3.5m from the floor level, to the lowest part of the roof. The sheds should be roofed with at least thatch and mud flooring will be provided with a dwarf wall around not less than 750mm. Sheds should be kept clean and the space should be on the basis of at least 0.05 square meter per head.

12.0 CRECHE :

a. At every work place at which 50 or more women workers are ordinarily employed there shall be provided two huts for the use of children under the age of 6 years belonging to such women one hut shall be used for infants

game and play and the other as their bed room. The hut shall not be constructed on a lower standard than the following :

i) Thatched roofs.
ii) Mud floors and walls.
iii) Planks spread over the mud floor & covered with matting.

The huts shall be provided with suitable and sufficient openings for light and ventilation. There shall be adequate provision of sweepers to keep the place clean. There shall be two daily in attendance. Sanitary utensils shall be provided to the satisfaction of the Health Officer of the area concerned. The use of the hut shall be restricted to children, there attendants and mothers of the children.

b. Where the number of women workers is more than 25 but less than 50 the Contractor shall provide at least one hut and one dia to look after the children of women workers.
c. The size of creche or cheches shall very according to the number of women workers.
d. The creche or creches shall be properly maintained and necessary equipments like toys etc, shall be provided.

13.0 CANTEEN :

A cooked food canteen on a moderate scale shall be provided for the benefit of workers wherever it is considered expedient.

LIST OF MATERIALS OF APPROVED BRAND AND / OR MANUFACTURERS

SL.NO.	DESCRIPTION	MAKES
1.	CEMENT	ULTRATECH / ACC / LAFARZ / KONARK.
2.	STEEL	TISCON / VIZAG / SAIL
3.	BRICK	K.B. BRICK (75 KG/ CM^2)
4.	SAND	SWEET RIVER SAND
5.	METAL	CRUSHER BROKEN GRANITE CHIPS
6.	CHIPS	CRUSHER BROKEN GRANITE CHIPS
7.	WATER PROOF MATERIALS	SIKA, PIDILITE / LATICRETE
8.	CHOWKATH	WELL SEASONED SAL WOOD CHOWKATH
9.	FLUSH DOORS	CENTURY / GREEN PLY / MAYUR GOLD
10.	HARD WARE FITTING	S.S. I.S.I. MARK MAT FINISH
11.	GLASS	MODIGUARD / SAINT GOBIN / AIS FLOAT/ SARAF
12.	C.P.V.C. PIPE & FITTINGS	KITEC/AJAY / ASTRA / FINOLEX/SUPREME
13.	P.V.C. SEWERAGE PIPE 6 KG / CM^2	KITEC /SUPREME / PRINCE / FINOLEX
14.	G.I. PIPE	TATA HEAVY MEDIUM / JINDAL HISSAR - B CLASS
15.	ALL SANITARY FITTINGS	PARRYWARE / HINDWARE / ROCA / KHOLER/TITA
16.	HARDWARE / LOCKING SYSTEM	GODREJ / HURRSSION /DORMA/DOORSET
17.	FLOOR SPRING	GODREJ / EVERITE / HARDWYN / DOOR SET/DORMA
18.	SCREW	H.F. BRAND
19.	LEAPING	1^{ST} QUALITY TEAK WOOD
20.	C.C. PAVERS	GICO / CABLE STONES
21.	MARBLE	DUNGURI 2^{ND} QUALITY
22.	STANDRAD MARBLE	AGRIA WHITE/MORWAD WHITE/RAYMOND WHITE
23.	CERAMIC WALL TILE	JOHNSON / KAJARIA / BELL / REGENCY/RAK/VARMORA/BLACK BERRY/SWASTIK
24.	CERAMIC FLOOR TILE	REGENCY / BELL / KAJARIA / CITY TILES / RAK/JOHNSON/SOMANY/ VARMORA/BLACK BERRY/SWASTIK
	ANTISKID FLOOR TILE	REGENCY / BELL / RAK / VARMORA/BLACK BERRY/SWASTIK
25.	ANTISKID WALL TILE	REGENCY / BELL / RAK / VARMORA/BLACK BERRY/SWASTIK
26.	VITRIFIED FLOOR TILE	ASIAN / KAJARIA / REGENT / CITY TILES / RAK/SOMANY/VARMORA/BLACK BERRY/SWASTIK
27.	VITRIFIED WALL TILE	ASIAN / KAJARIA / REGENT / CITY TILES / RAK/SOMANY/VARMORA/BLACK BERRY/SWASTIK

28.	GRANITE	ROYAL BROWN/MILLENIUM/ BROWN/OCEAN BLUE
29.	ENGINEERING MARBLE	AGL/JONSON/EQUIVALENT
30.	ITALIAN MARBLE	BOTTOCHINO/ROYAL BEIGE/ALASKA GREY
31.	ALUMINIUM FRAME	JINDAL / INDAL / OEL
32.	ADHESIVE	FEVICOL / JEEVAN JHOR / CENTURY
33.	ALL G.I. FIXTURES (TEE, BED, ELBOW ETC.)	HEAVY TYPE C.R. MAKE / UNIK MAKE
34.	FULL WAY VALVE	GUN METAL FULL WAY VALVE OF LEADER MAKE / SANT MAKE
35.	ALL H.C.I. PIPES	STANDARD I:S:I MARKED PIPES.
36.	PLASTIC W.C. SHEET	HINDUSTAN / DIPLOMAT/EQUIVALENT
37.	RAIN WATER PIPE 4 KG / CM^2	SUPREME / PRINCE / FINOLEX
38.	PRE-CAST TERRAZO TILE	NITCO / GICO / R.K. CEMENT BONDED TILE/ULTRA/EUROCON
39.	PORTICO TILES	EUROCON / MULTIWYN / ULTRA
40.	ALL C.P. FITTINGS	JAQUAR / MARC / CRABTREE / KOHLER / ESSESS
41.	FASTNER	HILTI / FISHER/EQUIVALENT
42.	ACRYLIC EMULSION PAINTS	ICI DULUX / BERGER / NEROLAC / ASIAN
43.	PUTTY	BIRLLA / ASIAN / JK
44.	EXTERIOR EMULSION PAINT	ICI DULUX / BERGER / ASIAN/NEROLAC
45.	WEATHER COAT PAINT	ICI DULUX / BERGER / ASIAN/ NEROLAC
46.	ENAMEL PAINT	ICI DULUX / BERGER / ASIAN/ NEROLAC
48.	VENEER	CENTURY / GREEN / AUSTIN/STYLIVE
49	LAMINATE	CENTURY MICA / GREEN / MERINO / AUSTIN/ASIS
50.	B.W.R. BLOCK BOARD 19 MM THICK CONFIRMING TO IS : 1659 / 90	CENTURY / GREEN / MAYUR GOLD / AUSTIN
51.	B.W.R. P.F. PLY 9 MM / 12 MM THICK CONFIRMING TO IS : 303 / 1989	CENTURY / GREEN / MAYUR GOLD
52.	U.P.V.C WINDOW FRAME	DURO PLAST / FINESTA/ STYLIVE
53	S.S.RAIL	OZONE/KICH/DQUNAX
54	WPC	STYLIVE/ALSTONE

Note: MAKE OF THE MATERIAL MAY CHANGE AS PER THE AVAILABILITY OF THE MARKET. THE MAKE SHALL BE APPROVED BY PMC/NLUO BEFORE PROCURING THE SAME.

ALL APPROVED MAKES SHALL BE ISI MARKED

LIST OF APPROVED MATERIALS

The contractor shall use materials in their works subject to inspection prior to dispatch, by owner or his authorized representative of any materials, as deemed necessary in accordance with the following list, all materials not otherwise specified shall be in accordance with the latest Indian Standard Specification, where such exists and prior approval of Owner / Architects. The contractor shall be bound to offer sample of materials. Which are claimed to be conforming to I.S. specifications, for testing at an approved Test Laboratory.

Contractor shall purchase all materials from the makers or their authorized stockists only. Necessary documentary evidences must be produced to the Owner or their authorized representative on demand. Contractor shall be bound to supply items of any make of the items as per the choice of the Owner / Architect.

1. Acceptable Materials List (Internal)

1.1 Conduits - P.V.C.

a) Make : ISI Marked.
b) Accessories : Same make as that of conduit.

1.2 Wiring Cables - PVC Insulated Copper

a) Make : Finolex./ Havell's / Polycab/RR Kable

b) Voltage Grade : 1100 Volts & as per IS 694 / 1990

1.3 Distribution Boards

a) Make : Schneider (protect) / Legrand (Mosic)/ Crabtree

b) Make of MCB's : Schneider (Protect) / Legrand / Havell's /

1.4 Wiring Accessories

a) 5A / 15A switches sockets, antenna sockets & telephone sockets : Schneider (Clipsal - Opale) / Legrand / Havell's / Crabtree (Athena)

b) Ceiling roses / Angle holders : Cona / Anchor

c) Switch plates / Covers : Schneider (Clipsal - Opale) / Legrand / Havell's / Crabtree (Athena)

(d) Switch box : Schneider (Clipsal-Opale) / Legrand / Havell's

1.5 Fitting & Fixtures :

a)	Light fittings	:	Philips/ Havell's /Goldwyn/Decolux/VIN/ G-ON /Bajaj/Hybac/Stylive.
b)	Bulb	:	Philips / Bajaj / CG Orpat
c)	Fan	:	Crompton Greaves / Bajaj / USHA
d)	Exhaust fan	:	Crompton Greaves / GE / Almonard

1.6 Telephone Wiring :

a)	Telephone Cable	:	Finolex / Havell's / Delton
b)	Tag Block	:	Finolex

1.7 Conduit Pipe : ISI Mark

Note : All approved makes shall be ISI Marked.

LIST OF APPROVED MATERIALS/FIRE FIGHTING AGENCY

The contractor shall use materials in their works subject to inspection prior to dispatch, by owner or his authorized representative of any materials, as deemed necessary in accordance with the following list, all materials not otherwise specified shall be in accordance with the latest Indian Standard Specification or equivalent , where such exists and prior approval of NLUO / PMC. The contractor shall be bound to offer sample of materials. Which are claimed to be conforming to I.S. specifications, for testing at an approved Test Laboratory.

FIRE FIGHTING EXECUTING AGENCY : CEASEFIRE / TYCO / MX SYSTEM INTERNATIONAL (P) LTD

The executing agency should have their office and necessary infrastructure in the state of Orissa, at least for a minimum period of 10 years or above with all necessary statutory registrations. The Technicians (Welders, Fitters & Electrical) being deployed in the project must be trained, skillful, experienced with necessary proof / certifications and must be employed by the company directly on their payrolls with necessary statutory requirements like ESIC, PF and insurance

APPROVED MAKE LIST OF FIRE PUMP ROOM EQUIPMENTS SYSTEM

Electric motor driven booster pump	:	Kirloskar/ Equivalent
Battery	:	Exide / Amco
MCC panel	:	Venus / Load Controls
Power and Control Cable	:	Polycab / Finolex / Equivalent
Cable Tray	:	Profab / Paifab
Pipe	:	Jindal / Tata / Equivalent
Gate Valve	:	Kartar / H.Sarker/Equivalent

Non Return Valve	:	Intervalve / H.Sarker / Equivalent
Butterfly Valve	:	Intervalve /H. Sarker / Equivalent
Ball Valve	:	Zoloto / Leader / Neta / Equivalent
Pressure Switch	:	Indfos / Danfoss / Equivalent
Pressure Gauge	:	H.Guru / Fiebig
Anti Corrosive Material	:	IWL
Fire Brigade Inlet	:	Newage / Winco
Hydrant Valve	:	Newage / Winco
RRL Hose	:	Newage/ EverSafe
Brach pipe	:	Newage / Winco
Hose Reel Drum	:	Newage/ EverSafe
Hose Cabinet / Fire Duct Shutter	:	Fabricated
Air Release Valve	:	Elems / Leader
RCC Hume Pipe	:	Indian Hume Pipes
Paint	:	Asian Paint / Berger
Welding Rod	:	Esab
Fastener	:	Hitech / Hilti

EQUIPMENT SCHEDULE AND LIST OF ACCEPTABLE MATERIALS MEDIUM VOLTAGE SWITCHES GEAR AND TRANSFORMER

1. List of Acceptable Materials

1.1. The following makes of equipment / materials shall be acceptable under this contract.

(A) Medium Voltage Switch-gear

i) Air circuit breakers	:	Larasen & Toubro / Schneider
ii) Switch-fuse units	:	Larsen & Toubro / G.E. / SCHNEIDER / SIEMENS
iii) HRC fuses	:	G.E. / Larsen & Toubro / SIEMENS / Schneider
iv) Change over switch	:	Schneider / Larsen & Toubro / G.E.
v) M.C.C.B.	:	Larsen & Toubro / Schneider / G.E.

(B) Cables

i) H.T. Cable	:	ICC / CCI Gloster / Nicco / Universal / Torrent / INCAB / RPG
ii) L.T. Cable	:	ICC / CCI / Gloster / NICCO / Universal / Torrent / Havells / INCAB / RPG

(C) Meters & Indicators

i) Ammeter / Voltmeter /

P.F. Meters : AEP / UE / IMP / Automatic Elect.

ii) Kwh Meter : REMCO / GEC / SEMS / HPL / ALTHOM / SECURE

iii) Frequency Meter : AEP / NIPPON / UE

iv) Indicating Lamps : Siemens / Larsen & Toubro / Binay / Concord.

(D) Instrument Transformers

i) H.T. Current Transformers : VE / EMS / KAPPA / AUTOMATIC ELECTRIC.

ii) H.T. Potential Transformers : Jyothi / VE / ESM.

iii) D.T. Current Transformers : ANP / KAPPA / ESM.

iv) Selector Switches : Larsen & Toubro / Kaycee / Thakoor.

(E) Relays

i) Over current and earth fault relay : AREVA / Siemens / Larsen & Toubro.

ii) Power factor correction relay : NIPPO / MSIL / AVMACO / Siemens.

iii) AX relay : AREVA / ABB

(F) Miscellaneous

i) Cable gland : APT / ELECTROMAG

ii) Lugs : Dowels.

iii) Connectors : Indian Engineering Company / ELMEC / Schneider

iv) Capacitors : Khatau Junker / Voltas / BSES / MSIL / Powercap / Crompton Greaves.

v) Contactors : Larsen & Toubro / Siemens / BCH / Schneider

vi) Starters : Larsen & Toubro / Siemens / BCH

(G) POLE

i) J.K. poles co.

ii) Electro poles products Pvt. Ltd.

iii) Trupti Electrical

iv) Caspian Energy corporation Pvt. Ltd.

v) Bajaj Electrical

(H) 7FT. HIGHT POLE

i) light pole - SS Pole(304)

N.B.: All material to be used should be of standard / make / specification as specified in the Tender and only after approval of the Concerned Consultant/ NLUO.

Note: All approved makes shall be ISI Marked

LIST OF APPROVED MAKES OF MATERIALS FOR PLUMBING / SANITARY / DRAINAGE

S. No. Details of Materials / Equipments		Manufacturer's Name
1.Vitreous China Sanitary ware	:	Hindustan / Parry ware / ROCA/Koehler
2.C.P. Brass fittings	:	Jaguar(continental range)/ Marc Crabtree/ ROCA/Koehler
3. Manhole	:	App equal & ISI marked.
4.R.C.C pipe	:	App. Equivalent ISI marked
5. Gully traps	:	Perfect Potteries / Approved equal ISI marked
6. G.M. / Forged brass valves	:	Zoloto / Leader
7 .Check valve/Butterfly valve	:	SKS / C & R / Advance
8 .Paints	:	Asian Paints /Berger/Nerolac
9. Pressure Gauge	:	H Guru / Approved Equal ISI marked
10. Pumps	:	Kirloskar / Crompton/ Grundfos
11. UPVC Pipes	:	Supreme / Prince/Finolex
12. S. S. Sink	:	Neelkanth / Jayana/ Nerali
13. Fire Fighting Equipment	:	Minimax / Newage
14. CPVC Pipes	:	Astral flowgard / HIF Poly/Oriplast / Ashirvad flowgard/Supreme
15. G.I Pipes	:	Jindal / Tata

Note : All approved makes shall be ISI Marked

LIST OF APPROVED MAKES/BRANDS OF VARIOUS MATERIALS.

The materials to be used should be form the following list of approved makes/brands or of equivalent quality as approved. Any other make/brand of a materials will also be allowed to be used if approved by consultant.

1. FERRULES
   A) LEADER B) JCSWR C) ACB D) NETA E) NEW F) HIMSON G) HVI

2. WATER METER
   A) CAPSTAN B) RAWCO C) DAS MASS

3. GATE VALVE & GLOBE VALVES
   A) LEADER B) LUSTER C) KIRTI D) SANT

4. BALL COCKS
   A) KINGSTON B) ARK C) LUSTER

5. POLYTHIENE FLOATS
   A) COMMANDER CHAMPION B) COMMANDER-WATER BIRD
   C) CMCOS BSJ. D) PEACOCK

6. MIRRORS
   A) GOLDEN FISH B) SWAN

7. POLYTHIENE OVERFLOW PIPES
   A) EMCO B) PEACOCK

8. CEMENT CONCRETE PIPES
   A) INDIAN HUME PIPES CO. B) M.M. METAL & CO.

9. WATER PROFING COMPOUND FOR INTEGRAL CEMENT BASED WATER PROOFING
   A) IMPERUM-(2% BY WT. BY CEMENT) M/S SNOCEM INDIA LTD.,
   B) CICI-(3% BY WT. OF CEMENT) M/S STRUCTURAL WATER PROOFING COL, C) CHOCKSEY.